ALABAMA HYDRO
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COOSA / WARRIOR RELICENSING PROJECT

INITIAL INFORMATION PACKAGE

for the

LOGAN MARTIN DEVELOPMENT

FERC No. 2146

Kleinschmidt
Energy & Water Resource Consultants

ALABAMA POWER
A SOUTHERN COMPANY

COOSA AND WARRIOR RIVER RELICENSING:

COOSA RIVER PROJECT – FERC NO. 2146
MITCHELL PROJECT – FERC NO. 82
JORDAN PROJECT – FERC NO. 618
WARRIOR RIVER PROJECTS – FERC NO. 2165

LOGAN MARTIN DEVELOPMENT

INITIAL INFORMATION PACKAGE

November 2000

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COOSA RIVER PROJECT (FERC NO. 2146)

LOGAN MARTIN DEVELOPMENT

Initial Information Package

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ACRONYMS

ACC	-	Alabama Control Center
ACOE	-	Army Corp of Engineers
ACF	-	Apalachicola-Chattahoochee-Flint
ACT	-	Alabama-Coosa-Tallapoosa
ADCNR	-	Alabama Department of Conservation and Natural Resources
ADEM	-	Alabama Department of Environmental Management
AL	-	Alabama
ALP	-	Alternative Licensing Procedures
APC	-	Alabama Power Company
APCA	-	Alabama Power Cooperative Approach
APEA	-	Applicant Prepared Environmental Assessment
B.A.I.T.	-	Bass Anglers Information Team
BOD		Biological Oxygen Demand
C	-	Celsius
cfs	-	cubic feet per second
CPE	-	catch per unit effort
CPH	-	catch per hour
DO	-	dissolved oxygen
EA	-	Environmental Assessment
EAP	-	Emergency Action Plan
ECPA	-	Electric Consumers Protection Act
EIS	-	Environmental Impact Statement
EMA	-	Emergency Action Agencies
EPAct	-	Energy Policy Act
F	-	Fahrenheit
FAD	-	fish accumulator device
FPA	-	Federal Power Act
FPC	-	Federal Power Commission (predecessor of FERC)
FERC	-	Federal Energy Regulatory Commission
ft	-	feet or foot
HPH	-	harvest per hour
IIP	-	Initial Information Package
kW	-	Kilowatt
mgd	-	millions of gallons per day
msl	-	mean sea level
MW	-	Megawatt
NEPA	-	National Environmental Policy Act
NGOs	-	non-government organizations
NMFS	-	National Marine Fisheries Service
NPDES	-	National Pollutant Discharge Elimination System
NHPA	-	National Historic Preservation Act
NRHP	-	National Register of Historic Places
NWI	-	National Wetlands Inventory
PM&E	-	Protection, mitigation and enhancement
PMF	-	Probable Maximum Flood
SHPO	-	State Historic Preservation Officer
USDA	-	United States Department of Agriculture
USFS	-	United States Forest Service
USFWS	-	United States Fish and Wildlife Service
WMA	-	Wildlife Management Area

1.0 INTRODUCTION

1.1 Background

Alabama Power Company (APC) operates ten hydroelectric developments on the Coosa and Warrior Rivers, Alabama, under five licenses issued by the Federal Energy Regulatory Commission (FERC). Four licenses are the subject of this document and this relicensing process including: the Coosa River Project (FERC No. 2146), located on the Coosa River, which includes the Weiss, Neely Henry, Logan Martin, Lay and Bouldin developments; the Mitchell (FERC No. 82) and Jordan (FERC No. 618) Projects on the Coosa River; and the Warrior River Project (FERC No. 2165), located on the Warrior River, which includes the Smith and Bankhead[1] developments. Throughout this document, these hydro developments will be collectively referred to as "Projects". The Holt Project (FERC No. 2203) located downstream of Bankhead and near the City of Tuscaloosa, Alabama, expires on August 31, 2015, and is not included in this relicensing. These Projects represent 1,164 megawatts (MW) of APC's total hydroelectric capacity of 1,620 MW.

The operating licenses for the Projects expire in 2007. In order for APC to continue operating the Projects, APC must obtain new operating licenses from FERC. Obtaining new operating licenses requires APC to complete a multi-year application process and file license applications with FERC by July 31, 2005. This process is called relicensing.

Successfully completing the relicensing process will involve identifying and resolving project issues in consultation with the many federal and state resource agencies, local and national non-governmental organizations (NGOs), home and boat owner

[1] The FERC license for Bankhead includes the powerhouse only. The dam and reservoir are owned and operated by the U.S. Army Corp of Engineers.

associations, and individuals that have an interest in the Projects. These entities and individuals are commonly referred to as “stakeholders”.

To encourage the participation of stakeholders, APC has developed a unique relicensing method called the Alabama Power Cooperative Approach (APCA). The APCA promotes and facilitates active participation of stakeholders in the process with the goal of resolving resource issues at the local level and presenting those resolved issues to FERC in a license application. The APCA will be used for all developments on both the Coosa and Warrior Rivers.

One of the first steps in this relicensing process is to provide stakeholders with information about the Projects. These Initial Information Packages (IIP) describe the relicensing process, the general Project areas, the hydro developments and how they operate and the environmental resources at each of the Projects. There are seven IIPs covering the nine developments:

- one IIP for the Warrior River Project (Smith and Bankhead developments) and
- six site-specific IIPs for the Coosa developments (Weiss, Neely Henry, Logan Martin, Lay, Mitchell, and Bouldin/Jordan), which also contain general information about the Coosa River and basin resources.

More information on the regulatory framework, the relicensing process, and the APCA is discussed in Section 1.3.

1.2 Navigating Through this Document

Compiling the information for all these Projects was no simple task but APC wants to ensure that finding the information is easy. In addition to a Table of Contents, there are a couple of “hints” in helping you locate specific information in which you might be interested. First, like most governmental processes, hydroelectric relicensing contains many acronyms and technical terms with which you might not be familiar. A list of acronyms follows the Table of Contents and a glossary is located in Appendix A.

Second, tables are found in Appendix C. Figures are found at the end of each section. A list of tables and figures and their corresponding page numbers are presented in the Table of Contents.

To assist in finding technical information in these documents, refer to the list provided below.

- Section 1 – The Regulatory Framework (describes the relicensing process, how to get involved, and summarizes how a hydro project works)
- Section 2 – Project Information (describes the project features, project history and resource allocation)
- Section 3 – Project Operations and Management (describes streamflow information, how the projects are operated, and safety programs)
- Section 4 – Environmental Resources (describes the environmental resources of the developments)
- Section 5 – Environmental Programs and Activities (describes the existing environmental plans and programs sponsored or participated in by APC)
- Section 6 – Preliminary Issues (describes on-going studies and preliminary issues identified as part of the relicensing process)
- Section 7 – Literature Cited
- Appendices A through E – glossary, letter requesting the use of FERC's Alternative Licensing Process, tables, water quality data, and additional information and references for the Coosa River Basin

There will be many opportunities to participate in this relicensing process. Per FERC regulations, APC invites comments on this IIP. Written comments should be clearly identified as **"Comments on the Coosa-Warrior IIPs"** and should include the name, address, and affiliation (if any) on the comment letter as well as the particular development(s) on which you are commenting. Please forward all written comments by **January 17, 2001** to:

R. M. Akridge - Manager, APC Hydro Licensing
Alabama Power Company
600 North 18th Street
P.O. Box 2641
Birmingham, AL 35291-8180

1.3 Regulatory Framework

Most non-federal hydroelectric projects in the United States are operated under licenses issued by FERC. The Federal Power Act (FPA) gives FERC the exclusive authority to issue licenses to construct, operate, and maintain certain non-federal hydropower projects. The Coosa River Project (No. 2146) was licensed in 1957, Mitchell (No. 82) and the Warrior River Projects (No. 2165) were licensed in 1975, and the Jordan Project (FERC No. 618) was licensed in 1980. The licenses for the Coosa River Project, Mitchell and Jordan Projects expire on July 31, 2007 (Coosa developments) and the Warrior River Project's license expires on August 31, 2007. The Mitchell and Jordan developments on the Coosa River have been through the relicensing process during the 1970's and 1980's.

FERC must give equal consideration to power and non-power values when deciding how projects should be operated during the new license term, which is typically a period of 30 to 50 years. Non-power values include fish and wildlife, terrestrial resources, cultural resources, aesthetic and scenic resources, recreation, energy conservation, flood control, water use and quality and other environmental aspects.

Before FERC issues a new operating license, it must first complete an environmental review of the project pursuant to the National Environmental Policy Act of 1969 (NEPA). NEPA requires that FERC examine the Projects' effects on the physical and human aspects of the environment and identify and analyze the various project alternatives and associated effects.

1.4 FERC's Relicensing Process

Alternative Licensing Procedures

The FPA requires that a licensee seeking to renew an operating license must submit an application to FERC two years prior to the expiration of the existing license. APC will submit two license applications—one for the developments on the Coosa River and one for the Warrior River developments—on or before July 31, 2005. Developing those license applications occurs during the relicensing process.

FERC provides a licensee with two process options for relicensing: Traditional Three Stage Consultation (outlined in 18 CFR§16.8) or Alternative Licensing Procedures (outlined in 18 CFR§4.34(i)). Both processes require consultation with resource agencies and the public followed by submittal of a license application to FERC, although the degree to which a licensee consults varies greatly in each of the processes.

The Traditional Three-Stage Consultation process involves consulting with resource agencies and the public regarding studies and study results. The licensee compiles the study results in a draft license application that is distributed for public review. The licensee receives comments and develops a final license application for filing with FERC. Once FERC has the license application, they review the application to make sure all requirements and regulations have been met and then begin the public scoping process, pursuant to NEPA. The scoping process helps identify issues and reasonable alternatives and determines if additional studies or other information are needed. Typically, it takes an average of two to five years for FERC to issue a licensing decision when using the Traditional Three Stage Consultation process; however, it can take much longer.

In October 1997, FERC issued new rules that provide hydro licensees with an option to relicense their project using regulations commonly known as "Alternative

Licensing Procedures (ALP)." The ALP allows licensees to "customize" the relicensing process by combining the consultation, study and environmental review processes. Instead of waiting until the licensee files it's license application, the environmental review required by NEPA and other federal and state statutory reviews is conducted before the licensee files the application with FERC, which is much earlier in the relicensing process compared to the Traditional Three Stage process.

The ALP also allows licensees to develop an applicant prepared environmental assessment (APEA) to file with the license application in lieu of the Environmental Report (License Exhibit E), which is required in the Traditional Three Stage consultation process. The Exhibit E report summarizes the existing environment, the environmental studies, and the licensee's proposed environmental protection, mitigation, and enhancement (PM&E) measures. The Exhibit E also includes agency and other stakeholders' proposed PM&E measures, but does not typically include an analysis of these measures or a cumulative effects analysis. The APEA analyzes how the proposed operation and the proposed PM&Es will effect the project's environmental and economic resources and reasonable operating alternatives and then recommends an alternative project operation and management plan that best balances power and non-power values. Scoping, an activity that FERC typically conducts once the application is filed, will be conducted early in the ALP relicensing process.

Since the responsibility of the environmental review pursuant to NEPA ultimately rests with FERC, FERC conducts an independent evaluation once the APEA is filed. FERC will then issue its own NEPA document, which is either an Environmental Assessment (EA) or Environmental Impact Statement (EIS). EA and EIS documents produced by FERC's Office of Energy Projects are very similar in their content, but the outline and presentation of information may vary slightly. The NEPA process at FERC, whether an EA or EIS document is produced, is the same: public scoping, thorough environmental and economic analysis, including cumulative effects, and public comment on the draft NEPA documents. There is an additional comment period on a final EIS but not on the final EA.

The ALP is designed to help licensees and stakeholders identify issues early and attempt to resolve them at the local level, *i.e.*, "local issues, local solutions." The process encourages settlement agreements but must have stakeholders that are willing to work cooperatively with the licensee and each other to meet reasonable goals.

APC must file a request with FERC to use ALPs. Along with its request, APC must convey to FERC that there is general consensus among stakeholders that the ALP should be used on the Coosa-Warrior relicensing. APC must also submit a communications protocol, which describes how participants in the relicensing process will document their communications. APC has worked with stakeholders to gain a consensus regarding the APCA, and has filed its request to use ALPs on September 22, 2000 (Appendix B).

1.5 The Alabama Power Cooperative Approach (APCA)

APC believes there are five critical elements for a successful relicensing.

Elements for a Successful Relicensing

- ***Excellent Communication among APC & Stakeholders***
- ***Public Involvement***
- ***Continual Education Process***
- ***Commitment among APC & Stakeholders***
- ***Issue Resolution***

In developing a relicensing process that would achieve these elements, APC listed the following major challenges to relicensing the Projects:

- Managing the logistics and complexities of the Projects;
- Accommodating the numerous stakeholders that will want to be involved;
- Balancing competing interests of APC and stakeholders;

- Focusing on identifying and resolving resource issues;
- Coordinating state and federal statutory requirements in the relicensing process;
- Administrative planning (meeting dates, times and locations); and
- Limited resources, including time.

Having listed the challenges and the critical elements that would make a successful relicensing process, APC developed a relicensing process specific to the Projects. This resulted in the APCA.

The APCA involves stakeholders throughout the process and includes early implementation of the NEPA process. The APCA promotes and facilitates early identification of issues and targets the eventual resolution of those issues. The APCA will be used on all Projects and will result in one license application and APEA for each river system (Coosa and Warrior).

The key elements of the APCA are 1) educating stakeholders through outreach activities; 2) using an ALP and communication plan; 3) sharing project information through the IIPs; 4) hosting Issue Identification Workshops; 5) forming Resource Advisory Teams and Cooperative Relicensing Teams; 6) conducting NEPA Scoping and applicable studies; 7) negotiating to resolve Project issues; and 8) filing two license applications and APEAs with FERC by July 31, 2005. Figure 1.5-1 shows a timeline with the major milestones of the APCA.

APC has been identifying stakeholders and educating them about the process since January 2000. APC has prepared and is issuing the IIPs as another step in educating and preparing stakeholders for upcoming events. In November and December 2000, APC will host "Issue Identification Workshops" in three locations on the Coosa and Warrior Rivers.[2] The goal of these workshops is to bring the stakeholders together

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[2] Issue Identification Workshops will be held in Jasper, Gadsden, and Montgomery, Alabama.

and to further identify Project issues and existing information. These workshops will be the foundation for the subsequent NEPA scoping and the development of Resource Advisory Teams and Cooperative Relicensing Teams.

Following the workshops and prior to NEPA scoping, APC will form Resource Advisory Teams, comprised of APC representatives and various stakeholders who are interested in working on specific resource issues. For example, one Resource Advisory Team might focus on aquatic resource issues on the Coosa River, including water quality and quantity. Involvement in the Resource Advisory Teams will require a significant commitment of time. APC will include stakeholders that may want to participate in the APCA process in other ways. Other opportunities to participate include attending the NEPA scoping meetings, and reviewing and commenting on documents produced during relicensing.

The Resource Advisory Teams will appoint members to a Cooperative Relicensing Team (CRT) that will review and discuss issues, questions, and recommendations made by the Resource Advisory Teams. There will be two CRTs: one for the Warrior River and one for the Coosa River. APC will encourage stakeholders to keep the CRTs to 25 representatives or less in order to facilitate negotiations and decision making.

Once the Resource Advisory Teams and CRTs are formed, they will meet and cooperatively work to provide input to the study plan phase and to prepare for NEPA scoping.

Development of study plans will lead to conducting studies, which will likely occur between 2001 and 2003.

NEPA scoping is a formal process required by FERC to identify issues and alternatives for analysis in the NEPA document. FERC will be responsible for organizing and conducting the NEPA scoping meetings with input and participation by

APC and stakeholders. APC anticipates that NEPA scoping meetings will occur in the fall of 2001.

After the needed studies are complete, the Resource Advisory Teams and CRTs, with public participation and input, will work to reach agreement on project operations and future management that will be presented as the “Preferred Alternative” in the NEPA document. APC will prepare its draft license applications and APEAs. The draft applications will be distributed to all stakeholders for review and comment. APC will revise the applications and APEAs based on comments and further negotiations, and file them with FERC by July 31, 2005.

It is APC’s goal that the license applications and APEAs reflect Project operations and management practices, as well as protection and enhancement measures, that are supported by all stakeholders.

FERC will review the license applications and NEPA documents to be sure they meet FERC regulations. FERC will issue a public notice requesting final terms, conditions, prescriptions, and recommendations from resource agencies and other stakeholders and invite parties to intervene in the process. Intervening in the FERC process means that an agency, organization or individual officially requests (in written form) party status in the process, which guarantees that they will be notified of any official meetings between FERC and other parties in the relicensing process and receive copies of official correspondence. Receiving "Intervenor" status also grants those entities other recognized rights in the FERC process. A stakeholder may not officially intervene in the process until **after** the license applications and NEPA documents have been filed with FERC.

Once FERC receives final recommendations, FERC staff will prepare their draft NEPA document (either an EA or EIS) and issue it for a 30-day public comment period. FERC will incorporate comments and issue a final EA followed by the license order, which will contain the terms of the new license. If FERC issues an EIS rather than an

EA, there will be an additional comment period following FERC's issuance of the final EIS.

The conclusion of the relicensing and NEPA process at FERC should take no longer than one year from the conclusion of the NEPA process to issue a new license if an ALP process is used and agreement regarding Project operation and PM&E measures is achieved between APC and stakeholders. This should ensure that a new license will be received on or before the current licenses expire.

1.6 Getting Involved – A Public Process

Participating in the multi-year APCA is easy and there are many ways in which to participate, both actively and passively. APC has several ways to share information with stakeholders:

1) distribution of documents by APC,
2) Speakers Bureau, which provides speakers to discuss the relicensing process,
3) the APC newsletter *Shorelines*; and
4) the APC website at alapower.com/hydro.

More active stakeholders are welcome to attend public meetings or become a member of the Resource Advisory Teams.

1.7 Hydroelectric Projects – What Are They Anyway and How Do They Work?

For thousands of years, man has used waterpower for energy. Before getting into the details of APC's Projects, presented in the sections to come, it is important to first understand how a typical hydro project operates and how it makes electricity (Figure 1.7-1).

At a hydroelectric facility, the force of falling water makes electricity—the greater the fall, the more energy can be produced. The project dam stores large amounts of water in a reservoir or lake. The stored water is released to produce electricity, either to meet the electricity demand or to maintain a constant lake level and/or to provide flood control. Water is carried through the dam in a penstock, which is basically a big pipe, and distributes water to the wicket gates. The wicket gates control water flow to a turbine. The rushing water forces the turbine to spin. The spinning turbine rotates the generator, which produces electricity. The water exits the power plant through a draft tube into the plant's tailrace, which is the area immediately downstream of the dam. Power lines carry the produced electricity to APC's residential, commercial and industrial customers.

1.8 Competing Interests/Uses

You will see the term "competing interests" or "competing uses" throughout this document and during the relicensing process. Competing uses implies that there may be demands on a particular resource that directly conflict with another demand or that the demands cannot occur simultaneously. For example, a competing use might be using instream flow to create habitat for fish or diverting the flow into a penstock to generate electricity during high energy demand. These conflicts do not always occur between developmental (*e.g.*, power, flood control) and non-developmental (*e.g.*, environmental, recreational) uses. Environmental uses might also conflict; for example, providing downstream flow releases for whitewater boating and at the same time attempting to maintain stable lake levels for fish habitat protection and lake recreation.

How are competing uses of resources resolved? FERC is required to consider all the uses and demands and determine what decision will be in "the best public interest." The ALP process provides APC's stakeholders with a unique opportunity to review those competing use questions and look for solutions that will be in the "public interest." Through this relicensing process APC will work with stakeholders representing various uses to achieve a balance of various uses.

Preliminary Relicensing Schedule

Coosa and Warrior Projects

ID	Task Name
1	Internal and External Roll Out of APCA
2	Initiation of Education/Outreach Program (EOP)
3	File Letter Requesting Use of ALP
4	Prepare and Distribute Initial Information Package
5	Warrior Issues Workshop
6	Upper Coosa Issues Workshop
7	Lower Coosa Issues Workshop
8	Formation of Resource Advisory Teams (RATs)
9	Formation of Cooperative Relicensing Teams (CRTs)
10	RATs and CRT Meetings - Coosa
28	RATs and CRT Meetings - Warrior
46	Prepare and Distribute SD1
47	NEPA Scoping Meetings
48	Prepare and Distribute SD2
49	Prepare Study Plans for Review and Comment
50	Conduct Environmental and Economic Studies
51	Prepare Draft Application and APEA documents
52	Distribute Issue Draft License Application for Public Review and Comment
53	Settlement Discussions
54	Prepare Final License Application and APEA's
55	File License Application and APEA with FERC

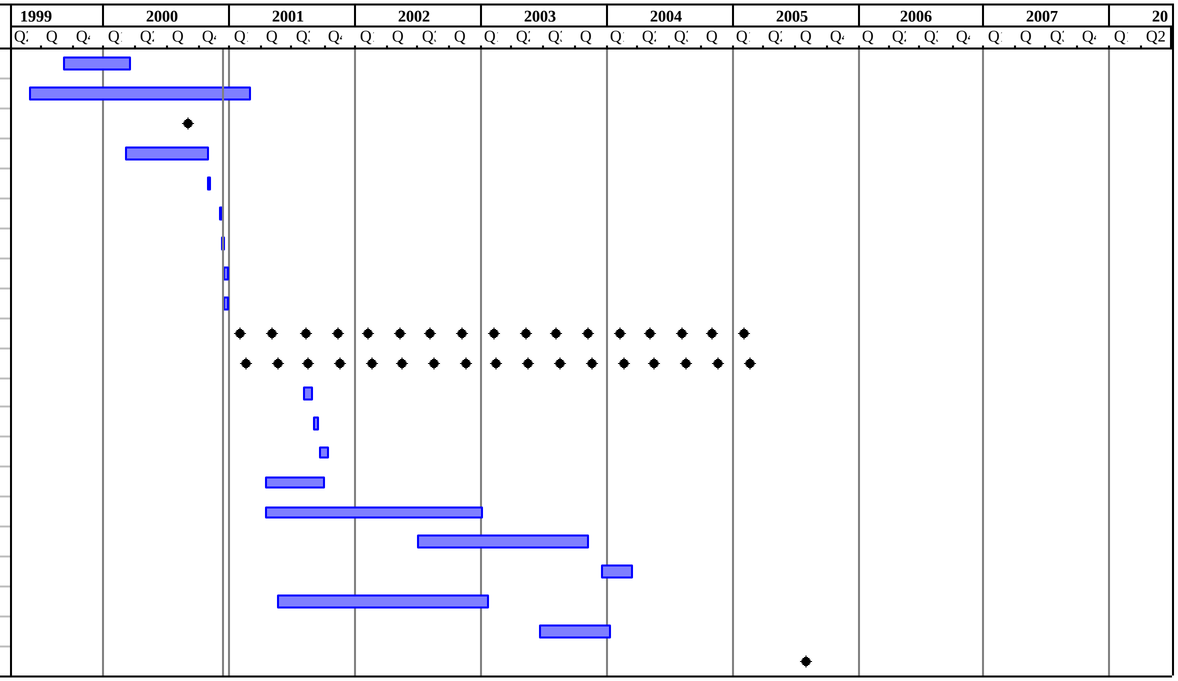
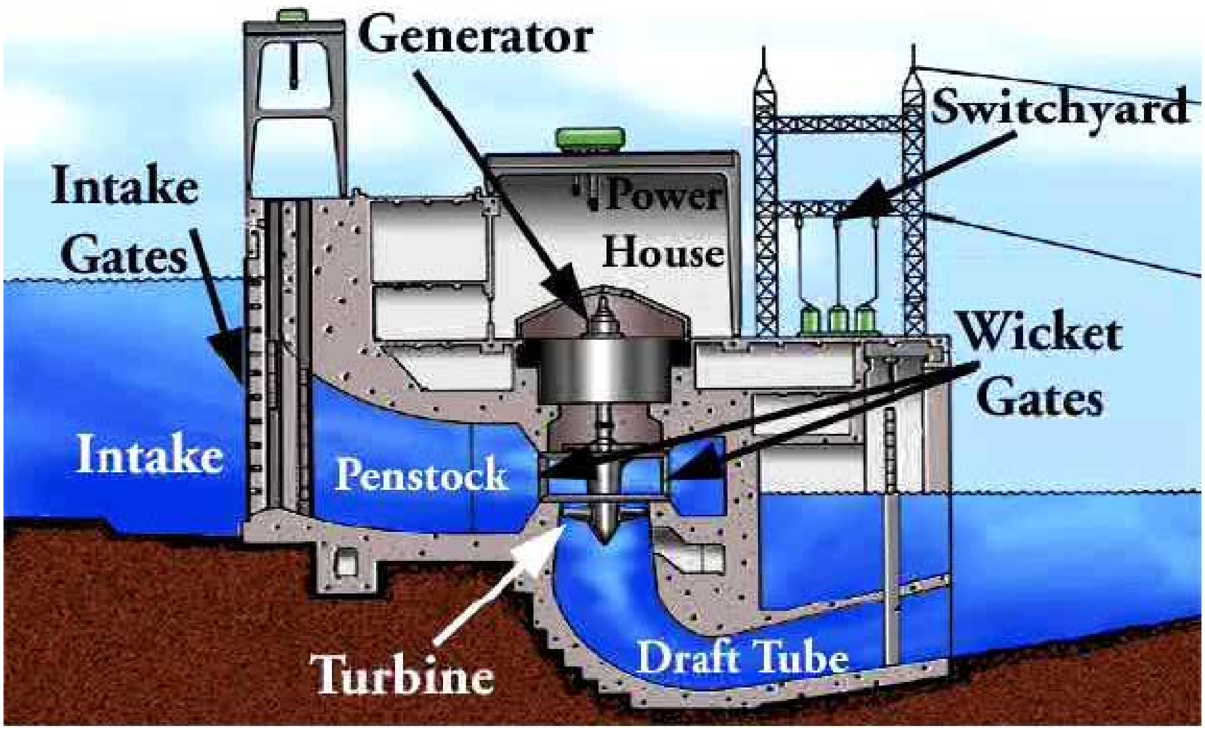


Figure 1.7-1 Typical Hydroelectric Generating Plant (Source: APC, 2000a, as modified by Kleinschmidt)



2.0 PROJECT INFORMATION

2.1 Project Lands and Boundary

The Logan Martin development is located in north central Alabama. Logan Martin Lake (lake) extends approximately 48.5 miles upstream from the Logan Martin Dam (dam) through Calhoun, St. Clair, and Talladega Counties. The dam is located approximately 99 river miles above the confluence of the Coosa and Tallapoosa Rivers, which form the Alabama River.

The Logan Martin development boundary (*i.e.*, those lands included in the FERC license) includes the lake (15,263 acres) up to a normal pool elevation (el.) of 465 feet (ft) above mean sea level (msl) (Figure 2.1-1). APC's shoreline and tailrace properties are shown in Section 4.7 (Figure 4.7-2). There are minimal federal lands within the Project area, the majority of which were inundated by the reservoir.

2.2 Project Description

2.2.1 Reservoir

Logan Martin Lake extends 48.5 miles upstream from the dam to Henry Dam and has a surface area of 15,263 acres at the normal water surface elevation of 465 ft msl. The lake has 275 miles of shoreline and a maximum depth of 69 ft at the dam (APC, 1995). The lake is used for hydroelectric generation, flood control, navigation flow augmentation, maintenance of downstream water quality, irrigation, industrial and municipal water supply, and recreational opportunities and serves as habitat for fish and wildlife. There is limited flood control storage in Logan Martin Lake; however, APC coordinates the operation of the Logan Martin development with its other hydro developments on the Coosa River to minimize flooding.

2.2.2 Dam

The water retaining structures at the Logan Martin development have a total length of 6,222 ft. The structures include a dam, a powerhouse and earth embankments. The dam impounds water from a 7,770 square mile drainage area. The storage capacity of Logan Martin Lake is 273,300 acre-ft at the normal pool elevation of 465 ft msl and 205,700 acre-ft at minimum pool elevation 460 ft msl.

The approximately 100 ft high dam, including the concrete gravity nonoverflow, headworks and spillway sections is 702 ft long (APC, 1995). The concrete spillway is approximately 327 ft long with a crest elevation of 432 ft msl (APC, 1995). The spillway is equipped with six tainter gates, each 40 ft wide and 38 ft high and one vertical trash gate that is 17.5 ft wide by 21.0 ft high. The embankments have a top elevation of 487.2 ft msl. The east embankment section is 4,650 ft long and abuts the spillway. The west embankment section is 870 ft long and connects the non-overflow section to the bank (APC, 1995; FERC, 1998; Jansen, 1994). The intake for the powerhouse is 238 ft long and is an integral part of the dam.

2.2.3 Powerhouse

The 295 ft long concrete powerhouse is built integrally with the intake. It contains three vertical fixed-blade turbines, each rated at 59,000 horsepower under 56 ft of head, and three generators, each rated at 42.75 MW (42,750 kW at 0.9 power factor). This yields a total rated capacity of 128.25 MW, (APC, 1995; FERC, 1998).

2.2.4 Tailrace

The Logan Martin tailwaters are the upper end of Lay Lake, which has a normal pool elevation of 396 ft msl (APC, 1995).

2.2.5 Transmission Lines

The plant's substation is connected to APC's transmission system through four high voltage lines: Leeds, Coosa Pines No. 1 and No. 2 and Jackson Shoals. All lines are rated at 115 Kv.

2.3 Project History and Improvements

APC began construction of the Project in July 1960. The dam and spillway were completed and the generating units were placed in commercial operation in 1964. Filling of the lake began in early July 1964 and reached an operating level of 460 ft msl on July 22, 1964.

Mud appeared in the river downstream of the dam during the filling of the lake and boils were observed in the river later in the year. Weirs were constructed in 1965 in the river downstream of the dam in order to measure the boils. A boil was discovered at the toe of the east embankment in the spring of 1966 and a weir box was constructed around the area. In April 1968, a sinkhole occurred in the downstream section of the east embankment, very close to the top of the embankment. A diver discovered three more sinkholes in the forebay upstream of this area. All of these were filled and extensive grouting was done, which resulted in the substantial reduction in discharge at the toe of the dam and opposite the sinkhole, and the water became clear (Jansen, 1994).

Fathometric soundings upstream from the dam in the spring of 1968 disclosed several sinkholes in the west floodplain upstream from the headworks section of the dam.

Filling of these holes began in November 1968. In 1969, boils continued in the riverbed and along both riverbanks, and several sinkholes were found in the floodplain upstream from the dam. The holes were filled in late 1969 and early 1970 (Jansen, 1994).

In March 1972, a long-term grouting program began along the original grout curtain. A rock fill bolster built against the downstream slope of the river section of the embankment was completed in 1977. To similarly protect the east floodplain area, construction of a trench drain and rock fill bolster to connect to the bolster of the river section was completed in 1980 (Jansen, 1994).

Work started in mid-1978 to fill sinkholes in the floodplain up to 1,000 ft upstream from the dam and to blanket the river bottom to a distance of 400 ft upstream using a bottom-dump barge. Several cycles of dumping have been needed as new sinkholes occurred or existing sinkholes enlarged. By November 1994, approximately 328,000 cubic yards of material had been dumped into the sinkholes. The required volume of material has declined in recent years and sinkhole activity has decreased noticeably since revised procedures were adopted in September 1993 (Jansen, 1994).

Recent improvements have included:

- New lighting in the galleries and replacement of trash racks on all three units (1990 and 1991);
- Construction of a building for the guards and roadway expansion joint repair, reducing leakage of rainwater into the plant (1991);
- An additional sump pump in the headworks gallery and upgrading of cranes (1992);
- A continuing program of intensive grouting in the river section and the adjoining floodplain reach of the east embankment (1991);
- Grout was pumped under the apron wall below the two main spillway bays nearest the powerhouse to repair an opening that had eroded between the riverbed rock and the base of the wall (1994);

- The foundation under the concrete structures, beginning at the spillway were drilled and grouted (1994);
- New public safety signs and buoys, installation of warning sirens, a new air compressor, and removal of retarding cylinders on headgates (1993); and
- New electronic entrance gate, new skirts on hatch covers, and repair of areas on embankments (1994) (Jansen, 1994).

2.4 Resource Utilization

APC uses the existing resources in the most efficient manner possible. APC conducts annual maintenance at this Project to ensure the efficiency of the units. APC periodically evaluates the use of the existing resources to determine if project upgrades are needed. APC is currently in the process of performing potential upgrade studies to determine the best efficiency of the units on all Coosa and Warrior Projects.

2.4.1 Allocation of Power

APC provides more than 30 percent of the power needs for Southern Company's residential, commercial and industrial customers. Of this 30 percent, 7.2 percent of the power is derived from APC's 14 hydroelectric facilities. One of these hydroelectric facilities, the Logan Martin development, provides a significant source of reliable, dependable and reasonably priced electricity for APC's consumers. Electricity produced at the Logan Martin development is transmitted to APC's power grid for allocation, as needed, to residential, commercial, and industrial customers.

2.4.2 Project Modification for Consideration

At present, APC is not considering modifications to the Logan Martin development. However, during the relicensing process, in response to stakeholder issues and concerns, APC may reexamine project modifications to attempt to enhance the operational, environmental, and economic value of the Logan Martin development.

2.5 Project Drawings and Records

Attached as Figures 2.5-1 through 2.5-4 are drawings of the Project structures and features. Table 2.5-1 (Appendix C, pgs. C-1 to C-3) provides specific information on the Logan Martin development.

Project Location Map
Logan Martin
Coosa-Warrior Rivers Relicensing

Project Boundary
Coosa River
City Boundaries
County Boundaries

Data Source:

All data supplied by Alabama Power Company as modified by Kleinschmidt Associates, 2000

N

2 0 2 4 Miles

Location Map

ALABAMA POWER
A SOUTHERN COMPANY
Kleinschmidt

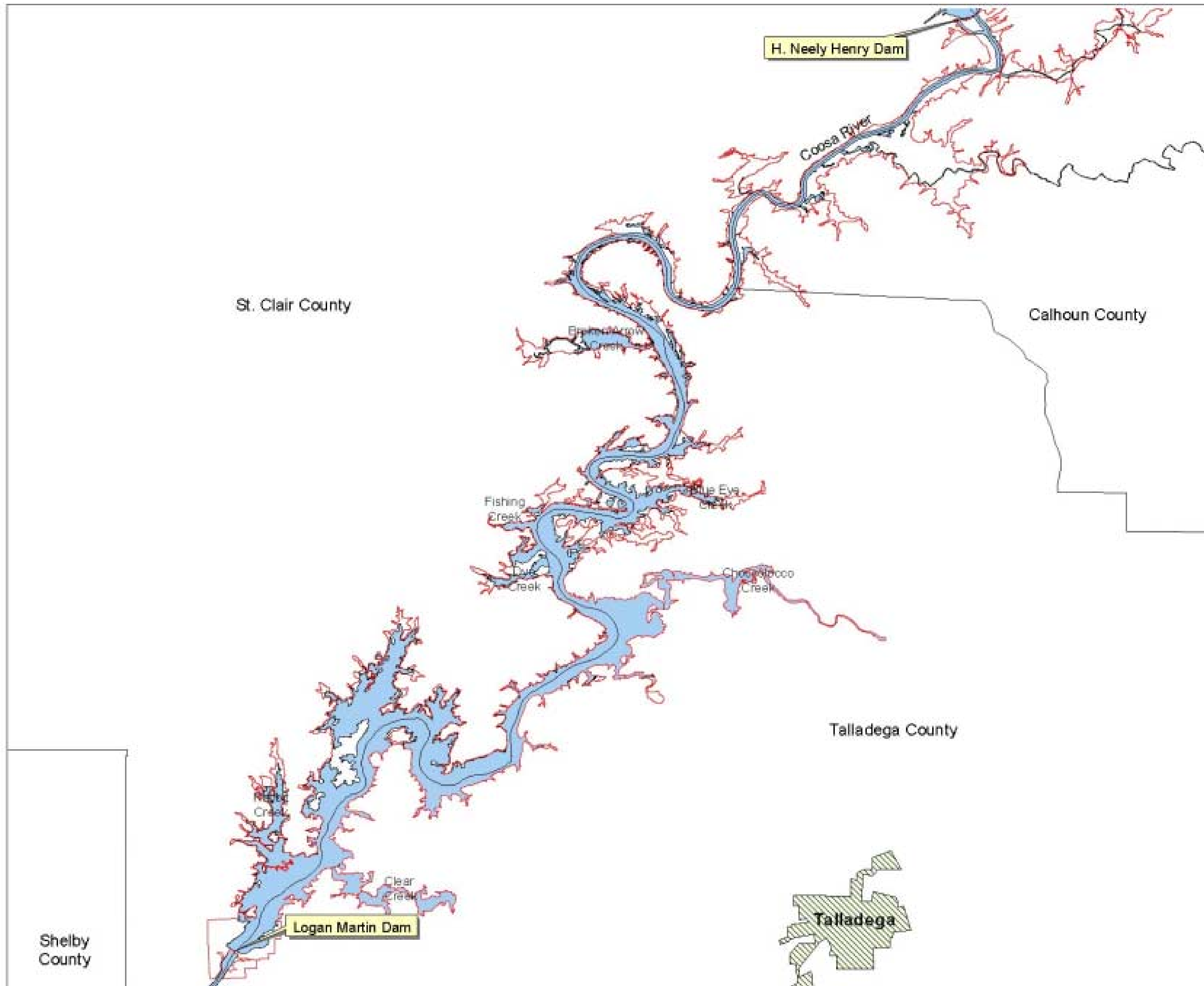
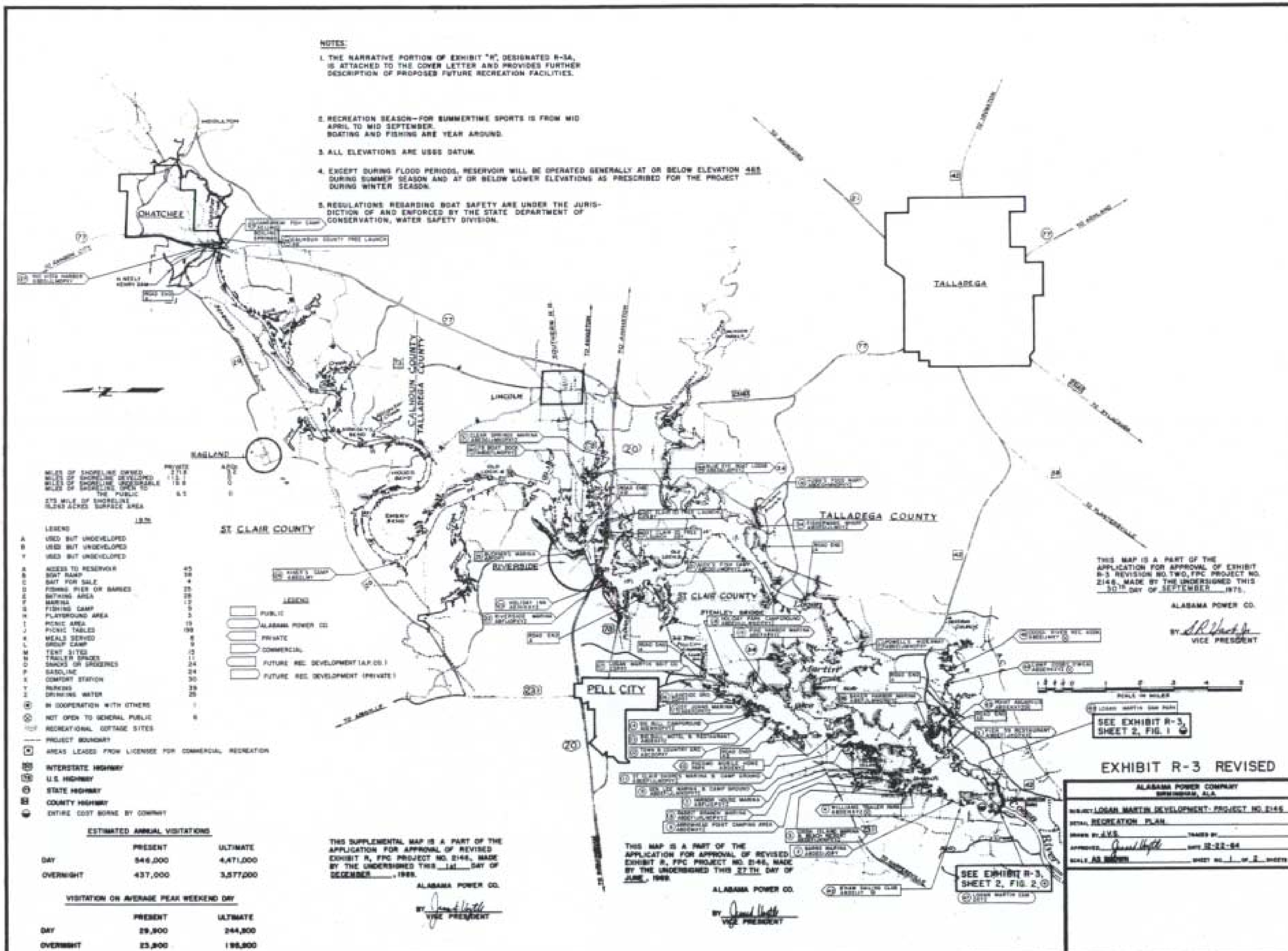


Figure 2.1-1



FPC # 2146-371

FIGURE 2.5–1

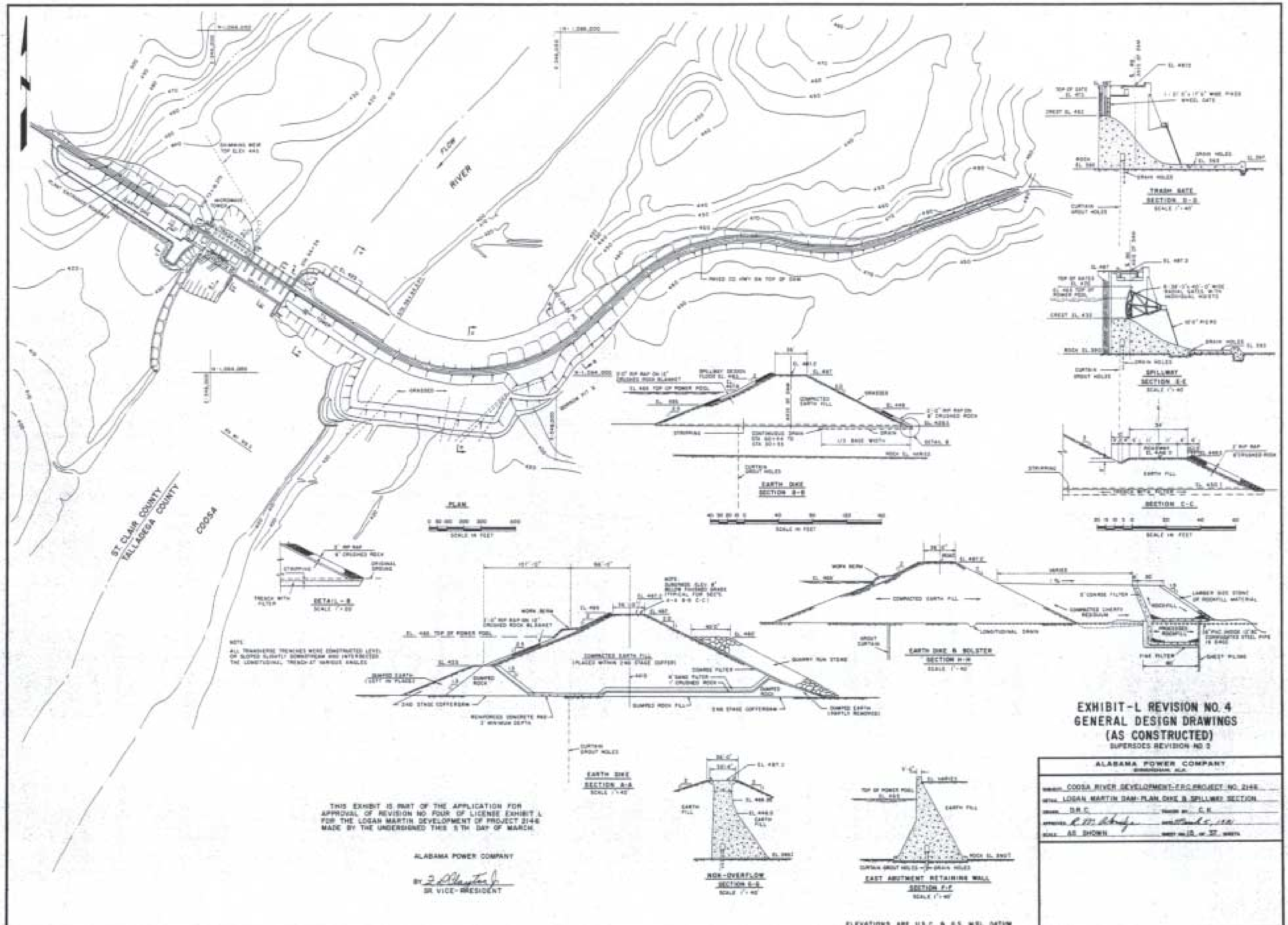

RIVER
FLOW
COOSA
ST CLAIR COUNTY
TALLADEGA COUNTY
PLAN
EARTH DIKE SECTION B-B
TRASH GATE SECTION D-D
SPILLWAY SECTION E-E
SECTION C-C
DETAIL-B
EARTH DIKE SECTION A-A
EARTH DIKE & BOLSTER SECTION H-H
NON-OVERFLOW SECTION G-G
EAST ABUTMENT RETAINING WALL SECTION F-F
THIS EXHIBIT IS PART OF THE APPLICATION FOR APPROVAL OF REVISION NO FOUR OF LICENSE EXHIBIT L FOR THE LOGAN MARTIN DEVELOPMENT OF PROJECT 2146 MADE BY THE UNDERSIGNED THIS 5TH DAY OF MARCH.
ALABAMA POWER COMPANY
SR. VICE-PRESIDENT
EXHIBIT-L REVISION NO. 4
GENERAL DESIGN DRAWINGS
(AS CONSTRUCTED)
SUPERSEDES REVISION NO 3
ALABAMA POWER COMPANY
COOSA RIVER DEVELOPMENT-F.P.C. PROJECT NO. 2146
LOGAN MARTIN DAM-PLAN DIKE & SPILLWAY SECTION
AS SHOWN
ELEVATIONS ARE U.S.C. & G.S. M.S.L. DATUM

FIGURE 2.5-2

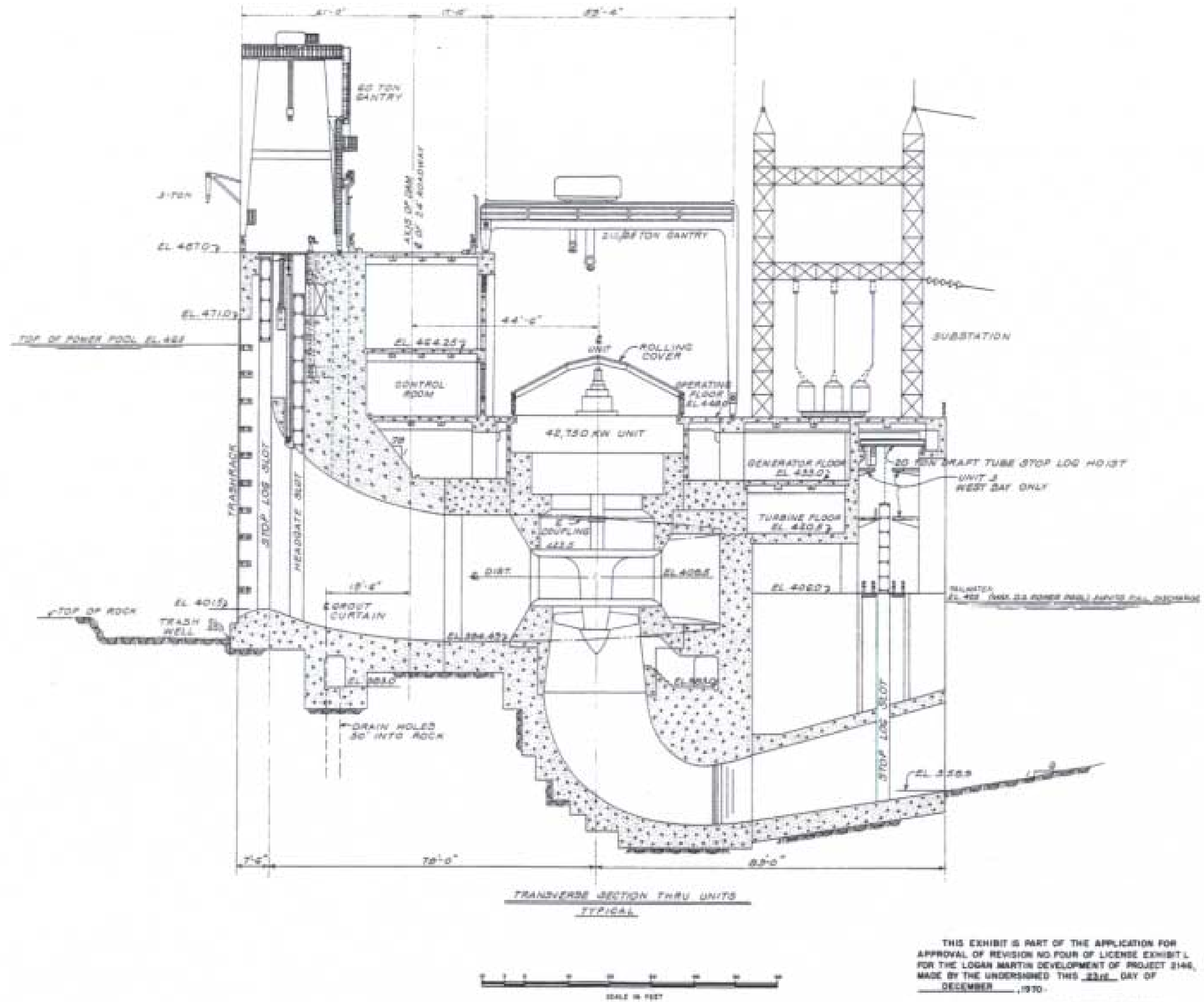


EXHIBIT-L REVISION NO. FOUR
GENERAL DESIGN DRAWINGS
(AS CONSTRUCTED)

THIS EXHIBIT IS PART OF THE APPLICATION FOR APPROVAL OF REVISION NO. FOUR OF LICENSE EXHIBIT L FOR THE LOGAN MARTIN DEVELOPMENT OF PROJECT 2146, MADE BY THE UNDERSIGNED THIS 23rd DAY OF DECEMBER, 1970.

ALABAMA POWER COMPANY

BY [signature]
VICE-PRESIDENT

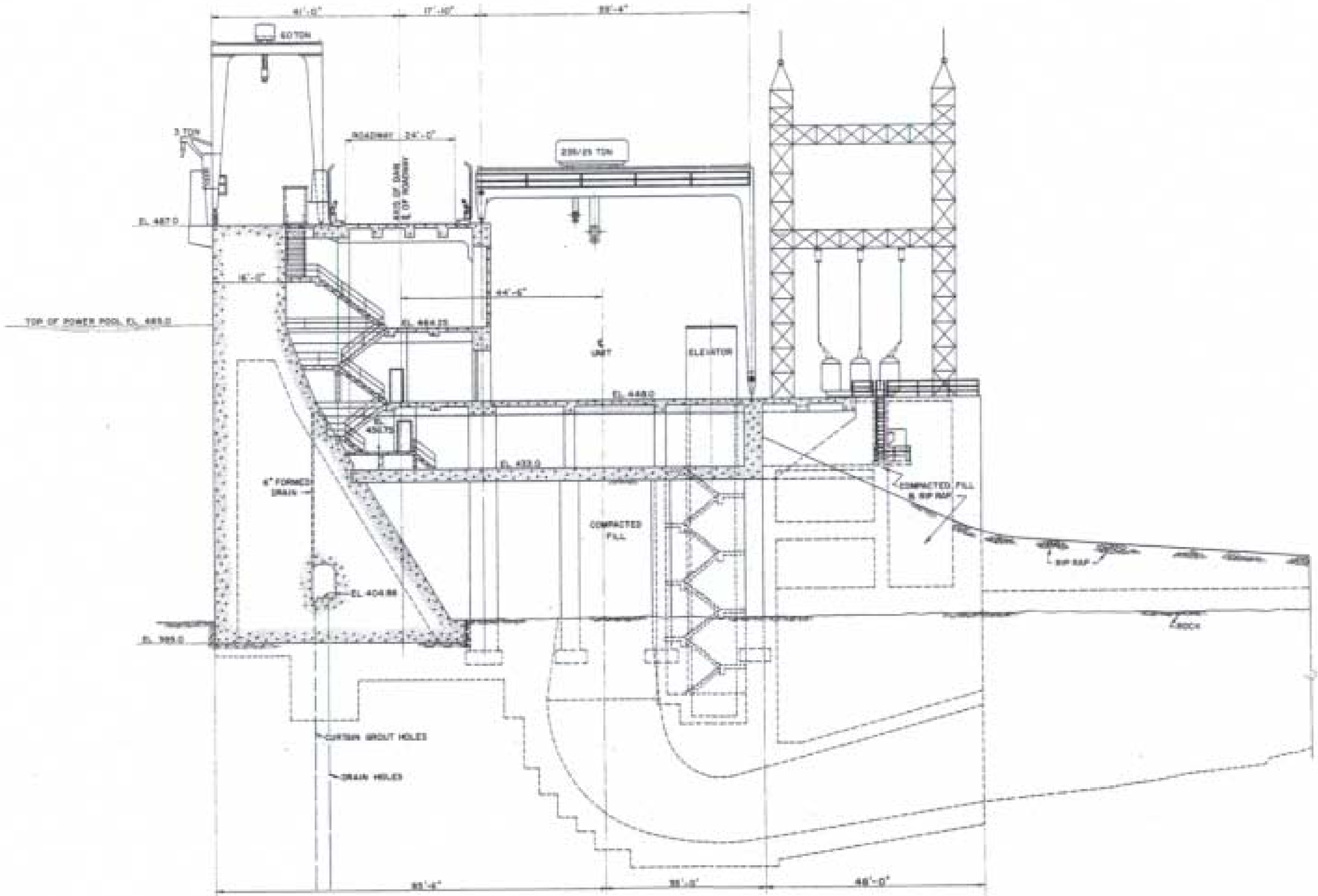
ALABAMA POWER COMPANY
BIRMINGHAM, ALA.

SUBJECT: COOSA RIVER DEVELOPMENT F.P.C. PROJECT NO. 2146
DETAIL: LOGAN MARTIN DAM POWERHOUSE TRANSVERSE SECTION
DRAWN BY: J.E.S. TRACED BY: K. BROWN
APPROVED: [signature] DATE: 12-23-70
SCALE: 3/32" = 1'-0" SHEET NO. 16 OF 37 SHEETS

ELEVATIONS ARE U.S.C. & G.S. M.S.L. DATUM

2146-327

FIGURE 2.5-3



TRANSVERSE SECTION THRU SERVICE BAY

SCALE IN FEET

THIS EXHIBIT IS PART OF THE APPLICATION FOR APPROVAL OF REVISION NO. TWO OF LICENSE EXHIBIT L FOR THE LOGAN MARTIN DEVELOPMENT OF PROJECT 2146, MADE BY THE UNDERSIGNED THIS 25TH DAY OF DECEMBER, 1970.

ALABAMA POWER COMPANY

BY [signature]
VICE PRESIDENT

ELEVATIONS ARE U.S.C. & G.S. M.S.L. DATUM

EXHIBIT-L REVISION NO. TWO
GENERAL DESIGN DRAWINGS
(AS CONSTRUCTED)

ALABAMA POWER COMPANY
BIRMINGHAM, ALA.

SUBJECT COOSA RIVER DEVELOPMENT-F.P.C. PROJECT NO. 2146
DETAIL LOGAN MARTIN DAM-POWERHOUSE-TRANSVERSE SECTION
DRAWN BY I.T.W. TRACED BY B.N.C.
APPROVED [signature] DATE 12-23-70
SCALE 3/32" = 1'-0" SHEET NO. 17 OF 37 SHEETS

2146-328

FIGURE 2.5-4

3.0 PROJECT OPERATIONS AND MANAGEMENT

3.1 Streamflow and Water Regime Information

3.1.1 Drainage Area

The drainage area of Logan Martin Lake is 7,770 square miles, consisting of parts of Calhoun, Talladega, and St. Clair Counties. The Coosa River Basin has a humid climate with usually mild, short winters and long, warm summers. The average annual precipitation in the basin is about 52 inches.

3.1.2 Flow Rates and Duration Curves

The Logan Martin Project began commercial operation in 1964. It has a total contribution drainage area of 7,770 square miles. The Project is a multi purpose storage reservoir with a seasonally changing water level. The Project is used to provide flood control during periods of high flow and low flow augmentation during dry periods. Discharges are made typically in response to inflows from upstream Project flows.

A difficulty with developing long-term flow data for the Logan Martin development is the lack of extensive site specific gage information. The USGS has several gages on the Coosa River. As noted in Table 3.1-1 (Appendix C, pg. C-4), only the gages at Gadsden and Jordan Dam have recorded any significant length of data that runs through the period when the Project was in operation. As such, outflow data for the Project was derived by analyzing and comparing the Childersburg (closest to the Logan Martin Project) and the Jordan Dam gages (downstream of the Project). Using both gages for the same period of record, a pro-ration factor (0.7622 – based on respective drainage area) was determined and each gage was also pro-rated to the other to determine the accuracy of the pro-ration factor. This analysis determined that a linear relationship was very accurate for adjusting the flow data from the gages up and down the river. As such, the data from the Coosa River at Jordan Dam was used to derive the flow data for the site.

Monthly flow duration curves for the Logan Martin Project were prepared using the mean daily flow data from the Coosa River gage at Jordan Dam near Wetumpka, Alabama (USGS gage #02411000 – after the pro-ration factor was applied) (Figures 3.1-1 to 3.1-13). The period of record used was from 1964 to the present. As noted, the Project began commercial operation in 1964.

The gage records note the peak flow of record on the Coosa River System occurred on April 13, 1979. Flows at the Jordan gage peaked at 316,000 cfs. The lowest minimum flows based on the Jordan Dam gage for the period 1964 to present was noted to be 65 cfs in April 1967. However, leakage flows from the Logan Martin Dam are much higher than this value (*i.e.*, leakage flows up to 700 cfs).

The typical flow pattern of the river noted the high flow periods occur in the early spring, March and April. After this, the flows decline to the late summer low flow periods and increase slightly with the late fall rain. Average monthly flows range from approximately 30,000 cfs during February, March and April to approximately 2,000 cfs during August, September and October.

3.2 Project Operations

3.2.1 Description of Power Operations

3.2.1.1 Typical Operations

APC operates the Logan Martin plant principally to produce peaking power. A curve delineating the seasonal variation in storage of the Logan Martin Lake is shown in Figure 3.2-1. The lake level is normally maintained at or below the curve except when flood inflows cause the pool to rise. The compulsory drawdown each year is to el. 460 ft msl. APC normally operates on a weekly cycle and the power generated is available for use in daily peak-load periods. When the lake level is below that shown on the Storage Delineation Curve (Figure 3.2-1), the powerhouse is operated in accordance with this curve and system requirements. Whenever the lake reaches the elevation shown on the curve, the powerhouse is operated as necessary up to full-gate capacity in order to discharge the amount of water required to prevent the lake level from exceeding that shown on the curve (APC, 1967).

Historically, APC operates the lake such that from the first part of May to the end of August, the lake level is maintained at or near the normal maximum water surface el. of 465 ft msl for normal inflows and system generation requirements. The winter drawdown begins at the end of September and reaches el. 460 ft msl in late December.

The Logan Martin development is operated either locally or remotely from the Alabama Control Center (ACC) in Birmingham. Operation is closely coordinated with the operation of the other facilities in the Coosa River Basin, particularly the Army Corp of Engineers'

(ACOE) Carters (on the Coosawattee River) and Allatoona (on the Etowah River) and APC's Weiss, Henry, Lay, Mitchell, and Jordan (including Bouldin forebay) Lakes. The ACC monitors the APC electrical system and directs the generation schedule. The plant may be brought on line at any time to most effectively meet system load requirements (APC, 1995). Additionally, an under-frequency relaying system automatically loads the units if the system frequency falls to 59.7 Hz (APC, 1995).

Usable storage of 67,700 acre-ft is provided between el. 465 and el. 460 ft msl to augment flow into the downstream Lay Lake during periods of low streamflow. The lake is lowered to 460 ft msl during the winter months to provide flood storage. The normal static tailwater elevation of 396 ft msl provides 69 ft of gross head.

3.2.1.2 Flood Control Operations

Flood control upstream in the Coosa River Basin is provided by the ACOE's Carters Reservoir (368,000 acre-ft), controlling 376 square miles of drainage of the Coosawattee River, and the ACOE's Allatoona Reservoir (377,000 acre-ft), controlling 1,110 square miles of the Etowah River. Floodwaters impounded by these two dams are released at rates to prevent or minimize damage after the flow of the Coosa River at Rome, Georgia has receded to within the banks. In addition, the Weiss development, located approximately 126 miles upstream of the Logan Martin development, is operated on an Induced Surcharge Curve that limits discharges to the downstream Projects within the limit of its flood control capabilities. During periods of flooding, APC maintains communication with the ACOE and with the Weather Service River Forecast Center in Atlanta.

To the extent possible within the limits of the discharge capacity of the powerhouse, the lake level is maintained below the Storage Delineation Curve (Figure 3.2-1). Releases through the powerhouse and spillway are adjusted depending upon inflow and the level of the lake relative to the power pool or flood storage pool. The Regulation Schedule specifies the releases corresponding to various combinations of inflow and lake level (Figure 3.2-2). The first adjustment is typically to increase the magnitude or duration of powerhouse releases, followed by increased spillway releases.

The release rate is limited to 50,000 cfs until the lake rises and/or the inflow increases to a point where a higher release rate is specified by the Induced Surcharge Curve (Figure 3.2-3). Every six hours thereafter, the release rate is adjusted to conform to the Induced Surcharge Curve (APC, 1967).

When the rate of lake inflow decreases to the lake release rate, the positions of the spillway gates are maintained during the emptying of flood storage above the elevation designated by the Storage Delineation Curve until the lake level recedes to that elevation. Should a second flood enter the lake prior to completion of emptying to the designated elevation, the rate of lake release is dictated by the Induced Surcharge Curve (Figure 3.2-3). When the lake level recedes to the elevation designated by the Storage Delineation Curve, after which the powerhouse is operated as required to maintain the lake on or below the specified limits (APC, 1967).

Flood control operation is normally in accordance with the regulation plan described above. However, the limited amount of storage allocated to flood control at Logan Martin Lake generally will not significantly reduce major flood peaks. When firm forecasts indicate that a major flood is in progress, APC and the ACOE collaborate in the analysis of available information and determine whether a deviation from the Induced Surcharge Curve is needed. Any departure from the regulation schedule requires approval by the ACOE (APC, 1967).

3.2.1.3 Low Water Operations

During periods of low inflows, water is released from storage to help maintain downstream water quality, aquatic habitat, power generation, navigation and recreational opportunities.

3.2.2 Description of Non-Power Operations

In addition to power production, the Logan Martin development provides other benefits to the region and immediate vicinity including recreational and environmental enhancements.

3.2.3 Project Operations During a New License Term

At present, APC anticipates continuing the present mode of operation at the Logan Martin development.

3.2.4 Project Maintenance

Project personnel consist of a supervisor, an operation and maintenance crew and security personnel. Project maintenance personnel are on site eight hours a day, Monday through Friday and the plant is monitored and operated remotely 24 hours a day (APC, 1995). Security personnel are present at all other times. All APC project personnel are trained in regulatory compliance, safety, dam surveillance, and emergency action procedures.

3.3 Safety Programs

3.3.1 Dam Safety & Inspections

APC maintains the dam in a safe manner so that the public is protected from accidents or failures. Engineers from the Southern Company (APC's parent company) and APC perform detailed biennial inspections and perform routine inspections on the development. FERC representatives also conduct annual inspections. APC maintains project records at the powerhouse to document project maintenance, power generation, periodic inspections and monitoring of instrumentation, and the Project's design and construction history (FERC, 1998). The dam is also monitored through instrumentation: 10 piezometers are monitored by continuous recorders; 119 piezometers are read weekly; 62 gallery relief drains and 12 dike relief drains are read monthly; and 34 first-order deformation monuments and 114 third-order settlement points are measured each month (APC, 2000b).

Logan Martin Dam is classified under FERC regulations as a "high" hazard dam. A "high" hazard classification is defined as: in the event of hypothetical dam failure significant damage may occur to people and/or property. Therefore, under 18 CFR Part 8 and 12, the dam must be inspected every five years by a FERC approved independent consultant. The most recent inspection of the Logan Martin development occurred in 1999, resulting in a draft report which is not yet available to the public. Information from the sixth five-year safety inspection of the Logan Martin development is presented in this IIP (Jansen, 1994). This inspection included a field inspection and a review of existing data, information, and reports. Instrumentation at the Project includes piezometers, gallery drains, seepage weirs, and alignment monuments. A fathometer survey boat is used to monitor sinkhole development in the lake within 1,000 ft of the dam (Jansen, 1994).

The dam showed no excessive effects of erosion and no significant amounts of eroded material had been deposited at the leakage weirs. The rate and extent of foundation erosion could not be estimated reliably. Sinkholes, boils, and large-scale leakage indicated problems related to known geologic deficiencies. Effects of foundation deterioration, primarily from solutioning, have been evident. The embankments and the concrete structures showed no conspicuous evidence of deterioration and the reservoir slopes showed no stability problems (Jansen, 1994).

Further findings from the safety inspection were as follows:

- Data showed no excessive settlement and the inspection disclosed no problems caused by settlement of embankment or concrete structures.
- Measurements of dam movement had not exceeded normal limits and there was no evidence of damaging deformation.
- Seepage through the embankments was minimal, but foundation seepage was significant.
- While the foundation of the dam continued to pass large-scale total leakage, the recent grouting concentrated in the river section of the east embankment had reduced leakage emerging at the toe in that reach.
- There were no major cracks that would indicate structural distress.
- The spillway and intake were in satisfactory condition (Jansen, 1994).

Previous stability analyses had shown adequate safety factors for the embankments and the concrete structures. New analyses of the concrete structures were in progress, using data from recent materials testing and uplift measurements. Previous spillway analyses had demonstrated the capability to pass the Probable Maximum Flood (PMF) with adequate freeboard remaining on the dam (Jansen, 1994).

3.3.1.1 Inspection Program

Southern Company's and APC's engineers and operating personnel, independent consultants, and FERC perform periodic inspections. Inspected facilities include the spillway, gates, all dam structures, turbine and generator units, other buildings, parking areas and the tailrace at recreational facilities (FERC, 1998).

The superintendent inspects the Project structures, embankments, and weirs at least twice weekly. Security guards working the evening and night shifts routinely inspect the structures, weirs, and riverbanks twice per shift and also monitor tailrace boils for changes such as mud and grout shows. The employees engaged in the foundation remedial program also monitor embankments, piezometers, weirs, and boils regularly. The conditions in the reservoir bottom at and near the dam are monitored by fathometric surveys and the leakage emerging in the river channel downstream is being monitored and gaged at several locations (Jansen, 1994).

3.2.1.2 Dam Safety Improvements Since Last Relicensing

The ongoing foundation grouting program has resulted in significant reductions in leakage flows near the dam structures.

No other major improvements have been necessary to ensure the safety of the dam since the original licensing and construction of the Project.

3.3.2 Emergency Action Plan Program

The purpose of the Emergency Action Plan (EAP) is to provide procedures designed to identify conditions that may endanger the dam in order to take mitigative action and to notify appropriate emergency management officials of possible, impending, or actual failure of the dam. It also includes maps of downstream areas, which show the estimated extent and timing of flooding in the event of a dam failure. The current version of the Logan Martin EAP was issued in January 2000 (APC, 2000b).

Training is provided for personnel to ensure that problems are detected as quickly as possible, that resources are identified for responding to emergencies, and that necessary judgments can be made. The time from discovery of a problem to implementation of the plan should be minimal, since the plant is continuously staffed and routine surveillance requirements have been established, including electronic monitoring from the ACC. Personnel are also trained to be alert for potential problems throughout the course of performance of their normal duties.

3.3.3 Public Safety Program

Numerous private and commercial developments are found in most areas of the lake. Public access to the dam and powerhouse is from the west downstream side. Public parking and a fishing pier are provided at this site. Fishing is the primary recreational activity at or near the dam, and tailrace fishing is popular from the pier and from both banks and boats. The public boat ramp nearest the dam is located at a marina one mile upstream and the nearest ramp downstream of the dam is located two miles away (APC, 1995).

APC maintains public safety fencing and gates to prevent unrestricted access to the plant's areas of operations. The spillway and powerhouse structures are lighted at night. An audible alarm with a downstream range of approximately 4,800 ft exists to alert the public to rapidly rising and turbulent waters from powerhouse and spillway discharges. There is a lighted sign over the powerhouse discharge explaining the reason for the sounding of the alarm. Smaller unlighted signs are posted at public access points within range of the alarm on both downstream banks, along the tailrace. Unlighted general warning signs are posted with these smaller signs, warning that dangerous and turbulent waters can quickly cover the bank and riverbed during powerhouse and spillway discharges (APC, 1995).

There are also specific warning signs: upstream on each bank, over the powerhouse intake openings, and on the spillway; and downstream on each bank below the dam, over the powerhouse discharge tunnels, and on the spillway. There are warning buoys upstream from the spillway and in the tailrace. There are also signs on each bank of the tailrace informing boaters of the requirement under state law that all boaters wear personal flotation devices within 800 ft below a dam (APC, 1995).

