ALABAMA HYDRO
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COOSA / WARRIOR RELICENSING PROJECT

INITIAL INFORMATION PACKAGE

for the

HENRY 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

NEELY HENRY DEVELOPMENT

INITIAL INFORMATION PACKAGE

November 2000

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COOSA RIVER PROJECT (FERC NO. 2146)

NEELY HENRY 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

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[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.

Figure 1.5-1 Timeline of APCs Relicensing Including Major Milestones of the APCA

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**

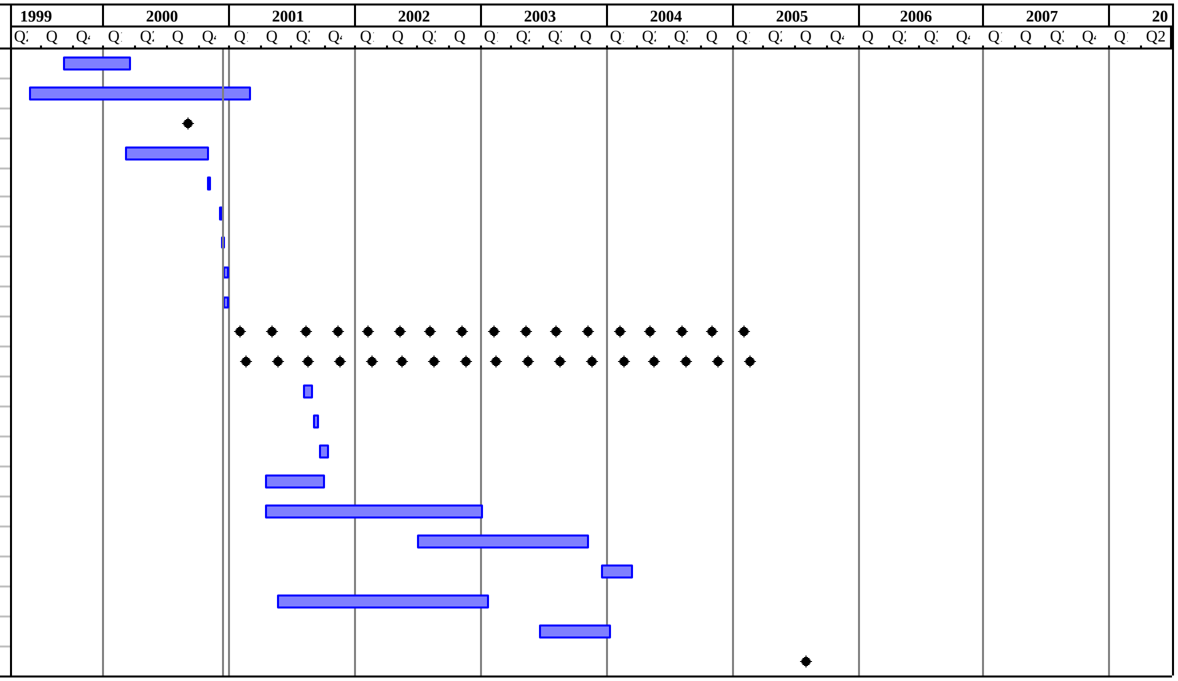
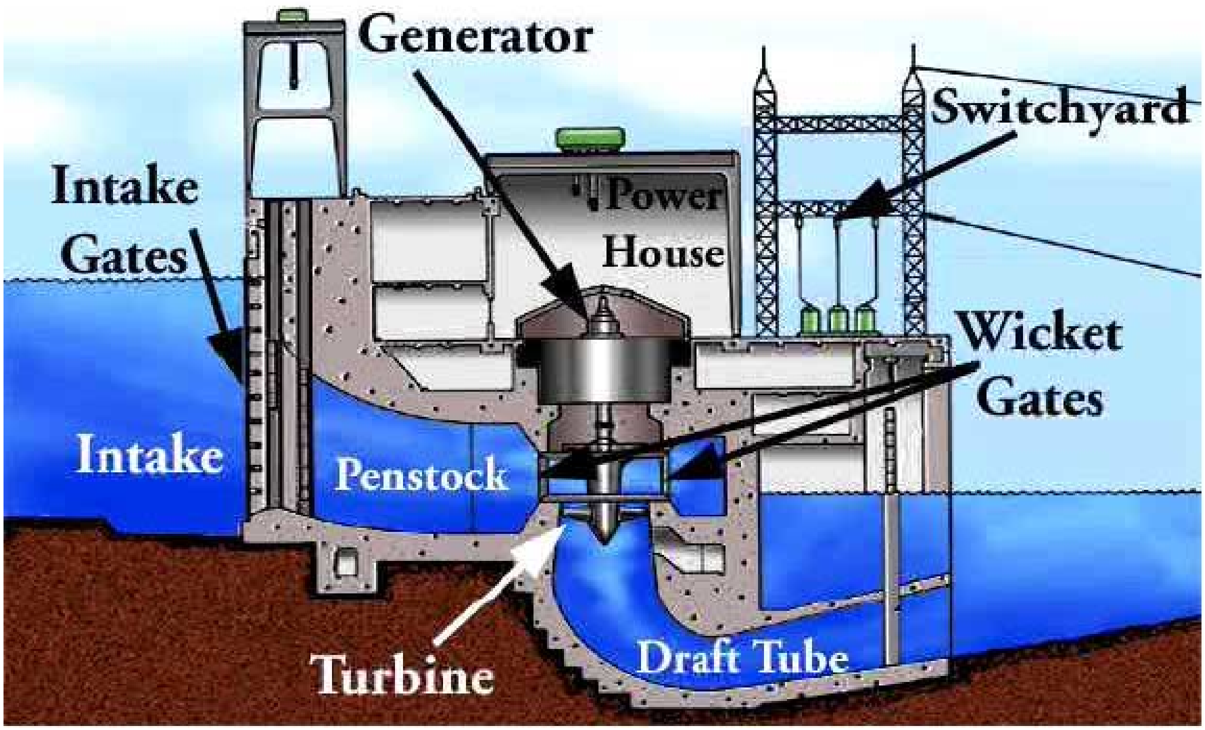


Figure 1.7-1 Typical Hydroelectric Generating Plant (Source: APC, 2000a, as modified by Kleinschmidt)



2.0 PROJECT INFORMATION

2.1 Project Lands and Boundary

The H. Neely Henry (Henry) development is located on the Coosa River. Neely Henry Lake (lake) extends approximately 78 miles upstream from the Neely Henry Dam (dam) through Cherokee, Calhoun, Etowah and St. Clair counties in northeast Alabama. The dam is located approximately 147 river miles above the confluence of the Coosa and Tallapoosa Rivers, which form the Alabama River (APC, 1995). The Henry development has a generating capacity of 72.9 MW.

The Henry development boundary (*i.e.*, those lands included in the FERC license) includes the lake (11,235 acres) up to normal pool elevation of 508 feet (ft) mean sea level (msl) and flood easements between el. 508 to 527 (Figure 2.1-1)(APC, 2000b). APC's shoreline and tailrace properties are shown in Section 4.7 (Figures 4.7-2). There are no federal lands within the Project area.

2.2 Project Description

2.2.1 Reservoir

Henry Lake extends 78 miles upstream from the Henry Dam to the Weiss Dam and has a surface area of 11,235 acres at normal water surface elevation of 508 ft msl during the summer (May 1 to October 31). The normal water surface elevation is 505 ft msl during the winter (November 5 to April 15) (APC, 1979). The lake has 339 miles of shoreline and a maximum depth of 53 ft (APC, 1995). The lake is relatively shallow, averaging 10.8 ft (3.3 m) in depth with a maximum depth of only 52.0 ft (16 m). Due to its shallow nature, the lake has limited storage capacity and typically fluctuates less than 1.5 ft in water level on a daily basis. Further, the lake is relatively small in size (11,235 surface acres) and cycles through quickly, having only a 5.78 day hydraulic retention time. For these reasons, the lake does not typically thermally stratify (ADEM, 1984). The lake is used for hydroelectric generation, navigation flow augmentation, flood control, storage for power generation, maintenance of downstream water quality, industrial and municipal water supply, irrigation and recreational opportunities and serves as habitat for fish and wildlife.

2.2.2 Dam

The water retaining structures at Henry development have a total length of 5,766 ft. The structures include a concrete gravity dam, earth embankments and powerhouse. The dam impounds water from a 6,600 square mile drainage area. The limited storage capacity of Henry Lake is 120,600 acre-ft at the normal pool el. of 508 ft msl.

The dam consists of a concrete gravity section, 858 ft long with earth fill non-overflow embankments on either side. The east embankment section is about 850 ft long and 60 ft high. The west embankment section is about 3,200 ft long and 60 ft high. Both have a top elevation of 539 ft msl (FERC, 1998; Verigin, 1995). The concrete section consists of a spillway section about 305 ft long, an intake-powerhouse section 300 ft long, and non-overflow bulkhead sections at the east and west ends with lengths 120 ft and 133 ft, respectively. All sections have a top elevation of 539 ft msl. The spillway has a crest elevation of 480 ft msl. The intake-powerhouse is about 104 ft high and the spillway is about 100 ft high. The spillway is equipped with six tainter gates, each 40 ft wide and 29 ft high.

2.2.3 Powerhouse

The concrete powerhouse is built integrally with the intake and is about 105 ft high, 300 ft long, and 170 ft wide including the service bay. It contains three vertical fixed-blade turbines, each rated at 33,500 horsepower (hp) under 35 ft of head, and three generators, each rated at 24.3 MW (27,000 kVA at 0.9 power factor). This yields a total rated capacity for the Henry development of 72.9 MW (APC, 1979; FERC, 1998 Verigin, 1995).

2.2.4 Tailrace

Discharges from the powerhouse are the upper reaches of APC's Logan Martin Lake, which has a normal full pool elevation of 465 ft msl (APC, 1995).

2.2.5 Transmission Lines

The plant's substation is connected to APC's transmission system through two high voltage lines: Anniston and Gulf States Steel. Both lines are rated at 115 Kv.

2.3 Project History and Improvements

Construction of the Henry development began in 1962. Construction was completed and the units were put in service in 1966. No major modifications have been made to the dam since completion of construction, aside from installation of embankment relief wells in 1976 (Verigin, 1995; APC, 1995).

In the 1970s, traffic on a roadway that crosses the powerhouse on its concrete slab roof caused vertical and longitudinal movement of the slab at its joints, resulting in leakage of rainwater. Attempts were made to stiffen the joints and the roadway was paved, but bumps developed at the joints, causing localized deterioration of the pavement. A king post truss system with tension cables was installed under the slab in 1977 and the roadway expansion joints were caulked in 1979, substantially reducing leakage (Verigin, 1995).

In 1986, 344 buoys were placed at strategic locations on the lake for public safety. Additional riprap was placed on the west bank of the Coosa River downstream from the spillway in 1988 to remedy erosion damage, and a small amount of riprap was added in 1990 on the same bank at the toe of the wing wall. In 1990, a sounding survey was made of the river channel downstream from the dam which documented no major problems (Verigin, 1995).

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, including the Henry development. The facilities provide a significant source of reliable, dependable and reasonably priced electricity for APC's consumers. Electricity produced at the Henry 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

By letter dated June 29, 1999 to FERC, APC is proposing to modify the rule curve for Henry Lake to enhance recreational use of the lake. APC has proposed a trial period of three years to confirm results of changes in lake elevation. During this period, the normal maximum lake level would be at el. 508

ft msl. The maximum level would be lowered to el. 507 ft msl between October 1 and November 30. The normal maximum level would remain at el. 507 ft msl from December 1 until March 31. APC would then refill the lake to el. 508 ft msl by May 1. During the trial period its effectiveness will be evaluated. Following the evaluations, APC will decide whether to file an application with FERC to make these lake levels permanent (FERC, 1999).

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 Henry development.

Project Location Map
Neely Henry
Coosa-Warrior Rivers Relicensing

Project Boundary
Coosa River
City Boundaries
County Boundaries

Note:
Neely Henry -

Normal Pool (May 1 to October 31) - el. 508 ft. msl
Normal Pool (November 5 to April 15) - el. 505 ft. msl
Maximum Pool - el. 527 ft. msl
Normal Tailwater - between el. 460 and 468 ft. msl

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

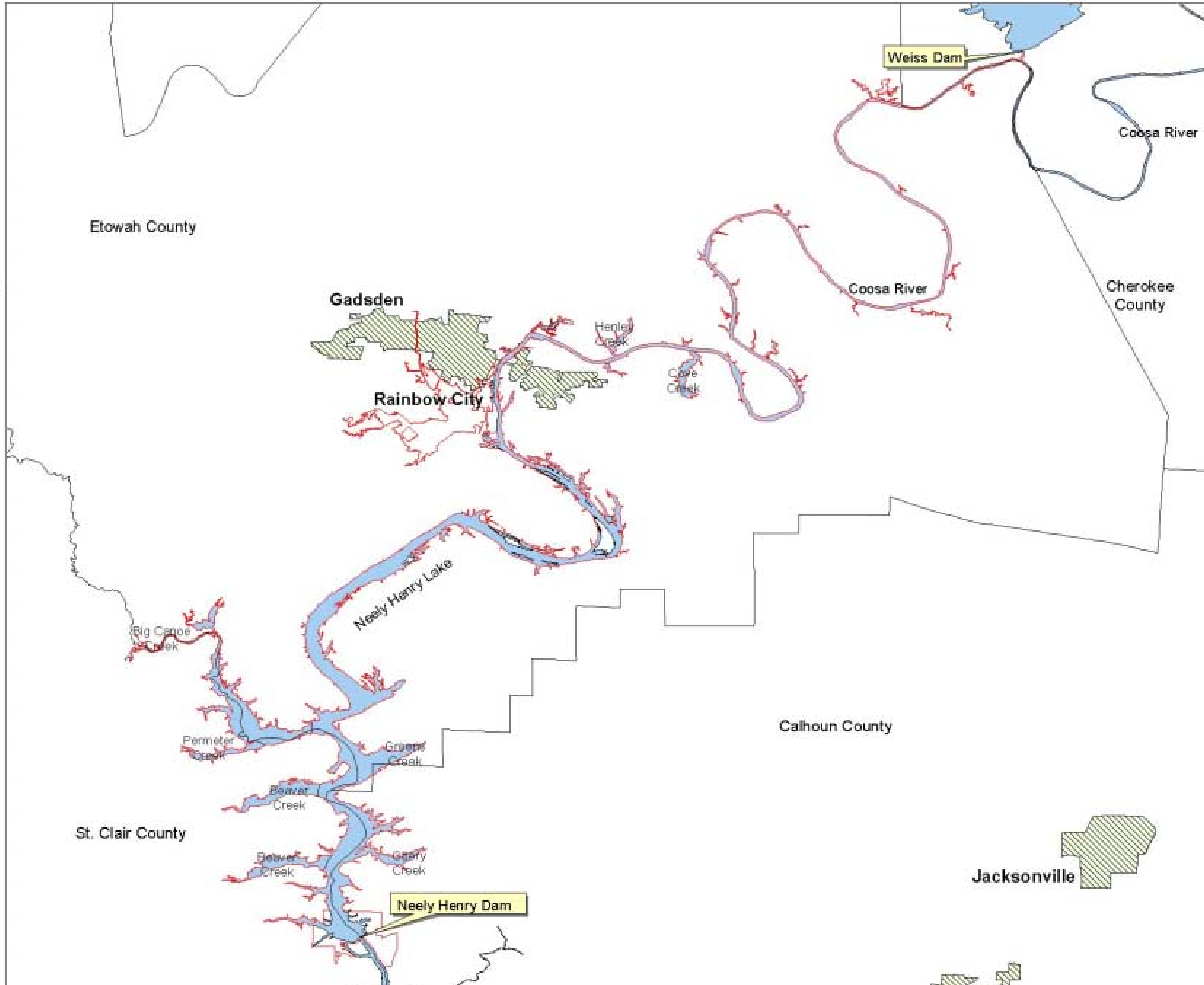
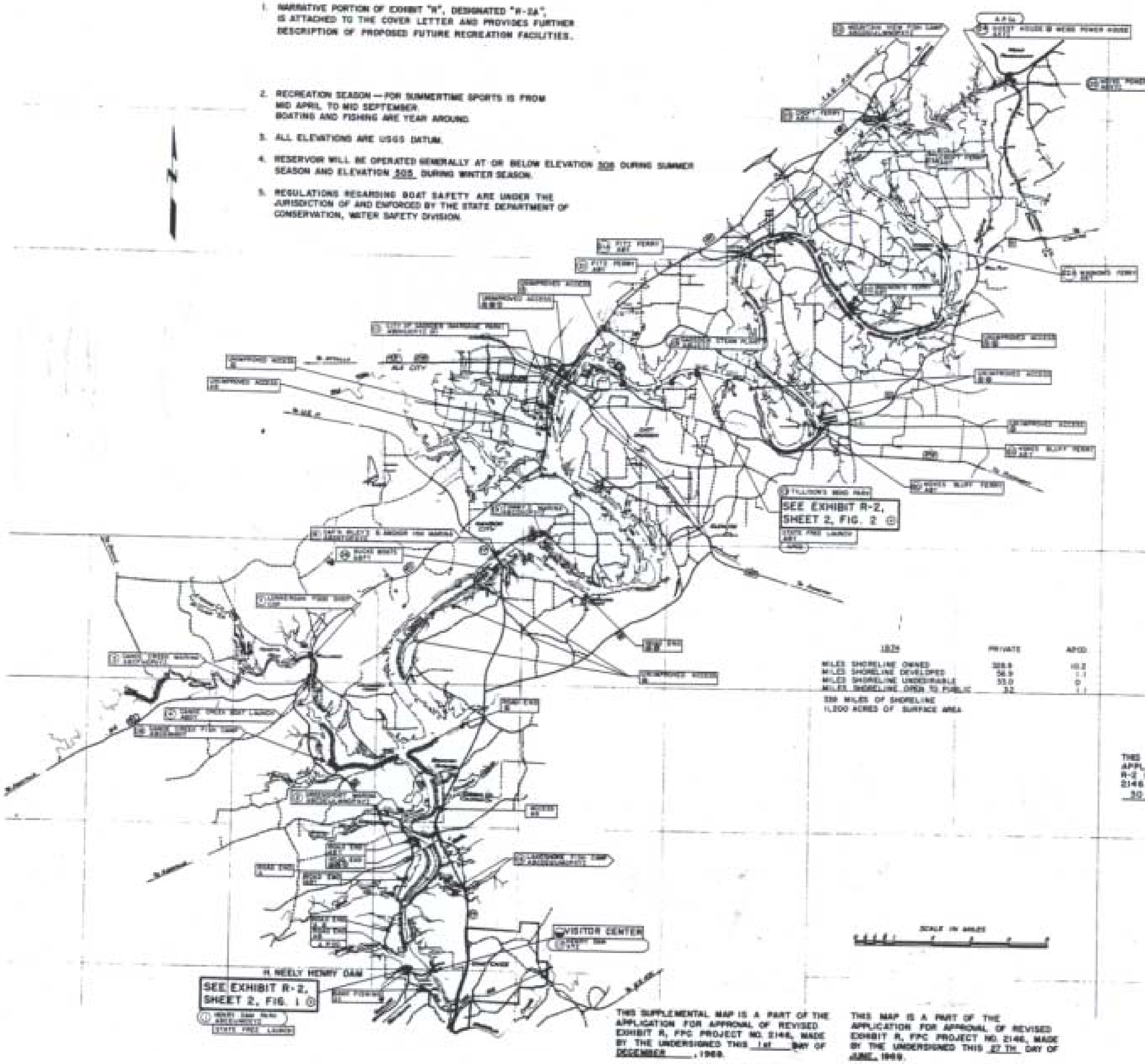


Figure 2.1-1

NOTES:

1. NARRATIVE PORTION OF EXHIBIT "R", DESIGNATED "R-2A", IS ATTACHED TO THE COVER LETTER AND PROVIDES FURTHER DESCRIPTION OF PROPOSED FUTURE RECREATION FACILITIES.
2. RECREATION SEASON — FOR SUMMERTIME SPORTS IS FROM MID APRIL TO MID SEPTEMBER. BOATING AND FISHING ARE YEAR AROUND.
3. ALL ELEVATIONS ARE USGS DATUM.
4. RESERVOIR WILL BE OPERATED GENERALLY AT OR BELOW ELEVATION 508 DURING SUMMER SEASON AND ELEVATION 505 DURING WINTER SEASON.
5. REGULATIONS REGARDING BOAT SAFETY ARE UNDER THE JURISDICTION OF AND ENFORCED BY THE STATE DEPARTMENT OF CONSERVATION, WATER SAFETY DIVISION.



LEGEND

- PUBLIC
- ALABAMA POWER CO.
- PRIVATE
- COMMERCIAL
- FUTURE REC. DEVELOPMENT (A.P.CO.)
- FUTURE REC. DEVELOPMENT (PRIVATE)

LEGEND

α	USED BUT UNDEVELOPED	14
β	USED BUT UNDEVELOPED	7
γ	USED BUT UNDEVELOPED	2
A	ACCESS TO RESERVOIR	31
B	BOAT RAMP	28
C	BAIT FOR SALE	8
D	FISHING PIER OR BARGES	9
E	BATHING AREA	4
F	MARINA	3
G	FISHING CAMP	4
H	PLAYGROUND AREA	1
I	PICNIC AREA	8
J	PICNIC TABLES	99
K	MEALS SERVED	1
L	GROUP CAMP	2
M	TENT SITES	3
N	TRAILER SPACES	4
O	SNACKS OR GROCERIES	10
P	GASOLINE	7
S	COMFORT STATION	12
T	PARKING	24
Z	DRINKING WATER	12
⊙	IN COOPERATION WITH OTHERS	2
⊗	NOT OPEN TO GENERAL PUBLIC	1
	RECREATIONAL COTTAGE SITES	
	PROJECT BOUNDARY	
⊡	AREAS LEASED FROM LICENSEE FOR COMMERCIAL RECREATION	

- U.S. HIGHWAY
- STATE HIGHWAY
- COUNTY HIGHWAY
- LANDS TO BE LEFT UNCLEARED
- ENTIRE COST BORNE BY COMPANY

ESTIMATED ANNUAL VISITATIONS

	PRESENT	ULTIMATE
DAY	546,000	4,471,000
OVERNIGHT	437,000	3,577,000

VISITATION ON AVERAGE PEAK WEEKEND DAY

	PRESENT	ULTIMATE
DAY	29,900	244,900
OVERNIGHT	23,900	195,900

1974	PRIVATE	APCO
MILES SHORELINE OWNED	328.8	10.2
MILES SHORELINE DEVELOPED	56.9	1.1
MILES SHORELINE UNDESIRABLE	33.0	0
MILES SHORELINE OPEN TO PUBLIC	32	1.1

339 MILES OF SHORELINE
11,200 ACRES OF SURFACE AREA

SCALE IN MILES

THIS MAP IS A PART OF THE APPLICATION FOR APPROVAL OF EXHIBIT R-2 REVISION NO. TWO, FPC PROJECT NO. 2146, MADE BY THE UNDERSIGNED THIS 30th DAY OF SEPTEMBER, 1975.