Figure 3.1-1 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, January Flow Duration Curve

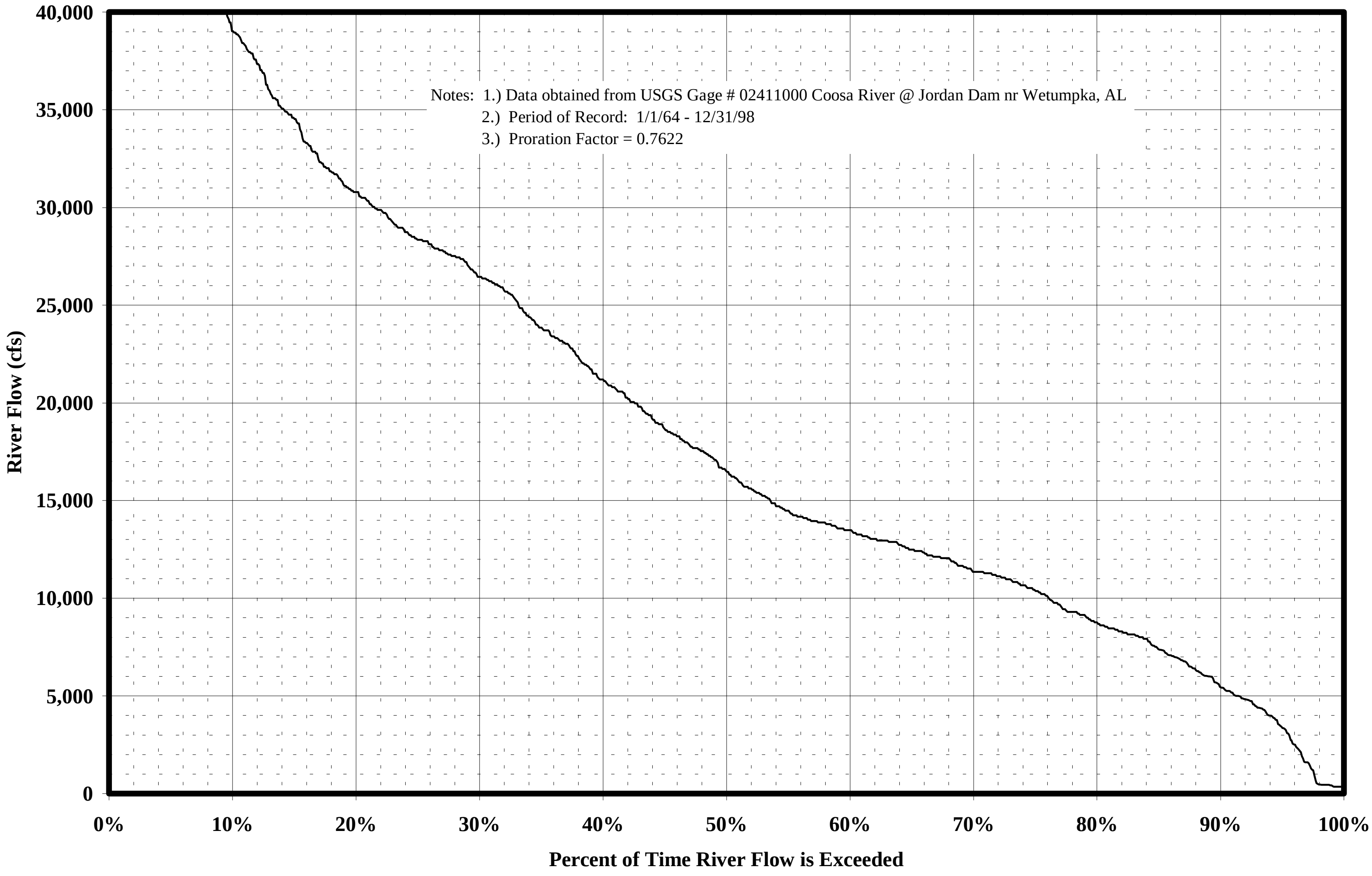


Figure 3.1-2 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, February Flow Duration Curve

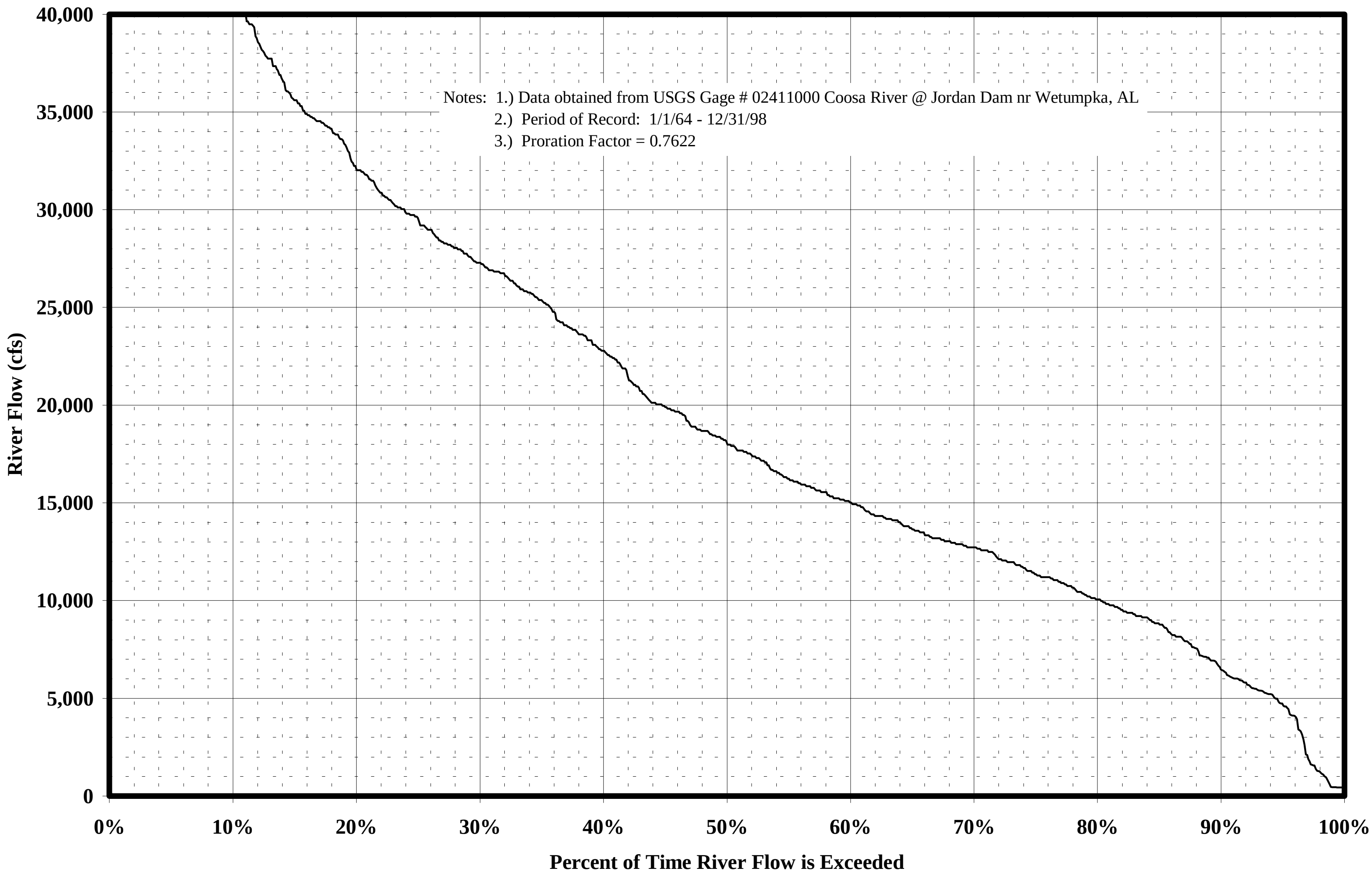


Figure 3.1-3 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, March Flow Duration Curve

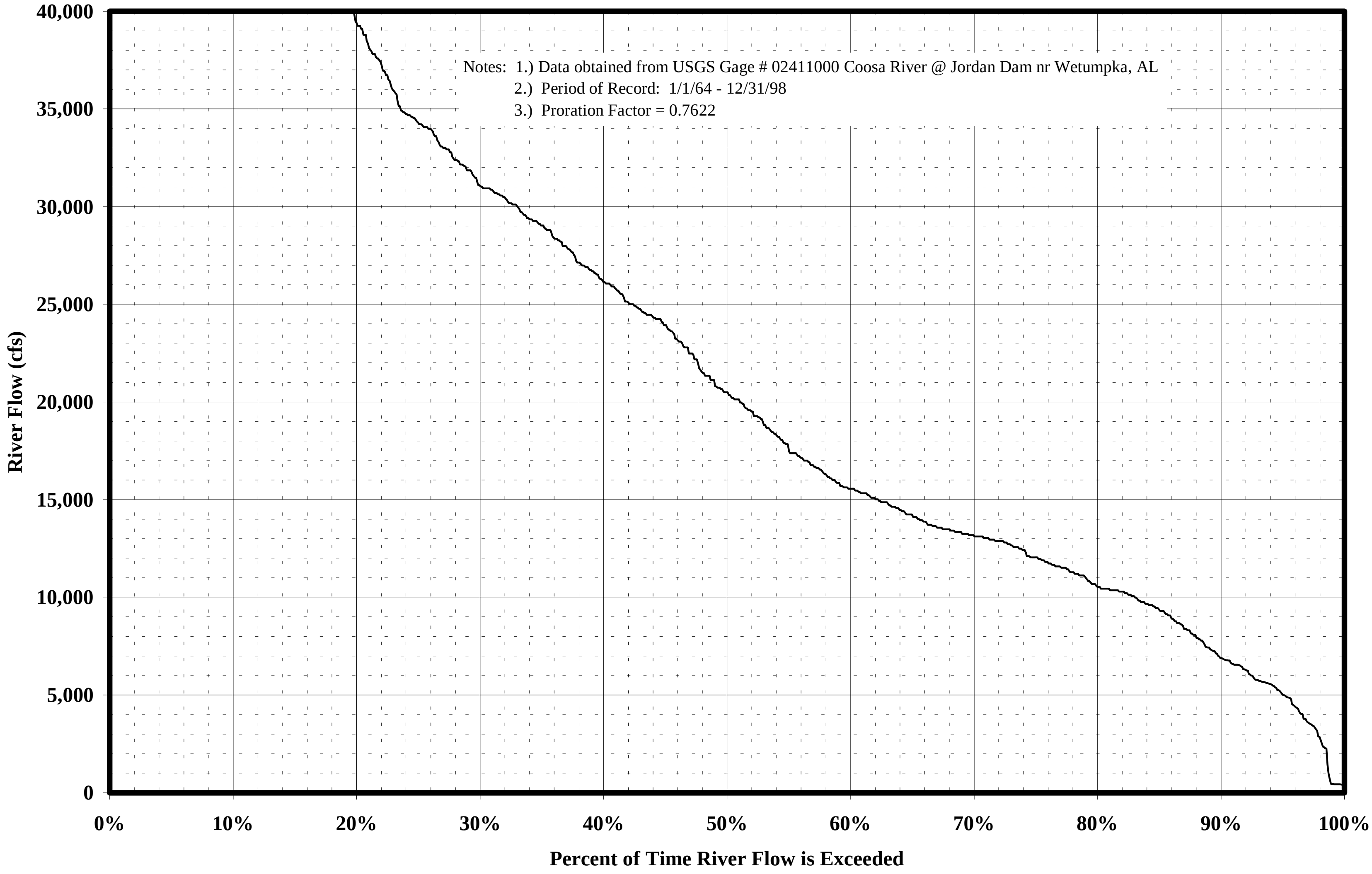


Figure 3.1-4 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, April Flow Duration Curve

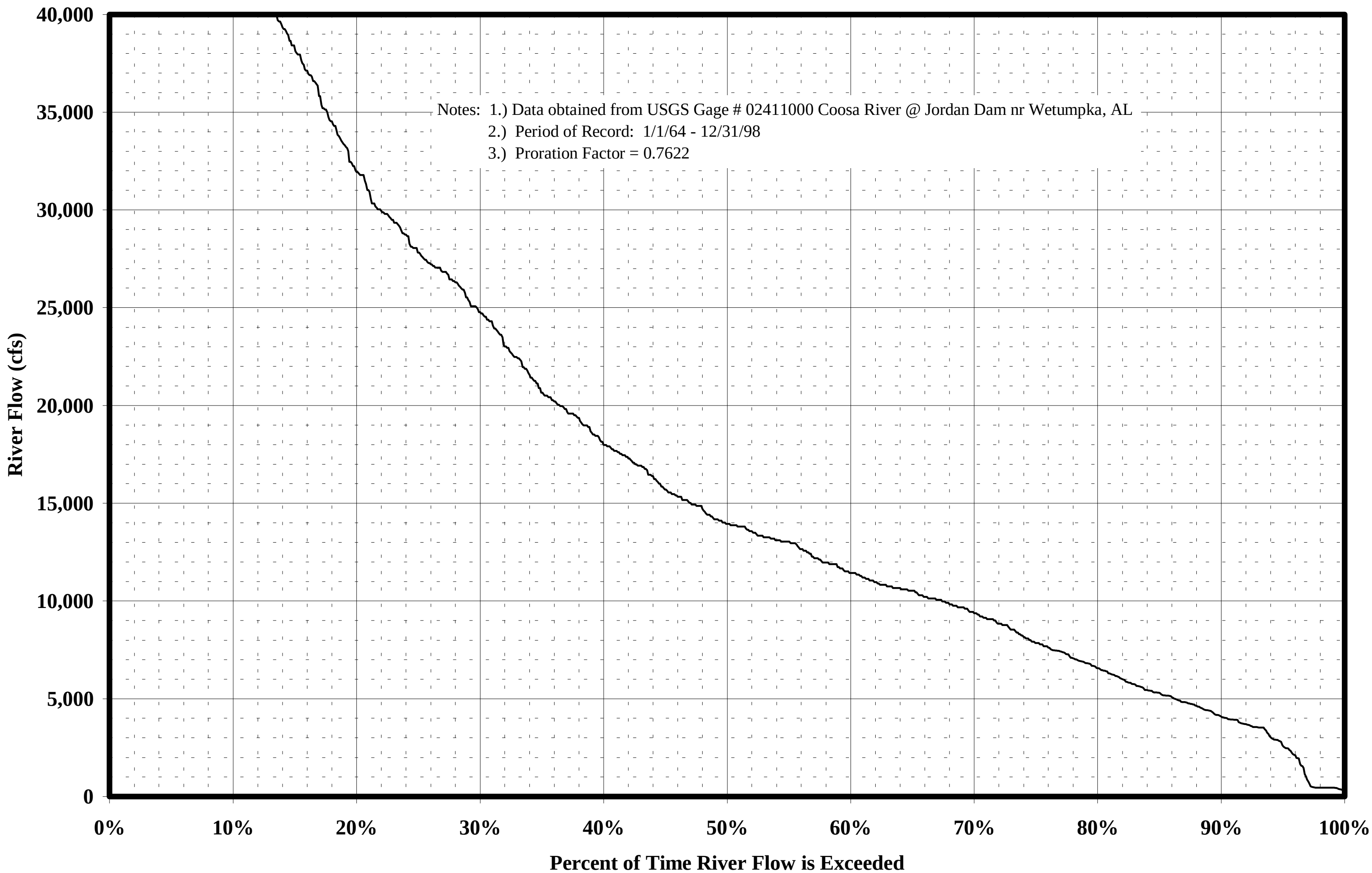


Figure 3.1-5 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, May Flow Duration Curve

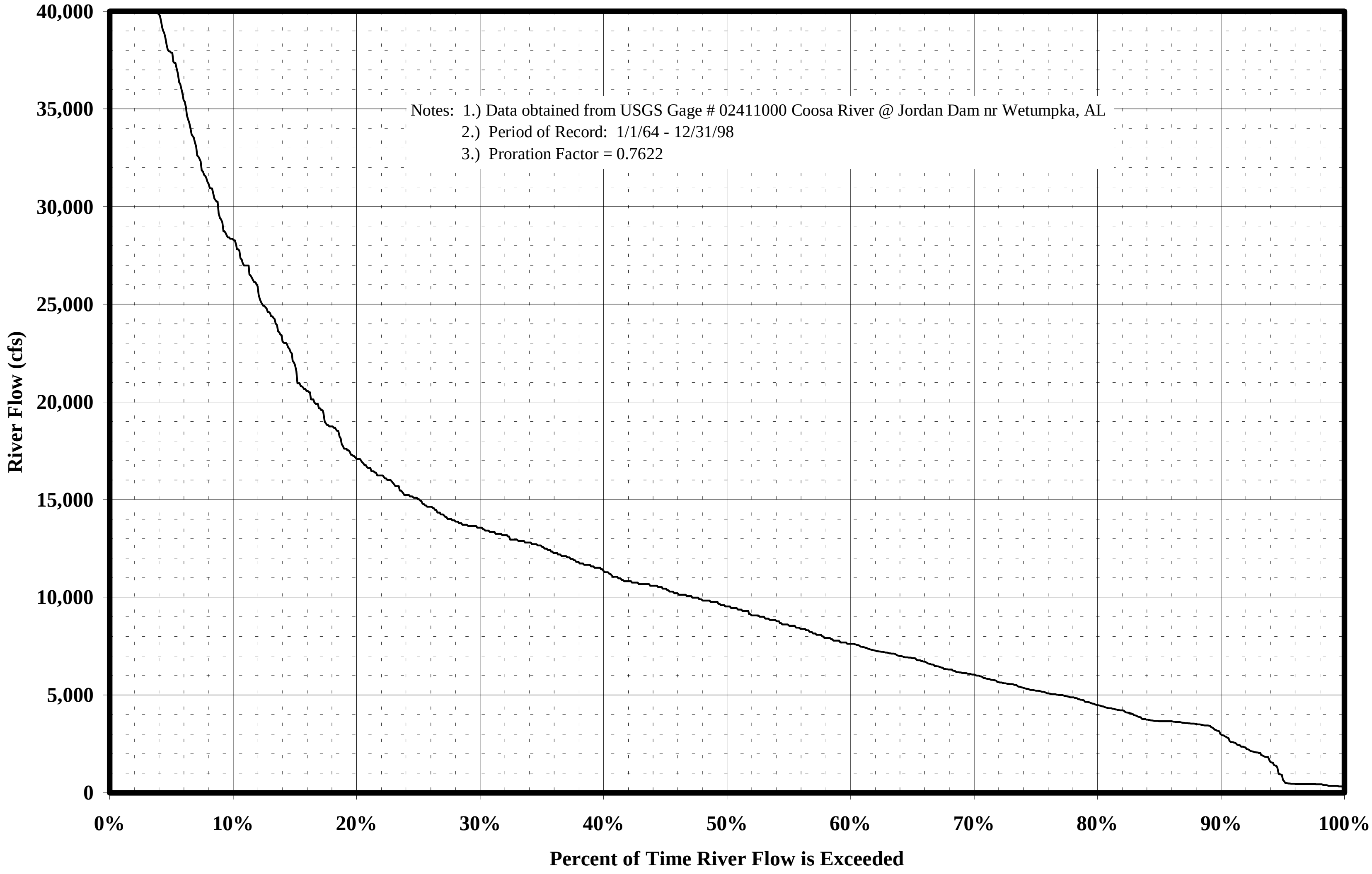


Figure 3.1-6 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, June Flow Duration Curve

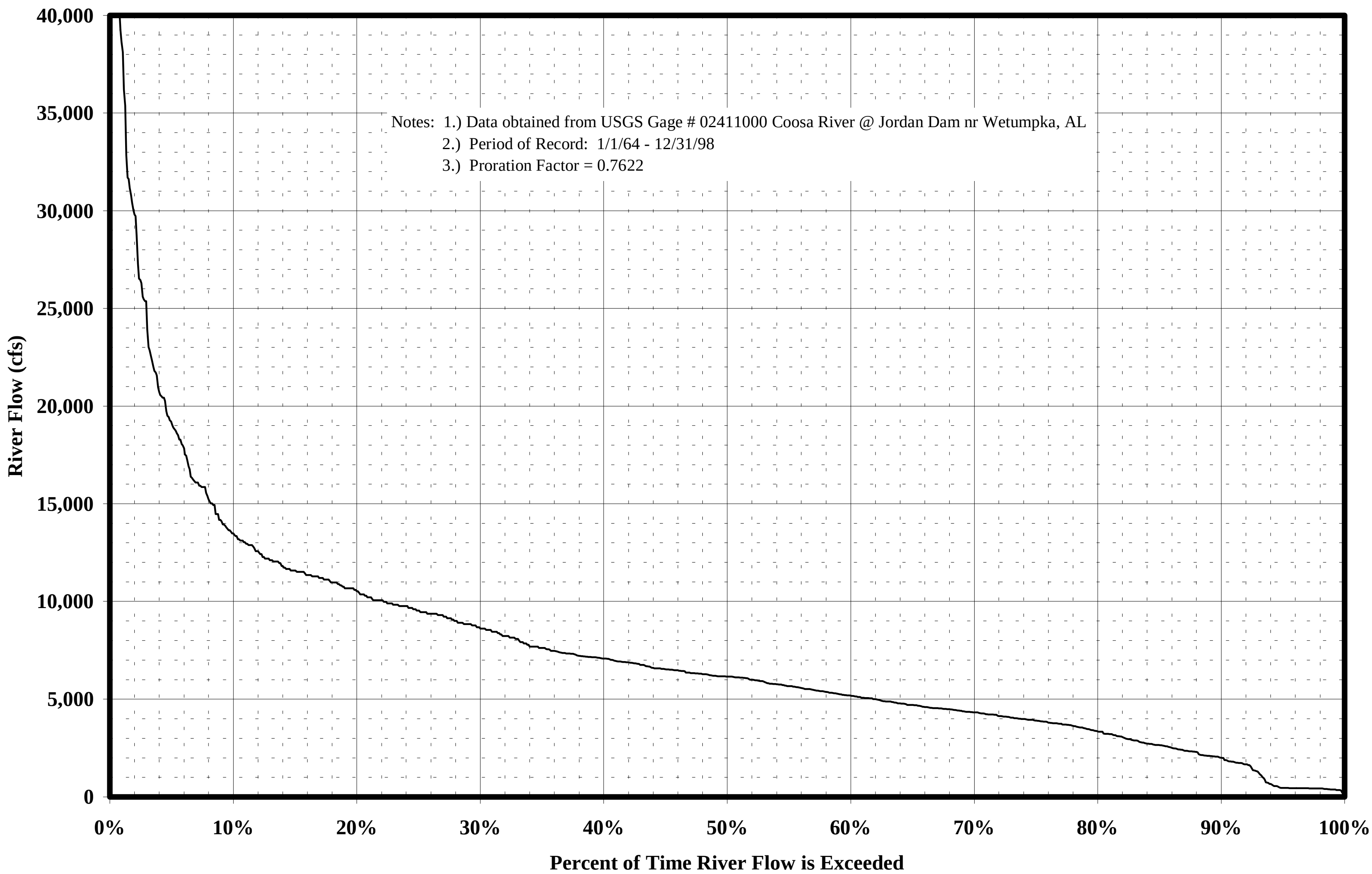


Figure 3.1-7 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, July Flow Duration Curve

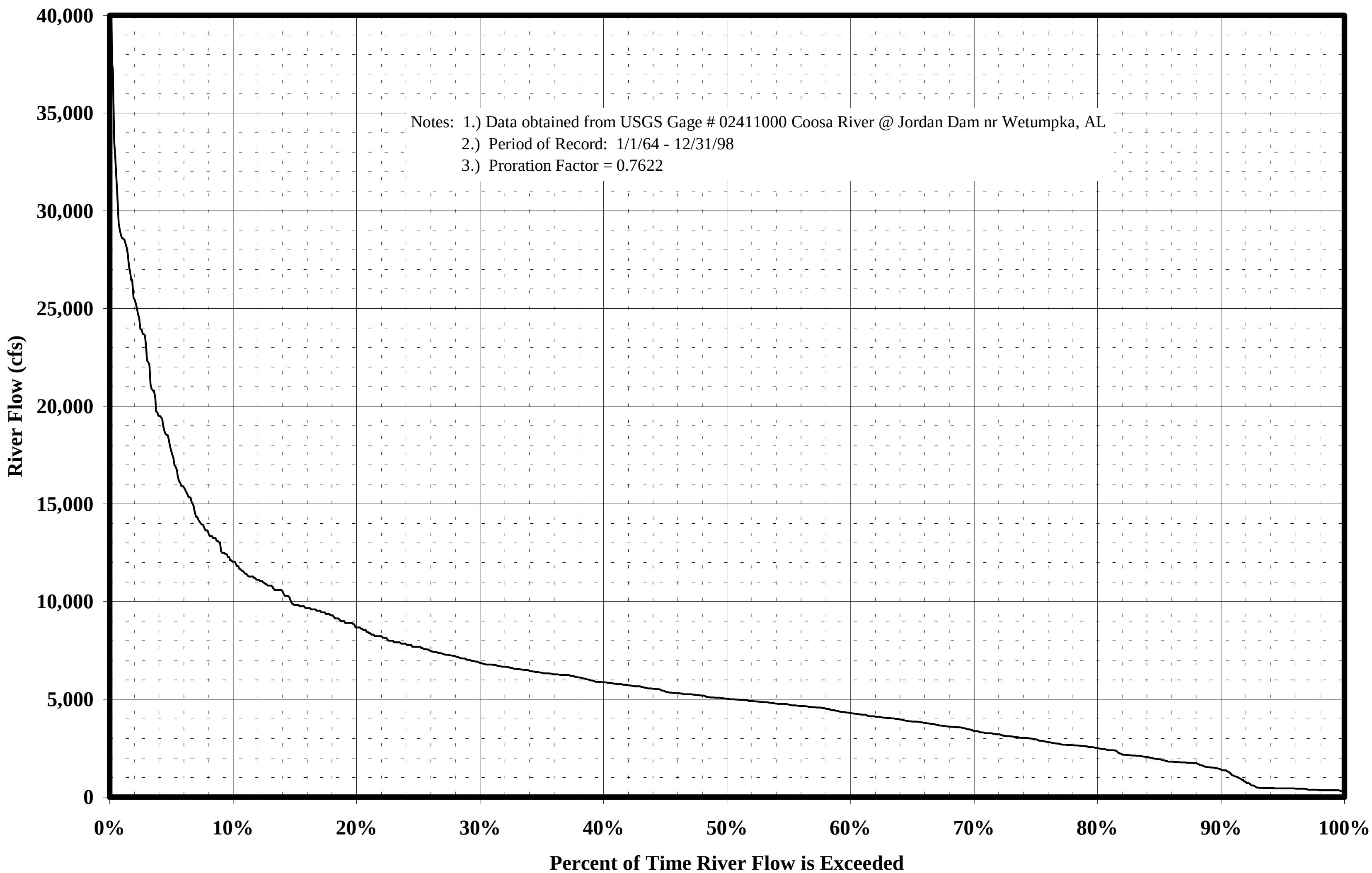


Figure 3.1-8 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, August Flow Duration Curve

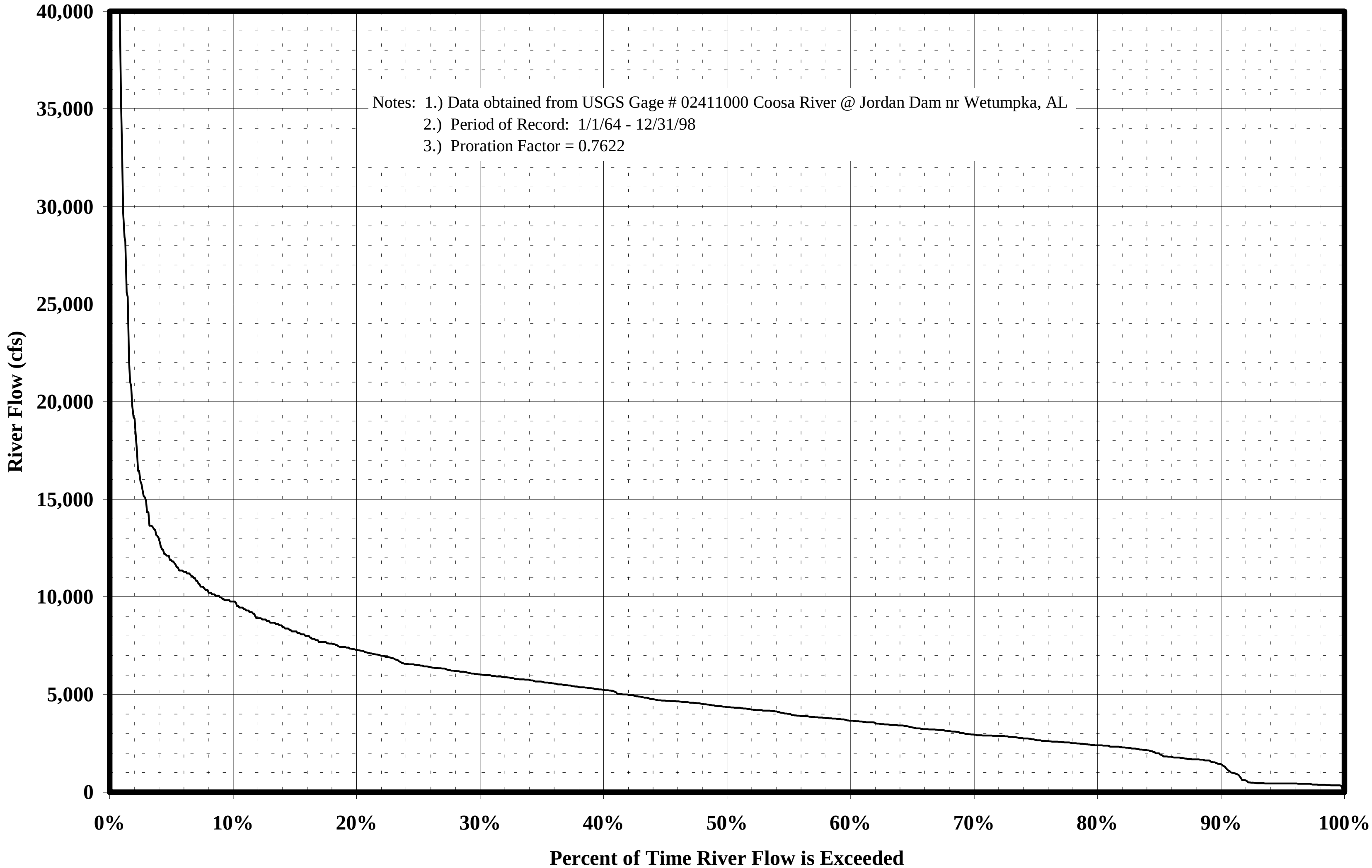


Figure 3.1-9 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, September Flow Duration Curve

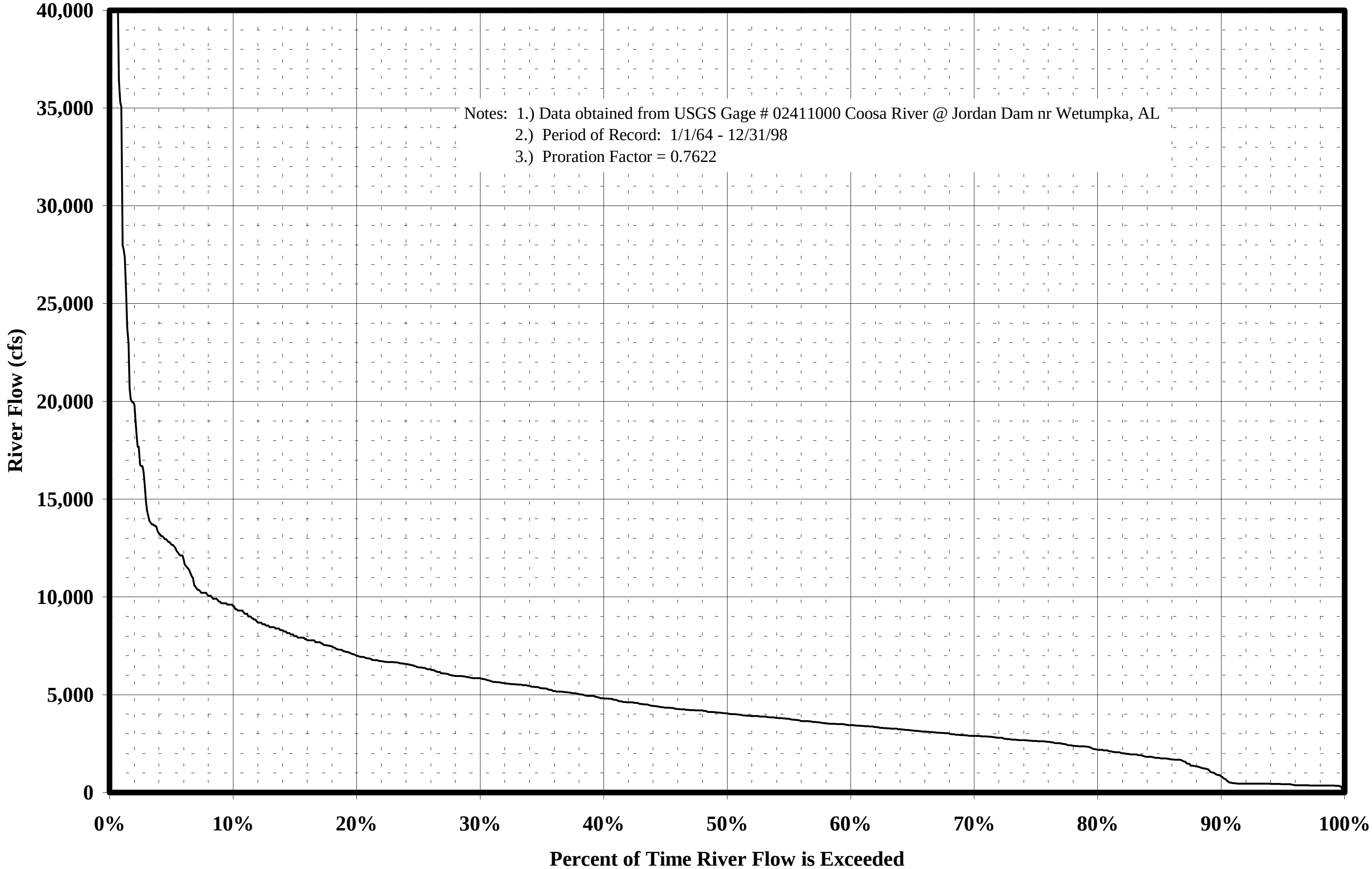


Figure 3.1-10 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, October Flow Duration Curve

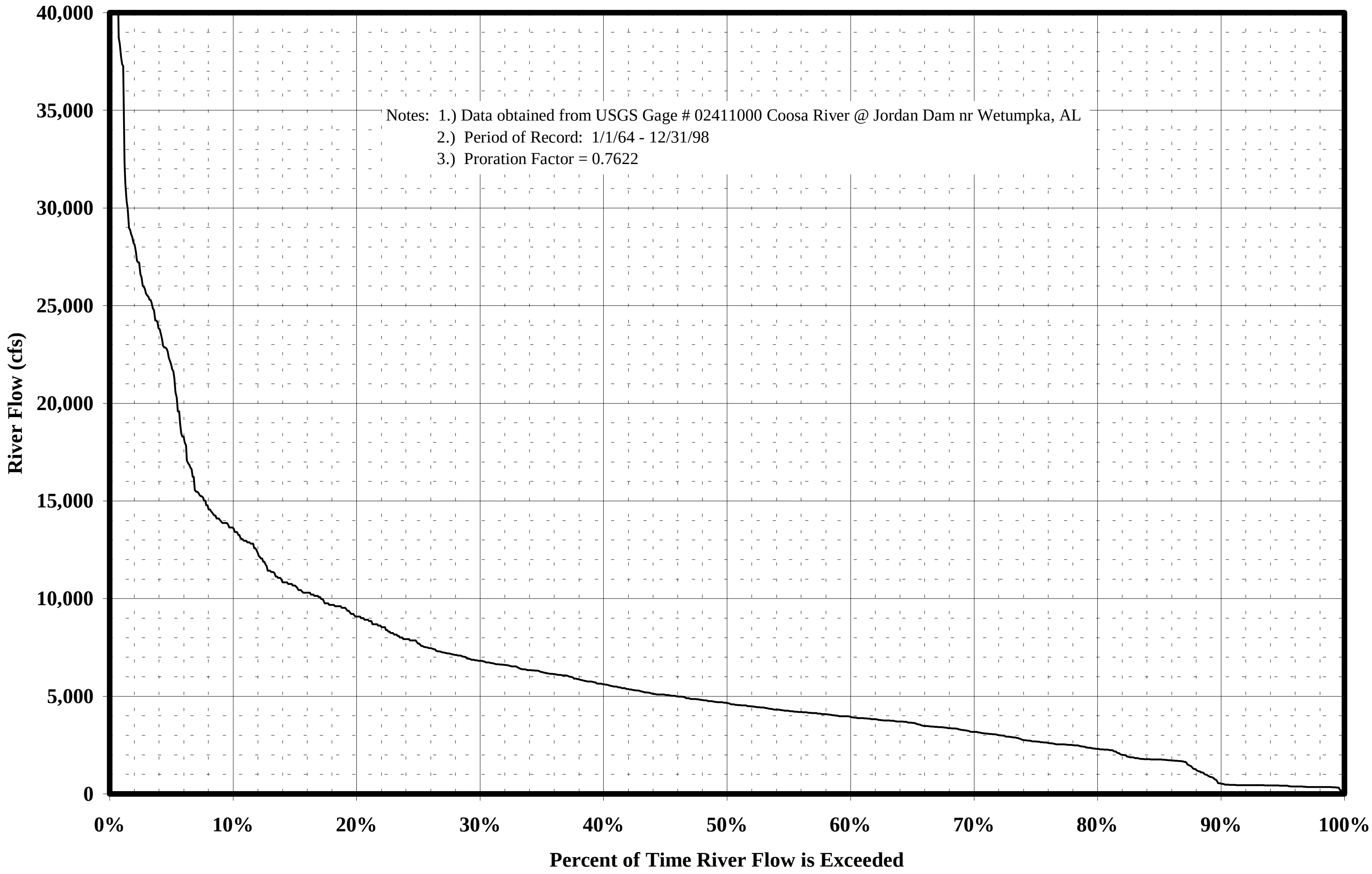


Figure 3.1-11 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, November Flow Duration Curve

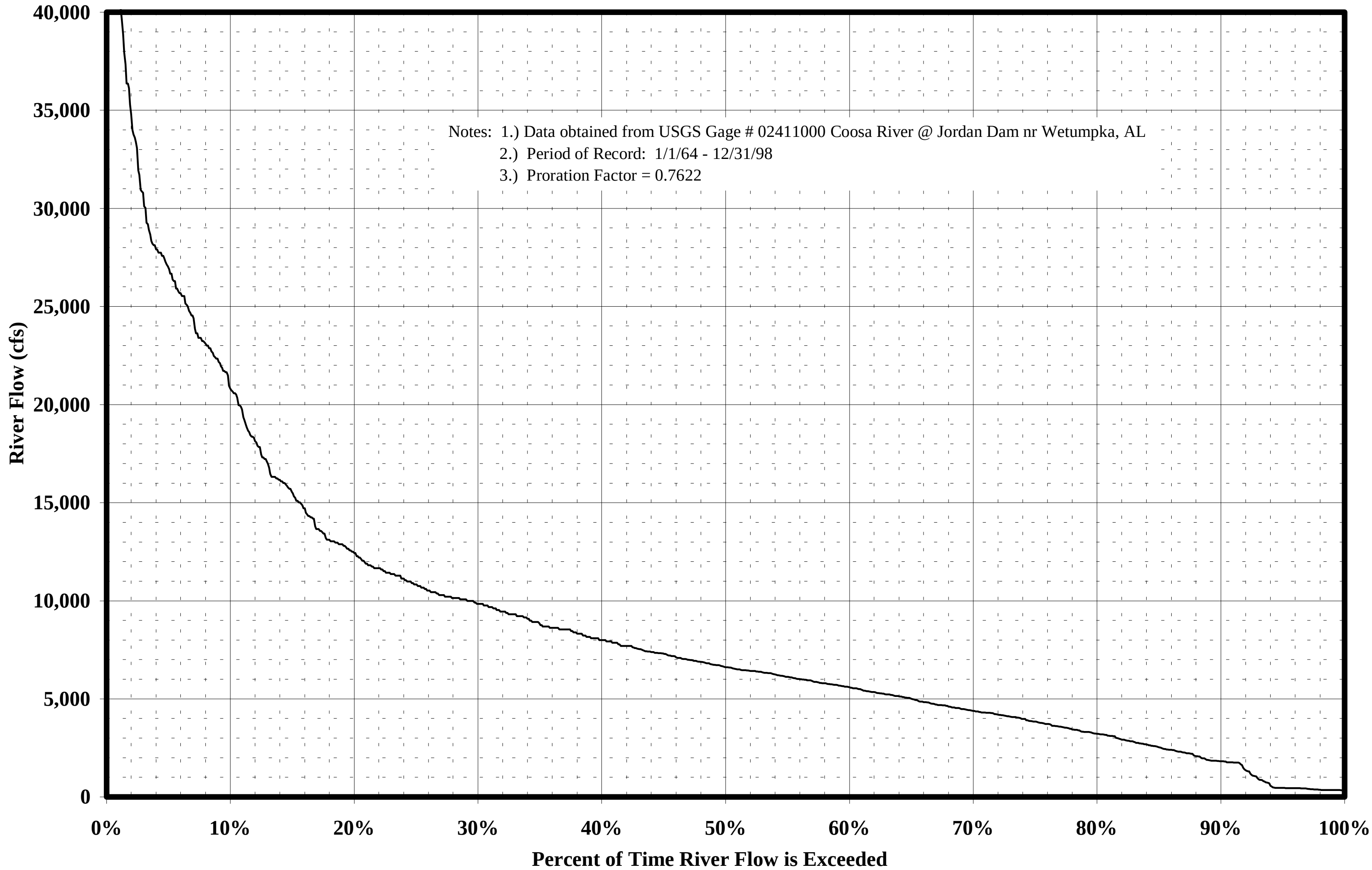


Figure 3.1-12 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, December Flow Duration Curve

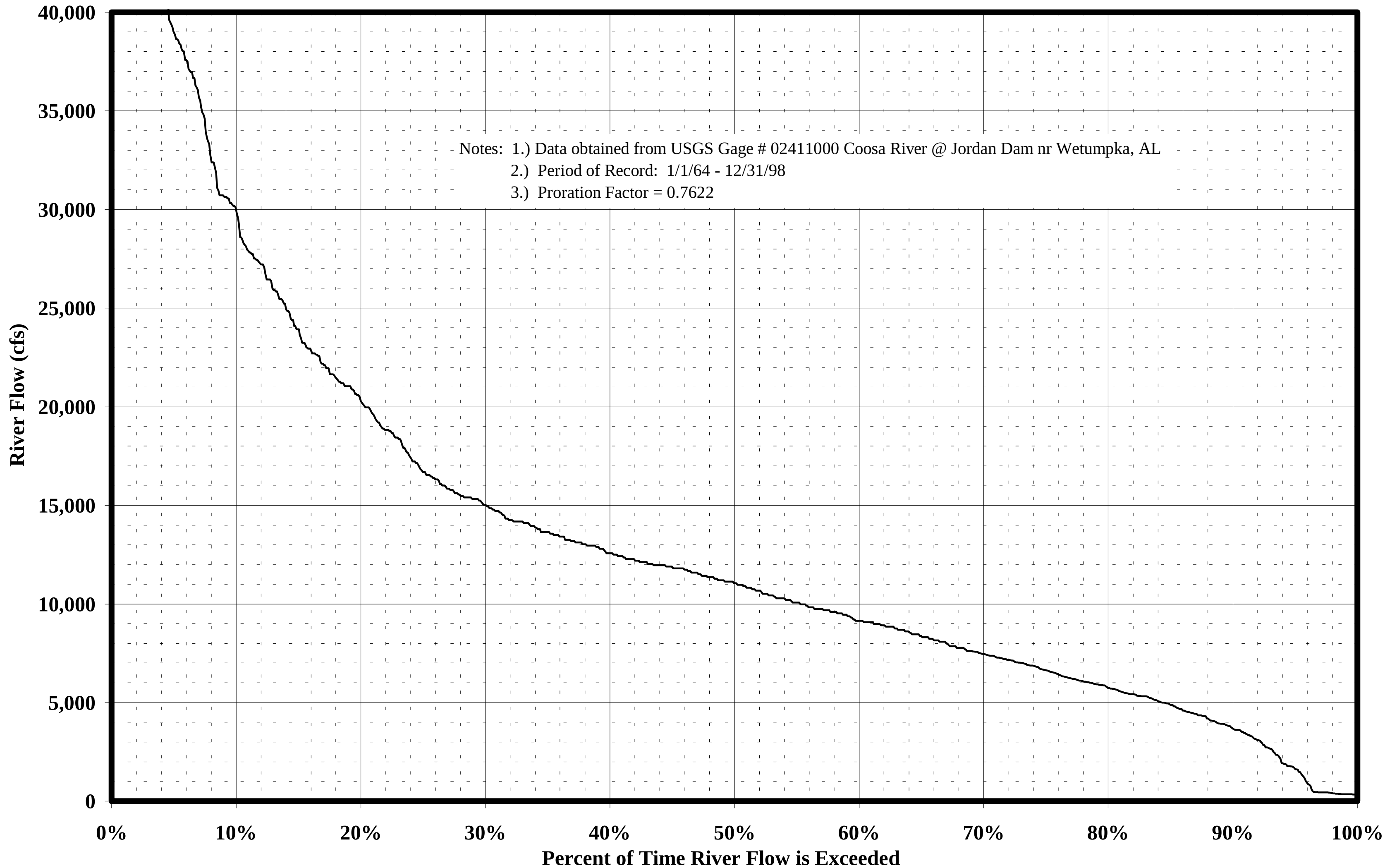


Figure 3.1-13 Alabama Power Company, Coosa River Project FERC # 2146, Logan Martin Development, Annual Flow Duration Curve

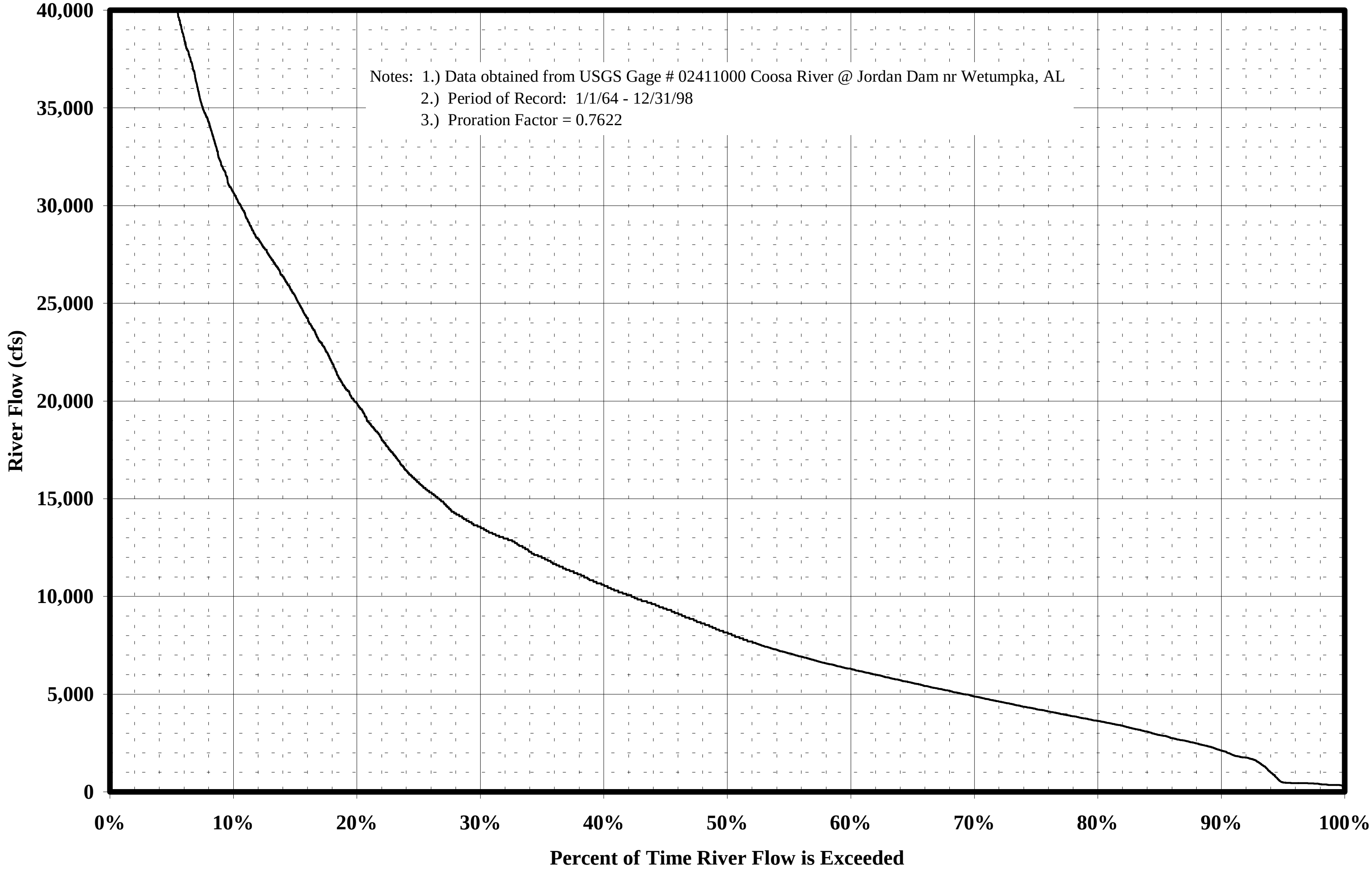
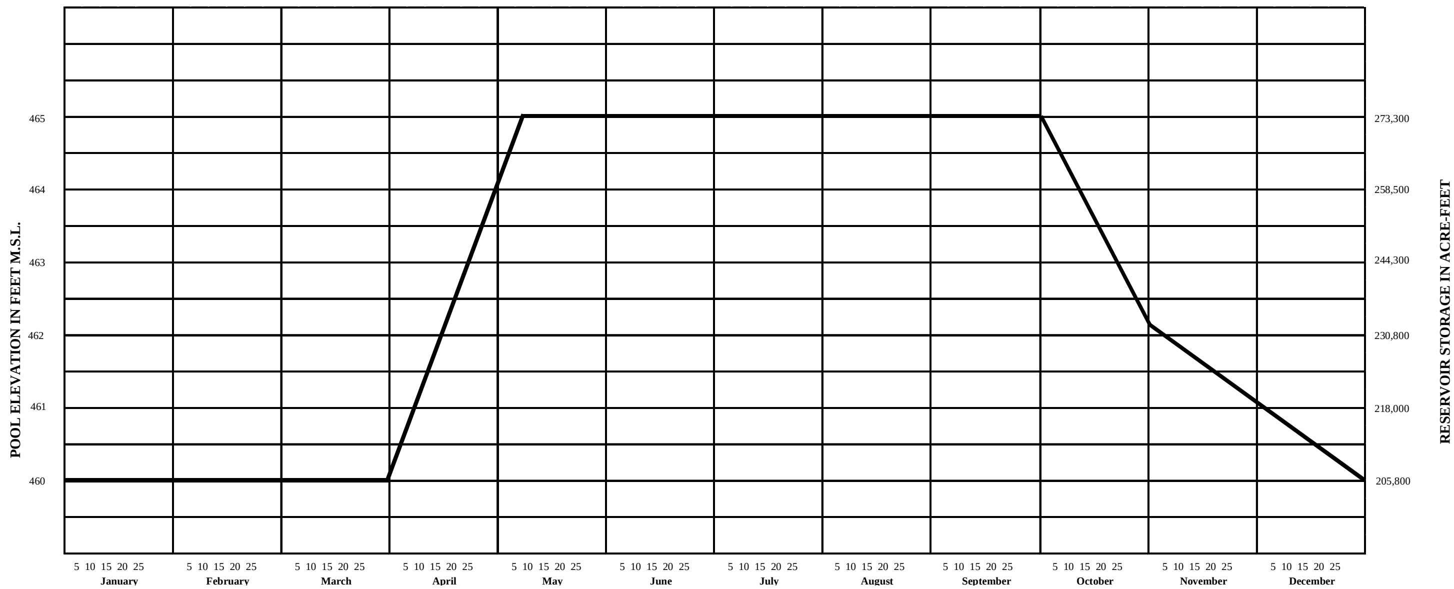


Figure 3.2-1 Storage Delineation Curve - Top of Power Pool (Source: APC 1967, as modified by Kleinschmidt)



ALABAMA - COOSA BASIN
RESERVOIR REGULATION MANUAL

LOGAN MARTIN RESERVOIR
(ALABAMA POWER COMPANY)
COOSA RIVER, ALABAMA

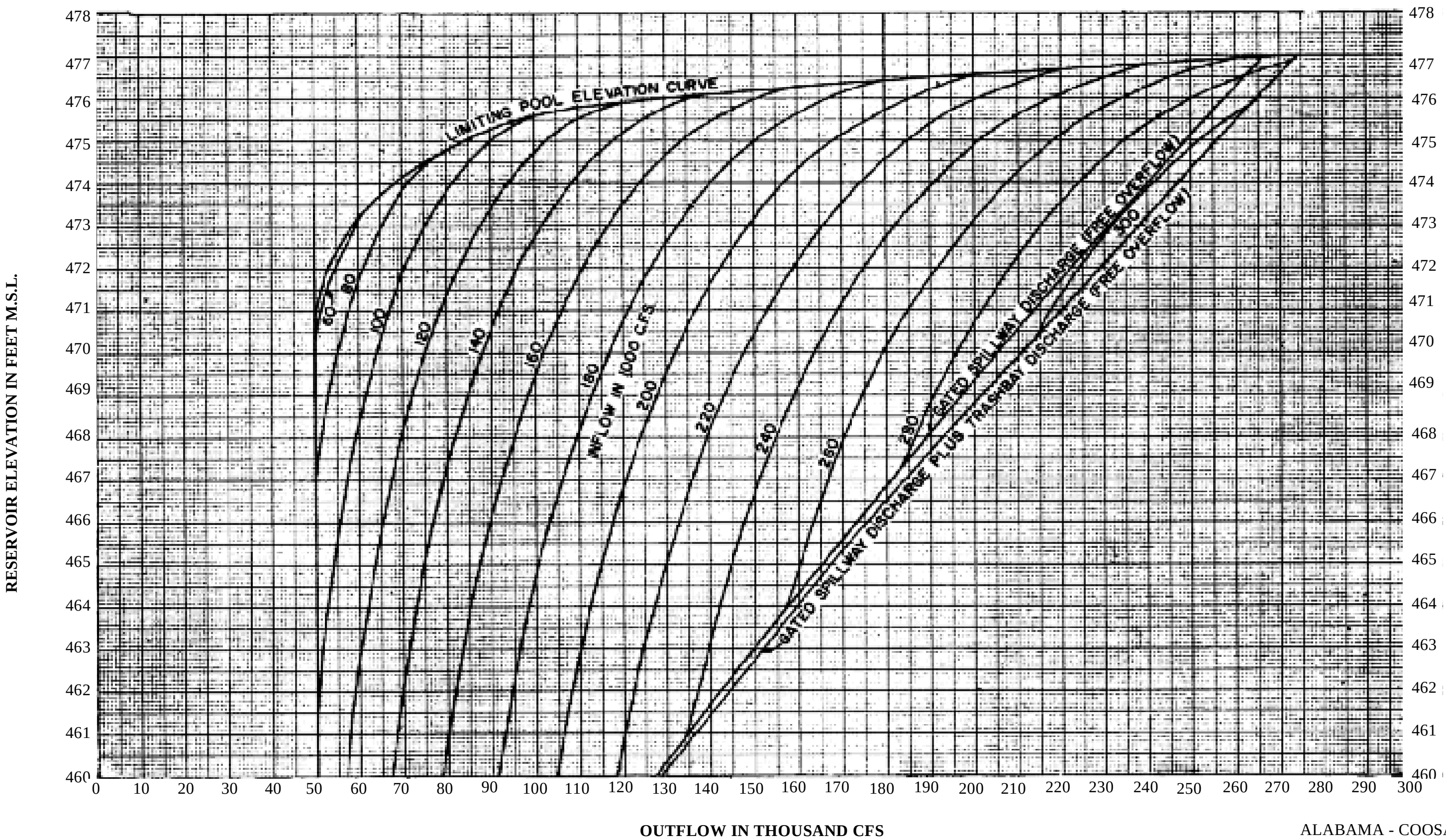
STORAGE DELINEATION CURVE
(TOP OF POWER POOL)

Figure 3.2-2 Flood Control Regulation Schedule for Logan Martin Reservoir (Source: APC 1967, as modified by Kleinschmidt)

Rule No.	Reservoir Stage	Required Outflow (1)	Operation
1	Below top-of-power-pool curve, Figure 3.2-1	Up to plant capacity	Operate power plant as required to satisfy normal system load requirements.
2	At top-of-power-pool, Figure 3.2-1	Ranging up to 50,000 cfs	Maintain reservoir stage at top-of-power-pool elevation, Figure 3.2-1, by passing the inflow up to 50,000 cfs.
3	Rising above top-of-power-pool elevation, Figure 3.2-1	50,000 cfs unless higher rate is specified by induced surcharge schedule, Figure 3.2-3	Maintain total discharge of 50,000 cfs until: (a) Reservoir stage recedes to top-of-power-pool elevation, Figure 3.2-1, after which Rule 2 applies, or (b) Reservoir stage and rate of inflow are such that higher rate of outflow is required by induced surcharge schedule. Figure 3.2-3, in which case Rule 4 applies.
4	Rising above top-of-power-pool elevation, Figure 3.2-1 with releases above 50,000 cfs specified by induced surcharge schedule, Figure 3.2-3	As specified by induced surcharge schedule, Figure 3.2-3	Operate according to induced surcharge schedule, Figure 3.2-3, passing the required outflow through the powerplant and spillway.
5	Above top-of-power-pool elevation, Figure 3.2-1 and falling		When the reservoir level begins to fall maintain the gate openings in effect at time of peak reservoir stage and continue power plant discharge in effect at that time until reservoir level recedes to top-of-power-pool elevation, Figure 3.2-1

(1) Normally releases will be made through the power plant at rates up to continuous operation at plant capacity (3 units at full-gate) supplemented by spillway discharge. If for any reason the power plant becomes inoperative the total required discharge will be passed through the spillway.

Figure 3.2-3 Induced Surcharge Curve (Source: APC 1967, as modified by Kleinschmidt)



ALABAMA - COOSA BASIN
RESERVOIR REGULATION MANUAL

LOGAN MARTIN RESERVOIR
(ALABAMA POWER COMPANY)
COOSA RIVER, ALABAMA

INDUCED SURCHARGE CUR

4.0 ENVIRONMENTAL RESOURCES

4.1 Geology and Soils

4.1.1 Surficial and Bedrock Geology

The Logan Martin Project area is located entirely within the Valley and Ridge physiographic province of the southern Appalachian Mountains. The bedrock geology of this area is comprised dominantly of Paleozoic era sedimentary formations (primarily shales and limestone, with some other sedimentary rock such as sandstones and dolomite) that have been extensively folded, faulted and thrusted. The geology results in ridges that are typically northeast-southwest oriented (ACOE, 1998). Valleys are formed in areas of easily weathered rock such as limestone and shale (Catchings and Cook, 1987). Ridges occur in areas of more resistant rock such as sandstone and quartzite (Catchings and Cook, 1987). The Coosa River and Logan Martin Lake occupy a valley of mostly limestone between the Logan Martin tailrace and the upstream extent of the lake (Catchings and Cook, 1987). The lake and vicinity contain karst features such as sinkholes and springs associated with the weathering of limestone (Jansen, 1994).

The Logan Martin Dam is located in the Coosa Valley subprovince of the Valley and Ridge physiographic province. The bedrock at the immediate Logan Martin Dam site consists of limestones and siliceous dolomites (Jansen, 1994). Deep rock excavation and grouting was necessary during dam construction because weathering of the calcareous bedrock had created large cavities that were filled with residual material (Jansen, 1994).

Floodplain alluvium and residuum (unconsolidated weathered material that accumulates over disintegrating rock) overlies the bedrock in portions of the region adjacent to streams (USDA, 1978; Verigin, 1995). Concentrations of coal deposits are found in the western portion of the Logan Martin Lake watershed (Catchings and Cook, 1987; USDA, 1978). These deposits typically occur between shale and sandstone layers. Small amounts of heavy metals, such as iron, aluminum and tin are found in the region (Catchings and Cook, 1987). Limestone deposits are mined in the region as well (USDA, 1978).

4.1.2 Seismicity and Geologic Stability

The northern half of Alabama has been historically subjected to moderate seismic activity (Jansen, 1994). There are a series of northeast trending thrust faults with southeasterly dips in the Logan Martin Lake region (Jansen, 1994). Three thrust faults outcrop in the vicinity of the Logan Martin Dam (Jansen, 1994). The dam and lake are underlain by rock of the Pell City fault block which has experienced periods of intense deformation (Jansen, 1994). The Pell City fault is one of the major thrust faults in the area (Verigin, 1995). This fault is not considered to be active (Verigin, 1995). There is also a well-developed series of vertical faults crossing the dam site that are widened by preferential groundwater flow (Jansen, 1994).

Seismic events have been of moderate magnitude in the region. Three earthquakes, all prior to 1940, have occurred in Alabama that were felt at in the vicinity of the Logan Martin development. A few quakes that were centered outside of Alabama have also been felt. A seismic coefficient of 0.1 is justified in the stability analysis of Project structures (Jansen, 1994; Verigin, 1995).

The development has a long history of sinkhole activity due to the karst topography. The many large-scale efforts that have been implemented to control sinkholes have established a near equilibrium condition (Jansen, 1994).

4.1.3 Soils

The Logan Martin development area soils are dominantly Ultisols (Brady and Weil, 1996; Catchings and Floyd, 1988). This soil order, which covers the majority of the state of Alabama, has developed in forested, humid/high rainfall, subtropical conditions on old landscapes (*e.g*., not glaciated or recently flooded). These soils are characterized by a surface soil (the uppermost part of the soil, ordinarily moved in tillage or its equivalent in uncultivated soils) that is often acidic and low in plant nutrients. The surface has a low base status (measure of fertility associated with a low percentage of the exchange capacity is satisfied by base-forming cations) due to high rainfall, weathering that has occurred over long time periods, and parent materials low in base forming minerals (Brady and Weil, 1996). Although Ultisols are not as fertile as many other soil orders they do support abundant forest growth and respond well to management for agriculture. The most fertile croplands in the Project area, however, occur in the alluvial stream valleys (USDA, 1974; Bayne *et al*., 1995).

Although soils that have formed in limestone are dominant, soils derived from alluvial (water-sorted material deposited on land by water) material border portions of the Coosa River and tributary streams (USDA, 1974). These alluvial soils are in the Inceptisol and Entisol orders and are much younger than the Ultisols (USDA, 1974; Brady and Weil, 1996). The soil forming process has only recently begun to alter the alluvial parent material. These soils are the most productive in the Project area and are generally not susceptible to erosion since they are on flat plains in valley bottoms (USDA, 1974). Lastly, soils derived from colluvium occur on steep sideslopes and are also relatively young (Inceptisols and Entisols). The colluvial soils in the Project area are susceptible to erosion.

Dominant soil associations (a group of soils geographically associated in a characteristic repeating pattern and defined as a single mapping unit) around the immediate perimeter of the Logan Martin Lake and the Coosa River below the dam include: Decatur-Dewey-Fullerton, Allen- Holston-Cane, and Bodine-Minvale (USDA, 1974; Bayne *et al*., 1995). These soils are dominantly deep, and moderately well drained to well drained. They are typically loamy, but in places are gravelly or cherty (chemically precipitated product of weathering). They are dominantly derived from limestone or cherty limestone. Gentle to moderate slopes (*i.e*., less than 15 percent) are typical on the immediate shorelines, but steep slopes occur on the side-slopes of ridges in the surrounding region (USDA, 1974). Erosion potential is generally moderate depending on slope and vegetation coverage (USDA, 1974; USDA, 1978; Bayne *et al*., 1995). Siltation problems occur in Logan Martin Lake related to erosion in the contributing watershed and periodic dredging operations necessary to maintain seawalls, piers and access slips (ACOE, 1998). The siltation appears to be primarily related to development occurring in lands upstream and immediately surrounding the lake (ACOE, 1998).

4.1.4 Climate

The climate of Talladega County (the Coosa River and Logan Martin Lake form the western edge of this county) is temperate but borders on subtropical in the summer. The summers in the Project area, between about May through September, are hot (slightly cooler in the hills and slightly hotter in the valleys) and humid. The average temperature in the summer is about 79°F, and the average daily maximum is approximately 90°F. The temperature exceeds 100°F usually only about one or two days per year. Breaks in the hot weather are few in July and August and thunderstorms are common (USDA, 1974).

The winters are characterized by frequent shifts and interaction between cold dry air moving south from Canada, and moist and mild air from the Gulf of Mexico. This results in considerable cloudiness and precipitation. Snowfall is infrequent and typically remains on the ground for only short periods at a time. Freezing temperatures occur, on average, about 60 times per year (primarily during the period from December through February). Average winter temperature in Talladega County is about 45°F. The average daily minimum temperature is about 34°F (USDA, 1974).

The total annual precipitation is approximately 52 inches, and precipitation is fairly evenly distributed throughout the year (Perrich, 1992). March is the wettest month of the year. Thunderstorms occur commonly in the summer, particularly in July. Heavy rain is also common, and rainfall amounts in excess of 5 inches have been recorded. Locally severe storms, including tornadoes, occur periodically. Precipitation exceeds evaporation, but periodic droughts do occur. Moderate droughts occur every two or three years in the Logan Martin area, but severe droughts occur only about every fifteen years or so (USDA, 1974).

4.2 Water Resources

4.2.1 Water Quality Classifications/Standards

ADEM (1999) is responsible for implementing management objectives for the State's waters. ADEM's "Use Classification" system is based on existing use, future uses, and uses not now possible because of pollution, but however could be available if the effects of pollution were controlled or eliminated. Stream Use Classification from Logan Martin Dam upstream to Henry Dam is "Swimming (S) and Fish and Wildlife (F&W)" and from the dam downstream to 1.5 miles above Talladega Creek (river mile 89) "Public Water Supply (PWS) and F&W." Waters from River mile 89 downstream to the Southern Railway Bridge are classified as "F&W". These designated uses are intended to conserve the waters of the State and to protect, maintain and improve the quality of public water supplies for the propagation of fish, wildlife and aquatic life, and for domestic, industrial, agricultural, recreational and beneficial uses.

ADEM's numerical water quality criteria serve to determine how waters of the State may be best utilized, to provide a guide for determining waste treatment requirements and determining the basis for water quality standards. Table 4.2-1 (Appendix C, pg. C-5) lists ADEM's water quality criteria as they apply to the Coosa River Basin including lakes, reservoirs and all supporting tributaries.

4.2.2 Water Quality Studies

Logan Martin Lake

In 1984, the ADEM conducted a study to determine the potential effects of hydroelectric dams on water quality in Alabama. The ADEM study assessed 22 reservoirs and dams to evaluate stratification tendencies with respect to temperature and DO profiles, with the expectation that stratification data would provide a good indication of water quality that typically passes through the power turbines to the tailrace area (ADEM, 1984). Of the 22 reservoirs studied, all reservoirs (including Logan Martin Lake) exhibited some thermal and chemical stratification tendencies at some point throughout the year (ADEM, 1994).

Data collected from Logan Martin Lake indicate stratification with respect to DO and very slight temperature stratification (ADEM, 1984). Extreme DO stratification was observed in the lower depths of the water column (60 to 70 ft) suggesting possible longer hydraulic retention time in the Logan Martin Lake (ADEM, 1984). Data collected from the Logan Martin tailrace during the ADEM study documented several incidences when DO levels typically ranged from 0.9 to 1.2 mg/l throughout the period from June to August. The study concluded that a reported 600 cfs leakage in the limestone on which the dam was constructed is a major contributing factor to these low tailrace DO levels (ADEM, 1984). Evidence of the leakage, in the form of boils and swirls, can be observed some distance downstream of Logan Martin Dam.

Industrialization of the upper Coosa River has had a pronounced effect on water quality in the Coosa River Basin. In 1962, the production doubled from Rome Kraft (Inland-Rome) pulp and paper mill and Weiss Lake reached full pool upon completion of the dam, which reduced flow and the natural aeration of the Coosa River as it flowed into Alabama. A study conducted during that year indicated that the presence of gross pollution from sources within Georgia was affecting the Coosa and Chattooga Rivers (Bayne *et al*., 1995). The oxygen demand of the Rome Kraft (Inland-Rome) treated waste and residual organic loading from Rome, Georgia exceeded the available oxygen supply in the Coosa River (Bayne *et al.*, 1995). This impact diminished DO levels in the Coosa River as it flowed into Alabama.

In 1973, the Environmental Protection Agency (EPA) conducted a National Eutrophication Survey of eleven Alabama Lakes. Results of the study concluded that Logan Martin Lake was classified as eutrophic which was likely the result of high phosphorus inputs from the upper Coosa Basin River (EPA, 1976).

The 305(b) Water Quality Report to Congress (ADEM, 1998) identifies the status and recent trends in the quality of the State's waters and indicates that nearly all of Logan Martin Lake's designated uses of aquatic life, recreation, and public water supply are threatened. The report indicated that nutrient loading and trophic status are areas threatening the current uses. Logan Martin Lake's trophic status (60 Trophic State Index (TSI)) ranked it in the top five of all reservoirs in the state. A TSI value of 60 is considered moderately eutrophic (rich in plant life and nutrients). Only upstream lakes (Weiss Lake and Henry Lake) contained trophic states higher than Logan Martin Lake, suggesting that Logan Martin water quality is likely influenced by upstream activities. Trends indicate that Logan Martin Lake may be degrading due to increases in trophic state, increases in nutrient concentrations, institution of fish consumption advisories or a combination of these factors (ADEM, 1998). The report concluded that Logan Martin Lake's aquatic life and recreation uses are considered threatened (ADEM, 1998). Point and non-point source pollution tend to be the most influencing factors on water quality in all upstream reservoirs and are likely to continue influencing Logan Martin Lake as well.