ALABAMA POWER CO.

BY [signature]
VICE PRESIDENT

THIS SUPPLEMENTAL MAP IS A PART OF THE APPLICATION FOR APPROVAL OF REVISED EXHIBIT R, FPC PROJECT NO. 2146, MADE BY THE UNDERSIGNED THIS 1st DAY OF DECEMBER, 1969.

ALABAMA POWER CO.

BY [signature]
VICE PRESIDENT

THIS MAP IS A PART OF THE APPLICATION FOR APPROVAL OF REVISED EXHIBIT R, FPC PROJECT NO. 2146, MADE BY THE UNDERSIGNED THIS 27 TH DAY OF JUNE, 1969.

ALABAMA POWER CO.

BY [signature]
VICE PRESIDENT

SUPPLEMENTAL EXHIBIT R-2 REVISED

ALABAMA POWER COMPANY
BIRMINGHAM, ALA.

SUBJECT H. NEELY HENRY DEVELOPMENT - PROJECT NO. 2146
DETAIL RECREATION PLAN
DRAWN BY J.V.S. TRACED BY
APPROVED [signature] DATE 12-22-64
SCALE AS SHOWN SHEET NO. 1 OF 2 SHEETS

FPC #2146-377

FIGURE 2.5-1

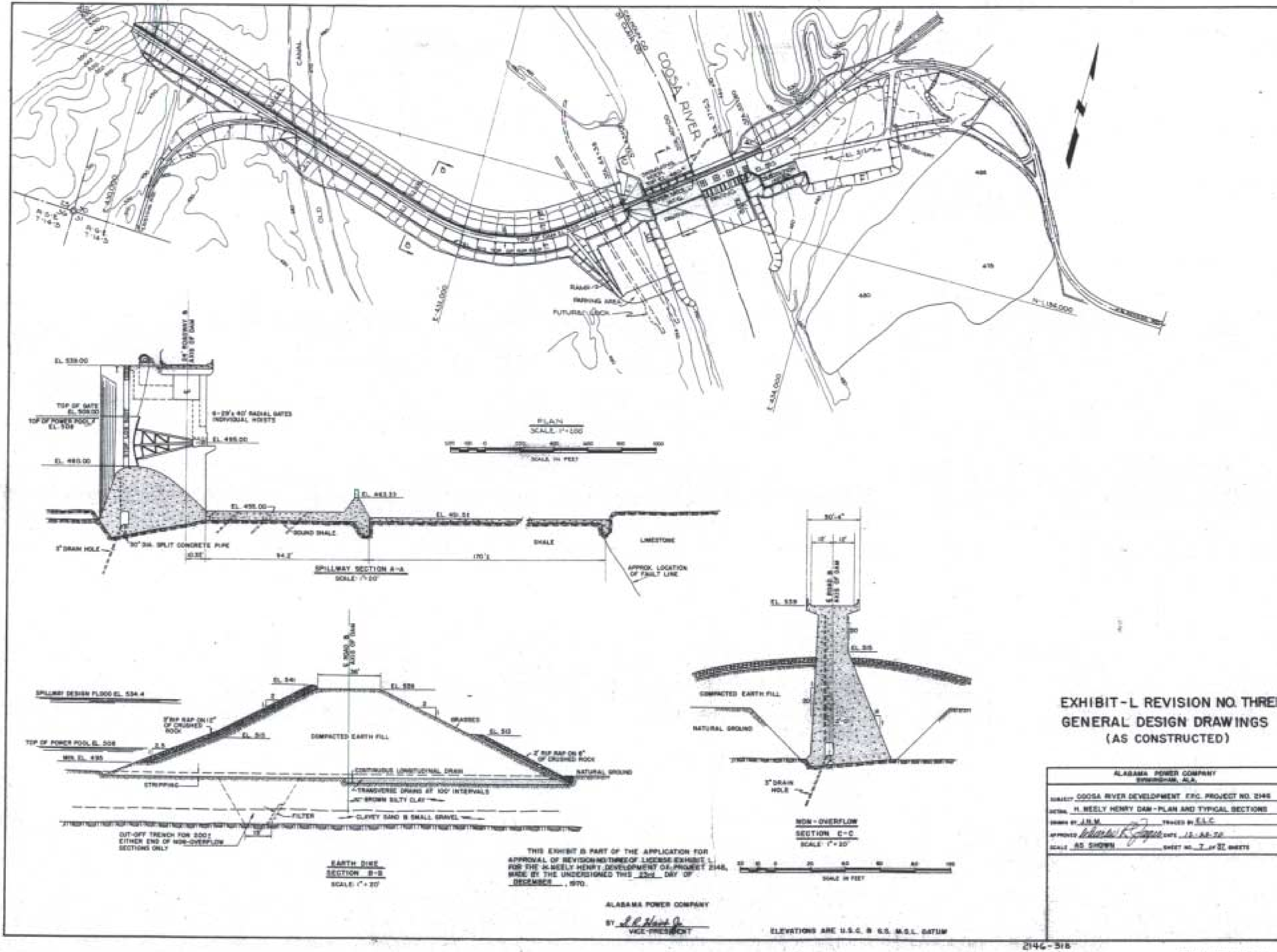
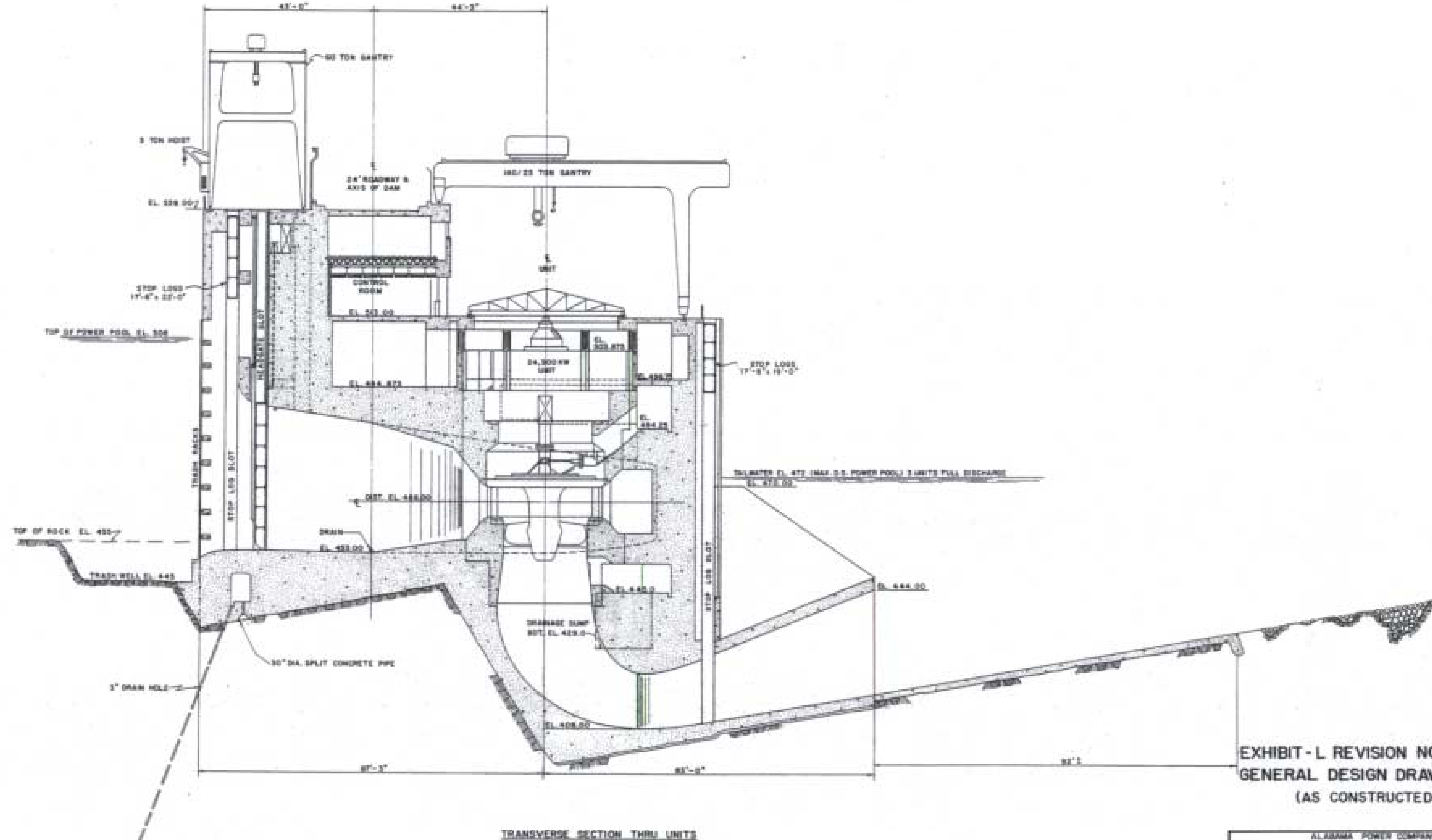

COOSA RIVER
CANAL
PLAN
SCALE: 1" = 100'
SCALE IN FEET
RAMP
PARKING AREA
FUTURE LOCK
EL. 539.00
TOP OF GATE EL. 509.00
TOP OF POWER POOL EL. 508
6-29' x 40' RADIAL GATES INDIVIDUAL HOISTS
EL. 495.00
EL. 480.00
EL. 455.00
SOUND SHALE
30" DIA. SPLIT CONCRETE PIPE
3" DRAIN HOLE
SHALE
LIMESTONE
APPROX. LOCATION OF FAULT LINE
SPILLWAY SECTION A-A
SCALE: 1" = 20'
SPILLWAY DESIGN FLOOD EL. 534.4
TOP OF POWER POOL EL. 508
MIN. EL. 495
COMPACTED EARTH FILL
GRASSES
CONTINUOUS LONGITUDINAL DRAIN
TRANSVERSE DRAINS AT 100' INTERVALS
BROWN SILTY CLAY
NATURAL GROUND
STRIPPING
FILTER
CLAYEY SAND & SMALL GRAVEL
CUT-OFF TRENCH FOR 200'± EITHER END OF NON-OVERFLOW SECTIONS ONLY
EARTH DIKE
SECTION B-B
SCALE: 1" = 20'
EL. 539
COMPACTED EARTH FILL
NATURAL GROUND
3" DRAIN HOLE
NON-OVERFLOW
SECTION C-C
SCALE: 1" = 20'
SCALE IN FEET
THIS EXHIBIT IS PART OF THE APPLICATION FOR APPROVAL OF REVISION NO. THREE OF LICENSE EXHIBIT L FOR THE H. NEELY HENRY DEVELOPMENT OF PROJECT 2146, MADE BY THE UNDERSIGNED THIS 23rd DAY OF DECEMBER, 1970.
ALABAMA POWER COMPANY
BY
VICE-PRESIDENT
ELEVATIONS ARE U.S.C. & G.S. M.S.L. DATUM
EXHIBIT-L REVISION NO. THREE
GENERAL DESIGN DRAWINGS
(AS CONSTRUCTED)
ALABAMA POWER COMPANY
BIRMINGHAM, ALA.
COOSA RIVER DEVELOPMENT F.P.C. PROJECT NO. 2146
H. NEELY HENRY DAM - PLAN AND TYPICAL SECTIONS
SCALE AS SHOWN
2146-516

FIGURE 2.5–2



TRANSVERSE SECTION THRU UNITS

TYPICAL

SCALE IN FEET

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

THIS EXHIBIT IS PART OF THE APPLICATION FOR APPROVAL OF REVISION NO. TWO OF LICENSE EXHIBIT L FOR THE H. NEELY HENRY DEVELOPMENT OF PROJECT 2146, MADE BY THE UNDERSIGNED THIS 23rd DAY OF DECEMBER, 1970.

ALABAMA POWER COMPANY

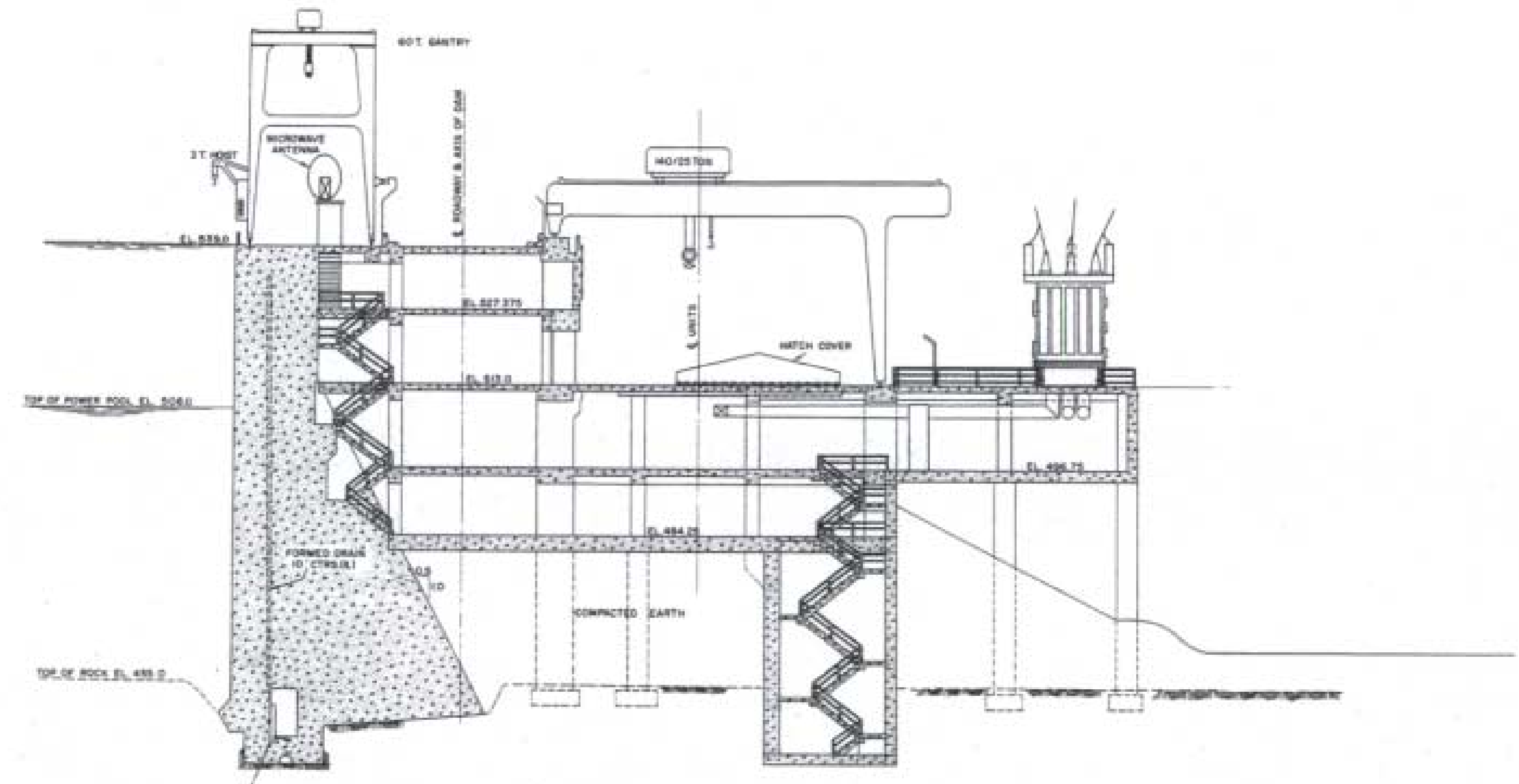
BY [signature]
VICE-PRESIDENT

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

ALABAMA POWER COMPANY BIRMINGHAM, ALA.
SUBJECT: COOSA RIVER DEVELOPMENT—F.P.C. PROJECT NO. 2146
DETAIL: H. NEELY HENRY DAM-POWERHOUSE TRANSVERSE SECTION
DRAWN BY C.R.K. TRACED BY W.M.L.
APPROVED [signature] DATE 12-22-70
SCALE 3/32" = 1'-0" SHEET NO. 8 OF 37 SHEETS

2146-[redacted] 319

FIGURE 2.5-3



TRANSVERSE SECTION THRU SERVICE BAY

SCALE IN FEET

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

THIS EXHIBIT IS PART OF THE APPLICATION FOR APPROVAL OF REVISION NO. TWO OF LICENSE EXHIBIT L FOR THE H. NEELY HENRY DEVELOPMENT OF PROJECT 2146, MADE BY THE UNDERSIGNED THIS 23rd DAY OF DECEMBER, 1970.

ALABAMA POWER COMPANY

BY S. R. Hart Jr.
VICE-PRESIDENT

ALABAMA POWER COMPANY
BIRMINGHAM, ALA.

SUBJECT COOSA RIVER DEVELOPMENT F.P.C. PROJECT NO. 2146
DETAIL H. NEELY HENRY DAM-TRANSVERSE SECTION THRU SERVICE BAY
DRAWN BY J.N.M. TRACED BY B.N.C.
APPROVED [signature] DATE 12-23-70
SCALE 3/32"=1'-0" SHEET NO. 9 OF 37 SHEETS

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

2146-320

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 the development is 6,600 square miles consisting of parts of Cherokee, Calhoun, St. Clair, and Etowah Counties (APC, 1979). 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 54 inches. Rainfall and stream flow information is reported to APC through automated gages. There are eight rain and three streamflow gages located throughout the basin.

3.1.2 Flow Rates and Duration

Review of the USGS flow records indicate that a flow gage is located upstream of the Project at Gadsden (Coosa River at Gadsden, Alabama, #02400500 – in operation since 1926) and measures inflow data (from Weiss Dam) into the Project. Another gage is located further downstream of both the Henry and Logan Martin developments combined (Coosa River at Childersburg). As such, there are no USGS gaging records for the area directly downstream of the Henry development, which demonstrate Project outflow. Since the Project has little flood storage capacity and fluctuates very little, the Gadsden gage was used to determine flow duration data for the Henry Project. The Gadsden gage is located midstream on a pier of the Etowah County Memorial Bridge on Forrest Avenue in Gadsden, 450 ft downstream from Louisville & Nashville Railroad bridge, 1.5 miles upstream from Big Wills Creek.

Monthly flow duration curves for the Henry development were prepared using the mean daily flow data from 1966 through 1976 recorded at the USGS Gadsden gage. This 10-year period of record was the longest continuous period of record available for the Henry development after commercial operation began in 1966. The period of record used for the curves was terminated after 1976 because of the intermittent nature of the gage data between 1976 and the present. Mean daily flows from the gage were pro-rated to the site based on the ratio of the respective drainage areas. The adjustment used was 1.1371.

The average discharge for the gage for the entire period of record (1926 to present) is 9,658 cfs. The average flow for the period 1966 to 1976 is however, 10,627 cfs indicating a slightly wetter period than the long-term historical value. The extreme high flow for the gage was recorded on April 6, 1886 at 115,000 cfs. High inflows typically occur during the spring and winter. High flows during these periods usually range between 40,000 and 60,000 cfs. Low daily inflows during the summer can be as low as several hundred cfs.

3.2 Project Operations

3.2.1 Description of Power Operations

3.2.1.1 Typical Operations

APC operates the Henry plant to produce peaking power and provide downstream flow augmentation. A curve delineating the seasonal variation in storage of the Henry Lake is shown in Figure 3.2-1. The lake level is normally maintained at or below the curve. The compulsory drawdown each year is to el. 505 ft msl during the flood season. APC normally operates on a weekly cycle and the power generated is available for use in daily peak-load periods Monday through Friday. When the lake level is below that shown on the Storage Delineation Curve (Figure 3.2-1), the powerhouse is operated in accordance with the rule 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, 1979).

Historically, APC has operated the lake such that from May 1 to October 31, the lake level was maintained at a normal maximum water surface el. of 508 ft msl, and el. 505 ft msl during the winter (November 5 to April 15). However, APC is evaluating alternative operating rules to accommodate recreational use. Under the revised rules, APC would maintain the lake at el. 508 ft msl from May 1 to September 30, then draw down to el. 507 ft msl by December 1 and maintain this level until March 31, then refill to el. 508 ft msl by May 1.

The Henry 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 developments in the Coosa Basin, including the Army Corp of Engineers' (ACOE) Carters (over 200 miles upstream on the Coosawattee River) and Allatoona (over 150 miles upstream on the Etowah River) Reservoirs and APC's Weiss, Logan Martin, 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. Additionally, an under-frequency relaying system automatically loads the units if system frequency falls to 59.7 Hz. The spillway can also be operated remotely from the ACC (APC, 1995).

Usable storage of 30,640 acre-ft is provided between elevations 508 ft msl and 505 ft msl to augment flow into the downstream Logan

Martin Lake during periods of low stream flow. The lake is lowered to el. 505 ft msl during the winter months to provide power storage (Verigin, 1995; FERC, 1998). The normal static tailwater elevation varies from el. 465 ft msl to el. 460 ft msl, providing a fluctuating gross head of 43 ft to 45 ft.

3.2.1.2 Flood Control Operations

Flood control in the basin upstream is provided by APC's Weiss development and 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 drainage 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 Project is operated on an Induced Surcharge Curve that limits discharges to the downstream Henry Project within the limits 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.

There is limited flood control storage in Henry Lake. APC lowers the lake to minimize river stages in advance of impending floods to reduce potential damage to the Gadsden area (ACOE, 1998). The principal factors in determining when to begin drawdown, the rate of drawdown, and the elevation to which the lake will be lowered are 1) the magnitude of discharges from the upstream Weiss development and 2) runoff estimates for the portion of the drainage basin downstream of Weiss. Figure 3.2.2 summarizes the rules for drawdown (APC, 1979).

When the expected total inflow at Gadsden (Weiss discharge plus runoff between Weiss and Gadsden) equals 28,500 cfs, Henry Lake is drawn down to 507.0 ft msl. If there are expected total inflows of 33,000 cfs or 37,000 cfs, APC will draw the lake down to 506 ft msl or 505 ft msl, respectively. The rate of drawdown may be as much as 0.33 ft per hour or as little as twice the rate of rise at the Gadsden gage. The lake is drawn down to 502.5 ft msl when either the expected Weiss discharge is greater than 40,000 cfs or if the expected total inflow at Gadsden is 40,500 cfs or more. The drawdown rate is 0.33 ft per hour between 508 ft msl and 505 ft msl, and 0.40 ft per hour below 505 ft msl.

Once the lake has been lowered to either 505 ft msl or 502.5 ft msl, APC operates to maintain that level to the extent possible with outflow from the lake limited to spillway capacity. Discharge through the turbines may be substituted for, but not added to, the required spillway discharge. The lake is returned to its normal level when the Weiss pool is either at elevation 565 ft msl and receding or at the seasonal level specified by the top-of-power- pool curve, with the rate of inflow decreasing; and the stage of the Coosa River at the Gadsden Steam Plant is below el. 511 ft msl and falling (APC, 1979).

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 activities.

3.2.2 Description of Non-Power Operations

In addition to power production, the Henry 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 Henry development. One exception is the trial evaluations of alternative lake levels as described in Section 2.5.2 above. As part of the relicensing process and in response to stakeholder interest, APC may reexamine their operations to enhance recreational, operational, environmental, and economic values of the Henry development.

3.2.4 Project Maintenance

Project personnel consist of a superintendent, a maintenance crew and a security crew. Maintenance personnel are on site eight hours per day, Monday through Friday and security personnel are present at all other times. The plant is monitored and operated remotely 24 hours a day (APC, 1995). 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 and APC also conduct annual inspections. APC takes regular measurements and makes evaluations of settlement, seepage, and piezometric levels. The dam is also monitored through instrumentation: 28 piezometers are read monthly; 88 gallery relief drains are measured annually, levels in 19 relief wells and the total relief well discharge are read monthly; and 20 deformation monuments are measured annually (APC, 2000c). APC maintains project records at the powerhouse including design drawings, instrumentation data, dam safety inspections, and emergency action plans (FERC, 1998).

The Henry Dam is classified under FERC regulation 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 Parts 8 and 12, the dam must be inspected every five years by a FERC approved independent consultant. The most recent inspection of the Henry development occurred in 1995 and included a field inspection and a review of existing data, information, and reports. Instrumentation at the Project includes piezometers in the concrete dam (intake and spillway) and in the right (east) embankment, relief wells along the toe of the right (east) embankment, settlement monuments on the top of the dam (intake and spillway) and embankments (east and west), and trammel points at two spillway bays (Verigin, 1995).

Findings from the safety inspection were as follows (Verigin, 1995):

- There was no evidence of significant settlement of the embankment or concrete dams.
- There was no sign of cracking, offset, or abrupt or significant movement that would affect the safety of the dam. A minor surface slump was noted on the highway embankment adjacent to the right (east) embankment, but this had occurred approximately five years

earlier and was judged to have no effect on the safety of the embankment. No recent movement was detected.

- All significant seepage flows from the embankments are collected and channeled so that they can be visually monitored and flow from relief wells is measured. No seepage conditions were noted that were considered to adversely affect the safety of the embankment. Leakage was clear and of acceptable quality.
- There was no significant cracking of the embankment or concrete structures. No recent movement could be detected in a previously observed crack in the left wall of the leftmost spillway bay.
- The inspection of the dam site judged those facilities to be well maintained, with no signs of significant deterioration.
- There were no indications of significant reservoir rim instability and none had been reported since the previous safety inspection.
- There was no significant erosion of the development, either up or downstream.

An October 1990 Southern Company Services study determined the peak PMF inflows into Henry Lake to be 356,200 cfs, which is considered adequate (Verigin, 1995).

3.3.1.1 Inspection Program

Southern Company and APC's engineers and operating personnel, independent consultants, and FERC perform periodic inspections. Inspected facilities include the spillway, gates, powerhouse abutments, all dam structures, turbines and generating equipment, other buildings, parking areas and tailrace at recreational areas and facilities (FERC, 1998). Special inspections are made when there are abnormal rains (Verigin, 1995).

3.2.1.2 Dam Safety Improvements

A relief well system was installed at the downstream toe of the right embankment in 1976 to help alleviate high piezometric levels observed in the area. This consisted of 21 wells and collector piping installed along a 550 ft length of the dam. This system has functioned as intended in reducing the water levels in the area. The water levels in each well and the total discharge from the system are measured and recorded monthly.

No other major improvements have been necessary to ensure the safety of the dam structures 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. APC issued the current version of the Henry EAP in January, 2000 (APC, 2000c).

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 performing 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 powerhouse for guided tours is available from the east downstream shore. Public parking is provided on the west downstream bank. There is a pier on the east bank below the powerhouse. There is a public recreation area located at the end of the west dike about 0.5 miles from the dam that includes a swimming beach, picnic tables, and a boat ramp. Fishing is the primary recreational activity at or near the dam, and tailrace fishing is popular from both banks and boats. Public boat ramps are available both on Henry Lake and approximately one mile downstream of the dam.

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 (APC, 1995). APC operates an audible alarm with a downstream range of approximately 4,500 ft to alert the public to rapidly rising and turbulent waters from powerhouse and spillway discharges. There are lighted signs over the powerhouse discharge explaining the meaning of the sounding of the alarm. Smaller unlighted signs are posted at public access points within range of the alarm on the downstream banks, along the tailrace. General warning signs are posted along the banks of the powerhouse discharge canal and at downstream public access points, warning that dangerous and turbulent waters quickly cover the rocks during powerhouse and spillway discharges (APC, 1995).

There are also specific warning signs: upstream on the west dike and east 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 also buoys upstream from the powerhouse and spillway and in the tailrace. There are also signs at the public boat ramp directing boaters away from the dam and 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 of the dam (APC, 1995).

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

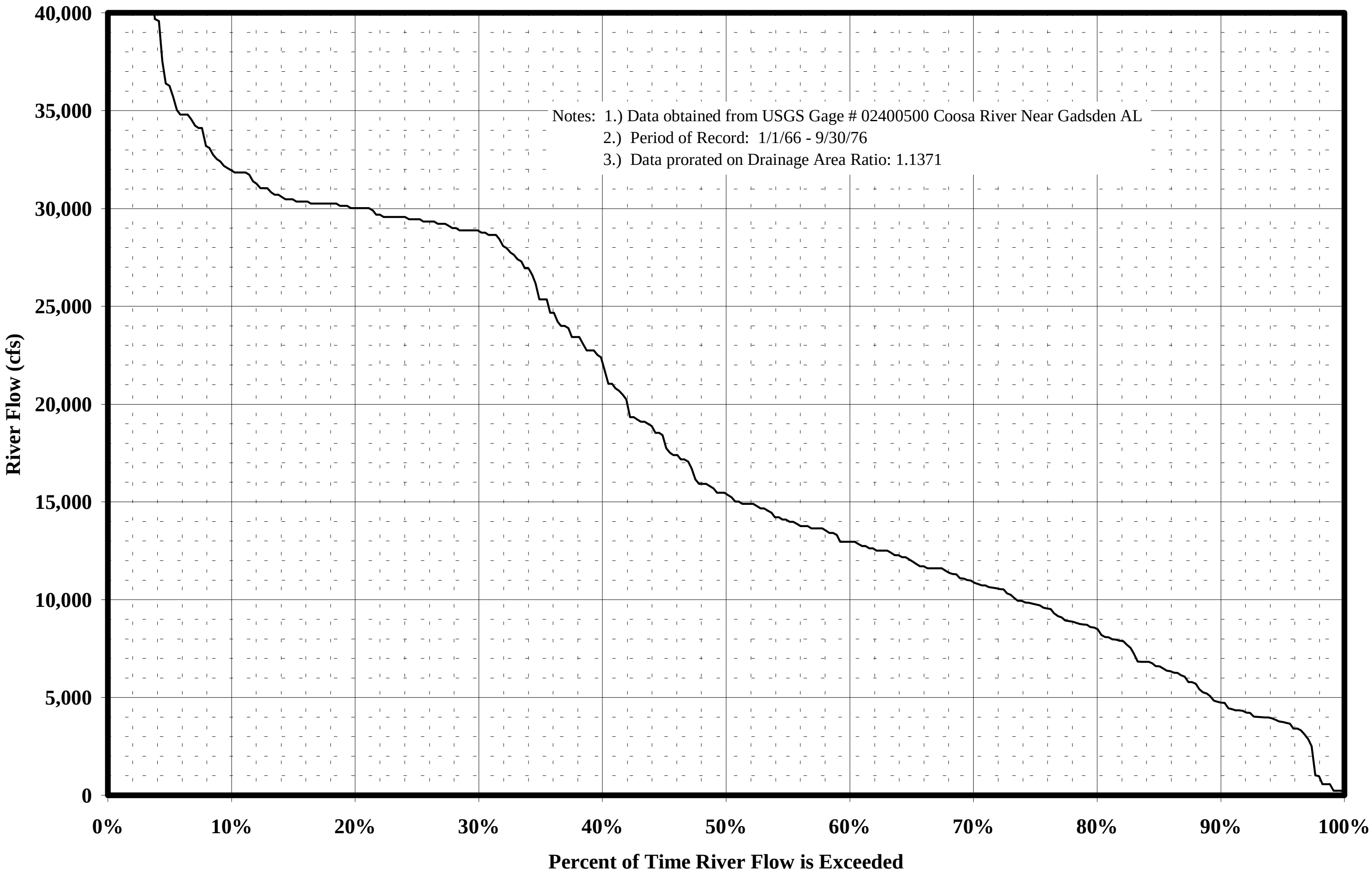


Figure 3.1-2 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, February Flow Duration Curve

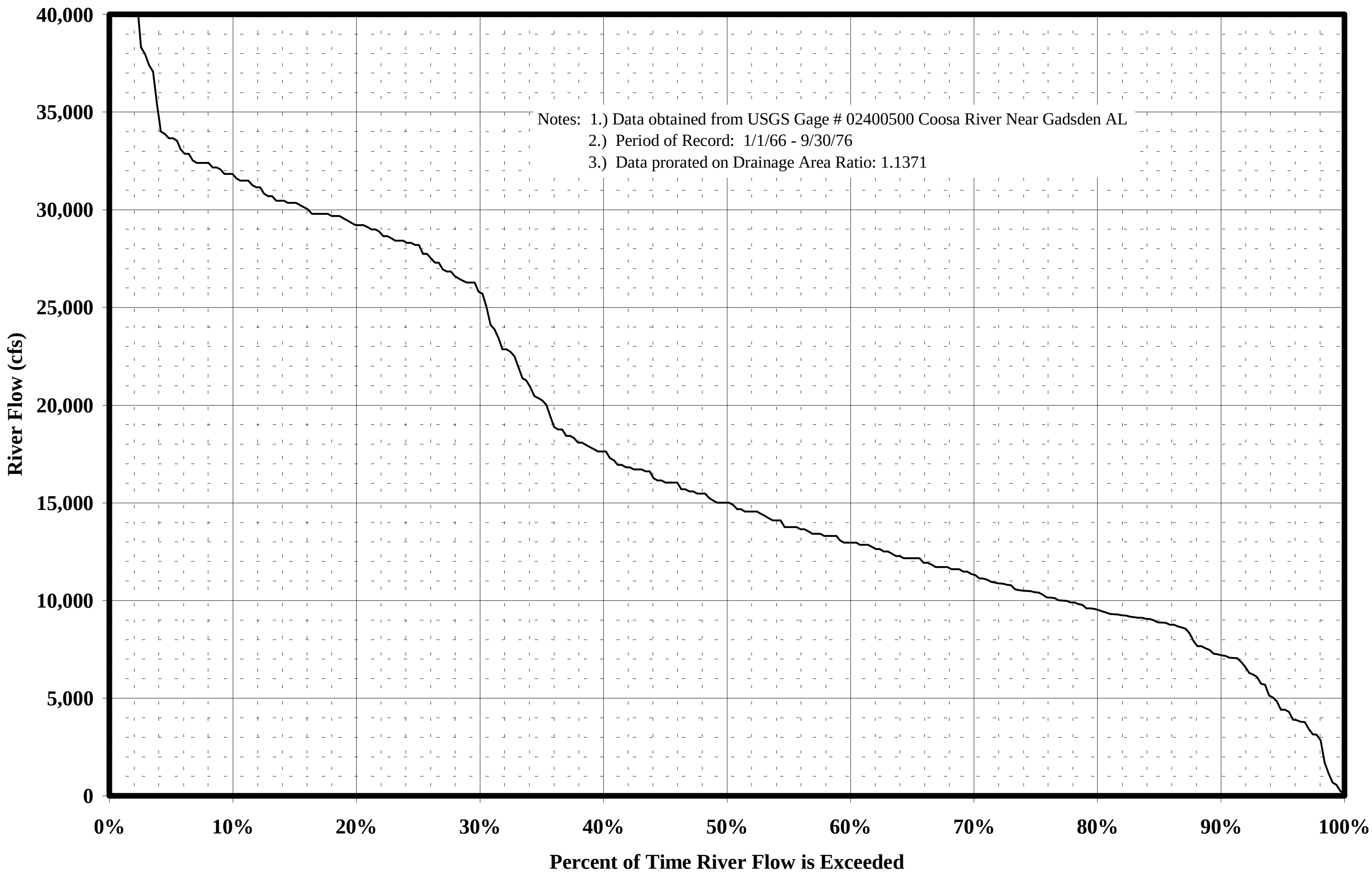


Figure 3.1-3 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, March Flow Duration Curve

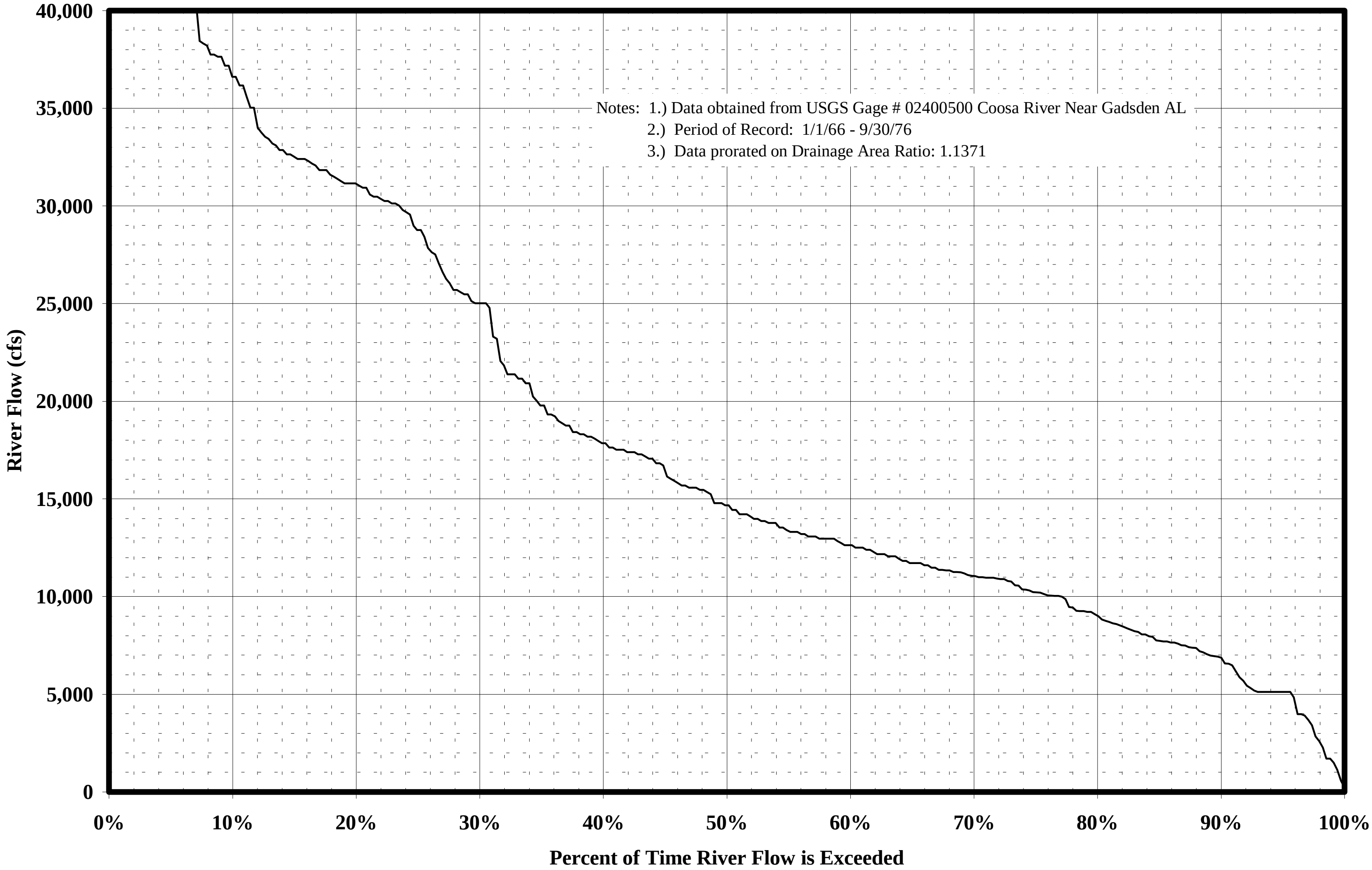


Figure 3.1-4 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, April Flow Duration Curve

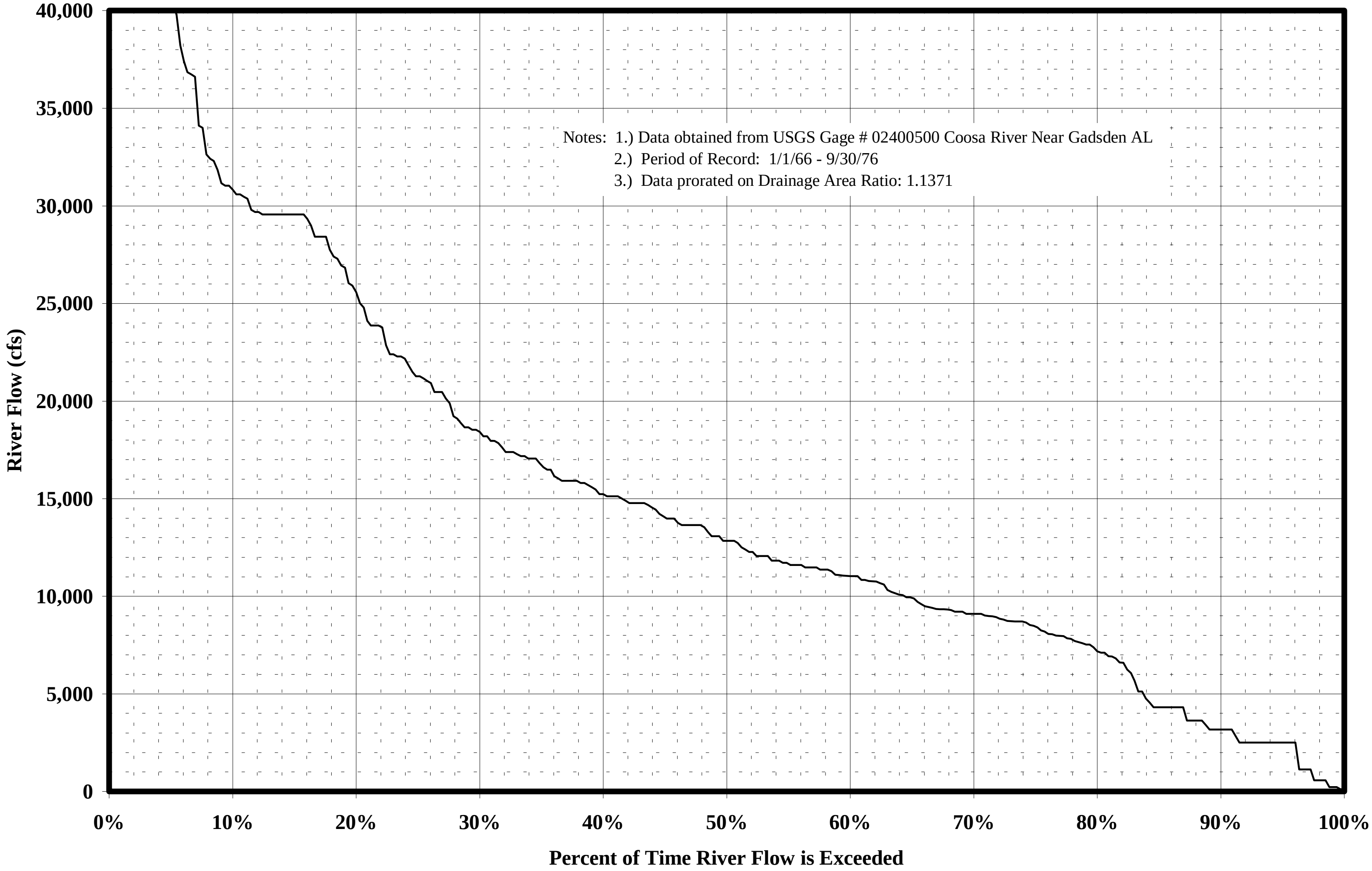


Figure 3.1-5 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, May Flow Duration Curve