Toxic Effects

The 305 (b) Report (ADEM, 1998) listed Polychlorinated biphenyls (PCB) contamination in fish tissues as a potential area of concern for portions of Logan Martin Lake. U.S. Food and Drug Administration reported the source of PCB contamination as the General Electric plant in Rome, Georgia that manufactured transformers. General Electric has since been placed under a consent order to reduce PCB contamination run-off from their plant site (Bayne *et al.*, 1995). In 1989 the State Health Officer issued a health advisory for catfish from the Georgia/Alabama state line to Logan Martin Dam. An additional advisory for non-consumption of largemouth, spotted or striped bass has been issued and is currently in effect for the area from Riverside, Alabama to Logan Martin Dam due to additional PCB contamination from Choccolocco Creek (ADPH, 2000). Separate "no consumption" advisories are in effect for Logan Martin Lake from Riverside, Alabama downstream to Logan Martin Dam and between the Logan Martin Dam to Lay Dam (Section 4.3).

Lake Water Quality Sampling

APC continues to monitor water quality within Logan Martin. APC monitors for a number of water quality parameters including temperature, DO and pH.

Logan Martin Lake forebay profiles were collected by APC from 1990 to 1999 and tend to support historical water quality data (Appendix D). The profile data indicates a tendency to strongly stratify chemically (DO) by mid summer with stratification typically observed at depths between the 20 to 30 ft levels and moves upward to the 15 to 20 ft level as the summer progresses. The pattern of stratification continues upstream in the lake for 16 to 18 miles. From approximately 18 miles upstream to the Henry tailrace, stratification is not evident (APC, unpublished data, 2000). Although stratification events are typically of short duration (August to September), periods of stratification may extend from 60 to 90 days. The data indicates that chemical stratification effects begin to subside further upstream of the dam. Figure 4.2-1 depicts the locations where temperature and DO profiles were collected. Table 4.2-2 (Appendix C, pgs. C-6 to C-7) presents maximum, minimum, and average temperature and DO data collected by APC from 1990 to 1999 at the five foot elevation (APC, unpublished data, 2000).

Tailwater Water Quality

Logan Martin tailrace data collected by APC from 1990 to 1999 indicates DO levels drop below the State standard of 4.0 mg/l during the summertime months. The strong stratification observed in the lower depths of Logan Martin Lake significantly affects DO levels in the tailrace. Data presented in Table 4.2-2 (Appendix C, pgs. C-6 to C-7) indicate that the lowest DO concentration observed in the Logan Martin tailrace was 1.2 mg/l, with an average of 6.0 mg/l reported. A continuous tailrace monitoring program was in effect from 1995 to 1999 (Table 4.2-3, Appendix C, pg. C-8) and demonstrated an average DO level in the tailrace of 5.9 mg/l. However, the tailrace discharge dropped below the State water quality threshold (4.0 mg/l) 0.7 percent of the time while generating and only 1.4 percent for the entire period of record. The temperature and DO data was collected at 15-minute intervals during the monitoring period utilizing a Hydrolab Mini-sonde continuous data collector.

APC has implemented mitigation technology by using a turbine aspiration system, a “speece cone” and an “aeration weir” to aerate (*i.e.*, add oxygen) discharges from the Logan Martin Powerhouse and aerate dam leakage in the tailrace. Additionally, generation pulses are used to mix with seepage flows, thus preventing accumulations of low DO waters in the tailrace area. In 1990, APC tested and began the use of the “speece cone” oxygenation system in the Logan Martin tailrace to increase seasonal DO levels. This aeration system uses liquid oxygen that is delivered into an inverted cone along with a stream of water. The stream of water mixes with the small bubbles of oxygen as they rise upward in the cone. The contact time between the bubbles and the water is extended due to the stream of water pushing the bubbles downward within the cone, thus increasing the transfer of oxygen to the water. The large volume of water in the tailrace and the large amounts of leakage through the dam limit the efficiency of the “speece cone” for oxygenation of the entire tailrace. Another factor that limits the efficiency of this system is the high metabolic rate of the existing phytobenthic (mostly blue-green algae) community, which can cause 1 to 2 mg/l shifts in DO levels through daily production and consumption of oxygen.

The type of turbine aspiration that APC uses is referred to as “draft tube aeration”. This method uses the naturally occurring low-pressure area below the turbine runner to aspirate atmospheric air into the draft tube via a pipe or manifold. The low-pressure area is created by the flow of water past the pipe or manifold opening, which draws air into the water flow. As the air and water mixture travel through the draft tube, it is subjected to turbulence and pressure changes that result in the formation of very small bubbles of air. The small bubbles provide an excellent condition for gas-transfer (oxygen and naturally occurring gases) to the water for the length of time that the water and bubbles are in contact. As the water-air mixture moves into the tailrace area the remaining portions of the air bubbles float up to the surface. This type of aeration system typically results in an average increase of 1 to 2 mg/l in DO levels (APC, 1993).

In 1991, APC constructed and tested an aeration weir on the east bank of the Logan Martin tailrace as a means to provide supplemental DO level increases during the summer and fall periods. This weir added approximately 2 mg/l of DO to a subsurface discharge located below the dam on the east bank. As water passes over the weir, it creates a turbulence that traps air bubbles in the water and results in the gas transfer of oxygen and other naturally occurring gases to the water.

Effluent Loading From NPDES Permit Discharge points

See Table 4.2.4 (Appendix C, pgs. C-9 to C-14) for a partial listing of the EPA's PCS database of reported dischargers into the Logan Martin sub-basin (EPA, 2000). The EPA PCS database is a listing of permitted dischargers as reported to EPA. The attached list does not include those permits not reported to EPA such as minor industrial dischargers, some mining dischargers, as well as some municipal/semi-public dischargers.

4.2.3 Water Use

Five water withdrawal facilities are located in or near the Logan Martin development (Figure 4.2-2). Numerous other facilities permitted by ADEM discharge wastewaters either directly into Logan Martin Lake and/or its tributaries. Among these dischargers are wastewater treatment facilities, industrial wastewater dischargers, municipal and semi-public wastewater facilities, as well as mining and other non-point runoff sources (Figures 4.2-3 through 4.3-6). ADEM monitors these facilities and enforces water quality standards through the issuance of discharge permits. The National Pollutant Discharge Elimination System (NPDES) and Alabama Water and Pollution Control Act provide the standards for protecting surface waters.

Information obtained from the ADEM and the EPA PCS database indicates that there are approximately 76 NPDES industrial permits which allow discharges into the Logan Martin sub-basin. In addition, there are 21 municipal/semi-public dischargers as well as 70 mining/other non-point source dischargers into the Logan Martin Lake (Figures 4.2-3 through 4.2-6 and Table 4.2-5, Appendix C, pgs. C-15 to C-20). See Table 4.2-6 (Appendix C, pgs. C-21 to C-23) for flow data collected from the PCS database.

In addition to point source discharges, ADEM has expressed concern regarding non-point source inputs to Logan Martin Lake. Non-point sources include:

- gasoline dumped or spilled into the lakes;
- trash dumped or flushed by heavy rains into the lakes;
- sewage that may go into the lakes from cabin cruisers, residences, and infrequent overflows of sewer pump stations and septic field leachate;
- spills from local industries;
- private lawns that have been treated with fertilizers or pesticides; and
- silvicutural and agricultural land uses

Figure 4.2-1 Logan Martin Lake Water Quality Monitoring Locations

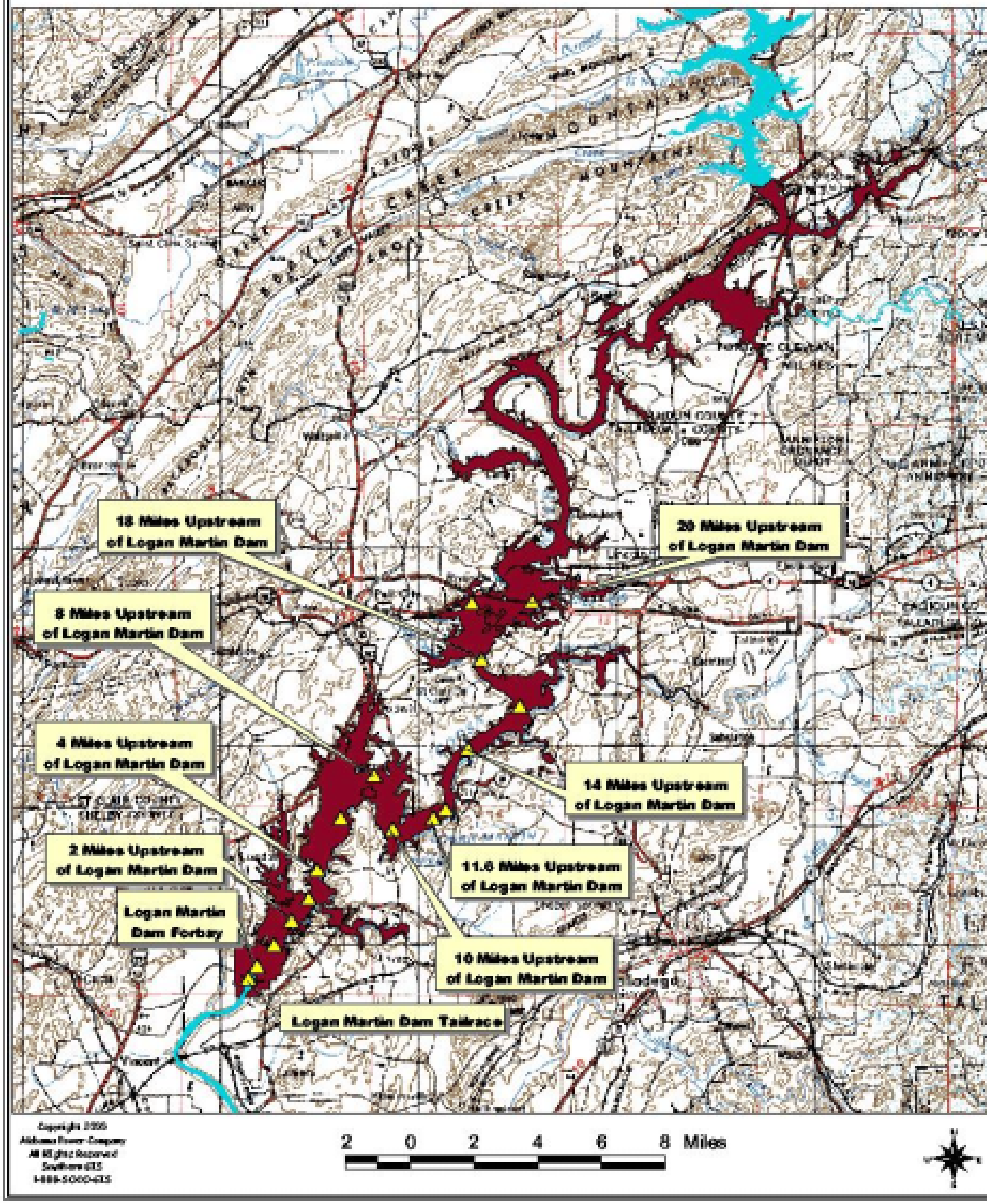


Figure 4.2-2 Water Withdrawal Locations.

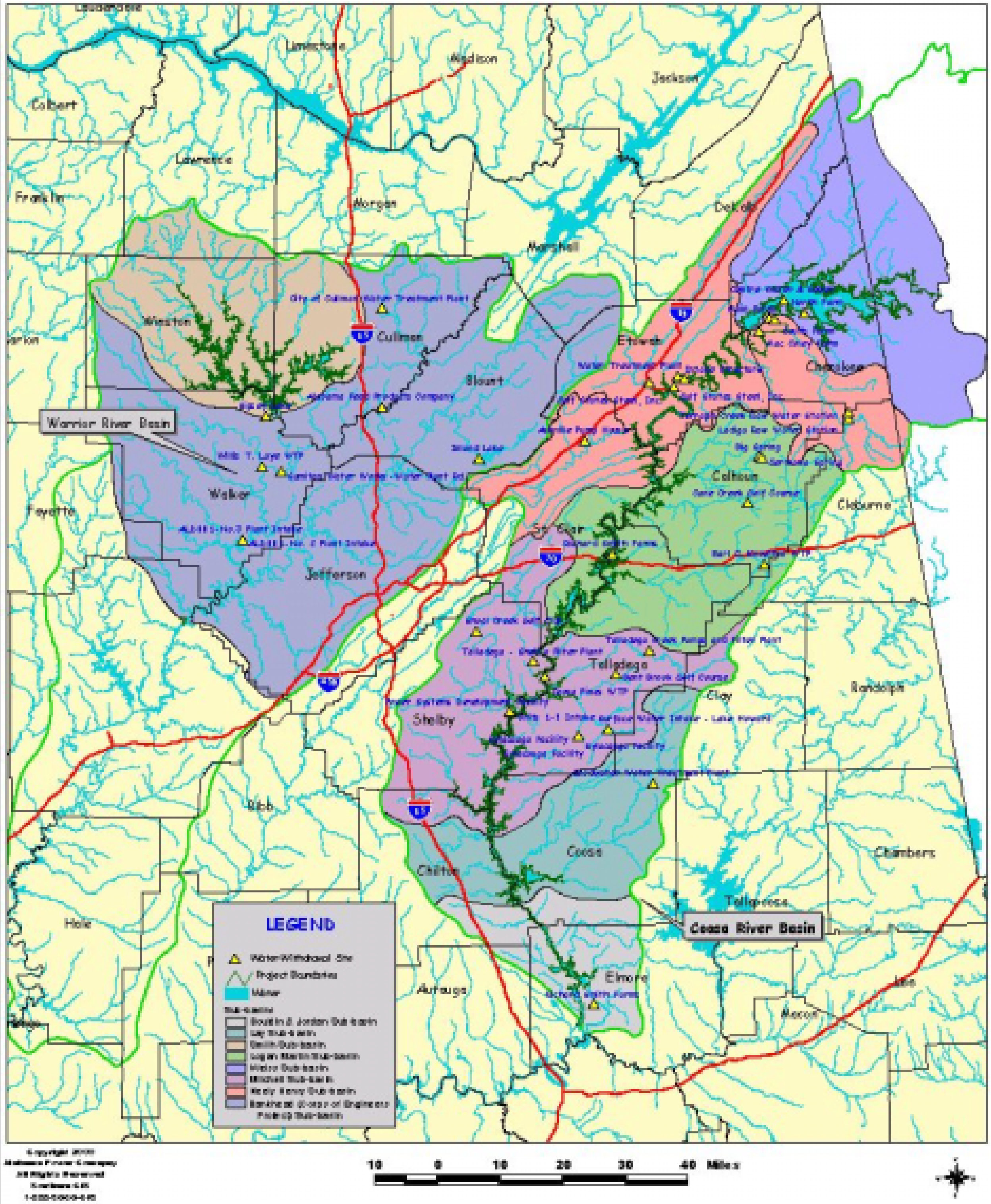


Figure 4.2-3 Wastewater Facility Locations.

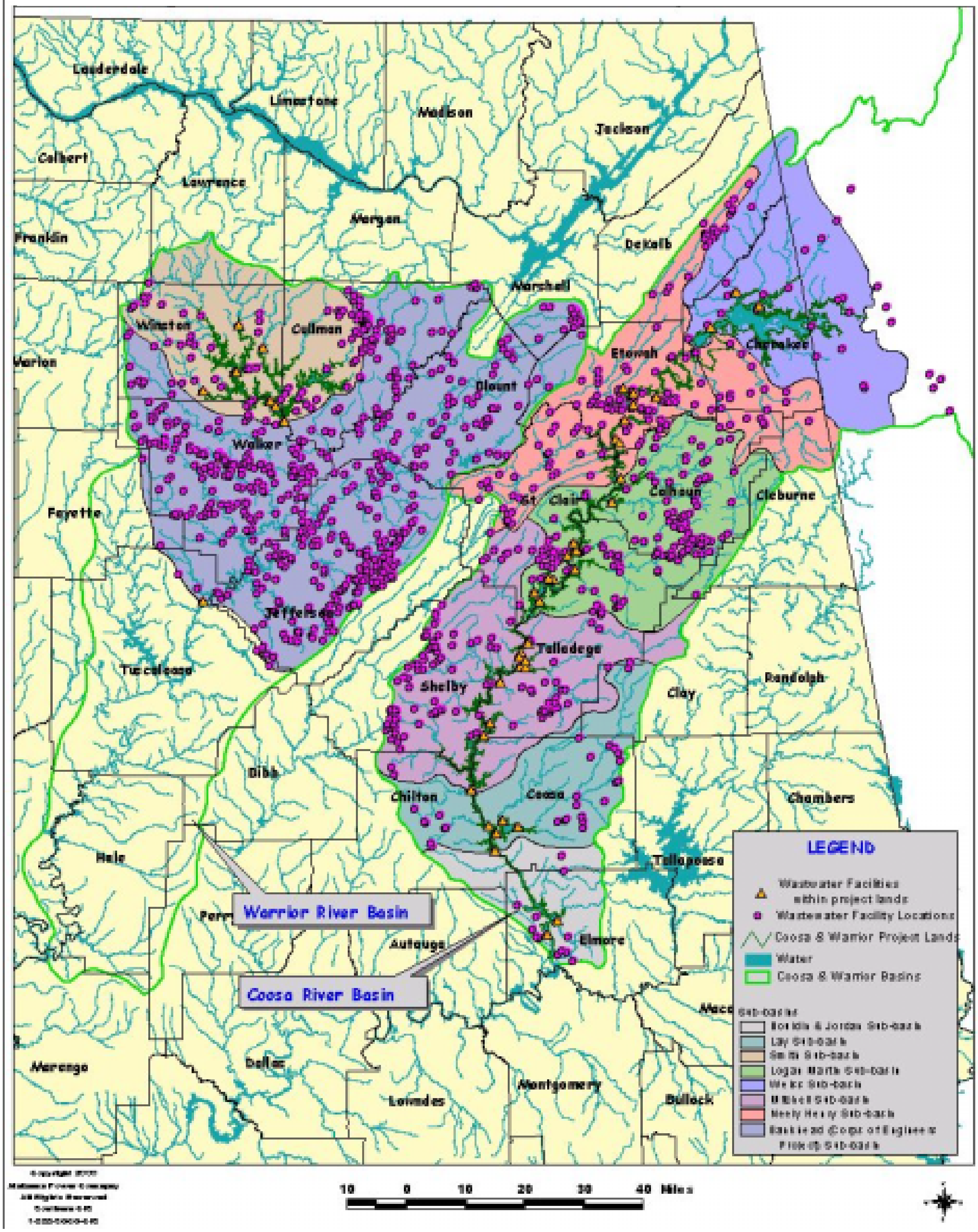


Figure 4.2-4 Industrial Wastewater Facility Locations.

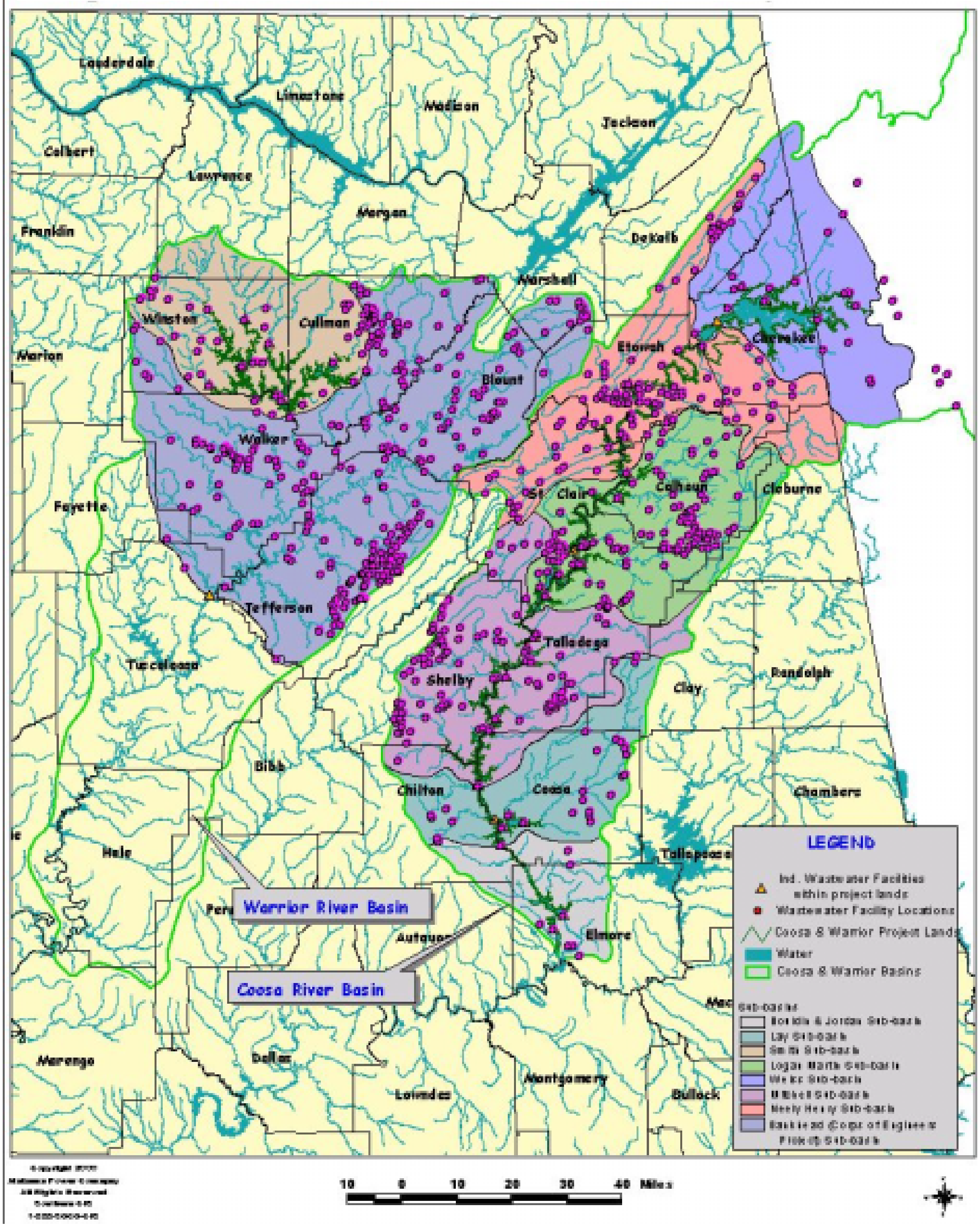


Figure 4.2-5 Municipal & Semi Public Wastewater Facility Locations.

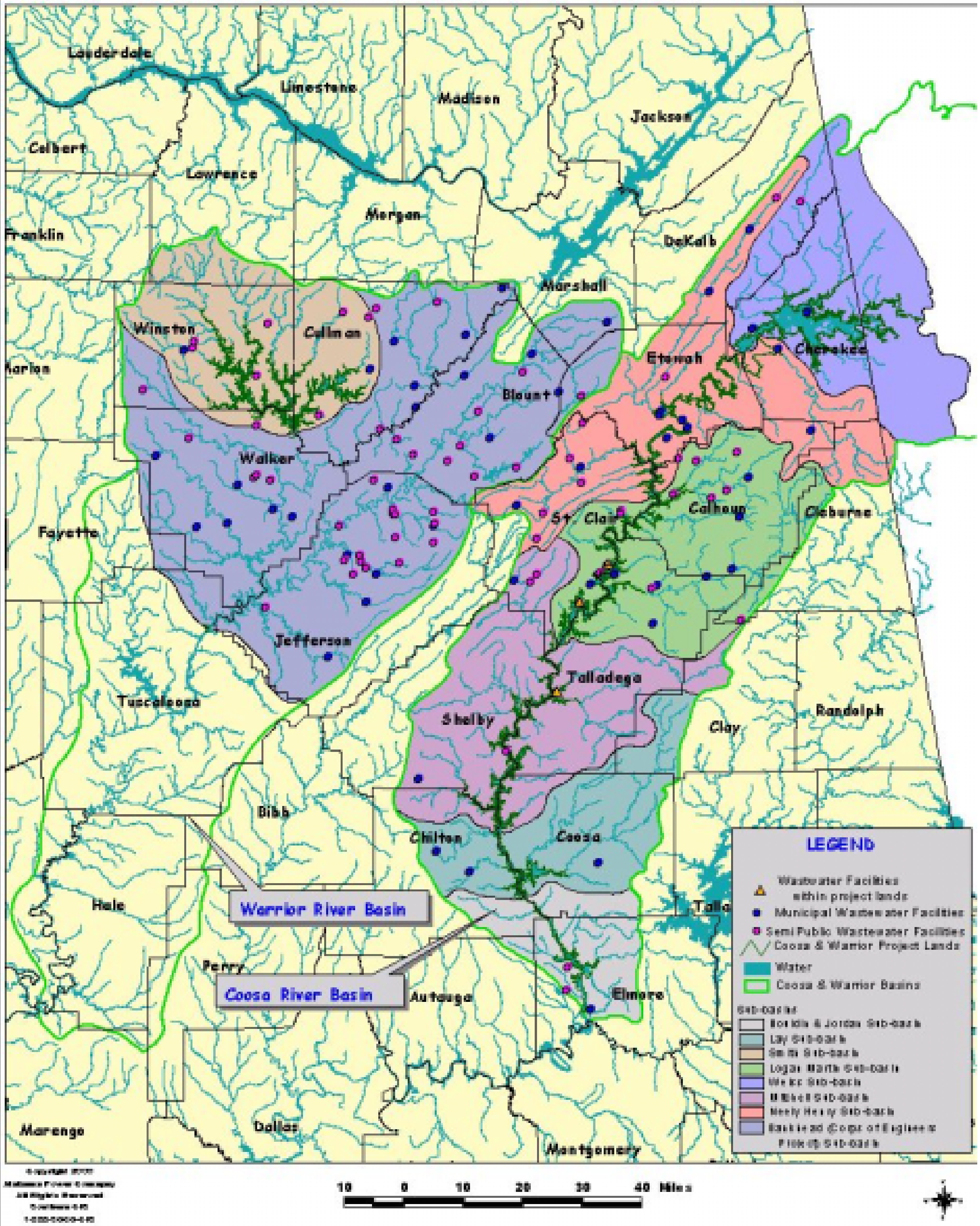
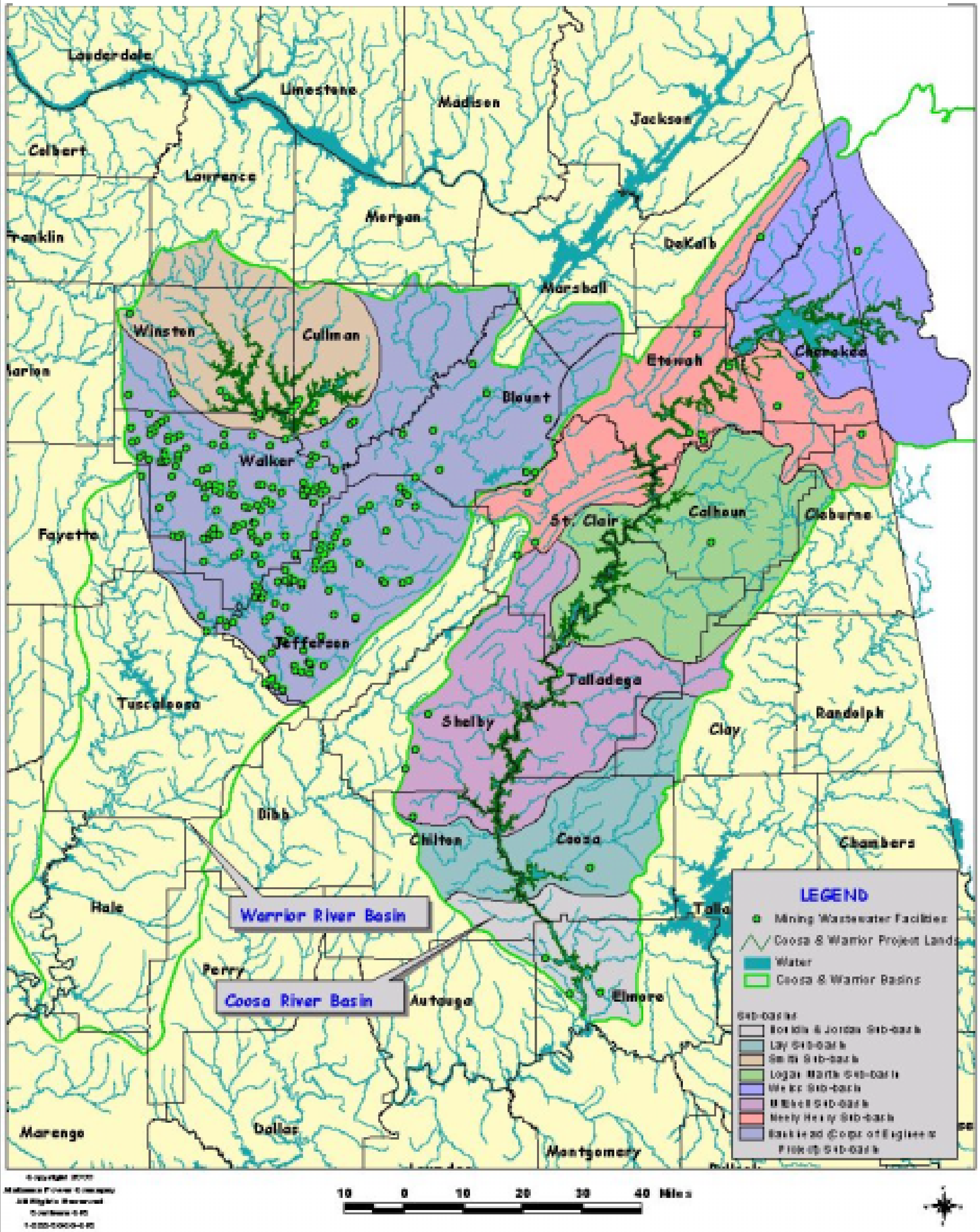


Figure 4.2-6 Mining Wastewater Facility Locations.



4.3 Aquatic Resources

4.3.1 Existing Habitat

Logan Martin Lake

The average depth of Logan Martin Lake is 18 ft, with a maximum depth of 69 ft, which is found in the vicinity of the dam (Catchings and Cook, 1987). As part of its operation plan, the lake is drawn down five feet in the fall and refilled each spring. As discussed in the water quality section (Section 4.2), the waters of Logan Martin Lake are highly productive and fairly turbid, which is similar to upstream lakes. Due to its riverine nature and low retention time, Logan Martin Lake exhibits only weak thermal stratification (Catchings and Cook, 1987). However, DO noticeably stratifies during the summer months, especially in some of the embayments and areas adjacent to the mainstem. The majority of substrate in Logan Martin Lake is composed of soft, mucky sand and clay.

Tailrace

Discharges from the Logan Martin Powerhouse empty directly into the Coosa River, which is also the upstream extent of Lay Lake. Average depth in the tailrace area is approximately 6 ft; however, a depression approximately 25 ft deep is located in the middle of the tailrace. The tailrace bottom is primarily composed of scoured bedrock. As discussed in the water quality section (Section 4.2), the tailrace area seasonally experiences problems with low DO levels due to dam leakage from the hypolimnetic zone of Logan Martin Lake.

4.3.2 Resident Fish

Logan Martin Lake

Logan Martin Lake is populated by a diverse community of warmwater species typical of fish assemblages found in the Coosa River (Table 4.3-1, Appendix C, pg. C-24). The black bass fishery is extremely popular on Logan Martin Lake, evidenced by the numerous tournaments held by bass fishing clubs participating in the Bass Angler Information Team (B.A.I.T) program. Other dominant recreational fish species include striped and hybrid bass, bluegill and redear sunfish, crappie, and catfish. In addition to the native fish species present, the ADCNR has regularly stocked striped bass, hybrid bass and Florida largemouth bass in Logan Martin Lake since the 1970's to enhance recreational fishing. Representative information on stocking efforts is shown in Table 4.3-2 (Appendix C, pgs. C-25 to C-26). The ADCNR periodically relies on Logan Martin Lake as a source for brood-fish used in the striped bass and hybrid bass hatchery production program (Catchings and Cook, 1987). In addition to the sport fishery, a commercial catfish fishery exists on Logan Martin Lake, of which the primary methods for harvest are trotlines and slatboxes (fish trap).

Due to elevated levels of PCB's in portions of the lake, a fish consumption advisory is in effect from Henry Dam downstream to Logan Martin Lake at Riverside, Alabama. The advisory recommends that people should limit their consumption of catfish over one pound to one meal per month, and that women of reproductive age and children less than 15 years old should abstain from consumption of catfish species altogether (ADPH, 2000). A separate "no consumption" advisory is in effect for Logan Martin Lake from Riverside, Alabama downstream to Logan Martin Dam. This advisory recommends that no one consume largemouth, spotted, or striped bass (ADPH, 2000).

Tailrace

The tailrace fishery in the Coosa River below the Logan Martin Powerhouse is considered excellent for hybrid striped bass and catfish. Seasonally, spotted bass and largemouth bass also inhabit the tailrace (Catchings and Floyd, 1988). The 1987 ADCNR reservoir management report noted fish kills below Logan Martin Dam as a recurring problem. The ADCNR pointed to low levels of DO in the leakage water coming from the dam as one probable cause of these fish kills (Catchings and Floyd, 1988). To address this problem, APC employs a draft tube venting system in the powerhouse and has installed an aeration weir and a "speece cone" oxygenation system in the tailrace, and pulses flows from Logan Martin Powerhouse to increase DO levels. For a detailed description of these oxygenation devices and how they work, see Section 4.2.2.

There is a "no consumption" advisory in effect between Logan Martin Dam to Lay Dam, which includes the Logan Martin tailrace. This advisory recommends that no one consume stripped bass, spotted bass, crappie, or blue catfish (ADPH, 2000).

Results of ADCNR studies

In 1986, the ADCNR initiated a reservoir management program to establish a database of information on fish species in large impoundments that could be used as a tool to improve fish population structure and fishing quality through management decisions (*e.g.*, fish stocking, harvest restrictions, etc.). According to the 1994 management report, the ADCNR sampled Logan Martin Lake in 1986, 1988, and 1994, and Auburn University sampled the lake in 1993.

Sampling efforts in 1994 indicated that the largemouth bass population of the lake was dominated by stock and quality-size fish. The 1994 electrofishing catch rate for largemouth bass (32.0 fish/hr) was similar to previous years. Large numbers of age 1 fish collected indicated good recruitment and excellent growth rates with some size classes exceeding the previous maximum statewide value (Smith *et al*., 1995).

Electrofishing catch rates for spotted bass in 1994 (35.8 fish/hr) were similar to catch rates for largemouth bass. The 1994 spotted bass sample was dominated by stock, quality, and preferred-size fish. Although no age 1 spotted bass were collected by Auburn University personnel in 1993, 17 percent of the 1994 sample was composed of age 1 fish, indicating fair recruitment. Growth rates for spotted bass were above statewide averages (Smith *et al*., 1995).

Sixty-seven black crappie and five white crappie were collected during sampling in 1994. Although catch rates for black crappie were low in 1994, 95 percent of the black crappie collected were age 1+, indicating good recruitment of the 1993 year class. Data also indicated excellent growth rates for black crappie. The ADCNR did note that hybridization of black and white crappie may occur in Logan Martin Lake. Since first generation hybrids look almost identical to black crappie, the ADCNR suggested that the sampling data may be affected (Smith *et al*., 1995).

The majority of gizzard shad collected in 1994 were greater than seven inches in total length (approximately 180 mm). Low numbers of age 3 and younger gizzard shad in the 1994 sample indicated this species was not providing a significant forage base in the lake. In contrast, the size structure and catch rates for threadfin shad indicated a population capable of providing a forage base for all sportfishes (Smith *et al*., 1995).

Angler Studies

The ADCNR conducted an access point creel survey on Logan Martin Lake in the spring of 1994 to query anglers about their attitudes and to better understand the nature of the sport fishery. The majority of the anglers interviewed were fishing for bass, followed by those individuals fishing for crappie. Survey data indicated bass anglers caught bass at twice the rate crappie anglers caught crappie. Additionally, the data shows bass anglers harvested a much smaller percentage of their catch than did crappie anglers (Table 4.3-3, Appendix C, pg. C-27).

B.A.I.T. Reports

In 1986, the ADCNR created the B.A.I.T. program. The function of this program is to gather and summarize information on bass populations from tournament catch data, which is provided by participating fishing clubs. Although this information is no substitute for fisheries data obtained through the standardized sampling of reservoirs (*i.e*., electrofishing, gillnetting, etc.), the program is a valuable tool for resource managers and provides insight into general trends in the status of sport fisheries for specific reservoirs. To date, the program has summarized data from over 6,000 tournament reports.

Each year, data provided by participating clubs are summarized in a report in which reservoirs are ranked based on five "fishing quality" indicators (Cook and McHugh, 2000):

- Percent of successful anglers (percent of anglers with more than one bass at weigh-in),
- Bass average weight,
- Number of bass per angler-day,

- Pounds of bass per angler-day, and
- Hours required to catch a bass five pounds or larger

Summarized B.A.I.T. information collected over the first eleven years of the program (1986 to 1996) ranked Logan Martin Lake near the top in several categories (Cook and McHugh, 2000). The most recent report shows that participating clubs held 60 tournaments on Logan Martin Lake in 1999. The 1999 report shows tournament anglers experienced above average success rates (73.6 percent). In the 60 tournaments, anglers caught eight bass over five pounds. When compared to other reservoirs in the report, average weight (1.60 lbs.) was average, while bass per angler-day (2.60) and pounds per angler-day (4.15) were above average (Cook and McHugh, 2000).

4.3.3 Anadromous Fish

Anadromous fish are species that upon maturity migrate from the ocean into freshwater environments to spawn. Historically, there were several species that migrated from Gulf Coast waters to inland Alabama rivers (including the Coosa River) to spawn. The Alabama shad (*Alosa alabamae*), Alabama sturgeon (*Scaphirhynchus suttkusi*), and striped bass (*Morone saxatilis*) are anadromous fish species that are currently or historically known to use portions of the Coosa River during this spawning migration (Mettee *et al*., 1996). However, use of the Coosa River by these species has been impeded and/or effectively blocked by the construction of several ACOE lock and dam projects and APC hydropower projects along the river system. The striped bass populations found in the upper portions of the Coosa River were produced by fish stockings by the ADCNR that have resulted in a “land-locked” population of striped bass above and below Logan Martin Lake (Catchings and Smith, 1996; Catchings *et al.*, 1999). The current status of other species of anadromous fish in the upper Coosa River is not known at this time.

4.3.4 Catadromous Fish

Catadromous fish are species that live most of their lives in freshwater environments and, upon reaching sexual maturity, migrate to the ocean to spawn. The juvenile offspring of catadromous fish migrate through the ocean to the mouths of rivers and move upstream to various aquatic habitats to live until adulthood. The American eel (*Anguilla rostrata*) is the only catadromous species native to the Coosa River system (Mettee *et al.*, 1996). As with the anadromous fish species discussed above, upstream movements of American eel into the Coosa System are impeded by several ACOE lock and dam projects and APC hydropower projects along the river system. American eel have been observed in the lower portions of the Coosa River, but their current status in the upper Coosa River is unknown.

4.3.5 Freshwater Mussels

Logan Martin Lake

The majority of freshwater mussels species, due to a variety of factors, are intolerant of impoundment by dams. Lacking necessary habitat requirements, populations of mussels in Logan Martin Lake are limited to species that can tolerate reservoir conditions.

Tailrace

In the summer of 1999, APC began a survey to determine the status of mussel populations in the tailrace. The field work for the survey should be completed in 2000.

4.3.6 Threatened and Endangered Aquatic Species

The USFWS Daphne Field Office provided a list of federally listed species in Alabama, sorted by county. The Logan Martin Project area encompasses lands within Calhoun, St. Clair and Talladega Counties. The list provided by the USFWS indicates a total of five threatened and seven endangered aquatic species for those counties (Table 4.3-4, Appendix C, pg. C-28).

4.4 Terrestrial Resources

4.4.1 Botanical Resources

The following information regarding botanical resources was provided to APC by Dr. David Whetstone, Jacksonville State University.

4.4.1.1 Upland Habitats

Logan Martin Lake lies within the Ridge and Valley section of the Appalachian Highlands. This portion of the Appalachians is characterized by a broad diversity of substrates. Consequently, a great diversity of plant and animal life occurs in the vicinity.

Potential natural vegetation most likely is oak-hickory forest, a segregate of the Eastern Deciduous Forest Biome. As suggested by the title, dominant vegetation comprises woody plants that form a closed canopy, and lose their leaves during winter. Some authors believe the original forests (and potential natural vegetation) to be oak-hickory-pine. The primary difference between the two communities lies in the role of pine species in the original forest of this area. Since pines are shade intolerant species, it seems unlikely that the large number of individuals of our common species would have existed in a primarily forested ecosystem.

In the middle Coosa Valley, most forests are now restricted to lower portions of the terraces and steep mountain slopes. At one time or another, original forests have been cleared for pasture, agricultural fields, lumber, and other purposes. Pockets of second-growth serve as evidence of original vegetation. Present day vegetation consists of a patchwork of communities ranging from early successional marshes, open woods, to forests with closed canopies.

Canopy oaks are variable, but commonly include white, black, rock chestnut, southern red, post, and scarlet oaks. Pignut, mockernut, and sand hickories are prevalent, though usually are less abundant than oak species. Pines are less abundant in forests than are hardwoods, though one commonly encounters loblolly, shortleaf, and scrub pine. Occasionally, longleaf pines dominate in areas with shallow soils associated with frequent fire cycles. Most of the pine communities are planted for their commercial value. Diversity in pine plantations is low as with most other cultivated communities. Other important canopy taxa include tulip-poplar, red maple, beech, and persimmon.

Subcanopy species are sourwood, black gum, flowering dogwood, and black cherry. Shrub taxa include deerberry, sparkleberry, low bush blueberry, high bush blueberry, strawberry bush, blackberry, and sweet shrub, among others. Herbs are variable, though they seldom form a distinct stratum. Lianas commonly include cross-vine, cow-itch vine, poison-ivy, Japanese honeysuckle, and Virginia creeper.

Non-forested communities are variable. Pasture communities comprise mostly non-native forage grasses such as Bahia grass, fescue, dallis grass, Bermuda grass, and a host of others. Fence rows and roadsides are vegetated by mostly herbaceous plants, though some of the woody taxa with aspect dominance include species such as sassafras, shining sumac, dewberry, chicksaw plum, and privet.

Common species and their scientific names appear in Table 4.4-1 (Appendix C, pgs. C-29 to C-34).

4.4.1.2 Wetlands

Wetlands (jurisdictional and non-jurisdictional) within this area are abundant. These grade into lowland communities, sometimes with little change in plant composition but gradual changes in hydrology and soils. Soil surveys of Calhoun, St. Clair, and Talladega counties indicate that dominant soil series around the immediate perimeter of Logan Martin Lake and the Coosa River below the dam include Decatur-Dewey-Fullerton, Allen-Holston-Cane, and Bodine-Minvale (USDA, 1974; Bayne *et al.*, 1995). Primarily, these soils are formed *in situ* from weathering of bedrock. These soils are mostly deep, moderately well-drained to well-drained. Typically, soils are loamy but range to gravelly. Gentle to moderate slopes (*i.e.*, less than 15 percent) are typical on the immediate shorelines, but steep slopes occur on the flanks of mountains in the surrounding area (USDA, 1974).

The USFWS National Wetlands Inventory (NWI) maps for the Project area indicate few large tracts of wetlands associated within the Project area. Wetlands are generally situated near the mouths of tributaries. Since streams are mostly entrenched, wetlands appear to form finger-like communities fringing the channels. Wetlands fall into three primary types, palustrine emergent, palustrine shrub-scrub, and palustrine forested. Wetlands may be inundated or saturated with no inundation during a portion of the growing season. These three communities are best viewed as a landscape continuum from mature forested system to scrub-shrub to herb system. Species are shared between communities. Thus, forests as well as scrub-shrub have herbaceous species similar in composition to those described for palustrine emergent communities.

Palustrine emergent type is made up of rooted herbaceous plants. If inundated, foliage and stems project above the surface waters. This community may be made up of lowland herbaceous plants growing in saturated soils. Communities with a long hydroperiod commonly have lizard's-tail, switch grass, soft-stem rush, leather rush, marsh seed-box, marsh mallows, cat-tails, flatsedges, spikerush, panic grass, beaksedge, water-willow, wool-grass, cut grass, and manna grass inhabiting them. Shorter hydroperiods include other taxa such as jewel-weed, cardinal flower, and knotweed.

Palustrine shrub-scrub communities comprise woody plants that are mostly 15 ft or less in height at maturity. Alder, willows, button-bush, red maple, swamp dogwoods, arrow-wood, and Virginia sweet-spire are common components of this system.

Palustrine forested wetlands are characterized by having a canopy mostly 15 plus ft in height. Dependent upon local conditions, the forests may be stratified into canopy, subcanopy, shrub, and herb layers. Common canopy taxa of this community include tupelo, swamp chestnut oak, swamp tupelo, red maple, Drummond's red maple, box-elder, silver maple, overcup oak, willow oak, water oak, green ash, and river birch. Communities with a short hydroperiod may have hornbeam and hop-hornbeam as prime components of the subcanopy. Rare among the canopy taxa is bald-cypress that is evident in mature forests as well as some disturbed sites. Dwarf palmetto is infrequently located among some of the more mature stands. The occurrence of palms within the mid-Coosa drainage basin is noteworthy since palms are mostly warm temperate and tropical.

Lianas in this melange include poison-ivy, cow-itch vine, pepper-vines, buckwheat vine, and virgin's-bower.

A feature that is seasonally present around the lake is mostly unconsolidated substrate exposed during periods of low lake levels. NWI maps indicate these areas as "limnetic unconsolidated shore", which are seasonally flooded containing no vegetation. The statement is partially true. During the spring and growing season, these "flats", though poorly studied, are vegetated by annual herbs including redstem, toothcup, and creeping rush. For reference, the wetlands identified on the NWI maps are illustrated in Figure 4.4-1 for Project lands.

4.4.1.3 Threatened and Endangered Species

Within the drainage basins of all reservoirs, a sizeable number of botanical species of conservation concern are known to occur. The highlands of Alabama are rich in biodiversity; thus it is reasonable to assume that amongst the commonly occurring taxa are those populations that are restricted in distribution but contribute to the overall biologic resources. The species cited herein are known to occur within the drainage basins of the indicated reservoirs. This does not imply that any of the taxa occur on land within the Project boundary.

Federally listed species

As with nearly all classification systems, categorizing these species nearly defy definition, so biologists address them on several different levels. The USFWS listings of "threatened" and "endangered" are based upon a great deal of research. Federal listings provide protection for taxa with regard to disturbances to the individuals and sometimes to habitats required for their maintenance. The "LE" designation means "listed endangered" by the USFWS. This means the species is in danger of extinction throughout all or a significant portion of its entire range. The "LT" designation means the species is "threatened" and likely to become an endangered species within the foreseeable future (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

There are three botanical species that are listed as federally threatened or endangered that occur in Calhoun, St. Clair, and Talladega Counties surrounding Logan Martin Lake: Alabama leather flower (*Clematis socialis*), Mohr's Barbara's buttons (*Marshallia mohrii*) and Tennessee yellow-eyed grass (*Xyris tennesseensis*) (USFWS, 1997a and 1997b).

- Alabama leather flower (Ranunculaceae) is known from four populations, all within the Coosa River basin. This species inhabits woodlands and roadsides in "gumbo-like" soils. All populations are above streams flowing into Henry Lake.
- Mohr's Barbara's buttons (Asteraceae, threatened) is an upland species occurring mostly over limestones. Individuals usually grow in open areas, such as along roadsides. Though known from other drainages in Alabama, this species has populations within the basin of Henry and Weiss Lakes.
- Tennessee yellow-eyed-grass (Xyridaceae, endangered), though first described from Tennessee, occurs in wetlands

along in the Cane Creek system. This species occurs in roadside seeps and on the periphery of ponds, usually occupying sites that are disturbed. Cane Creek flows into Logan Martin Lake.

State Species of Concern

State of Alabama listings do not rely upon the careful study nor the rigorous political process, and do not confer protection. State listings are properly regarded as a planning tool or tracking list for species that are extremely rare throughout their range, or that perhaps are more common outside the borders of the State but may be represented in Alabama by a few individual plants. Thus, the listings attract the attention of researchers on these species for "environmental assessments", determination of potential listings or requests for protection of the U.S. or State government and for prioritization of natural areas that harbor these species (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

The "CH" is used to denote "commercially harvested" and means the species is collected from the wild with populations monitored, and commerce controlled by State government. The "S" designation indicates rankings by the State of Alabama with attention to occurrences within the State. If additional populations are known to occur but lack vitality or appear vulnerable to perceived threats, then the number of populations may vary with regard to each category. "S1" signifies 5 or fewer occurrences are known or with very few individuals remaining, thus means the species is "critically imperiled". "S2" means 6 to 20 occurrences or few individuals are known, and are considered "imperiled". "S3" means 21 to100 populations are known, so are deemed "rare or uncommon".

An estimated 20 State species of concern may potentially occur within the Project area. These are enumerated in Table 4.4-2 (Appendix C, pg. C-35), but are not further elaborated upon here.

4.4.2 Wildlife Resources

Forested areas surrounding the lake provides habitat for a variety of woodland animals such as turkey, gray fox, white-tailed deer, Virginia opossum, armadillo, gray squirrel, fox squirrel, cottontail rabbits, red fox, eastern chipmunk and raccoon. A variety of wildlife including songbirds, reptiles, and amphibians also inhabit forested areas around the lake. Some of these taxa include American robin, eastern bluebird, bobwhite quail, mourning dove, and meadowlark.

Open water habitats are utilized to some extent by mammals such as muskrat, mink, and raccoon for foraging. Waterfowl such as mallard, Canada goose, green herons, blue herons, American egrets, and wood ducks use the shallow waters for foraging and cover. Open water birds include herring gull, ospreys, bank swallows, and kingfisher. Presently, a single Wildlife Management Area (WMA) is located within the Project area. St. Clair Community WMA, managed by the ADCNR is a 6,397 acre tract of land about 10 miles northwest of the Project. The Talladega National Forest, managed by the USFS, is located approximately 20 miles east of the Project area. This tract encompasses about 378,000 acres which provides valuable habitat for wildlife. Due to the decommissioning of Fort McClellan, the USFS will manage about 10,000 acres in the vicinity of Anniston. Typical wildlife species for the Project area are listed in Table 4.4-3 through 4.4-6 (Appendix C, pgs. C–36 to C-46).

4.4.2.1 Threatened and Endangered Species

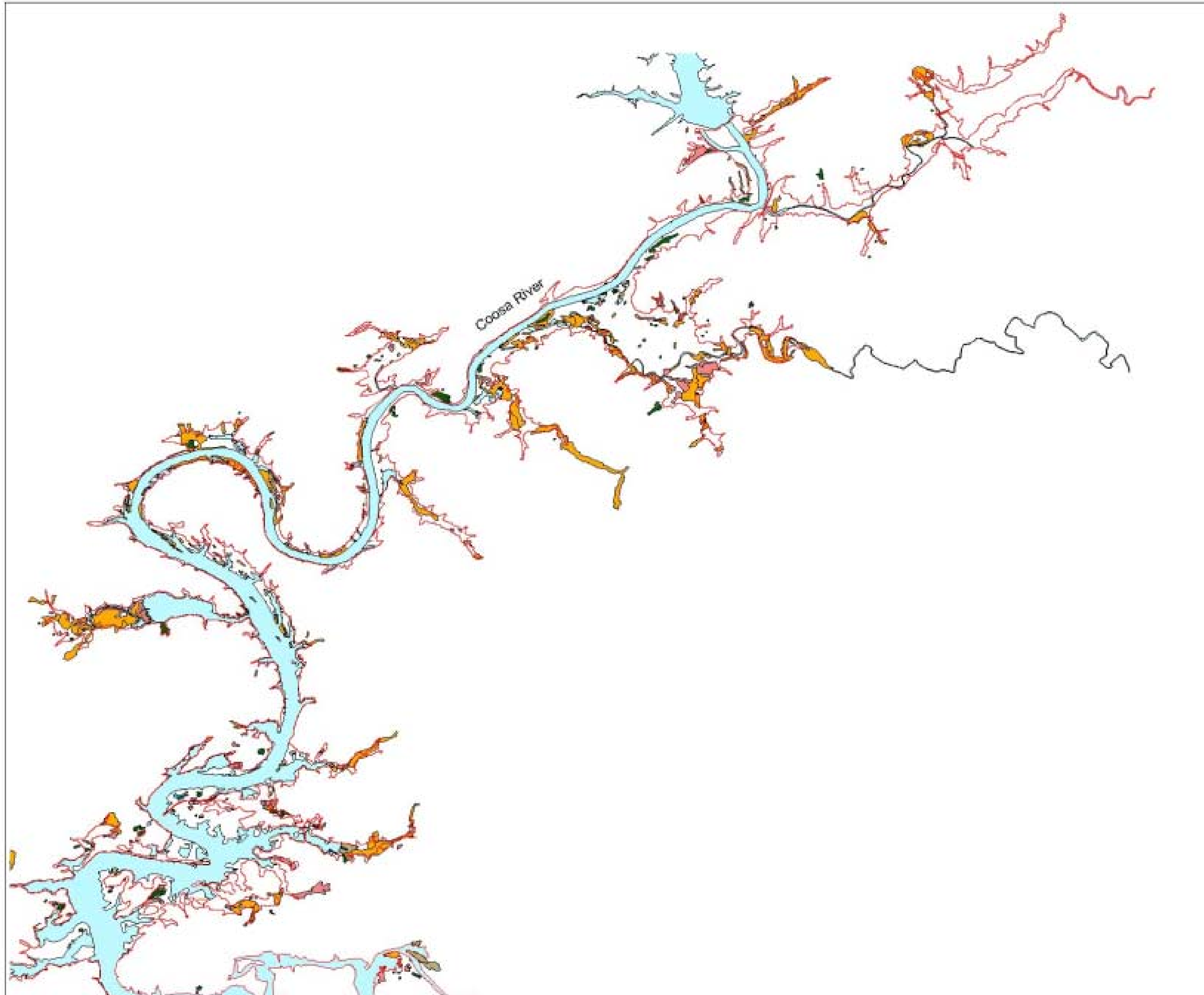
Within the drainage basins of all reservoirs, a sizeable number of species of conservation concern are known to occur. The highlands of Alabama are rich in biodiversity, thus it is reasonable to assume that amongst the commonly occurring taxa are those populations that are restricted in distribution but contribute to the overall biologic resources. The species cited herein are known to occur within the drainage basins of the indicated reservoirs. This does not imply that any of the taxa occur on land within the Project boundary.

The State of Alabama does not classify species as being threatened or endangered but does classify certain species as "protected" under state law (ADCNR, 1999). The red-cockaded woodpecker (*Picoides borealis*) and gray bat (*Myotis grisescens*) have been identified as occurring in the counties surrounding Logan Martin Lake. These two wildlife species are federally listed as threatened or endangered and are protected under Alabama State law (ADEM, 1998; USFWS, 1997).

The red-cockaded woodpecker is a federally listed endangered species occurring in Calhoun and St. Clair counties. Its preferred habitat includes yellow pine forest where hardwoods make up less than 35 percent of the stand, open stands with very little midstory vegetation, and mature forests (at least 60 years old) (McDonald, 1998). Habitat management for the red-cockaded woodpecker is carried out through careful forestry practices to the Southern Mixed Pine-Oak Forest (McDonald, 1998). Unmanaged habitat tends to become unsuitable because lack of fire results in a heavy hardwood mid-story that the birds find unacceptable (USFWS, 1997). The use of artificial cavity inserts has also been used in some areas to promote roosting and nesting (McDonald, 1998).

The gray bat is a federally endangered species that is found in Calhoun County (USFWS, 1997a). One feature that distinguishes this species from all other eastern bats is its uni-colored dorsal fur, which on other eastern bats is bi- or tri-colored. Populations are found mainly in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee, but a few occur in northwestern Florida, western Georgia and, southwestern Kansas. The gray bat population was estimated to be about 2.25 million in 1970; however, in 1976 a census of 22 important colonies in Alabama and Tennessee revealed an average decline of more than 50 percent. Gray bat colonies are restricted entirely to caves or cave-like habitats (USFWS, 1997b). During summer the bats are highly selective for caves providing specific temperature and roost conditions. Usually these caves are all located within a mile of a river or reservoir. Consequently, only a small proportion of the caves in any area is or can be used regularly. Banding studies indicate the bats occupy a rather definite summer range with relation to the roosting site and nearby foraging areas over large streams and reservoirs. Summer colonies show a preference for caves not over 1.2 miles from the feeding area (USFWS, 1997b).

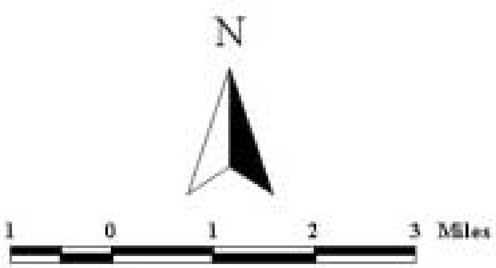
Project Area Wetlands
Logan Martin Lake
Coosa-Warrior Rivers Relicensing



Project Boundary
National Wetlands Inventory
Palustrine Emergent
Palustrine Forested
Palustrine Scrub/Shrub
Palustrine Unconsolidated Bottom
Palustrine Unconsolidated Shore
City Boundaries

Data Source:

Wetlands data from USFWS National Wetlands Inventory, date unknown; all other data from Alabama Power Company, 2000



Location Map

ALABAMA POWER
A SOUTHERN COMPANY

Kleinschmidt

Figure 4.4-1
Sheet 1 of 2

Project Area Wetlands
Logan Martin Lake
Coosa-Warrior Rivers Relicensing

Project Boundary
National Wetlands Inventory
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Unconsolidated Bottom
- Palustrine Unconsolidated Shore
- City Boundaries

Data Source:

Wetlands data from USFWS National Wetlands Inventory, date unknown; all other data from Alabama Power Company, 2000

N

1 0 1 2 3 Miles

Location Map

ALABAMA POWER
A SOUTHERN COMPANY
Kleinschmidt
Energy & Water Resource Consultants

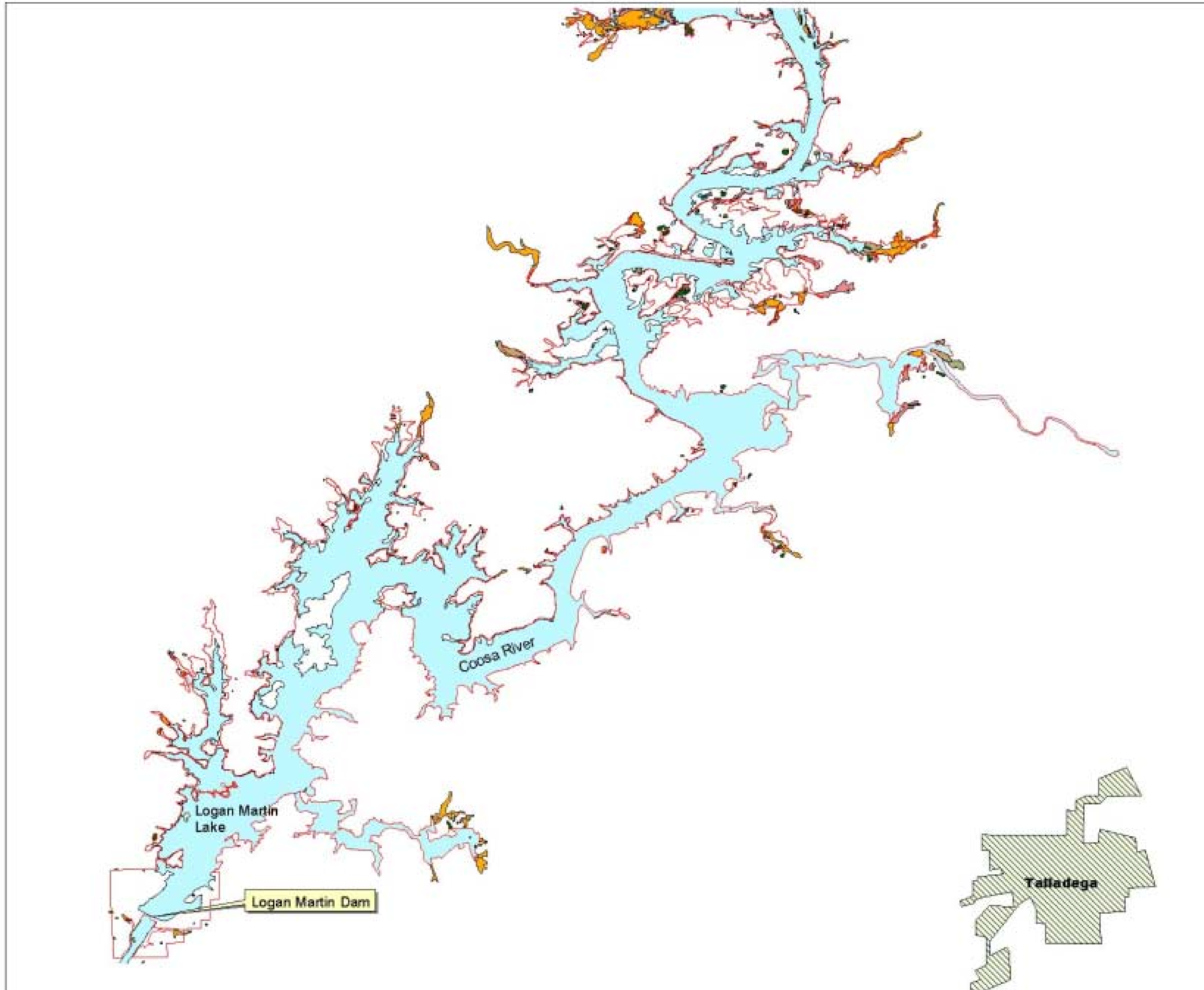


Figure 4.4-1
Sheet 2 of 2

4.5 Cultural Resources

The following information is a condensed summary of an unpublished report from the University of Alabama sent to Bill Gardner, APC.

4.5.1 Cultural Chronology

Logan Martin Lake is located in central Alabama in Calhoun, Talladega and St. Clair Counties. Located within the Coosa Valley district of the Alabama Valley and Ridge physiographic section, the lake lies in the central Coosa River drainage and is surrounded by moderate to steeply sloping uplands and stream and river terraces. Other significant topographic features include Woods Island, Ogletree Island, and Embry Bend. Ohatchee, Cane, and Choccolocco Creeks drain into the Coosa. The Coosa drainage has been the subject of considerable archaeological research (Graham, 1966; Knight, 1985, 1993 and 1998; Mistovich, 1981a and 1981b; Mistovich and Zeanah, 1983; Morrel, 1964 and 1965; Walling and Schrader, 1983; Waselkov, 1980). The Coosa is well known for its Native American occupancy beginning in the 1500s and ending in the early 1800s. The Paleoindian and Archaic periods are poorly understood in this area and the Tennessee Valley serves as the primary point of reference for these cultures.

Paleoindian (10,000 to 8,000 B.C.)

The Paleoindian stage is separated into early (10,000 to 9,000 B.C.), middle (9,000 to 8,500 B.C.) and late (8,500 to 8,000 B.C.) periods (Bense, 1994). Archaeological evidence suggests that Paleoindian groups reached Alabama at least 11,000 years ago. North Alabama, in particular, contains numerous sites dating to this stage. These ancient sites are difficult to identify because of their age and the mobility of the small family units, which left little cultural material behind. There is little documentation regarding Paleoindian sites in the Coosa Valley. The first recognizable, yet small occupation probably dates to the Late Paleoindian Period.

Few Early Paleoindian sites have been identified in Alabama. During this period, inhabitants utilized their limited tool kits for hunting large mammals and supplementing with other strategies, like hunting smaller animals, fishing, and gathering nuts, berries and other plant resources, which was probably important to their overall success in migrating throughout North America (Bense, 1994).

The presence of Paleoindian groups in Alabama is more prominent during the Middle Paleoindian. During this time period, inhabitants relied on many of the same subsistence practices, but the tool kits became more diverse and local raw materials were used in the manufacture of their tools. Several regional cultures emerged throughout the Southeast during this time period. Most notably, the Redstone-Quad-Beaver Lake culture is defined for the central Tennessee Valley in North Alabama, Mississippi, and Tennessee (Bense, 1994; Futato, 1982).

Human population appears to have increased in Alabama during the Late Paleoindian, as it did elsewhere. These people had adapted even more to their local environments and had expanded into new environmental zones, especially the uplands (Bense, 1994). Rockshelters and caves in the Tennessee Valley were occupied seasonally, as evidenced by sites like Russell Cave (Griffin, 1974) in northeast Alabama; and Stanfield-Worley Bluff Shelter (DeJarnette *et al.*, 1962) and Dust Cave (Driskell, 1994 and 1996) in northwest Alabama. Paleoindian settlement may also have been regulated by seasonal changes in availability and distribution of resources (Hubbert, 1989). Subsistence of this time period relied upon hunting a wide variety of animals, fishing, and harvesting wild plants and fruits. Here in the Coosa Valley, the Late Paleoindian phase is defined as the Dalton/Hardaway horizon.

Archaic Stage (8,000 to 1,200 B.C.)

The beginning of the Archaic period was marked by shifts in the climate and local environments. Archaic people successfully adapted to the changes in the weather, vegetation, and animal populations. The Archaic stage is divided into early (8,000 to 6,500 B.C.), middle (6,500 to 3,200 B.C.), and late (3,000 to 1,200 B.C.) periods.

During the Early Archaic, hunting and gathering remained the primary subsistence strategy, though there were significant changes from the previous Paleoindian culture. A wide array of resources were believed to be exploited, including both large and small mammals, birds, fish and mussels, as well as nut and fruit crops (Chapman and Shea, 1981; Gardner, 1994; Griffin, 1974; Grover, 1994; Parmalee, 1962; Walker, 1998). Early Archaic sites are recorded across Alabama, though they still are most numerous in the Tennessee Valley. Settlement patterns for the Early Archaic reflect use of both riverine and upland (*i.e.*, sinks, caves and bluff shelters) localities with larger more permanent settlements flourishing in the river valleys. It is suspected that the large river valleys were primarily used during the spring and summer months, while the upland sites were occupied during the fall and winter months. The tool kit for the Early Archaic hunter was much more extensive than before and included points that would have been attached to a spear thrower, or atlatl, which was an important technological innovation for hunting.

Three Early Archaic horizons have been defined for the middle Coosa Valley, including Big Sandy/Autauga, Kirk, or Kirk Stemmed/Crawford Creek (Knight, 1985).

The Middle Archaic was marked by a post-glacial, global warming trend. The climate became warmer and drier, resulting in decreased rainfall and changes from cool, temperate mixed hardwoods forest to oak-hickory, mixed hardwood and southern pine forests (Delcourt *et al.*, 1983; Delcourt and Delcourt, 1985). Settlement patterns and subsistence strategies remained virtually the same as the previous period, although there seems to have been an increase in population and sedentism. For the first time, long-distance trade appears to have played an important role in the economy. There were additional advances in the stone tool technology, like the process of heat treating chert, and grinding and polishing stone tools or ornaments (Bense, 1994).

The Middle Archaic period is not well defined in the Coosa Valley, especially the early part of the period. Knight (1985) suggests that " there may actually be a regional decline in population for approximately 1,000 to 2,000 years, corresponding roughly with the hypsithermal climatic episode." The later part of the Middle Archaic is related to the Morrow Mountain.

The Late Archaic coincided with a climatic regime that is similar to the present day. Settlement patterns were similar to those of the Middle Archaic, although there was a marked increase in sedentism. Large basecamps with large storage pits as common features were common along the major river valleys (Futato, 1983; Oakley and Futato, 1975). There was an increased reliance upon aquatic resources and wild plant foods, which served as a steady food supply for the larger, more sedentary settlements. The beginnings of horticulture were apparent during the Late Archaic, which at least included container crops, like bottle gourds and hard-rind squash (Bense, 1994). Technological advances included axes, weights, plummets, ornamental items and stone bowls (steatite or sandstone). Aspects of economic and social complexity became even further developed. More extensive trade networks had evolved, focusing on steatite, marine shell, and high quality lithic resources (Futato, 1983). Continued interment of the dead with assorted grave goods was practiced.

Three Late Archaic horizons are defined for the middle Coosa Valley: Sykes/White Springs, Savannah River, Gypsy/Late Savannah River/Ledbetter

(Knight, 1985). Sykes/White Springs actually appears at the end of the Middle Archaic and lasts through ca. 3,000 B.C. Around this time, these point types grade into the Savannah River type to around 2,000B.C. The latest Late Archaic horizon, Gypsy/Late Savannah River/Ledbetter, is a “typological potpourri” with some resembling upland Middle South types, like Ledbetter, Pickwick, Elora, and Cotaco Creek, and others conforming to Piedmont types, such as late Savannah River and Gypsy (Knight, 1985).

Gulf Formational Stage (1,200 to 300 B.C.)

The Gulf Formational stage, as defined by Walthall and Jenkins (1976), began with the advent of ceramic technology. The earliest ceramics in the Southeast are found on the Coastal Plain, although in Alabama the culture apparently extended into the Tennessee Valley and portions of the Cumberland Plateau. Cultural patterns of this stage were virtually the same as the Late Archaic. The only marked difference was the addition of pottery. There are three periods, early, middle (1200 to 500 B.C.) and late (500 to 100 B.C.), defined for the Gulf Formational stage, but only the middle and later periods are present in Alabama.

There is little evidence of the Middle Gulf Formational period early ceramic occupation within the Coosa Valley (Knight, 1998). It is undetermined if these finds would be related to the Wheeler culture, found within the Tennessee River and Black Warrior-Tombigbee River drainages, or if they relate more to the Stallings or Norwood cultures found to the east.

The Late Gulf Formational period extends between approximately 500 B.C. to 100 B.C. Pottery for this time period is sand tempered. The Alexander culture is defined for the Late Gulf Formational in the Tennessee Valley, Black Warrior-Tombigbee River valleys (Jenkins, 1976), and has been identified in the Coosa Valley. The Dry Branch phase is defined for the Coosa Valley (Walling and Schrader, 1983), which often includes a mix of Alexander pottery and Early Woodland fabric impressed wares.