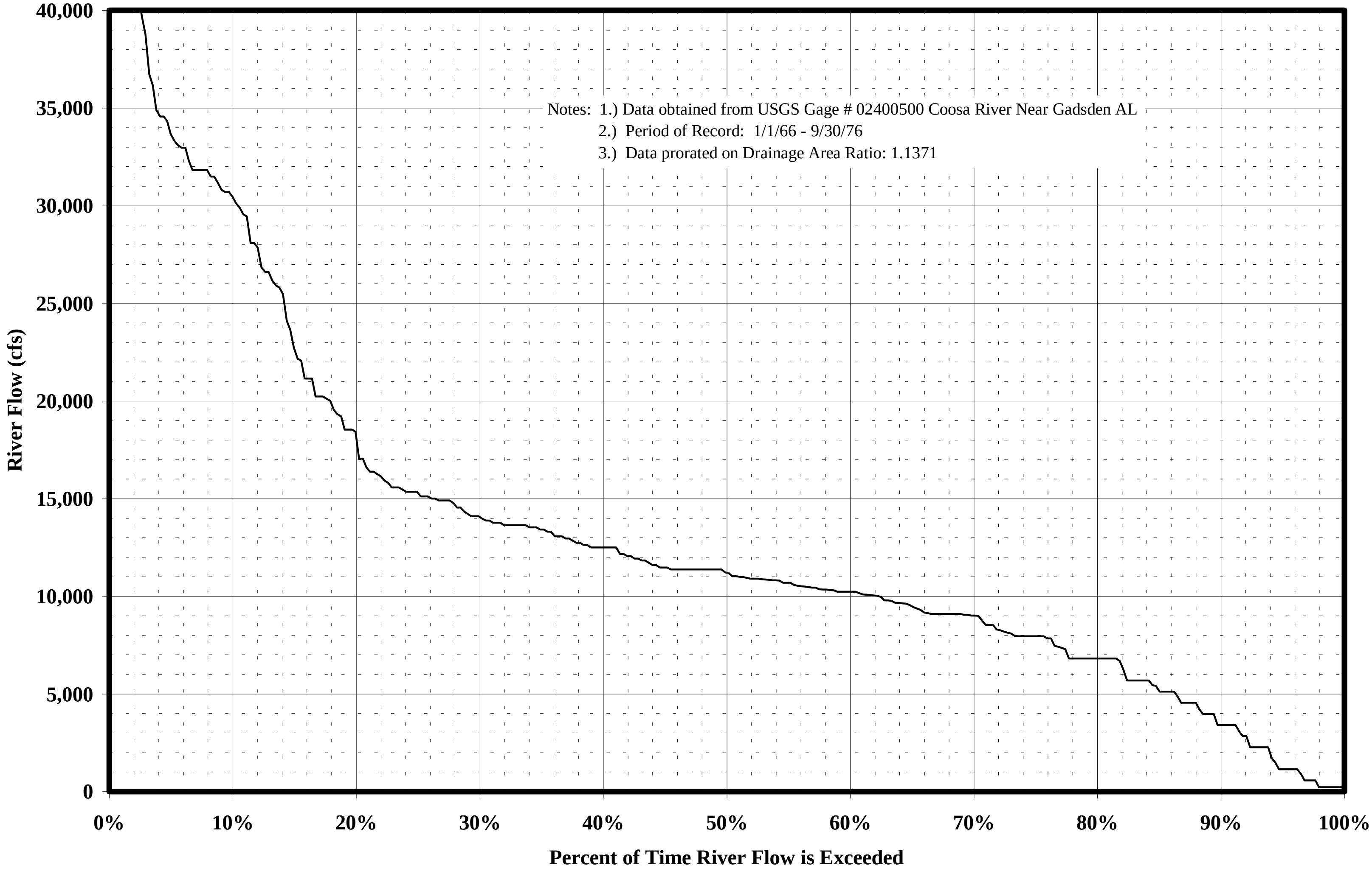


Figure 3.1-6 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, June Flow Duration Curve

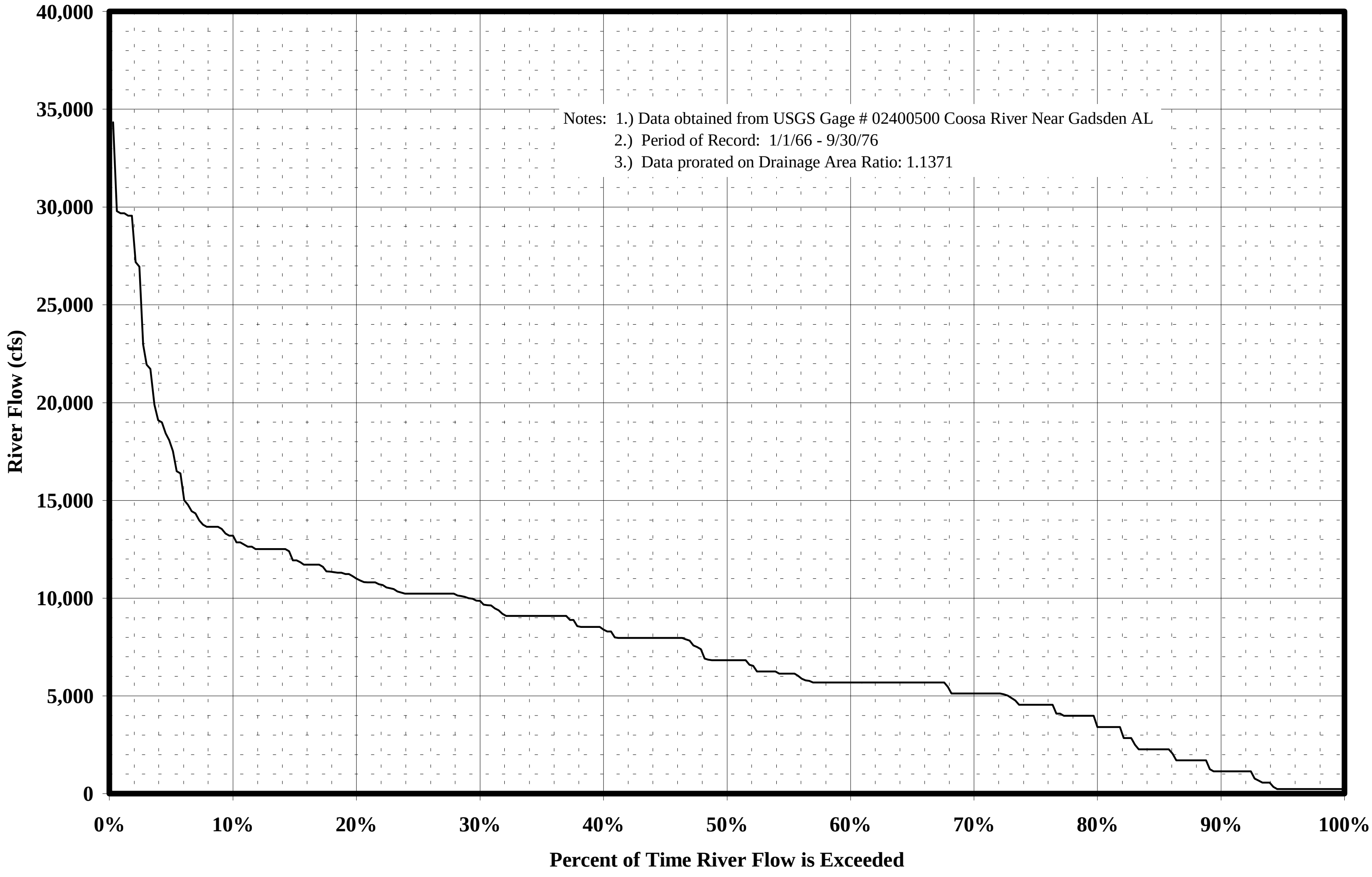


Figure 3.1-7 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, July Flow Duration Curve

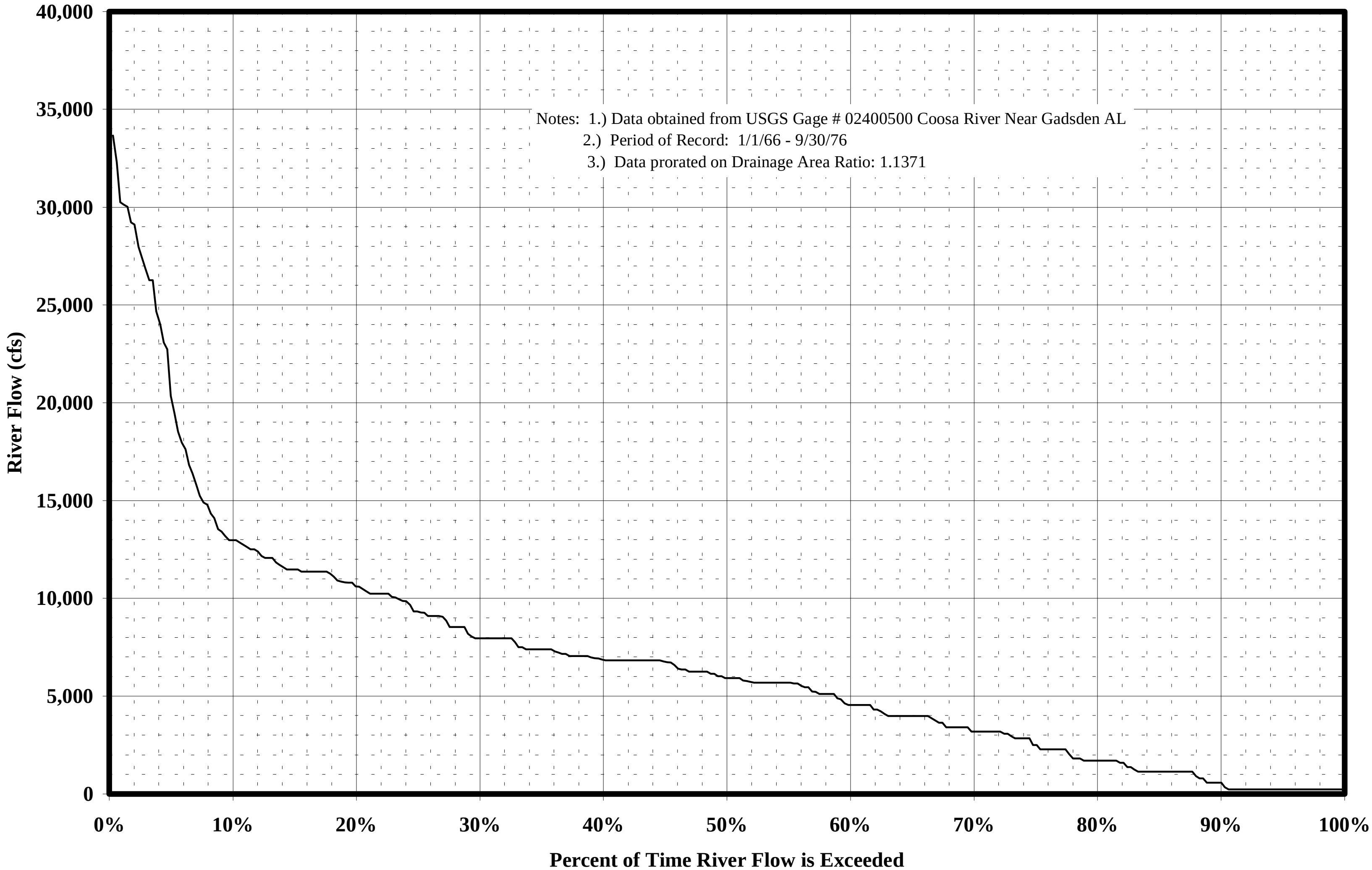


Figure 3.1-8 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, August Flow Duration Curve

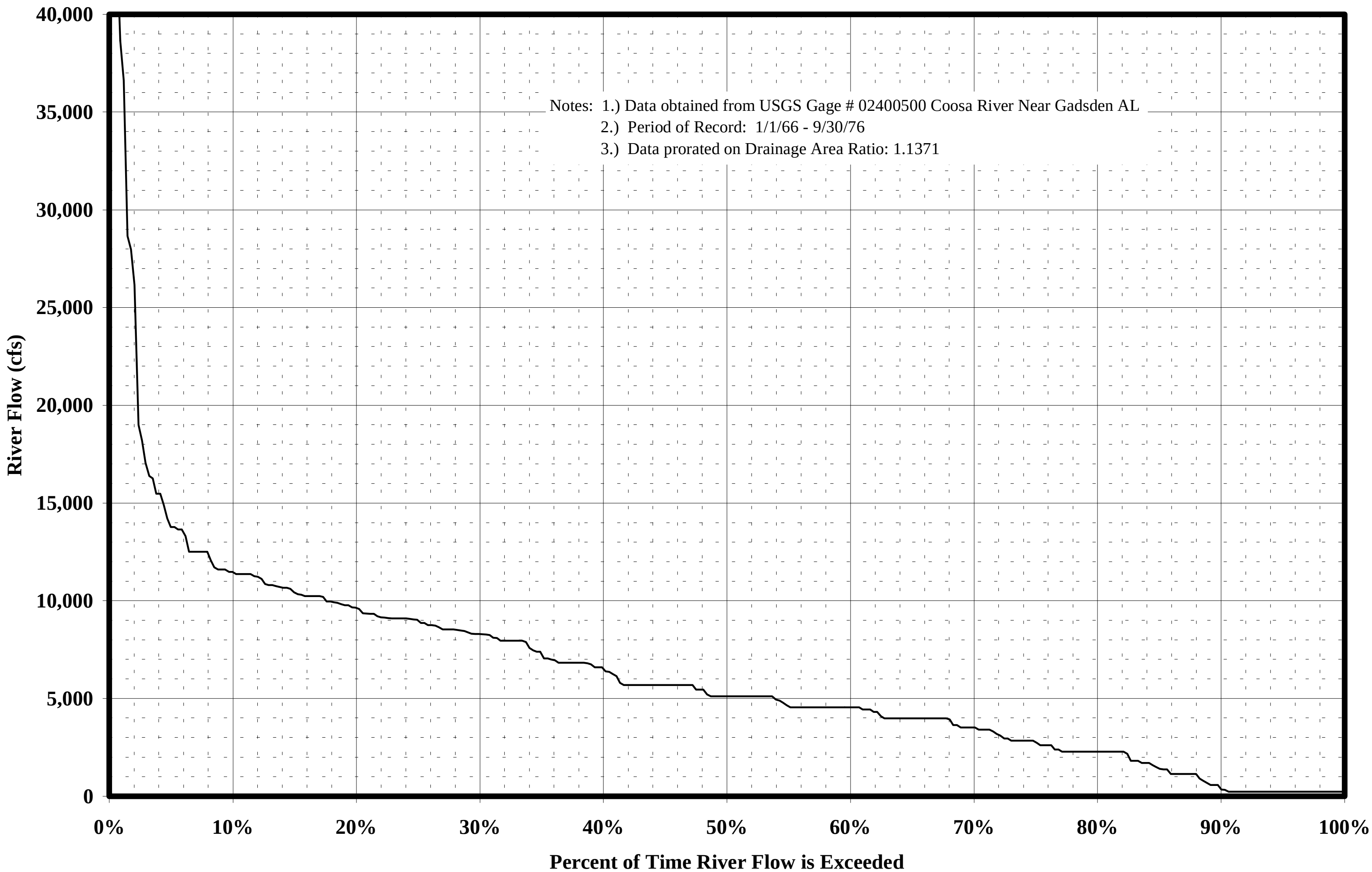


Figure 3.1-9 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, September Flow Duration Curve

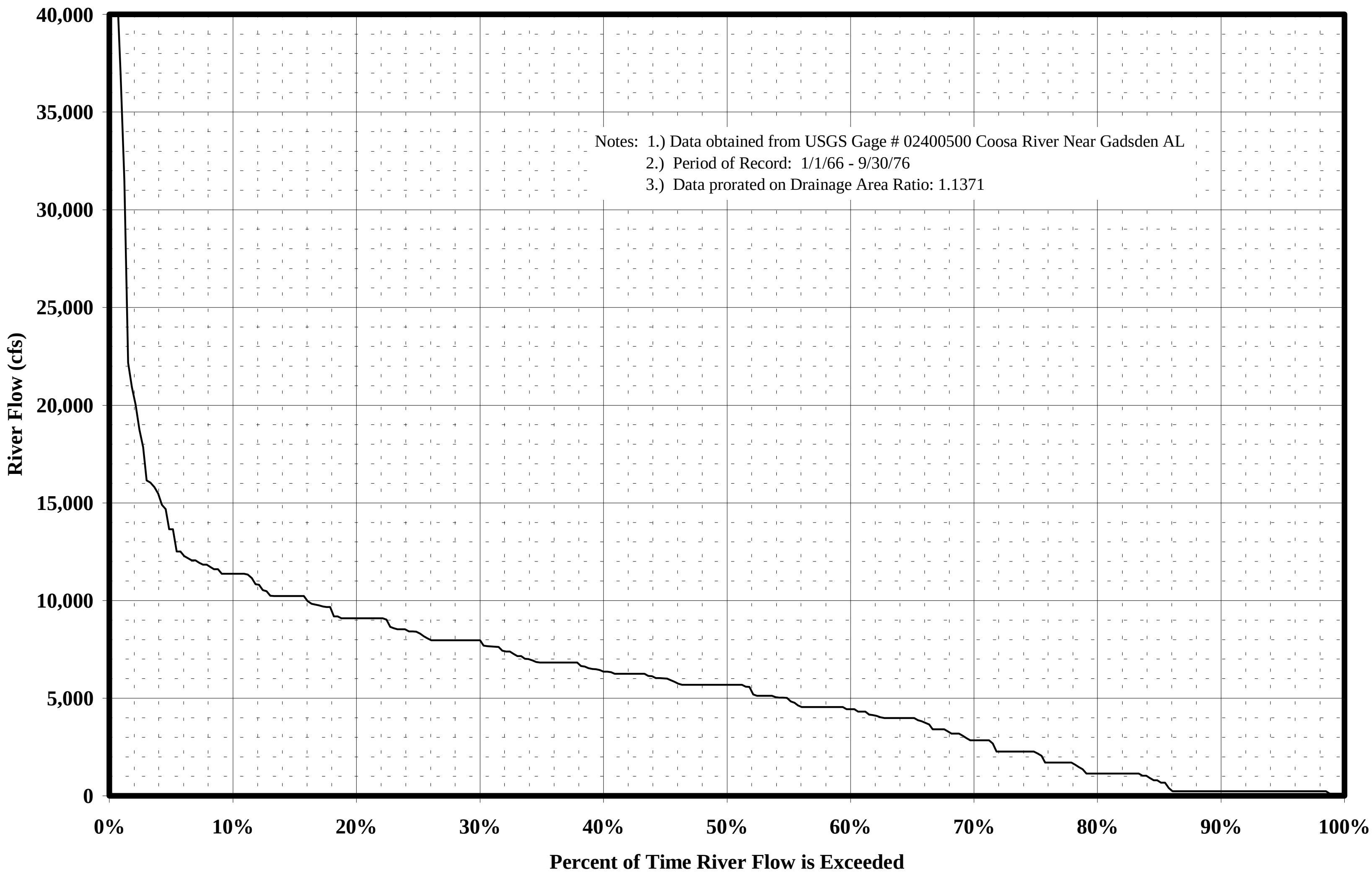


Figure 3.1-10 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, October Flow Duration Curve

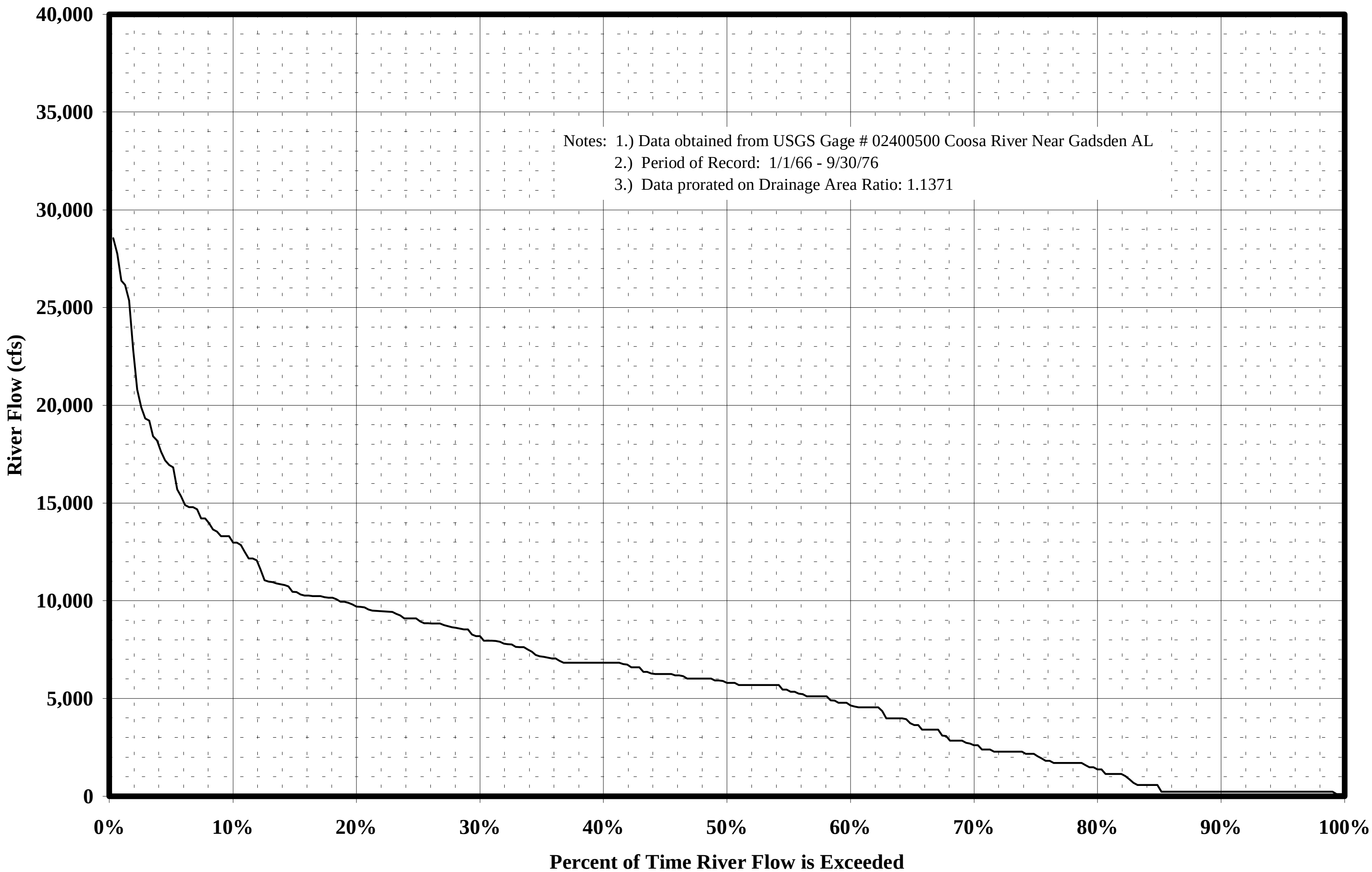


Figure 3.1-11 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, November Flow Duration Curve

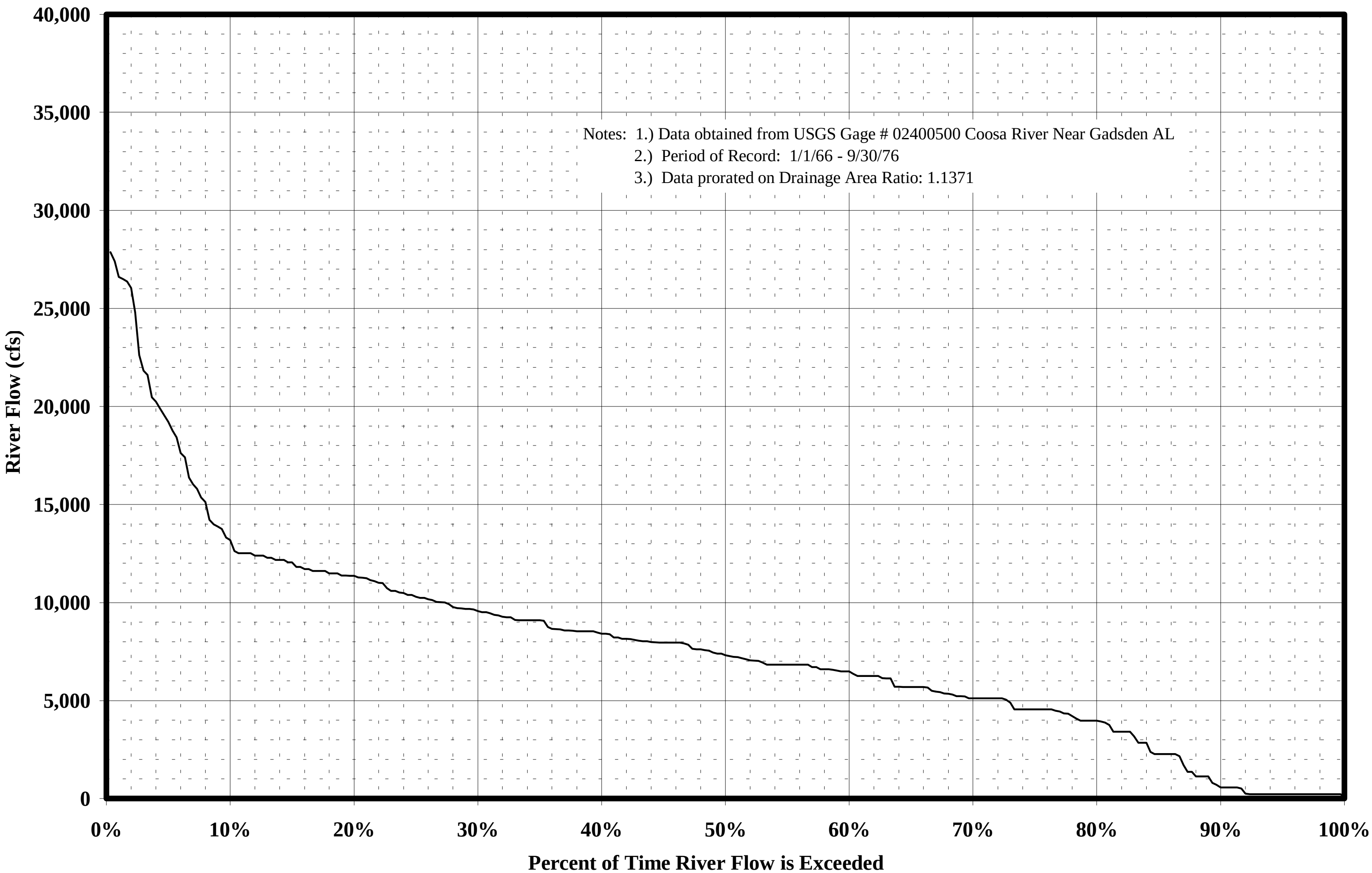


Figure 3.1-12 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, December Flow Duration Curve

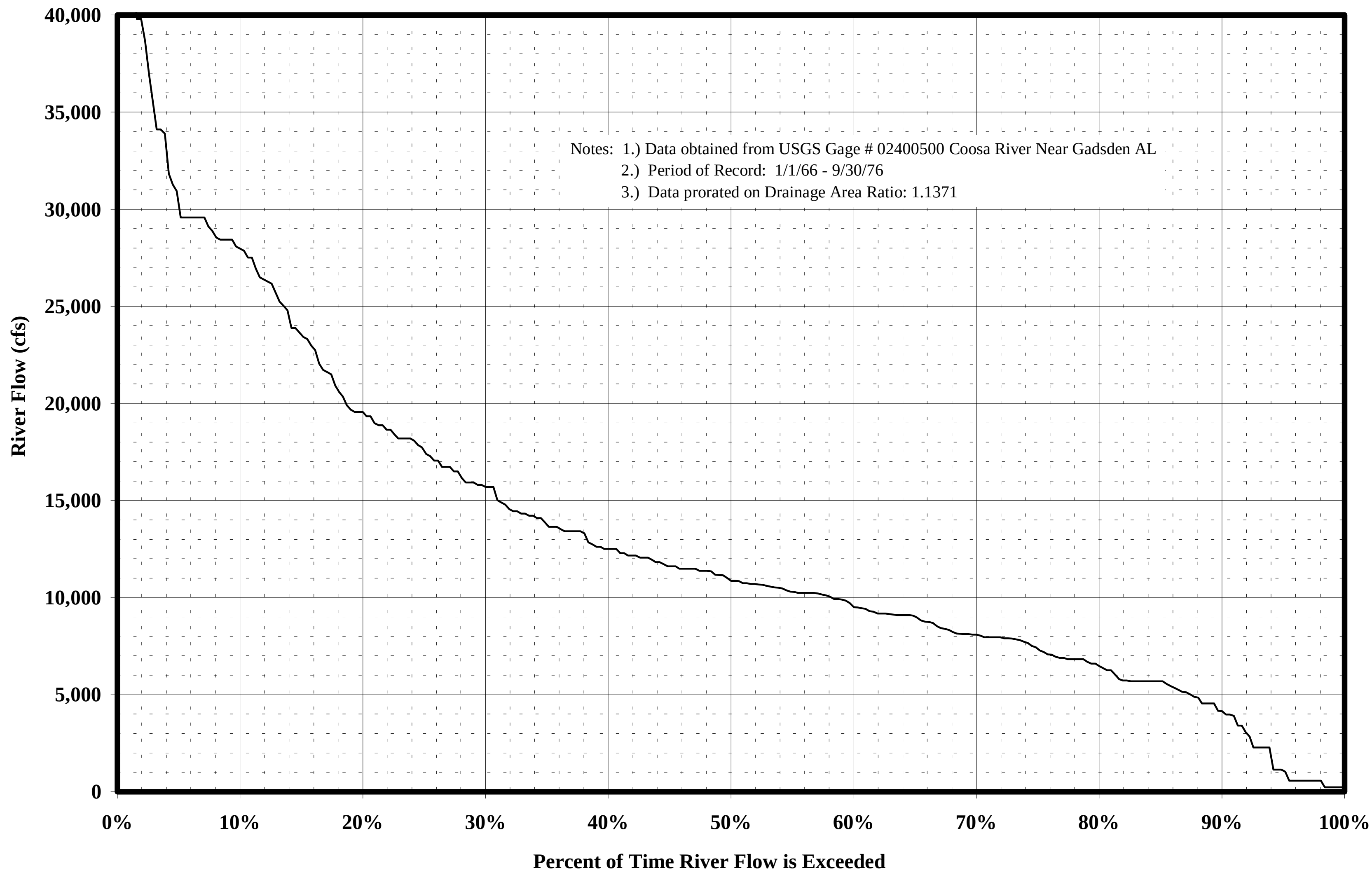


Figure 3.1-13 Alabama Power Company, Coosa River Project FERC #2146, Henry Development, Annual Flow Duration Curve

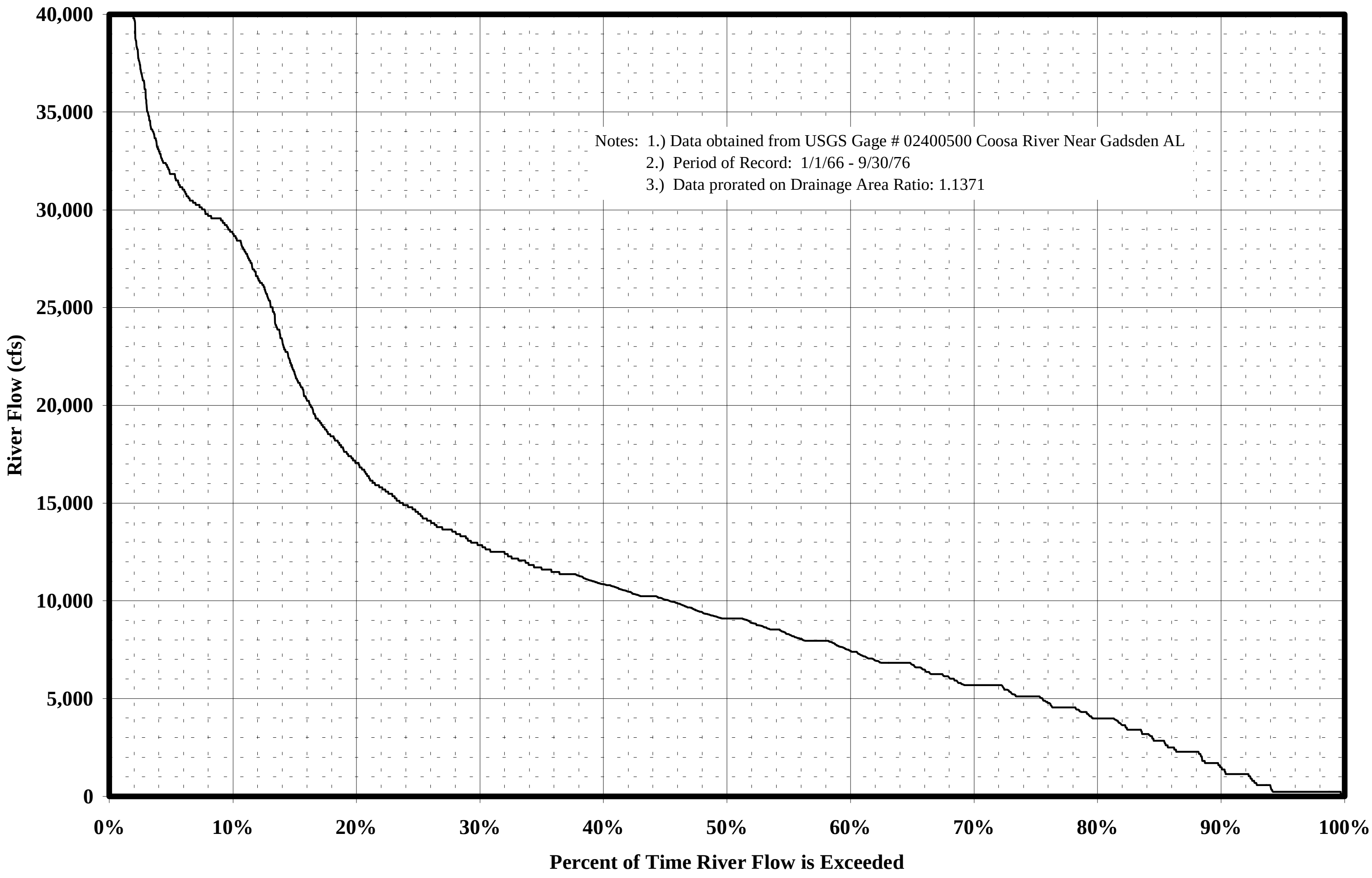
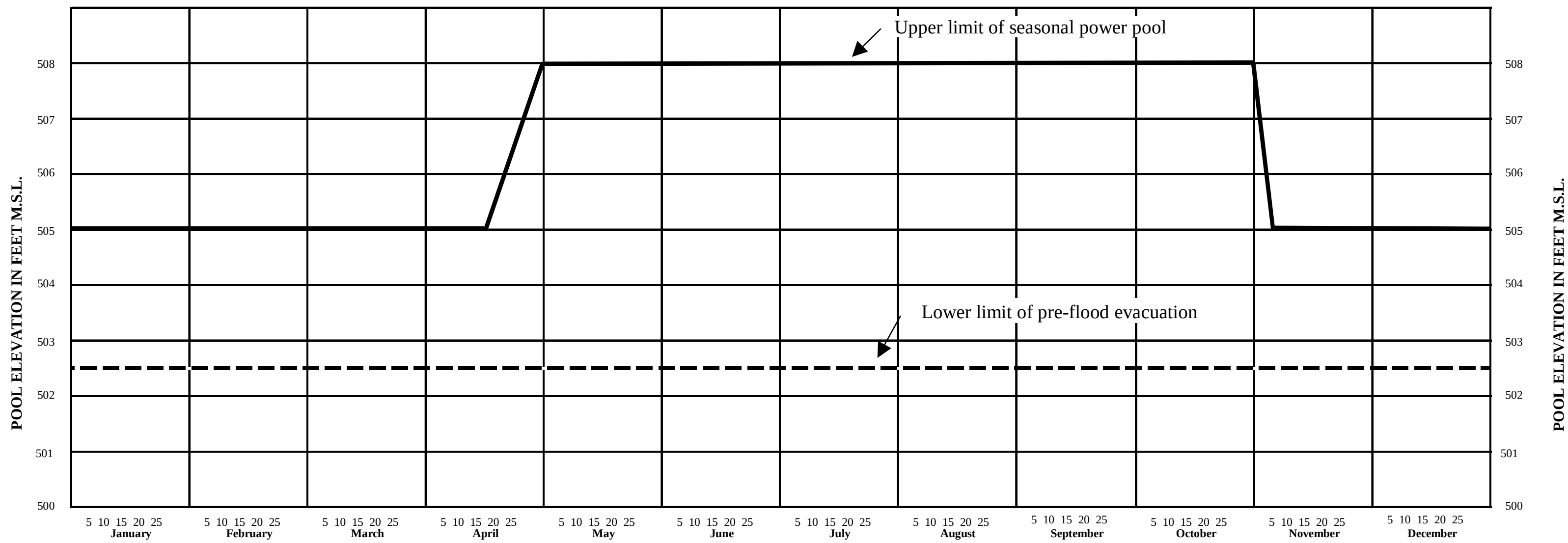


Figure 3.2-1 Top of Power Pool Curve (Source: APC, 1979, as modified by Kleinschmidt)



ALABAMA - COOSA BASIN
RESERVOIR REGULATION MANUAL

H. NEELY HENRY RESERVOIR

(ALABAMA POWER COMPANY)
COOSA RIVER, ALABAMA

TOP OF POWER POOL CURVE

Figure 3.2-2 Pre-flood Drawdown Schedule – Henry Lake (Source: APC, 1979, as modified by Kleinschmidt)

Regulation No.	**Reservoir Change**	**Evacuation Rate**)	Conditions for Operation
1	Evacuation from 508 to 507	.33 ft/hr, or Twice the rate of rise of Gadsden gauge or .33 ft/hr whichever is less while Gadsden gauge is below 508.5 and Henry Dam elevation is between 508 and 505	When the discharge required at Weiss to remain below Weiss' rule curve added to estimated inflows between Weiss and Gadsden equals to or exceeds 28,500 cfs at Gadsden. Evacuation may be stopped when the Gadsden gauge stops rising and is below elevation 510.5.
2	Evacuation from 507 to 506	.33 ft/hr, or Twice the rate of rise of Gadsden gauge or .33 ft/hr whichever is less while Gadsden gauge is below 508.5 and Henry Dam elevation is between 508 and 505.	When the discharge required at Weiss to remain below Weiss' rule curve added to estimated inflows between Weiss and Gadsden equals to or exceeds 33,000 cfs at Gadsden. Evacuation may be stopped when the Gadsden gauge stops rising and is below elevation 510.5.
3	Evacuation from 506 to 505	.33 ft/hr, or Twice the rate of rise of Gadsden gauge or .33 ft/hr whichever is less while Gadsden gauge is below 508.5 and Henry Dam elevation is between 508 and 505.	When the discharge required at Weiss to remain below Weiss' rule curve added to estimated inflows between Weiss and Gadsden equals to or exceeds 37,000 cfs at Gadsden. Evacuation may be stopped when the Gadsden gauge stops rising and is below elevation 510.5.
4	Evacuation from 505 to 502.5	.40 ft/hr	When the discharge required at Weiss to remain below Weiss' rule curve added to estimated inflows between Weiss and Gadsden equals to or exceeds 40,500 cfs at Gadsden; or when there is a forecast of a discharge greater than 40,000 cfs from Weiss.
5	At evacuation level		After lowering reservoir stage to either el. 505.0 or 502.5, the reservoir should be operated to maintain this level insofar as possible. While maintaining the stage at elevation 502.5 or while unavoidable surcharging above this level, the reservoir outflow rate shall be limited to the capacity of the spillway and turbines.
6	Refilling		Begin refilling when: Weiss pool level is at elevation 565 and falling; or, is on the storage delineation curve and the rate of inflow to Weiss Reservoir is decreasing, and The stage of the Coosa River at Gadsden Steam Plant is below el. 511.0 and falling.
7	Priority		The evacuation regulations above shall apply during refilling if conditions warrant.

4.0 ENVIRONMENTAL RESOURCES

4.1 Geology and Soils

4.1.1 Surficial and Bedrock Geology

The Henry development is located in 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, with some other sedimentary rock such as sandstones) that have been extensively folded, faulted and thrusted. The geology results in ridges that are typically northeast-southwest oriented, and the stream patterns that are typically trellis-like or rectangular (ACOE, 1998). The Coosa River occupies a broad, flat, shale valley above the Henry Dam (USDA, 1978a).

The bedrock consists dominantly of shale interbedded with localized layers of limestone and dolomite. The shale, which is of Mississippian age, is soft and tends to weather relatively rapidly where exposed (Verigin, 1995; University of Alabama, 2000).

Portions of the region, particularly in the lowlands adjacent to the Coosa River, have floodplain alluvium and residuum (unconsolidated weathered material that accumulates over disintegrating rock) over the bedrock (USDA, 1978a; Verigin, 1995). Limestone deposits are mined in the region (USDA, 1978a).

4.1.2 Seismicity and Geologic Stability

There are a series of northeast trending thrust faults in the vicinity of the Henry Project area (Verigin, 1995). Faults close to the Henry Dam include the Pell City (less than one mile downstream), and Helena (about four miles upstream). The dam is about 60 miles northwest of the Brevard Fault Zone (Verigin, 1995). None of these faults are considered to be active (Verigin, 1995). The folding and thrusting associated with the faults are thought to have occurred in the sedimentary rock rather than in the basement rock formation beneath the sedimentary rock.

Seismic events have been of moderate magnitude in the Henry Dam region (Verigin, 1995). Three earthquakes, all prior to 1940, have occurred in Alabama that were felt at the Henry Dam (Verigin, 1995). 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 (Verigin, 1995).

4.1.3 Soils

The Henry development area soils are dominantly Ultisols (Brady and Weil, 1996; Catchings and Smith, 1995). 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 as 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, 1978; Catchings and Smith, 1995).

The alluvial (water-sorted material deposited on land by water) soils border portions of the Coosa River and Henry Lake. These alluvial soils are in the Inceptisol and Entisol orders and are much younger than the Ultisols (USDA, 1978b; 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. 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 Coosa River and Henry Lake include: Cobert-Conasauga-Firestone, Conasauga-Firestone-Talbott, Holston-McQueen-Chewacla, Minvale-Bodine-Fullerton, and Hector-Rockland-Limestone-Allen (USDA, 1978b; Bayne *et al.*, 1995). These soils are dominantly moderately deep to deep, and well drained. They are typically loamy, but in places are gravelly or cherty (chemically precipitated product of weathering). Gentle to moderate slopes (*i.e.*, less than 15 percent) are typical on the immediate lake shorelines, but greater slopes do occur in the area (USDA, 1978b). Erosion potential is generally moderate depending on slope and vegetation coverage (USDA, 1978b; Bayne *et al.*, 1995).

4.1.4 Climate

The climate of Etowah County (encompassing the majority of the lake, including the entire northern portion of the Project area) is temperate. The summers in the Project area, between about May to mid September, are hot (slightly cooler in the hills and slightly hotter in the valleys) and humid. The average temperature in the summer is about 78ºF, and the average daily maximum is approximately 89ºF. The temperature exceeds 100ºF usually only about one or two days per year, and the highest recorded temperature on record is 105ºF (USDA, 1978a).

The winters are moderately cold. Snowfall is infrequent and typically remains on the ground for only short periods at a time. Average winter temperatures in Etowah County are about 44°F and minimum temperatures frequently fall below freezing. The average daily minimum temperature is about 33°F. The lowest temperature on record in the county is about minus 2°F (USDA, 1978a).

The total annual precipitation is about 54 inches, and precipitation is fairly evenly distributed throughout the year (USDA, 1978). About 25 inches typically falls between April and September. Thunderstorms occur on average 60 days a year, and locally severe storms, including tornadoes, occur periodically. Heavy rain is a common occurrence, peaking slightly in the spring. October, on average, is the driest month. Snowfall is rare, and there is no measurable snow in more than 80 percent of the winters. Precipitation exceeds evaporation, but periodic droughts do occur.

4.2 Water Resources

4.2.1 Water Quality Classifications/Standards

ADEM 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. Henry Dam upstream to McCardney's Ferry is classified as "Swimming (S) /Fish and Wildlife (F&W)". McCardney's Ferry to Gadsden water supply intake is classified as "F&W" and Gadsden water supply intake to Weiss Dam powerhouse is classified as "Public Water Supply (PWS) and 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 determine the basis for water quality standards. Table 4.2-1 (Appendix C, pg. C-4) 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

Henry 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 dissolved oxygen (DO) profiles, with the expectation that stratification data would provide a good indication of the quality of water that typically pass through power turbines to the tailrace area. Of the 22 reservoirs studied, all reservoirs (including Henry Lake) exhibited some thermal and/or chemical stratification tendencies at some point throughout the year (ADEM, 1984).