Woodland Stage (A.D. 100 to 1000)

For many regions in Alabama, and even for the middle and lower Coosa River valley, the preceding Gulf Formational periods replace the Early Woodland period. The closest Early Woodland complex, Colbert I, is found in the Tennessee Valley. These ceramics co-occur with Alexander wares on Dry Branch phase sites, dating them to the Late Gulf Formational. Therefore, the Woodland stage in this region includes the Middle Woodland (A.D. 100 to 700) and Late Woodland (A.D. 700 to 1000) periods. The Woodland cultures relied on hunting and gathering as their primary subsistence. The bow and arrow was developed during this stage. However, horticulture became increasingly important throughout the Woodland, which helped to support the increasing population. Larger more permanent villages were being occupied, but extractive campsites were still important for hunting and foraging. Mound building was common, especially during the Middle Woodland period. Trade was of great importance to the local economies and probably was essential in the spread of social, political and religious philosophies.

Two complexes are defined for the Middle Woodland Period in the middle Coosa Valley, the early Cleveland complex and later Bradley/Flint River Spike complex (Knight, 1985 and 1998). Small mounds have been associated with the Cleveland complex and are linked to the Copena culture of the Tennessee Valley. The later Bradley/Flint River Spike complex is distinguished from the earlier complex by its point types. Associated ceramics consist mostly of plain coarse sand/grit tempered pottery.

The terminal Late Woodland period in the middle Coosa Valley is similar to the West Jefferson phase of the Black Warrior and Cahaba drainages (Knight, 1985 and 1998). Ceramics of this complex were dominated by grog tempered plainwares, and small quantities of shell tempered plain, limestone tempered plain, and decorated limestone tempered wares. Hamilton points are common to this complex, as are tubular clay pipes, chunkee stones, and bone awls.

Mississippian Stage (A.D. 1000 to 1500)

The Mississippian stage was characterized by a complex society and generally extended between A.D. 1000 to 1500, though there was some regional variation. Mississippian society was hierarchical with an agrarian economy. The cultivation of corn, beans, and squash was a primary part of the Mississippian culture and the larger river valleys were the preferred environment for their expansive societies (Walthall, 1980). Mound centers served as the social, political and religious hubs, with farmsteads and villages distributed throughout the river valleys. Sociopolitical organization was built upon chiefdoms and kinship. Paramount chiefs ruled large territories with lesser chiefs serving beneath them. Nobility existed as did priests and elite warriors. Extensive trade networks traversed the eastern United States.

The Mississippian stage in the middle Coosa Valley is dated ca. A.D. 1100 to 1500 (Knight, 1998), although there was an apparent lack of settlement within this region. What has been identified is "limited mainly to small groups and short-term occupations" (Knight, 1998). Etowah II-III begins at the Early Mississippian and ends during the early part of the Middle Mississippian period. This complex is related to the Etowah culture in northern Georgia, which is named after the renowned civic-ceremonial mound site. Etowah II-III sites are primarily located in the floodplain environments in the northern segment of the middle Coosa Valley (Knight, 1985). The later part of the Middle Mississippian period is poorly defined and is called the Wilbanks/Savannah complex. No sites have been identified for the succeeding Late Mississippian period.

Historic (1500 to 1800)

The Coosa Valley is well known for its aboriginal occupation during historic times. Marvin Smith (1987 and 1993) suggests that the Coosa chiefdom, which originated in northwestern Georgia, gradually migrated down the Coosa River valley after Spanish contact in the mid-1500s. Settlements dating to the sixteenth century are found in northern Georgia on the Coosawattee, Etowah, and Coosa Rivers (Hally *et al.*, 1990). Late sixteenth century sites were found in Alabama around Terrapin Creek in Cherokee County, although only few sites have been identified. By the beginning of the seventeenth century, settlement was centered in the Cedar Bluff area (now Weiss Lake) where the Coosa and Chattooga Rivers join. At least three village and 13 possible hamlets have been identified. By 1630, settlement had moved further south to the Whortens Bend near Gadsden. Six or seven sites have been identified; four of which may be villages. Settlement moved again around 1670 to the Woods Island sites in St. Clair County. This occupation had the first contact with British traders. By the early 1700s, settlement moved further south around Childersburg. Here the Coosa people joined an "indigenous population, the descendents of the Kymulga phase" and "reentered the historic record as the Coosas and Abihkas" (Smith, 1993).

Knight (1985) defines three historic phases for the middle Coosa Valley: Kymulga (1500 to 1650); Woods Island (1650 to 1715); and Childersburg (1715 to 1800). Another phase is defined for the Gadsden areas called McKee Island (1630 to 1670) (Knight, 1998).

The Kymulga phase, dating 1500 to 1650, is centered in Talladega County. Its pottery assemblage was similar to the Barnett phase, which was roughly contemporaneous and found in the upper Coosa drainage and containing a combination of Lamar and late Dallas (McKee Island) characteristics (Knight, 1985). Kymulga pottery is generally plain, with a "smorgasbord" of tempers, like grog, shell, and/or sand/grit (Knight, 1998). Decoration includes Lamar-like decorations, including complicated stamped, brushed, and bold incised. Effigy adornos and clay pipes are common to Kymulga components, as are small triangular arrow points, greenstone celts, stone pipes, mortars, and hammerstones (Knight, 1985). European trade goods are also found on Kymulga sites, most of which are Spanish in nature, which indicate occupations extended well into the Seventeenth Century (Knight, 1998).

Both the McKee Island and Woods Island complexes are dominated by shell tempered pottery which "have their stylistic ancestry in the Dallas-Mouse Creek Mississippian complexes, as refracted through the Barnett phase in northwest Georgia (Knight, 1998). Pottery types include McKee Island Plain, McKee Island Incised, McKee Island Brushed, and McKee Island Cord Marked. Varying percentages of each type help to define the different complexes. The McKee Island phase is defined for the Gadsden area, dating between 1630 and 1670 (Knight, 1998). The Woods Island phase dates between 1650 to 1715 and is generally defined for the central Coosa Valley. English trade goods are associated with Woods Island, which would have reached this region by 1690 following the establishment of the Carolina trade system (Knight, 1985).

The Childersburg phase, as defined by DeJarnette and Hansen (1960), is related to the Upper Creek between 1715 and 1800. Pottery associated with Childersburg occupations is predominantly shell and grog tempered McKee wares, including plain, incised and brushed types. European trade goods commonly occur.

4.5.2 <u>Archaeological Resources</u>

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), APC prepared the Coosa River Project Lands – Recorded Archaeological Sites (2000c) report in order to determine the effects of the

Projects on any archaeological or historical properties that may be located within the Logan Martin Project boundaries. APC contracted with the University of Alabama's Office of Archaeological Services to perform the inventory. The inventory included the examination of the National Archaeological Bibliography and the Alabama State Site File (APC, 2000c).

It was determined that there are 112 archaeological sites known to exist and 10 archaeological and culture resources surveys that are known to have been conducted on the Project lands. These archaeological sites within or adjacent to the Project area show evidence from all the above prehistoric time periods. There are no federally recognized Native American tribal lands within or adjacent to the Project area.

4.5.3 Historical Resource

During the Proto-Historical Period (1540 to 1600 AD) and the Exploration to Territorial Period (1519 to 1819 A.D.) the French, Spanish, and British struggled with the Native Americans. European contact within Alabama debatably began in 1540 when Spanish explorers, led by Hernando De Soto, battled with Native Americans near the capital city of Mauvila (Logan and Muse, 1998). DeSoto reportedly crossed the Coosa River at what is known as the Ten Island Shoals, in St. Clair County. The Native Americans that were present during the initial European contact included the Chickasaw, Cherokee, Creek, Etowah and Choctaw. By the 1600's, English and French settlements were established in the region.

During the 1700's changing alliances between the Native Americans and Europeans, primarily the British and French, characterized the region (Logan and Muse, 1998). In 1763 the British laid claim to the region under the Treaty of Paris (Logan and Muse, 1998).

After the American Revolution, no longer were European powers trying to gain control of the region, but the newly formed United States was looking to expand. The United States laid claim to Mobile under the 1803 Louisiana Purchase, allowing access to the interior through the port of New Orleans and gained authority over much of the region that would later become Alabama. Multiple treaties in Alabama opened large areas to Caucasians beginning in 1804 and large tracts of Native American lands were ceded to them. The War of 1812 presented further conflicts in the area and various alliances between the United States and England and the Native Americans.

The United States (under the command of Andrew Jackson) waged the Creek War (1813 and 1814) against the Creek Nation. The War ended in March 1814 at the Battle of Horseshoe Bend and in August of that year many of the Creek lands were ceded to the United States (Logan and Muse, 1998). These lands comprised almost half of the Alabama Territory that was established in 1817. Alabama became the 22nd state in the Union on December 14, 1819.

During the "Settlement and Emergence of King Cotton Period" (1820 to 1862) the population of the region increased and small farms, plantations, and communities were developing along the rivers. Advances in transportation, including ferries, steamboats, railroads (in the 1840's), and a system of river control mechanisms (including dams and locks) allowed for increased access throughout Alabama. Cotton became the principal export and provided the economic means for the expansion of the infrastructure. During this period the Coosa River was utilized for trade and industry. Increased pressure on the lands and the institution of the cotton economy led to the relocation of Native Americans from Alabama to Oklahoma in the 1830 Indian Removal Act.

During the Civil War, Reconstruction and Post War Development Period (1862 to 1875) Alabama joined and fought with the Confederate States of America, who established the first confederate capital in Montgomery. The Civil

War caused a shift from the production of cotton to the manufacturing of war supplies in many of the rural regions and led to the enlistment of soldiers into the war. This period was marked by disruption of state and national affairs. New cultural patterns were formed by the hardships of war, emancipation of slaves, and construction of earthworks, factories, hospitals, and other permanent and temporary works. Following the Civil War, Alabama refused to sign the 14th Amendment of the Constitution and was placed under military rule in 1867. In 1868, Alabama signed the amendment, which protected civil rights for African Americans, and was readmitted to the Union. Alabama's economy returned primarily to agricultural production, but Reconstruction led to increased industrialization and urbanization in several Alabama cities.

Calhoun County was created on December 18, 1832 from territory surrendered by the Creek Indians. Calhoun County was originally named Benton County in honor of Thomas Hart Benton and in 1833, Jacksonville was established as the county seat (ADAH, 1995a). On January 29, 1858, the county name was changed to Calhoun County in honor of John C. Calhoun, and in 1899, the county seat was moved to Anniston. Other notable towns in Calhoun County include Piedmont and Oxford (ADAH, 1995a).

St. Clair County was established on November 20, 1818 by the Alabama Territorial legislature. St. Clair County was named after General Arthur St. Clair from Pennsylvania who served during the American Revolution (ADAH, 1995b). Pell City, located along the shores of the lake was established in 1907 by the Alabama Constitution and was named for George H. Pell, an early settler (ADAH, 1995b).

Talladega County was created by an act of the Alabama General Assembly on December 18, 1832, from land ceded by the Creek Indians (ADAH, 1995c). It is located near the geographic center of the state in the Coosa River Valley. The county is named for a Creek Indian village and the literal translation means “Town of Creek Indians”. The county seat was established at Talladega in 1834 (ADAH, 1995c).

4.5.4 History of the Project Area and Project

Approximately 53 miles upstream of the Logan Martin development, the Henry Dam site and surrounding properties has for centuries been host to developing humanity. Investigations have revealed artifacts and a fish weir below Henry Dam, providing evidence of man’s existence in the area since 11,000 B.C. (APC, undated). Ten Island Shoals area is located approximately 30 miles upstream of the Logan Martin development and is rich in history.

Some historians suggest that the first aboriginal town in the Ten Islands shoals was established around 1540, when DeSoto reportedly spent a week in the area. However, some historians dispute the town’s origin but research proves that there was life at the Ten Islands before, during and after DeSoto’s journey (APC, undated). Henry Lake now covers all but two of the Ten Islands with Henry Dam spanning the largest and southernmost “Woods Island”, named for the Woods Family who purchased the property in 1822.

Older historians suggest that when explorer Hernando DeSoto spent a week in the area in 1540, the first aboriginal town was established at the Ten Islands shoals. While some historians dispute the town’s origin, research proves that there was life at the Ten Islands before, during and after DeSoto’s journeys (APC, undated). Henry Lake now covers all but two of the Ten islands with Henry Dam spanning the largest and southernmost “Woods Island,” named for the Woods Family who purchased the property in 1822.

After the Creek and Indian War, settlement increased in the Coosa Valley and by 1836 the city of Wetumpka was established. James Lafferty, a shipbuilder from Ohio, built a steamboat and aptly named it the Coosa and made the maiden

Coosa River voyage in 1845. Steamboating reached its pinnacle during the 19^{th} century on the Coosa, with paddlewheelers running from Rome, Georgia to Greensport, Alabama. Shoals and rapids made navigation on the Coosa south of Greensport dangerous, specifically at the Ten Islands Shoals.

Use of the river dwindled after the Civil War as new modes of transportation were established. In 1889, the Federal Government appropriated money to develop a system of navigation to connect the Coosa with the Alabama River; however only three locks were completed before it was decided that navigation in the lower Coosa would not be feasible.

Because of abundant streamflow and numerous excellent power sites, the Alabama-Coosa River system has long been recognized as having vast hydroelectric power potential. APC began to investigate the possibilities of establishing hydroelectric projects on the river and in 1914 the Lay Dam was constructed, followed by Mitchell Dam in 1923, and Jordan Dam in 1929.

In 1925 APC conducted a study of the storage possibilities of the Coosa River above its existing Lay Dam with regard to the development of five additional power dams. In 1928, APC prepared a report on complete “canalization” of the Coosa River including a study of Radcliff Island, which was only 3 miles below the current location of Logan Martin Dam.

In 1934, the ACOE developed a general plan for the overall development of the Alabama-Coosa River system. The plan was submitted to Congress and included a low navigation dam on the Coosa River at Howell Mill Shoals, located 4 miles upstream from the site of Logan Martin Dam. This was apparently the earliest record of Federal interest in a navigation dam near the site of the present Logan Martin Project.

In 1941, the ACOE submitted an interim report to Congress recommending the Alabama-Coosa River and tributaries for navigation, flood control, power generation and other purposes. The report included a dam with a powerhouse at the Howell Mill Shoals site, an investigation of a site, Bell Island, which was not included in the ultimate plan of improvement; but it is the site finally selected for Logan Martin Dam. Development of the Alabama-Coosa River System as recommended in House Document No. 414 was authorized by Congress in Section 2 of the River and Harbor Act of March 1945, Public Law 14, 79th Congress, first session.

On June 28, 1954 the 83rd Congress enacted Public Law 436, which suspended the authorization under the River and Harbor Act of March 1945, insofar as it concerned Federal development of the Coosa River for the generation of electric power, in order to permit development by private interests under a license to be issued by the Federal Power Commission (FPC). The law stipulates that the license shall require provisions for flood control storage and for future navigation. It further stated that the projects shall be operated for flood control and navigation in accordance with reasonable rules and regulations of the Secretary of the Army.

On December 2, 1955, APC submitted an application to the FPC for a license for development of the Coosa River in accordance with the provisions of Public Law 436. The development proposed by APC, designated in the application as FPC Project No. 2146, included a dam named Kelly Creek at a site about 5.3 miles downstream from the Howell Mill Shoals site. The name, Kelly Creek, was later changed to Logan Martin and the site moved approximately 1.3 miles upstream.

The FPC issued a license to APC on September 4, 1957, for the construction, operation and maintenance of Project No. 2146. The license directed that construction of the Logan Martin (Kelly Creek) development commence within 3 years from September 4, 1957, and be completed within 7 years.

Construction began in July 1960, the dam and spillway were completed in July 1964, and the Project placed in commercial operation on August 10, 1964.

4.5.4 Sites Listed on National Register

No Project features, structures or components in the Project area have been identified as historic properties included in the National Register of Historic Places (NRHP). Additionally, there are no archaeological sites in the Project area included in the NRHP.

4.6 Recreation Resources

4.6.1 Existing Facilities

4.6.1.1 Regional

Logan Martin Lake is located in Alabama's northern tourism region (Alabama Bureau of Travel and Tourism, 2000). The region extends from the Tennessee border south to Birmingham (Figure 4.6-1). This tourism region encompasses recreational areas including the Tennessee River, William B. Bankhead National Forest, Wheeler Lake, a portion of Bankhead Lake, Guntersville Lake, Lewis Smith Lake, Henry Lake, Weiss Lake, Talladega National Forest, and nine state parks. This region supports numerous types of boating, fishing, hunting, hiking, camping, and scenic viewing activities and a variety of recreational use areas developed by both private and public interests. Site specific recreation opportunities for APC's projects are described in further detail in each IIP.

Other recreational opportunities available in the vicinity of Logan Martin Lake are provided by many golf courses, Talladega Super Speedway, DeSoto Caverns Park, Hollins WMA, International Motorsports Hall of Fame, Cheaha State Park, St. Clair Community WMA, and a variety of historical sites. The Cities of Talladega, Birmingham, Pell City, Anniston, and Sylacauga, located near Logan Martin Lake provide many urban cultural recreational, historical, and entertainment opportunities.

4.6.1.2 Local

Logan Martin Lake is the third lake on the Coosa River with the upstream extent of the lake meeting the Henry Powerhouse tailrace. The lake is 15,623 acres in size and spreads across Calhoun, St. Clair and Talladega Counties. The lake is located approximately 85 miles north of Montgomery, 30 miles east of Birmingham, 25 miles west of Anniston, 9 miles west of Talladega, and 4 miles east of Pell City.

Logan Martin Lake provides many different recreational opportunities. The downstream portion of the lake (upstream to approximately Riverside) provides a broad surface area and many coves for water sports, recreational motorized boating, and other land and water based recreational activities. This area is more heavily developed both by public and private entities. The upstream portion (from approximately Riverside to the Henry tailrace) is riverine and less developed and offers fishing, canoeing, scenic viewing opportunities, and other water and land based recreation opportunities. The lake, one of the most popular lakes in the state, has many private clubs, golf courses, and marinas and is heavily utilized by the public for recreation and private residences. The Bass

Masters Classic has been held several years on the lake along with many other annual fishing tournaments.

The Project area provides opportunities for a variety of recreation activities, including fishing, hunting, boating, swimming, picnicking, walking, and scenic viewing. Numerous recreation sites have been developed on the lake to accommodate and provide for recreation (Figure 4.6-2). Specific recreation facilities in the Project area include boat launches, marinas, boat slips, campgrounds, picnic areas, beaches, fishing piers, general piers, trails, and playgrounds. Table 4.6-1 (Appendix C, pg. C-47) provides a list of recreation sites located in the Project area and the recreation facilities present at each site.

There are a total of 45 recreational use areas located on Logan Martin Lake. For purposes of this IIP, public recreation sites refer to sites that are open to the public and operated by federal, state, and local agencies, and APC. A commercial site refers to a site operated by a business for profit. According to the ACT Draft Report (1998) Logan Martin Lake has 79 campsites, 7 picnic sites, 30 boat launches, and 28 public docks and fishing piers.

Public recreation areas on the lake include the Calhoun County Recreation Facility, Pell City Lakeside Park, Stemley Bridge Public Use Area, and Choccoloco Creek at Highway 77 Boat Ramp, which provide boat launching and day use facilities.

APC owns and operates the Logan Martin Tailrace Area and Visitors Center, which are open to the public free of charge. The fishing pier and parking area are located on the western shoreline (APC, 1995). Tailrace fishing from the pier and banks is a popular activity in the tailrace

(APC, 1995). The Visitors Center offers tours of APC's hydroelectric facilities (APC, 1995).

APC also leases property around the lake to various state and local entities and private interests that provide recreation sites that serve the public.

Commercial recreation sites in the Project area include 17 marinas, 5 campgrounds, 3 resorts (including fishing camps and inns), 2 landings, 2 stores with boat launches, 1 sailing club, and 8 other sites. Other sites include Bama Power Sports, Redstone, Macguires Park, Red Arks, Sportsman Cove, Creel's Island, Frank Blue Eye, and Hide-A-Way. These other sites provide public access and multi-use recreation facilities such as boat launches, campsites, picnic areas, swimming areas, food services, and lodging. The marinas generally provide launching facilities, fuel services, groceries/food services, boat rental or repair, marine supplies, bait and tackle, piers, and several provide camping facilities and day use areas. Camping facilities and resorts provide a variety of day and overnight use facilities.

4.6.2 Existing Use

4.6.2.1 Market Area

Results of a survey conducted in 1994 to 1995 showed that Logan Martin Lake primarily serves residents from Alabama (96.9 percent) (FIMS, unpublished data). Respondents from Alabama resided in Jefferson (35.9 percent), St. Clair (28.8 percent), Talladega (14.1 percent), and Calhoun (9.6 percent) Counties. The majority of respondents (78 percent) traveled less than 40 miles one way to recreate on the lake (FIMS, unpublished data). Most survey respondents reported that they did not own homes on the lake (70.6 percent), but visited for one day trips (78.1 percent). Recreationists on the lake stated that they visited the lake because of its proximity to primary residence, convenience, and good fishing, and some visited because they owned lakefront property.

The majority of the visitors interviewed in the upstream portion of the lake were Alabama residents (97.6 percent).[3] Alabama residents using this area were from Calhoun (40.1 percent), Jefferson (30.2 percent), St. Clair (12.8 percent), Talladega (8.3 percent), and Etowah (6.2 percent) Counties. The vast majority (98 percent) of all visitors did not own a home in this area and traveled less than 40 miles one-way (79.3 percent) to recreate at this site. Survey results indicated that users particularly enjoyed the upstream portion of the lake because of good fishing, proximity to primary residence, convenience, and good striped bass fishing.

4.6.2.2 Existing Use and Activities

Annual recreation use of Logan Martin Lake was estimated to be 1,234,540 person-hours of recreational activity in 1994 to 1995, which translates to 176,363 person-trips (FIMS, unpublished data). Approximately 83 percent of the total annual use occurred from April through August (FIMS, unpublished data). Boat fishing was the primary activity, accounting for approximately 30 percent of use, followed by land recreation (23 percent), boating and other water recreation (both 18 percent), and bank fishing (12 percent).

[3] FIMS did not investigate the tailwater reach of the Logan Martin development. Instead, the stretch of river from the upstream extent of Logan Martin Lake at the normal full pool elevation to Henry Powerhouse tailrace was investigated. For purposes of this IIP, this section of the lake is referred to as the upstream portion of Logan Martin Lake.

A study conducted for the ACOE's Draft EIS for the ACT Basin (1998) estimated use on Logan Martin Lake to be 309,041 total annual trips, which translates to 1,343,657 total-visitor days. Approximately 82 percent of total use occurred during the spring and summer. Participation in recreational activities were not considered mutually exclusive, thus percentages of the following activities will sum to greater than 100 percent. Boat fishing was the primary activity, accounting for 82 percent of the total trips, pleasure boating (42 percent), swimming (37 percent), picnicking (30 percent), water skiing (24 percent), shoreline fishing (17 percent), jet skiing (12 percent), and camping (11 percent). Estimated total trips for registered boat owners in the ACT and ACF River Basins to Logan Martin Lake was 361,740.

The primary launching sites utilized by boating recreationists were ramps or boathouses on private property (29.9 percent), Bill's Marina (11.9 percent), Town and Country Food Mart (9.7 percent), and Riverside Marina (6.0 percent) (FIMS, unpublished data). No other boat ramp on the lake was reported to be used for more than 8 percent of the launches.

An estimated 875,176 person-hours or 125,025 person trips can be attributed to recreation activities on the upstream portion of the lake (FIMS, unpublished data). Approximately 85 percent of the total annual use occurred during the months of March through September. Bank fishing was the primary activity in this area, accounting for 73 percent of all use in this area.

Alternatives to Logan Martin Lake for water and land based recreation were reported to be Lay Lake, Guntersville Reservoir, Henry Lake, Lewis Smith Lake, Martin Lake, Weiss Lake, and private ponds.

4.6.2.3 Landowners

Lakefront property owners were also surveyed in 1994 to 1995 and out of 724 households surveyed, 32 percent (234) responded to the survey (FIMS, unpublished data). Results indicated that over half (55 percent) of all respondents were permanent residents, 34 percent were part-time residents, 8 percent owned undeveloped lots, and 3 percent owned lots with small structures, small lots close to their homes, or recreational property. Of the part-time residents over half were from Jefferson County (54 percent), 11 percent from Calhoun County, and 10 percent from Talladega County. Peak visitation for part-time residents occurred between May through September, which corresponds with full-pond levels. Activities that all respondents most commonly participated in were fishing, boating, swimming, sunbathing, entertaining, scenic viewing, and water skiing. Respondents indicated that their lakefront site was “special” to them because of location, it’s home, view, proximity to their primary residence, and “nice people live there.”

4.6.2.4 Business

Commercial business owners were surveyed in 1994 to 1995 and out of 37 businesses contacted, 22 (18 of which were lake businesses) surveys were returned, resulting in a total of 50 percent of lake businesses (36 in total) being sampled (FIMS, unpublished data). Respondents indicated that day use visitors accounted for the majority of visitation and that primary activities that their customers engaged in were boating, fishing, and water skiing.

Alabama Regional Recreation Opportunites
Northern Region - Logan Martin Lake
Coosa-Warrior Rivers Relicensing

- ● Covered Bridge
- Historical State Park
- State Park
- National Forest

Data Source:

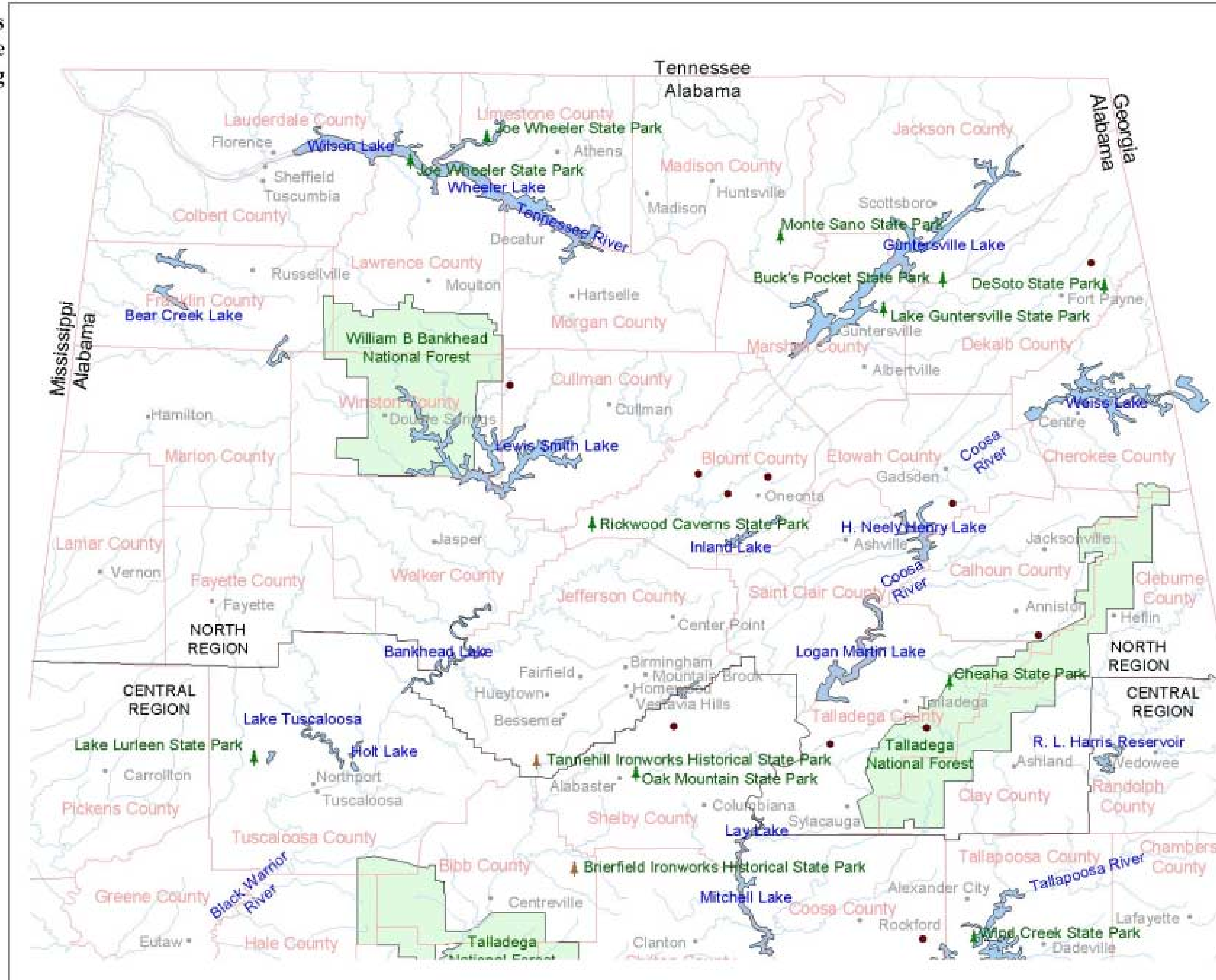
Alabama Bureau of Tourism and Travel, Official Vacation Guide, 2000; DeLorme, Alabama Atlas & Gazetteer, 1998; Internet Resources, 2000; Alabama Power Company, 2000

N

Approximate Scale

5 0 5 10 15 Miles

Location Map



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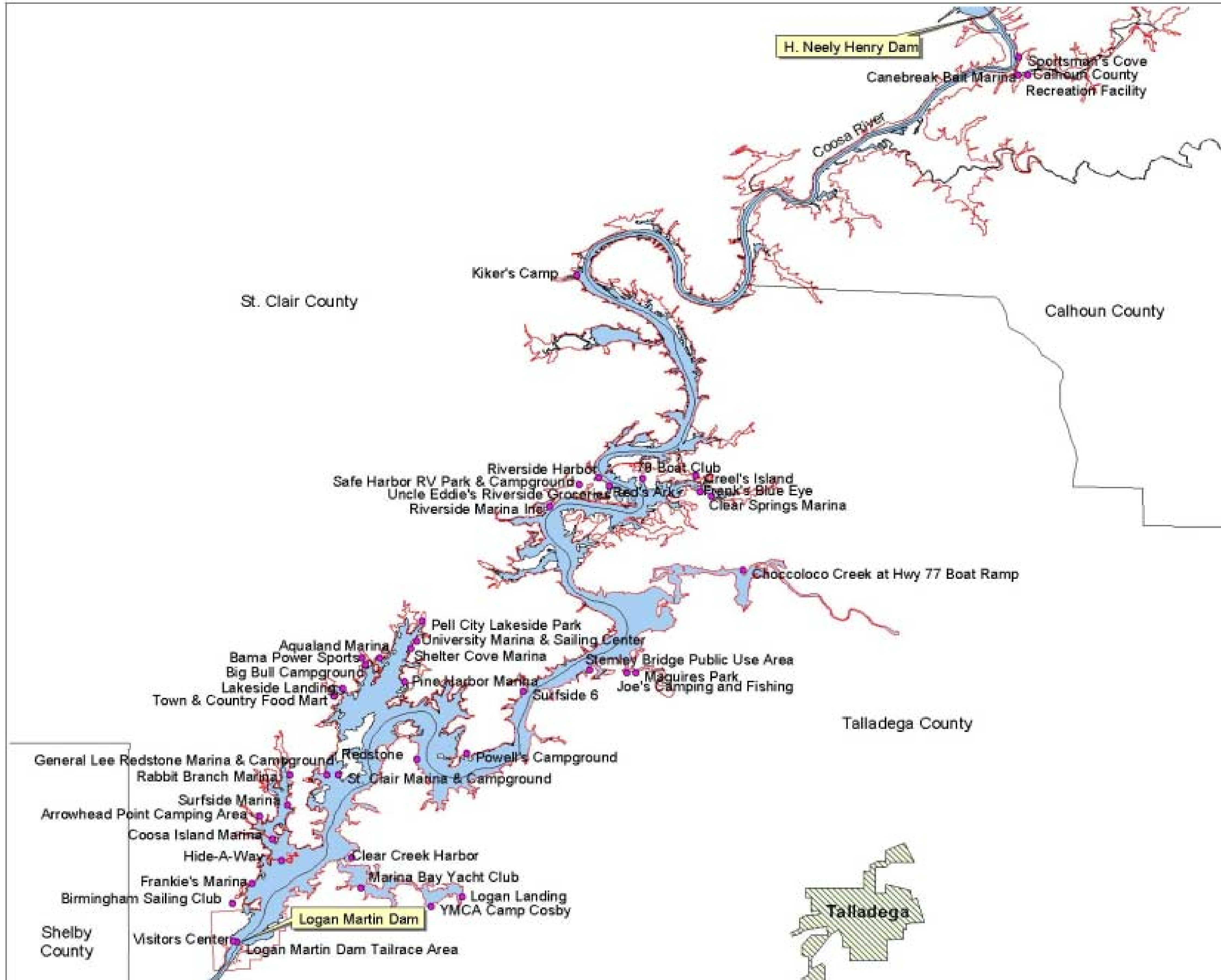
Energy & Water Resource Consultants

Figure 4.6-1

Recreation Opportunities
Logan Martin Lake
Coosa-Warrior Rivers Relicensing

- Recreation Sites
- Project Boundary
- Water
- County Boundaries

Data Source:
Base map supplied by Alabama Power Company, 2000; recreation site data supplied by Alabama Power Company as modified by Kleinschmidt, 2000; FIMS, unpublished data; Carto-Craft Maps, unknown.



Location Map

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Energy & Water Resource Consultants

Figure 4.6-2

4.7 Land Use and Aesthetics

4.7.1 Existing Land Use

Land use in the vicinity of the Project is influenced by a variety of factors, which include topography, soil characteristics, APC permitting regulations, and the current uses of land and water resources. Social and economic factors such as employment, population, and development also influence land use patterns.

Logan Martin Lake is located in the Coosa River Basin (Figure 4.7-1). The Basin extends from the Blue Ridge Mountains in Tennessee to Wetumpka, Alabama (north of Montgomery) and has a drainage basin of approximately 10,200 square miles (ACOE, 1998). Land use in this basin consists of approximately 86 percent forestland, 12 percent agricultural land, and one percent urban[4] (personal communication, APC Reservoir Management Group, October 20, 2000).

Logan Martin Lake (15,263 acres) is located on the Upper Coosa River and has a drainage basin of 7,770 square miles. This area is characterized by wide, rolling valleys and steep rough ridges (trending northeast-southeast) (Catchings and Cook, 1987). The lake extends for 48.5 miles upstream to Henry Dam, and consists of 275 miles of shoreline (APC, 1995). The Project area including land and water, is approximately 27,000 acres (Figure 4.7-2).[5] Approximately 73 percent of the 904,299 acres of land surrounding the lake is forested, agriculture constitutes 21 percent of the land, 3 percent is urban and 3 percent is utilized for other purposes (Catchings and Cook, 1987). The largest cities near the lake are Pell City, Talladega, Birmingham, Anniston, and

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[4] Land use percentages are based on 1970 data.

[5] The land use maps were created using the Anderson land use classification system. The land cover data was digitally rendered at a scale of 1:250,000, which mean that only major land use areas are shown on the map.

Sylacauga and municipalities in the vicinity of Logan Martin Lake are Riverside, Lincoln, and Cropwell.

The Project area lies within Calhoun, Talladega, and St. Clair Counties. Calhoun County has an area of 611 square miles and contains the City of Anniston and twelve other towns including Jacksonville, Ohatchee, and Piedmont. Calhoun County has a total of 685 farms with a total farm acreage of 90,474 and total cropland acreage of 41,055 (Bayne *et al.*, 1995). The majority of the County's population resides in an urban setting.

St. Clair County has an area of 641 square miles and contains twelve municipalities including Ashville, Springville, Pell City and Odenville. St. Clair County has a total of 634 farms with a total farm acreage of 89,109 and total cropland acreage of 39,773 (Bayne *et al.*, 1995). The majority of the population resides in a rural setting.

Talladega County has an area of 750 square miles and contains 12 municipalities, including Childersburg, Sylacauga, and Talladega. Talladega County has a total of 472 farms with a total farm acreage of 104,199 (U.S. Bureau of Census, 1999). The population resides in both urban and rural settings.

APC owns lands in fee up to the normal lake elevation of 465 ft msl. It also owns in fee and easement for flood storage. The lake shoreline is heavily developed by commercial (marinas and campgrounds) and private entities (residential) (APC, 1995).

There are no land use plans for Calhoun, Talladega, or St. Clair Counties; however, Pell City has developed land use ordinances for properties within the municipality. Pell City has 12 zoning districts including residential, business, manufacturing, and special districts (Pell City Planning Commission, 1993). Although Pell City does not have specific shoreline zoning ordinances, it does provide zoning regulations for designated floodplain and conservation districts. These provisions supercede other zoning districts (Pell City Planning Commission, 1993). Uses of this district include: wildlife refuges; watershed reservation areas and reservoirs; public outdoor recreation (by city, county, state or federal governments); aircraft landing strips; public utility facilities; and agricultural uses (this can include a single dwelling occupied by the farm owner/worker, as well as no structures with animals within 200 ft of a residential district) (Pell City Planning Commission, 1993). No other permanent structures can be placed within the district unless they are approved by the Planning Commission (Pell City Planning Commission, 1993).

APC maintains a Shoreline Permitting Program that manages all shoreline property within the Project boundary. The ACOE has given APC the authority to manage certain permitting on the lake that ordinarily would be subject to ACOE permitting. The objective of this management approach is to control all development activities and monitor the shoreline areas on a regular basis to preserve the scenic, recreational, and environmental attributes of the lake. This management approach allows APC to quickly respond to shoreline owner permitting needs.

APC's Shoreline Permitting Program was established in 1991. Since then APC has issued approximately 1,107 permits for the Logan Martin Project. Structures built (prior to 1991) on the lake that are in good condition are not included in this total. If improvements or enhancements are made to these structures, the individual property owner must follow APC's permitting process.

Privately owned shoreline property is subject to permitting by APC. The shoreline permitting program provides a proactive, ongoing plan for shoreline development by private property owners, commercial developers, and local, state and federal agencies that want to construct piers, boat ramps, seawalls, boathouses, boat slips or other structures on lands within the Project area. Private and commercial owners are provided a copy of general guidelines for recreational development and a copy of APC's permitting program and permit application. APC schedules on-site meetings with the property owner to review the placement of structures and specific issues that must be addressed prior to APC approval. The property owner gives APC a detailed drawing of the proposed structure, a copy of the deed to the property, and any other necessary permits or approvals from the appropriate state or local agency, where applicable. Commercial property owners must follow a more detailed procedure that includes review by APC's Corporate Real Estate, Hydro Licensing, and Environmental Affairs departments, and State and Federal agencies, before final approval by FERC.

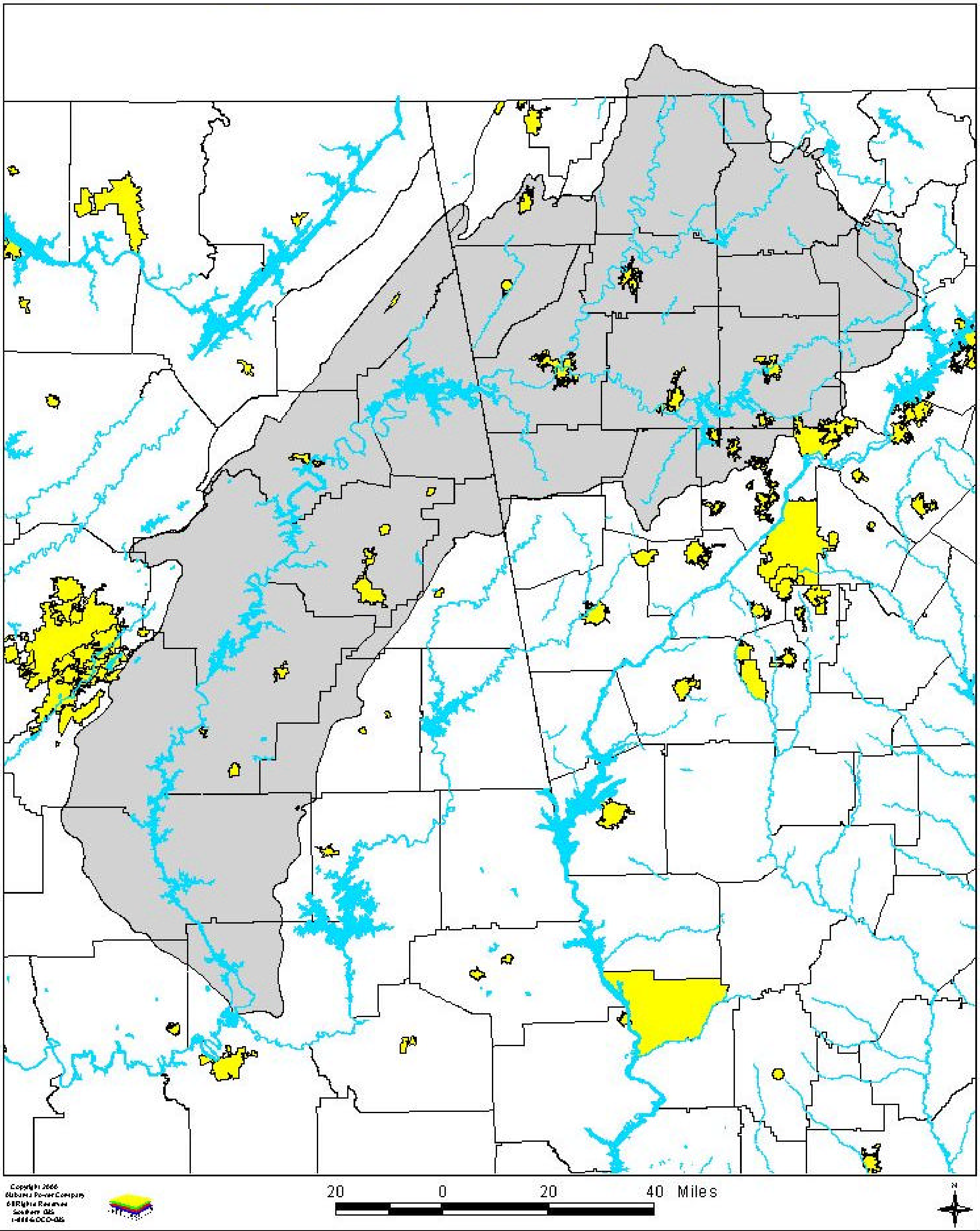
Upon FERC approval, APC issues a permit and monitors the construction of the project for compliance with the terms of the permit. The construction of the project must be completed within one year of issuance of the permit. After completion, APC marks the structures with metal tags depicting the APC permit number. These tags are displayed for APC's reference during regular field inspections. APC maintains permit records and copies are sent to the ACOE where applicable.

4.7.2 Aesthetic Resources

Logan Martin Lake offers unique viewing opportunities of large coves, beaches, forestland, and heavily developed shoreline areas. The lake can be divided into two scenic viewing sections. The downstream portion of the lake is more open and offers opportunities of viewing the lake and developed shoreline. The upstream riverine portion of the lake offers more undeveloped scenic and wildlife viewing opportunities. Since the lake extends for 48.5 miles there are no single vantage points along the shoreline in which to view the entire lake. Vantage points located at recreation sites, near bridges and from the adjacent municipalities offer views of the shoreline. Roads adjacent to the lake and bridges spanning the lake include Interstate 20, U.S. Route 231, State Routes 34 and 53, and various county and local roads. Boating around the lake offers diverse view of various areas of the lake and shoreline.

Vantage points above and below the dam offer views of the APC facilities. County Road 54 crosses the Logan Martin Dam and offers views of the facilities, lake and tailrace area.

Figure 4.7-1 Map of the Coosa River Basin



Project Area Land Cover
Logan Martin Lake
Coosa-Warrior Rivers Relicensing

APC Owned Lands
County Boundaries

Land Cover Types
- COMMERCIAL AND SERVICES
- CONFINED FEEDING OPERATIONS
- CROPLAND AND PASTURE
- DECIDUOUS FOREST LAND
- EVERGREEN FOREST LAND
- FORESTED WETLAND
- INDUSTRIAL
- MIXED FOREST LAND
- MIXED URBAN OR BUILT-UP
- NONFORESTED WETLAND
- OTHER AGRICULTURAL LAND
- OTHER URBAN OR BUILT-UP
- WATER
- RESIDENTIAL
- STRIP MINES
- TRANSPORTATION, COMMUNICATIONS & UTILITIES
- TRANSITIONAL AREAS

N

Data Source:
DeLorme, Alabama Atlas & Gazetteer, 1998; Alabama Power Company as modified by Kleinschmidt Associates, 2000

Notes:
Project boundary for Logan Martin Lake is approximate to accomodate the scale of the land cover type data.

2 0 2 4 Miles

Location Map

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Kleinschmidt
Energy & Water Resource Consultants

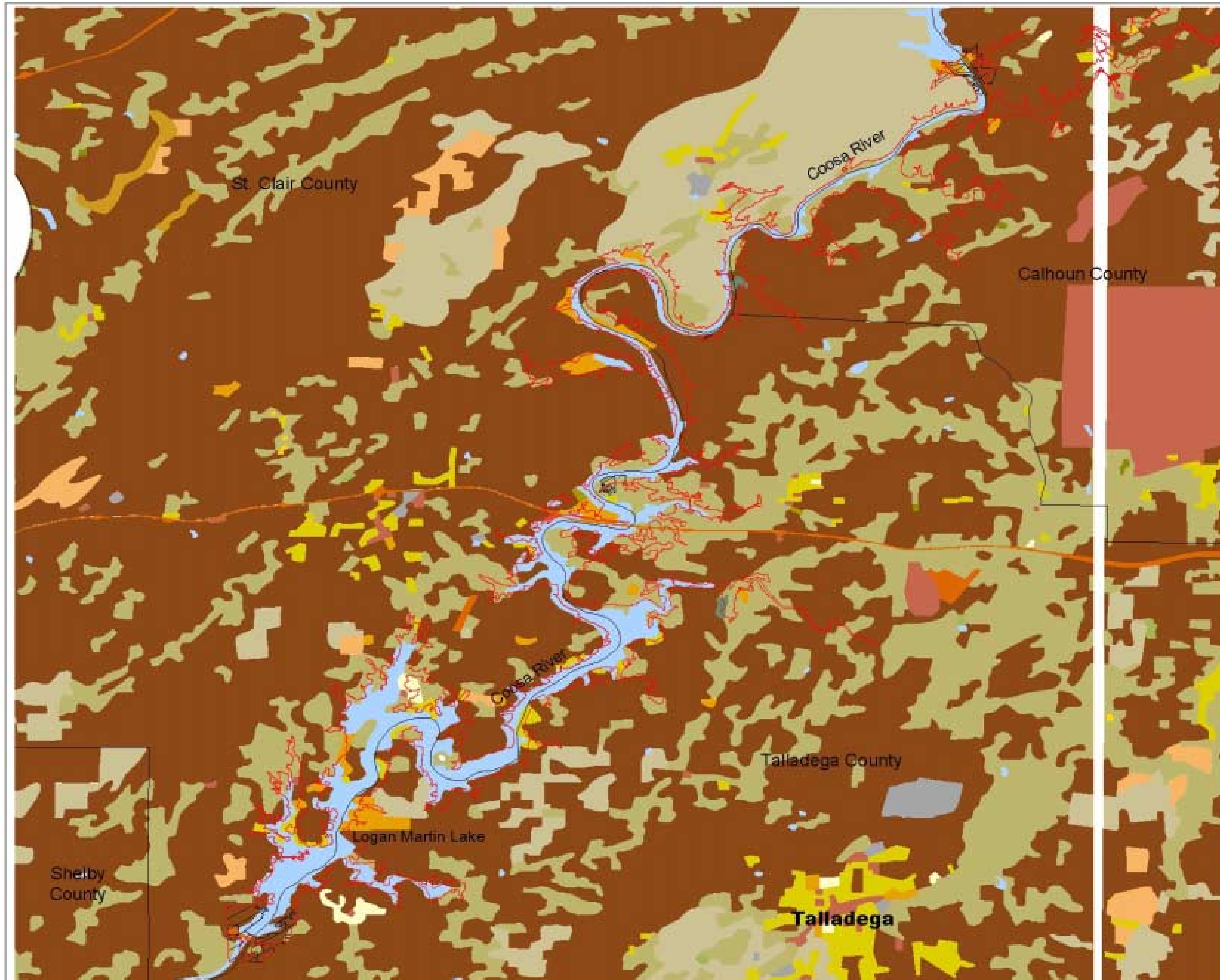

Figure 4.7-2

4.8 Socioeconomics

4.8.1 Demographics

A summary of the demographic profile of the immediate Project vicinity including: Calhoun, St. Clair and Talladega Counties, Alabama is provided in Table 4.8-1 (Appendix C, pg. C-48). As of 1997, Alabama ranked 23rd in population within the United States (this ranking includes the District of Columbia) (REIS, 1999). Calhoun, St. Clair and Talladega Counties ranked 8th, 6th, and 15th in population in the state (out of 67 counties), respectively. The population growth rate of Calhoun County experienced a modest growth rate of 0.4 percent, St. Clair County was 27.7 percent, and Talladega County experienced a moderate growth rate of 4.6 percent between 1990 to 1999 (REIS, 1999). This compares to a population growth rate of approximately 8.2 percent for Alabama over the same time period. The population of Calhoun County resides primarily in urban settings, while the population of St. Clair County is predominantly rural, and in Talladega County the population is evenly split between urban and rural.

Alabama's population is expected to increase to 4,648,291 in 2005; 4,884,761 in 2010; and 5,119,997 in 2015.

4.8.2 Economy

A summary of economic information pertaining to the State of Alabama, Calhoun, St. Clair and Talladega Counties is provided in Table 4.8-2 (Appendix C, pg. C-49). The per capita personal income for Alabama was $12,394 in 1987 and $20,672 in 1997 which ranked 44th and 39th in the United States, respectively (REIS, 1999). The average annual growth rate of per capita income was 5.2 percent over this time period, which is slightly greater than the national average of

4.7 percent. The state's unemployment rate was 6.0 percent in 1994, which is slightly lower than the national average of 6.1 percent.

The per capita income for Calhoun County was $11,640 in 1987 and $18,855 in 1997, which ranked 18th and 22nd in the state respectively. The average annual growth rate of per capita income for Calhoun County was 4.9 percent over this time period.

The per capita income for St. Clair County was $10,545 in 1987 and $18,496 in 1997, which ranked 34th and 26th in the state, respectively. The average annual growth rate of per capita income for St. Clair County was 5.8 percent over this time period.

The per capita income for Talladega County was $10,440 in 1987 and $16,857 in 1997, which ranked 37th and 49th in the state, respectively. The average annual growth rate of per capita income for Talladega County was 4.9 percent over this time period.

This region is supported by a wide variety of major businesses, industries, education, and health care, but also relies heavily on natural resources. Calhoun County has approximately 2,299 business establishments and 685 farms (Bayne *et al*., 1995). Retail trade and service businesses are the most numerous, but manufacturing businesses employ the most individuals of any single business type (Bayne *et al*., 1995). The largest employers in the County include NE AL Regional Medical Center, Springs Industries, Westinghouse and Bostrom Seating (Calhoun County Chamber of Commerce, Unknown).

St. Clair County has approximately 715 business establishments and 634 farms (Bayne *et al*., 1995). Similar to Calhoun County, retail trade and service businesses are the most numerous, but manufacturing employees comprise the most individuals (Bayne *et al.*, 1995). Talladega County has a total of 1,256 private nonfarm establishments and 472 farms (U.S. Bureau of Census, 1999).

4.8.3 Social Infrastructure

Calhoun, St. Clair and Talladega Counties provide many services including law enforcement, county roads, sanitation, judicial, emergency medical, health care facilities, hospitals, fire protection, civic organizations, recreation facilities, and management of public records.

Calhoun County has five school systems consisting of approximately 33 public schools. St. Clair County has two school systems consisting of approximately 21 public schools. Talladega County has three school districts consisting of approximately 28 schools. Secondary education opportunities within the Counties include Talladega College, Ayers State Technical College, and Jacksonville State University.

4.8.4 Access and Transportation

Calhoun. St. Clair and Talladega Counties are served by several railroads, five airports, various motor freight and trucking companies, and a system of highways. Interstate 20 and U.S Route 78 connect the Project area with Birmingham and Atlanta. Interstate 20 and U.S. Route 78 are the major east-west connectors, and U.S. 231 is the major north south connector in the vicinity of the Project area. Other major routes in the counties include Interstate 59, U.S. Route 11, 411, 431, and 280 and Alabama Highways 174, 23, 25, 144, 7, 77, 202, 1, 204, 21, 9, 34, 76, and 148. The McMinn Airport (Calhoun County), St. Clair County Airport, Talladega Municipal Airport, and Merkel-Field Sylacauga Municipal Airport (Talladega County) are public airports that provide general air transportation. The Anniston Metro Airport located south of Anniston provides commercial air transportation. Birmingham's International Airport, served by major commercial airlines, is less than 30 miles from the Project area.

5.0 ENVIRONMENTAL PROGRAMS AND ACTIVITIES FOR LOGAN MARTIN

5.1 Environmental Programs

APC is committed to continuously seeking ways to improve Alabama's environment while providing its citizens with safe, reliable, low-cost electricity. Some of APC's improvement projects are briefly described below. In addition, volunteer groups at Logan Martin Lake are also briefly described.

Alabama Water Watch

Alabama Water Watch currently works with the public to develop an awareness of water quality issues within the State. The group educates the public and collects data from various water bodies within the State. Included within the AWW monitoring system is Logan Martin Lake. Further information on AWW may be obtained at http://web1.duc.auburn.edu/academic/societies/alabama_water_watch/.

Turbine Aeration Program

Diminished DO levels occasionally occur in the Logan Martin tailrace. APC has implemented a mitigation technology by using an aspiration system, a "speece cone" and an aeration weir to aerate discharges from the Logan Martin powerhouse and aerate dam leakage to the tailrace. This aeration system uses liquid oxygen that is delivered into an inverted cone along with a stream of water. The stream of water mixes with the small bubbles of oxygen as they rise upward in the cone. The contact time between the bubbles and the water is extended due to the stream of water pushing the bubbles downward within the cone, thus increasing the transfer of oxygen to the water.

The type of turbine aspiration that APC uses is referred to as "draft tube aeration". This method uses the naturally occurring low-pressure area below the turbine runner to aspirate atmospheric air into the draft tube via a pipe or manifold. The low-pressure area is created by the flow of water past the pipe or manifold opening, which draws air into the water flow. As the air and water mixture travel through the draft tube, it is subjected to turbulence and pressure changes that result in the formation of very small bubbles of air. The small bubbles provide an excellent condition for gas-transfer (oxygen and naturally occurring gases) to the water for the length of time that the water and bubbles are in contact. As the water-air mixture moves into the tailrace area the remaining portions of the air bubbles float up to the surface. This type of aeration system typically results in an average increase of 1 to 2 mg/l in DO levels (APC, 1993).

In 1991, APC constructed and tested an aeration weir on the east bank of the Logan Martin tailrace as a means to provide supplemental DO level increases during the summer and fall periods. This weir added approximately 2 mg/l of DO to a subsurface discharge located below the dam on the east bank. As water passes over the weir, it creates a turbulence that traps air bubbles in the water and results in the gas transfer of oxygen and other naturally occurring gases to the water.

APC has spent significant resources for both construction and operation of these turbine aeration systems. Costs are also associated with operation of these systems through the loss of turbine efficiency. Operating costs associated with these systems include both capacity and energy losses.

Aquatic Vegetation Control Plan

APC recognizes the ecological importance of aquatic vegetation in its reservoirs and therefore manages aquatic vegetation to optimize the uses of these reservoirs in compliance with local, state, and federal laws and regulations. When aquatic vegetation is beneficial for the fishery or enhances aesthetic value, APC leaves it in its natural state.

APC considers implementing aquatic vegetation control when the vegetation:

- Creates a mosquito-breeding habitat
- Poses a threat to power generation facilities or water withdrawal structures
- Restricts recreational use of a reservoir; and/or
- Poses a threat to the ecological balance of a reservoir.

Fish Habitat Enhancement Program

In 1992, APC and the Bass Anglers Sportsman's Society (BASS) fishing organization signed an agreement to work together to enhance the productivity of the fisheries in lakes managed by APC. One improvement that APC, BASS members, lake associations, and other sportsmen groups work cooperatively on is the Christmas tree recycling program. The goal of this program is to create and enhance fishery habitat. To achieve this goal, Christmas trees are collected, tied in bundles, weighted with concrete blocks, and sunk in areas of the lakes where the bottom is bare. Once in place, the trees provide cover for fish and aquatic organisms to live. APC records the coordinates (latitude and longitude) of each tree bundle installed and makes this data available to public. Table 5.1-1 (Appendix C, pg. C-50) provides a summary of this enhancement program.

Fish Weigh-In Station

During the past several years, APC has provided a mobile "Weigh-In Station" for tournaments held on the lakes. The stations provide a good way to handle and process fish caught during a tournament. The use of the "Weigh-In Station" can reduce fish stress and mortality commonly associated with tournament weigh-in procedures. In this way, APC helps reduce some of the impacts on the fishery resources associated with tournament angling.

Recreation Program, Plans, and Studies

Although APC owns and operates only two sites in the Project area, it provides assistance to other public recreation areas.

Several studies and resources are available for recreationists on Logan Martin Lake. APC distributes a free map that shows public and commercial recreation sites, roads, WMAs, National Forests, cities, and counties. Carto-Craft Maps, Inc. also provides recreation maps and fishing tips for the lake, these are available for a fee at stores near the lake.

Fishery Information Management Systems (FIMS) conducted a survey during 1994 and 1995 to assess the potential impacts of water diversion on recreational use and economic value of Logan Martin Lake and tailwater. This study inventoried recreational sites, estimated use numbers, collected sociocultural and economic values, and projected impact of water level on visitation. FIMS conducted on-site monitoring and surveys of lake users, landowners, and businesses.

6.0 PRELIMINARY ISSUES AND ON-GOING STUDIES

6.1 Preliminary Issues

APC has collected information from stakeholders on potential issues at the Project. While not intended to be a complete list, the following represent issues raised to date.

The issues are grouped by the primary resource area.

Water Resources – Quality and Quantity

- The effect of point and non-point source discharges on water quality
- Erosion and siltation and its effects on water quality
- Whether the Project complies with state water quality standards

Fisheries – Lake and Riverine

- The effect of erosion and resulting siltation on fish habitat
- The effect of existing shoreline permitting requirements on fisheries shoreline habitat
- Expanding the existing fish habitat enhancement program.
- Effects of changing winter water level in Logan Martin Lake to improve crappie recruitment.

Recreation

- Whether to provide additional opportunities for hunting, camping, biking and wildlife areas
- Effects of additional access for non-boating anglers
- Effects of additional boating facilities

Operations

- Effects of lake level fluctuations
- Effect of changing current project operations

Wildlife

- Project effects on threatened and endangered species
- Opportunities for increasing nesting structures

6.2 On-Going

APC is currently involved in a variety of environmental, recreational, and engineering studies. The following list provides APC's on-going research.

- Water quality monitoring in the lake and tailrace
- Recreation facilities inventory
- Threatened and endangered species field investigations
- Evaluating project modifications – potential upgrades for increasing operation efficiency

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APPENDIX A

Glossary

GLOSSARY

acre-foot	The amount of water it takes to cover one acre to a depth of one foot, 43,560 cubic feet or 1,233.5 cubic meters
active storage	The volume of water in a reservoir between its minimum operating elevation and its maximum normal operating elevation.
alluvium	Material such as sand, silt or clay, deposited on land by water such as on floodplains.
anadromous fish	Fish that live in saltwater habitats most of their lives, but periodically migrate into freshwater to spawn and develop to the juvenile stage (e.g., alewife).
aquatic life	Any plants or animals which live at least part of their life cycle in water.
baseline	A set of existing environmental conditions upon which comparisons are made during the NEPA process.
base load	A power plant that is planned to run continually except for maintenance and scheduled or unscheduled outages. Also refers to the nearly steady level of demand on a utility system.
benthic	Associated with lake or river bottom or substrate.
benthic macroinvertebrates	Animals without backbones, which are visible to the eye and which live on, under, and around rocks and sediment on the bottoms of lakes, rivers, and streams.
bypass reach	The original water channel of the river that is directly affected by the diversion of water though the penstocks to the generating facilities. This portion of the river, the "bypassed reach" may remain watered or become dewatered.
capacity	The load for which an electric generating unit, other electrical equipment or power line is rated.
catadromous fish	Fish that live in freshwater most of their lives, but periodically migrate to the sea to spawn (e.g., American eel).
Clean Water Act (CWA)	The Federal Water Pollution Control Act of 1972 and subsequent amendments in 1977, 1981, and 1987 (commonly referred to as the Clean Water Act). The Act established a regulatory system for navigable waters in the United States, whether on public or private land. The Act set national policy to eliminate discharge of water pollutants into navigable waters, to regulate discharge of toxic pollutants, and to prohibit discharge of pollutants from point source without permits. Most importantly it authorized EPA to set water quality criteria for states to use to establish water quality standards.
colluvium	Soil material and/or rock fragments moved by gravity such as during creep, slide, or localized wash-outs, which is deposited at the base of steep slopes.
combustion turbine	A fuel-fired turbine engine used to drive an electric generator.
conservation	A process or program designed to increase the efficiency of energy and water use, production, or distribution.
creel census	Counting and interviewing anglers to determine fishing effort and catch. Usually conducted by a census clerk on systematic regularly scheduled visits to significant fishing areas.

cubic feet per second (cfs)	A measurement of water flow representing one cubic foot of water moving past a given point in one second. One cfs is equal to 0.0283 cubic meters per second and 0.646 mgd.
cultural resources	Includes items, structures, etc. of historical, archaeological, or architectural significance.
cumulative impacts	The effect on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseen future actions. Can result from individually minor but collectively significant actions taking place over a period of time.
dam	A structure constructed across a water body typically used to increase the hydraulic head at hydroelectric generating units. A dam typically reduces the velocity of water in a particular river segment and increases the depth of water by forming an impoundment behind the dam. It also generally serves as a water control structure.
demand	The rate at which electric energy is delivered to or by a system at a given instant or averaged over a designated period, usually expressed in kilowatts or megawatts.
dike	A raised bank, typically earthen, constructed along a waterway to impound the water and to prevent flooding.
dissolved oxygen (DO)	Perhaps the most commonly employed measure of water quality. Low DO levels adversely affect fish and other aquatic life. The total absence of DO leads to the development of an anaerobic condition with the eventual development of odor and aesthetic problems.
distribution lines	Power lines, like those in neighborhoods, used to carry moderate voltage electricity which is "stepped down" to household levels by transformers on power poles.
drawdown	The distance the water surface of a reservoir is lowered from a given elevation as the result of releasing water.
emergent aquatic vegetation	Plants rooted in substrate covered by shallow water (of up to 6.6 ft depth), with most of the parts out of the water.
energy	Average power production over a stated interval of time, expressed in kilowatt-hours, megawatt-hours, average kilowatts and average megawatts.
Environmental Impact Statement (EIS)	An environmental review document prepared under NEPA to determine the environmental impact of a specific action. A Draft Environmental Impact Statement (DEIS) is prepared and circulated for public comment. After incorporation of public comments, a Final Environmental Impact Statement (FEIS) is published.
eutrophic	Waters with a high concentration of nutrients and a high level of primary production.
evapotranspiration:	The evaporation from all water, soil, snow, ice, vegetation, and other surfaces, plus transpiration.
Federal Energy Regulatory Commission	The governing federal agency responsible for overseeing the licensing/relicensing and operation of hydroelectric projects in the United States.

Federal Power Act (FPA)	Federal statute enacted in 1920 that established the Federal Power Commission (now FERC) and the statutes for licensing hydroelectric projects.
Federal Power Commission (FPC)	Predecessor of FERC
Federal Register	A publication of the Federal Government that includes official transactions of the U.S. Congress, as well as all federal agencies such as FERC. Copies of the Federal Register are usually available at large public and university libraries.
flow	The volume of water passing a given point per unit time.
flow duration curve	A graphical representation of the percentage of time in the historical record that a flow of any given magnitude has been equaled or exceeded.
forebay	That portion of a hydroelectric project impoundment immediately upstream of the intake to the turbines (see also headwaters).
generation	The process of producing electricity from other forms of energy, such as steam, heat, or water. Refers to the amount of electric energy produced, expressed in kilowatt hours.
gross storage	The sum of the dead storage and the live storage volumes of a reservoir, the total amount of water contained in a reservoir at its maximum normal operating elevation.
habitat	The locality or external environment in which a plant or animal normally lives and grows.
head	The distance that water falls in passing through a hydraulic structure or device such as a hydroelectric plant. Gross head is the difference between the headwater and tailwater levels; net head is the gross head minus hydraulic losses such as friction incurred as water passes through the structure; and rated head is the head at which the full-gate discharge of a turbine will produce the rated capacity of the connected generator.
headwater	The waters immediately upstream of a dam. For power dams, also referred to as the water in the impoundment which supplies the turbines (see also forebay).
hydraulic	Relating to water in motion.
hydroelectric plant	A facility at which the turbine generators are driven by falling water.
hydroelectric power	Capturing flowing water to produce electrical energy.
hydroelectric project	The complete development of a hydroelectric power site, including dams, reservoirs, transmission lines, and accessories needed for the maintenance and operation of the powerhouse and any other hydroelectric plant support facilities.
hypolimnetic	The deeper cooler portions of a reservoir or lake that result from stratification.
impoundment	The body of water created by a dam.

Initial Information Package (IIP)	A document containing detailed information on a hydroelectric project; the document is used to describe the project and its resources and to start the applicant's consultation process with resource agencies and the public.
kilowatt (kW)	A unit of electrical power equal to 1,000 watts.
kilowatt-hour (kWh)	A basic unit of electricity consumption equals to 1 kW of power used for one hour. A kilowatt-hour equals the amount of electricity needed to burn ten, 100-watt light bulbs for one hour.
lacustrine	Related to standing water, (e.g., a lake).
lentic	Standing or still water including lakes, ponds, and swamps.
license	FERC authorization to construct a new project or continue operating and existing project. The license contains the operating conditions for a term of 30 to 50 years.
littoral	Associated with shallow (shoreline area) water (e.g., the littoral zone of an impoundment).
load	The total customer demand for electric service at any given time.
lotic	Flowing or actively moving water including rivers and streams.
mainstem	The main channel of a river as opposed to the streams and smaller rivers that feed into it.
maximum drawdown elevation	The lowest surface elevation to which a reservoir can be lowered and still maintain generation capability. This is usually somewhat lower than the minimum operating elevation.
maximum normal operating elevation	The maximum surface elevation to which the reservoir can be raised without surcharging or exceeding the license provisions.
megawatt (MW)	A unit of electrical power equal to one million watts or 1,000 kW.
megawatt-hour (MWh)	A unit of electrical energy equal to 1 MW of power used for one hour.
minimum normal operating elevation	The lowest elevation to which a reservoir is normally lowered during power generation operations. Below this point power output and generation efficiency is significantly impacted.
nameplate capacity (also called installed capacity)	A measurement indicating the approximate generating capability of a project or unit, as designated by the manufacturer. In many cases, the unit is capable of generating substantially more than the nameplate capacity since most generators installed in newer hydroelectric plants have a continuous overload capacity of 115 percent of the nameplate capacity.
National Environmental Policy Act (NEPA)	A law passed by the U.S. Congress in 1969 to establish methods and standards for review of development projects requiring Federal action such as permitting or licensing.
Non-Governmental Organizations (NGOs)	Local, regional and national organizations such as conservation, sportman's or commerce groups.

normal operating elevation	The reservoir elevation approximating an average surface elevation at which a reservoir is kept.
normal operating elevation range	The elevation difference between the normal maximum and normal minimum operating elevations.
off peak	A period of relatively low demand for electrical energy, such as the middle of the night.
on peak	A period of relatively high demand for electrical energy.
outage	The period during which a generating unit, transmission line, or other facility is out of service.
palustrine emergent wetland	Contains rooted herbaceous vegetation that extend above the water surface (*i.e.*, cattails, sedges)
palustrine forested wetland	Dominated by woody vegetation less than 20 ft tall (*i.e*., willows, dogwood)
palustrine scrub/shrub wetlands	Comprised of woody vegetation that is 20 ft tall or greater (*i.e*., American elm, swamp white oak).
peaking operations	A powerplant that is scheduled to operate during peak energy demand.
periphyton	Macroscopic (visible without a microscope) and microscopic (visible only with a microscope) algae (single- and multi-celled plants) that grow on or attach to rocks, logs, and aquatic plants. Periphyton, phytoplankton, and aquatic plants are the primary producers that convert nutrients into plant material by the process of photosynthesis.
phytoplankton	Algae floating in the water column. These are mostly microscopic single-celled and colonial forms.
ponding operations	The process of storing and releasing water based on electric demand or flood control.
peak demand	A one hour period in a year representing the highest point of customer consumption of electricity.
piezometer	A device that measures water pressure.
Plenary group	A group consisting of stakeholder representatives and APC to assist in decision making on the Coosa Warrior relicensing.
pool	Refers to the reservoir (impounded body of water).
powerhouse	The building that typically houses electric generating equipment.
power pool	A regional organization of electric companies interconnected for the sharing of reserve generating capacity.
Probable Maximum Flood (PMF)	A statistical formula used to calculate a hypothetical flood event that could occur on a particular river basin over a particular duration. This is derived from the probable maximum precipitation over time.
Project area	APC lands and waters within the project boundary.
project boundary	A line established by the FERC to enclose the lands, waters and structures needed to operate a licensed hydroelectric project.