Forebay DO and temperature profiles demonstrated that Henry Lake experiences only slight stratification with respect to DO (chemical) during the study and no stratification with respect to temperature (ADEM, 1984). The report further concluded that Henry Lake's shallow nature and mixing effects from power generation minimize the severity of stratification. This trend was typical of most reservoirs within the Coosa River basin. Data collected from the Henry tailrace during the ADEM study documented DO levels that typically ranged from

6.3 to 7.0 mg/l throughout the period from June to October. There were three occasions in August to September when DO levels dropped slightly below the State DO standard of 4.0 mg/l (3.7 mg/l, 3.0 mg/l, and 3.9 mg/l, respectively).

In the early 1990's, Henry Lake was selected under 314(a) of the Clean Water Act for a comprehensive Clean Lakes Feasibility Study (CLFS). Objectives of the study were to gather historic and current data on the lake, identify water quality problems, and determine feasible corrective solutions (Bayne *et al.,* 1995). Industrialization of Rome, Georgia upstream of Weiss and Henry Lakes placed stresses on the water quality of the Coosa River. Further pollution originating in the vicinity of Gadsden and Attalla, Alabama caused serious water quality problems in Henry Lake (Bayne *et al.,*1995).

In 1973, the Environmental Protection Agency (EPA) conducted a National Eutrophication Survey of eleven Alabama lakes. Results of the study concluded that Henry Lake was classified as eutrophic and was one of the most enriched of the eleven lakes studied (Bayne *et al*., 1995). High phosphorus inputs into the lake was the suspected cause. Throughout the 1980's, Henry Lake continued to suffer from nutrient enrichment and poor water quality. The ADEM cited poor DO levels related to excessive organic enrichment as a major concern for the lake.

Limnological (study of water quality in lakes/reservoirs) assays conducted in the CLFS confirmed that nutrient enrichment continues in Henry Lake. The report cited excessive algal growth as the most obvious response to the nutrient rich waters in Henry Lake. During the CLFS study, 63 algal taxa were detected in Henry Lake (Bayne *et al.,* 1995). Diverse and abundant phytoplankton communities are indicative of nutrient enriched reservoirs (Wetzel, 1983).

The CLFS also documented the defined absence of thermal stratification but noted the presence of chemical stratification. DO levels measured at 6.6 ft

(2.0 m) ranged between 3.6 to 11.1 mg/l and varied inversely with temperature during the growing season (Bayne *et al.*, 1995). High flushing rates appeared to weaken chemical stratification even in the deeper lacustrine areas (Bayne *et al.*, 1995).

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 Henry Lake's designated uses of aquatic life, recreation, and public water supply are threatened. The report indicated that nutrient loading and trophic status were areas threatening the current uses. Henry Lake's trophic state is one of the highest (62 Trophic State Index) of 32 reservoirs tested in Alabama. Only Weiss Lake (located upstream of Henry Lake) contained a higher Trophic State Index (64). A Trophic State Index value of 62 is considered moderate to highly eutrophic (rich in plant life and nutrients) and nearly hypereutrophic (excessively rich in plant nutrients). Point and non-point source pollution tend to be the most influencing factors on water quality in Henry Lake (ADEM, 1998).

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 Henry Lake. The U. S. Food and Drug Administration reported the source of contamination as a General Electric plant in Rome, Georgia that manufactured transformers. General Electric has 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, which includes Henry Lake.

The current fish consumption advisory is for the Coosa River from the Alabama-Georgia state line to Weiss Dam and restricts the consumption of catfish. There are no health advisories currently in effect for Henry Lake, although health advisories are in effect for waters below Henry Dam.

Water Sampling

APC continues to monitor water quality within Henry Lake and its supporting tributaries. APC monitors for a number of water quality parameters including temperature, DO, and pH.

Henry Lake forebay profiles were collected by APC from 1990 to 1999 to an average depth of 40 ft and tend to support historical water quality data (Appendix D). Only chemical stratification was noted in all years to some extent, but not with any consistency. Months that indicated stratification were not regular, nor did the stratification last for any sustained length of time (consecutive months) except in 1993. At locations 15.4 and 25.5 miles upstream, profiles were taken for the 12 month period of 1998 to average depths of 35 ft and 25 ft, respectively. There was no indication of stratification, but rather a uniform gradient of decreasing DO from top to bottom (APC unpublished data, 2000). Figure 4.2-1 depicts the locations where temperature and DO profiles were collected. Table 4.2-2 (Appendix C, pg. C-5) presents maximum, minimum and average temperature and DO data at the five foot depth collected by APC from 1990 to 1999 (APC unpublished data, 2000).

Tailwater Water Quality

Henry tailrace data collected by APC from 1990 to 1999 indicates DO levels remain at or above the State standard for 4.0 mg/l for the entire period of record. Data presented in Table 4.2-2 (Appendix C, pg. C-5), indicate that the lowest DO concentration observed in the Henry tailrace was 4.1 mg/l, with an average of 6.9 mg/l reported. In addition, APC conducted continuous tailrace monitoring during 1999 showed a minimum DO of 1.89 mg/l, with an average of

5.74 mg/l. However, the tailrace discharge dropped below the State water quality threshold only 0.8% of the time while generating. This data was collected using a Hydro Lab mini-sonde continuous data collector recording at 15-minute intervals. The temperature and DO data summary for this data collection is presented in Table 4.2-3 (Appendix C, pg. C-6).

Effluent Loading from NPDES Permit Discharge Points

See Table 4.2-4 (Appendix C, pgs. C-7 to C-13) for a partial listing of the EPA's PCS database of reported discharges into the Henry 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

Ten water withdrawals are located in or near the Henry development (Figure 4.2-2). The Gadsden water withdrawal provides a potable source of drinking water (after conventional treatment) for approximately 48,000 residents. All other water withdrawals are used in water treatment or industrial applications.

There are numerous facilities, permitted by ADEM, which discharge either directly into Henry Lake or its tributaries (Figure 4.2-3). Among these dischargers are wastewater treatment facilities, industrial wastewater dischargers, municipal and semi-public wastewater wastewater facilities, as well as mining and other non-point sources (Figures 4.2-4 through 4.2-6). ADEM monitors these facilities and establishes and enforces water quality standards through the issuance of discharge permits. The National Pollutant Discharge Elimination System (NPDES) and the Alabama Water and Air Pollution Control Act provide the standards for protecting surface waters.

Information obtained from ADEM and the EPA PCS database indicates that there are approximately 64 NPDES industrial permits which allow discharges into the Henry sub-basin. In addition, there are 21 municipal/semi-public dischargers as well as 62 mining/other non-point source dischargers into the Henry Lake (Figures 4.2-4 through 4.2-6 and Table 4.2-6, Appendix C, pgs. C-19 to C-25). See Table 4.2-5 (Appendix C, pgs. C-14 to C-18) for flow data collected from the PCS database.

In addition to point source discharges, ADEM has expressed concern regarding non-point source inputs to Henry 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;
- agricultural runoff;
- spills from local industries;
- private lawns that have been treated with fertilizers or pesticides; and
- industrial spills and stormwater contamination.

Figure 4.2-1 Henry Lake Water Quality Monitoring Locations

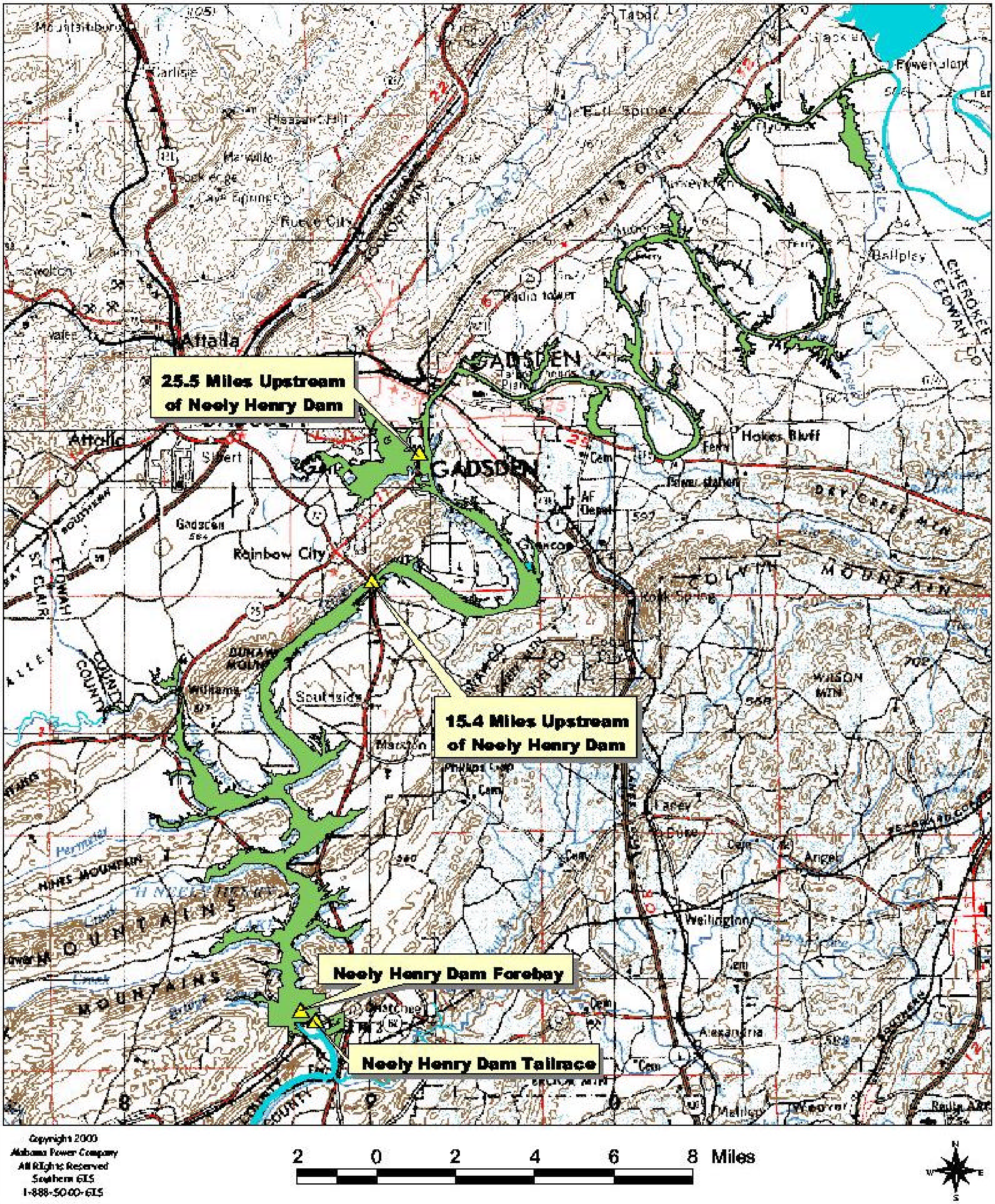


Figure 4.2-2 Water Withdrawal Locations.

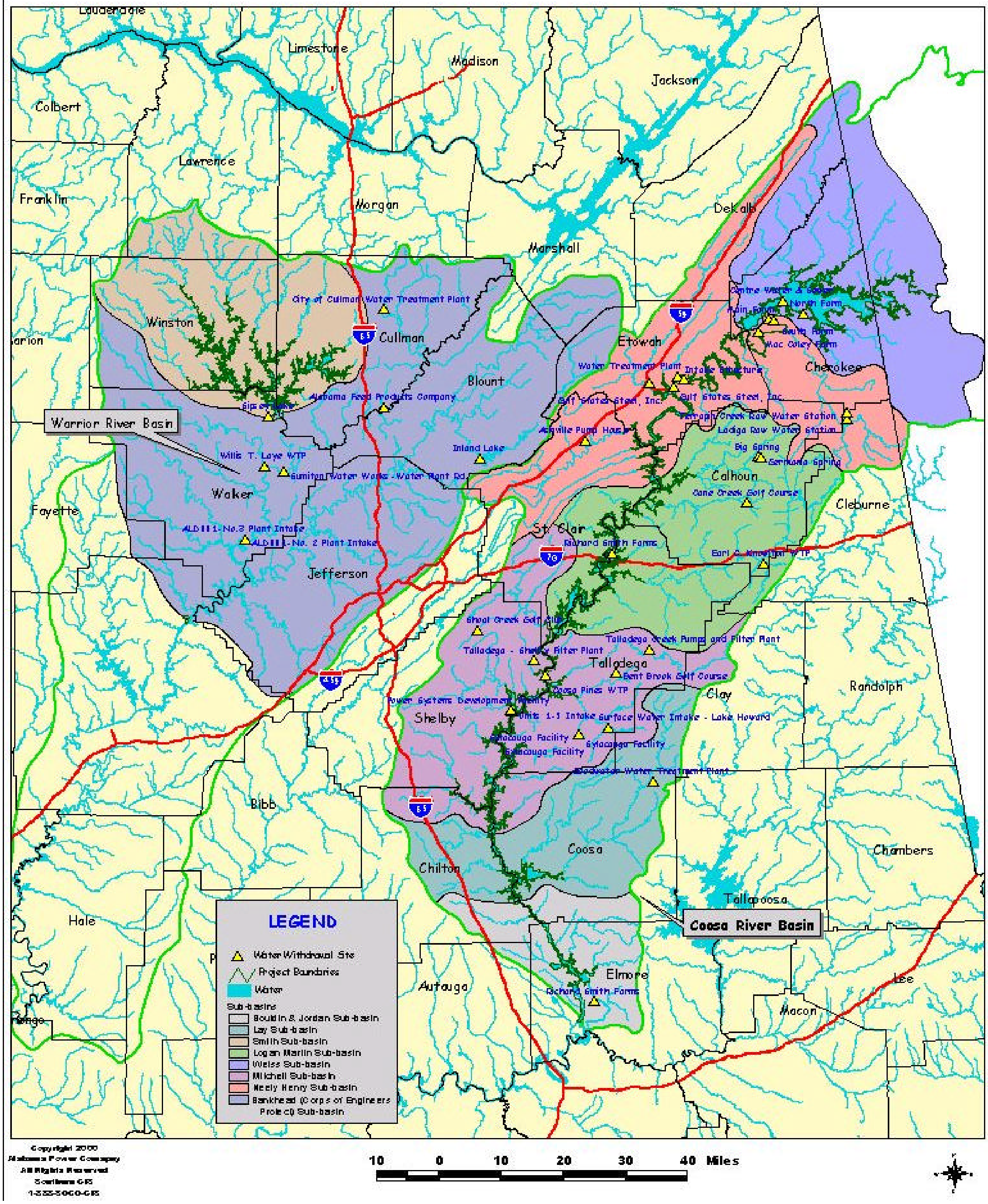


Figure 4.2-3 Wastewater Facility Locations.

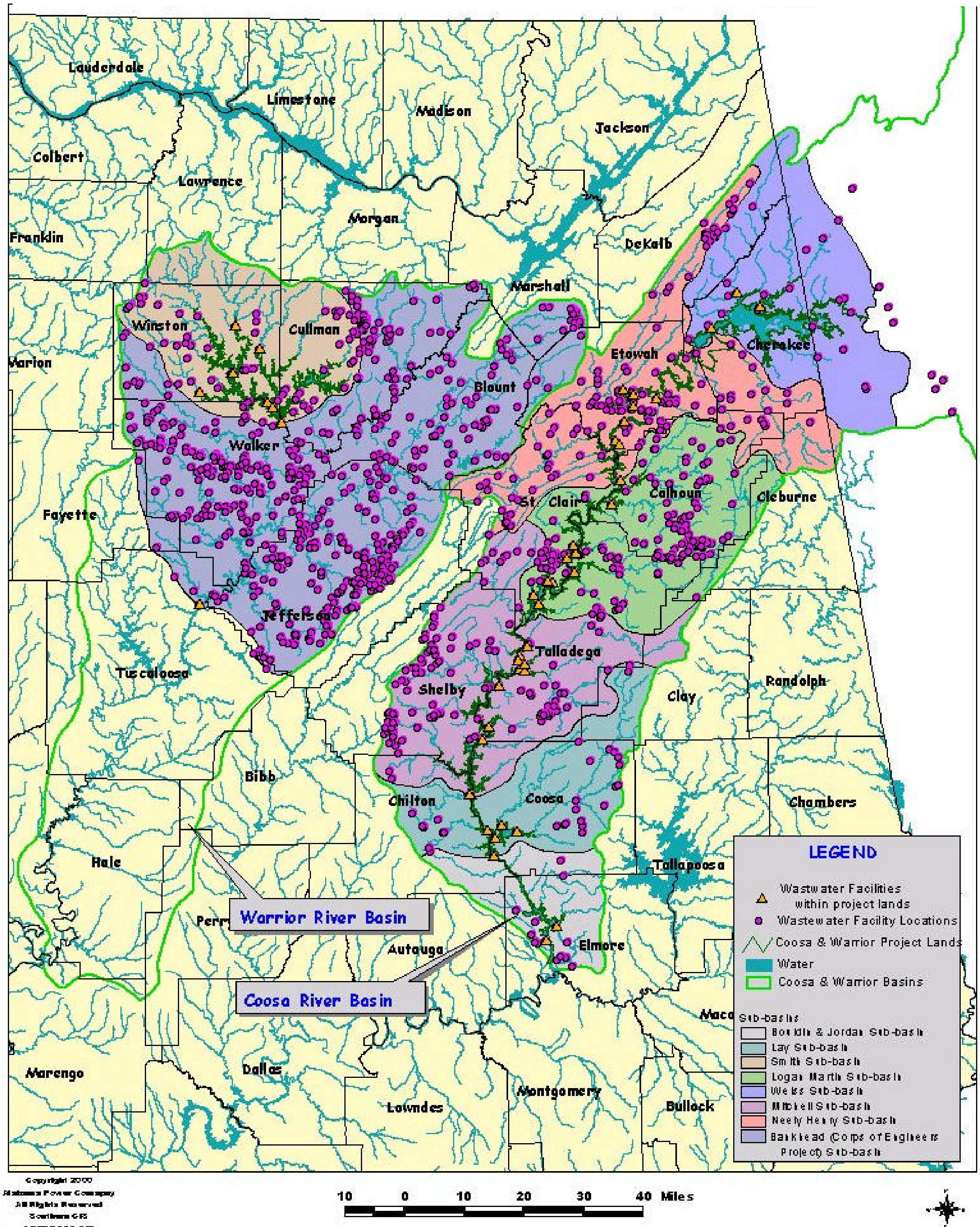


Figure 4.2-4 Industrial Wastewater Facility Locations.

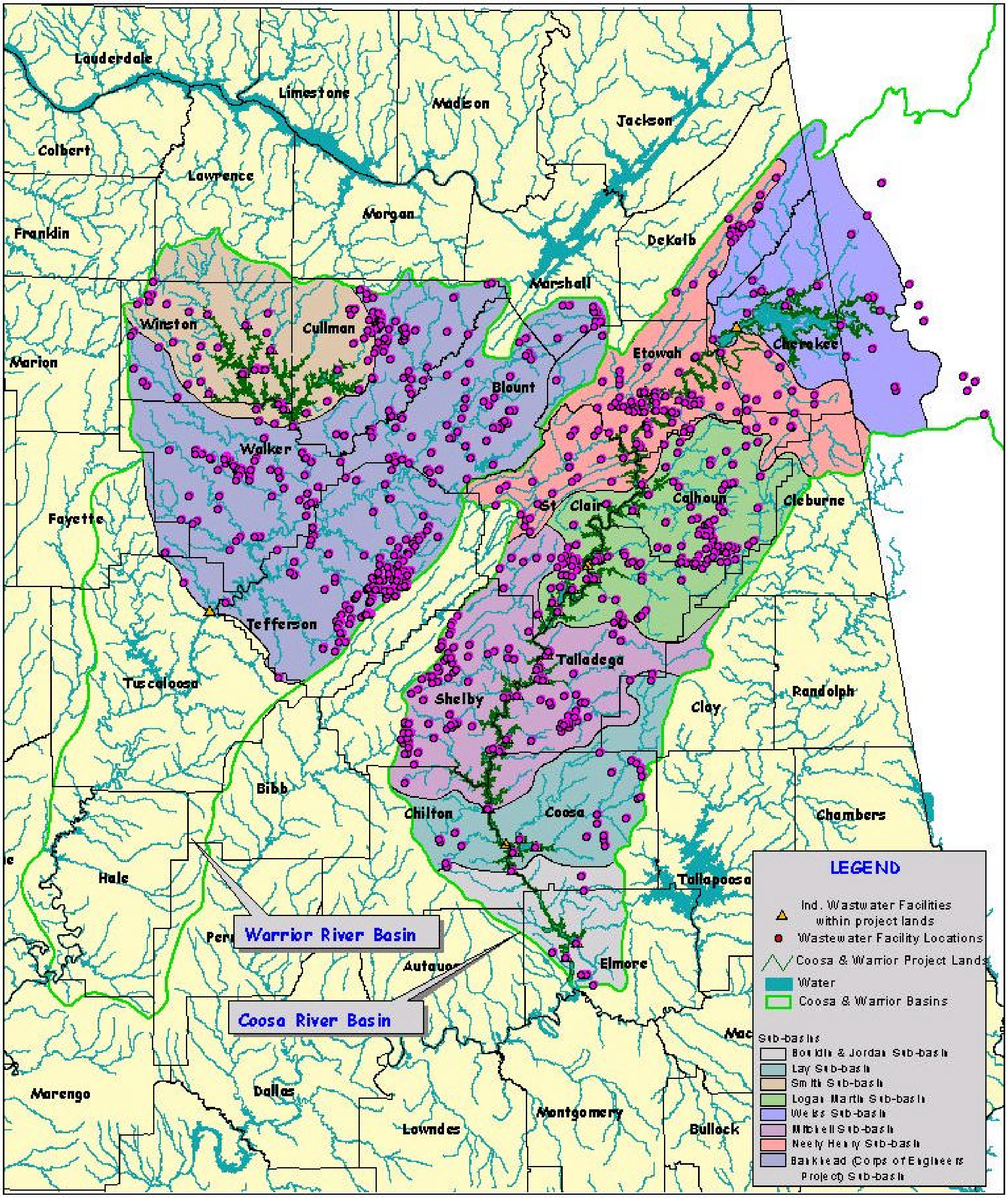


Figure 4.2-5 Municipal & Semi Public Wastewater Facility Locations.