Project vicinity	Lands and waters within which studies were conducted for baseline environmental data. These lands and waters include the Project area.
public utility	A business enterprise rendering a service considered essential to the public and, as such, subject to regulation.
ramp rate	The rate of change in output from a power plant. A maximum ramp rate is sometimes established to prevent undesirable effects due to rapid changes in loading or, in the case of hydroelectric plants, discharge.
relicensing	The administrative proceeding in which FERC, in consultation with other federal and state agencies, decide whether and on what terms to issue a new license for an existing hydroelectric project at the expiration of the original license.
reserve capacity	Extra generating capacity available to meet unanticipated demand for power or to generate power in the event of loss of generation.
reservoir	An artificial lake into which water flows and is stored for future use.
resident fish	Fish that spend their entire life cycle in freshwater, such as trout and bass.
Resource Advisory Team	Groups consisting of stakeholders and APC designed to identify studies and work cooperatively to develop study scopes, review and comment on information and provide recommendations on project operations and protection and enhancement measures to the Plenary Group.
resource agency	A federal, state, or interstate agency with responsibilities in the areas of flood control, navigation, irrigation, recreation, fish or wildlife, water resource management, or cultural or other relevant resources of the state in which a project is or will be located.
rhizome	Underground stem.
riparian area	A specialized form of wetland with characteristic vegetation restricted to areas along, adjacent to or contiguous with rivers and streams. Also, periodically flooded lake and reservoir shore areas, as well as lakes with stable water.
river miles	Miles from the mouth of a river; for upstream tributaries, from the confluence with the main river.
run	A general term referring to upriver migration of anadromous fish over a particular time and area – often composed of multiple individual breeding stocks.
run-of-river	A term used to describe the operation of a hydroelectric project in which the quantity of water discharged from the project essentially equals the flow in the river.
runner	The rotating part of a turbine.
Scoping Document 1 (SD1)	A document prepared by FERC as part of NEPA environmental review that initially identifies issues pertinent to FERC's review of a project. FERC circulates the SD1 and holds a public meeting to obtain the public's comment.
Scoping Document 2 (SD2)	A revision to SD1 which takes into account public comment on that document.

secchi depth	Average depth at which a standard size black and white disk disappears and reappears when viewed from the lake surface as it is lowered. An indicator of water clarity.
seepage	The amount of water that leaks through a structure, such as a dam.
spawn	The act of fish releasing and fertilizing eggs.
spillway	The section of a dam that is designed to pass water over or through it.
stock	The existing density of a particular species of fish in an aquatic system.
stratification	A physical and chemical process that results in the formation of distinct layers of water within a lake or reservoir (i.e., epilimnion, metalimnion, and hypolimnion).
streamflow	The rate at which water passes a given point in a stream, usually expressed in cubic feet per second (cfs).
submerged aquatic vegetation	Plants with rigid stems and/or leaves rooted in substrate and generally covered by deep water (greater than 6.6 ft depth), with all of the plant parts covered by water.
tailrace	The channel located between a hydroelectric powerhouse and the river into which the water is discharged after passing through the turbines.
tailwater	The waters immediately downstream of a dam. For power dams, also referred to as the water discharged from the draft tubes.
tainter gate	A gate with a curved skin or face plate connected with steel arms to an axle. It is usually lifted or lowered by a cable connected to a hook at the top of the gate rotating on the axle as it is moved.
taxon	A means of referring to a set of animals or plants of related classification, such as all of the species (i.e., brook trout, lake trout) in a genus (trout); or all of the genera (all trout and salmon) in a family of fishes (salmonidae). Plural form of taxon is taxa.
transformer	Equipment vital to the transmission and distribution of electricity designed to increase or decrease voltage.
transmission	The act or process of transporting electric energy in bulk from one point to another in the power system, rather than to individual customers.
transmission lines	Power lines normally used to carry high voltage electricity to substations which then is "stepped down" for distribution to individual customers.
transpiration	The process by which water absorbed by plants is converted to vapor and discharged to the atmosphere.
turbidity	A measure of the extent to which light passing through water is reduced due to suspended materials.
turbine	A machine for generating rotary mechanical power from the energy in a stream of fluid (such as water, steam, or hot gas). Turbines covert the energy of fluids to mechanical energy through the principles of impulse and reaction, or a mixture of the two.
vantage point	The location from which a viewer sees the landscape.

volt	The unit of electromotive force or electric pressure, akin to water pressure in pounds per square inch.
warmwater fish	Species tolerant of warm water (e.g., bass, perch, pickerel, sucker).
watershed	An entire drainage basin including all living and nonliving components of the system.
wetlands	Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands must have the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; 3) the substrate is on soil and is saturated with water or covered by shallow water at some time during the growing season of each year.
zooplankton	Microscopic and macroscopic animals that swim in the water column. These invertebrates include chiefly three groups: rotifers, cladocerans, and copepods.

Appendix B

Request to use Alternative Licensing Procedures

600 North 18th Street
Post Office Box 2641
Birmingham, Alabama 35291
Tel 205.257.1000

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OFFICE OF THE SECRETARY

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FEDERAL ENERGY
REGULATORY
COMMISSION

September 21, 2000

ALABAMA POWER
A SOUTHERN COMPANY

Mr. David P. Boergers, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: Request to Use Alternative Licensing Procedures for the
Relicensing of the Coosa River Project (FERC No. 2146);
Mitchell Project (FERC No. 82); Jordan Project (FERC No. 618);
and the Warrior River Project (FERC No. 2165)

Dear Mr. Boergers:

Alabama Power Company (APC) respectfully requests the Federal Energy Regulatory Commission's (FERC) approval to use the Alternative Licensing Procedures (ALP), pursuant to 18 C.F.R. Section 4.34(i). APC intends to seek new licenses for nine hydroelectric developments that are incorporated into four operating licenses currently in effect. These four licenses are the Coosa River Project (FERC No. 2146), which includes the Weiss, Henry, Logan Martin, Lay, and Bouldin developments; the Mitchell Project (FERC No. 82); the Jordan Project (FERC No. 618); and the Warrior River Project (FERC No. 2165), which includes the Smith and Bankhead developments. Collectively, APC refers to these nine developments as the "Coosa-Warrior Projects". The Coosa-Warrior Projects' licenses expire in 2007.

Over the last 18 months, APC has developed a relicensing approach, tailored to the unique characteristics and needs of the Coosa and Warrior River Projects, that we believe will allow APC, FERC and the numerous stakeholders to achieve the goals identified in Section 4.34(i)(2). This process, which APC has named the Alabama Power Cooperative Approach (APCA) is described in detail in Attachment A. Specifically, the APCA will (1) combine into a single review process the pre-filing consultation process and the development of draft NEPA documents; (2) facilitate greater participation by and communication with resource agencies, FERC and other stakeholders; (3) allow for applicant-prepared environmental assessments; (4) promote cooperative efforts by APC, resource agencies, FERC and other stakeholders; and, (5) facilitate an orderly and expeditious review of APC's applications. Also attached to this request is a draft communications plan and a preliminary relicensing timeline (Attachments B and C., respectively).

APC is committed to providing opportunities for stakeholder participation in the relicensing of the Coosa-Warrior Projects. Since April, 2000, APC has met with numerous state and federal resource agencies, citizens' groups and others that may be affected by the relicensings to discuss the APCA and the Coosa-Warrior Projects. Our outreach and consultation activities to date are described in Attachment D, including a list of consulted parties. As a result of these consultation and outreach meetings, APC believes that a consensus exists among these stakeholders that the use of FERC's ALP is appropriate in these circumstances.

APC believes that FERC involvement is an important component to the success of an ALP, and we look forward to having FERC staff involved in this innovative relicensing process. Mr. Ron McKitrick of the Atlanta Regional Office attended our Agency Outreach meeting and we have discussed our proposed relicensing process with him. We look forward to your commitment of Mr. McKitrick and other FERC staff to assist us and the stakeholders in the relicensing process.

Pursuant to 18 CFR Section 16.6 (c), APC is required to notify FERC of its intent to relicense the Projects at least five years, but no more than five and one-half years before the existing licenses expire. Therefore, APC is required to file the Notice of Intent (NOI) between February 2002 and August 2002 for the Coosa-Warrior Projects. However, APC intends to file its NOI on or before December 31, 2000, and will therefore request a waiver of the timing requirement in Section 16.6(c).

In order to encourage stakeholders' timely and active participation in the relicensing activities that will occur prior to issuance of the NOI and the scoping process pursuant to the National Environmental Policy Act (NEPA), APC respectfully requests that FERC include in its response to this letter language that will notify the stakeholders that the relicensing has officially begun and that their participation is important. Furthermore, APC plans to hold workshops in November and December of 2000 to initiate dialogue with stakeholders and begin to define the issues. For this reason, APC respectfully requests formal approval to use the ALP be granted to APC prior to these workshop dates.

If you would like any additional information or have any questions regarding the relicensing of these Projects, our proposed process or schedule, please contact the Coosa-Warrior Relicensing Project Managers: Mr. Jim Crew at (205) 257-4265 (email at JFCREW@southernco.com) or Mr. Barry Lovett at (205) 257-1268 (email at BKLOVETT@southernco.com). We look forward to working with the FERC and welcome its input on implementing a successful relicensing process.

Yours truly,

R. M. Akridge
Manager
APC Hydro Licensing

Enclosures:

Attachment A - Description of Relicensing Process
Attachment B - Draft Communications Plan
Attachment C - Preliminary Relicensing Timeline
Attachment D - Outreach / Consultation Activities

cc: Mr. Dan Adamson
Federal Energy Regulatory Commission

Mr. Mark Robinson
Federal Energy Regulatory Commission

Mr. Ed Abrams
Federal Energy Regulatory Commission

Mr. Ron McKitrick
Federal Energy Regulatory Commission

Mr. Glen Gains
US Forest Service
USDA – FS
P. O. Box 278
Double Springs, AL 35553

Mr. Edmond B. Burkett
Mobile Corps of Engineers
Water Management Division
P.O. Box 228
Mobile, AL 36628

Mr. Fred Harders
Alabama Department of Conservation and Natural Resources
64 North Union Street
Montgomery, AL 36130-1901

Mr. Bill Lott
Alabama Department of Environmental Management
1400 Coliseum Boulevard
P.O. Box 301463
Montgomery, AL 36130-1463

Mr. Larry Goldman
Fish and Wildlife Services
P.O. Drawer 1190
Daphne, AL 36526

Mr. Ted Besterfeld
Environmental Protection Agency
61 Forsyth Street
13th Floor
Atlanta, GA 30303

Ms. Elizabeth Brown
Alabama Historical Commission
468 South Perry Street
Montgomery, AL 36130-0900

Mr. Jon Strickland
Alabama Department of Economic and Community Affairs
Recreation Division
401 Adams Avenue
Montgomery, AL 36130-5690

Mr. Brad McLane
Alabama Rivers Alliance
2027 2nd Avenue North, Suite A
Birmingham, AL 35203

Mr. Don Greer
Logan Martin Lake Protection Association
P.O. Box 2002
Pell City, AL 35125

Mr. Jerry Sailors
Coosa-Alabama River Improvement Association
200 Coosa Street, Suite 212
Montgomery, AL 36117

Mr. Bruce Shupp
B.A.S.S. Incorporated
P.O. Box 17900
Montgomery, AL 36141-0900

Mr. Jim Howard
Alabama BASS Federation
501 Five Mile Road
Eufaula, AL 36027

Ms. Debbie Berry
Smith Lake Environmental Preservation Committee
860 Alford Avenue
Hoover, AL 35226

Mr. Joe Dentici
Neely Henry Lake Association
3912 Montevallo Road
Mountain Brook, AL 35213

Mr. Ross Kramer
Coosa River Paddlers Club
5143 Atlanta Highway
Montgomery, AL 36109

Mr. Art Ivins
Lake Jordan Homeowners and Boatowners Association
P.O. Box 431
Wetumpka, AL 36092

Ms. Hollie Sandlin
Smith Lake Civic Association
1901 Sheltered Cove Road
Jasper, AL 35504

Mr. Andrew Fahlund
American Rivers
1025 Vermont Avenue NW
Suite 720
Washington, D.C. 20005

Mr. Frank Jones
Lay Lake Homeowners Association
17160 Highway 42
Shelby, AL 35143

Mr. Wayne Probst
Georgia Department of Natural Resources
P.O. Box 519
Calhoun, GA 30703

Mr. Peter Conroy
Governor's Environmental Task Force
Jacksonville State University
700 Pelham Road North
Jacksonville, AL 36265-1602

Mr. Jim Woodrow
Mitchell Homeowners and Boatowners
Association
P.O. Box 1324
Clanton, AL 35046

Mr. Prescott Brownell
U.S. National Marine Fisheries Service
219 Ft. Johnson Road
Charleston, SC 29412

Ms. Kelly Fargo
Kleinschmidt Associates
6225 Brandon Avenue
Suite 213
Springfield, VA 2215

Mr. Jerry Culberson
Weiss Lake Improvement Association
P.O. Box 369
Centre, AL 35960

Mr. Jeff Duncan
National Park Service
US Department of Interior
Chattanooga, TN

Mr. Ray Luce
Georgia Historic Preservation Division
57 Forsyth Street, NW
Atlanta, GA 30303

Attachment A

DESCRIPTION OF RELICENSING PROCESS

To encourage the participation of stakeholders and to reach resolution on relicensing issues, APC has developed an innovative relicensing method called the Alabama Power Cooperative Approach (APCA). The APCA promotes and facilitates active participation of stakeholders in the process with the goal of resolving resource issues at the local level and presenting those resolved issues to FERC in a license application. The APCA will be used concurrently for all developments on both the Coosa and Warrior Rivers.

APC believes this process will:

- Increase public involvement (over the traditional process) in identifying issues and alternatives, and commenting on study scope, plans, reports, and the draft license applications and NEPA documents;
- Improve communication between APC and the stakeholders;
- Provide for early implementation of FERC's NEPA process, including identification of issues, alternatives, and potential costs;
- Provide early FERC staff involvement (*e.g.*, at NEPA scoping meeting);
- Encourage issue resolution (overall settlement of issues) prior to filing the license applications with FERC; and
- Promote decision making and issue resolution at the local level.

Consistent with FERC's regulations at 18 CFR 4.34(i) (4) (i-iii), the APCA includes distributing Initial Information Packages (IIP) and holding public meetings, conducting cooperative scoping of the environmental, recreational, operational, and economic issues, and preparing preliminary draft NEPA documents. The APCA involves working cooperatively with stakeholders on Resource Advisory Teams (RATs) and Cooperative Relicensing Teams (CRTs), designed to assist APC in identifying and resolving relicensing issues. Below we describe details of the APCA: the initial activities, the issuance of the IIPs, the Issues Identification Workshops, developing the Resource Advisory Teams and CRTs, and NEPA activities.

It is important to note that while APC has spent considerable time and effort developing the APCA, the details of ground rules, meeting dates, and the formation of the Resource Advisory Teams and Cooperative Relicensing Teams will be developed in cooperation with stakeholders that choose to participate in the process. Those details will be filed with FERC subsequent to the formation of these teams, which should occur in the first quarter of 2001.

Initial Activities

The APCA formally began with internal and external “roll out” events in February 2000. These events were designed to provide initial information about the Projects and the process to APC employees and external stakeholders (federal, state and local resource agencies, NGOs, and the public). Following the roll out events, APC developed a stakeholder Education and Outreach Program (EOP) that included one-on-one meetings with primary stakeholders and a telephone survey of a broader base of stakeholders. The one-on-one meetings and the survey were initiated in April, 2000.

The EOP included a presentation of the APCA, including a video of the Projects, and a stakeholder profile form. The purpose of these one-on-one meetings was:

1. To educate stakeholders on the Projects and the APCA,
2. To learn more about the stakeholders and their interest in the Projects and process, and
3. To solicit stakeholder support for the APCA, including review of the communications plan.

To date, APC has met with 22 stakeholder groups and has conducted phone interviews with 97 other stakeholders. During our discussions with stakeholders, there has been overwhelming support for the APCA.

Initial Information Packages & Issue Identification Workshops

APC is in the process of preparing IIPs for all the developments. APC intends to distribute the Warrior River Project IIP (Smith and Bankhead developments) in October and the IIPs for the Coosa River developments in early November, 2000.

In November and December, APC will host "Issue Identification Workshops", which will be open to the public. The goals of these workshops are to bring together all of the stakeholders, to identify Project issues and additional sources of existing information, and to solicit participation on the Resource Advisory Teams. The Issue Identification Workshops will be held regionally, with day and evening sessions to accommodate and encourage participation by a variety of stakeholders. These workshops will also serve as the IIP meeting, pursuant to FERC's regulations at 4.34(i)(4) (ii). APC is currently mailing the information and registration form to all stakeholders and will make the workshop information available through their website. In addition to the website and direct mail, APC is advertising the workshops in their quarterly newsletter (*Shorelines)*, local newspapers, and local radio stations.

Forming the Resource Advisory Teams and Cooperative Relicensing Teams

Following the Issues Workshops, APC will form Resource Advisory Teams (RATs), which will include various stakeholders who are interested in working on specific resource issues. The RATs will appoint a limited number of members to a CRT that will review and discuss issues, questions, or evaluate recommendations submitted. There will be two CRTs: The Coosa Cooperative Relicensing Team (CCRT) and the Warrior Cooperative Relicensing Team (WCRT). While the Resource Advisory Teams may comprise a larger number of stakeholders, APC will emphasize the need to keep the CRTs to 25 representatives or less in order to facilitate negotiations and decision making.

NEPA Activities

NEPA scoping is a formal process required by FERC to identify project issues and alternatives for analysis in the NEPA document. APC will assist FERC in conducting early NEPA scoping to further identify Coosa-Warrior Projects' issues and alternatives. We anticipate that NEPA scoping will occur in the early fall, 2001. APC plans to spend the remainder of 2000 and first half of 2001 working with stakeholders on issue identification and team building. APC believes that forming the teams and having them work together on NEPA issues will make FERC's formal NEPA scoping process much more productive.

APC intends to complete two license applications and two preliminary draft environmental assessments—one for the Coosa River developments and one for the Warrior River developments—to file with FERC in 2005. APC recognizes the complex nature of the river systems and the voluminous information that will be presented. However, APC strongly advocates preparing applicant prepared environmental assessments (APEA) because preparation of these documents will maximize stakeholders' opportunities for participation and development of the issues, alternatives, and resolutions presented. The preliminary draft APEAs can be used by FERC in deciding whether to issue draft environmental assessments (EAs) for public review or whether to prepare a draft environmental impact statement (EIS). APC expects that the APEAs prepared for these Projects will contain essentially the level of detail and analysis, including an analysis of cumulative effects, traditionally found in an EIS.

Attachment B

FERC has determined in its Final Rule, issued on September 15, 1999 (Order No. 607) that its ex-parte rule does not apply to pre-filing consultation; however, FERC's ALP regulations still require that a licensee requesting use of an ALP develop a communications protocol. APC has developed a communications plan that describes how APC will document and make available to the public its communications. APC has omitted any reference to FERC's ex-parte regulations, as this is not applicable to pre-filing consultation.

The communications plan has been presented and discussed with stakeholders. APC anticipates working with stakeholders to develop Team Operating Guidelines that will include ground rules, decision-making processes, meeting dates, etc. APC and the stakeholders will file the Team Operating Guidelines with FERC upon completion.

COMMUNICATIONS PLAN
FOR THE
COOSA AND WARRIOR RIVER HYDROELECTRIC PROJECTS
(FERC Nos. 2146, 82, 618, and 2165)

Introduction

This Communications Plan describes how Alabama Power Company (APC) will document, and make available, communications during the pre-filing consultation process for the relicensing of the Coosa River Hydroelectric Project (Weiss, Henry, Logan Martin, Lay, and Bouldin developments - FERC No. 2146), Mitchell Project (FERC No. 82), and Jordan Project (FERC No. 618), and the Warrior River Hydroelectric Project (Smith and Bankhead developments, FERC No. 2165). These hydroelectric projects will be referred to throughout this document collectively as the "Coosa-Warrior Projects". The purpose of this plan is to govern how APC will make communications (including written, oral, and electronic mail documents) accessible to participants in the relicensing process. This plan specifically discusses APC and the Federal Energy Regulatory Commission’s (FERC) public files, proper formats for filing comments and briefly describes future communication and operating guidelines that will be developed with the Resource Advisory Teams and Cooperative Relicensing Teams.

APC anticipates filing Resource Advisory Team and Cooperative Relicensing Team Operating Guidelines, which may include, but not be limited to ground rules, meeting schedules, decision making and dispute resolution processes, with the FERC and stakeholders during 2001.

Background

The existing licenses for the Coosa-Warrior Projects expire on July 31, 2007 (Coosa River Projects) and August 31, 2007 (Warrior River Project). APC internally developed the Coosa Warrior Relicensing Team (CWRT) to address all procedural and technical issues related to the relicensing of the Projects. The CWRT developed the Alabama Power Cooperative Approach (APCA), which combines the requirements of the National Environmental Policy Act (NEPA) of 1969 with relicensing activities in the pre-filing consultation period of the relicensing process, consistent with FERC’s regulations at 18 CFR 4.34 (i). Specifically, the CWRT's goals are to work cooperatively with the stakeholders to scope issues and studies, and to resolve resource issues in order to protect and enhance the Coosa-Warrior Projects' economic, environmental, and recreational resources. Beginning in February, 2000 through August, 2000, the CWRT contacted federal, state, and local resource agencies, non-governmental organizations (NGOs), and members of the public to participate in the APCA.

APC and FERC's Public Reference File

To provide access to communications, two public reference files are maintained in the following locations:

Alabama Power Company 600 North 18th Street Hydro Licensing – 16th Floor Birmingham, AL 35291	Federal Energy Regulatory Commission Public Reference Room, Room 2-A 888 First Street, N.E. Washington, D.C. 20426

The relicensing public reference file at APC will include copies of all written correspondence, telephone contact sheets (oral communications), meeting minutes, study plans, study reports, and other documents that are filed with FERC. FERC's public reference file will include the six-month progress reports referencing the items in APC's public reference file, the Initial Information Packages (IIP), Scoping Documents 1 and 2, the draft license applications and preliminary draft APEAs. Upon filing the final license applications with FERC (on or before July 21, 2005), APC will include a list of the major milestone documents (*e.g.*, IIPs, scoping documents, study reports, draft license applications) that are located in their public file.

All documents in APC's public reference file are available for public review by contacting Ms. Nancy Braswell, Alabama Power Company, 600 North 18th Street, 16N-8180, Birmingham, AL 35291; Telephone: (205) 257-2211; Fax: (205) 257-1596; E-mail nebraswe@southernco.com.

Copies of documents can be requested. Requests to APC for a minor number of copies can be accomplished at the library site. Single copies of documents up to ten pages in length will be free of charge. Documents in excess of ten pages or multiple copies of documents will be charged at a rate of $0.10/page.

FERC's public reference file may be viewed on the web at: www.ferc.fed.us/online/rims.html. Contact FERC at (202) 208-2222, if you need assistance using the web site. Hard copies are available from FERC at the cost of $.10/page and may be obtained by writing or faxing your request to the Public Reference Room: FAX (202) 208-2320.

Filing Written Communications with FERC

In order for written comments to be included in the public record for the Coosa-Warrior Projects, an original and eight (8) copies must be sent to Mr. David P. Boergers, Secretary of the Commission, Public Reference Room 2-A, 888 First Street, N.E., Washington, D.C. 20426. At present, FERC will not accept any electronic filing for its docketed records (*i.e.,* electronic mail files must be submitted into the public record as paper copies), including the public reference file, without specific waiver of the filing regulations.

A copy of any material submitted to FERC must also be sent to APC, specifically to Mr. R.M. Akridge, Alabama Power Company, 600 North 18th Street, 16N-8180, Birmingham, AL. 35291. The copy will be placed in APC's public reference file.

All written communication for the Coosa River Projects must have the following clearly displayed on the first page:

COOSA RIVER HYDROELECTRIC PROJECT-
WEISS, HENRY, LOGAN MARTIN, LAY AND BOULDIN
(FERC No. 2146)

All written communication for the Mitchell Project must have the following clearly displayed on the first page:

MITCHELL HYDROELECTRIC PROJECT (FERC NO. 82)

All written communication for the Jordan Project must have the following clearly displayed on the first page:

JORDAN HYDROELECTRIC PROJECT (FERC NO. 618)

All written communication for the Warrior River Projects must have the following clearly displayed on the first page:

WARRIOR RIVER HYDROELECTRIC PROJECT-
SMITH AND BANKHEAD (FERC No. 2165)

Written Documentation from APC

Progress Reports: APC will prepare a progress report beginning six months following FERC's notice approving APC's use of FERC's alternative licensing procedures. The six-month progress report summarizes the relicensing activities and correspondence during that six-month period and will be filed with FERC and placed in APC's public reference file.

Future Operating Guidelines

Resource Team Meetings and Workshops: APC will develop Resource Advisory Teams and Cooperative Relicensing Teams as needed to identify and address relicensing issues. APC and the stakeholders participating in the Resource Advisory Teams will develop team ground rules, meeting procedures and schedules, and decision and dispute resolution processes. These items will be documented in the Resource Advisory Team Operating Guidelines that will be filed with FERC upon completion.

Agreement to the Protocol

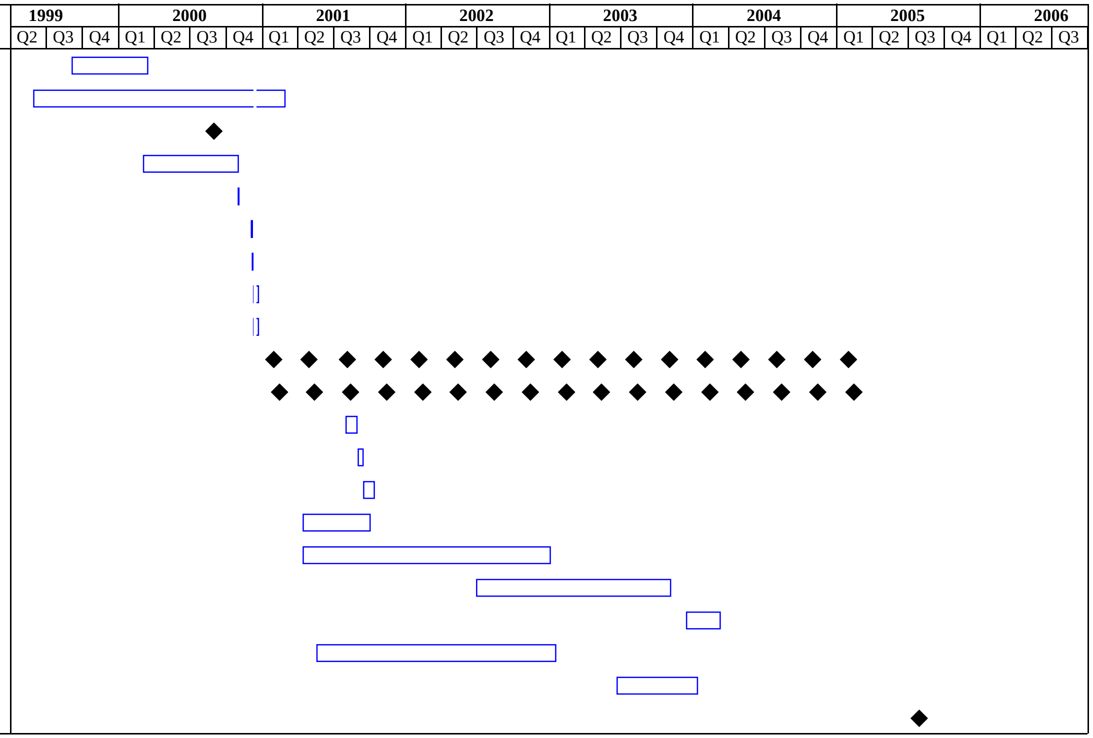
The entities and individuals that are expected to participate during the APCA have reviewed this Communication Plan for the Coosa-Warrior Projects relicensing process and agree to the contents herein.

Preliminary Relicensing Schedule

Coosa and Warrior Projects

Attachment C

ID	Task Name
1	Internal and External Roll Out of APCA
2	Initiation of Education/Outreach Program (EOP)
3	File Letter Requesting Use of ALP
4	Prepare and Distribute Initial Information Package
5	Warrior Issues Workshop
6	Upper Coosa Issues Workshop
7	Lower Coosa Issues Workshop
8	Formation of Resource Advisory Teams (RATs)
9	Formation of Cooperative Relicensing Teams (CRTs)
10	RATs and CRT Meetings - Coosa
28	RATs and CRT Meetings - Warrior
46	Prepare and Distribute SD1
47	NEPA Scoping Meetings
48	Prepare and Distribute SD2
49	Prepare Study Plans for Review and Comment
50	Conduct Environmental and Economic Studies
51	Prepare Draft Application and APEA documents
52	Distribute Issue Draft License Application for Public Review and Comment
53	Settlement Discussions
54	Prepare Final License Application and APEA's
55	File License Application and APEA with FERC



Attachment D

Summary of Outreach and Consultation

In addition to the Education and Outreach Plan described earlier, APC has also expended tremendous resources to develop education materials about the Coosa-Warrior Projects and the relicensing process and to contact potential stakeholders. Education and outreach activities to date are listed below.

- Information brochure sent to all stakeholders
- Development of a stakeholder database
- Formation of a Speaker's Bureau
- Development of a Relicensing Web site
- Videos of the projects and relicensing process

Primary Stakeholders

One-on-One Meeting Participants

1. U. S. Forest Service - Double Springs, AL
2. U. S. Army Corps of Engineers - Mobile, AL
3. U. S. Environmental Protection Agency - Atlanta, GA
4. U. S. Fish and Wildlife Service - Daphne, AL
5. U. S. National Marine Fisheries Service - Charleston, SC (scheduled for October 17)
6. U. S. National Park Service - Chattanooga, TN (to be scheduled)
7. Alabama Department of Conservation and Natural Resources
8. Alabama Department of Environmental Management
9. Alabama Historical Commission
10. Alabama Department of Economic and Community Affairs
11. State of Alabama Environmental Task Force
12. Georgia Department of Natural Resources
13. Georgia Historic Preservation Division (elected not to meet; correspondence only)
14. Coosa Alabama River Improvement Association
15. BASS Inc.
16. Alabama BASS Federation
17. Smith Lake Environmental Preservation Committee
18. Smith Lake Civic Association
19. Logan Martin Lake Association
20. Weiss Lake Improvement Association (to be scheduled)
21. Neely Henry Lake Association
22. Jordan Homeowners Association
23. Lay Lake Homeowners Association
24. Mitchell Homeowners Association (scheduled for October 26)
25. Coosa River Paddlers Club
26. American Rivers
27. Alabama Rivers Alliance

General Stakeholders
Telephone Interview Participants

1. Coosa County Commission
2. Lovejoy Realty
3. Avondale Mills
4. JR’s Marina
5. Cherokee County Health Engineer
6. Talladega Motor Speedway
7. Al Hite
8. Ohatchee Volunteer Fire Department
9. Cedar Bluff Homeowners
10. Bill Peppenhorse
11. Birmingport
12. Fly Fishers
13. Alabama Water Watch
14. Sierra Club
15. Walker County Chamber of Commerce
16. Coosa River Basin Initiative
17. Wetumpka Chamber of Commerce
18. Cullman County Chamber of Commerce
19. Audubon Society
20. Tri State Paddlers
21. Nature Conservancy
22. Clean Water Partnership
23. Chilton County Commission
24. Pell City Mayor
25. Childersburg Chamber of Commerce
26. Gadsden Mayor
27. Walker County Commission
28. Walker County Industrial Division Association
29. Cherokee County Commission
30. Tuscaloosa County Commission
31. Shelby County Commission
32. Talladega County Commission
33. Talladega Chamber of Commerce
34. Okomo Residential Association
35. Birmingham Water Works
36. Solutia
37. Birmingham Industrial Water Board
38. Bevill State Community College
39. Pruitts Fish Camp
40. Cherokee County Chamber of Commerce
41. The Ark Restaurant
42. Bessemer Water Board
43. Exchange Club Bass Tournament
44. US Alliance
45. Pell City Government Office
46. Alabama Mussel Catchers Association
47. Rockford Mayor
48. Alabama Environmental Council
49. Cahaba River Society
50. Alabama Fisheries Association
51. Probate Judge Jimmy Stubbs
52. Cherokee Infrastructure Comm.

53. City of Wetumpka
54. Lake Mitchell Marina
55. West Alabama Chamber of Commerce
56. Pell City Chamber of Commerce
57. St. Clair County Economic Development
58. Ohatchee Mayor
59. State Senator Larry Means
60. Jasper Mayor
61. State Rep. Richard Lindsay
62. State Rep. Ron Johnson
63. Northport Mayor
64. Clanton Mayor
65. Talladega Mayor
66. Rainbow City Mayor
67. Bay Spring Marina
68. Kelly Realty
69. Russell Corporation
70. Hope Realty
71. Ashville Mayor
72. Weiss County Extension Office
73. Gregorson's Grocery
74. Attorney Hugh Holiday
75. Childersburg Kiwanis Club
76. Tom McKinzie
77. Business Council of Alabama
78. State Senator Jim Pruitt
79. Kent Hensley
80. Coosa River Society
81. Elmore County Commission
82. Magic City Ski Club
83. Birmingham Audobon Society
84. Birmingham Canoe Club
85. PJ's Paint & Tackle
86. Lake Jordan Marina
87. St. Clair County Commission
88. Birmingham Sailing Club
89. Calhoun County Commission
90. Walker County Probate Judge
91. Weiss Lake Sailing Club
92. Tuscaloosa Mayor
93. Wetumpka City Council
94. Talladega Water Works
95. City of Calera
96. Tuscaloosa Industrial Development
97. Greenport Marina

Appendix C

Tables – Logan Martin Development

Table 2.5-1 Logan Martin Development – Standard Numbers

Description		Number or Fact
GENERAL INFORMATION		
FERC Project Number		2146
License Issued		September 4, 1957
License Expiration Date		July 31, 2007
Licensed Capacity		128,250 kw
Project Location		Near Town of Vincent; Counties of Talladega, Calhoun, and St. Clair; Coosa River; 459 river miles above Mobile
Total Area Encompassed by Existing Project Boundary (* land and water)		27,000 acres
Acres of Water Within Existing Project Boundary		15,263 acres
Acres of Mainland Within Existing Project Boundary		11,737 acres
Logan Martin Dam Drainage Basin		7,700 mi^2
Length of River From Logan Martin Dam upstream to Henry Dam		48.5 mi
Length of River From Logan Martin Dam downstream to Lay		48 mi
1. DAM		
Date of Construction		July 18, 1960
In-service Date		August 10, 1964
Construction Type		Gravity concrete and earth-fill
Elevation Top of Abutments		487 ft
Gross Head at Normal Pool Elevation (when Lay Lake is at el. 396 ft msl)		69 ft
Spillway Height (to top of gates)		97 ft
Total Length of Water Retaining Structures		6,222 ft
Length of Abutments:	East embankment	4,650 ft
	West embankment	870 ft
Length of Powerhouse (substructure)		295 ft
Length of Spillway (total)		702 ft
Length of Spillway (gated)		327 ft
Gates:	Spillway Gates	6 total
	Dimensions	40 ft wide x 38 ft high
	Invert Elevation (top of gate)	470 ft msl
	Capacity of each gate	12,253,000 gpm
	Trashrack gate	1

Description		Number or Fact
	Trashrack dimensions	17.5 ft wide x 21.0 ft high
Hazard Classification		High
2. LOGAN MARTIN – GENERAL INFORMATION		
Length of Impoundment		48.5 mi
Pool Elevations:	Maximum (flood control)	477 ft msl
	Normal	465 ft msl
	Minimum	453 ft msl
Gross Storage:	Maximum Pool @ Elevation 477.0	518,600 acre-ft
	Normal Pool @ Elevation 465.0	273,300 acre-ft
	Minimum Pool @ Elevation 453.0	135,700 acre-ft
Usable Storage Capacity (between 453 and 465)		137,600 acre-ft
Surface Area (at el. 465 ft msl)		15,263 acres
Miles Shoreline (including tributaries) at el. 465 ft msl		275 mi
Number of Boat Docks		1,107
Existing Classification		Public Water Supply, Swimming and Fish and Wildlife
3. POWERHOUSE		
Length (Superstructure)		295 ft
Width (Superstructure)		168.5 ft
Height		65 ft
Construction Type (Superstructure)		Concrete gravity
Normal Tailwater Elevation		396 ft msl
High Tailwater Elevation (Bank Full)		404 ft msl
Discharge Capacity		33,000 cfs
Intake Openings:	Number of Openings	9
Outdoor Gantry Crane Capacity		235 tons
4. TURBINES		3
Rated Net Head		56 ft
Turbines		
	Manufacturer	Allis Chalmers
	Type	Propeller
Rated Discharge Capacity:	Maximum	11,000 cfs each
Speed		90 rpm
Rated Output at 56 ft head		59,000 hp each

Description		Number or Fact
5. GENERATORS		3
Manufacturer		Allis Chalmers
Nameplate Rating		42,750 kW each
Power Factor		0.9
Voltage		13,800 volts
Number of Phases		3
Frequency		60 cycle
Estimated average annual output		384,586,000 kwh
6. TRANSFORMERS		
Transmission Voltage		Low side – 13,800 volts High side – 115,000 volts
Rating		155,000 kilovolt amp
7. FLOOD FLOWS – LOGAN MARTIN DAM		
Probable Maximum Flood	Elevation	485.2 ft msl
	Flow	361,200 cfs

Table 3.1-1 USGS Gaging Stations Located on the Coosa River

Gage Name	Period of Record	Drainage Area
Coosa River at Gadsden	1926-Present	5,805
Coosa River at Leesburg	1937-1958	5,270
Coosa River at Childersburg	1913-1986	8,392
Coosa River at Jordan Dam	1925 – Present	10,102

Table 4.2-1 Water quality criteria for Logan Martin Project waters adopted by the Alabama Department of Environmental Management (Source: ADEM, 1999, as modified by Kleinschmidt)

pH	Shall not deviate more than one unit from the normal or natural pH nor be less than 6.0 nor greater than 8.5
Temperature	Maximum temperature in streams, lakes, reservoirs, shall not exceed 90^{o}F (32^{o}C).
Dissolved Oxygen	For diversified warmwater biota, daily DO concentrations shall not be less than 5 mg/l at all times; except under extreme conditions due to natural causes, it may range between 5 mg/l and 4 mg/l, provided that all other water quality is favorable in all other parameters. In no event shall the DO level be less than 4.0 mg/l due to discharges from existing hydroelectric generation impoundments.
Bacteria	Bacteria of Fecal coliform shall not exceed a geometric mean of 2,000/100 ml nor exceed a maximum of 4,000/100 ml in any sample in stream segments classified as PWS. For stream segments classified as F&W, the bacteria of Fecal coliform shall not exceed a geometric mean of 1,000/100 ml on a monthly average nor exceed a maximum of 2,000/100 ml in any sample. For stream segments classified as S, the bacteria of Fecal coliform shall not exceed a geometric mean of 200/100 ml.

Table 4.2-2 Coosa River-Logan Martin Lake Summary of Water Quality Dissolved Oxygen Data at 5 feet 1990 through 1999. (APC unpublished data, 2000a)

Dissolved Oxygen

Location	Count	Min	Avg	Max
31.1 miles Upstream of L. Martin Dam	12	5.1	9.00	13.2
22.0 miles Upstream of L. Martin Dam	6	4.9	5.67	6.1
21.6 miles Upstream of L. Martin Dam	1	8.2	8.2	8.2
20.1 miles Upstream of L. Martin Dam	12	6.1	8.76	12.8
20.0 miles Upstream of L. Martin Dam	6	4.7	5.62	7.0
18.0 miles Upstream of L. Martin Dam	7	5.3	6.31	8.9
16.0 miles Upstream of L. Martin Dam	7	4.9	6.37	7.4
14.0 miles Upstream of L. Martin Dam	7	4.7	6.48	7.5
12.0 miles Upstream of L. Martin Dam	7	5.3	6.77	8.7
11.6 miles Upstream of L. Martin Dam	13	6.2	9.02	12.6
10.0 miles Upstream of L. Martin Dam	7	6.2	6.99	7.6
8.0 miles Upstream of L. Martin Dam	7	5.7	7.00	8.9
6.0 miles Upstream of L. Martin Dam	8	6.3	7.5	9.6
4.0 miles Upstream of L. Martin Dam	9	4.8	6.94	9.7
3.0 miles Upstream of L. Martin Dam	8	5.0	7.23	10.0
2.0 miles Upstream of L. Martin Dam	9	5.4	6.74	8.9
1.0 mile Upstream of L. Martin Dam	8	5.3	6.9	9.3
Logan Martin Dam Forebay	93	2.3	7.28	12.2
Logan Martin Dam Tailrace	82	1.2	6.05	13.49

Table 4.2-2 (cont.) **Coosa River-Logan Martin Lake Summary of Water Quality Temperature Data at 5 feet 1990 through 1999. (APC unpublished data, 2000a)**

Temperature

Location	Count	Min	Avg	Max
31.1 miles Upstream of L. Martin Dam	12	6.9	19.53	29.5
22.0 miles Upstream of L. Martin Dam	6	29.9	30.73	31.8
21.6 miles Upstream of L. Martin Dam	1	11.2	11.2	11.2
20.1 miles Upstream of L. Martin Dam	12	7.1	19.73	29.8
20.0 miles Upstream of L. Martin Dam	6	29.9	30.75	32.1
18.0 miles Upstream of L. Martin Dam	7	30.0	30.76	31.8
16.0 miles Upstream of L. Martin Dam	7	30.1	30.71	32.1
14.0 miles Upstream of L. Martin Dam	7	29.7	30.70	32.2
12.0 miles Upstream of L. Martin Dam	7	29.9	30.74	31.9
11.6 miles Upstream of L. Martin Dam	13	7.4	19.25	31.8
10.0 miles Upstream of L. Martin Dam	7	29.9	30.74	31.9
8.0 miles Upstream of L. Martin Dam	7	30.1	30.8	31.9
6.0 miles Upstream of L. Martin Dam	8	30.3	30.84	31.9
4.0 miles Upstream of L. Martin Dam	9	28.6	30.43	32.0
3.0 miles Upstream of L. Martin Dam	8	28.4	30.39	31.7
2.0 miles Upstream of L. Martin Dam	9	28.4	30.28	31.5
1.0 mile Upstream of L. Martin Dam	8	28.2	30.34	31.8
Logan Martin Dam Forebay	93	7.3	25.45	32.2
Logan Martin Dam Tailrace	82	8.5	24.58	31.9

Table 4.2-3 Coosa River-Logan Martin Lake Summary of Tailrace Dissolved Oxygen/Temperature Data 1995 through 1999 (Source: APC, unpublished data, 2000)

Location	Count	Min	Avg.	Max
Dissolved Oxygen (mg/l)				
Logan Martin Dam Tailrace	18695	2.3	5.88	9.36
Temperature (^oC)				
Logan Martin Dam Tailrace	18695	13.7	25.6	31.9

Table 4.2-4 Partial listing of the EPA's PCS database of reported dischargers into the Logan Martin Sub-Basin (Source: EPA, 2000)

	Flow		Quantity		Concentration		
	Daily Max	Monthly Avg	Daily Max	Monthly Avg	Daily Max	Monthly Avg	
Permit #	Mgd	Mgd	ppd	ppd	mg/l	mg/l	Facility Name
				BOD Carbonaceous 5 Day			
AL0024520	1488.00	11.41	773.00	213.14	90.70	28.59	Optec Inc Ft McClellan Stp
AL0058408	1252.00	8.00	5002.00	737.33	275.00	47.77	Oxford Tull C Allen WWTP
AL0022586	22929.00	20.03	146.00	35.47	6.00	2.05	Jacksonville WWTP
				BOD, 5 Day			
AL0058408	1252.00	8.00	8787.00	1118.82	18699.00	74.30	Oxford Tull C Allen WWTP
ALG240051	0.23	0.11			26.80		Aladdin Manufacturing Corp
ALG240003	0.87				6.00		Barbour Threads Inc
ALG180401	0.08	0.05			4.00	2.67	Waste Recycling Anniston
ALG180148	24.70	5.25			40.00	17.25	Huron Valley Steel Corp
ALG160124	2.00						Superior Waste Services of AL
ALG160046	1.17				6.00		Jacksonville Piedmont Landfill
ALG060045	2.06	1.00					Georgia Pacific Corp Talladega
AL0024520	1488.00	11.41	6246.00	746.43	307.00	68.74	Anniston Ft McClellan WWTP
AL0022586	22929.00	20.03	7300.00	1549.51	1221.00	90.52	Jacksonville WWTP

Table 4.2-4 (cont.) Partial listing of the EPA's PCS database of reported dischargers into the Logan Martin Sub-Basin (Source: EPA, 2000)

	Flow		Quantity		Concentration		
	Daily Max	Monthly Avg	Daily Max	Monthly Avg	Daily Max	Monthly Avg	
Permit #	Mgd	Mgd	ppd	ppd	mg/l	mg/l	Facility Name
AL0022195	22.00	9.29	30593.00	4851.56	414.00	69.18	Anniston Choccolocco WWTP
AL0003930	1.47	0.41	1233.00	223.50	586.00	72.93	NGC Industries, Inc.
AL0002658	5.61	0.24	47.50	11.90	148.00	9.51	Anniston Army Depot
ALG060271	6.00	1.95					Fulghum Fibres Inc, Ohatchee
			Chemical Oxygen Demand (COD)				
ALG160046	1.17				131.00		Jacksonville Piedmont Landfill
ALG240003	0.87				143.00		Barbour Threads Inc
ALG180497	0.05						Pops and Sons Used Cars
ALG180494	0.06				0.10		Sonny Cook Motors Salvage
ALG180479	0.05	0.03			0.50		Oxford Scrap Metal Co Inc
ALG180301	0.09	0.05			13.00		Woodard Auto Salvage
ALG180148	24.70	5.25			196.00		Huron Valley Steel Corp
ALG160124	2.00						Superior Waste Services of AL
ALG180523	0.04				0.20		Rite Way Auto Sales and Salvage

Table 4.2-4 (cont.) Partial listing of the EPA's PCS database of reported dischargers into the Logan Martin Sub-Basin (Source: EPA, 2000)

	Flow		Quantity		Concentration		
	Daily Max	Monthly Avg	Daily Max	Monthly Avg	Daily Max	Monthly Avg	
Permit #	Mgd	Mgd	ppd	ppd	mg/l	mg/l	Facility Name
ALG060271	6.00	1.95					Fulghum Fibres Inc, Ohatchee
ALG020037	7.00				763.00		McCartney Construction Co
AL0002658	5.61	0.24			180.00		Anniston Army Depot
ALG180007	50.81	5.45			0.40		Shortys Southern Yard
ALG240051	0.23	0.11			57.20		Aladdin Manufacturing Corp
ALG180511	0.04				0.50		Wood Recycling
			Nitrite + Nitrate, Total (as N)				
AL0002658	5.61	0.24					Anniston Army Depot
			Nitrogen, Ammonia Total (as N)				
AL0002658	5.61	0.24			10.20	1.23	Anniston Army Depot
AL0003930	1.47	0.41	1.23	1.11	20.30	1.59	NGC Industries, Inc.
AL0022195	22.00	9.29	705.00	110.40	9.30	1.43	Anniston Choccolocco WWTP
AL0022586	22929.00	20.03	225.00	332.77	9.76	0.89	Jacksonville WWTP

Table 4.2-4 (cont.) Partial listing of the EPA's PCS database of reported dischargers into the Logan Martin Sub-Basin (Source: EPA, 2000)

	Flow		Quantity		Concentration		
	Daily Max	Monthly Avg	Daily Max	Monthly Avg	Daily Max	Monthly Avg	
Permit #	Mgd	Mgd	ppd	ppd	mg/l	mg/l	Facility Name
AL0024520	1488.00	11.41	206.00	27.57	16.00	2.32	Optec Inc Ft McClellan STP
AL0058408	1252.00	8.00	494.00	35.62	21.00	2.53	Oxford Tull C Allen WWTP
			Nitrogen, Kjeldahl Total (as N)				
AL0003930	1.47	0.41			27.50	8.43	NGC Industries, Inc.
AL0022586	22929.00	20.03	104.92	56.76	5.00	2.78	Jacksonville WWTP
AL0002658	5.61	0.24					Anniston Army Depot
AL0058408	1252.00	8.00	1879.00	542.00	112.00	32.94	Oxford Tull C Allen WWTP
			Nitrogen, Nitrate (as N)				
AL0002658	5.61	0.24					Anniston Army Depot
			Nitrogen, Organic Total (as N)				
AL0002658	5.61	0.24			1.53	0.57	Anniston Army Depot

Table 4.2-4 (cont.) Partial listing of the EPA's PCS database of reported dischargers into the Logan Martin Sub-Basin (Source: EPA, 2000)

	Flow		Quantity		Concentration		
	Daily Max	Monthly Avg	Daily Max	Monthly Avg	Daily Max	Monthly Avg	
Permit #	Mgd	Mgd	ppd	ppd	mg/l	mg/l	Facility Name
				Nitrogen, Total (as N)			
ALG120114	0.04	0.02			17.36	9.89	Southern Tool Inc
ALG120182	0.30	0.24			2.90	2.10	Multimetco Inc
ALG180511	0.04				1.50		Wood Recycling
ALG180479	0.05	0.03			2.00	1.95	Oxford Scrap Metal Co Inc
ALG180401	0.08	0.05			3.08	1.35	Waste Recycling Anniston
ALG180148	24.70	5.25			60.47	8.49	Huron Valley Steel Corp
ALG180007	50.81	5.45			61.60	9.18	Shortys Southern Yard
ALG120183	0.07	0.02			5.15	0.60	Werner Co Anniston
ALG120181	1.71	0.06			2.20	1.19	M and H Valve Company
ALG120169	0.20	0.07			2.59	2.59	Lincoln Metals Corp
ALG120154	0.08	0.03			1.80	0.86	Oxford Machine Co
ALG120128	0.30	0.06			2.00	1.65	Anniston Plating and Metal Fin

Table 4.2-4 (cont.) **Partial listing of the EPA's PCS database of reported dischargers into the Logan Martin Sub-Basin (Source: EPA, 2000)**

	Flow		Quantity		Concentration		
	Daily Max	Monthly Avg	Daily Max	Monthly Avg	Daily Max	Monthly Avg	
Permit #	Mgd	Mgd	ppd	ppd	mg/l	mg/l	Facility Name
ALG120067	0.14	0.07			13.44	8.99	Southern Tool Inc
ALG120020	0.34	0.07			5.50	2.06	Union Foundry Company
ALG120132	0.07	0.04			2.97	1.05	York Group Wallace Metal Prod
			Phosphate, Ortho (as P)				
AL0002658	5.61	0.24			0.95	0.16	Anniston Army Depot
ALG020126	0.07						APAC Al Inc Oxford Asphalt Plt
ALG120020	0.34	0.07					Union Foundry Company
ALG120433	0.00				0.70		North American Bus Industries
			Phosphorus, Total (as P)				
ALG120154	0.08	0.03			7.06	1.44	Oxford Machine Co
ALG120020	0.34	0.07					Union Foundry Company

Table 4.2-5 Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Logan Martin Lake (Source: EPA, 2000)

Classification Industrial

Permit #	*Facility Name*
AL0001201	Solutia Inc
AL0002089	Barber Pure Milk
AL0002186	Vulcan Materials Ohatchee Qurr
AL0002658	Anniston Army Depot
AL0003166	Lee Brass Co Anniston
AL0003930	NGC Industries, Inc.
AL0024520	Optec Inc Ft McClellan Stp
AL0031542	National Cement Blue Spring Fk
AL0041327	Riverside Refract Brush Pond M
AL0055999	U S Army Fort McClellan
AL0063509	Union Foundry Landfill
AL0066320	Mccartney Const Co Speedway Qu
AL0066486	TBA South Inc
AL0069892	Mccartney Const Coldwater Qua
ALG020033	Dunn Construction Co Tarrant
ALG020037	Mccartney Construction Co
ALG020126	Apac Al Inc Oxford Asphalt Plt
ALG030009	Surfside Marina Inc
ALG060045	Georgia Pacific Corp Talladega
ALG060252	Jenkins Mfg Company
ALG060271	Fulghum Fibres Inc Ohatchee
ALG060330	Shoffner Industries Inc
ALG110017	Webb Concrete Oxford
ALG110107	Southern Ready Mix Inc Oxford
ALG110218	Southern Ready Mix Inc
ALG110306	Wells Septic Tank Service
ALG120020	Union Foundry Company
ALG120067	Southern Tool Inc
ALG120069	Advance Tank and Construction
ALG120114	Southern Tool Inc

Table 4.2-5 (cont.) **Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Logan Martin Lake (Source: EPA, 2000)**

ALG120128	Anniston Plating and Metal Fin
ALG120132	York Group Wallace Metal Prod
ALG120154	Oxford Machine Co
ALG120165	Shelby Steel Pell City
ALG120169	Lincoln Metals Corp
ALG120181	M and H Valve Company
ALG120182	Mulrimetco Inc
ALG120183	Werner Co Anniston
ALG120409	Blue Giant Corporation
ALG120433	North American Bus Industries
ALG140050	Anniston Metro Airport
ALG140547	Saia Motor Freight Lines
ALG140705	Guess Sanitation Company
ALG150134	Tyson Foods Inc Talladega
ALG160046	Jacksonville Piedmont Landfill
ALG160084	Superior Cedar Hill Landfill I
ALG160124	Superior Waste Services of Al
ALG180007	Shortys Southern Yard
ALG180148	Huron Valley Steel Corp
ALG180301	Woodard Auto Salvage
ALG180401	Waste Recycling Anniston
ALG180455	Ron Reid Auto Inc
ALG180479	Oxford Scrap Metal Co Inc
ALG180494	Sonny Cook Motors Salvage
ALG180497	Pops and Sons Used Cars
ALG180511	Wood Recycling
ALG180514	Isbells Garage
ALG180516	Dillard and Sons Wrecker
ALG180523	Rite Way Auto Sales and Salvage
ALG230025	PG Industries DBA Pryor Giggey
ALG230037	Riverside Refractories Inc
ALG240003	Barbour Threads Inc.
ALG240051	Aladdin Manufacturing Corp

Table 4.2-5 (cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Logan Martin Lake (Source: EPA, 2000)

ALG240071	Tape Craft Corp
ALG250006	Trans Cycle Industries
ALG340066	Spurlin Oil Company
ALG340097	The Nolen Company Inc
ALG340101	M B Lawley Inc
ALG340136	Jack Green Oil Company
ALG340158	John T Davis Oil Co Inc
ALG340181	Town and Country Food Mart
ALG340201	Murphy Oil USA Inc
ALG340264	West 10TH BP
ALG360002	Alabama Power Co Henry Hydro
ALG670031	Southern Natural Gas Co
ALG670042	Southern Natural Gas Co

Classification ***Mining/Other Nonpoint***

Permit #	*Facility Name*
AL0028011	Landfill Clays Inc Mine
ALR100063	Calhoun Co Comm CCP-08-69-92
ALR100419	Calhoun Co Comm Cane Creek
ALR100421	Calhoun Co Upper Choccolocco C
ALR100422	Calhoun Co Comm Ohatchee Creek
ALR100593	Talladega County Choccolocco
ALR100595	Talladega County Clear Creek
ALR100597	Talladega County Cheaha Cr
ALR100598	Talladega County Acker Creek
ALR100599	Talladega County Choccolocco
ALR100600	Talladega County Coosa River
ALR100606	Talladega County Blue Eye Cr
ALR100771	Anniston Army HUC 03150106 190
ALR100772	Anniston Army HUC 03150106 220
ALR100773	Anniston Army HUC 03150106 250
ALR100774	Anniston Army HUC 03150106 270
ALR100872	Blount Co Comm Cane Creek

Table 4.2-5 (cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Logan Martin Lake (Source: EPA, 2000)

ALR100873	Blount Co Comm Hogeland Creek
ALR101210	St Clair Co Comm Coosa Rv 230
ALR101217	St Clair Co Comm Coosa Rv 290
ALR101219	St Clair Co Comm Coosa Rv 200
ALR101309	Jacksonville Hosp Maint Fac
ALR101438	Township Serv Corp Silver Lake
ALR101655	ADOT STPAA 7404 1
ALR101787	ADOT STPAA 62 14
ALR101791	Quintard Mall Ltd Expansion
ALR101935	Fulghum Fibres Inc Ohatchee
ALR102022	Wal Mart Store Supercenter 809
ALR102158	Piedmont City of Ladiga Trail
ALR102371	ADOT IM 20 1 117
ALR102387	ADOT STPOA 413 2 AND 4
ALR102540	R K Allen Oil Co Retail Est
ALR102723	Monsanto Co Anniston Plant
ALR102734	Douthit George Jacksonville HS
ALR102790	Holmes II Exc Infrastucture
ALR103145	Colyer Lloyd Gen YKK Tapecraft
ALR103252	ADOT STPOA 7441 5
ALR103363	Scot Lytton Incorporation
ALR103382	Jacksonville City of Ladiga Tr
ALR103397	Weaver City of Chief Ladiga
ALR103414	AGC Broadway Ave and Brecon Ac
ALR103422	Jacksonville Chief Ladiga
ALR103426	Rosamond Corp Glidewell Prop
ALR103448	Calhoun Rd Dept Chief Ladiga
ALR103449	Huckeba Clyde Hidden Creek Sub
ALR103512	Alabama Gas Corp YKK Anniston
ALR103639	Old Henry Barn LLC Development
ALR103640	Tyson Foods Talladega Feed Mil
ALR103822	Armory Comm of Al Range 53
ALR103852	Eagles Landing LLC
ALR103893	Eagle Pointe Eastates Inc Subd

Table 4.2-5 (cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Logan Martin Lake (Source: EPA, 2000)

ALR103971	Oxford City of Industrial Road
ALR103993	ADOT DPI 0192 2
ALR104022	Army Comm of AL Sim Area
ALR104023	APAC Ala Oxford Asphalt Plant
ALR104034	Hall Jimmy L Auto City Inc
ALR104146	ADOT DBAA 510 2
ALR104189	Pell City of Const of Access
ALR104264	McWhorter Prop Lowes of Oxford
ALR104308	Balanced Care Corp Outlook Pt
ALR104363	AGC Friendship Reinf
ALR104428	RMD Inc Morningside Subd
ALR104431	Pell City Boe Sports and Athl
ALR104459	Holyle Eugene Meadow Brood Sub
ALR320095	APAC Alabama Inc 431 Pit
ALR320107	Kimberly Clark Nesbitt Lake
ALR320112	US Alliance Coosa Pines Hall
ALR320231	C C Excav Greenbriar Church
ALR320418	W W Dyar and Sons Alvin Woods
ALR320431	Solutia Inc Morrisville Road

Classification ***Municipal/Semi-Public***

Permit #	*Facility Name*
AL0022195	Anniston Choccolocco WWTP
AL0022349	Talladega Brecon WWTP
AL0022586	Jacksonville WWTP
AL0024520	Anniston FT McClellan WWTP
AL0027570	River Bend Apartments
AL0043052	Northern District School
AL0043338	Ragland Housing Authority
AL0045993	Pell City Dye Creek WWTP
AL0046728	Cheaha State Park
AL0050385	Paradise Isle Condominiums
AL0052281	Harbortown Townhomes WWTP

Table 4.2-5 (cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Logan Martin Lake (Source: EPA, 2000)

AL0053422	Best Western Riverside Inn
AL0054356	Lincoln South WWTP
AL0054658	Talladega Airport Ind WWTP
AL0055549	Alexandria School WWTP
AL0055727	Ohatchee School
AL0057703	North Pine Inc WWTP
AL0058238	Talladega Speedway
AL0058408	Oxford Tull C Allen WWTP
AL0066630	Silver Lakes Subdivision Lagoo
AL0070041	Ragland School

Table 4.2-6 Major NPDES Dischargers Based on Max Reported Flow (MGD) in the Logan Martin Sub-Basin (Source: EPA, 2000)

Max Reported Flow (MGD)	Facility Name	Permit #	DSN	Receiving Water
22929	Jacksonville WWTP	AL0022586	1	Williams Br to Tallasseehatchee Creeks
1488	Optec Inc Ft McClellan STP	AL0024520	1	Cane Creek
1488	Anniston Ft McClellan WWTP	AL0024520	1	Cane Creek
1252	Oxford Tull C Allen WWTP	AL0058408	1	Choccolocco Creek
50.81	Shortys Southern Yard	ALG180007	2	Snow Creek
24.7	Huron Valley Steel Corp	ALG180148	3	UT Snow Creek
24.7	Huron Valley Steel Corp	ALG180148	1	UT Snow Creek
22	Anniston Choccolocco WWTP	AL0022195	1	Choccolocco Creek
18	Webb Concrete Oxford	ALG110017	1	UT Choccolocco Creek
16	Anniston Choccolocco WWTP	AL0022195	4	Choccolocco Creek
15	Anniston Choccolocco WWTP	AL0022195	2	Choccolocco Creek
15	Anniston Choccolocco WWTP	AL0022195	3	Choccolocco Creek
15	Anniston Choccolocco WWTP	AL0022195	5	Choccolocco Creek
10	PG Industries DBA Pryor Giggey	ALG230025	4	T Snow Creek
7	McCartney Construction Co	ALG020037	1	Eastaboga & UT Choccolocco Creeks
6	Fulghum Fibres Inc Ohatchee	ALG060271	1	Coosa River
5.614	Anniston Army Depot	AL0002658	13	Choccolocco DRY Cane Creeks
5.5	Jacksonville WWTP	AL0022586	2	Williams Br to Tallasseehatchee Creek
4.816	Anniston Army Depot	AL0002658	15	Choccolocco DRY Cane Creeks
2.06	Georgia Pacific Corp Talladega	ALG060045	1	UT Kelly Creek
2	Superior Waster Services of Al	ALG160124	1	UT to and Choccolocco Creek
1.88	Anniston Army Depot	AL0002658	11	Choccolocco Dry Cane Creeks
1.71	M and H Valve Company	ALG120181	1	T Cane Creek Snow Creek
1.568	Anniston Army Depot	AL0002658	12	Choccolocco Dry Cane Creeks
1.466128	NGC Industries, Inc.	AL0003930	1	Choccolocco Creek UT of Coldwater
1.37	Southern Natural Gas Co	ALG670042	1	Choccolocco Creek
1.19	Anniston Army Depot	AL0002658	5	Choccolocco Dry Cane Creeks
1.17	Jacksonville Piedmont Landfill	ALG160046	1	Tallasseehatchee Creek
1.071	Anniston Army Depot	AL0002658	6	Choccolocco Dry Cane Creeks
1.071	Anniston Army Depot	AL0002658	8	Choccolocco Dry Cane Creeks
1.071	Anniston Army Depot	AL0002658	9	Choccolocco Dry Cane Creeks
1	Webb Concrete Oxford	ALG110017	2	UT Choccolocco Creek
0.923	Anniston Army Depot	AL0002658	2	Choccolocco Dry Cane Creeks
0.874	Barbour Threads Inc	ALG240003	1	UT Cane Creek
0.864	Alabama Power Co Henry Hydro	ALG360002	1	Coosa River
0.85	Anniston Army Depot	AL0002658	10	Choccolocco Dry Cane Creeks

Table 4.2-6 (cont.) Major NPDES Dischargers Based on Max Reported Flow (MGD) in the Logan Martin Sub-Basin (Source: EPA, 2000)

Max Reported Flow (MGD)	Facility Name	Permit #	DSN	Receiving Water
0.718873	NGC Industries, Inc.	AL0003930	2	Choccolocco Creek UT of Coldwater
0.697	M and H Valve Company	ALG120181	4	T Cane Creek Snow Creek
0.544	Anniston Army Depot	AL0002658	1	Choccolocco Dry Cane Creeks
0.5	Murphy Oil USA Inc	ALG340201	7	Choccolocco Creek
0.469	Anniston Army Depot	AL0002658	14	Choccolocco Dry Cane Creeks
0.443	PG Industries DBA Pryor Giggey	ALG230025	1	T Snow Creek
0.375	Southern Natural Gas Co	ALG670031	3	UT Eastaboga Choccolocco Coosa Tall
0.3375	Union Foundry Company	ALG120020	1	UT Snow Creek
0.3308	Southern Ready Mix Inc Oxford	ALG110107	1	UT Choccolocco Creek
0.3308	Southern Ready Mix Inc Oxford	ALG110107	2	UT Choccolocco Creek
0.307	Anniston Army Depot	AL0002658	7	Choccolocco Dry Cane Creeks
0.301	Multimetco Inc	ALG120182	1	UT Choccolocco Creek
0.3	Anniston Plating and Metal Fin	ALG120128	1	UT Cane Creek
0.238	Anniston Army Depot	AL0002658	16	Choccolocco Dry Cane Creeks
0.234	Aladdin Manufacturing Corp	ALG240051	3	Henderson Branch
0.217	Aladdin Manufacturing Corp	ALG240051	1	Henderson Branch
0.217	Aladdin Manufacturing Corp	ALG240051	5	Henderson Branch
0.2016	Alabama Power Co Henry Hydro	ALG360002	2	Coosa River
0.20126	NGC Industries, Inc.	AL0003930	4	Choccolocco Creek UT of Coldwater
0.2	Lincoln Metals Corp	ALG120169	4	Ditch Blue Eye Creek
0.173	West 10th BP	ALG340264	1	UT Choccolocco Creek
0.162988	NGC Industries, Inc.	AL0003930	3	Choccolocco Creek UT of Coldwater
0.15	Murphy Oil USA Inc	ALG340201	2	Choccolocco Creek
0.144	Union Foundry Company	ALG120020	4	UT Snow Creek
0.1393	Southern Tool Inc	ALG120067	1	Choccolocco Creek
0.126	Jenkins Mfg Company	ALG060252	1	UT Choccolocco Creek
0.118	Barbour Threads Inc	ALG240003	3	UT Cane Creek
0.112	Shoffner Industries Inc	ALG060330	1	Eastaboga Creekvia Storm Sewer
0.0973	NGC Industries, Inc.	AL0003930	5	Choccolocco Creek UT of Coldwater
0.096	Southern Natural Gas Co	ALG670031	1	UT Eastaboga Choccolocco Coosa Tall
0.091	Woodard Auto Salvage	ALG180301	1	Ohatchee Creek
0.0831	Waste Recycling Anniston	ALG180401	3	Snow Creek
0.077	Union Foundry Company	ALG120020	2	UT Snow Creek
0.0767	Oxford Machine Co	ALG120154	2	Coldwater Creek

Table 4.2-6 (cont.) Major NPDES Dischargers Based on Max Reported Flow (MGD) in the Logan Martin Sub-Basin (Source: EPA, 2000)

Max Reported Flow (MGD)	Facility Name	Permit #	DSN	Receiving Water
0.0767	Oxford Machine Co	ALG120154	1	Coldwater Creek
0.073	Werner Co Anniston	ALG120183	1	Choccolocco Creek
0.07	Lincoln Metals Corp	ALG120169	1	Ditch Blue Eye Creek
0.069	York Group Wallace Metal Prod	ALG120132	1	Choccolocco Creek
0.065	APAC Al Inc Oxford Asphalt Plt	ALG020126	7	Choccolocco Creek
0.063	Sonny Cook Motors Salvage	ALG180494	1	Kelly Creekto Cheaha
0.053	Pops and Sons Used Cars	ALG180497	1	UT Cottaquilla Creek
0.0493	Oxford Scrap Metal Co Inc	ALG180479	2	UT Choccolocco Creek
0.045	Spurlin Oil Company	ALG340066	2	
0.0449	Riteway Auto Sales and Salvage	ALG180523	1	UT Choccolocco Creek
0.0384	Wood Recycling	ALG180511	2	UT Tallasseehatchee Creek

Table 4.3-1 An annotated list of fish species present in Logan Martin Lake (Source: Catchings and Cook, 1987, as modified by Kleinschmidt)

Scientific Name	Common Name
Lepisosteus osseus	longnose gar
Lepisosteus oculatus	spotted gar
Dorosoms cepedianum	gizzard shad
Dorosoms petenense	threadfin shad
Esox niger	chain pickerel
Cyprinus carpio	carp
Carassius auratus	goldfish
Cyprinella venusta	blacktail shiner
Notemigonus crysoleucas	golden shiner
Ictobius bubalus	smallmouth buffalo
Moxostoma melanops	spotted sucker
Moxostoma poecilurum	blacktail redhorse
Moxostoma duquesnii	black redhorse
Ictalurus furcatus	blue catfish
Ictalurus punctatus	channel catfish
Ameiurus catus	white catfish
Ameiurus nebulosus	brown bullhead
Ameiurus melas	black bullhead
Gambusia affinis	mosquitofish
Morone chrysops	white bass
Morone saxatilis	striped bass
Morone hybrid	hybrid striped bass
Chaenobryttus gulosus	warmouth
Lepomis auritus	redbreast sunfish
Lepomis cyanellus	green sunfish
Lepomis humilis	orange spotted sunfish
Lepomis macrochirus	bluegill
Lepomis megalotis	longear sunfish
Lepomis microlophus	redear sunfish
Micropterus punctulatus	spotted bass
Micropterus salmoides	largemouth bass
Pomoxis annularis	white crappie
Pomoxis nigromaculatus	black crappie
Percina kathae	Mobile logperch
Stizostedion vitreum	walleye
Aplodinotus grunniens	freshwater drum

Table 4.3-2 Fish stockings in Logan Martin Lake[1] (Source: personal communication, Nick Nichols, May 3, 2000, Hatchery Supervisor, Marion State Hatchery, Marion, ADCNR, Alabama, as modified by Kleinschmidt)

Species	Date	Size Group (in.)	Total
largemouth bass	1964	2	7,800
	1981[2]	1-3	18,400
	1983	1-3	6,100
	1986	1-3	27,042
	1987	1-3	15,368
	1988	1-4	65,446
	1989	1	60,970
	1992	1-2	30,520
	1993	1	30,520
	1994	1-5	71,040
			Total 333,206
striped bass	1972	1-2	3,698
	1973	1-2	6,000
	1974	1-2	15,250
	1977	1-3	71,975
	1979	1-3	76,340
	1980	1	76,500
	1982	1-2	32,000
	1983	1-2	75,400
	1984	1-2	75,200
	1985	1-2	98,400
	1986[3]	1-2	70,800
	1987	1-4	92,000
	1988[3]	1-2	76,300
	1989	1-2	76,800
	1990	1-2	76,300
	1991[3]	1-3	76,616
	1992[3]	1-2	76,989
	1993[3]	1-2	80,798
	1994[3]	1	19,791
	1995[3]	1	76,351
	1996[3]	1	76,255
	1998[3]	1	46,009
	1999[3]	1	12,345
	1999	1	33,932
			Total 1,422,049

Table 4.3-2 Fish stockings in Logan Martin Lake[1] (Source: personal communication, Nick Nichols, May 3, 2000, Hatchery Supervisor, Marion State Hatchery, Marion, ADCNR, Alabama, as modified by Kleinschmidt)

Species	Date	Size Group (in.)	Total
hybrid striped bass	1976	1-2	35,451
	1977	1-3	3,640
	1981	1-2	37,000
	1982	1-3	154,770
	1983	1-3	157,462
	1984	1	157,820
	1985	1-2	157,014
	1986	1-2	157,100
	1987	1-2	94,500
	1988	1-2	45,800
	1989	2	30,000
	1990	1-2	30,500
	1991	1-3	30,823
	1992	1	30,520
	1993	1	30,745
	1994	1	45,916
	1995	1	76585
	1996	1	61,310
	1998	1	47,464
	1999	1-2	45,873
			Total 1,430,293
Paddlefish	1981	22-29	46
	1983	3-4	3,500
			Total 3,546

[1]In many years, the lake was stocked on more than one occasion, sometimes using different size classes. This table presents the total number and size range stocked within a particular year.