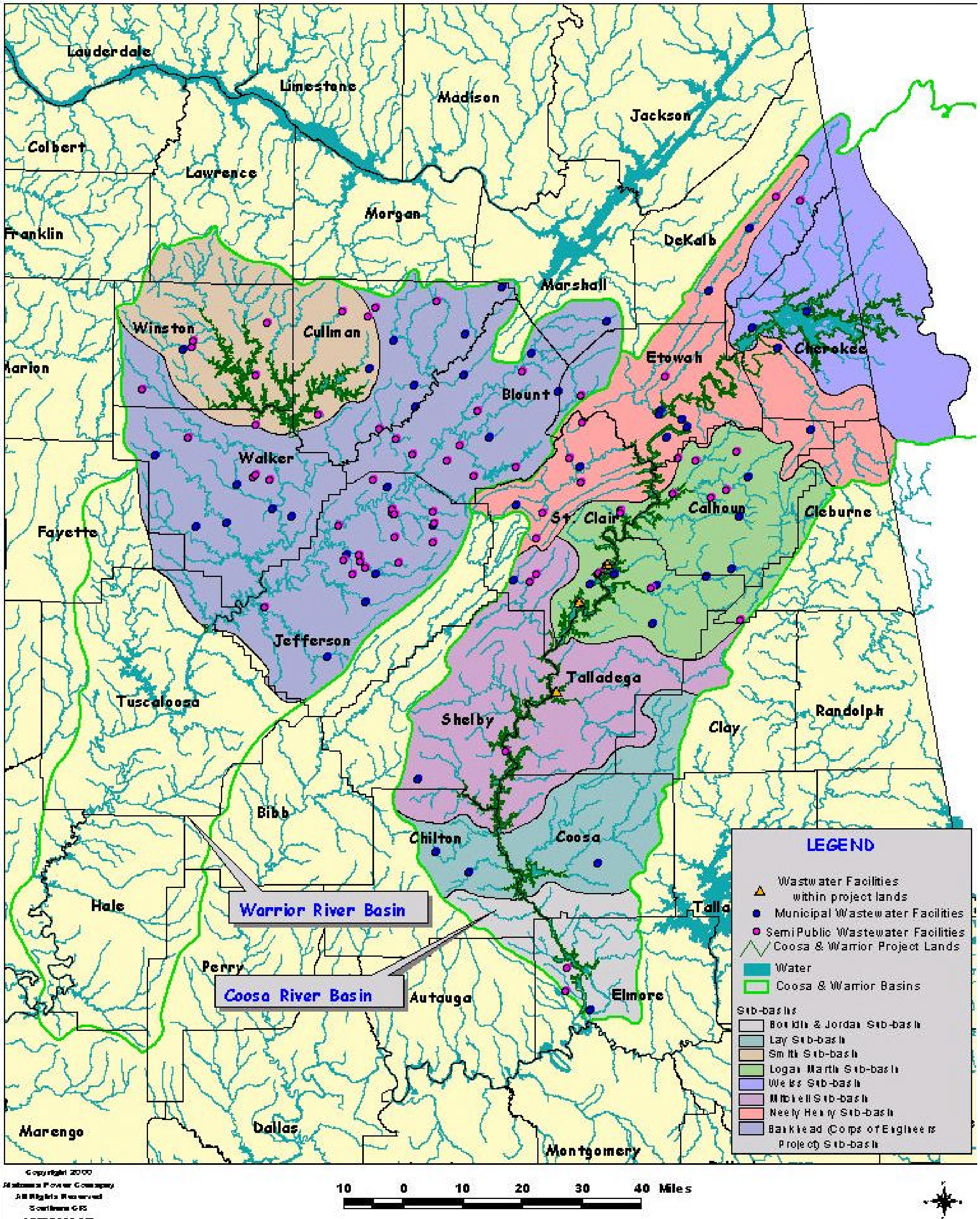
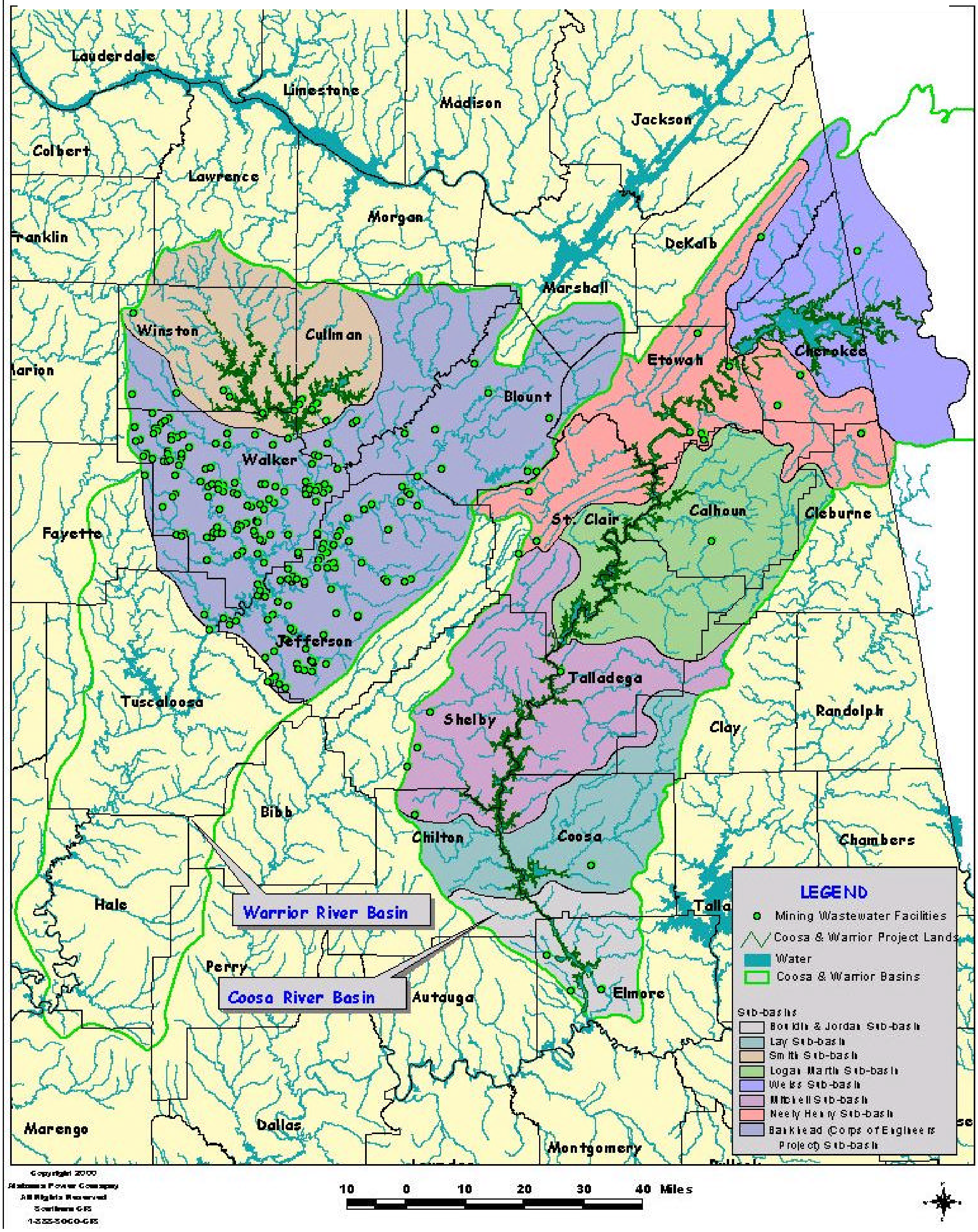


Figure 4.2-6 Mining Wastewater Facility Locations.



4.3 Aquatic Resources

4.3.1 Existing Habitat

Henry Lake

Henry is one of the shallowest lakes in Alabama (10.8 ft. average depth). Deeper areas can be found in the mainstem creek channel and at the confluence of Black Creek and Big Wills Creek. As discussed in Section 4.2, the waters of Henry Lake are highly productive and fairly turbid. Due to the shallowness of the lake and low retention time, thermal stratification rarely occurs, especially in the mainstem (Floyd and Catchings, 1989; Bayne *et al.*, 1995). However, chemical stratification (*i.e.*, DO levels that decline with depth) has been observed, especially in embayments during the warmer months and under lower flow conditions (Bayne *et al.*, 1995). Except for the mainstem and areas where tributaries enter the lake, the majority of substrate in Henry Lake is composed of soft, mucky sand and clay. These substrates, combined with shallow embayments provide excellent habitat for largemouth bass and other sunfish species.

Tailrace

Discharges from the Henry Powerhouse empty directly into the Coosa River, which is also the headwaters of Logan Martin Lake.

4.3.2 Resident Fish

Henry Lake

A diverse community of warmwater fish species populate Henry Lake (Table 4.3-1, Appendix C, pg. C-26). A total of 35 fish species have been collected from the lake, with an additional 25 species present in streams of the surrounding watershed (Floyd and Catchings, 1989; Bayne *et al*., 1995). Dominant recreational fish species include largemouth bass, spotted bass, white and black crappie, bluegill and redear sunfish. The dominant forage species in the lake is gizzard shad.

A limited commercial fishery for catfish exists on Henry Lake and primarily uses trotlines (long lines with multiple baited hooks) to harvest the fish.

Tailrace

The tailrace fishery in the Coosa River below the Henry powerhouse is considered excellent for hybrid striped bass, striped bass, white bass, and catfish, especially during the spring and fall. As such, this area is subject to heavy angling pressure during those periods (Floyd and Catchings, 1989). However, due to elevated levels of PCB's, the Alabama Department of Public Health (ADPH) Officer issued 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).

Results of ADCNR studies

In 1986, the ADCNR initiated a reservoir management program in order 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 Henry Lake in the spring and fall of 1988, 1993, 1994.

Sampling efforts in 1994 indicated a healthy largemouth bass population with good recruitment. Electrofishing catch rates for largemouth bass were highest in 1988 (59.5 fish/hr), dropped slightly in 1993 (30.9 fish/hr), and rebounded in 1994 (52.1 fish/hr) to previously observed levels. While 1993 collections were dominated by age 2 fish (50 percent) with few (3 percent) age 1 fish, 1994 sampling revealed good recruitment with 40 percent of the sample composed of age 1 fish. In addition, age 5 and older largemouth bass comprised 25 percent and 17 percent of the sample in 1993 and 1994, respectively. The 1993 and 1994 collections indicated excellent growth rates for largemouth bass, with most size classes exceeding statewide growth rate averages (Catchings and Smith, 1995).

Spotted bass collections indicated trends similar to those exhibited by largemouth bass. Electrofishing catch rates for spotted bass were also highest in 1998 (40.4 fish/hr), were slightly lower in 1993 (19.7 fish/hr), and rebounded in 1994 (36.0 fish/hr) to levels previously observed. While 1993 collections were dominated by age 2 fish (49 percent) with few (1 percent) age 1 fish, 1994 sampling revealed improved recruitment with 17.1 percent of the sample composed of age 1 fish. Growth rates were good for age 2 and age 4 fish; however, age 3 fish exhibited poor growth compared to populations in other Alabama reservoirs. The ADCNR attributed this poor growth rate to the size of the 1991 year class which comprised almost 50 percent of the sample in 1993 and 1994 (Catchings and Smith, 1995). Overabundant year classes can cause increased intraspecific competition for forage species and result in diminished growth rates.

Electrofishing catch rates for black crappie (2.9 fish per net night) were relatively high compared to other Coosa River reservoirs, while catch rates for white crappie were somewhat lower (1.4 fish per net night). Sampling in 1994 indicated roughly 80 percent of the black and white crappie populations in Henry Lake were dominated by fish from the 1993 year class. Additionally, only 1 young-of-year black crappie and 3 young-of-year white crappie were collected. The ADCNR noted that hybridization of crappie within Henry Lake may be occurring and influencing study results (Catchings and Smith, 1995).

Spring and fall 1994 sampling for bluegill yielded catch rates of 77.5 fish/hr and 11.4 fish per net night. In general, the majority of bluegill collected were relatively small, exhibiting poor growth rates. The 1994 electrofishing catch rates for gizzard shad (98.2 fish/hr) were higher than catch rates reported in 1988 (83.1 fish/hr). However, sampling indicated the size structure of the gizzard shad population was similar to 1988 values, with the majority of fish collected falling into the approximately 6 to 7 inches (160 to 170 mm) total length size category. The 1994 report did note low recruitment as a possible concern for the gizzard shad population (Catchings and Smith, 1995). Threadfin shad collections were dominated by fish approximately 2 to 3 in. (60 to 70 mm) total length (Table 4.3-2, Appendix C, pg. C-27).

B.A.I.T. Reports

In 1986, the ADCNR created the Bass Anglers Information Team (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 on 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.

A 1996 report summarized B.A.I.T. information collected over the first eleven years of the program (1986 to 1996) ranked Henry Lake near the middle in most categories. The most recent report shows that participating clubs held 41 tournaments on Henry Lake in 1999. The 1999 report shows tournament anglers experienced average success rates (70.4 percent). In the 41 tournaments, anglers caught eight bass weighing over five pounds. When compared to other reservoirs listed in the report, average weight (1.63 lbs.), bass per angler-day (2.01), and pounds per angler-day (3.27) were 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 Weiss Lake including Henry Lake (Catchings and Smith, 1995; Catchings *et al.*, 1999). The current status of other species of anadromous fish in the upper Coosa River are 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

Henry 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 Henry 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 collection work for the survey should be completed in 2000.

4.3.6 Threatened and Endangered Species

The USFWS Daphne Field Office provided a list of federally listed species in Alabama, sorted by county. The Henry Project area encompasses lands within Cherokee, Calhoun, Etowah, and St. Clair Counties. The list provided by the USFWS indicates a total of five threatened and nine endangered aquatic species for those counties (Table 4.3-3, Appendix C, pg. C-28).

4.4 Terrestrial Resources

4.4.1 Botanical Resources

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

4.4.1.1 Upland Habitats

The variable topography, geology, and soils in the Henry Project area support a wide variety of plant communities as well as plant diversity (Table 4.4-1, Appendix C, pgs. C-29 to C-34). The potential natural vegetation for the vicinity of Henry Lake is oak-hickory forest, part of the Eastern Deciduous Forest Biome. Primary canopy components are deciduous oaks and hickories. Forests have a closed canopy. No original forest is thought to remain; however, large tracts of second growth are located within this portion of the Coosa Basin. Most forests of the lower terraces were removed to create agricultural fields. Consequently, most mature second growth forests are located in sites which are difficult to access, e.g., steep ravines, bluffs, rocky slopes. Canopy taxa commonly encountered are southern red oak, white oak, black oak, rock chestnut oak, scarlet oak, tulip-poplar, sand hickory, mockernut hickory, pignut hickory, black locust, shortleaf pine, loblolly pine, scrub pine, and beech. Pines are mostly restricted to disturbed sites and to pine plantations (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

Subcanopy species include chalk maple, persimmon, black cherry, flowering dogwood, black gum, and sourwood. Shrub taxa include sparkleberry, deerberry, low-bush blueberry, blackberry, sweet shrub, and high-bush blueberry. Herbs seldom form a distinct stratum unless the habitat is mesic, however, a large number of species are located within the area. Lianas include cross-vine, cow-itch vine, Japanese honeysuckle, poison-ivy, and Virginia creeper (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

Communities with a great deal of disturbance, such as roadsides, power line corridors, gas line rights-of-way, fallow fields, and urban woodlands are highly variable in species composition. Some common woody flora in these sites are sassafras, chickasaw plum, red mulberry, hackberry, devil's-walking-stick, winged sumac, shining sumac, tree-of-heaven, privet, dewberry, winged elm, red maple, American ash, and post oak. Many large tracts of cotton, turf, and soybean are located within the drainage (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

4.4.1.2 Wetlands

Wetlands within the Project area are not abundant relative to upland sites. These sites are scattered along shores of the lake, old oxbows, and margins of tributaries. Soil surveys of Calhoun, Cherokee, Etowah, and St. Clair Counties name the following as dominant soils around the immediate perimeter of the Project area, *i.e.*, Colbert-Conasauga-Firestone, Conasauga-Firestone-Talbot, Holston-McQueen-Chewacla, Minvale-Bodine-Fullerton, and Hector-Rockland-Limestone-Allen. These soils are deep to moderately deep and generally well drained with gentle to moderate slopes (less than 15 percent) around the edge of the shores. Steep slopes are common in the southern portions of the drainage.

The USFWS National Wetlands Inventory (NWI) maps for the Project area indicate few large floodplains. Large floodplains exist near the confluence with tributaries. Typically, wetlands range from 1 to 10 acres. Three primary types of communities are palustrine emergent, palustrine scrub/shrub, and palustrine forested wetlands. These communities intergrade with regard to hydrology, soils, physiognomy, and vegetation.

Palustrine emergent wetlands are characterized by having rooted, herbaceous plants growing in saturated to inundated substrates. If inundated, aerial portions generally extend above the water level. Communities with a long period of inundation are variable, but frequently contain bur-reed, soft-stem rush, climbing hemp vine, Spanish-needles, jewel-weed, lizard's-tail, leather rush, marsh seed-box, marsh mallows, cat-tails, flatsedges, spikerush, panic grass, beaksedge, water-willow, wool-grass, cut grass, and manna grass. Sites with shorter periods of inundation have a diverse flora, though commonly encountered are goldenrods, boneset, and St. John's wort (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

Palustrine scrub/shrub communities have woody plants that are generally short in stature, may be malformed, and are usually less than 15 ft. The canopy is open, though tree species are occasionally present. Dominant woody plants in these sites are willows, alder, swamp dogwoods, box-elder, red maple, and button-bush. Lianas are frequent, and may include poison-ivy, pepper-vines, buckwheat-vine, and Virginia creeper (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

Palustrine forested wetlands have a closed canopy, and are usually 15 ft or greater in height. Stratification does occur, though most forests are disturbed. Abundant canopy species include water oak, willow oak, overcup oak, swamp chestnut oak, red maple, Drummond's maple, box-elder, sweet bay, honey-locust, sycamore, silver maple, river birch, and green ash. Hornbeam and hop-hornbeam often are present in the subcanopy (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

Commonly found in these environments are lianas such as poison-ivy, cow-itch vine, pepper-vines, buckwheat vine, and virgin's-bower (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

Large fluctuations in lake levels expose shoals and shallow shorelines for variable periods of time. The NWI maps refer to these as "limnetic, unconsolidated shore" which are seasonally flooded and contain no vegetation. Usually, lake levels are lowered during winter and flooded during warm months. An annual flora forms a distinct carpet on these exposures whether it is during early spring or if lake levels fall during summer months. Abundant on these flats are redstem, toothcup, and creeping rush (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

An interesting community occurs within this basin that contains many characteristics of the coastal plain as well as the piedmont. A cluster of species that may occur in this transition zone include the green pitcher plant, bog-buttons, yaupon holly, dwarf palmetto, and wax-myrtle (personal communication from Dr. David Whetstone, Jacksonville University to Jim Lochamy, APC, September 2000).

Exposed shoals and reaches occur along the shoreline during times of low lake levels. This shoreline feature is present seasonally around the lake but is not a vegetated wetland. The NWI maps identify these areas as limnetic unconsolidated shore, which are seasonally flooded and contain no vegetation. This particular feature is very prevalent around Henry Lake (Figure 4.4-1).

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 owned by APC.

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 and are assigned with nearly extreme discretion. 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 five botanical species that are listed as federally threatened or endangered that occur in Cherokee, Calhoun, St. Clair, and Etowah Counties surrounding Henry Lake: Kral’s water-plantain (*Sagittaria secudifolia),* Alabama leather flower (*Clematis socialis*), Mohr’s Barbara’s buttons (*Marshallia mohrii*), Tennessee yellow-eyed grass (*Xyris tennesseensis*), Mock’s bishop’s weed (*Ptilimnium nodosum)* and green pitcher plant (*Sarracenia oreophila*) (Table 4.4-2, Appendix C, pgs. C-35 to C-36) (USFWS, 1997a and 1997b).

- Kral’s water-plantain (Alismataceae, threatened) is known only from shallow waters of Little River. Leaves are mostly submerged with flowering stems emergent. The species is common in the Canyon area, but is known to be extirpated from Sand Mountain.

- 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.
- Mock bishop's-weed (Apiaceae, endangered) occurs within Little River Canyon in Cherokee County, but is not known within the pool levels of Weiss Lake. It is found growing on exposed sandstone in the river bed.
- Green pitcher-plant (Sarraceniaceae, endangered) grows along Little River, the rim of Little River Canyon, and in various localities above the pool level of Weiss and Henry Lakes.

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 US 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 34 State species of concern may potentially occur within the Project area. These are enumerated in Table 4.4-2 (Appendix C, pgs. C-35 to C-36), but are not further elaborated upon here.

4.4.2 Wildlife Resources

Forested areas surrounding Henry Lake provide habitat for a variety of species such as gray fox, white-tailed deer, Virginia opossum, woodchuck, turkey, fox squirrel, and gray squirrel. A concomitant variety of songbird, reptile, and amphibian species also make use of forested sites in the vicinity (Tables 4.4-3 through 4.4-6, Appendix C, pgs. C-37 to C-47).

There is one Wildlife Management Area (WMA) in the vicinity of the Henry development. The St. Clair Community WMA is a 6,397-acre tract of land located approximately 10 miles southwest of the Henry development. This area provides valuable habitat for a variety of wildlife. It is managed and operated by the Alabama Wildlife and Inland Freshwater Fish Commission. The Talladega National Forest, owned and managed by the National Park Service, is located approximately 25 miles east of the Project. The forest encompasses 377,703 acres, providing valuable habitat for an abundance of wildlife.

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 owned by APC.