[2]Florida strain (all largemouth stocked since 1981)
[3]Gulf Coast strain (all other striped bass stocked were Atlantic strain)

Table 4.3-3 Logan Martin creel summary for 1994 (Source: Smith *et al.*, 1995, as modified by Kleinschmidt)

Number of anglers interviewed	646
Percent of crappie anglers	15.8
Percent of bass anglers	72.8
Percent of “anything” anglers	7.7
Harvest rate (crappie/hr) for crappie anglers	0.142
Catch rate (crappie/hr) for crappie anglers	0.216
Harvest rate (bass/hr) for bass anglers	0.079
Catch rate (bass/hr) for bass anglers	0.534
Overall harvest rate (fish/hr)	0.08
Overall catch rate (fish/hr)	0.489
Avg. # of bass <12” released by bass anglers	2
Avg. # of bass >12” released by bass anglers	4
Avg. # of crappie <10” released by crappie anglers	32
Avg. # of crappie >10” released by crappie anglers	1

Table 4.3-4 Threatened and endangered aquatic wildlife species in Alabama counties occupied by the Logan Martin Development (Source: personal communication, USFWS, April 17, 2000, Daphne Field Office, Daphne, Alabama, as modified by Kleinschmidt)

Scientific Name	Common Name	County of Occurrence	Status
Lampsilis altilis	fine-lined pocketbook mussel	Calhoun, St. Clair, Talladega	T
Medionidus parvulus	Coosa moccasinshell mussel	Talladega	E
Pleurobema georgianum	southern pigtoe mussel	Calhoun, St. Clair	E
Pleurobema perovatum	ovate clubshell mussel	St. Clair	E
Epioblasma othcaloogensis	southern acornshell mussel	St. Clair	E
Epioblasma metastriata	upland combshell mussel	St. Clair	E
Ptychobranchus greeni	triangular kidneyshell mussel	St. Clair	E
Leptoxis taeniata	painted rocksnail	Calhoun, Talladega	T
Tulotoma magnifica	tulotoma snail	Calhoun, St. Clair, Talladega	E
Elimia crenatella	lacy elimia	Talladega	T
Cottus pygmaeus	pygmy sculpin	Calhoun	T
Cyprinella caerulea	blue shiner	Calhoun	T

Table 4.4-1 Common botanical species of Logan Martin Lake drainage basin (Source: APC, 2000d)

Family	Scientific name	Vernacular name	Nativity	Community type
Aceraceae (maple)	*Acer drummondii*	Drummond's maple	Native	Lowland
Aceraceae (maple)	*Acer negundo*	Box-elder	Native	Lowland
Aceraceae (maple)	*Acer rubrum*	Red maple	Native	Upland, disturbed upland, lowland
Aceraceae (maple)	*Acer saccharinum*	Silver maple	Native	Lowland
Anacardiaceae (cashew)	*Rhus glabra*	Shining or smooth sumac	Native	Disturbed upland
Anacardiaceae (cashew)	*Toxicodendron radicans*	Poison-ivy	Native	Upland, disturbed upland, lowland, disturbed lowland
Arecaceae (palm)	*Sabal minor*	Dwarf palmetto	Native	Lowland
Balsaminaceae (jewel-weed)	*Impatiens capensis*	Jewel-weed	Alien	Lowland, disturbed lowland
Betulaceae (birch)	*Alnus serrulata*	Alder	Native	Lowland, disturbed lowland
Betulaceae (birch)	*Betula nigra*	River birch	Native	Lowland
Betulaceae (birch)	*Carpinus caroliniana*	Hornbeam	Native	Lowland
Betulaceae (birch)	*Ostrya virginiana*	Hop-hornbeam	Native	Lowland
Bignoniaceae (trumpet-creeper)	*Bignonia capreolata*	Cross-vine	Native	Upland, disturbed upland, lowland, disturbed lowland

Table 4.4-1 Common botanical species of Logan Martin Lake drainage basin (Source: APC, 2000d)

Family	Scientific name	Vernacular name	Nativity	Community type
Bignoniaceae (trumpet-creeper)	*Campsis radicans*	Cow-itch	Native	Upland, disturbed upland, lowland, disturbed lowland
Calycanthaceae (sweet shrub)	*Calycanthus floridus*	Sweet shrub	Native	Upland
Campanulaceae (bell-flower)	*Lobelia cardinalis*	Cardinal flower	Native	Lowland, disturbed lowland
Caprifoliaceae (honeysuckle)	*Lonicera japonica*	Japanese honeysuckle	Alien	Disturbed upland, lowland, disturbed lowland
Caprifoliaceae (honeysuckle)	*Viburnum nudum*	Arrow-wood	Native	Lowland
Cornaceae (dogwood)	*Cornus amomum*	Swamp dogwood	Native	Lowland
Cornaceae (dogwood)	*Cornus florida*	Flowering dogwood	Native	Upland
Cornaceae (dogwood)	*Cornus foemina*	Swamp dogwood	Native	Lowland
Cyperaceae (sedge)	*Cyperus iria*	Flatsedge	Native	Disturbed lowland
Cyperaceae (sedge)	*Cyperus pseudovegetus*	Flatsedge	Native	Disturbed lowland
Cyperaceae (sedge)	*Eleocharis obtusa*	Spikerush	Native	Disturbed lowland
Cyperaceae (sedge)	*Rhynchospora corniculata*	Beaksedge	Native	Lowland, disturbed lowland
Cyperaceae (sedge)	*Scirpus cyperinus*	Wool-grass	Native	Lowland, disturbed lowland

Table 4.4-1 Common botanical species of Logan Martin Lake drainage basin (Source: APC, 2000d)

Family	Scientific name	Vernacular name	Nativity	Community type
Ebenaceae (ebony)	*Diospyros virginiana*	Persimmon	Native	Upland
Ericaceae (heath)	*Oxydendrum arboreum*	Sourwood	Native	Upland
Ericaceae (heath)	*Vaccinium arboreum*	Sparkleberry	Native	Upland
Ericaceae (heath)	*Vaccinium corymbosum*	Highbush blueberry	Native	Upland, lowland
Ericaceae (heath)	*Vaccinium pallidum*	Lowbush blueberry	Native	Upland
Ericaceae (heath)	*Vaccinium stamineum*	Deerberry	Native	Upland
Fagaceae (oak)	*Fagus grandifolia*	Beech	Native	Upland
Fagaceae (oak)	*Quercus alba*	White oak	Native	Upland
Fagaceae (oak)	*Quercus coccinea*	Scarlet oak	Native	Upland
Fagaceae (oak)	*Quercus falcata*	Southern red oak	Native	Upland
Fagaceae (oak)	*Quercus lyrata*	Overcup oak	Native	Lowland
Fagaceae (oak)	*Quercus michauxii*	Swamp chestnut oak	Native	Lowland
Fagaceae (oak)	*Quercus montana*	Rock chestnut oak	Native	Upland
Fagaceae (oak)	*Quercus nigra*	Water oak	Native	Lowland
Fagaceae (oak)	*Quercus phellos*	Willow oak	Native	Lowland
Fagaceae (oak)	*Quercus stellata*	Post oak	Native	Upland
Fagaceae (oak)	*Quercus velutina*	Black oak	Native	Upland
Juglandaceae (hickory)	*Carya glabra*	Pignut hickory	Native	Upland
Juglandaceae (hickory)	*Carya pallida*	Sand hickory	Native	Upland

Table 4.4-1 Common botanical species of Logan Martin Lake drainage basin (Source: APC, 2000d)

Family	Scientific name	Vernacular name	Nativity	Community type
Juglandaceae (hickory)	*Carya tomentosa*	Mockernut hickory	Native	Upland
Juncaceae (rush)	*Juncus coriaceus*	Leather rush	Native	Lowland, disturbed lowland
Juncaceae (rush)	*Juncus effusus*	Soft-stem rush	Native	Lowland, disturbed lowland
Juncaceae (rush)	*Juncus repens*	Creeping rush	Native	Lowland
Lauraceae (bay)	*Sassafras albidum*	Sassafras	Native	Disturbed upland
Lythraceae (crape-myrtle)	*Ammania coccinea*	Redstem	Native	Lowland
Lythraceae (crape-myrtle)	*Rotala ramosior*	Toothcup	Native	Lowland
Magnoliaceae (magnolia)	*Liriodendron tulipifera*	Tulip-poplar	Native	Upland, disturbed upland
Malvaceae (mallow)	*Hibiscus moscheutos*	Marsh mallow	Native	Lowland
Nyssaceae (gum)	*Nyssa aquatica*	Tupelo	Native	Lowland
Nyssaceae (gum)	*Nyssa biflora*	Swamp tupelo	Native	Lowland
Nyssaceae (gum)	*Nyssa sylvatica*	Black gum	Native	Upland
Oleaceae (olive)	*Fraxinus pensylvanica*	Green ash	Native	Lowland
Oleaceae (olive)	*Ligustrum sinense*	Privet	Alien	Disturbed upland, lowland, disturbed lowland
Pinaceae (pine)	*Pinus echinata*	Shortleaf pine	Native	Upland, disturbed upland

Table 4.4-1 Common botanical species of Logan Martin Lake drainage basin (Source: APC, 2000d)

Family	Scientific name	Vernacular name	Nativity	Community type
Pinaceae (pine)	*Pinus palustris*	Longleaf pine	Native	Upland
Pinaceae (pine)	*Pinus taeda*	Loblolly	Native	Upland, disturbed upland, lowland
Pinaceae (pine)	*Pinus virginiana*	Scrub pine	Native	Upland, disturbed upland
Poaceae (grass)	*Cynodon dactylon*	Bermuda grass	Alien	Disturbed upland
Poaceae (grass)	*Festuca elatior*	Fescue	Alien	Disturbed upland
Poaceae (grass)	*Glyceria striata*	Manna grass	Native	Lowland, disturbed lowland
Poaceae (grass)	*Leersia oryzoides*	Cut grass	Native	Lowland, disturbed lowland
Poaceae (grass)	*Leersia virginica*	Cut grass	Native	Lowland, disturbed lowland
Poaceae (grass)	*Panicum clandestinum*	Panic grass	Native	Lowland, disturbed lowland
Poaceae (grass)	*Panicum virgatum*	Switch grass	Native	Lowland, disturbed lowland
Poaceae (grass)	*Paspalum dilatatum*	Dallis grass	Alien	Disturbed upland
Poaceae (grass)	*Paspalum notatum*	Bahia grass	Alien	Disturbed upland
Polygonaceae (knotweed)	*Polygonum punctatum*	Knotweed	Native	Lowland
Ranunculaceae (butter-cup)	*Clematis terniflora*	Virgin's-bower	Alien	Lowland
Rosaceae (rose)	*Prunus angustifolia*	Chicksaw plum	Native	Disturbed upland
Rosaceae (rose)	*Prunus serotina*	Black cherry	Native	Upland
Rosaceae (rose)	*Rubus flagellaris*	Dewberry	Native	Disturbed upland

Table 4.4-1 Common botanical species of Logan Martin Lake drainage basin (Source: APC, 2000d)

Family	Scientific name	Vernacular name	Nativity	Community type
Rubiaceae (coffee)	*Cephalanthus occidentalis*	Button-bush	Native	Lowland, disturbed lowland
Salicaceae (willow)	*Salix caroliniana*	Willow	Native	Lowland, disturbed lowland
Salicaceae (willow)	*Salix nigra*	Willow	Native	Lowland, disturbed lowland
Saururaceae (lizard's-tail)	*Saururus cernuus*	Lizard's-tail	Native	Lowland, disturbed lowland
Saxifragaceae (saxifrage)	*Itea virginica*	Virginia sweet-spire	Native	Lowland
Taxodiaceae (bald-cypress)	*Taxodium distichum*	Bald-cypress	Native	Lowland
Typhaceae (cat-tail)	*Typha angustifolia*	Cat-tail	Native	Disturbed lowland
Typhaceae (cat-tail)	*Typha latifolia*	Cat-tail	Native	Disturbed lowland
Vitaceae (grape)	*Ampelopsis arborea*	Pepper-vine	Native	Lowland
Vitaceae (grape)	*Ampelopsis cordata*	Pepper-vine	Native	Lowland
Vitaceae (grape)	*Parthenocissus quinquefolia*	Virginia creeper	Native	Upland, lowland

Table 4.4-2 Botanical species of special concern in the Logan Martin Lake drainage basin (Source: APC, 2000d).

Family	Species	Vernacular name	Category	Location
Aspleniaceae	Asplenium trichomanes	maidenhair spleenwort	S2/S3	Logan Martin Lake
Dennstaedtiaceae	Dennstaedtia punctilobula	hay-scented fern	xS3	Logan Martin Lake
Cupressaceae	Juniperus communis	common juniper	S1	Logan Martin Lake
Araliaceae	Panax quinquefolium	ginseng	S4/CH	Logan Martin Lake
Asteraceae	Helianthus smithii	sunflower	S2	Logan Martin Lake
Asteraceae	Jamesianthus alabamensis	jamesianthus	S3	Logan Martin Lake
Hippocastanaceae	Aesculus parviflora	bottle-brush buckeye	S2/S3	Logan Martin Lake
Orobanchaceae	Orobanche uniflora	cancer-root	S2	Logan Martin Lake
Polygalaceae	Polygala boykinii	milkwort	S3/S3	Logan Martin Lake
Primulaceae	Lysimachia fraseri	loosestrife	S1	Logan Martin Lake
Ranunculaceae	Aconitum uncinatum	monk's-hood	S1	Logan Martin Lake
Rosaceae	Crataegus triflora	hawthorn	S2	Logan Martin Lake
Rosaceae	Prunus alabamensis	Alabama cherry	S1	Logan Martin Lake
Saxifragaceae	Parnassia asarifolia	grass-of-parnassus	S1/S2	Logan Martin Lake
Amaryllidaceae	Hymenocallis coronaria	cahaba-lily	S2	Logan Martin Lake
Araceae	Acorus americanus	sweet-flag	S1	Logan Martin Lake
Orchidaceae	Platanthera integrilabia	white fringeless orchid	S2	Logan Martin Lake
Orchidaceae	Platanthera peramena	purple fringeless orchid	S1	Logan Martin Lake
Orchidaceae	Ponthieva racemosa	shadow-witch orchid	S2	Logan Martin Lake
Xyridaceae	Xyris tennesseensis	yellow-eyed-grass	LE	Logan Margin Lake

Table 4.4-3 Mammal species typical of the Logan Martin development vicinity (Source: Holliman, 1963; Mount, 1984)[1].

Common Name	Scientific Name
Virginia opossum	*Didelphis virginiana*
southern short-tailed shrew	*Blarina carolinensis*
least shrew	*Cryptotis parva*
southeastern shrew	*Sorex longirostris*
eastern mole	*Scalopus aquaticus*
big brown bat	*Eptesicus fuscus*
silver-haired bat	*Lasionycteris noctivagans*
red bat	*Lasiurus borealis*
hoary bat	*Lasiurus cinereous*
southeastern myotis	*Myotis austroriparius*
evening bat	*Nycticeius humeralis*
eastern pipistrelle	*Pipistrellus subflavus*
nine-banded armadillo	*Dasypus novemcinctus*
swamp rabbit	*Sylvilagus aquaticus*
eastern cottontail	*Sylvilagus floridanus*
southern flying squirrel	*Glaucomys volans*
woodchuck	*Marmota monax*
gray squirrel	*Sciurus carolinsis*
fox squirrel	*Sciurus niger*
eastern chipmunk	*Tamias striatus*
beaver	*Castor canadensis*
woodland vole	*Microtus pinetorum*
eastern woodrat	*Neotoma floridana*
golden mouse	*Ochrotomys nuttalli*
muskrat	*Ondatra zibethicus*
marsh rice rat	*Oryzomys palustris*
cotton mouse	*Peromyscus gossypinus*
white-footed mouse	*Peromyscus leucopus*
old field mouse	*Peromyscus polionotus*
eastern harvest mouse	*Reithrodontomys humulis*
hispid cotton rat	*Sigmodon hispidus*

Table 4.4-3 Mammal species typical of the Logan Martin development vicinity (Source: Holliman, 1963; Mount, 1984)[1].

Common Name	Scientific Name
house mouse	*Mus musculus*
Norway rat	*Rattus norvegicus*
coyote	*Canis latrans*
gray fox	*Urocyon cinereoargenteus*
red fox	*Vulpes fulva*
raccoon	*Procyon lotor*
river otter	*Lutra canadensis*
striped skunk	*Mephitis mephitis*
spotted skunk	*Spilogale putorius*
mink	*Mustela vison*
long-tailed weasel	*Mustela frenata*
bobcat	*Felis rufus*
white-tailed deer	*Odocoileus virginianus*

[1] These mammals may be expected to be found in and around lands surrounding this reservoir in the appropriate habitat.

Table 4.4-4 Bird species typical of the Logan Martin development vicinity (Source: Imhof, 1976; Mount, 1984).[1]

Common Name	Status[2]	Season[3]	Scientific Name
common loon	M	(W)	*Gavia immer*
pied-billed grebe	M	(W)	*Podilymbus podiceps*
great blue heron	PR		*Ardea herodias*
great egret	M	(S, Su)	*Casmerodius albus*
little blue heron	M	(Su, F)	*Florida caerulea*
green heron	M	(S, Su)	*Butorides virescens*
black-crowned night heron	M	(Su, F)	*Nycticorax nycticorax*
yellow-crowned night heron	M	(S, Su, F)	*Nyctanassa violacea*
wood duck	PR		*Aix sponsa*
green-winged teal	M	(W)	*Anas crecca*
blue-winged teal	M	(S, Su, F)	*Anas discors*
mallard	PR		*Anas platyrhynchos*
northern shoveler	M	(S, F, W)	*Anas cylpeata*
gadwall	M	(W)	*Anas strepera*
American widgeon	M	(S, F, W)	*Anas americana*
ring-necked duck	M	(W)	*Aytha collarisa*
bufflehead	M	(W)	*Bucephala albeola*
hooded merganser	PR		*Lophodytes cucullatus*
ruddy duck	M	(W)	*Oxyura jamaicensis*
black vulture	PR		*Coragyps atratus*
turkey vulture	PR		*Cathartes aura*
sharp-shinned hawk	M	(Su)	*Accipter striatus*
Cooper's hawk	PR		*Accipter cooperii*
red-tailed hawk	PR		*Buteo jamaicensis*
red-shouldered hawk	PR		*Buteo lineatus*
broad-winged hawk	M	(S, Su, F)	*Buteo platypterus*
bald eagle	M	(S, Su, W)	*Haliaeetus leucocephalus*
osprey	M	(S, F, W)	*Pandio haliaetus*
kestrel	PR		*Falco sparverius*
northern bobwhite	PR		*Colinus virginianus*
wild turkey	PR		*Meleagris gallopavo*
American coot	PR		*Fulica americana*
killdeeer	PR		*Charadruis vociferus*
American woodcock	PR		*Scolopax minor*
common snipe	M	(S, F, W)	*Gallinago gallinago*

Table 4.4-4 Bird species typical of the Logan Martin development vicinity (Source: Imhof, 1976; Mount, 1984).[1]

Common Name	Status[2]	Season[3]	Scientific Name
greater yellowlegs	M	(S, F, W)	*Tringa melenoleuca*
lesser yellowlegs	M	(S, F, W)	*Tringa flavipes*
spotted sandpiper	M	(S, F, W)	*Actitis macularia*
ring-billed gull	M	(S, F, W)	*Larus delawarensis*
rock dove	PR		*Columba livia*
mourning dove	PR		*Zenaida macroura*
yellow-billed cuckoo	M	(S, Su, F)	*Coccyzus americanus*
black-billed cuckoo	M	(S)	*Coccyzus erythropthalmus*
barn owl	PR		*Tyto alba*
eastern screech owl	PR		*Otus asio*
great horned owl	PR		*Bubo virginianus*
barred owl	PR		*Strix varia*
Chuck-will's-widow	M	(S, Su, F)	*Caprimulgus carolinensis*
whip-poor-will	M	(S, F)	*Caprimulgus vociferus*
common nighthawk	M	(S, Su)	*Chordeiles minor*
chimney swift	M	(S, Su, F)	*Chaetura pelagica*
ruby-throated hummingbird	M	(S, Su, F)	*Archilochus colubris*
belted kingfisher	PR		*Ceryle alcyon*
northern flicker	PR		*Colaptes auratus*
pileated woodpecker	PR		*Dryocopus pileatus*
red-bellied woodpecker	PR		*Melanerpes carolinus*
red-headed woodpecker	PR		*Melanerpes erythrocephalus*
yellow-bellied sapsucker	M	(W)	*Sphyrapicus varius*
hairy woodpecker	PR		*Picoides villosus*
downy woodpecker	PR		*Picoides pubescens*
eastern kingbird	M	(S, Su)	*Tyrannus tyranus*
great crested flycatcher	M	(S, Su, F)	*Myiarchus crinitus*
eastern phoebe	PR		*Sayornis phoebe*
acadian flycatcher	M	(S, Su, F)	*Empidonax virescens*
eastern wood pewee	M	(S, Su, F)	*Contopus virens*
southern rough-winged swallow	M	(S, Su, F)	*Stelgidopteryx ruficollis*
barn swallow	M	(S, Su, F)	*Hirundo rustica*
purple martin	M	(S, Su)	*Progne subis*

Table 4.4-4 Bird species typical of the Logan Martin development vicinity (Source: Imhof, 1976; Mount, 1984).[1]

Common Name	Status[2]	Season[3]	Scientific Name
blue jay	PR		*Cyanocitta cristata*
American crow	PR		*Corvus brachyrhynchos*
fish crow	PR		*Corvus ossifragus*
Carolina chickadee	PR		*Parus carolinensis*
tufted titmouse	PR		*Baeolophus bicolor*
white-breasted nuthatch	PR		*Sitta carolinensis*
red-breasted nuthatch	M	(W)	*Sitta canadensis*
brown creeper	M	(F, W)	*Certhia americana*
winter wren	M	(W)	*Troglodytes troglodytes*
Carolina wren	PR		*Thryothorus ludovicianus*
northern mockingbird	PR		*Mimus polyglottos*
gray catbird	PR		*Dumetella carolinensis*
brown thrasher	PR		*Toxostoma rufum*
American robin	PR		*Turdus migratorius*
wood thrush	M	(S, Su, F)	*Hylocichla mustelina*
hermit thrush	M	(F, W)	*Catharus guttatus*
Swainson's thrush	M	(S, F)	*Catharus ustulatus*
gray-cheeked thrush	M	(S,F)	*Catharus minimus*
veery	M	(S,F)	*Catharus fuscescens*
eastern bluebird	PR		*Sialia sialis*
blue-gray gnatcatcher	PR		*Polioptila caerulea*
golden-crowned kinglet	M	(F, W)	*Regulus satrapa*
ruby-crowned kinglet	M	(S, F, W)	*Regulus calendula*
cedar waxwing	PR		*Bombycilla cedrorum*
loggerhead shrike	PR		*Lanius ludovicianus*
European starling	PR		*Sturnus vulgaris*
white-eyed vireo	PR		*Vireo griseus*
yellow-throated vireo	M	(S, Su)	*Vireo flavifrons*
solitary vireo	M	(S, F, W)	*Vireo solitarius*
warbling vireo	M	(S)	*Vireo gilvus*
Philadelphia vireo	M	(F)	*Vireo philadelphicus*
red-eyed vireo	M	(F)	*Vireo olivaceus*
black-and-white warbler	M	(S, Su, F)	*Minotilta varia*

Table 4.4-4 Bird species typical of the Logan Martin development vicinity (Source: Imhof, 1976; Mount, 1984).[1]

Common Name	Status[2]	Season[3]	Scientific Name
prothonotary warbler	M	(S, Su, F)	*Protonotaria citrea*
Swainson's warbler	M	(S, Su, F)	*Limnothlypis swainsonii*
worm-eating warbler	M	(S, Su, F)	*Helmitheros vermivorus*
blue-winged warbler	M	(Su, F)	*Vermivora pinus*
golden-winged warbler	M	(Su, F)	*Vermivora chrysoptera*
Tennessee warbler	M	(S, F)	*Vermivora peregrina*
orange-crowned warbler	M	(S, F)	*Vermivora celata*
Nashville warbler	M	(F)	*Vermivora ruficapilla*
northern parula	M	(S, Su, F)	*Parula americana*
yellow warbler	M	(S, Su, F)	*Dendroica petechia*
magnolia warbler	M	(S, Su)	*Dendroica magnolia*
Cape May warbler	M	(S)	*Dendrocia tigrina*
black-throated blue warbler	M	(S, F)	*Dendroica caerulescens*
yellow-rumped warbler	M	(S, F, W)	*Dendroica coronata*
black-throated green warbler	M	(S, F)	*Dendroica virens*
cerulean warbler	M	(S, Su)	*Dendroica cerulea*
Blackburnian warbler	M	(S, F, W)	*Dendroica fusca*
yellow-throated warbler	M	(S, Su)	*Dendroica dominica*
chestnut-sided warbler	M	(S, F)	*Dendroica pensylvanica*
bay-breasted warbler	M	(S, F)	*Dendroica castanea*
blackpoll warbler	M	(S)	*Dendroica striata*
pine warbler	PR		*Dendroica pinus*
prairie warbler	M	(S, Su, F)	*Dendroica discolor*
palm warbler	M	(S, F, W)	*Dendroica palmarum*
ovenbird	M	(S, Su, F)	*Seiurus aurocapillus*
northern waterthrush	M	(S, F)	*Seiurus novebaracensis*
Louisiana waterthrush	M	(S, Su, F)	*Seiurus motacilla*
Kentucky warbler	M	(S, Su, F)	*Oporornis formosus*
Connecticut warbler	M	(W)	*Oporornis agilis*
mourning warbler	M	(S, F)	*Oporornis philadelphia*
common yellowthroat	PR		*Geothlypis trichas*
yellow-breasted chat	M	(S, Su, F)	*Icteria virens*
hooded warbler	M	(S, Su, F)	*Wilsonia citrina*
Wilson's warbler	M	(S, F)	*Wilsonia pusilla*
Canada warbler	M	(S, Su, F)	*Wilsonia canadensis*
American redstart	M	(S, Su, F)	*Setophaga ruticilla*
house sparrow	PR		*Passer domesticus*
eastern meadowlark	PR		*Sturnella magna*
red-winged blackbird	PR		*Agelaius phoeniceus*

Table 4.4-4 Bird species typical of the Logan Martin development vicinity (Source: Imhof, 1976; Mount, 1984).[1]

Common Name	Status[2]	Season[3]	Scientific Name
orchard oriole	M	(S, Su, F)	*Icterus spurius*
northern oriole	M	(S, F)	*Icterus galbula*
rusty blackbird	M	(W)	*Euphagus carolinus*
common grackle	PR		*Quiscalus quiscula*
brown-headed cowbird	PR		*Molothrus ater*
scarlet tanager	M	(S, Su, F)	*Piranga olivacea*
summer tanager	M	(S, Su, F)	*Piranga rubra*
northern cardinal	PR		*Cardinalis cardinalis*
rose-breasted grosbeak	M	(S, F)	*Pheucticus ludovicianus*
blue grosbeak	M	(S, Su, F)	*Guiraca caerulea*
indigo bunting	M	(S, Su, F)	*Passerina cyanea*
evening grosbeak	M	(W)	*Cassothraustes vespertinus*
purple finch	M	(W)	*Carpodacus purpureus*
house finch	PR		*Carpodacus mexicanus*
pine siskin	M	(W)	*Carduelis pinus*
American goldfinch	PR		*Carduelis tristis*
eastern towhee	PR		*Pipilo erythrophthalmus*
Savannah sparrow	M	(F, W)	*Passerculus sandwichensis*
dark-eyed junco	M	(F, W)	*Junco hyemalis*
chipping sparrow	PR		*Spizella passerina*
field sparrow	PR		*Spizella pusilla*
white-throated sparrow	M	(S, F, W)	*Zonotrichia albicollis*
fox sparrow	M	(F, W)	*Passerella iliaca*
swamp sparrow	M	(F, W)	*Melsopiza georgiana*
song sparrow	M	(F, W)	*Melsopiza melodia*

[1] These birds may be expected to be found in or on contiguous lands in the appropriate habitat.
[2] PR – Permanent Resident – Found throughout the year.
M – Migrant – Found only seasonally. These may be:
- Spring or summer resident,
- Fall or winter resident, or
- Transient during spring and/or fall

[3] (S) – Spring March – May
(Su) - Summer June – August
(F) - Fall September – November
(W) - Winter December - February

Note: Nomenclature and taxonomy follows 7th edition of American Ornithological Union check list.

Table 4.4-5 Amphibians typical of the Logan Martin development vicinity (Source: APC, 2000d).

Common Name	Scientific Name
Bufonidae	
American toad	*Bufo americanus americanus*
oak toad	*B. quercicus*
Fowler's toad	*B. woodhousii*
Hylidae	
northern cricket frog	*Acris crepitans crepitans*
gray treefrog	*Hyla chrysoscelis*
barking treefrog	*H. gratiosa*
squirrel treefrog	*H. squirella*
mountain chrous frog	*Pseudarius brachyphona*
spring peeper	*P.crucifer crucifer*
upland chorus frog	*P triseriata feriarum*
Microhylidae	
eastern narrow-mouthed toad	*Gastrophyrne carolinensis*
Pelobatidae	
eastern spadefoot toad	*Scaphiopus holbrooki holbrooki*
Ranidae	
bullfrog	*Rana catesbeiana*
green frog	*Rana clamitans meloneta*
pickerel frog	*Rana palustris*
southern leopard frog	*Rana sphenocephala*
Ambystomatidae	
spotted salamander	*Ambystoma maculatum*
marbled salamander	*A. a opacum*
eastern tiger salamander	*A. tigrinum tigrinum*
Plethodontidae	
northern dusky salamander	*Desmongnathus fuscus conanti*
two-lined salamander	*Eurycea cirrigera*
three-lined salamander	*E. longicauda guttolineata*
cave salamander	*E. lucifuga*
northern spring salamander	*Gryinophilus porphyriticus porphyriticus*
four-toed salamander	*Hemidactylium scutatum*
Webster's zigzag salamander	*Plethodon websteri*
slimy salamander	*P. glutinosus glutinosus*

Table 4.4-5 Amphibians typical of the Logan Martin development vicinity (Source: APC, 2000d).

Common Name	Scientific Name
mud salamander	*Pseudotriton montanus flavissimus*
red salamender	*Pseudotriton ruber ruber*
Proteidae	
Beyer’s waterdog	*Necturus beyeri*
Salamandridae	
eastern newt	*Notophthalmus viridescens viridenscens*

Table 4.4-6 Reptiles typical of the Logan Martin development vicinity (Source: APC, 2000d)

Common Name	Scientific Name
Alligatoridae	
American Alligator	*Alligator mississippiensis*
Chelydridae	
common snapping turtle	*Chelydra serpentina*
alligator snapping turtle	*Macroclemys temmincki*
Emydidae	
southern painted turtle	*Chrysemys picta dorsalis-marginata intergrades*
eastern chicken turtle	*Deirochelys recticularia reticularis*
common map turtle	*Graptemys geographica*
Alabama map turtle	*G. pulchra*
river cooter	*Pseudemys concinna concinna*
eastern box turtle	*Terrapene carolina carolina-triungus intergrades*
pond slider	*Trachemys scripta scripta-elegans intergrade*
Kinosternidae	
eastern mud turtle	*Kinosternon subrubrum subrubrum*
stripe-necked musk turtle	*Sternotherus minor peltifer*
stinkpot turtle	*S. odoratus*
Trionychidae	
spiny softshell	*Apalone spiniferus aspera*
Anguidae	
eastern slender glass lizard	*Ophisaurus attenuatus longicaudus*
eastern glass lizard	*O. ventralis*
Polychrotidae	
green anole	*Anolis carolinensis carolinensis*
Scincidae	
coal skink	*Eumeces anthracinus pluvialis*
five-lined skink	*E. fasciatus*
southern five-lined skink	*E. inexpectatus*
broad-headed skink	*E.laticeps*
ground skink	*Scincella lateralis*

Table 4.4-6 Reptiles typical of the Logan Martin development vicinity (Source: APC, 2000d)

Common Name	Scientific Name
Teiidae	
six-lined racerunner	*Cnemidophorus sexlineatus sexlineatus*
Colubridae	
eastern worm snake	*Carphophis amoenus amoenus*
northern scarlet snake	*Cemphora coccinea copei*
black racer	*Coluber constrictor constrictor*
southern ringneck snake	*Diadophis punctatus punctatus-edwardsi*
corn snake	*Elaphe guttata guttata*
gray rat snake	*E. obsoleta-obsoleta spiloides intergrades*
eastern hognose snake	*Heterodon platyrhinos*
mole snake	*Lampropeltis calligaster rhombomaculata*
black kingsnake	*L. getula nigra*
milk kingsnake	*Lampropeltis triangulum triangulum*
eastern coachwhip	*Masticophis flagellum flagellum*
yellow-bellied water snake	*Nerodia erythrogaster-flavigaster intergrades*
midland water snake	*N. sipedon pieuralis*
green vine snake	*Opheodrys aestivus*
northern pine snake	*Pituophis melanoleucus melanoleucus*
queen snake	*Regina septemvittata*
midland brown snake	*Storeria dekayi wrightorum*
northern red-bellied snake	*S. occipitomaculata occipitomaculata*
southeastern crowned snake	*Tantilla coronata*
eastern ribbon snake	*Thamnophis sauritus sauritus*
eastern garter snake	*T. siratalis sirtalis*
smooth earth snake	*Virginia valeriae valeriae*
Viperidae	
southern copperhead	*Agkistrodon contortrix-mokeson intergrades*
eastern cottonmouth	*A. piscivorus piscivorus*
timber rattelsnake	*Crotalus horridus*
carolina pigmy rattlesnake	*Sistrurus miliarius miliarius*

Table 4.6-1 Recreational Sites on Logan Martin Lake and the Facilties at Each Site (Source: FIMS, unpublished data; Carto-Craft Map, unknown)

Facilities	Parking	Boat Launch	Boat Slips	Boat Rental	Boat Repair	Boat Storage	Fuel Services	Dock Pumps	Fishing Pier	General Pier	Fishing Guide Services	Marine Sports Supplies	Tackle & Bait	Groceries/Food Services	Camping Areas	Rental Cabins/Rooms	RV or Trailer Park	Dump Station	Swimming Pool	Swimming Area	Picnic Area	Outdoor grills/BBQ Pits	Playground	Trail	Restrooms	Bathhouse	Other
78 Boat Club	X	X	X		X	X				X					X										X		
Aqualand Marina	X	X	X			X				X			X	X					X		X	X			X		
Arrowhead Point Camping Area														NA													
Bama Power Sports	X	X								X		X								X	X	X			X		X
Big Bull Campground	X	X								X					X	X				X	X				X	X	
Birmingham Sailing Club	X	X	X			X				X					X					X	X	X	X		X		
Calhoun County Recreation Facility														NA													
Canebreak Bait Marina														NA													
Choccoloco Creek at Hwy 77 Boat Ramp	X	X																									
Clear Creek Harbor	X	X	X	X		X	X	X		X		X	X	X	X		X				X	X			X	X	
Clear Springs Marina	X	X	X			X	X	X		X		X	X	X											X		
Coosa Island Marina	X	X	X		X	X	X	X				X	X	X			X	X		X	X				X	X	
Creel's Island	X	X								X									X	X	X				X		
Frank's Blue Eye														NA													
Frankie's Marina	X	X	X				X			X											X				X		
General Lee Marina and Campground	X	X	X			X	X			X		X	X	X	X		X	X		X	X				X	X	
Hide-A-Way	X	X	X			X								X											X		
Joe's Camping and Fishing	X	X	X						X	X					X												
Kiker's Camp	X	X							X	X											X		X		X		X
Lakeside Landing		X				X	X	X				X	X	X	X		X	X		X	X						
Logan Landing	X	X		X		X			X						X	X			X	X	X	X	X	X	X	X	X
Logan Martin Dam Tailrace Area	X								X																		
Maquires Park	X	X				X	X	X				X	X	X			X	X			X						
Marina Bay Yacht Club														NA													
Pell City Lakeside Park	X	X							X	X											X	X		X	X	X	
Pine Harbor Marina														NA													
Powell's Campground	X	X													X										X		
Rabbit Branch Marina	X	X	X			X	X	X		X		X	X				X			X	X		X		X	X	
Red Ark's														NA													
Redstone														NA													
Riverside Marina, Inc.	X	X	X		X	X	X			X	X	X	X			X					X				X		
Riverside Harbor	X	X					X	X				X	X	X													
Safe Harbor RV Park and Campground	X	X															X	X			X						
Shelter Cove Marina	X	X	X			X				X										X	X	X	X		X	X	
Sportsman's Cove														NA													
St. Clair Marina and Campground		X				X							X	X	X	X	X	X		X	X						
Stemley Bridge Public Use Area														NA													
Surfside 6	X	X								X					X						X				X		
Surfside Marina	X	X	X		X	X	X	X		X		X			X		X								X	X	X
Town & Country Food Mart	X	X					X	X		X		X	X	X											X		
Uncle Eddie's Riverside Groceries	X	X								X				X											X		
University Marine & Sailing Center	X	X	X	X	X	X	X	X		X		X		X		X		X			X	X			X	X	
Visitors Center	X																								X		X
YMCA Camp Crosby	X	X								X					X	X			X	X				X	X	X	

Table 4.8-1 Demographic Profiles for Alabama, Calhoun, St. Clair, and Talladega Counties (Source: U.S. Bureau of the Census, 1999; REIS, 1999)

	Alabama	Calhoun County	St. Clair County	Talladega County
1999 Population	4,369,862	116,541	63,852	77,521
1997 Population	4,322,113	117,227	60,694	76,913
1990 Population	4,040,389	116,032	50,009	74,107
Percent Population Change (1990 to 1999)	8.2%	0.4%	27.7%	4.6%
Persons per Occupied Housing Unit (1990)	2.62	2.59	2.74	2.71
Resident population per square mile (1992)	81.5	191.3	84.1	101.6
Percent Urban (1990)	67.7%	71.3%	28.3%	52.7%
Percent Rural (1990)	32.3%	28.7%	71.7%	47.3%
High School Graduates[1]	66.9%	67.4%	61.0%	60.7%
College Graduates[1]	15.7%	14.2%	8.5%	10.2%

[1] This information pertains to persons in 1990 over the age of 25.

Table 4.8-2 Economic and Social Characteristics for Alabama, Calhoun, St. Clair, and Talladega Counties (Source: U.S. Bureau of the Census, 1999; REIS, 1999, as modified by Kleinschmidt)

	Alabama	Calhoun County	St. Clair County	Talladega County
Per Capita Personal Income (1997)	$20,672	$18,855	$18,496	$16,857
Per Capita Personal Income (1987)	$12,394	$11,640	$10,545	$10,440
Civilian Labor Force (1994)	2,031,000	52,545	25,669	35,014
Unemployment Rate (1999)	4.8%	4.8%	3.2%	5.8%
Unemployment Rate (1994)	6.0%	7.1%	4.2%	7.4%
Unemployment Rate (1990)	6.9%	7.2%	5.6%	9.3%
Percent persons below poverty (1993)	18.8%	18.0%	16.2%	22.3%
Total units of housing (1990)	1,670,379	46,753	20382	29,861
Occupied units/households (1990)	1,506,790	42,983	17,666	26,448
Owner-Occupied	70.5%	70.3%	83.1%	75.2%
Renter-Occupied	29.5%	29.7%	16.9%	24.8%
Vacant	9.8%	8.1%	13.3%	11.4%
Median value	$53,700	$51,600	$53,400	$44,800
Occupations (percent Employed 16 and over in 1990)	1,741,794	46,899	21,593	30,069
Technical, Sales & Administrative Support	29.4%	28.0%	29.6%	23.5%
Operators, Fabrications & Laborers	20.7%	22.7%	23.0%	28.7%
Managerial & Professional Specialty	22.7%	21.3%	16.4%	18.7%
Service	11.9%	12.6%	9.5%	12.6%
Precision Production Craft & Repair	13.0%	14.0%	19.1%	14.7%
Farming, Forestry & Fishing	2.3%	1.4%	2.5%	1.9%

Table 5.1-1 Summary of installations of recycled Christmas trees at Logan Martin Lake (Source: personal communication, Doug Powell, Environmental Affairs, APC, April 24, 2000).

Year	Number of trees installed
1995	400
1996	50
1999	40

Appendix D

Logan Martin Reservoir Profiles

Alabama Power Company

Logan Martin Reservoir Profiles

1990-1999

Location Definitions

31.1 miles Upstream of L. Martin Dam	CORLM490.0
22.0 miles Upstream of L. Martin Dam	CORLM480.9
21.6 miles Upstream of L. Martin Dam	CORLM480.5
20.1 miles Upstream of L. Martin Dam	CORLM479.0
20.0 miles Upstream of L. Martin Dam	CORLM478.9
18.0 miles Upstream of L. Martin Dam	CORLM476.9
16.0 miles Upstream of L. Martin Dam	CORLM474.9
14.0 miles Upstream of L. Martin Dam	CORLM472.9
12.0 miles Upstream of L. Martin Dam	CORLM470.9
11.6 miles Upstream of L. Martin Dam	CORLM470.5
10.0 miles Upstream of L. Martin Dam	CORLM468.9
8.0 miles Upstream of L. Martin Dam	CORLM466.9
6.0 miles Upstream of L. Martin Dam	CORLM464.9
4.0 miles Upstream of L. Martin Dam	CORLM462.9
3.0 miles Upstream of L. Martin Dam	CORLM461.9
2.0 miles Upstream of L. Martin Dam	CORLM460.9
1.0 mile Upstream of L. Martin Dam	CORLM459.9
Logan Martin Dam Forebay	COFLM458.9
Logan Martin Dam Tailrace	COTLM458.4

Logan Martin Reservoir

1990-1999

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	5/29/90 1:45:00 PM	0	24.6	9.7
COFLM458.9	5/29/90 1:45:00 PM	3	24.5	9.5
COFLM458.9	5/29/90 1:45:00 PM	5	24.5	9.4
COFLM458.9	5/29/90 1:45:00 PM	10	24.5	9.3
COFLM458.9	5/29/90 1:45:00 PM	15	24.2	8.8
COFLM458.9	5/29/90 1:45:00 PM	20	24	7.5
COFLM458.9	5/29/90 1:45:00 PM	30	23.2	5
COFLM458.9	5/29/90 1:45:00 PM	40	22.9	4.7
COFLM458.9	5/29/90 1:45:00 PM	50	22.9	4.7
COFLM458.9	5/29/90 1:45:00 PM	60	22.9	3.9
COFLM458.9	5/29/90 1:45:00 PM	70	22.9	3.6
COFLM458.9	6/26/90 10:20:00 AM	0	28	8.4
COFLM458.9	6/26/90 10:20:00 AM	3	28	8.5
COFLM458.9	6/26/90 10:20:00 AM	5	27.8	8.3
COFLM458.9	6/26/90 10:20:00 AM	10	27.8	8.2
COFLM458.9	6/26/90 10:20:00 AM	15	27.5	7.9
COFLM458.9	6/26/90 10:20:00 AM	20	27.2	6.1
COFLM458.9	6/26/90 10:20:00 AM	30	26.2	1.2
COFLM458.9	6/26/90 10:20:00 AM	40	25.5	0.5
COFLM458.9	6/26/90 10:20:00 AM	50	25	0.5
COFLM458.9	6/26/90 10:20:00 AM	60	24.9	0.5
COFLM458.9	6/26/90 10:20:00 AM	70	25.2	0.5
COFLM458.9	7/17/90 9:56:00 AM	0	29	6.6
COFLM458.9	7/17/90 9:56:00 AM	3	29	6.6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	7/17/90 9:56:00 AM	5	29	6.4
COFLM458.9	7/17/90 9:56:00 AM	10	29	6.4
COFLM458.9	7/17/90 9:56:00 AM	15	29	6.4
COFLM458.9	7/17/90 9:56:00 AM	20	29	6.4
COFLM458.9	7/17/90 9:56:00 AM	30	28.9	5.3
COFLM458.9	7/17/90 9:56:00 AM	40	28.5	2.2
COFLM458.9	7/17/90 9:56:00 AM	50	27.2	
COFLM458.9	7/17/90 9:56:00 AM	60	27.1	
COFLM458.9	7/17/90 9:56:00 AM	70	26.8	
COFLM458.9	8/6/90 2:45:00 PM	0	31.2	7.5
COFLM458.9	8/6/90 2:45:00 PM	3	31.1	7.5
COFLM458.9	8/6/90 2:45:00 PM	5	31.1	7.5
COFLM458.9	8/6/90 2:45:00 PM	10	30.9	7.1
COFLM458.9	8/6/90 2:45:00 PM	15	29.8	8.1
COFLM458.9	8/6/90 2:45:00 PM	20	29.3	1
COFLM458.9	8/6/90 2:45:00 PM	30	28.9	0.2
COFLM458.9	8/6/90 2:45:00 PM	40	28.5	0.2
COFLM458.9	8/6/90 2:45:00 PM	50	28.3	0.2
COFLM458.9	8/16/90 9:45:00 AM	0	30.1	8
COFLM458.9	8/16/90 9:45:00 AM	3	30	8
COFLM458.9	8/16/90 9:45:00 AM	5	30	7.9
COFLM458.9	8/16/90 9:45:00 AM	10	29.9	7.4
COFLM458.9	8/16/90 9:45:00 AM	15	29.2	6.1
COFLM458.9	8/16/90 9:45:00 AM	20	29	4.4
COFLM458.9	8/16/90 9:45:00 AM	30	28.9	2.2
COFLM458.9	8/16/90 9:45:00 AM	40	28.7	1.2
COFLM458.9	8/16/90 9:45:00 AM	50	28.3	1.1
COFLM458.9	8/16/90 9:45:00 AM	60	28.2	1.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	8/16/90 9:45:00 AM	65	28	1.1
COFLM458.9	8/29/90 2:21:00 PM	0	30.5	9.3
COFLM458.9	8/29/90 2:21:00 PM	3	30.1	9.1
COFLM458.9	8/29/90 2:21:00 PM	5	29.8	9.3
COFLM458.9	8/29/90 2:21:00 PM	10	28.9	3.6
COFLM458.9	8/29/90 2:21:00 PM	15	28.5	1.6
COFLM458.9	8/29/90 2:21:00 PM	20	28.1	0.4
COFLM458.9	8/29/90 2:21:00 PM	30	28	0.5
COFLM458.9	8/29/90 2:21:00 PM	40	27.5	0.5
COFLM458.9	8/29/90 2:21:00 PM	50	27.5	0.5
COFLM458.9	8/29/90 2:21:00 PM	60	27.3	0.7
COFLM458.9	9/19/90 10:24:00 AM	0	28.9	4.9
COFLM458.9	9/19/90 10:24:00 AM	3	28.8	4.8
COFLM458.9	9/19/90 10:24:00 AM	5	28.8	4.8
COFLM458.9	9/19/90 10:24:00 AM	10	28.8	4.5
COFLM458.9	9/19/90 10:24:00 AM	15	28.8	4.4
COFLM458.9	9/19/90 10:24:00 AM	20	28.7	4.3
COFLM458.9	9/19/90 10:24:00 AM	30	28.7	4.1
COFLM458.9	9/19/90 10:24:00 AM	40	28.5	3.7
COFLM458.9	9/19/90 10:24:00 AM	50	28.3	3.9
COFLM458.9	9/19/90 10:24:00 AM	60	27	3.6
COFLM458.9	9/19/90 10:24:00 AM	70	27	1.3
COFLM458.9	10/1/90 1:14:00 PM	0	27	10.5
COFLM458.9	10/1/90 1:14:00 PM	3	26.3	10.1
COFLM458.9	10/1/90 1:14:00 PM	5	26.1	9.8
COFLM458.9	10/1/90 1:14:00 PM	10	26	8.3
COFLM458.9	10/1/90 1:14:00 PM	15	25.9	3.7
COFLM458.9	10/1/90 1:14:00 PM	20	25.4	3.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	10/1/90 1:14:00 PM	30	25.3	3
COFLM458.9	10/1/90 1:14:00 PM	40	25.3	2.5
COFLM458.9	10/1/90 1:14:00 PM	50	25.3	2.3
COFLM458.9	10/9/90 1:30:00 PM	0	26.2	7.8
COFLM458.9	10/9/90 1:30:00 PM	3	25.2	6.4
COFLM458.9	10/9/90 1:30:00 PM	5	25.2	5.2
COFLM458.9	10/9/90 1:30:00 PM	10	25	4.1
COFLM458.9	10/9/90 1:30:00 PM	15	25	3.6
COFLM458.9	10/9/90 1:30:00 PM	20	25	3.3
COFLM458.9	10/9/90 1:30:00 PM	30	24.8	3.1
COFLM458.9	10/9/90 1:30:00 PM	40	24.8	2.4
COFLM458.9	10/9/90 1:30:00 PM	50	24.8	2.5
COFLM458.9	10/9/90 1:30:00 PM	60	24.8	1.7
COFLM458.9	10/9/90 1:30:00 PM	65	24.8	1.2
COFLM458.9	10/16/90 11:10:00 AM	0	21.5	6.4
COFLM458.9	10/16/90 11:10:00 AM	3	21.5	6.4
COFLM458.9	10/16/90 11:10:00 AM	5	21.5	5.9
COFLM458.9	10/16/90 11:10:00 AM	10	21.5	5.9
COFLM458.9	10/16/90 11:10:00 AM	15	21.2	5.9
COFLM458.9	10/16/90 11:10:00 AM	20	21.2	5.9
COFLM458.9	10/16/90 11:10:00 AM	30	21.2	5.6
COFLM458.9	10/16/90 11:10:00 AM	40	21.2	4.6
COFLM458.9	10/16/90 11:10:00 AM	50	21.2	4.2
COFLM458.9	11/15/90 12:20:00 PM	0	18	9.8
COFLM458.9	11/15/90 12:20:00 PM	3	16.2	9.9
COFLM458.9	11/15/90 12:20:00 PM	5	16	9.1
COFLM458.9	11/15/90 12:20:00 PM	10	16	8.5
COFLM458.9	11/15/90 12:20:00 PM	15	16	8.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	11/15/90 12:20:00 PM	20	16	8.3
COFLM458.9	11/15/90 12:20:00 PM	30	16	8.1
COFLM458.9	11/15/90 12:20:00 PM	40	15.9	7.6
COFLM458.9	11/15/90 12:20:00 PM	50	15.5	6.8
COFLM458.9	11/15/90 12:20:00 PM	60	15.2	6.6
COFLM458.9	11/15/90 12:20:00 PM	65	15.2	6.5
COFLM458.9	6/5/91 9:20:00 AM	0	27.5	8
COFLM458.9	6/5/91 9:20:00 AM	3	27.5	8
COFLM458.9	6/5/91 9:20:00 AM	5	27.5	8
COFLM458.9	6/5/91 9:20:00 AM	10	27.5	8
COFLM458.9	6/5/91 9:20:00 AM	15	27.5	7.8
COFLM458.9	6/5/91 9:20:00 AM	20	26.1	4.8
COFLM458.9	6/5/91 9:20:00 AM	30	25.5	4.3
COFLM458.9	6/5/91 9:20:00 AM	40	25	4.1
COFLM458.9	6/5/91 9:20:00 AM	50	24.9	3.7
COFLM458.9	6/10/91 1:11:00 PM	0	29	9.9
COFLM458.9	6/10/91 1:11:00 PM	3	29	10.1
COFLM458.9	6/10/91 1:11:00 PM	5	29	9.9
COFLM458.9	6/10/91 1:11:00 PM	10	27	9.9
COFLM458.9	6/10/91 1:11:00 PM	15	27	8
COFLM458.9	6/10/91 1:11:00 PM	20	26	6.9
COFLM458.9	6/10/91 1:11:00 PM	30	25	5.2
COFLM458.9	6/10/91 1:11:00 PM	40	23	2.6
COFLM458.9	6/10/91 1:11:00 PM	50	22	1.9
COFLM458.9	6/10/91 1:11:00 PM	60	21	1.8
COFLM458.9	6/10/91 1:11:00 PM	70	21	1.5
COFLM458.9	6/10/91 1:11:00 PM	80	21	1.5
COFLM458.9	7/22/91 10:36:00 AM	0	29.5	9.6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	7/22/91 10:36:00 AM	3	29	9.7
COFLM458.9	7/22/91 10:36:00 AM	5	28.8	9.2
COFLM458.9	7/22/91 10:36:00 AM	10	28.1	6.5
COFLM458.9	7/22/91 10:36:00 AM	15	27.8	4.2
COFLM458.9	7/22/91 10:36:00 AM	20	27.7	3.3
COFLM458.9	7/22/91 10:36:00 AM	30	27.3	0.7
COFLM458.9	7/22/91 10:36:00 AM	40	27	0.3
COFLM458.9	7/22/91 10:36:00 AM	50	26.8	0.3
COFLM458.9	8/19/91 11:15:00 AM	0	29.7	3.9
COFLM458.9	8/19/91 11:15:00 AM	3	29.4	4
COFLM458.9	8/19/91 11:15:00 AM	5	28.8	3.2
COFLM458.9	8/19/91 11:15:00 AM	10	28.5	2.4
COFLM458.9	8/19/91 11:15:00 AM	15	28.5	2.4
COFLM458.9	8/19/91 11:15:00 AM	20	28.5	2.5
COFLM458.9	8/19/91 11:15:00 AM	30	28.5	2.5
COFLM458.9	8/19/91 11:15:00 AM	40	28.4	1.5
COFLM458.9	8/19/91 11:15:00 AM	45	28.4	1.5
COFLM458.9	9/3/91 1:16:00 PM	0	28.4	10.1
COFLM458.9	9/3/91 1:16:00 PM	3	28.4	10.1
COFLM458.9	9/3/91 1:16:00 PM	5	27.9	10.1
COFLM458.9	9/3/91 1:16:00 PM	10	27.9	10.1
COFLM458.9	9/3/91 1:16:00 PM	15	27.9	9.5
COFLM458.9	9/3/91 1:16:00 PM	20	27.8	9
COFLM458.9	9/3/91 1:16:00 PM	30	27.6	1.4
COFLM458.9	9/3/91 1:16:00 PM	40	27.4	0.9
COFLM458.9	9/26/91 9:33:00 AM	0	26	4.9
COFLM458.9	9/26/91 9:33:00 AM	3	25.8	4.7
COFLM458.9	9/26/91 9:33:00 AM	5	25.8	4.6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	9/26/91 9:33:00 AM	10	25.7	4.4
COFLM458.9	9/26/91 9:33:00 AM	15	25.6	4.4
COFLM458.9	9/26/91 9:33:00 AM	20	25.5	4.4
COFLM458.9	9/26/91 9:33:00 AM	30	25.5	4.25
COFLM458.9	9/26/91 9:33:00 AM	40	25.5	4.4
COFLM458.9	9/26/91 9:33:00 AM	50	25.5	4.4
COFLM458.9	9/26/91 9:33:00 AM	60	25.5	4.35
COFLM458.9	9/26/91 9:33:00 AM	65	25.5	4.35
COFLM458.9	10/8/91 9:20:00 AM	0	22	3.5
COFLM458.9	10/8/91 9:20:00 AM	3	22	3.5
COFLM458.9	10/8/91 9:20:00 AM	5	22	3.5
COFLM458.9	10/8/91 9:20:00 AM	10	22	3.5
COFLM458.9	10/8/91 9:20:00 AM	15	22	3.5
COFLM458.9	10/8/91 9:20:00 AM	20	22	3.5
COFLM458.9	10/8/91 9:20:00 AM	30	22	3.6
COFLM458.9	10/8/91 9:20:00 AM	40	21.9	6.3
COFLM458.9	5/5/92 11:30:00 AM	0	20.7	8.7
COFLM458.9	5/5/92 11:30:00 AM	3	20.7	8.8
COFLM458.9	5/5/92 11:30:00 AM	5	20.6	8.7
COFLM458.9	5/5/92 11:30:00 AM	10	20.5	8.7
COFLM458.9	5/5/92 11:30:00 AM	15	20.3	8.4
COFLM458.9	5/5/92 11:30:00 AM	20	20.3	8.3
COFLM458.9	5/5/92 11:30:00 AM	30	20.3	8.1
COFLM458.9	5/5/92 11:30:00 AM	40	20.1	7.4
COFLM458.9	5/5/92 11:30:00 AM	50	19	5
COFLM458.9	5/5/92 11:30:00 AM	60	19.1	4.7
COFLM458.9	5/12/92 9:15:00 AM	0	21.3	10.6
COFLM458.9	5/12/92 9:15:00 AM	3	21.2	10.8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	5/12/92 9:15:00 AM	5	21	10.5
COFLM458.9	5/12/92 9:15:00 AM	10	20	8.6
COFLM458.9	5/12/92 9:15:00 AM	15	23.3	5.9
COFLM458.9	5/12/92 9:15:00 AM	20	23.4	5.2
COFLM458.9	5/12/92 9:15:00 AM	25	24.2	5
COFLM458.9	5/12/92 9:15:00 AM	30	24.5	4.8
COFLM458.9	5/12/92 9:15:00 AM	40	27	4.3
COFLM458.9	5/12/92 9:15:00 AM	50	27.7	3.8
COFLM458.9	5/12/92 9:15:00 AM	60	27.8	3.6
COFLM458.9	5/12/92 9:15:00 AM	65	27.7	3.5
COFLM458.9	5/12/92 9:33:00 AM	0	21.2	10.5
COFLM458.9	5/12/92 9:33:00 AM	3	21.1	10.5
COFLM458.9	5/12/92 9:33:00 AM	5	21	10.5
COFLM458.9	5/12/92 9:33:00 AM	10	20.1	9.5
COFLM458.9	5/12/92 9:33:00 AM	15	23.8	7.1
COFLM458.9	5/12/92 9:33:00 AM	20	24.1	5
COFLM458.9	5/12/92 9:33:00 AM	25	24.3	5
COFLM458.9	5/12/92 9:33:00 AM	30	24.7	4.5
COFLM458.9	5/12/92 9:33:00 AM	40	27.6	3.9
COFLM458.9	5/12/92 9:33:00 AM	50	27.8	3.8
COFLM458.9	5/12/92 9:33:00 AM	55	27.4	3.8
COFLM458.9	5/12/92 12:35:00 PM	0	22.2	10.8
COFLM458.9	5/12/92 12:35:00 PM	3	21.2	11.2
COFLM458.9	5/12/92 12:35:00 PM	5	22.9	10.9
COFLM458.9	5/12/92 12:35:00 PM	10	22.2	7.6
COFLM458.9	5/12/92 12:35:00 PM	15	22.5	6.1
COFLM458.9	5/12/92 12:35:00 PM	20	22.7	5.4
COFLM458.9	5/12/92 12:35:00 PM	25	23.7	5.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	5/12/92 12:35:00 PM	30	23.8	5.1
COFLM458.9	5/12/92 12:35:00 PM	40	24.1	4.8
COFLM458.9	5/12/92 12:35:00 PM	50	24.4	4.6
COFLM458.9	5/12/92 12:35:00 PM	60	24.2	4.5
COFLM458.9	5/12/92 12:35:00 PM	65	24.3	4.4
COFLM458.9	5/12/92 12:45:00 PM	0	22.5	10.6
COFLM458.9	5/12/92 12:45:00 PM	3	21.3	11
COFLM458.9	5/12/92 12:45:00 PM	5	20.8	10.7
COFLM458.9	5/12/92 12:45:00 PM	10	21.8	8.3
COFLM458.9	5/12/92 12:45:00 PM	15	21.7	6
COFLM458.9	5/12/92 12:45:00 PM	20	22.1	5.7
COFLM458.9	5/12/92 12:45:00 PM	25	22.8	5.5
COFLM458.9	5/12/92 12:45:00 PM	30	23.1	5.3
COFLM458.9	5/12/92 12:45:00 PM	35	22.9	5
COFLM458.9	5/12/92 12:45:00 PM	40	23.1	4.9
COFLM458.9	5/12/92 12:45:00 PM	50	23.3	4.6
COFLM458.9	5/12/92 12:45:00 PM	55	23.6	4.7
COFLM458.9	5/20/92 10:30:00 AM	0	26.9	9.3
COFLM458.9	5/20/92 10:30:00 AM	3	26.7	9.7
COFLM458.9	5/20/92 10:30:00 AM	5	26.6	9.5
COFLM458.9	5/20/92 10:30:00 AM	10	26.4	9.5
COFLM458.9	5/20/92 10:30:00 AM	15	26.2	9.2
COFLM458.9	5/20/92 10:30:00 AM	20	22.6	7.3
COFLM458.9	5/20/92 10:30:00 AM	30	21.4	3.9
COFLM458.9	5/20/92 10:30:00 AM	40	20.9	3
COFLM458.9	5/20/92 10:30:00 AM	50	20.8	3
COFLM458.9	5/20/92 10:30:00 AM	55	21.2	2.4
COFLM458.9	6/1/92 1:16:00 PM	0	24.3	8.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	6/1/92 1:16:00 PM	3	24.3	8.3
COFLM458.9	6/1/92 1:16:00 PM	5	24.2	8.3
COFLM458.9	6/1/92 1:16:00 PM	10	24	8
COFLM458.9	6/1/92 1:16:00 PM	15	24	7.6
COFLM458.9	6/1/92 1:16:00 PM	20	24	7.5
COFLM458.9	6/1/92 1:16:00 PM	30	24	7.6
COFLM458.9	6/1/92 1:16:00 PM	40	20.5	1.3
COFLM458.9	6/1/92 1:16:00 PM	50	20.5	1
COFLM458.9	6/1/92 1:16:00 PM	60	20.5	1.1
COFLM458.9	6/3/92 10:06:00 AM	0	23.5	9.2
COFLM458.9	6/3/92 10:06:00 AM	3	23.5	9.2
COFLM458.9	6/3/92 10:06:00 AM	5	23.5	9.1
COFLM458.9	6/3/92 10:06:00 AM	10	23.3	8
COFLM458.9	6/3/92 10:06:00 AM	15	23.2	7.3
COFLM458.9	6/3/92 10:06:00 AM	20	23.2	7.2
COFLM458.9	6/3/92 10:06:00 AM	30	22.5	6.7
COFLM458.9	6/3/92 10:06:00 AM	40	22.4	5.2
COFLM458.9	6/3/92 10:06:00 AM	50	21.2	2
COFLM458.9	6/3/92 10:06:00 AM	60	21	1.8
COFLM458.9	7/14/92 11:11:00 AM	0	30	7.9
COFLM458.9	7/14/92 11:11:00 AM	3	29.7	7.5
COFLM458.9	7/14/92 11:11:00 AM	5	29.3	5.7
COFLM458.9	7/14/92 11:11:00 AM	10	28.7	3.7
COFLM458.9	7/14/92 11:11:00 AM	15	28.5	3.2
COFLM458.9	7/14/92 11:11:00 AM	20	28.4	2.9
COFLM458.9	7/14/92 11:11:00 AM	30	27.9	2.1
COFLM458.9	7/14/92 11:11:00 AM	40	27.7	1.9
COFLM458.9	8/17/92 11:05:00 AM	0	29.4	8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	8/17/92 11:05:00 AM	3	29.2	8
COFLM458.9	8/17/92 11:05:00 AM	5	29	8.2
COFLM458.9	8/17/92 11:05:00 AM	10	29	7.3
COFLM458.9	8/17/92 11:05:00 AM	15	28.9	7.1
COFLM458.9	8/17/92 11:05:00 AM	20	28.7	6.5
COFLM458.9	8/17/92 11:05:00 AM	30	28.6	5.6
COFLM458.9	8/17/92 11:05:00 AM	40	28.5	4.4
COFLM458.9	8/17/92 11:05:00 AM	50	28.5	3.6
COFLM458.9	9/22/92 10:25:00 AM	0	26.2	3.1
COFLM458.9	9/22/92 10:25:00 AM	3	26.2	3
COFLM458.9	9/22/92 10:25:00 AM	5	26.1	2.9
COFLM458.9	9/22/92 10:25:00 AM	10	26.1	2.7
COFLM458.9	9/22/92 10:25:00 AM	15	26.1	1.9
COFLM458.9	9/22/92 10:25:00 AM	20	26.1	1.7
COFLM458.9	9/22/92 10:25:00 AM	30	26.1	0.4
COFLM458.9	9/22/92 10:25:00 AM	40	26	1.5
COFLM458.9	9/22/92 10:25:00 AM	50	26	1
COFLM458.9	9/22/92 10:25:00 AM	60	26	0.8
COFLM458.9	9/22/92 10:36:00 AM	0	26.2	3.2
COFLM458.9	9/22/92 10:36:00 AM	3	26.2	3.2
COFLM458.9	9/22/92 10:36:00 AM	5	26.1	2.9
COFLM458.9	9/22/92 10:36:00 AM	10	26.1	2.8
COFLM458.9	9/22/92 10:36:00 AM	15	26.1	2.8
COFLM458.9	9/22/92 10:36:00 AM	20	26.1	2.8
COFLM458.9	9/22/92 10:36:00 AM	30	26	1.4
COFLM458.9	9/22/92 10:36:00 AM	35	26	0.9
COFLM458.9	9/22/92 2:25:00 PM	0	26.1	3.4
COFLM458.9	9/22/92 2:25:00 PM	3	26.1	3.5

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	9/22/92 2:25:00 PM	5	26.2	3.7
COFLM458.9	9/22/92 2:25:00 PM	10	26.2	3.5
COFLM458.9	9/22/92 2:25:00 PM	15	26	3.3
COFLM458.9	9/22/92 2:25:00 PM	20	26	1.9
COFLM458.9	9/22/92 2:25:00 PM	30	26	2.1
COFLM458.9	9/22/92 2:25:00 PM	40	26	2.2
COFLM458.9	9/22/92 2:25:00 PM	50	26	1.6
COFLM458.9	9/22/92 2:25:00 PM	60	26	1.3
COFLM458.9	10/5/92 10:40:00 AM	0	22.6	5.8
COFLM458.9	10/5/92 10:40:00 AM	3	22.6	5.8
COFLM458.9	10/5/92 10:40:00 AM	5	22.6	5.8
COFLM458.9	10/5/92 10:40:00 AM	10	22.6	5.8
COFLM458.9	10/5/92 10:40:00 AM	15	22.6	5.8
COFLM458.9	10/5/92 10:40:00 AM	20	22.6	5.7
COFLM458.9	10/5/92 10:40:00 AM	30	22.6	5.7
COFLM458.9	10/5/92 10:40:00 AM	40	22.6	5.6
COFLM458.9	10/5/92 10:40:00 AM	50	22.6	5.6
COFLM458.9	10/5/92 10:40:00 AM	60	22.5	5.5
COFLM458.9	5/10/93 12:10:00 PM	0	23.4	10.6
COFLM458.9	5/10/93 12:10:00 PM	3	23.3	10.7
COFLM458.9	5/10/93 12:10:00 PM	5	22.9	10.5
COFLM458.9	5/10/93 12:10:00 PM	10	21.3	8.1
COFLM458.9	5/10/93 12:10:00 PM	15	20.5	7.2
COFLM458.9	5/10/93 12:10:00 PM	20	20.4	7.1
COFLM458.9	5/10/93 12:10:00 PM	30	20.1	6.9
COFLM458.9	5/10/93 12:10:00 PM	40	20	6.8
COFLM458.9	5/10/93 12:10:00 PM	50	19.7	6.5
COFLM458.9	5/10/93 12:10:00 PM	60	19.7	5.9

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	5/24/93 1:50:00 PM	0	24.7	6.2
COFLM458.9	5/24/93 1:50:00 PM	3	25.2	5.9
COFLM458.9	5/24/93 1:50:00 PM	5	25	5.8
COFLM458.9	5/24/93 1:50:00 PM	10	25.9	5.4
COFLM458.9	5/24/93 1:50:00 PM	15	26.1	5.1
COFLM458.9	5/24/93 1:50:00 PM	20	26.2	4.9
COFLM458.9	5/24/93 1:50:00 PM	30	26.5	5.1
COFLM458.9	5/24/93 1:50:00 PM	40	26.5	5.1
COFLM458.9	5/24/93 1:50:00 PM	50	26.4	5
COFLM458.9	5/24/93 1:50:00 PM	60	26.4	4.2
COFLM458.9	6/7/93 1:20:00 PM	0	28	10.9
COFLM458.9	6/7/93 1:20:00 PM	3	27.8	11
COFLM458.9	6/7/93 1:20:00 PM	5	27.1	11.3
COFLM458.9	6/7/93 1:20:00 PM	10	25.9	10.3
COFLM458.9	6/7/93 1:20:00 PM	15	25.3	8.1
COFLM458.9	6/7/93 1:20:00 PM	20	25.1	7.1
COFLM458.9	6/7/93 1:20:00 PM	30	23.6	2.7
COFLM458.9	6/7/93 1:20:00 PM	40	23.3	1.9
COFLM458.9	6/7/93 1:20:00 PM	50	23.2	1.8
COFLM458.9	6/7/93 1:20:00 PM	60	23.1	1.5
COFLM458.9	6/16/93 1:25:00 PM	0	31.4	8.2
COFLM458.9	6/16/93 1:25:00 PM	3	30	8.2
COFLM458.9	6/16/93 1:25:00 PM	5	29.7	8.1
COFLM458.9	6/16/93 1:25:00 PM	10	29.4	7.2
COFLM458.9	6/16/93 1:25:00 PM	15	28.3	4.8
COFLM458.9	6/16/93 1:25:00 PM	20	26.3	2
COFLM458.9	6/16/93 1:25:00 PM	30	25.3	1.3
COFLM458.9	6/16/93 1:25:00 PM	40	24.5	0.6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	6/16/93 1:25:00 PM	50	24.2	0.3
COFLM458.9	6/16/93 1:25:00 PM	60	24	0.4
COFLM458.9	6/29/93 9:20:00 AM	0	28.2	4.7
COFLM458.9	6/29/93 9:20:00 AM	3	28.2	4.9
COFLM458.9	6/29/93 9:20:00 AM	5	28.2	4.8
COFLM458.9	6/29/93 9:20:00 AM	10	28.1	4.7
COFLM458.9	6/29/93 9:20:00 AM	15	27.9	1.4
COFLM458.9	6/29/93 9:20:00 AM	20	27.8	0.7
COFLM458.9	6/29/93 9:20:00 AM	30	27.1	0.05
COFLM458.9	6/29/93 9:20:00 AM	40	26	0.05
COFLM458.9	6/29/93 9:20:00 AM	50	25.5	0.04
COFLM458.9	6/29/93 9:20:00 AM	60	25.2	0.06
COFLM458.9	6/29/93 9:20:00 AM	67	24.9	0.05
COFLM458.9	7/6/93 10:50:00 AM	0	30.5	6.05
COFLM458.9	7/6/93 10:50:00 AM	3	29.9	6.14
COFLM458.9	7/6/93 10:50:00 AM	5	29.6	6.15
COFLM458.9	7/6/93 10:50:00 AM	10	29.3	5.73
COFLM458.9	7/6/93 10:50:00 AM	15	29.1	4.75
COFLM458.9	7/6/93 10:50:00 AM	20	28.5	2.48
COFLM458.9	7/6/93 10:50:00 AM	30	28	1.22
COFLM458.9	7/6/93 10:50:00 AM	40	26.9	0.4
COFLM458.9	7/6/93 10:50:00 AM	50	26	0.44
COFLM458.9	7/6/93 10:50:00 AM	60	25.8	0.58
COFLM458.9	7/15/93 10:40:00 AM	0	31.9	6.4
COFLM458.9	7/15/93 10:40:00 AM	3	31.7	6.4
COFLM458.9	7/15/93 10:40:00 AM	5	31.5	6.1
COFLM458.9	7/15/93 10:40:00 AM	10	31.4	5.7
COFLM458.9	7/15/93 10:40:00 AM	15	31.4	5.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	7/15/93 10:40:00 AM	20	31.2	3
COFLM458.9	7/15/93 10:40:00 AM	30	30.6	0.3
COFLM458.9	7/15/93 10:40:00 AM	40	30.1	0.3
COFLM458.9	7/15/93 10:40:00 AM	50	29.9	0.4
COFLM458.9	7/15/93 10:40:00 AM	60	29.7	0.4
COFLM458.9	7/20/93 8:38:00 AM	0	30.4	5.7
COFLM458.9	7/20/93 8:38:00 AM	3	30.4	5.6
COFLM458.9	7/20/93 8:38:00 AM	5	30.3	5.1
COFLM458.9	7/20/93 8:38:00 AM	10	30.2	3
COFLM458.9	7/20/93 8:38:00 AM	15	30.2	3
COFLM458.9	7/20/93 8:38:00 AM	20	30	2.1
COFLM458.9	7/20/93 8:38:00 AM	30	29.6	0.8
COFLM458.9	7/20/93 8:38:00 AM	40	28.6	0.4
COFLM458.9	7/20/93 8:38:00 AM	50	27.7	0.4
COFLM458.9	7/20/93 8:38:00 AM	60	27.5	0.4
COFLM458.9	7/28/93 10:37:00 AM	0	31.8	7.4
COFLM458.9	7/28/93 10:37:00 AM	3	31.3	7.6
COFLM458.9	7/28/93 10:37:00 AM	5	31.3	7.4
COFLM458.9	7/28/93 10:37:00 AM	10	31.2	7
COFLM458.9	7/28/93 10:37:00 AM	15	31.2	6.7
COFLM458.9	7/28/93 10:37:00 AM	20	30.8	5.5
COFLM458.9	7/28/93 10:37:00 AM	30	29.9	0.3
COFLM458.9	7/28/93 10:37:00 AM	40	29.1	0.3
COFLM458.9	7/28/93 10:37:00 AM	50	28.6	0.3
COFLM458.9	7/28/93 10:37:00 AM	60	28.3	0.3
COFLM458.9	7/28/93 10:37:00 AM	70	28.1	0.3
COFLM458.9	7/29/93 10:10:00 AM	0	31.5	7.6
COFLM458.9	7/29/93 10:10:00 AM	3	31.2	7.9

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	7/29/93 10:10:00 AM	5	31	7.7
COFLM458.9	7/29/93 10:10:00 AM	10	30.9	7.1
COFLM458.9	7/29/93 10:10:00 AM	15	30.9	6.9
COFLM458.9	7/29/93 10:10:00 AM	20	30.7	3.1
COFLM458.9	7/29/93 10:10:00 AM	30	30	0.1
COFLM458.9	7/29/93 10:10:00 AM	40	29.6	0.2
COFLM458.9	7/29/93 10:10:00 AM	50	28.9	0.2
COFLM458.9	7/29/93 10:10:00 AM	60	28.5	0.2
COFLM458.9	7/29/93 10:10:00 AM	70	27.6	0.2
COFLM458.9	8/2/93 2:30:00 PM	0	30.5	6.3
COFLM458.9	8/2/93 2:30:00 PM	3	30.5	6.4
COFLM458.9	8/2/93 2:30:00 PM	5	30.5	6.3
COFLM458.9	8/2/93 2:30:00 PM	10	30.4	6
COFLM458.9	8/2/93 2:30:00 PM	15	30.3	5.3
COFLM458.9	8/2/93 2:30:00 PM	20	30.2	4.4
COFLM458.9	8/2/93 2:30:00 PM	30	29.8	0.2
COFLM458.9	8/2/93 2:30:00 PM	40	29.6	0.1
COFLM458.9	8/2/93 2:30:00 PM	50	29	0.1
COFLM458.9	8/2/93 2:30:00 PM	60	28.7	0.1
COFLM458.9	8/5/93 10:50:00 AM	0	29.9	4.5
COFLM458.9	8/5/93 10:50:00 AM	3	29.7	3.7
COFLM458.9	8/5/93 10:50:00 AM	5	29.7	3.4
COFLM458.9	8/5/93 10:50:00 AM	10	29.6	3
COFLM458.9	8/5/93 10:50:00 AM	15	29.6	3.2
COFLM458.9	8/5/93 10:50:00 AM	20	29.6	3.3
COFLM458.9	8/5/93 10:50:00 AM	30	29.6	3.3
COFLM458.9	8/5/93 10:50:00 AM	40	29.5	2.7
COFLM458.9	8/5/93 10:50:00 AM	50	29	0.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	8/5/93 10:50:00 AM	60	28.9	0.4
COFLM458.9	8/23/93 12:00:00 PM	0	30.9	8.7
COFLM458.9	8/23/93 12:00:00 PM	3	30.9	8.6
COFLM458.9	8/23/93 12:00:00 PM	5	30.6	8.7
COFLM458.9	8/23/93 12:00:00 PM	10	30	8
COFLM458.9	8/23/93 12:00:00 PM	15	29.8	6.6
COFLM458.9	8/23/93 12:00:00 PM	20	29.3	1
COFLM458.9	8/23/93 12:00:00 PM	30	28.8	0.1
COFLM458.9	8/23/93 12:00:00 PM	40	28.5	0.1
COFLM458.9	8/23/93 12:00:00 PM	50	28.2	0.1
COFLM458.9	8/23/93 12:00:00 PM	60	28.2	0.1
COFLM458.9	9/1/93 10:10:00 AM	0	30.4	7.3
COFLM458.9	9/1/93 10:10:00 AM	3	30.4	7
COFLM458.9	9/1/93 10:10:00 AM	5	30.2	6.9
COFLM458.9	9/1/93 10:10:00 AM	10	30.2	6.5
COFLM458.9	9/1/93 10:10:00 AM	15	30.1	6.6
COFLM458.9	9/1/93 10:10:00 AM	20	29.7	2.8
COFLM458.9	9/1/93 10:10:00 AM	30	28.7	0.2
COFLM458.9	9/1/93 10:10:00 AM	40	28.4	0.2
COFLM458.9	9/1/93 10:10:00 AM	50	28.2	0.2
COFLM458.9	9/1/93 10:10:00 AM	60	27.1	0.2
COFLM458.9	9/7/93 10:50:00 AM	0	29.3	6
COFLM458.9	9/7/93 10:50:00 AM	3	29.2	5.7
COFLM458.9	9/7/93 10:50:00 AM	5	29.2	5.6
COFLM458.9	9/7/93 10:50:00 AM	10	29.1	4.3
COFLM458.9	9/7/93 10:50:00 AM	15	29	2.6
COFLM458.9	9/7/93 10:50:00 AM	20	29	2.8
COFLM458.9	9/7/93 10:50:00 AM	30	28.9	2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	9/7/93 10:50:00 AM	40	28.7	0.2
COFLM458.9	9/7/93 10:50:00 AM	50	28.3	0.1
COFLM458.9	9/7/93 10:50:00 AM	60	28.2	0.1
COFLM458.9	9/13/93 1:15:00 PM	0	28.3	4.6
COFLM458.9	9/13/93 1:15:00 PM	3	28.2	4.7
COFLM458.9	9/13/93 1:15:00 PM	5	28.2	4.6
COFLM458.9	9/13/93 1:15:00 PM	10	28	4.1
COFLM458.9	9/13/93 1:15:00 PM	15	27.9	3.6
COFLM458.9	9/13/93 1:15:00 PM	20	27.9	3.4
COFLM458.9	9/13/93 1:15:00 PM	30	27.9	3.4
COFLM458.9	9/13/93 1:15:00 PM	40	27.9	3.6
COFLM458.9	9/13/93 1:15:00 PM	50	27.9	3.6
COFLM458.9	9/13/93 1:15:00 PM	60	27.9	3.5
COFLM458.9	10/10/93 2:12:00 PM	0	20.6	4.2
COFLM458.9	10/10/93 2:12:00 PM	3	20.6	4
COFLM458.9	10/10/93 2:12:00 PM	5	21	4.1
COFLM458.9	10/10/93 2:12:00 PM	10	21	4.1
COFLM458.9	10/10/93 2:12:00 PM	15	20.8	4.2
COFLM458.9	10/10/93 2:12:00 PM	20	21.1	4.2
COFLM458.9	10/10/93 2:12:00 PM	30	21.1	4.2
COFLM458.9	10/10/93 2:12:00 PM	40	20.5	4.1
COFLM458.9	10/10/93 2:12:00 PM	50	19.8	4.3
COFLM458.9	10/10/93 2:12:00 PM	60	20	4.5
COFLM458.9	10/12/93 9:30:00 AM	0	22.5	5.1
COFLM458.9	10/12/93 9:30:00 AM	3	22.5	5.1
COFLM458.9	10/12/93 9:30:00 AM	5	22.4	5.1
COFLM458.9	10/12/93 9:30:00 AM	10	22.4	5
COFLM458.9	10/12/93 9:30:00 AM	15	22.4	5

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	10/12/93 9:30:00 AM	20	22.4	5
COFLM458.9	10/12/93 9:30:00 AM	30	22.2	4.8
COFLM458.9	10/12/93 9:30:00 AM	40	21.5	4.6
COFLM458.9	10/12/93 9:30:00 AM	50	21.6	4.5
COFLM458.9	6/1/94 11:00:00 AM	0	26.5	8.1
COFLM458.9	6/1/94 11:00:00 AM	3	25.3	8.5
COFLM458.9	6/1/94 11:00:00 AM	5	25	8.9
COFLM458.9	6/1/94 11:00:00 AM	10	24.7	8.2
COFLM458.9	6/1/94 11:00:00 AM	15	24.7	8.1
COFLM458.9	6/1/94 11:00:00 AM	20	24.6	8
COFLM458.9	6/1/94 11:00:00 AM	30	24.6	8
COFLM458.9	6/1/94 11:00:00 AM	40	23.3	4.2
COFLM458.9	6/1/94 11:00:00 AM	50	23.1	2.2
COFLM458.9	7/19/94 10:00:00 AM	0	28.8	10.6
COFLM458.9	7/19/94 10:00:00 AM	3	28.3	9.5
COFLM458.9	7/19/94 10:00:00 AM	5	27.8	6.4
COFLM458.9	7/19/94 10:00:00 AM	10	27.7	5.4
COFLM458.9	7/19/94 10:00:00 AM	15	27.6	5.1
COFLM458.9	7/19/94 10:00:00 AM	20	27.5	4.6
COFLM458.9	7/19/94 10:00:00 AM	30	27.5	4.3
COFLM458.9	7/19/94 10:00:00 AM	40	27.4	4.2
COFLM458.9	7/19/94 10:00:00 AM	50	27.4	3.8
COFLM458.9	7/19/94 10:00:00 AM	60	27.4	3.6
COFLM458.9	8/17/94 9:40:00 AM	0	29	7
COFLM458.9	8/17/94 9:40:00 AM	3	28.7	7.4
COFLM458.9	8/17/94 9:40:00 AM	5	28.6	7.1
COFLM458.9	8/17/94 9:40:00 AM	10	28.4	6.1
COFLM458.9	8/17/94 9:40:00 AM	15	28.4	6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	8/17/94 9:40:00 AM	20	28.4	5.7
COFLM458.9	8/17/94 9:40:00 AM	30	28.2	5.1
COFLM458.9	8/17/94 9:40:00 AM	40	27	0.3
COFLM458.9	8/17/94 9:40:00 AM	50	27.3	0.6
COFLM458.9	9/20/94 10:30:00 AM	0	26.6	5.2
COFLM458.9	9/20/94 10:30:00 AM	3	26.7	4.6
COFLM458.9	9/20/94 10:30:00 AM	5	26.7	4.5
COFLM458.9	9/20/94 10:30:00 AM	10	26.6	4.3
COFLM458.9	9/20/94 10:30:00 AM	15	26.6	4.3
COFLM458.9	9/20/94 10:30:00 AM	20	26.6	4.3
COFLM458.9	9/20/94 10:30:00 AM	30	26.6	4.4
COFLM458.9	9/20/94 10:30:00 AM	40	26.6	4.3
COFLM458.9	9/20/94 10:30:00 AM	50	26.5	4.5
COFLM458.9	9/29/94 11:15:00 AM	0	25.1	6.88
COFLM458.9	9/29/94 11:15:00 AM	3	24.5	5.45
COFLM458.9	9/29/94 11:15:00 AM	5	24.4	5.35
COFLM458.9	9/29/94 11:15:00 AM	8	24.3	5
COFLM458.9	9/29/94 11:15:00 AM	10	24.3	4.6
COFLM458.9	9/29/94 11:15:00 AM	15	24.3	4.4
COFLM458.9	9/29/94 11:15:00 AM	20	24.2	4.63
COFLM458.9	9/29/94 11:15:00 AM	30	24.1	4.7
COFLM458.9	9/29/94 11:15:00 AM	40	24	4.63
COFLM458.9	9/29/94 11:15:00 AM	50	23.9	4.52
COFLM458.9	9/29/94 11:15:00 AM	60	23.9	4.29
COFLM458.9	9/29/94 11:15:00 AM	70	23.9	3.55
COFLM458.9	10/17/94 10:45:00 AM	0	20.1	6.86
COFLM458.9	10/17/94 10:45:00 AM	3	19.9	6.4
COFLM458.9	10/17/94 10:45:00 AM	5	19.9	6.29

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	10/17/94 10:45:00 AM	10	19.9	5.99
COFLM458.9	10/17/94 10:45:00 AM	15	19.8	5.85
COFLM458.9	10/17/94 10:45:00 AM	20	19.8	5.72
COFLM458.9	10/17/94 10:45:00 AM	30	19.7	5.33
COFLM458.9	10/17/94 10:45:00 AM	40	19.6	5.43
COFLM458.9	10/17/94 10:45:00 AM	50	19.5	5.24
COFLM458.9	10/17/94 10:45:00 AM	60	19.5	5.2
COFLM458.9	10/27/94 10:10:00 AM	0	19.1	7.3
COFLM458.9	10/27/94 10:10:00 AM	3	19.1	7.3
COFLM458.9	10/27/94 10:10:00 AM	5	19.1	7.3
COFLM458.9	10/27/94 10:10:00 AM	10	19.1	7.3
COFLM458.9	10/27/94 10:10:00 AM	15	19	7.3
COFLM458.9	10/27/94 10:10:00 AM	20	19	7.3
COFLM458.9	10/27/94 10:10:00 AM	30	19	7.2
COFLM458.9	10/27/94 10:10:00 AM	40	19	7.2
COFLM458.9	10/27/94 10:10:00 AM	50	19	7.1
COFLM458.9	4/20/95 11:15:00 AM	0	20.5	8.37
COFLM458.9	4/20/95 11:15:00 AM	3	20.2	8.1
COFLM458.9	4/20/95 11:15:00 AM	5	19.9	7.58
COFLM458.9	4/20/95 11:15:00 AM	10	19.8	7.07
COFLM458.9	4/20/95 11:15:00 AM	15	19.3	6.34
COFLM458.9	4/20/95 11:15:00 AM	20	18.5	5.46
COFLM458.9	4/20/95 11:15:00 AM	30	18.2	5.26
COFLM458.9	4/20/95 11:15:00 AM	40	18	4.92
COFLM458.9	4/20/95 11:15:00 AM	50	17.8	4.32
COFLM458.9	5/24/95 12:23:00 PM	0	26.7	9.75
COFLM458.9	5/24/95 12:23:00 PM	3	25.7	9.15
COFLM458.9	5/24/95 12:23:00 PM	5	25.6	8.8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	5/24/95 12:23:00 PM	10	25.2	6.7
COFLM458.9	5/24/95 12:23:00 PM	15	25	6.25
COFLM458.9	5/24/95 12:23:00 PM	20	24.6	5.35
COFLM458.9	5/24/95 12:23:00 PM	30	24.3	4.78
COFLM458.9	5/24/95 12:23:00 PM	40	23.6	3.08
COFLM458.9	5/24/95 12:23:00 PM	50	23.4	2.56
COFLM458.9	5/24/95 12:23:00 PM	60	22.6	0.94
COFLM458.9	5/24/95 12:23:00 PM	70	22.6	0.31
COFLM458.9	6/20/95 11:10:00 AM	0	27.1	6.5
COFLM458.9	6/20/95 11:10:00 AM	3	26.8	6.6
COFLM458.9	6/20/95 11:10:00 AM	5	26.8	6.5
COFLM458.9	6/20/95 11:10:00 AM	10	26.5	6.5
COFLM458.9	6/20/95 11:10:00 AM	15	26.4	5.8
COFLM458.9	6/20/95 11:10:00 AM	20	26.4	5.5
COFLM458.9	6/20/95 11:10:00 AM	30	26.3	5.4
COFLM458.9	6/20/95 11:10:00 AM	40	26.2	3.1
COFLM458.9	6/20/95 11:10:00 AM	50	26.3	2.5
COFLM458.9	7/31/95 9:17:00 AM	0	30.4	7.4
COFLM458.9	7/31/95 9:17:00 AM	3	30.4	7.4
COFLM458.9	7/31/95 9:17:00 AM	5	30.3	7.1
COFLM458.9	7/31/95 9:17:00 AM	10	30.3	6.9
COFLM458.9	7/31/95 9:17:00 AM	15	30.2	6.8
COFLM458.9	7/31/95 9:17:00 AM	20	30.2	6.8
COFLM458.9	7/31/95 9:17:00 AM	30	30.2	6.6
COFLM458.9	7/31/95 9:17:00 AM	40	28.8	0.73
COFLM458.9	7/31/95 9:17:00 AM	50	28	1.2
COFLM458.9	7/31/95 9:17:00 AM	60	27.7	1.1
COFLM458.9	8/17/95 11:20:00 AM	0	32.2	10.95

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	8/17/95 11:20:00 AM	3	32.2	10.95
COFLM458.9	8/17/95 11:20:00 AM	5	32.2	10.84
COFLM458.9	8/17/95 11:20:00 AM	10	32	10.57
COFLM458.9	8/17/95 11:20:00 AM	15	29.8	4.54
COFLM458.9	8/17/95 11:20:00 AM	20	29.1	1.16
COFLM458.9	8/17/95 11:20:00 AM	30	28.9	0.55
COFLM458.9	8/17/95 11:20:00 AM	40	28.6	0.25
COFLM458.9	8/17/95 11:20:00 AM	50	28.5	0.25
COFLM458.9	8/17/95 11:20:00 AM	60	28.4	0.31
COFLM458.9	8/29/95 9:00:00 AM	0	29.8	7.3
COFLM458.9	8/29/95 9:00:00 AM	3	29.7	7.2
COFLM458.9	8/29/95 9:00:00 AM	5	29.7	7.2
COFLM458.9	8/29/95 9:00:00 AM	10	29.7	7.2
COFLM458.9	8/29/95 9:00:00 AM	15	29.7	7.2
COFLM458.9	8/29/95 9:00:00 AM	20	29.6	6.6
COFLM458.9	8/29/95 9:00:00 AM	30	29.2	3.9
COFLM458.9	8/29/95 9:00:00 AM	40	29.2	3.7
COFLM458.9	8/29/95 9:00:00 AM	50	28.9	1.8
COFLM458.9	9/21/95 9:35:00 AM	0	26.9	4.2
COFLM458.9	9/21/95 9:35:00 AM	3	26.9	4.2
COFLM458.9	9/21/95 9:35:00 AM	5	26.9	4.3
COFLM458.9	9/21/95 9:35:00 AM	10	26.9	4.2
COFLM458.9	9/21/95 9:35:00 AM	15	26.9	4.2
COFLM458.9	9/21/95 9:35:00 AM	20	26.8	4
COFLM458.9	9/21/95 9:35:00 AM	30	26.8	3.8
COFLM458.9	9/21/95 9:35:00 AM	40	26.8	3.5
COFLM458.9	9/21/95 9:35:00 AM	50	26.8	3.4
COFLM458.9	9/21/95 9:35:00 AM	60	26.8	3.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	9/21/95 10:15:00 AM	0	26.8	6.3
COFLM458.9	5/6/96 11:20:00 AM	0	22.9	8.1
COFLM458.9	5/6/96 11:20:00 AM	3	21.6	7.88
COFLM458.9	5/6/96 11:20:00 AM	5	21.5	7.78
COFLM458.9	5/6/96 11:20:00 AM	10	21.4	7.75
COFLM458.9	5/6/96 11:20:00 AM	15	20.9	0.2
COFLM458.9	5/6/96 11:20:00 AM	20	20.6	7.15
COFLM458.9	5/6/96 11:20:00 AM	30	20.3	6.94
COFLM458.9	5/6/96 11:20:00 AM	40	20.2	6.86
COFLM458.9	5/6/96 11:20:00 AM	50	20.1	6.79
COFLM458.9	5/6/96 11:20:00 AM	60	20	6.7
COFLM458.9	5/6/96 11:20:00 AM	70	20.1	4.69
COFLM458.9	5/6/96 11:20:00 AM	80	20.2	3.69
COFLM458.9	6/25/96 1:40:00 PM	0	29.9	9.2
COFLM458.9	6/25/96 1:40:00 PM	3	29.9	9.2
COFLM458.9	6/25/96 1:40:00 PM	5	29.9	9.2
COFLM458.9	6/25/96 1:40:00 PM	10	29.6	9.2
COFLM458.9	6/25/96 1:40:00 PM	15	29.2	8
COFLM458.9	6/25/96 1:40:00 PM	20	28	3.8
COFLM458.9	6/25/96 1:40:00 PM	30	27.1	2.3
COFLM458.9	6/25/96 1:40:00 PM	40	26.6	1.7
COFLM458.9	6/25/96 1:40:00 PM	50	26.3	1.4
COFLM458.9	6/25/96 1:40:00 PM	60	26.3	0.78
COFLM458.9	7/24/96 11:30:00 AM	0	30.5	10.1
COFLM458.9	7/24/96 11:30:00 AM	3	30.1	10.3
COFLM458.9	7/24/96 11:30:00 AM	5	30	9.9
COFLM458.9	7/24/96 11:30:00 AM	10	29.8	9.3
COFLM458.9	7/24/96 11:30:00 AM	15	29.7	8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	7/24/96 11:30:00 AM	20	29.4	5.6
COFLM458.9	7/24/96 11:30:00 AM	30	29	2.1
COFLM458.9	7/24/96 11:30:00 AM	40	28.6	0.4
COFLM458.9	8/20/96 12:31:00 PM	0	30.7	9.2
COFLM458.9	8/20/96 12:31:00 PM	3	30.7	9.1
COFLM458.9	8/20/96 12:31:00 PM	5	30.6	9.1
COFLM458.9	8/20/96 12:31:00 PM	10	29.8	8.7
COFLM458.9	8/20/96 12:31:00 PM	15	29	4.1
COFLM458.9	8/20/96 12:31:00 PM	20	28.7	1.2
COFLM458.9	8/20/96 12:31:00 PM	30	28.5	0.8
COFLM458.9	8/20/96 12:31:00 PM	40	28.4	0.2
COFLM458.9	8/20/96 12:31:00 PM	50	28.4	0.1
COFLM458.9	8/20/96 12:31:00 PM	55	28.4	0.1
COFLM458.9	9/11/96 2:30:00 PM	0	28.4	7.8
COFLM458.9	9/11/96 2:30:00 PM	3	28.3	7.8
COFLM458.9	9/11/96 2:30:00 PM	5	28.2	7.7
COFLM458.9	9/11/96 2:30:00 PM	10	28.1	7.5
COFLM458.9	9/11/96 2:30:00 PM	15	28	7.2
COFLM458.9	9/11/96 2:30:00 PM	20	27.8	6.8
COFLM458.9	9/11/96 2:30:00 PM	30	27.7	5.9
COFLM458.9	9/11/96 2:30:00 PM	40	27.4	2
COFLM458.9	9/11/96 2:30:00 PM	50	27.2	0.3
COFLM458.9	9/11/96 2:30:00 PM	60	27	0.2
COFLM458.9	10/21/96 10:15:00 AM	0	20.1	6.4
COFLM458.9	10/21/96 10:15:00 AM	3	19.9	6.7
COFLM458.9	10/21/96 10:15:00 AM	5	19.9	6.4
COFLM458.9	10/21/96 10:15:00 AM	10	19.9	6.5
COFLM458.9	10/21/96 10:15:00 AM	15	19.8	6.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	10/21/96 10:15:00 AM	20	19.8	6.3
COFLM458.9	10/21/96 10:15:00 AM	30	19.8	6.3
COFLM458.9	10/21/96 10:15:00 AM	40	19.9	6.3
COFLM458.9	10/21/96 10:15:00 AM	50	19.9	6.2
COFLM458.9	10/21/96 10:15:00 AM	60	19.9	6.2
COFLM458.9	6/10/97 10:50:00 AM	0	22.4	7.8
COFLM458.9	6/10/97 10:50:00 AM	3	22.3	7.3
COFLM458.9	6/10/97 10:50:00 AM	5	22.3	6.9
COFLM458.9	6/10/97 10:50:00 AM	10	22.3	6.7
COFLM458.9	6/10/97 10:50:00 AM	15	22.4	6.5
COFLM458.9	6/10/97 10:50:00 AM	20	22.3	5.7
COFLM458.9	6/10/97 10:50:00 AM	30	22.3	5.1
COFLM458.9	6/10/97 10:50:00 AM	40	22.2	4.5
COFLM458.9	6/10/97 10:50:00 AM	50	22.2	3.8
COFLM458.9	7/16/97 10:15:00 AM	0	29.8	7.5
COFLM458.9	7/16/97 10:15:00 AM	3	29.4	7.6
COFLM458.9	7/16/97 10:15:00 AM	5	29.4	7.7
COFLM458.9	7/16/97 10:15:00 AM	10	28.7	4.8
COFLM458.9	7/16/97 10:15:00 AM	15	28.1	2.5
COFLM458.9	7/16/97 10:15:00 AM	20	28	2.2
COFLM458.9	7/16/97 10:15:00 AM	30	27.6	1.5
COFLM458.9	7/16/97 10:15:00 AM	40	27.1	0.7
COFLM458.9	7/16/97 10:15:00 AM	50	26.7	0.4
COFLM458.9	7/16/97 10:15:00 AM	60	26.5	0.6
COFLM458.9	9/10/97 8:50:00 AM	0	27.4	2.6
COFLM458.9	9/10/97 8:50:00 AM	3	27.4	2.4
COFLM458.9	9/10/97 8:50:00 AM	5	27.4	2.4
COFLM458.9	9/10/97 8:50:00 AM	10	27.4	2.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	9/10/97 8:50:00 AM	15	27.4	2.1
COFLM458.9	9/10/97 8:50:00 AM	20	27.4	2.3
COFLM458.9	9/10/97 8:50:00 AM	30	27.3	2.3
COFLM458.9	9/10/97 8:50:00 AM	40	27.3	1.5
COFLM458.9	9/10/97 8:50:00 AM	50	27.1	0.1
COFLM458.9	9/10/97 8:50:00 AM	60	26.9	0.1
COFLM458.9	10/28/97 1:40:00 PM	1	18.2	8.2
COFLM458.9	10/28/97 1:40:00 PM	3	18.2	8
COFLM458.9	10/28/97 1:40:00 PM	5	18.1	8
COFLM458.9	10/28/97 1:40:00 PM	10	18.1	7.8
COFLM458.9	10/28/97 1:40:00 PM	15	18.1	7.8
COFLM458.9	10/28/97 1:40:00 PM	20	18.1	7.8
COFLM458.9	10/28/97 1:40:00 PM	30	18.1	7.8
COFLM458.9	10/28/97 1:40:00 PM	40	18	7.8
COFLM458.9	10/28/97 1:40:00 PM	50	18	7.7
COFLM458.9	10/28/97 1:40:00 PM	60	18	7.7
COFLM458.9	1/21/98 12:53:00 PM	0	9.5	10.4
COFLM458.9	1/21/98 12:53:00 PM	1	9.5	10.3
COFLM458.9	1/21/98 12:53:00 PM	3	9.4	10.3
COFLM458.9	1/21/98 12:53:00 PM	5	9.4	10.2
COFLM458.9	1/21/98 12:53:00 PM	10	9.4	10.4
COFLM458.9	1/21/98 12:53:00 PM	15	9.3	10.4
COFLM458.9	1/21/98 12:53:00 PM	20	9.3	10.2
COFLM458.9	1/21/98 12:53:00 PM	25	9.3	10.4
COFLM458.9	1/21/98 12:53:00 PM	30	9.3	10.5
COFLM458.9	1/21/98 12:53:00 PM	40	9.3	10.5
COFLM458.9	1/21/98 12:53:00 PM	50	9.3	10.7
COFLM458.9	1/21/98 12:53:00 PM	60	9.3	11.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	2/11/98 11:35:00 AM	0	7.3	12.2
COFLM458.9	2/11/98 11:35:00 AM	1	7.3	12.2
COFLM458.9	2/11/98 11:35:00 AM	3	7.3	12.2
COFLM458.9	2/11/98 11:35:00 AM	5	7.3	12.2
COFLM458.9	2/11/98 11:35:00 AM	10	7.3	12.2
COFLM458.9	2/11/98 11:35:00 AM	15	7.3	12.4
COFLM458.9	2/11/98 11:35:00 AM	20	7.3	12.4
COFLM458.9	2/11/98 11:35:00 AM	25	7.3	12.3
COFLM458.9	2/11/98 11:35:00 AM	35	7.2	12.3
COFLM458.9	2/11/98 11:35:00 AM	45	7.2	12.3
COFLM458.9	2/11/98 11:35:00 AM	55	7.2	12.2
COFLM458.9	2/11/98 11:35:00 AM	65	7.3	12.2
COFLM458.9	3/4/98 12:37:00 PM	0	12.6	10.2
COFLM458.9	3/4/98 12:37:00 PM	1	12.6	10.1
COFLM458.9	3/4/98 12:37:00 PM	3	12.3	10.1
COFLM458.9	3/4/98 12:37:00 PM	5	12.3	10
COFLM458.9	3/4/98 12:37:00 PM	10	12	9.9
COFLM458.9	3/4/98 12:37:00 PM	15	12.1	10
COFLM458.9	3/4/98 12:37:00 PM	20	12	10.1
COFLM458.9	3/4/98 12:37:00 PM	25	12	10.1
COFLM458.9	3/4/98 12:37:00 PM	35	12	10.1
COFLM458.9	3/4/98 12:37:00 PM	45	11.9	10.1
COFLM458.9	3/4/98 12:37:00 PM	55	11.9	10.2
COFLM458.9	3/4/98 12:37:00 PM	65	12	10.1
COFLM458.9	4/9/98 2:45:00 PM	0	18	9.1
COFLM458.9	4/9/98 2:45:00 PM	1	18	9.1
COFLM458.9	4/9/98 2:45:00 PM	3	18	9.1
COFLM458.9	4/9/98 2:45:00 PM	5	18	8.9

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	4/9/98 2:45:00 PM	10	18	8.8
COFLM458.9	4/9/98 2:45:00 PM	15	18	8.8
COFLM458.9	4/9/98 2:45:00 PM	20	18	8.8
COFLM458.9	4/9/98 2:45:00 PM	25	18	8.8
COFLM458.9	4/9/98 2:45:00 PM	30	17.9	8.6
COFLM458.9	4/9/98 2:45:00 PM	40	17.9	8.5
COFLM458.9	4/9/98 2:45:00 PM	50	17.9	8.5
COFLM458.9	4/9/98 2:45:00 PM	60	17.9	8.5
COFLM458.9	5/6/98 12:05:00 PM	0	19.7	8.9
COFLM458.9	5/6/98 12:05:00 PM	1	19.7	8.9
COFLM458.9	5/6/98 12:05:00 PM	3	19.7	8.8
COFLM458.9	5/6/98 12:05:00 PM	5	19.6	8.8
COFLM458.9	5/6/98 12:05:00 PM	10	19.4	8.6
COFLM458.9	5/6/98 12:05:00 PM	15	19.1	8
COFLM458.9	5/6/98 12:05:00 PM	20	18.9	7.4
COFLM458.9	5/6/98 12:05:00 PM	25	18.8	7.4
COFLM458.9	5/6/98 12:05:00 PM	35	18.6	7.1
COFLM458.9	5/6/98 12:05:00 PM	45	18.6	7.1
COFLM458.9	5/6/98 12:05:00 PM	55	18.6	7.1
COFLM458.9	5/6/98 12:05:00 PM	65	18.5	6.8
COFLM458.9	6/3/98 10:48:00 AM	0	28.4	7.2
COFLM458.9	6/3/98 10:48:00 AM	1	28.4	7.2
COFLM458.9	6/3/98 10:48:00 AM	3	28.4	7.1
COFLM458.9	6/3/98 10:48:00 AM	5	28.2	7
COFLM458.9	6/3/98 10:48:00 AM	10	27.9	5.6
COFLM458.9	6/3/98 10:48:00 AM	15	27.3	3.8
COFLM458.9	6/3/98 10:48:00 AM	20	26.7	2.4
COFLM458.9	6/3/98 10:48:00 AM	25	26.5	2.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	6/3/98 10:48:00 AM	35	25.6	1.3
COFLM458.9	6/3/98 10:48:00 AM	45	24	0.5
COFLM458.9	6/3/98 10:48:00 AM	55	24.1	0.3
COFLM458.9	6/3/98 10:48:00 AM	65	23.8	0.4
COFLM458.9	7/16/98 2:14:00 PM	0	30.5	7.1
COFLM458.9	7/16/98 2:14:00 PM	1	30.6	7
COFLM458.9	7/16/98 2:14:00 PM	3	30.5	6.8
COFLM458.9	7/16/98 2:14:00 PM	5	29.8	6
COFLM458.9	7/16/98 2:14:00 PM	10	29.7	5.3
COFLM458.9	7/16/98 2:14:00 PM	15	29.6	4.9
COFLM458.9	7/16/98 2:14:00 PM	20	29.6	4.5
COFLM458.9	7/16/98 2:14:00 PM	25	29.5	4.6
COFLM458.9	7/16/98 2:14:00 PM	35	29.4	4
COFLM458.9	7/16/98 2:14:00 PM	45	28.7	0.1
COFLM458.9	7/16/98 2:14:00 PM	55	28.3	0.2
COFLM458.9	7/16/98 2:14:00 PM	65	28	0.4
COFLM458.9	8/10/98 1:15:00 PM	0	32.2	7.2
COFLM458.9	8/10/98 1:15:00 PM	1	31.1	7.2
COFLM458.9	8/10/98 1:15:00 PM	3	31	7.5
COFLM458.9	8/10/98 1:15:00 PM	5	30.9	7.2
COFLM458.9	8/10/98 1:15:00 PM	10	30.1	5
COFLM458.9	8/10/98 1:15:00 PM	15	29.8	4.2
COFLM458.9	8/10/98 1:15:00 PM	20	29.7	3.4
COFLM458.9	8/10/98 1:15:00 PM	25	29.7	2.1
COFLM458.9	8/10/98 1:15:00 PM	35	29.5	0.6
COFLM458.9	8/10/98 1:15:00 PM	45	29.1	0.4
COFLM458.9	8/10/98 1:15:00 PM	55	28.8	0.3
COFLM458.9	8/10/98 1:15:00 PM	65	28.6	0.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	9/14/98 1:28:00 PM	0	28	5.8
COFLM458.9	9/14/98 1:28:00 PM	1	28	5.8
COFLM458.9	9/14/98 1:28:00 PM	3	28	5.7
COFLM458.9	9/14/98 1:28:00 PM	5	27.9	5.6
COFLM458.9	9/14/98 1:28:00 PM	10	27.6	4.5
COFLM458.9	9/14/98 1:28:00 PM	15	27.5	3.8
COFLM458.9	9/14/98 1:28:00 PM	20	27.4	3.7
COFLM458.9	9/14/98 1:28:00 PM	25	27.4	3.6
COFLM458.9	9/14/98 1:28:00 PM	30	27.4	3.5
COFLM458.9	9/14/98 1:28:00 PM	40	27.4	3.4
COFLM458.9	9/14/98 1:28:00 PM	50	27.4	3.4
COFLM458.9	9/14/98 1:28:00 PM	60	27.4	2.8
COFLM458.9	10/21/98 12:34:00 PM	0	23.4	5.4
COFLM458.9	10/21/98 12:34:00 PM	1	23.4	5.3
COFLM458.9	10/21/98 12:34:00 PM	3	23.4	5.2
COFLM458.9	10/21/98 12:34:00 PM	5	23.4	5.3
COFLM458.9	10/21/98 12:34:00 PM	10	23.4	5.1
COFLM458.9	10/21/98 12:34:00 PM	15	23.4	5.1
COFLM458.9	10/21/98 12:34:00 PM	20	23.4	5.1
COFLM458.9	10/21/98 12:34:00 PM	25	23.4	5.2
COFLM458.9	10/21/98 12:34:00 PM	35	23.4	5.1
COFLM458.9	10/21/98 12:34:00 PM	45	23.3	5.2
COFLM458.9	10/21/98 12:34:00 PM	55	23.3	5.1
COFLM458.9	10/21/98 12:34:00 PM	65	23.3	5.1
COFLM458.9	11/4/98 10:42:00 AM	0	20.6	7.4
COFLM458.9	11/4/98 10:42:00 AM	1	20.6	7.3
COFLM458.9	11/4/98 10:42:00 AM	3	20.5	7.3
COFLM458.9	11/4/98 10:42:00 AM	5	20.5	7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	11/4/98 10:42:00 AM	10	20.4	6.7
COFLM458.9	11/4/98 10:42:00 AM	15	20.4	6.5
COFLM458.9	11/4/98 10:42:00 AM	20	20.4	6.4
COFLM458.9	11/4/98 10:42:00 AM	25	20.4	5.8
COFLM458.9	11/4/98 10:42:00 AM	30	20.3	4
COFLM458.9	11/4/98 10:42:00 AM	40	20.1	3.1
COFLM458.9	11/4/98 10:42:00 AM	50	19.9	2.8
COFLM458.9	11/4/98 10:42:00 AM	60	19.8	2.8
COFLM458.9	12/3/98 2:05:00 PM	0	16.7	8.3
COFLM458.9	12/3/98 2:05:00 PM	1	16.7	8.2
COFLM458.9	12/3/98 2:05:00 PM	3	16.5	7.4
COFLM458.9	12/3/98 2:05:00 PM	5	16.1	7
COFLM458.9	12/3/98 2:05:00 PM	10	16	6.7
COFLM458.9	12/3/98 2:05:00 PM	15	16	6.7
COFLM458.9	12/3/98 2:05:00 PM	20	15.9	6.6
COFLM458.9	12/3/98 2:05:00 PM	25	15.9	6.3
COFLM458.9	12/3/98 2:05:00 PM	30	15.9	6.2
COFLM458.9	12/3/98 2:05:00 PM	40	15.9	6
COFLM458.9	12/3/98 2:05:00 PM	50	15.9	5.9
COFLM458.9	12/3/98 2:05:00 PM	60	15.9	6
COFLM458.9	1/19/99 3:04:00 PM	0	9.3	11.5
COFLM458.9	1/19/99 3:04:00 PM	1	9.2	11.4
COFLM458.9	1/19/99 3:04:00 PM	3	8.4	11.5
COFLM458.9	1/19/99 3:04:00 PM	5	7.9	11.3
COFLM458.9	1/19/99 3:04:00 PM	10	7.8	11.1
COFLM458.9	1/19/99 3:04:00 PM	15	7.8	11.1
COFLM458.9	1/19/99 3:04:00 PM	20	7.8	11
COFLM458.9	1/19/99 3:04:00 PM	25	7.8	11

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	1/19/99 3:04:00 PM	30	7.8	11
COFLM458.9	1/19/99 3:04:00 PM	40	7.8	11.1
COFLM458.9	1/19/99 3:04:00 PM	50	7.8	11.2
COFLM458.9	1/19/99 3:04:00 PM	60	7.8	11.5
COFLM458.9	6/8/99 1:05:00 PM	0	29.5	10.6
COFLM458.9	6/8/99 1:05:00 PM	1	29.5	10.5
COFLM458.9	6/8/99 1:05:00 PM	3	29.4	10.4
COFLM458.9	6/8/99 1:05:00 PM	5	29.3	10.3
COFLM458.9	6/8/99 1:05:00 PM	10	28.8	10
COFLM458.9	6/8/99 1:05:00 PM	15	25.9	4.9
COFLM458.9	6/8/99 1:05:00 PM	20	25.4	2.5
COFLM458.9	6/8/99 1:05:00 PM	25	25.3	2
COFLM458.9	6/8/99 1:05:00 PM	35	24.6	0.4
COFLM458.9	6/8/99 1:05:00 PM	45	24.2	0.4
COFLM458.9	6/8/99 1:05:00 PM	55	23.6	0.1
COFLM458.9	6/8/99 1:05:00 PM	65	23.4	
COFLM458.9	7/7/99 10:13:00 AM	0	30.7	9.9
COFLM458.9	7/7/99 10:13:00 AM	1	30.1	9.9
COFLM458.9	7/7/99 10:13:00 AM	3	29	8.3
COFLM458.9	7/7/99 10:13:00 AM	5	28.9	8
COFLM458.9	7/7/99 10:13:00 AM	10	27.3	4.6
COFLM458.9	7/7/99 10:13:00 AM	15	27.1	3.5
COFLM458.9	7/7/99 10:13:00 AM	20	26.9	3.1
COFLM458.9	7/7/99 10:13:00 AM	25	26.8	3
COFLM458.9	7/7/99 10:13:00 AM	35	26.6	2.9
COFLM458.9	7/7/99 10:13:00 AM	45	26.4	2.3
COFLM458.9	7/7/99 10:13:00 AM	55	26.5	2.2
COFLM458.9	7/7/99 10:13:00 AM	65	26.4	3.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	8/3/99 11:28:00 PM	0	32.1	8.4
COFLM458.9	8/3/99 11:28:00 PM	1	32.1	8
COFLM458.9	8/3/99 11:28:00 PM	3	32	8
COFLM458.9	8/3/99 11:28:00 PM	5	32	7.7
COFLM458.9	8/3/99 11:28:00 PM	10	31.8	7.3
COFLM458.9	8/3/99 11:28:00 PM	15	31.8	7.2
COFLM458.9	8/3/99 11:28:00 PM	20	31.7	7.2
COFLM458.9	8/3/99 11:28:00 PM	25	31.5	5.8
COFLM458.9	8/3/99 11:28:00 PM	35	29.7	0.7
COFLM458.9	8/3/99 11:28:00 PM	45	28.8	0.2
COFLM458.9	8/3/99 11:28:00 PM	55	28	0.2
COFLM458.9	9/7/99 9:35:00 AM	0	28.9	2.8
COFLM458.9	9/7/99 9:35:00 AM	1	28.8	2.7
COFLM458.9	9/7/99 9:35:00 AM	3	28.8	2.6
COFLM458.9	9/7/99 9:35:00 AM	5	28.7	2.3
COFLM458.9	9/7/99 9:35:00 AM	10	28.7	2
COFLM458.9	9/7/99 9:35:00 AM	15	28.6	2
COFLM458.9	9/7/99 9:35:00 AM	20	28.6	1.9
COFLM458.9	9/7/99 9:35:00 AM	25	28.6	1.9
COFLM458.9	9/7/99 9:35:00 AM	30	28.6	1.8
COFLM458.9	9/7/99 9:35:00 AM	40	28.6	0.8
COFLM458.9	9/7/99 9:35:00 AM	50	28.5	0.3
COFLM458.9	9/7/99 9:35:00 AM	60	28.5	0.4
COFLM458.9	10/6/99 10:15:00 AM	0	23.2	5
COFLM458.9	10/6/99 10:15:00 AM	1	23.2	4.8
COFLM458.9	10/6/99 10:15:00 AM	3	23.2	4.7
COFLM458.9	10/6/99 10:15:00 AM	5	23.2	4.6
COFLM458.9	10/6/99 10:15:00 AM	10	23.2	4.5

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFLM458.9	10/6/99 10:15:00 AM	15	23.1	4.5
COFLM458.9	10/6/99 10:15:00 AM	20	23.1	4.5
COFLM458.9	10/6/99 10:15:00 AM	25	23.1	4.5
COFLM458.9	10/6/99 10:15:00 AM	30	23.1	4.5
COFLM458.9	10/6/99 10:15:00 AM	40	23.1	4.5
COFLM458.9	10/6/99 10:15:00 AM	50	23.1	4.5
COFLM458.9	10/6/99 10:15:00 AM	60	23.1	4.6
CORLM459.9	7/15/93 10:53:00 AM	0	31.9	7
CORLM459.9	7/15/93 10:53:00 AM	3	31.9	6.8
CORLM459.9	7/15/93 10:53:00 AM	5	31.8	6.5
CORLM459.9	7/15/93 10:53:00 AM	10	31.8	6.1
CORLM459.9	7/15/93 10:53:00 AM	15	32	5.8
CORLM459.9	7/15/93 10:53:00 AM	20	32	5.1
CORLM459.9	7/15/93 10:53:00 AM	30	31.5	0.3
CORLM459.9	7/15/93 10:53:00 AM	40	30.6	0.3
CORLM459.9	7/15/93 10:53:00 AM	50	30.3	0.04
CORLM459.9	7/20/93 8:50:00 AM	0	30.8	7
CORLM459.9	7/20/93 8:50:00 AM	3	30.7	7.1
CORLM459.9	7/20/93 8:50:00 AM	5	30.6	6.7
CORLM459.9	7/20/93 8:50:00 AM	10	30.5	6.2
CORLM459.9	7/20/93 8:50:00 AM	15	30.2	5.1
CORLM459.9	7/20/93 8:50:00 AM	20	30	1.6
CORLM459.9	7/20/93 8:50:00 AM	30	29.7	1
CORLM459.9	7/20/93 8:50:00 AM	40	28.7	0.3
CORLM459.9	7/20/93 8:50:00 AM	50	27.8	0.3
CORLM459.9	7/20/93 8:50:00 AM	60	27.4	0.3
CORLM459.9	7/20/93 8:50:00 AM	70	26.1	0.3
CORLM459.9	7/29/93 10:26:00 AM	0	31.9	7.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM459.9	7/29/93 10:26:00 AM	3	31.5	7.8
CORLM459.9	7/29/93 10:26:00 AM	5	31.3	7.7
CORLM459.9	7/29/93 10:26:00 AM	10	31.1	7.3
CORLM459.9	7/29/93 10:26:00 AM	15	31	6.9
CORLM459.9	7/29/93 10:26:00 AM	20	30.9	6
CORLM459.9	7/29/93 10:26:00 AM	30	30.1	0.1
CORLM459.9	7/29/93 10:26:00 AM	40	29.2	0.1
CORLM459.9	7/29/93 10:26:00 AM	50	28.8	0.1
CORLM459.9	7/29/93 10:26:00 AM	60	28.4	0.1
CORLM459.9	8/2/93 2:21:00 PM	0	30.4	5.8
CORLM459.9	8/2/93 2:21:00 PM	3	30.4	5.8
CORLM459.9	8/2/93 2:21:00 PM	5	30.4	5.8
CORLM459.9	8/2/93 2:21:00 PM	10	30.4	5.7
CORLM459.9	8/2/93 2:21:00 PM	15	30.4	5.6
CORLM459.9	8/2/93 2:21:00 PM	20	30.4	5.7
CORLM459.9	8/2/93 2:21:00 PM	30	30.3	5.3
CORLM459.9	8/2/93 2:21:00 PM	40	29.6	0.3
CORLM459.9	8/23/93 12:15:00 PM	0	31.3	9.2
CORLM459.9	8/23/93 12:15:00 PM	3	31.2	9.4
CORLM459.9	8/23/93 12:15:00 PM	5	30.9	9.3
CORLM459.9	8/23/93 12:15:00 PM	10	30	7.6
CORLM459.9	8/23/93 12:15:00 PM	15	29.4	1
CORLM459.9	8/23/93 12:15:00 PM	20	29.1	0.1
CORLM459.9	8/23/93 12:15:00 PM	30	28.7	0.1
CORLM459.9	8/23/93 12:15:00 PM	40	28.5	0.1
CORLM459.9	8/23/93 12:15:00 PM	50	28.3	0.07
CORLM459.9	8/23/93 12:15:00 PM	60	28	0.1
CORLM459.9	9/1/93 9:25:00 AM	0	30.5	8.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM459.9	9/1/93 9:25:00 AM	3	30.5	8.5
CORLM459.9	9/1/93 9:25:00 AM	5	30.4	8.4
CORLM459.9	9/1/93 9:25:00 AM	10	30.3	7.9
CORLM459.9	9/1/93 9:25:00 AM	15	29.9	2.7
CORLM459.9	9/1/93 9:25:00 AM	20	29.6	0.2
CORLM459.9	9/1/93 9:25:00 AM	30	28.7	0.2
CORLM459.9	9/1/93 9:25:00 AM	40	28.2	0.2
CORLM459.9	9/1/93 9:25:00 AM	50	27.5	0.2
CORLM459.9	9/1/93 9:25:00 AM	60	27.5	0.2
CORLM459.9	9/7/93 11:10:00 AM	0	29.4	6
CORLM459.9	9/7/93 11:10:00 AM	3	29.3	6
CORLM459.9	9/7/93 11:10:00 AM	5	29.1	5.5
CORLM459.9	9/7/93 11:10:00 AM	10	29.1	4.6
CORLM459.9	9/7/93 11:10:00 AM	15	29.1	4.3
CORLM459.9	9/7/93 11:10:00 AM	20	29	4.1
CORLM459.9	9/7/93 11:10:00 AM	30	29	3.3
CORLM459.9	9/7/93 11:10:00 AM	40	28.6	0.06
CORLM459.9	9/7/93 11:10:00 AM	50	28.4	0.07
CORLM459.9	9/13/93 1:25:00 PM	0	28.3	5.7
CORLM459.9	9/13/93 1:25:00 PM	3	28.3	5.6
CORLM459.9	9/13/93 1:25:00 PM	5	28.2	5.3
CORLM459.9	9/13/93 1:25:00 PM	10	27.9	4
CORLM459.9	9/13/93 1:25:00 PM	15	27.9	3.5
CORLM459.9	9/13/93 1:25:00 PM	20	27.9	3.3
CORLM459.9	9/13/93 1:25:00 PM	30	27.9	3.6
CORLM459.9	9/13/93 1:25:00 PM	40	27.8	4.1
CORLM459.9	9/13/93 1:25:00 PM	50	27.8	3.5
CORLM459.9	9/13/93 1:25:00 PM	60	27.8	0.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM460.9	7/6/93 11:07:00 AM	0	31.1	6.52
CORLM460.9	7/6/93 11:07:00 AM	3	30.6	6.63
CORLM460.9	7/6/93 11:07:00 AM	5	30.3	6.4
CORLM460.9	7/6/93 11:07:00 AM	10	30	6.27
CORLM460.9	7/6/93 11:07:00 AM	15	29.3	4.27
CORLM460.9	7/6/93 11:07:00 AM	20	28.6	2.25
CORLM460.9	7/6/93 11:07:00 AM	30	27.8	1.3
CORLM460.9	7/6/93 11:07:00 AM	40	27.2	0.4
CORLM460.9	7/6/93 11:07:00 AM	50	26.4	0.22
CORLM460.9	7/6/93 11:07:00 AM	60	25.3	0.24
CORLM460.9	7/15/93 11:01:00 AM	0	31.5	7.1
CORLM460.9	7/15/93 11:01:00 AM	3	31.3	6.6
CORLM460.9	7/15/93 11:01:00 AM	5	31.4	6.3
CORLM460.9	7/15/93 11:01:00 AM	10	31.6	6.3
CORLM460.9	7/15/93 11:01:00 AM	15	31.8	6.1
CORLM460.9	7/15/93 11:01:00 AM	20	31.6	5.7
CORLM460.9	7/15/93 11:01:00 AM	30	30.8	0.8
CORLM460.9	7/15/93 11:01:00 AM	40	30.6	1.2
CORLM460.9	7/20/93 9:01:00 AM	0	31.1	7.5
CORLM460.9	7/20/93 9:01:00 AM	3	31	7.5
CORLM460.9	7/20/93 9:01:00 AM	5	30.8	6.9
CORLM460.9	7/20/93 9:01:00 AM	10	30.5	5.2
CORLM460.9	7/20/93 9:01:00 AM	15	30.4	4.1
CORLM460.9	7/20/93 9:01:00 AM	20	30.3	3.6
CORLM460.9	7/20/93 9:01:00 AM	30	29.6	0.5
CORLM460.9	7/20/93 9:01:00 AM	40	28.6	0.2
CORLM460.9	7/20/93 9:01:00 AM	50	27.7	0.2
CORLM460.9	7/20/93 9:01:00 AM	60	27.6	0.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM460.9	7/29/93 10:37:00 AM	0	32	8.5
CORLM460.9	7/29/93 10:37:00 AM	3	31.6	8.3
CORLM460.9	7/29/93 10:37:00 AM	5	31.5	8.3
CORLM460.9	7/29/93 10:37:00 AM	10	31.3	7.3
CORLM460.9	7/29/93 10:37:00 AM	15	31.1	6.9
CORLM460.9	7/29/93 10:37:00 AM	20	30.7	0.8
CORLM460.9	7/29/93 10:37:00 AM	30	29.8	0.1
CORLM460.9	7/29/93 10:37:00 AM	40	29.2	0.1
CORLM460.9	7/29/93 10:37:00 AM	50	28.5	0.1
CORLM460.9	7/29/93 10:37:00 AM	60	27.4	0.1
CORLM460.9	7/29/93 10:37:00 AM	70	27	0.1
CORLM460.9	8/2/93 2:14:00 PM	0	30.5	5.8
CORLM460.9	8/2/93 2:14:00 PM	3	30.5	5.7
CORLM460.9	8/2/93 2:14:00 PM	5	30.5	5.4
CORLM460.9	8/2/93 2:14:00 PM	10	30.4	5.4
CORLM460.9	8/2/93 2:14:00 PM	15	30.4	5.3
CORLM460.9	8/2/93 2:14:00 PM	20	30.4	4.9
CORLM460.9	8/2/93 2:14:00 PM	30	30.3	5
CORLM460.9	8/2/93 2:14:00 PM	40	29.8	0.2
CORLM460.9	8/23/93 12:20:00 PM	0	31.2	9.3
CORLM460.9	8/23/93 12:20:00 PM	3	31	9.3
CORLM460.9	8/23/93 12:20:00 PM	5	30.3	8.9
CORLM460.9	8/23/93 12:20:00 PM	10	30.1	8.5
CORLM460.9	8/23/93 12:20:00 PM	15	29.4	1.5
CORLM460.9	8/23/93 12:20:00 PM	20	29.1	0.03
CORLM460.9	8/23/93 12:20:00 PM	30	28.7	0.05
CORLM460.9	8/23/93 12:20:00 PM	40	28.3	0.05
CORLM460.9	8/23/93 12:20:00 PM	50	28.1	0.05

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM460.9	8/23/93 12:20:00 PM	60	27.8	0.06
CORLM460.9	9/1/93 9:35:00 AM	0	30.3	7.3
CORLM460.9	9/1/93 9:35:00 AM	3	30.2	7.1
CORLM460.9	9/1/93 9:35:00 AM	5	30.2	6.8
CORLM460.9	9/1/93 9:35:00 AM	10	30.1	6.9
CORLM460.9	9/1/93 9:35:00 AM	15	30	5.3
CORLM460.9	9/1/93 9:35:00 AM	20	29.7	3.5
CORLM460.9	9/1/93 9:35:00 AM	30	28.7	0.2
CORLM460.9	9/1/93 9:35:00 AM	40	28.2	0.2
CORLM460.9	9/1/93 9:35:00 AM	50	27.9	0.2
CORLM460.9	9/1/93 9:35:00 AM	60	27.5	0.2
CORLM460.9	9/7/93 11:20:00 AM	0	29.4	6.3
CORLM460.9	9/7/93 11:20:00 AM	3	29.2	6.4
CORLM460.9	9/7/93 11:20:00 AM	5	29.1	5.8
CORLM460.9	9/7/93 11:20:00 AM	10	29.1	4.9
CORLM460.9	9/7/93 11:20:00 AM	15	29	3.3
CORLM460.9	9/7/93 11:20:00 AM	20	29	3
CORLM460.9	9/7/93 11:20:00 AM	30	28.9	2.1
CORLM460.9	9/7/93 11:20:00 AM	40	28.7	0.05
CORLM460.9	9/7/93 11:20:00 AM	50	29.3	0.06
CORLM460.9	9/13/93 1:33:00 PM	0	28.7	6.4
CORLM460.9	9/13/93 1:33:00 PM	3	28.6	6.3
CORLM460.9	9/13/93 1:33:00 PM	5	28.4	5.9
CORLM460.9	9/13/93 1:33:00 PM	10	28	4.9
CORLM460.9	9/13/93 1:33:00 PM	15	28	4.7
CORLM460.9	9/13/93 1:33:00 PM	20	27.9	4.8
CORLM460.9	9/13/93 1:33:00 PM	30	27.9	4.3
CORLM460.9	9/13/93 1:33:00 PM	40	27.8	4.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM460.9	9/13/93 1:33:00 PM	50	27.8	4.4
CORLM461.9	7/15/93 11:09:00 AM	0	31.8	7.7
CORLM461.9	7/15/93 11:09:00 AM	3	31.7	7.5
CORLM461.9	7/15/93 11:09:00 AM	5	31.7	7.2
CORLM461.9	7/15/93 11:09:00 AM	10	31.7	6.5
CORLM461.9	7/15/93 11:09:00 AM	15	31.8	6.2
CORLM461.9	7/15/93 11:09:00 AM	20	31.8	5.9
CORLM461.9	7/15/93 11:09:00 AM	30	31.4	2.6
CORLM461.9	7/15/93 11:09:00 AM	40	30.1	0.5
CORLM461.9	7/15/93 11:09:00 AM	50	29.5	0.7
CORLM461.9	7/20/93 9:11:00 AM	0	31.2	7.7
CORLM461.9	7/20/93 9:11:00 AM	3	31.1	7.8
CORLM461.9	7/20/93 9:11:00 AM	5	31	7.8
CORLM461.9	7/20/93 9:11:00 AM	10	30.9	7.7
CORLM461.9	7/20/93 9:11:00 AM	15	30.6	7.2
CORLM461.9	7/20/93 9:11:00 AM	20	29.9	2.8
CORLM461.9	7/20/93 9:11:00 AM	30	29.1	0.2
CORLM461.9	7/20/93 9:11:00 AM	40	28.6	0.2
CORLM461.9	7/20/93 9:11:00 AM	50	27.8	0.2
CORLM461.9	7/20/93 9:11:00 AM	60	26.5	0.2
CORLM461.9	7/20/93 9:11:00 AM	70	26.1	0.2
CORLM461.9	7/29/93 10:43:00 AM	0	31.9	8.2
CORLM461.9	7/29/93 10:43:00 AM	3	31.7	8.4
CORLM461.9	7/29/93 10:43:00 AM	5	31.6	8.5
CORLM461.9	7/29/93 10:43:00 AM	10	31.5	8.2
CORLM461.9	7/29/93 10:43:00 AM	15	31.2	6.5
CORLM461.9	7/29/93 10:43:00 AM	20	30.6	0.9
CORLM461.9	7/29/93 10:43:00 AM	30	30.2	0.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM461.9	7/29/93 10:43:00 AM	40	29.3	0.1
CORLM461.9	7/29/93 10:43:00 AM	50	28.6	0.1
CORLM461.9	7/29/93 10:43:00 AM	60	27.6	0.1
CORLM461.9	8/2/93 2:05:00 PM	0	30.6	6.2
CORLM461.9	8/2/93 2:05:00 PM	3	30.6	6.4
CORLM461.9	8/2/93 2:05:00 PM	5	30.6	6.4
CORLM461.9	8/2/93 2:05:00 PM	10	30.6	6.4
CORLM461.9	8/2/93 2:05:00 PM	15	30.4	4.6
CORLM461.9	8/2/93 2:05:00 PM	20	30.3	4.4
CORLM461.9	8/2/93 2:05:00 PM	30	30.3	3.8
CORLM461.9	8/2/93 2:05:00 PM	40	30	0.6
CORLM461.9	8/2/93 2:05:00 PM	50	29.8	0.7
CORLM461.9	8/2/93 2:05:00 PM	60	29.3	0.2
CORLM461.9	8/23/93 12:31:00 PM	0	31.4	8.9
CORLM461.9	8/23/93 12:31:00 PM	3	30.9	9.5
CORLM461.9	8/23/93 12:31:00 PM	5	30.4	10
CORLM461.9	8/23/93 12:31:00 PM	10	29.9	5.4
CORLM461.9	8/23/93 12:31:00 PM	15	29.5	2.4
CORLM461.9	8/23/93 12:31:00 PM	20	29	0.04
CORLM461.9	8/23/93 12:31:00 PM	30	28.8	0.07
CORLM461.9	8/23/93 12:31:00 PM	40	28.5	0.1
CORLM461.9	9/1/93 9:45:00 AM	0	30.4	7
CORLM461.9	9/1/93 9:45:00 AM	3	30.4	6.9
CORLM461.9	9/1/93 9:45:00 AM	5	30.3	6.9
CORLM461.9	9/1/93 9:45:00 AM	10	30.2	6.1
CORLM461.9	9/1/93 9:45:00 AM	15	30.1	6.2
CORLM461.9	9/1/93 9:45:00 AM	20	29.9	2.1
CORLM461.9	9/1/93 9:45:00 AM	30	28.9	0.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM461.9	9/1/93 9:45:00 AM	40	28.2	0.1
CORLM461.9	9/1/93 9:45:00 AM	50	28.1	0.1
CORLM461.9	9/1/93 9:45:00 AM	60	27.5	0.2
CORLM461.9	9/7/93 11:27:00 AM	0	29.5	6.1
CORLM461.9	9/7/93 11:27:00 AM	3	29.3	5.6
CORLM461.9	9/7/93 11:27:00 AM	5	29.1	5
CORLM461.9	9/7/93 11:27:00 AM	10	29	4.3
CORLM461.9	9/7/93 11:27:00 AM	15	28.9	3.8
CORLM461.9	9/7/93 11:27:00 AM	20	28.9	4.3
CORLM461.9	9/7/93 11:27:00 AM	30	28.9	2.9
CORLM461.9	9/7/93 11:27:00 AM	40	28.6	1.6
CORLM461.9	9/7/93 11:27:00 AM	50	28.5	0.05
CORLM461.9	9/7/93 11:27:00 AM	60	27.8	0.05
CORLM461.9	9/13/93 1:40:00 PM	0	28.5	6.4
CORLM461.9	9/13/93 1:40:00 PM	3	28.4	6.2
CORLM461.9	9/13/93 1:40:00 PM	5	28.4	6
CORLM461.9	9/13/93 1:40:00 PM	10	28.2	5.3
CORLM461.9	9/13/93 1:40:00 PM	15	28.1	5.2
CORLM461.9	9/13/93 1:40:00 PM	20	28	5
CORLM461.9	9/13/93 1:40:00 PM	30	27.9	4.8
CORLM461.9	9/13/93 1:40:00 PM	40	27.8	5
CORLM461.9	9/13/93 1:40:00 PM	50	27.8	3.3
CORLM462.9	7/6/93 11:19:00 AM	0	31.3	6.45
CORLM462.9	7/6/93 11:19:00 AM	3	30.7	6.5
CORLM462.9	7/6/93 11:19:00 AM	5	30.5	6.45
CORLM462.9	7/6/93 11:19:00 AM	10	30.3	6.28
CORLM462.9	7/6/93 11:19:00 AM	15	29.6	4.05
CORLM462.9	7/6/93 11:19:00 AM	20	28.8	2.43

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM462.9	7/6/93 11:19:00 AM	30	27.9	1.2
CORLM462.9	7/6/93 11:19:00 AM	40	27.1	0.95
CORLM462.9	7/15/93 11:16:00 AM	0	32.1	7.6
CORLM462.9	7/15/93 11:16:00 AM	3	32.1	7.4
CORLM462.9	7/15/93 11:16:00 AM	5	32	7
CORLM462.9	7/15/93 11:16:00 AM	10	31.9	6.3
CORLM462.9	7/15/93 11:16:00 AM	15	32	6
CORLM462.9	7/15/93 11:16:00 AM	20	31.9	5.3
CORLM462.9	7/15/93 11:16:00 AM	30	31.4	1.7
CORLM462.9	7/15/93 11:16:00 AM	40	30.4	0.7
CORLM462.9	7/20/93 9:20:00 AM	0	31.1	7.7
CORLM462.9	7/20/93 9:20:00 AM	3	31.1	7.6
CORLM462.9	7/20/93 9:20:00 AM	5	30.9	7.1
CORLM462.9	7/20/93 9:20:00 AM	10	30.7	5.8
CORLM462.9	7/20/93 9:20:00 AM	15	30.5	5.5
CORLM462.9	7/20/93 9:20:00 AM	20	30.2	3.5
CORLM462.9	7/20/93 9:20:00 AM	30	29.5	0.6
CORLM462.9	7/20/93 9:20:00 AM	40	28.6	0.2
CORLM462.9	7/20/93 9:20:00 AM	50	27.6	0.2
CORLM462.9	7/20/93 9:20:00 AM	60	26.9	0.2
CORLM462.9	7/29/93 10:50:00 AM	0	32.8	8.1
CORLM462.9	7/29/93 10:50:00 AM	3	31.7	8.5
CORLM462.9	7/29/93 10:50:00 AM	5	31.6	8
CORLM462.9	7/29/93 10:50:00 AM	10	31.4	7.6
CORLM462.9	7/29/93 10:50:00 AM	15	31.2	5.8
CORLM462.9	7/29/93 10:50:00 AM	20	30.8	2
CORLM462.9	7/29/93 10:50:00 AM	30	30.2	0.1
CORLM462.9	7/29/93 10:50:00 AM	40	29.6	0.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM462.9	7/29/93 10:50:00 AM	50	28.3	0.1
CORLM462.9	7/29/93 10:50:00 AM	60	27.9	0.1
CORLM462.9	8/2/93 1:55:00 PM	0	30.6	6.1
CORLM462.9	8/2/93 1:55:00 PM	3	30.5	6
CORLM462.9	8/2/93 1:55:00 PM	5	30.5	5.3
CORLM462.9	8/2/93 1:55:00 PM	10	30.4	5.1
CORLM462.9	8/2/93 1:55:00 PM	15	30.3	4.5
CORLM462.9	8/2/93 1:55:00 PM	20	30.3	4.3
CORLM462.9	8/2/93 1:55:00 PM	30	30.2	3.7
CORLM462.9	8/2/93 1:55:00 PM	40	29.8	0.1
CORLM462.9	8/2/93 1:55:00 PM	50	29.4	1
CORLM462.9	8/23/93 12:40:00 PM	0	31.5	9.1
CORLM462.9	8/23/93 12:40:00 PM	3	30.9	9.9
CORLM462.9	8/23/93 12:40:00 PM	5	30.6	9.7
CORLM462.9	8/23/93 12:40:00 PM	10	30.2	8.9
CORLM462.9	8/23/93 12:40:00 PM	15	29.6	2.5
CORLM462.9	8/23/93 12:40:00 PM	20	29.2	0.03
CORLM462.9	8/23/93 12:40:00 PM	30	28.7	0.07
CORLM462.9	8/23/93 12:40:00 PM	40	28.4	0.03
CORLM462.9	8/23/93 12:40:00 PM	50	28.2	0.05
CORLM462.9	8/23/93 12:40:00 PM	60	27.6	0.06
CORLM462.9	9/1/93 10:00:00 AM	0	30.5	7.5
CORLM462.9	9/1/93 10:00:00 AM	3	30.3	7.2
CORLM462.9	9/1/93 10:00:00 AM	5	30.2	6.7
CORLM462.9	9/1/93 10:00:00 AM	10	30.2	7.2
CORLM462.9	9/1/93 10:00:00 AM	15	30.1	6.9
CORLM462.9	9/1/93 10:00:00 AM	20	29.7	3.2
CORLM462.9	9/1/93 10:00:00 AM	30	28.9	0.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM462.9	9/1/93 10:00:00 AM	40	28.4	0.2
CORLM462.9	9/1/93 10:00:00 AM	50	27.6	0.2
CORLM462.9	9/7/93 11:36:00 AM	0	29.2	5.5
CORLM462.9	9/7/93 11:36:00 AM	3	29.1	5.4
CORLM462.9	9/7/93 11:36:00 AM	5	29	4.8
CORLM462.9	9/7/93 11:36:00 AM	10	29	4.2
CORLM462.9	9/7/93 11:36:00 AM	15	28.9	3.9
CORLM462.9	9/7/93 11:36:00 AM	20	28.9	3.6
CORLM462.9	9/7/93 11:36:00 AM	30	28.8	3.5
CORLM462.9	9/7/93 11:36:00 AM	40	28.6	2.2
CORLM462.9	9/7/93 11:36:00 AM	50	28.4	1
CORLM462.9	9/13/93 1:47:00 PM	0	28.7	7.3
CORLM462.9	9/13/93 1:47:00 PM	3	28.7	7.4
CORLM462.9	9/13/93 1:47:00 PM	5	28.6	7.4
CORLM462.9	9/13/93 1:47:00 PM	10	27.9	5.4
CORLM462.9	9/13/93 1:47:00 PM	15	27.9	4.9
CORLM462.9	9/13/93 1:47:00 PM	20	27.8	4.6
CORLM462.9	9/13/93 1:47:00 PM	30	27.7	4.7
CORLM462.9	9/13/93 1:47:00 PM	40	27.7	4.8
CORLM464.9	7/6/93 11:27:00 AM	0	31.7	6.8
CORLM464.9	7/6/93 11:27:00 AM	3	31.1	6.75
CORLM464.9	7/6/93 11:27:00 AM	5	30.8	6.7
CORLM464.9	7/6/93 11:27:00 AM	10	30.2	5.53
CORLM464.9	7/6/93 11:27:00 AM	15	30	4.55
CORLM464.9	7/6/93 11:27:00 AM	20	29.4	2.71
CORLM464.9	7/6/93 11:27:00 AM	30	29.2	2.47
CORLM464.9	7/6/93 11:27:00 AM	40	28.8	1.66
CORLM464.9	7/6/93 11:27:00 AM	50	28.9	1.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM464.9	7/15/93 11:25:00 AM	0	32.7	7.2
CORLM464.9	7/15/93 11:25:00 AM	3	32.2	7.1
CORLM464.9	7/15/93 11:25:00 AM	5	31.9	6.9
CORLM464.9	7/15/93 11:25:00 AM	10	31.7	5.8
CORLM464.9	7/15/93 11:25:00 AM	15	31.7	5.5
CORLM464.9	7/15/93 11:25:00 AM	20	31.9	5
CORLM464.9	7/15/93 11:25:00 AM	30	32	4.6
CORLM464.9	7/20/93 9:32:00 AM	0	30.9	7.3
CORLM464.9	7/20/93 9:32:00 AM	3	30.9	7.1
CORLM464.9	7/20/93 9:32:00 AM	5	30.8	6.8
CORLM464.9	7/20/93 9:32:00 AM	10	30.7	6.7
CORLM464.9	7/20/93 9:32:00 AM	15	30.6	6.4
CORLM464.9	7/20/93 9:32:00 AM	20	30.6	5.9
CORLM464.9	7/20/93 9:32:00 AM	30	29.8	1
CORLM464.9	7/20/93 9:32:00 AM	40	29.1	0.2
CORLM464.9	7/20/93 9:32:00 AM	50	27.7	0.2
CORLM464.9	7/29/93 11:02:00 AM	0	32.2	8.1
CORLM464.9	7/29/93 11:02:00 AM	3	31.6	8
CORLM464.9	7/29/93 11:02:00 AM	5	31.5	7.7
CORLM464.9	7/29/93 11:02:00 AM	10	31.4	7.1
CORLM464.9	7/29/93 11:02:00 AM	15	31.3	6.7
CORLM464.9	7/29/93 11:02:00 AM	20	31	3.5
CORLM464.9	7/29/93 11:02:00 AM	30	30.6	0.7
CORLM464.9	7/29/93 11:02:00 AM	40	29.9	0.1
CORLM464.9	7/29/93 11:02:00 AM	50	28.7	0.1
CORLM464.9	8/2/93 1:42:00 PM	0	30.5	6.9
CORLM464.9	8/2/93 1:42:00 PM	3	30.5	6.8
CORLM464.9	8/2/93 1:42:00 PM	5	30.5	6.6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM464.9	8/2/93 1:42:00 PM	10	30.4	5.6
CORLM464.9	8/2/93 1:42:00 PM	15	30.2	4.4
CORLM464.9	8/2/93 1:42:00 PM	20	30.2	4.5
CORLM464.9	8/2/93 1:42:00 PM	30	30.2	4.1
CORLM464.9	8/2/93 1:42:00 PM	40	30.2	0.7
CORLM464.9	8/23/93 12:45:00 PM	0	31.9	8.8
CORLM464.9	8/23/93 12:45:00 PM	3	31.3	9.1
CORLM464.9	8/23/93 12:45:00 PM	5	30.3	9.4
CORLM464.9	8/23/93 12:45:00 PM	10	30	7.6
CORLM464.9	8/23/93 12:45:00 PM	15	29.8	5.2
CORLM464.9	8/23/93 12:45:00 PM	20	29.2	0.4
CORLM464.9	8/23/93 12:45:00 PM	30	28.7	0.05
CORLM464.9	8/23/93 12:45:00 PM	40	28.4	0.08
CORLM464.9	8/23/93 12:45:00 PM	50	28.1	0.1
CORLM464.9	8/23/93 1:00:00 PM	0	32.5	8.8
CORLM464.9	8/23/93 1:00:00 PM	3	31.2	10
CORLM464.9	8/23/93 1:00:00 PM	5	30.6	9.6
CORLM464.9	8/23/93 1:00:00 PM	10	30.2	6.4
CORLM464.9	8/23/93 1:00:00 PM	15	29.8	3.6
CORLM464.9	8/23/93 1:00:00 PM	20	29.3	0.9
CORLM464.9	8/23/93 1:00:00 PM	30	28.7	0.05
CORLM464.9	8/23/93 1:00:00 PM	40	28.5	0.1
CORLM464.9	9/1/93 10:15:00 AM	0	30.5	6
CORLM464.9	9/1/93 10:15:00 AM	3	30.4	6.1
CORLM464.9	9/1/93 10:15:00 AM	5	30.3	6.3
CORLM464.9	9/1/93 10:15:00 AM	10	30.1	5.8
CORLM464.9	9/1/93 10:15:00 AM	15	30	5.8
CORLM464.9	9/1/93 10:15:00 AM	20	29.7	2.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM464.9	9/1/93 10:15:00 AM	30	28.8	0.1
CORLM464.9	9/1/93 10:15:00 AM	40	28.6	0.3
CORLM466.9	7/6/93 11:54:00 AM	0	31.4	6.65
CORLM466.9	7/6/93 11:54:00 AM	3	30.5	6.62
CORLM466.9	7/6/93 11:54:00 AM	5	30.3	6.08
CORLM466.9	7/6/93 11:54:00 AM	10	30.1	5.6
CORLM466.9	7/6/93 11:54:00 AM	15	29.9	4.7
CORLM466.9	7/6/93 11:54:00 AM	20	29.4	2.82
CORLM466.9	7/6/93 11:54:00 AM	30	29.4	2
CORLM466.9	7/6/93 11:54:00 AM	40	29.6	2.27
CORLM466.9	7/6/93 11:54:00 AM	50	29.9	2.15
CORLM466.9	7/15/93 11:40:00 AM	0	32.5	7.6
CORLM466.9	7/15/93 11:40:00 AM	3	31.8	6.7
CORLM466.9	7/15/93 11:40:00 AM	5	31.9	5.7
CORLM466.9	7/15/93 11:40:00 AM	10	31.9	5.4
CORLM466.9	7/15/93 11:40:00 AM	15	32	4.6
CORLM466.9	7/15/93 11:40:00 AM	20	32	5.2
CORLM466.9	7/15/93 11:40:00 AM	30	31.9	3.1
CORLM466.9	7/15/93 11:40:00 AM	40	32.4	1.3
CORLM466.9	7/20/93 9:46:00 AM	0	31.3	8.1
CORLM466.9	7/20/93 9:46:00 AM	3	31.2	8
CORLM466.9	7/20/93 9:46:00 AM	5	31.1	8
CORLM466.9	7/20/93 9:46:00 AM	10	30.9	7.2
CORLM466.9	7/20/93 9:46:00 AM	15	30.8	6.4
CORLM466.9	7/20/93 9:46:00 AM	20	30.4	4.2
CORLM466.9	7/20/93 9:46:00 AM	30	29.9	1.2
CORLM466.9	7/20/93 9:46:00 AM	40	29.6	0.4
CORLM466.9	7/20/93 9:46:00 AM	50	27.8	0.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM466.9	7/29/93 11:09:00 AM	0	32.3	8.2
CORLM466.9	7/29/93 11:09:00 AM	3	31.7	8.1
CORLM466.9	7/29/93 11:09:00 AM	5	31.6	8
CORLM466.9	7/29/93 11:09:00 AM	10	31.4	6.9
CORLM466.9	7/29/93 11:09:00 AM	15	31.3	5.7
CORLM466.9	7/29/93 11:09:00 AM	20	31	3.9
CORLM466.9	7/29/93 11:09:00 AM	30	30.2	0.1
CORLM466.9	7/29/93 11:09:00 AM	40	29.6	0.1
CORLM466.9	7/29/93 11:09:00 AM	45	29	0.1
CORLM466.9	8/2/93 1:31:00 PM	0	30.5	6.2
CORLM466.9	8/2/93 1:31:00 PM	3	30.5	6.1
CORLM466.9	8/2/93 1:31:00 PM	5	30.5	5.9
CORLM466.9	8/2/93 1:31:00 PM	10	30.4	5.3
CORLM466.9	8/2/93 1:31:00 PM	15	30.3	4.4
CORLM466.9	8/2/93 1:31:00 PM	20	30.2	4.4
CORLM466.9	8/2/93 1:31:00 PM	30	30	3.4
CORLM466.9	8/2/93 1:31:00 PM	40	28.9	0.2
CORLM466.9	8/23/93 1:08:00 PM	0	31.8	8.1
CORLM466.9	8/23/93 1:08:00 PM	3	30.6	10.2
CORLM466.9	8/23/93 1:08:00 PM	5	30.1	8.9
CORLM466.9	8/23/93 1:08:00 PM	10	29.7	5.4
CORLM466.9	8/23/93 1:08:00 PM	15	29.7	2.8
CORLM466.9	8/23/93 1:08:00 PM	20	29.5	4.2
CORLM466.9	9/1/93 10:25:00 AM	0	30.7	6.1
CORLM466.9	9/1/93 10:25:00 AM	3	30.2	6.6
CORLM466.9	9/1/93 10:25:00 AM	5	30.1	6.4
CORLM466.9	9/1/93 10:25:00 AM	10	30	5.4
CORLM466.9	9/1/93 10:25:00 AM	15	29.9	4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM466.9	9/1/93 10:25:00 AM	20	29.6	1
CORLM466.9	9/1/93 10:25:00 AM	30	29.1	0.2
CORLM468.9	7/6/93 12:04:00 PM	0	31.4	6.54
CORLM468.9	7/6/93 12:04:00 PM	3	30.6	6.85
CORLM468.9	7/6/93 12:04:00 PM	5	30.5	6.65
CORLM468.9	7/6/93 12:04:00 PM	10	30.2	6.02
CORLM468.9	7/6/93 12:04:00 PM	15	29.8	4.73
CORLM468.9	7/6/93 12:04:00 PM	20	29.3	3.3
CORLM468.9	7/6/93 12:04:00 PM	30	28.5	2.04
CORLM468.9	7/6/93 12:04:00 PM	40	27	1.76
CORLM468.9	7/15/93 11:50:00 AM	0	32.5	7.7
CORLM468.9	7/15/93 11:50:00 AM	3	32.1	7.4
CORLM468.9	7/15/93 11:50:00 AM	5	31.9	7.4
CORLM468.9	7/15/93 11:50:00 AM	10	31.9	5.3
CORLM468.9	7/15/93 11:50:00 AM	15	31.9	5.2
CORLM468.9	7/15/93 11:50:00 AM	20	31.8	5
CORLM468.9	7/15/93 11:50:00 AM	30	31.4	2.7
CORLM468.9	7/15/93 11:50:00 AM	40	31.2	1.3
CORLM468.9	7/20/93 9:58:00 AM	0	31.3	8.2
CORLM468.9	7/20/93 9:58:00 AM	3	31.1	7.9
CORLM468.9	7/20/93 9:58:00 AM	5	30.9	7.6
CORLM468.9	7/20/93 9:58:00 AM	10	30.6	5.2
CORLM468.9	7/20/93 9:58:00 AM	15	30.5	4
CORLM468.9	7/20/93 9:58:00 AM	20	30.3	2.6
CORLM468.9	7/20/93 9:58:00 AM	30	29.9	1.5
CORLM468.9	7/20/93 9:58:00 AM	40	28.7	0.6
CORLM468.9	7/20/93 9:58:00 AM	50	26.8	0.2
CORLM468.9	7/29/93 11:21:00 AM	0	32.8	8.6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM468.9	7/29/93 11:21:00 AM	3	31.6	8.3
CORLM468.9	7/29/93 11:21:00 AM	5	31.3	7.3
CORLM468.9	7/29/93 11:21:00 AM	10	31.2	4.5
CORLM468.9	7/29/93 11:21:00 AM	15	31.1	5.3
CORLM468.9	7/29/93 11:21:00 AM	20	31	2.7
CORLM468.9	7/29/93 11:21:00 AM	30	30.4	0.1
CORLM468.9	8/2/93 1:20:00 PM	0	30.6	7
CORLM468.9	8/2/93 1:20:00 PM	3	30.6	6.6
CORLM468.9	8/2/93 1:20:00 PM	5	30.5	6.2
CORLM468.9	8/2/93 1:20:00 PM	10	30.4	6
CORLM468.9	8/2/93 1:20:00 PM	15	30.4	6.1
CORLM468.9	8/2/93 1:20:00 PM	20	30.3	5.1
CORLM468.9	8/2/93 1:20:00 PM	30	30.1	1.3
CORLM468.9	8/2/93 1:20:00 PM	40	29.3	0.7
CORLM468.9	8/23/93 1:15:00 PM	0	32.1	8.7
CORLM468.9	8/23/93 1:15:00 PM	3	30.7	9.3
CORLM468.9	8/23/93 1:15:00 PM	5	30.2	7.4
CORLM468.9	8/23/93 1:15:00 PM	10	29.9	4.2
CORLM468.9	8/23/93 1:15:00 PM	15	29.6	0.9
CORLM468.9	8/23/93 1:15:00 PM	20	29.4	0.3
CORLM468.9	8/23/93 1:15:00 PM	30	28.7	0.03
CORLM468.9	8/23/93 1:15:00 PM	40	27.6	0.05
CORLM468.9	8/23/93 1:15:00 PM	50	27.1	0.07
CORLM468.9	9/1/93 10:35:00 AM	0	30.4	6.4
CORLM468.9	9/1/93 10:35:00 AM	3	30.2	6.2
CORLM468.9	9/1/93 10:35:00 AM	5	29.9	6.4
CORLM468.9	9/1/93 10:35:00 AM	10	29.8	5.5
CORLM468.9	9/1/93 10:35:00 AM	15	29.8	4.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM468.9	9/1/93 10:35:00 AM	20	29.5	1.7
CORLM468.9	9/1/93 10:35:00 AM	25	29.1	0.2
CORLM470.5	1/21/98 11:02:00 AM	0	8.5	11.1
CORLM470.5	1/21/98 11:02:00 AM	1	8.5	11.2
CORLM470.5	1/21/98 11:02:00 AM	3	8.5	11.2
CORLM470.5	1/21/98 11:02:00 AM	5	8.5	11.2
CORLM470.5	1/21/98 11:02:00 AM	10	8.4	11.2
CORLM470.5	1/21/98 11:02:00 AM	15	8.4	11.2
CORLM470.5	1/21/98 11:02:00 AM	20	8.4	11.2
CORLM470.5	1/21/98 11:02:00 AM	25	8.4	11.3
CORLM470.5	1/21/98 11:02:00 AM	35	8.4	11.3
CORLM470.5	1/21/98 11:02:00 AM	45	8.4	11.3
CORLM470.5	2/11/98 10:10:00 AM	0	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	1	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	3	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	5	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	10	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	15	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	20	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	25	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	30	7.4	12.6
CORLM470.5	2/11/98 10:10:00 AM	40	7.4	12.6
CORLM470.5	3/4/98 11:10:00 AM	0	11.9	10.3
CORLM470.5	3/4/98 11:10:00 AM	1	11.9	10.3
CORLM470.5	3/4/98 11:10:00 AM	3	11.9	10.3
CORLM470.5	3/4/98 11:10:00 AM	5	11.8	10.3
CORLM470.5	3/4/98 11:10:00 AM	10	11.7	10.3
CORLM470.5	3/4/98 11:10:00 AM	15	11.7	10.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM470.5	3/4/98 11:10:00 AM	20	11.7	10.3
CORLM470.5	3/4/98 11:10:00 AM	25	11.7	10.3
CORLM470.5	3/4/98 11:10:00 AM	30	11.7	10.3
CORLM470.5	3/4/98 11:10:00 AM	40	11.7	10.2
CORLM470.5	4/9/98 12:30:00 PM	0	18.1	9.5
CORLM470.5	4/9/98 12:30:00 PM	1	18.1	9.5
CORLM470.5	4/9/98 12:30:00 PM	3	18.1	9.4
CORLM470.5	4/9/98 12:30:00 PM	5	18.1	9.3
CORLM470.5	4/9/98 12:30:00 PM	10	18.1	9.2
CORLM470.5	4/9/98 12:30:00 PM	15	18.1	9
CORLM470.5	4/9/98 12:30:00 PM	20	18.1	9
CORLM470.5	4/9/98 12:30:00 PM	25	18.1	9.1
CORLM470.5	4/9/98 12:30:00 PM	35	18	9.1
CORLM470.5	4/9/98 12:30:00 PM	45	18	9.3
CORLM470.5	5/6/98 10:22:00 AM	0	20	9.8
CORLM470.5	5/6/98 10:22:00 AM	1	20	9.8
CORLM470.5	5/6/98 10:22:00 AM	3	20	9.7
CORLM470.5	5/6/98 10:22:00 AM	5	19.9	9.6
CORLM470.5	5/6/98 10:22:00 AM	10	19.7	9.1
CORLM470.5	5/6/98 10:22:00 AM	15	19.4	8.5
CORLM470.5	5/6/98 10:22:00 AM	20	19.3	8.6
CORLM470.5	5/6/98 10:22:00 AM	25	19.3	8.6
CORLM470.5	5/6/98 10:22:00 AM	35	19.2	8.6
CORLM470.5	5/6/98 10:22:00 AM	45	19.2	8.6
CORLM470.5	6/3/98 9:55:00 AM	0	29	7.3
CORLM470.5	6/3/98 9:55:00 AM	1	29	7.2
CORLM470.5	6/3/98 9:55:00 AM	3	28.9	7.3
CORLM470.5	6/3/98 9:55:00 AM	5	28.7	7.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM470.5	6/3/98 9:55:00 AM	10	28.6	6.8
CORLM470.5	6/3/98 9:55:00 AM	15	28.4	6.2
CORLM470.5	6/3/98 9:55:00 AM	20	28.1	5.1
CORLM470.5	6/3/98 9:55:00 AM	25	27.9	4.9
CORLM470.5	6/3/98 9:55:00 AM	35	27.5	4.5
CORLM470.5	6/3/98 9:55:00 AM	45	26.1	2.5
CORLM470.5	7/16/98 1:15:00 PM	0	30.7	8.6
CORLM470.5	7/16/98 1:15:00 PM	1	30.7	8.7
CORLM470.5	7/16/98 1:15:00 PM	3	30.6	8.7
CORLM470.5	7/16/98 1:15:00 PM	5	30.4	8.6
CORLM470.5	7/16/98 1:15:00 PM	10	29.5	6.1
CORLM470.5	7/16/98 1:15:00 PM	15	29.5	5.6
CORLM470.5	7/16/98 1:15:00 PM	20	29.5	5.5
CORLM470.5	7/16/98 1:15:00 PM	25	29.4	5.4
CORLM470.5	7/16/98 1:15:00 PM	35	29.2	4
CORLM470.5	7/16/98 1:15:00 PM	45	28.4	2.9
CORLM470.5	8/10/98 11:00:00 AM	0	31.1	9.1
CORLM470.5	8/10/98 11:00:00 AM	1	31	8.8
CORLM470.5	8/10/98 11:00:00 AM	3	30.9	8.6
CORLM470.5	8/10/98 11:00:00 AM	5	31.8	7.8
CORLM470.5	8/10/98 11:00:00 AM	10	30.4	7.1
CORLM470.5	8/10/98 11:00:00 AM	15	29.7	4.5
CORLM470.5	8/10/98 11:00:00 AM	20	29.6	3.8
CORLM470.5	8/10/98 11:00:00 AM	25	29.4	3.3
CORLM470.5	8/10/98 11:00:00 AM	35	29.2	2
CORLM470.5	8/10/98 11:00:00 AM	45	28.3	0.7
CORLM470.5	9/14/98 2:37:00 PM	0	28	8.8
CORLM470.5	9/14/98 2:37:00 PM	1	28	8.8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM470.5	9/14/98 2:37:00 PM	3	27.6	7.6
CORLM470.5	9/14/98 2:37:00 PM	5	27.1	6.2
CORLM470.5	9/14/98 2:37:00 PM	10	27	5.6
CORLM470.5	9/14/98 2:37:00 PM	15	26.9	4.8
CORLM470.5	9/14/98 2:37:00 PM	20	26.9	4.4
CORLM470.5	9/14/98 2:37:00 PM	25	26.8	4.4
CORLM470.5	9/14/98 2:37:00 PM	30	26.7	4
CORLM470.5	9/14/98 2:37:00 PM	40	26.3	2.6
CORLM470.5	10/21/98 10:40:00 AM	0	22.7	6.9
CORLM470.5	10/21/98 10:40:00 AM	1	22.7	6.9
CORLM470.5	10/21/98 10:40:00 AM	3	22.7	6.9
CORLM470.5	10/21/98 10:40:00 AM	5	22.7	6.8
CORLM470.5	10/21/98 10:40:00 AM	10	22.7	6.8
CORLM470.5	10/21/98 10:40:00 AM	15	22.7	6.8
CORLM470.5	10/21/98 10:40:00 AM	20	22.7	6.7
CORLM470.5	10/21/98 10:40:00 AM	25	22.7	6.8
CORLM470.5	10/21/98 10:40:00 AM	30	22.7	6.8
CORLM470.5	10/21/98 10:40:00 AM	40	22.5	6.4
CORLM470.5	11/4/98 9:35:00 AM	0	19.8	8.1
CORLM470.5	11/4/98 9:35:00 AM	1	19.8	8
CORLM470.5	11/4/98 9:35:00 AM	3	19.8	8
CORLM470.5	11/4/98 9:35:00 AM	5	19.8	8
CORLM470.5	11/4/98 9:35:00 AM	10	19.8	7.8
CORLM470.5	11/4/98 9:35:00 AM	15	19.8	7.8
CORLM470.5	11/4/98 9:35:00 AM	20	19.8	7.8
CORLM470.5	11/4/98 9:35:00 AM	25	19.8	7.7
CORLM470.5	11/4/98 9:35:00 AM	35	19.7	7.4
CORLM470.5	11/4/98 9:35:00 AM	45	19.7	6.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM470.5	12/3/98 11:40:00 PM	0	16	10.4
CORLM470.5	12/3/98 11:40:00 PM	1	16	10
CORLM470.5	12/3/98 11:40:00 PM	3	15.5	9.5
CORLM470.5	12/3/98 11:40:00 PM	5	15.4	9.1
CORLM470.5	12/3/98 11:40:00 PM	10	15.4	9
CORLM470.5	12/3/98 11:40:00 PM	15	15.4	8.9
CORLM470.5	12/3/98 11:40:00 PM	20	15.4	8.9
CORLM470.5	12/3/98 11:40:00 PM	25	15.4	8.9
CORLM470.5	12/3/98 11:40:00 PM	30	15.4	8.9
CORLM470.5	12/3/98 11:40:00 PM	40	15.4	9
CORLM470.5	1/19/99 1:52:00 PM	0	9.2	10.7
CORLM470.5	1/19/99 1:52:00 PM	1	9	10.7
CORLM470.5	1/19/99 1:52:00 PM	3	8.5	10.7
CORLM470.5	1/19/99 1:52:00 PM	5	8.6	10.7
CORLM470.5	1/19/99 1:52:00 PM	10	8.4	10.7
CORLM470.5	1/19/99 1:52:00 PM	15	8.4	10.7
CORLM470.5	1/19/99 1:52:00 PM	20	8.4	10.7
CORLM470.5	1/19/99 1:52:00 PM	25	8.4	10.7
CORLM470.5	1/19/99 1:52:00 PM	30	8.4	10.7
CORLM470.5	1/19/99 1:52:00 PM	40	8.5	10.5
CORLM470.9	7/6/93 12:16:00 PM	0	31.6	6.8
CORLM470.9	7/6/93 12:16:00 PM	3	30.7	6.95
CORLM470.9	7/6/93 12:16:00 PM	5	30.4	6.78
CORLM470.9	7/6/93 12:16:00 PM	10	30.1	6.1
CORLM470.9	7/6/93 12:16:00 PM	15	29.8	4.97
CORLM470.9	7/6/93 12:16:00 PM	20	29.3	3.28
CORLM470.9	7/6/93 12:16:00 PM	30	28.1	2.05
CORLM470.9	7/6/93 12:16:00 PM	40	26.8	1.73

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM470.9	7/6/93 12:16:00 PM	50	26.5	1.42
CORLM470.9	7/15/93 11:58:00 AM	0	32.1	7.3
CORLM470.9	7/15/93 11:58:00 AM	3	31.9	6.4
CORLM470.9	7/15/93 11:58:00 AM	5	31.9	6.1
CORLM470.9	7/15/93 11:58:00 AM	10	31.9	5.5
CORLM470.9	7/15/93 11:58:00 AM	15	32	5.4
CORLM470.9	7/15/93 11:58:00 AM	20	32	5.3
CORLM470.9	7/15/93 11:58:00 AM	30	31.8	4.4
CORLM470.9	7/15/93 11:58:00 AM	40	30.7	1.5
CORLM470.9	7/20/93 10:15:00 AM	0	31.2	7.5
CORLM470.9	7/20/93 10:15:00 AM	3	31.1	7.4
CORLM470.9	7/20/93 10:15:00 AM	5	30.8	6.8
CORLM470.9	7/20/93 10:15:00 AM	10	30.7	5.9
CORLM470.9	7/20/93 10:15:00 AM	15	30.6	5.3
CORLM470.9	7/20/93 10:15:00 AM	20	30.4	4
CORLM470.9	7/20/93 10:15:00 AM	30	29.7	2.3
CORLM470.9	7/20/93 10:15:00 AM	40	28.5	2
CORLM470.9	7/20/93 10:15:00 AM	50	27.6	1.2
CORLM470.9	7/29/93 11:28:00 AM	0	33	7.6
CORLM470.9	7/29/93 11:28:00 AM	3	32	8.2
CORLM470.9	7/29/93 11:28:00 AM	5	31.7	7.3
CORLM470.9	7/29/93 11:28:00 AM	10	31.6	5.6
CORLM470.9	7/29/93 11:28:00 AM	15	31.1	2.7
CORLM470.9	7/29/93 11:28:00 AM	20	30.9	1.8
CORLM470.9	7/29/93 11:28:00 AM	30	29.7	0.2
CORLM470.9	7/29/93 11:28:00 AM	40	28.7	0.1
CORLM470.9	7/29/93 11:28:00 AM	50	28	0.1
CORLM470.9	8/2/93 1:12:00 PM	0	30.5	5.8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM470.9	8/2/93 1:12:00 PM	3	30.5	5.9
CORLM470.9	8/2/93 1:12:00 PM	5	30.4	5.3
CORLM470.9	8/2/93 1:12:00 PM	10	30.3	4.7
CORLM470.9	8/2/93 1:12:00 PM	15	30.2	4.2
CORLM470.9	8/2/93 1:12:00 PM	20	30.2	4.3
CORLM470.9	8/23/93 1:24:00 PM	0	31.3	8.3
CORLM470.9	8/23/93 1:24:00 PM	3	31.1	8.5
CORLM470.9	8/23/93 1:24:00 PM	5	30.1	8.7
CORLM470.9	8/23/93 1:24:00 PM	10	30	5.9
CORLM470.9	8/23/93 1:24:00 PM	15	29.7	4.1
CORLM470.9	8/23/93 1:24:00 PM	20	29.6	1.1
CORLM470.9	8/23/93 1:24:00 PM	30	28.8	1
CORLM470.9	9/1/93 10:40:00 AM	0	30.2	6.4
CORLM470.9	9/1/93 10:40:00 AM	3	30.2	6.4
CORLM470.9	9/1/93 10:40:00 AM	5	29.9	6.4
CORLM470.9	9/1/93 10:40:00 AM	10	29.8	5.7
CORLM470.9	9/1/93 10:40:00 AM	15	29.6	3.9
CORLM470.9	9/1/93 10:40:00 AM	20	29.4	0.2
CORLM470.9	9/1/93 10:40:00 AM	30	28.6	0.1
CORLM470.9	9/1/93 10:40:00 AM	40	27.3	0.1
CORLM470.9	9/1/93 10:40:00 AM	50	26.9	0.2
CORLM472.9	7/6/93 12:28:00 PM	0	31.4	7.28
CORLM472.9	7/6/93 12:28:00 PM	3	30.6	7.34
CORLM472.9	7/6/93 12:28:00 PM	5	30.2	6.55
CORLM472.9	7/6/93 12:28:00 PM	10	30	6.08
CORLM472.9	7/6/93 12:28:00 PM	15	29.9	5.62
CORLM472.9	7/6/93 12:28:00 PM	20	29.8	4.93
CORLM472.9	7/6/93 12:28:00 PM	30	29	1.65

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM472.9	7/6/93 12:28:00 PM	40	29.1	1.29
CORLM472.9	7/6/93 12:28:00 PM	50	29.4	1.9
CORLM472.9	7/15/93 12:07:00 PM	0	32.4	8.4
CORLM472.9	7/15/93 12:07:00 PM	3	32.4	8
CORLM472.9	7/15/93 12:07:00 PM	5	32.2	7.5
CORLM472.9	7/15/93 12:07:00 PM	10	32	6.1
CORLM472.9	7/15/93 12:07:00 PM	15	32.2	5.8
CORLM472.9	7/15/93 12:07:00 PM	20	32.2	4.5
CORLM472.9	7/15/93 12:07:00 PM	30	32	4.6
CORLM472.9	7/20/93 10:35:00 AM	0	31.2	7.8
CORLM472.9	7/20/93 10:35:00 AM	3	30.9	7.1
CORLM472.9	7/20/93 10:35:00 AM	5	30.8	6.7
CORLM472.9	7/20/93 10:35:00 AM	10	30.6	5.8
CORLM472.9	7/20/93 10:35:00 AM	15	30.5	5.3
CORLM472.9	7/20/93 10:35:00 AM	20	30.5	5.2
CORLM472.9	7/20/93 10:35:00 AM	30	29.4	3.2
CORLM472.9	7/20/93 10:35:00 AM	40	28.5	1.7
CORLM472.9	7/29/93 11:37:00 AM	0	32.3	7.5
CORLM472.9	7/29/93 11:37:00 AM	3	31.6	7.7
CORLM472.9	7/29/93 11:37:00 AM	5	31.4	6.1
CORLM472.9	7/29/93 11:37:00 AM	10	31.3	4.6
CORLM472.9	7/29/93 11:37:00 AM	15	31.3	4.2
CORLM472.9	7/29/93 11:37:00 AM	20	31	2.8
CORLM472.9	7/29/93 11:37:00 AM	30	30.6	1
CORLM472.9	8/2/93 1:05:00 PM	0	30.5	6.6
CORLM472.9	8/2/93 1:05:00 PM	3	30.5	6.6
CORLM472.9	8/2/93 1:05:00 PM	5	30.5	6.4
CORLM472.9	8/2/93 1:05:00 PM	10	30.4	5.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM472.9	8/2/93 1:05:00 PM	15	30.4	5.4
CORLM472.9	8/2/93 1:05:00 PM	20	30.3	5.2
CORLM472.9	8/2/93 1:05:00 PM	30	30.2	5
CORLM472.9	8/23/93 1:50:00 PM	0	32.7	9.2
CORLM472.9	8/23/93 1:50:00 PM	3	30.7	10.2
CORLM472.9	8/23/93 1:50:00 PM	5	30.1	7.4
CORLM472.9	8/23/93 1:50:00 PM	10	29.9	6.5
CORLM472.9	8/23/93 1:50:00 PM	15	29.8	3.1
CORLM472.9	8/23/93 1:50:00 PM	20	29.7	2.5
CORLM472.9	8/23/93 1:50:00 PM	30	27.6	0.1
CORLM472.9	9/1/93 10:50:00 AM	0	30.1	6.2
CORLM472.9	9/1/93 10:50:00 AM	3	29.9	5.5
CORLM472.9	9/1/93 10:50:00 AM	5	29.7	4.7
CORLM472.9	9/1/93 10:50:00 AM	10	29.6	4.1
CORLM472.9	9/1/93 10:50:00 AM	15	29.6	5.1
CORLM472.9	9/1/93 10:50:00 AM	20	29.4	3.4
CORLM472.9	9/1/93 10:50:00 AM	30	28.7	0.2
CORLM474.9	7/6/93 12:36:00 PM	0	31.5	7.2
CORLM474.9	7/6/93 12:36:00 PM	3	30.5	7.74
CORLM474.9	7/6/93 12:36:00 PM	5	30.2	7.42
CORLM474.9	7/6/93 12:36:00 PM	10	29.9	5.4
CORLM474.9	7/6/93 12:36:00 PM	15	29.8	4.73
CORLM474.9	7/6/93 12:36:00 PM	20	29.5	2.42
CORLM474.9	7/6/93 12:36:00 PM	30	29.1	1.4
CORLM474.9	7/6/93 12:36:00 PM	40	28.6	0.23
CORLM474.9	7/6/93 12:36:00 PM	50	28.8	0.14
CORLM474.9	7/6/93 12:36:00 PM	60	28.9	0.16
CORLM474.9	7/15/93 12:16:00 PM	0	32.6	8.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM474.9	7/15/93 12:16:00 PM	3	32.1	7
CORLM474.9	7/15/93 12:16:00 PM	5	32.1	6.2
CORLM474.9	7/15/93 12:16:00 PM	10	32.2	5.7
CORLM474.9	7/15/93 12:16:00 PM	15	32.4	5.6
CORLM474.9	7/15/93 12:16:00 PM	20	32.3	5.7
CORLM474.9	7/20/93 10:55:00 AM	0	31.4	8.4
CORLM474.9	7/20/93 10:55:00 AM	3	31.2	8.1
CORLM474.9	7/20/93 10:55:00 AM	5	30.9	7.3
CORLM474.9	7/20/93 10:55:00 AM	10	30.6	5.8
CORLM474.9	7/20/93 10:55:00 AM	15	30.5	4
CORLM474.9	7/20/93 10:55:00 AM	20	30.3	3
CORLM474.9	7/20/93 10:55:00 AM	30	30.1	1.5
CORLM474.9	7/29/93 11:45:00 AM	0	32.8	6.9
CORLM474.9	7/29/93 11:45:00 AM	3	32	7.5
CORLM474.9	7/29/93 11:45:00 AM	5	31.4	5.7
CORLM474.9	7/29/93 11:45:00 AM	10	31.3	4.6
CORLM474.9	7/29/93 11:45:00 AM	15	31.3	4.2
CORLM474.9	7/29/93 11:45:00 AM	20	31.2	3.3
CORLM474.9	7/29/93 11:45:00 AM	30	29.3	0.1
CORLM474.9	8/2/93 12:57:00 PM	0	30.7	7.1
CORLM474.9	8/2/93 12:57:00 PM	3	30.2	5
CORLM474.9	8/2/93 12:57:00 PM	5	30.2	4.6
CORLM474.9	8/2/93 12:57:00 PM	10	30.1	4.7
CORLM474.9	8/2/93 12:57:00 PM	15	30.1	5
CORLM474.9	8/2/93 12:57:00 PM	20	30	4.3
CORLM474.9	8/23/93 1:43:00 PM	0	31.7	9.4
CORLM474.9	8/23/93 1:43:00 PM	3	30.5	9
CORLM474.9	8/23/93 1:43:00 PM	5	30.1	6.8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM474.9	8/23/93 1:43:00 PM	10	29.8	5.7
CORLM474.9	8/23/93 1:43:00 PM	15	29.7	3.6
CORLM474.9	8/23/93 1:43:00 PM	20	29.7	3.9
CORLM474.9	8/23/93 1:43:00 PM	30	29.6	1.3
CORLM474.9	9/1/93 11:00:00 AM	0	31.4	7.1
CORLM474.9	9/1/93 11:00:00 AM	3	30.4	7.7
CORLM474.9	9/1/93 11:00:00 AM	5	30.1	6.6
CORLM474.9	9/1/93 11:00:00 AM	10	29.9	3
CORLM474.9	9/1/93 11:00:00 AM	15	29.7	4.1
CORLM474.9	9/1/93 11:00:00 AM	20	29.5	2.1
CORLM474.9	9/1/93 11:00:00 AM	25	28.9	0.2
CORLM476.9	7/6/93 12:42:00 PM	0	31.8	6.38
CORLM476.9	7/6/93 12:42:00 PM	3	30.5	6.05
CORLM476.9	7/6/93 12:42:00 PM	5	30.1	5.77
CORLM476.9	7/6/93 12:42:00 PM	10	29.9	4.4
CORLM476.9	7/6/93 12:42:00 PM	15	29.8	4.25
CORLM476.9	7/6/93 12:42:00 PM	20	29.8	3.43
CORLM476.9	7/6/93 12:42:00 PM	30	29.6	2.82
CORLM476.9	7/6/93 12:42:00 PM	40	29.6	1.83
CORLM476.9	7/6/93 12:42:00 PM	50	29.6	1.7
CORLM476.9	7/6/93 12:42:00 PM	60	29.9	2.23
CORLM476.9	7/6/93 12:42:00 PM	70	30	2.28
CORLM476.9	7/15/93 12:01:00 AM	0	32.5	7.5
CORLM476.9	7/15/93 12:01:00 AM	3	32.2	7.3
CORLM476.9	7/15/93 12:01:00 AM	5	31.8	6.6
CORLM476.9	7/15/93 12:01:00 AM	10	31.9	5.1
CORLM476.9	7/15/93 12:01:00 AM	15	31.9	5.2
CORLM476.9	7/15/93 12:01:00 AM	20	31.9	5.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM476.9	7/15/93 12:01:00 AM	30	32.2	5.2
CORLM476.9	7/20/93 11:15:00 AM	0	31.3	7.1
CORLM476.9	7/20/93 11:15:00 AM	3	31.1	6.9
CORLM476.9	7/20/93 11:15:00 AM	5	30.7	6.1
CORLM476.9	7/20/93 11:15:00 AM	10	30.5	5.7
CORLM476.9	7/20/93 11:15:00 AM	15	30.4	5.3
CORLM476.9	7/20/93 11:15:00 AM	20	30.4	5
CORLM476.9	7/20/93 11:15:00 AM	30	30.3	3.5
CORLM476.9	7/29/93 11:51:00 AM	0	32.8	6.5
CORLM476.9	7/29/93 11:51:00 AM	3	31.9	6.8
CORLM476.9	7/29/93 11:51:00 AM	5	31.5	5.8
CORLM476.9	7/29/93 11:51:00 AM	10	31.3	4.1
CORLM476.9	7/29/93 11:51:00 AM	15	31.2	4.1
CORLM476.9	7/29/93 11:51:00 AM	20	31.2	3.4
CORLM476.9	7/29/93 11:51:00 AM	30	31.2	2.9
CORLM476.9	8/2/93 12:50:00 PM	0	30.4	6.6
CORLM476.9	8/2/93 12:50:00 PM	3	30.1	5.6
CORLM476.9	8/2/93 12:50:00 PM	5	30	5.3
CORLM476.9	8/2/93 12:50:00 PM	10	30	5.2
CORLM476.9	8/2/93 12:50:00 PM	15	29.9	4.9
CORLM476.9	8/2/93 12:50:00 PM	20	29.8	4.9
CORLM476.9	8/2/93 12:50:00 PM	25	29.8	5.1
CORLM476.9	8/23/93 1:45:00 PM	0	31.3	8.7
CORLM476.9	8/23/93 1:45:00 PM	3	31.2	8.6
CORLM476.9	8/23/93 1:45:00 PM	5	31.1	8.9
CORLM476.9	8/23/93 1:45:00 PM	10	29.9	6.1
CORLM476.9	8/23/93 1:45:00 PM	15	29.8	4.1
CORLM476.9	8/23/93 1:45:00 PM	20	29.7	3.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM476.9	8/23/93 1:45:00 PM	30	29.7	2.5
CORLM476.9	9/1/93 11:10:00 AM	0	30.1	7.2
CORLM476.9	9/1/93 11:10:00 AM	3	30.1	6.2
CORLM476.9	9/1/93 11:10:00 AM	5	30.1	5.7
CORLM476.9	9/1/93 11:10:00 AM	10	30	3.3
CORLM476.9	9/1/93 11:10:00 AM	15	30	3.8
CORLM476.9	9/1/93 11:10:00 AM	20	30	4.5
CORLM476.9	9/1/93 11:10:00 AM	30	29.9	5.3
CORLM478.9	7/6/93 12:56:00 PM	0	31.6	5.62
CORLM478.9	7/6/93 12:56:00 PM	3	30.4	5.37
CORLM478.9	7/6/93 12:56:00 PM	5	30.1	4.72
CORLM478.9	7/6/93 12:56:00 PM	10	29.9	3.77
CORLM478.9	7/6/93 12:56:00 PM	15	29.9	4.44
CORLM478.9	7/6/93 12:56:00 PM	20	29.9	3.88
CORLM478.9	7/6/93 12:56:00 PM	30	29.8	1.67
CORLM478.9	7/6/93 12:56:00 PM	40	29.9	1.6
CORLM478.9	7/6/93 12:56:00 PM	50	30.4	2.83
CORLM478.9	7/6/93 12:56:00 PM	60	30.4	2.7
CORLM478.9	7/6/93 12:56:00 PM	70	30.5	2.79
CORLM478.9	7/15/93 12:33:00 PM	0	32.8	8
CORLM478.9	7/15/93 12:33:00 PM	3	32.5	7.6
CORLM478.9	7/15/93 12:33:00 PM	5	32.1	7
CORLM478.9	7/15/93 12:33:00 PM	10	32.1	5.4
CORLM478.9	7/15/93 12:33:00 PM	15	32.2	5.6
CORLM478.9	7/15/93 12:33:00 PM	20	32.3	5.6
CORLM478.9	7/15/93 12:33:00 PM	25	32.3	5.4
CORLM478.9	7/20/93 11:25:00 AM	0	31.6	7.2
CORLM478.9	7/20/93 11:25:00 AM	3	30.9	6.8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM478.9	7/20/93 11:25:00 AM	5	30.5	6
CORLM478.9	7/20/93 11:25:00 AM	10	30.5	5.2
CORLM478.9	7/20/93 11:25:00 AM	15	30.4	4.6
CORLM478.9	7/20/93 11:25:00 AM	20	30.4	4.7
CORLM478.9	7/20/93 11:25:00 AM	30	30.3	4.7
CORLM478.9	7/20/93 11:25:00 AM	40	30.4	1.4
CORLM478.9	7/29/93 12:00:00 PM	0	32.4	7.5
CORLM478.9	7/29/93 12:00:00 PM	3	31.6	5.8
CORLM478.9	7/29/93 12:00:00 PM	5	31.5	5
CORLM478.9	7/29/93 12:00:00 PM	10	31.5	4.3
CORLM478.9	7/29/93 12:00:00 PM	15	31.4	4.4
CORLM478.9	7/29/93 12:00:00 PM	20	31.4	4.5
CORLM478.9	7/29/93 12:00:00 PM	30	31.3	4.3
CORLM478.9	8/2/93 12:42:00 PM	0	30.5	6.3
CORLM478.9	8/2/93 12:42:00 PM	3	30.4	6.2
CORLM478.9	8/2/93 12:42:00 PM	5	30.4	5.9
CORLM478.9	8/2/93 12:42:00 PM	10	30.3	5.5
CORLM478.9	8/2/93 12:42:00 PM	15	30.2	5.2
CORLM478.9	8/2/93 12:42:00 PM	20	30.2	5.1
CORLM478.9	8/2/93 12:42:00 PM	30	30.1	4.8
CORLM478.9	9/1/93 11:20:00 AM	0	30.7	6.2
CORLM478.9	9/1/93 11:20:00 AM	3	30.1	5.9
CORLM478.9	9/1/93 11:20:00 AM	5	29.9	5.1
CORLM478.9	9/1/93 11:20:00 AM	10	29.8	4.7
CORLM478.9	9/1/93 11:20:00 AM	15	29.8	3.9
CORLM478.9	9/1/93 11:20:00 AM	20	29.8	4.2
CORLM478.9	9/1/93 11:20:00 AM	30	29.8	4.2
CORLM479.0	2/11/98 9:00:00 AM	0	7.1	12.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM479.0	2/11/98 9:00:00 AM	1	7.1	12.7
CORLM479.0	2/11/98 9:00:00 AM	3	7.1	12.7
CORLM479.0	2/11/98 9:00:00 AM	5	7.1	12.8
CORLM479.0	2/11/98 9:00:00 AM	10	7.1	12.7
CORLM479.0	2/11/98 9:00:00 AM	15	7.1	12.7
CORLM479.0	2/11/98 9:00:00 AM	20	7.1	12.7
CORLM479.0	2/11/98 9:00:00 AM	25	7.1	12.8
CORLM479.0	2/11/98 9:00:00 AM	30	7.1	12.7
CORLM479.0	3/4/98 10:20:00 AM	0	11.7	10.4
CORLM479.0	3/4/98 10:20:00 AM	1	11.7	10.4
CORLM479.0	3/4/98 10:20:00 AM	3	11.6	10.4
CORLM479.0	3/4/98 10:20:00 AM	5	11.6	10.4
CORLM479.0	3/4/98 10:20:00 AM	10	11.6	10.4
CORLM479.0	3/4/98 10:20:00 AM	15	11.6	10.4
CORLM479.0	3/4/98 10:20:00 AM	20	11.6	10.4
CORLM479.0	3/4/98 10:20:00 AM	25	11.6	10.5
CORLM479.0	3/4/98 10:20:00 AM	30	11.6	10.6
CORLM479.0	4/9/98 11:05:00 AM	0	18	9.3
CORLM479.0	4/9/98 11:05:00 AM	1	18	9.3
CORLM479.0	4/9/98 11:05:00 AM	3	18	9.3
CORLM479.0	4/9/98 11:05:00 AM	5	18	9.2
CORLM479.0	4/9/98 11:05:00 AM	10	18	9.2
CORLM479.0	4/9/98 11:05:00 AM	15	18	9.2
CORLM479.0	4/9/98 11:05:00 AM	20	18	9.4
CORLM479.0	4/9/98 11:05:00 AM	25	18	9.4
CORLM479.0	4/9/98 11:05:00 AM	30	18	9.4
CORLM479.0	5/6/98 8:58:00 AM	0	20.1	9.7
CORLM479.0	5/6/98 8:58:00 AM	1	19.9	9.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM479.0	5/6/98 8:58:00 AM	3	19.5	9.4
CORLM479.0	5/6/98 8:58:00 AM	5	19.4	9.2
CORLM479.0	5/6/98 8:58:00 AM	10	19.4	9
CORLM479.0	5/6/98 8:58:00 AM	15	19.4	8.8
CORLM479.0	5/6/98 8:58:00 AM	20	19.4	8.8
CORLM479.0	5/6/98 8:58:00 AM	25	19.4	9
CORLM479.0	5/6/98 8:58:00 AM	35	19.4	9
CORLM479.0	6/3/98 8:50:00 AM	0	28.7	6.5
CORLM479.0	6/3/98 8:50:00 AM	1	28.7	6.4
CORLM479.0	6/3/98 8:50:00 AM	3	28.7	6.1
CORLM479.0	6/3/98 8:50:00 AM	5	28.6	6.1
CORLM479.0	6/3/98 8:50:00 AM	10	28.6	5.8
CORLM479.0	6/3/98 8:50:00 AM	15	28.6	5.9
CORLM479.0	6/3/98 8:50:00 AM	20	28.6	5.8
CORLM479.0	6/3/98 8:50:00 AM	25	28.6	5.7
CORLM479.0	6/3/98 8:50:00 AM	35	28.5	5.5
CORLM479.0	7/15/98 2:14:00 PM	0	29.6	6.9
CORLM479.0	7/15/98 2:14:00 PM	1	29.6	6.9
CORLM479.0	7/15/98 2:14:00 PM	3	29.6	6.8
CORLM479.0	7/15/98 2:14:00 PM	5	29.5	6.6
CORLM479.0	7/15/98 2:14:00 PM	10	29.4	6.1
CORLM479.0	7/15/98 2:14:00 PM	15	29.3	5.6
CORLM479.0	7/15/98 2:14:00 PM	20	29.3	5.4
CORLM479.0	7/15/98 2:14:00 PM	25	29.3	5.3
CORLM479.0	7/15/98 2:14:00 PM	35	29.2	5.4
CORLM479.0	8/10/98 9:55:00 AM	0	30.3	8.4
CORLM479.0	8/10/98 9:55:00 AM	1	30.3	8.3
CORLM479.0	8/10/98 9:55:00 AM	3	30	7.9

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM479.0	8/10/98 9:55:00 AM	5	29.8	7.1
CORLM479.0	8/10/98 9:55:00 AM	10	29.5	5.1
CORLM479.0	8/10/98 9:55:00 AM	15	29.5	4.8
CORLM479.0	8/10/98 9:55:00 AM	20	29.4	4.6
CORLM479.0	8/10/98 9:55:00 AM	25	29.4	5
CORLM479.0	8/10/98 9:55:00 AM	35	29.3	3.8
CORLM479.0	9/14/98 1:44:00 PM	0	28.7	9
CORLM479.0	9/14/98 1:44:00 PM	1	28.6	9.1
CORLM479.0	9/14/98 1:44:00 PM	3	28.5	9.1
CORLM479.0	9/14/98 1:44:00 PM	5	27.7	8.9
CORLM479.0	9/14/98 1:44:00 PM	10	26.8	7
CORLM479.0	9/14/98 1:44:00 PM	15	26.7	6.4
CORLM479.0	9/14/98 1:44:00 PM	20	26.7	6.1
CORLM479.0	9/14/98 1:44:00 PM	25	26.7	5.7
CORLM479.0	9/14/98 1:44:00 PM	35	26.7	5.2
CORLM479.0	10/21/98 9:48:00 AM	0	22.5	7.1
CORLM479.0	10/21/98 9:48:00 AM	1	22.5	7.1
CORLM479.0	10/21/98 9:48:00 AM	3	22.5	7.1
CORLM479.0	10/21/98 9:48:00 AM	5	22.5	7.1
CORLM479.0	10/21/98 9:48:00 AM	10	22.5	7
CORLM479.0	10/21/98 9:48:00 AM	15	22.5	7
CORLM479.0	10/21/98 9:48:00 AM	20	22.5	7.1
CORLM479.0	10/21/98 9:48:00 AM	25	22.5	7.1
CORLM479.0	10/21/98 9:48:00 AM	35	22.3	7.1
CORLM479.0	11/4/98 8:30:00 AM	0	19.4	7.6
CORLM479.0	11/4/98 8:30:00 AM	1	19.4	7.6
CORLM479.0	11/4/98 8:30:00 AM	3	19.4	7.5
CORLM479.0	11/4/98 8:30:00 AM	5	19.4	7.5

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM479.0	11/4/98 8:30:00 AM	10	19.4	7.3
CORLM479.0	11/4/98 8:30:00 AM	15	19.3	7.3
CORLM479.0	11/4/98 8:30:00 AM	20	19.3	7.3
CORLM479.0	11/4/98 8:30:00 AM	25	19.3	7.3
CORLM479.0	11/4/98 8:30:00 AM	30	19.2	7.4
CORLM479.0	12/3/98 10:10:00 PM	0	15.4	9.9
CORLM479.0	12/3/98 10:10:00 PM	1	14.9	9.5
CORLM479.0	12/3/98 10:10:00 PM	3	15	9.5
CORLM479.0	12/3/98 10:10:00 PM	5	15	9.5
CORLM479.0	12/3/98 10:10:00 PM	10	15	9.4
CORLM479.0	12/3/98 10:10:00 PM	15	15	9.4
CORLM479.0	12/3/98 10:10:00 PM	20	15	9.4
CORLM479.0	12/3/98 10:10:00 PM	25	15	9.4
CORLM479.0	12/3/98 10:10:00 PM	30	15	9.4
CORLM479.0	1/19/99 12:55:00 PM	0	8.5	10.7
CORLM479.0	1/19/99 12:55:00 PM	1	8.4	10.7
CORLM479.0	1/19/99 12:55:00 PM	3	8.3	10.7
CORLM479.0	1/19/99 12:55:00 PM	5	8.2	10.7
CORLM479.0	1/19/99 12:55:00 PM	10	8.1	10.7
CORLM479.0	1/19/99 12:55:00 PM	15	8.1	10.7
CORLM479.0	1/19/99 12:55:00 PM	20	8.2	10.7
CORLM479.0	1/19/99 12:55:00 PM	25	8.2	10.9
CORLM479.0	1/19/99 12:55:00 PM	30	8.2	10.9
CORLM480.5	1/21/98 9:02:00 AM	0	8.2	11
CORLM480.5	1/21/98 9:02:00 AM	3	8.2	11.1
CORLM480.5	1/21/98 9:02:00 AM	5	8.2	11.2
CORLM480.5	1/21/98 9:02:00 AM	10	8.2	11.3
CORLM480.5	1/21/98 9:02:00 AM	15	8.2	11.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM480.5	1/21/98 9:02:00 AM	20	8.2	11.3
CORLM480.5	1/21/98 9:02:00 AM	25	8.2	11.3
CORLM480.5	1/21/98 9:02:00 AM	30	8.2	11.4
CORLM480.9	7/6/93 1:10:00 PM	0	31.7	7
CORLM480.9	7/6/93 1:10:00 PM	3	30.5	6.94
CORLM480.9	7/6/93 1:10:00 PM	5	30.1	6.13
CORLM480.9	7/6/93 1:10:00 PM	10	29.9	4.98
CORLM480.9	7/6/93 1:10:00 PM	15	29.9	4.58
CORLM480.9	7/6/93 1:10:00 PM	20	29.9	4.45
CORLM480.9	7/6/93 1:10:00 PM	30	29.8	4.15
CORLM480.9	7/6/93 1:10:00 PM	40	29.8	4.23
CORLM480.9	7/6/93 1:10:00 PM	50	29.9	0.51
CORLM480.9	7/6/93 1:10:00 PM	60	29.9	3.42
CORLM480.9	7/6/93 1:10:00 PM	70	30	3.44
CORLM480.9	7/15/93 12:40:00 PM	0	32.6	7.7
CORLM480.9	7/15/93 12:40:00 PM	3	32.3	7.3
CORLM480.9	7/15/93 12:40:00 PM	5	31.8	6
CORLM480.9	7/15/93 12:40:00 PM	10	31.9	5.3
CORLM480.9	7/15/93 12:40:00 PM	15	32.1	5.3
CORLM480.9	7/15/93 12:40:00 PM	20	32.1	5.4
CORLM480.9	7/15/93 12:40:00 PM	30	32.2	5.3
CORLM480.9	7/15/93 12:40:00 PM	40	32.2	5.4
CORLM480.9	7/20/93 11:35:00 AM	0	31.4	6.5
CORLM480.9	7/20/93 11:35:00 AM	3	30.9	6.4
CORLM480.9	7/20/93 11:35:00 AM	5	30.7	5.8
CORLM480.9	7/20/93 11:35:00 AM	10	30.5	4.8
CORLM480.9	7/20/93 11:35:00 AM	15	30.5	4.7
CORLM480.9	7/20/93 11:35:00 AM	20	30.4	4.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM480.9	7/20/93 11:35:00 AM	30	30.4	4.2
CORLM480.9	7/20/93 11:35:00 AM	40	30.4	3.9
CORLM480.9	7/20/93 11:35:00 AM	50	30.3	0.2
CORLM480.9	7/29/93 12:07:00 PM	0	33.1	7.5
CORLM480.9	7/29/93 12:07:00 PM	3	31.6	5.9
CORLM480.9	7/29/93 12:07:00 PM	5	31.5	4.9
CORLM480.9	7/29/93 12:07:00 PM	10	31.5	4.6
CORLM480.9	7/29/93 12:07:00 PM	15	31.4	4.8
CORLM480.9	7/29/93 12:07:00 PM	20	31.4	4.7
CORLM480.9	7/29/93 12:07:00 PM	30	31.4	4.5
CORLM480.9	7/29/93 12:07:00 PM	40	31.4	4.5
CORLM480.9	8/2/93 12:35:00 PM	0	30.6	7.1
CORLM480.9	8/2/93 12:35:00 PM	3	30.5	6.9
CORLM480.9	8/2/93 12:35:00 PM	5	30.4	5.9
CORLM480.9	8/2/93 12:35:00 PM	10	30.2	5.4
CORLM480.9	8/2/93 12:35:00 PM	15	30.2	5.4
CORLM480.9	8/2/93 12:35:00 PM	20	30.2	5.3
CORLM480.9	8/2/93 12:35:00 PM	30	30.1	5.3
CORLM480.9	8/2/93 12:35:00 PM	40	30.1	5.2
CORLM480.9	9/1/93 11:30:00 AM	0	31.1	6.6
CORLM480.9	9/1/93 11:30:00 AM	3	30.1	6.5
CORLM480.9	9/1/93 11:30:00 AM	5	29.9	5.3
CORLM480.9	9/1/93 11:30:00 AM	10	29.8	3.9
CORLM480.9	9/1/93 11:30:00 AM	15	29.8	4.6
CORLM480.9	9/1/93 11:30:00 AM	20	29.8	3.9
CORLM480.9	9/1/93 11:30:00 AM	30	29.7	3.7
CORLM480.9	9/1/93 11:30:00 AM	40	29.6	4.1
CORLM490.0	1/20/98 3:20:00 PM	0	8.6	11.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM490.0	1/20/98 3:20:00 PM	1	8.5	11.4
CORLM490.0	1/20/98 3:20:00 PM	3	8.5	11.6
CORLM490.0	1/20/98 3:20:00 PM	5	8.5	11.7
CORLM490.0	1/20/98 3:20:00 PM	10	8.5	11.9
CORLM490.0	1/20/98 3:20:00 PM	12	8.5	12.3
CORLM490.0	2/9/98 4:40:00 PM	0	6.9	13.2
CORLM490.0	2/9/98 4:40:00 PM	1	6.9	13.1
CORLM490.0	2/9/98 4:40:00 PM	3	6.9	13.2
CORLM490.0	2/9/98 4:40:00 PM	5	6.9	13.2
CORLM490.0	2/9/98 4:40:00 PM	10	6.9	13.4
CORLM490.0	2/9/98 4:40:00 PM	15	6.9	13.7
CORLM490.0	4/9/98 9:38:00 AM	0	18	8.9
CORLM490.0	4/9/98 9:38:00 AM	1	18	8.9
CORLM490.0	4/9/98 9:38:00 AM	3	18	9
CORLM490.0	4/9/98 9:38:00 AM	5	18	9
CORLM490.0	4/9/98 9:38:00 AM	10	18	9
CORLM490.0	4/9/98 9:38:00 AM	15	18	9
CORLM490.0	4/9/98 9:38:00 AM	20	18	9
CORLM490.0	5/5/98 1:15:00 PM	0	19	9.1
CORLM490.0	5/5/98 1:15:00 PM	1	19	9.1
CORLM490.0	5/5/98 1:15:00 PM	3	19	9.1
CORLM490.0	5/5/98 1:15:00 PM	5	19	9.1
CORLM490.0	5/5/98 1:15:00 PM	10	19	9
CORLM490.0	5/5/98 1:15:00 PM	15	19	9
CORLM490.0	6/2/98 12:25:00 PM	0	28.6	9
CORLM490.0	6/2/98 12:25:00 PM	1	28.6	8.8
CORLM490.0	6/2/98 12:25:00 PM	3	28.5	8.9
CORLM490.0	6/2/98 12:25:00 PM	5	28.1	8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM490.0	6/2/98 12:25:00 PM	10	27.5	6.2
CORLM490.0	6/2/98 12:25:00 PM	15	27.5	5.7
CORLM490.0	7/15/98 1:02:00 PM	0	29.3	6.3
CORLM490.0	7/15/98 1:02:00 PM	1	29.3	6.1
CORLM490.0	7/15/98 1:02:00 PM	3	29.2	5.7
CORLM490.0	7/15/98 1:02:00 PM	5	29.1	5.1
CORLM490.0	7/15/98 1:02:00 PM	10	29	4.4
CORLM490.0	7/15/98 1:02:00 PM	15	28.9	4.6
CORLM490.0	8/10/98 8:52:00 AM	0	29.7	8.8
CORLM490.0	8/10/98 8:52:00 AM	1	29.7	8.8
CORLM490.0	8/10/98 8:52:00 AM	3	29.6	8.7
CORLM490.0	8/10/98 8:52:00 AM	5	29.5	8.1
CORLM490.0	8/10/98 8:52:00 AM	10	29.1	4.6
CORLM490.0	8/10/98 8:52:00 AM	15	29.1	4.6
CORLM490.0	9/14/98 12:45:00 PM	0	27.7	8.1
CORLM490.0	9/14/98 12:45:00 PM	1	27.6	8.1
CORLM490.0	9/14/98 12:45:00 PM	3	27.3	7.9
CORLM490.0	9/14/98 12:45:00 PM	5	27	7.4
CORLM490.0	9/14/98 12:45:00 PM	10	26.7	6.4
CORLM490.0	9/14/98 12:45:00 PM	15	26.7	6.2
CORLM490.0	10/14/98 11:17:00 AM	0	23.5	8.7
CORLM490.0	10/14/98 11:17:00 AM	1	23.5	8.5
CORLM490.0	10/14/98 11:17:00 AM	3	23.2	8
CORLM490.0	10/14/98 11:17:00 AM	5	22.9	7.4
CORLM490.0	10/14/98 11:17:00 AM	10	22.9	7.2
CORLM490.0	10/14/98 11:17:00 AM	15	22.3	7
CORLM490.0	11/4/98 1:05:00 PM	0	19.8	9.3
CORLM490.0	11/4/98 1:05:00 PM	1	19.7	9.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORLM490.0	11/4/98 1:05:00 PM	3	19.7	9.2
CORLM490.0	11/4/98 1:05:00 PM	5	19.7	9
CORLM490.0	11/4/98 1:05:00 PM	10	19.5	8.7
CORLM490.0	12/3/98 9:20:00 AM	0	15.4	9.6
CORLM490.0	12/3/98 9:20:00 AM	1	15.4	9.6
CORLM490.0	12/3/98 9:20:00 AM	3	15.4	9.6
CORLM490.0	12/3/98 9:20:00 AM	5	15.4	9.6
CORLM490.0	12/3/98 9:20:00 AM	10	15.4	9.4
CORLM490.0	1/19/99 11:15:00 AM	0	10.3	10.4
CORLM490.0	1/19/99 11:15:00 AM	1	10.3	10.4
CORLM490.0	1/19/99 11:15:00 AM	3	10.3	10.4
CORLM490.0	1/19/99 11:15:00 AM	5	10.3	10.4
CORLM490.0	1/19/99 11:15:00 AM	10	10.3	10.4
COTLM458.4	6/26/90 1:09:00 PM	0	27.5	8
COTLM458.4	7/17/90 9:25:00 AM	0	27	7.6
COTLM458.4	8/6/90 3:20:00 PM	0	29.5	7
COTLM458.4	8/29/90 2:00:00 PM	0	28.5	5.1
COTLM458.4	8/29/90 2:00:00 PM	3	28.5	5.2
COTLM458.4	8/29/90 2:00:00 PM	5	28.5	5.3
COTLM458.4	9/2/90 8:16:00 AM	0	27.8	1.4
COTLM458.4	9/2/90 8:16:00 AM	3	27.3	1.8
COTLM458.4	9/2/90 8:16:00 AM	5	26	2.5
COTLM458.4	9/3/90 8:10:00 AM	0	28	2.3
COTLM458.4	9/3/90 8:10:00 AM	3	27.8	2
COTLM458.4	9/3/90 8:10:00 AM	5	27.1	2.8
COTLM458.4	9/19/90 12:01:00 AM	0	28.1	4.7
COTLM458.4	9/19/90 12:01:00 AM	3	28.1	4.7
COTLM458.4	9/19/90 12:01:00 AM	5	28.1	4.5

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COTLM458.4	9/19/90 12:01:00 AM	10	28.1	4.8
COTLM458.4	9/19/90 12:01:00 AM	15	28.1	4.7
COTLM458.4	9/19/90 12:01:00 AM	20	28.1	4.7
COTLM458.4	10/1/90 12:48:00 PM	0	26.1	7.3
COTLM458.4	10/16/90 1:15:00 PM	0	22	6.8
COTLM458.4	6/5/91 9:55:00 AM	0	26.9	6.6
COTLM458.4	7/22/91 10:10:00 AM	0	29.7	7.4
COTLM458.4	8/19/91 11:10:00 AM	0	28.6	5.2
COTLM458.4	9/3/91 12:56:00 PM	0	27.9	9.5
COTLM458.4	9/26/91 9:52:00 AM	5	25.7	6.7
COTLM458.4	10/8/91 10:00:00 AM	0	22	8.6
COTLM458.4	5/20/92 11:33:00 AM	0	25.5	8.6
COTLM458.4	6/3/92 11:02:00 AM	0	22.2	13.49
COTLM458.4	6/7/92 6:34:00 AM	0	21.5	2.2
COTLM458.4	6/7/92 6:34:00 AM	3	21.5	2.1
COTLM458.4	6/7/92 6:34:00 AM	5	21.4	2.1
COTLM458.4	6/8/92 6:19:00 AM	0	19.9	6.2
COTLM458.4	6/8/92 6:19:00 AM	3	19.7	5.8
COTLM458.4	6/8/92 6:19:00 AM	5	19.3	4.8
COTLM458.4	6/8/92 6:23:00 AM	0	20.2	1.2
COTLM458.4	6/8/92 6:23:00 AM	3	20.2	1.3
COTLM458.4	6/8/92 6:23:00 AM	5	20.4	1.3
COTLM458.4	6/8/92 6:26:00 AM	0	19.8	1.5
COTLM458.4	6/8/92 6:26:00 AM	3	19.8	1.5
COTLM458.4	6/8/92 6:26:00 AM	5	19.9	1.5
COTLM458.4	7/14/92 11:45:00 AM	0	28.5	6
COTLM458.4	8/17/92 11:56:00 AM	0	28.7	5.6
COTLM458.4	9/22/92 1:55:00 PM	0	26.5	5.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COTLM458.4	10/5/92 11:15:00 AM	0	22.4	4.8
COTLM458.4	11/12/92 1:50:00 PM	6	14.8	7.38
COTLM458.4	5/10/93 12:27:00 PM	0	21.8	9.5
COTLM458.4	5/24/93 2:00:00 PM	0	26.8	6.1
COTLM458.4	6/7/93 1:40:00 PM	0	25.4	9.1
COTLM458.4	6/16/93 1:00:00 PM	0	28.3	7.9
COTLM458.4	7/28/93 9:40:00 AM	5	30.7	7.7
COTLM458.4	8/5/93 11:09:00 AM	0	29.5	11.4
COTLM458.4	10/12/93 9:46:00 AM	0	22.3	6.5
COTLM458.4	6/1/94 11:40:00 AM	0	24.9	8.8
COTLM458.4	7/19/94 10:45:00 AM	0	28.6	5.4
COTLM458.4	8/17/94 10:33:00 AM	0	28.5	7.4
COTLM458.4	10/27/94 10:57:00 AM	5	19	6.6
COTLM458.4	7/31/95 10:15:00 AM	5	29.3	6.8
COTLM458.4	6/25/96 2:30:00 PM	0	27.9	7.1
COTLM458.4	7/24/96 12:13:00 PM	0	29.5	7
COTLM458.4	8/20/96 1:44:00 PM	0	29.1	7.2
COTLM458.4	9/11/96 3:08:00 PM	0	28.2	7.1
COTLM458.4	6/10/97 11:48:00 AM	3	22.4	8.4
COTLM458.4	7/16/97 12:10:00 PM	0	29.3	5.1
COTLM458.4	10/28/97 2:25:00 PM	1	17.6	7.3
COTLM458.4	1/21/98 2:00:00 PM	0	9.6	10.3
COTLM458.4	2/11/98 12:55:00 PM	0	8.5	10.4
COTLM458.4	3/4/98 2:13:00 PM	0	12.7	8.71
COTLM458.4	4/9/98 3:20:00 PM	0	17.9	7.2
COTLM458.4	5/6/98 1:05:00 PM	0	20.5	7.2
COTLM458.4	6/3/98 11:25:00 AM	0	27.8	5.5
COTLM458.4	7/16/98 3:45:00 PM	0	29.6	6.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COTLM458.4	8/10/98 2:00:00 PM	0	30.4	6.2
COTLM458.4	9/14/98 4:07:00 PM	0	27.5	6
COTLM458.4	10/21/98 1:26:00 PM	0	23.3	6.5
COTLM458.4	11/4/98 11:22:00 AM	0	20.1	6.7
COTLM458.4	12/3/98 2:30:00 PM	0	17.8	6
COTLM458.4	1/19/99 3:40:00 PM	0	8.6	11.5
COTLM458.4	6/8/99 1:58:00 PM	0	26.4	6.8
COTLM458.4	7/7/99 10:55:00 AM	0	29	6.9
COTLM458.4	8/3/99 12:10:00 PM	0	31.9	7.5
COTLM458.4	9/7/99 10:20:00 AM	0	28.6	7.1
COTLM458.4	10/6/99 10:55:00 AM	0	23.3	6.9

Appendix E

Additional Information for Coosa River Basin

<u>**Additional Available Study Reference List for Coosa River Basin**</u>

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