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*), flattened musk turtle (*Sternotherus depressus*), bald eagle (*Haliaeetus leucocephalus*) and gray bat (*Myotis grisescens*) have been identified as occurring in the counties surrounding Henry Lake. These four 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) with the presence of dead snags for cavity nesting (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 flattened musk turtle is federally listed as threatened (USFWS, 1997a). This species is primarily found in the Black Warrior River System (Conant and Collins, 1991) but has been identified in Etowah County as well. It prefers streams with rocky substrates and the impoundments associated with these streams (Behler and King, 1991).

The bald eagle is also protected under federal law and is a federally-listed threatened species that occurs in Cherokee County. Bald eagles may be found throughout North America, typically around water where they feed on fish and scavenge on carrion. Bald eagles thrive around bodies of water where adequate food exists and human disturbance is limited. Eagles nest in large trees near water, and can produce one to three young per year (Degraaf and Rudis, 1986). Adults typically use the same nest for years, and make repairs to it annually (Degraaf and Rudis, 1986).

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 are 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
Neely Henry 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 Miles

Location Map

ALABAMA POWER
A SOUTHERN COMPANY

Kleinschmidt
Energy & Water Resource Consultants

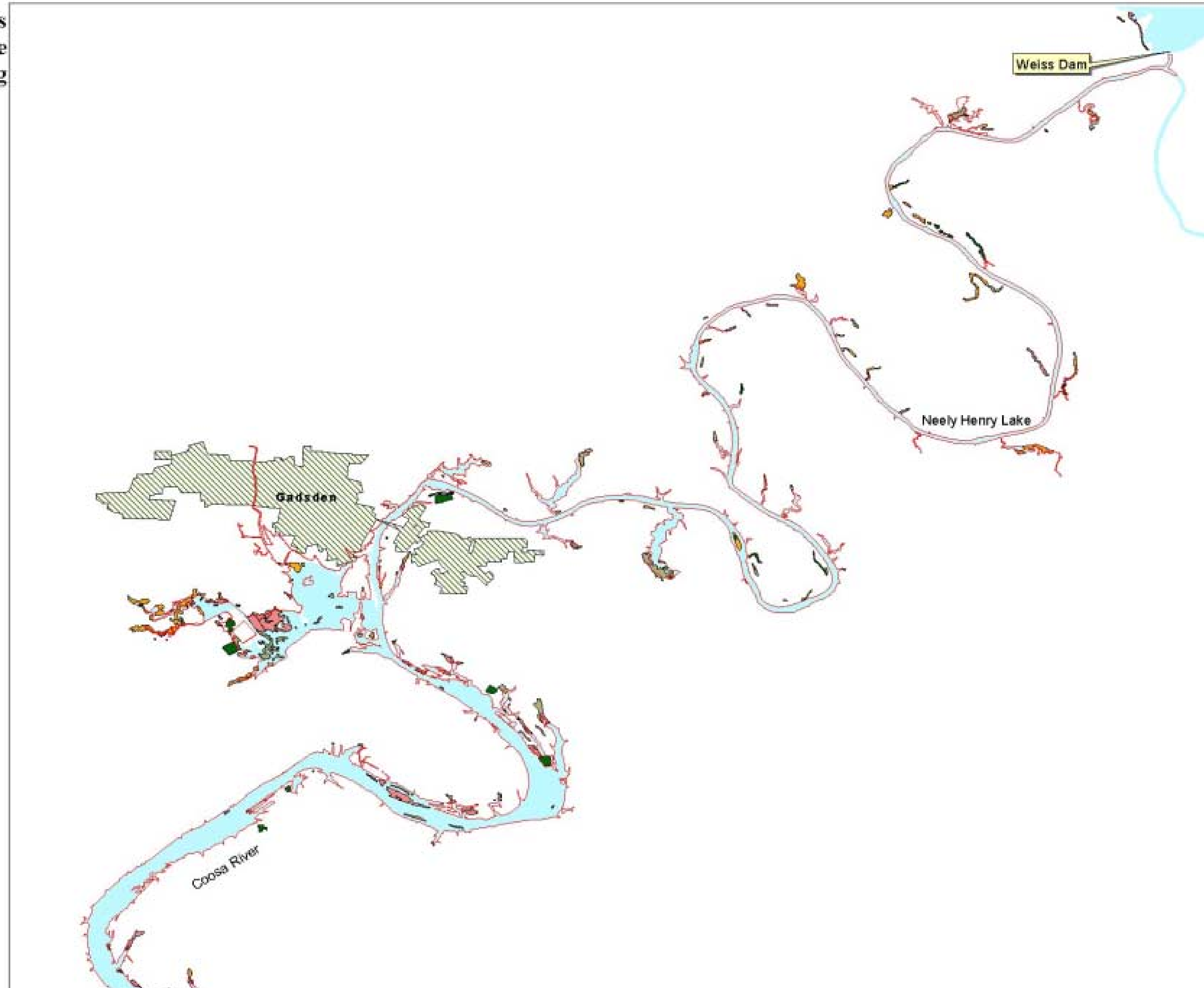


Figure 4.4-1
Sheet 1 of 2

Project Area Wetlands
Neely Henry 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 Miles

Location Map

ALABAMA POWER
A SOUTHERN COMPANY
Kleinschmidt

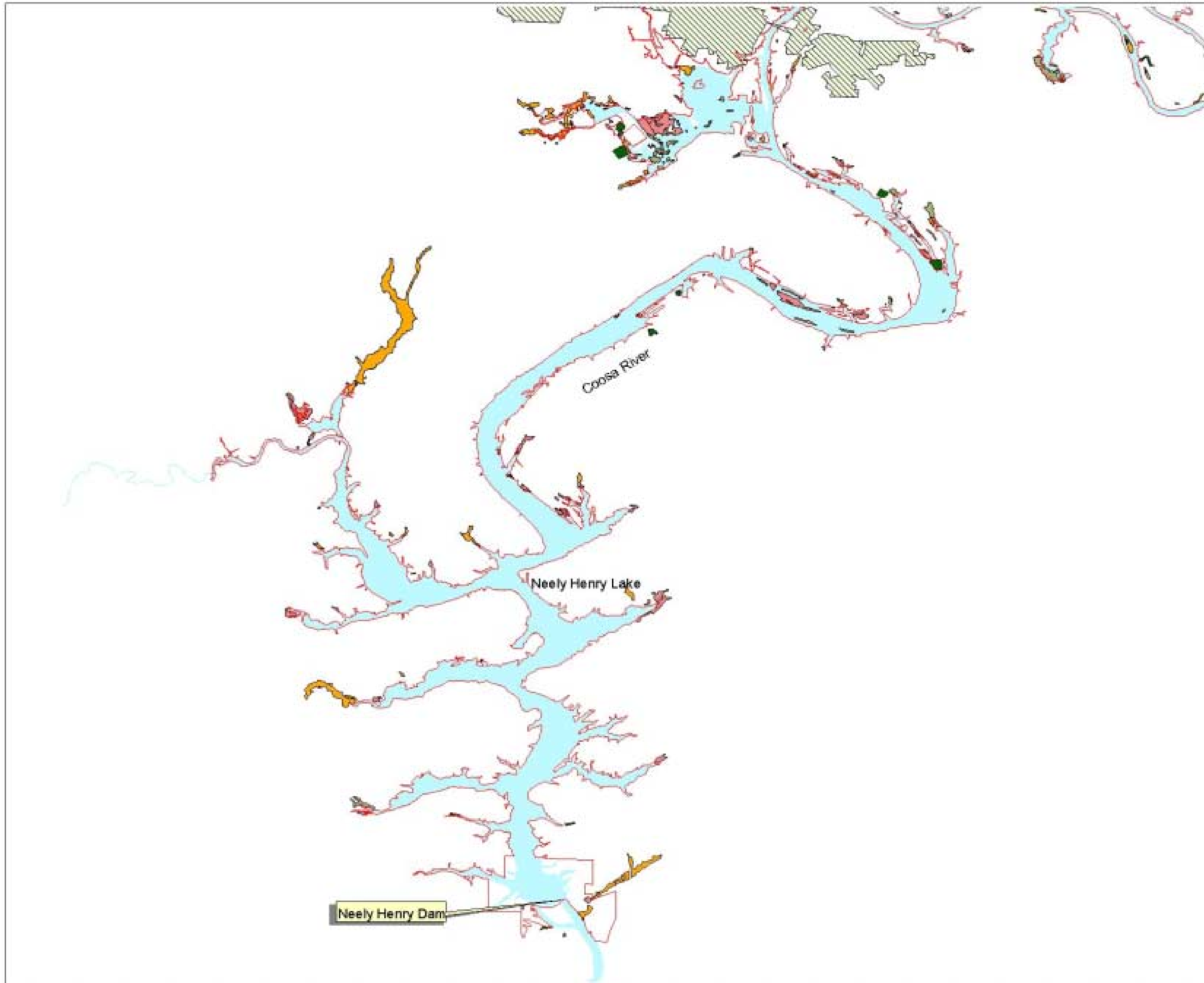


Figure 4.4-1
Sheet 2 of 2

4.5 Cultural Resources

The following information is based on an unpublished report from the University of Alabama sent to Bill Gardner, APC.

4.5.1 Cultural Chronology

Henry Lake is located in Cherokee, St. Clair, Calhoun, and Etowah Counties, Alabama. Located within the Coosa Valley district of the Alabama Valley and Ridge physiographic section, the lake lies in the northern part of the central Coosa River drainage. It is surrounded by moderate to steeply sloping ridges and stream and river terraces. Several large ridges surround the lake, including Look Out Mountain, Dunaway Mountain, Shinbone Ridge, Shoal Creek Mountains, and Greens Creek Mountain. Numerous terraces and river bends are found along the lake, most notably Tidore Bend and Whorton Bend, and Woods Island is located at the south end of the lake. Several tributaries drain into Henry Lake, namely Bigs Wills Creek, Black Creek, and Big Canoe Creek. 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 include 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. 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 late 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 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 Misississippian 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 Archaeological Resources

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), APC prepared the Coosa River Project Lands – Recorded Archaeological Sites (2000b) report in order to determine the effects of the Projects on any archaeological or historical properties that may be located within the Henry 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, 2000b).

It was determined that there are 115 archaeological sites known to exist and 8 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 Euro-American History

During the Proto-Historical Period (1540 to 1600 A.D.) 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 in 1763 (Logan and Muse, 1998).

After the American Revolution, no longer were European powers trying to gain control of the region, but the new 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 on 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 22^{nd} 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 developed 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 used 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, Alabama 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 14^{th} 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.

Cherokee County was created by the Alabama legislature on January 9, 1836. It was named for the Cherokee Indians, who ceded the land that now comprises the county to the Federal government by the treaty of New Echota, in 1835. The first ten years the residents of Cherokee County quarreled over the location of a county seat. In 1837, the Alabama legislature authorized the seat of county government to be established at Cedar Bluff. In 1844 an election was held and the county seat was moved to the town of Centre. Other towns and communities in Cherokee County include Jamestown, Gaylesville, Forney, and Rock Run.

St. Clair County was established on November 20, 1818 by the Alabama Territorial legislature and was named after General Arthur St. Clair from Pennsylvania who served during the American Revolution. 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.

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. 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.

Etowah County was created by the Alabama Legislature on December 7, 1866. The county was originally named Baine County in honor of Confederate General David W. Baine of Lowndes County. On December 1, 1868, the Constitutional Convention abolished the county and re-established it the same day under the name of Etowah, which comes from the Cherokee language. The county seat of Etowah County is Gadsden, named after Colonel James Gadsden who was a distinguished soldier, diplomat, and railroad president. Other notable towns in Etowah County include Attalla and Rainbow City.

4.5.4 History of the Project Area and Project

The Henry Dam site and surrounding properties have for centuries been host to developing humanity. Investigations have revealed artifacts and a fish weir visible below Henry Dam, providing evidence of man's existence in the area since 11,000 B.C.

Some historians suggest that the first aboriginal town in the Ten Islands shoals area 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 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 the city of Wetumpka was established in 1836. James Lafferty, a shipbuilder from Ohio, built a steamboat and aptly named her the Coosa and made the maiden Coosa River voyage in 1845. Steamboating reached its pinnacle during the 19th century on the Coosa, with paddlewheelers running from Rome, Georgia to Greensport, Alabama. Shoals and rapids made navigation on the Coosa south of Greesnport 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 hydro-electric 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 the Mitchell Dam in 1923, and the Jordan Dam in 1929.

The hydropower potential of the Coosa River system has been studied by both private interests and the Federal Government. In 1925 APC conducted a study of the storage possibilities of the Coosa River above their existing Lay Dam with regard to the development of five additional power dams. In 1928, APC prepared a report on complete "canal-ization" of the Coosa River. That report included the study of a power and navigation dam at the site of the existing Federal Lock 2. The report identified this as the Patlay site.

In 1934, the ACOE developed a general plan for the over-all development of the Alabama-Coosa River system. That plan included a power and navigation dam on the Coosa River at the Patlay site previously studied by APC. Patlay (Lock 2) is about 1.5 miles upstream from the Henry Dam.

Further studies were directed by Congress in resolutions adopted by the Committee on Rivers and Harbors, House of Representatives, on April 1, 1936 and April 28, 1936, and by the Committee on Commerce, United States Senate, on January 18, 1939. That report recommended development of the Alabama-Coosa River and tributaries for navigation, flood control, power generation and other purposes in accordance with plans being proposed by the Chief of Engineers. The improvement outlined in House Document No. 414 included a dam with a powerhouse at the Patlay site.

On June 28, 1954, the 83rd Congress enacted Public Law 436, which suspended the authorization under the River and Harbor Act of March 2, 1945, insofar as it concerned Federal development of the Coosa River for the generation of electric power. This was done in order to permit development of the river by private interests under a license to be issued by the Federal Power Commission (FPC). The law stipulated 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 plans for a dam at the site of old Lock 3 about 2.0 miles downstream from the Patlay site. Later the site was relocated approximately 0.5 mile upstream to its present location, 48.5 miles above Logan Martin Dam.

The FPC issued a license to APC on September 4, 1957, for the construction, operation and maintenance of Project 2146. The license directed that construction of Henry (Lock 3) development commence within 5 years and be completed within 8 years from the date of commencement of construction of Weiss Dam. Construction of the Henry development started on August 1, 1962 and the dam was completed in June 1966, with the Project beginning operation by June 29, 1966.

4.5.5 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

Henry 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, Wilson Lake, a portion of Bankhead Lake, Lake Guntersville, Lewis Smith Lake, Weiss Lake, Logan Martin Lake, Talledega 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 recreation opportunities in the vicinity of Henry Lake include Pinhoti National Recreation Trail System, Overton Lake, Lees Lake, several golf courses, Etowah Conservation Lake, Chandler Mountain Lake, Lake Sumatanga, Pinedale Lake, Gilliland-Reese Covered Bridge, Lookout Mountain Parkway, James D. Martin Wildlife Park, Noccalula Falls Park, and Choccolocco Valley. The cities of Gadsden, Birmingham, Albertville, Boaz, Rainbow City, Jacksonville, and Anniston, located near Henry Lake provide many urban cultural, recreational, historical, and entertainment opportunities.

4.6.1.2 Local

Henry Lake is the second lake on the Coosa River with the upstream extent of the lake meeting the Weiss powerhouse tailrace. The Lake is 11,235 acres and spreads across Cherokee, Calhoun, Etowah, and St. Clair Counties. The City of Gadsden borders the lake approximately 20 miles north of the dam. The City of Gadsden offers recreational access for much of its population (Bayne *et al*., 1995). The lake is approximately 55 miles northeast of Birmingham, 20 miles northwest of Anniston and 90 miles west of Atlanta. Henry Lake is a popular recreational bass fishing destination, hosting numerous fishing tournaments throughout the year (Bayne *et al.,* 1995).

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-48) provides a list of recreation sites located in the Project area and the recreation facilities present at each site.

There are 26 recreational use areas located on Henry 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.

Public access is provided at three (3) free public access areas and eight (8) user fee access areas (Bayne *et al.,* 1995). These areas include boat launches, picnic areas, campgrounds, and two city park. According to the ACT Draft Report (1998) Henry Lake has 108 campsites, 214 picnic sites, 28 boat launches, and 11 public docks and fishing piers.

Public recreation areas on the lake include the Alford Bend, Coats Bend, Croft Ferry Road, Fitts Ferry Road, Hokes Bluff Ferry, Haney Road, and Tilson's Bend Boat Ramps, which provide boat launching opportunities. Unimproved boat ramps include the Davis Ferry Dirt Ramp. The City of Gadsden Park provides boat launching and day use facilities. Ten Islands Historic Park provides day use recreational facilities.

APC owns and operates the Henry Tailrace Area and Visitors Center, which are open to the public free of charge (APC, 1995). The parking lot at the Henry Tailrace Area is located on the western downstream bank and is utilized for informal shoreline fishing opportunities (APC, 1995). A fishing pier and parking lot are also located on the eastern downstream bank. Fishing is popular in the tailrace from both banks (APC, 1995). The Visitors Center offers tours of APC's hydroelectric facilities. 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 7 marinas, 1 campground, 2 resorts (including fishing camps and inns), 1 landing and 3 boat launches. These 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 and day use areas. Camping facilities and resorts provide a variety of day and overnight use facilities.

4.6.2 Existing Use

A study conducted for the ACOE's Draft Environmental Impact Statement (EIS) for the ACT Basin (1998) estimated use on Henry Lake to be 170,431 total trips, which translates to 501,268 total-visitor days (ACOE, 1998). Approximately 82 percent of use occurred in the spring and summer (ACOE, 1998). The winter accounted for 12 percent and the fall for 6 percent of total annual visitor days. Henry is the fifth most visited lake in the ACT basin (ACOE, 1998).

Boat fishing was the primary activity, accounting for 82 percent of the total trips, followed by pleasure boating (36 percent), swimming (27 percent), picnicking (22 percent), water skiing (22 percent), and fishing from shore (12 percent). Camping and jet skiing accounted for less than 10 percent of total trips.

Participation in recreational activities were not considered mutually exclusive, thus percentages of the activities sum to greater than 100 percent. Estimated total annual trips for registered owners in the ACT River Basin to Henry Lake was 204,558. Approximately 80 percent of the total annual trips occurred in the spring and summer (ACOE, 1998).

Alabama Regional Recreation Opportunites
Northern Region - Neely Henry Lake
Coosa-Warrior Rivers Relicensing

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

Data Source:

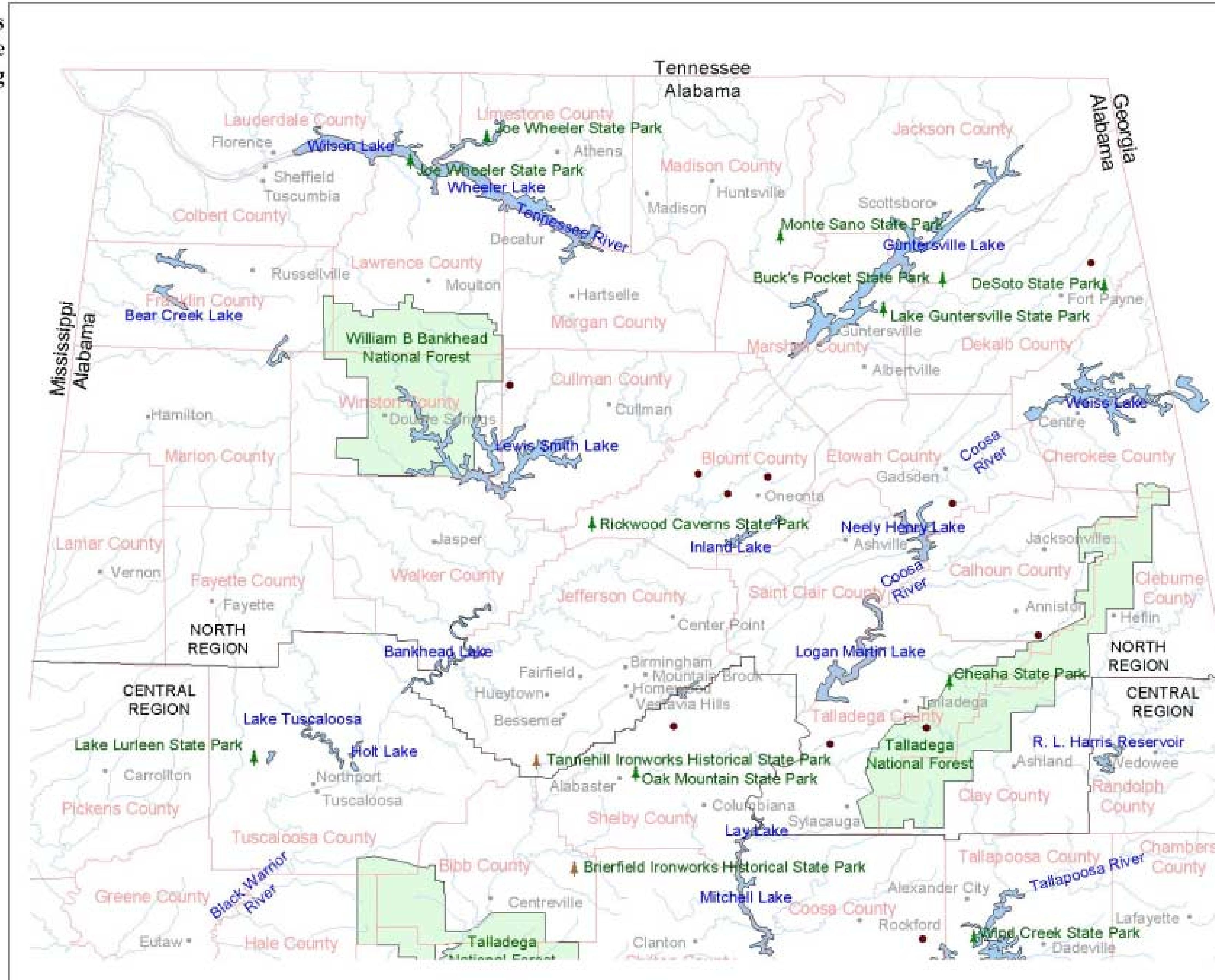
Alabama Bureau of Tourism and Travel, Official Vacation Guide, 2000; DeLorme, Alabama Atlas & Gazetteer, 1998; Internet Resources, 2000; Alabama Power Company, 2000

N

Approximate Scale

5 0 5 10 15 Miles

Location Map

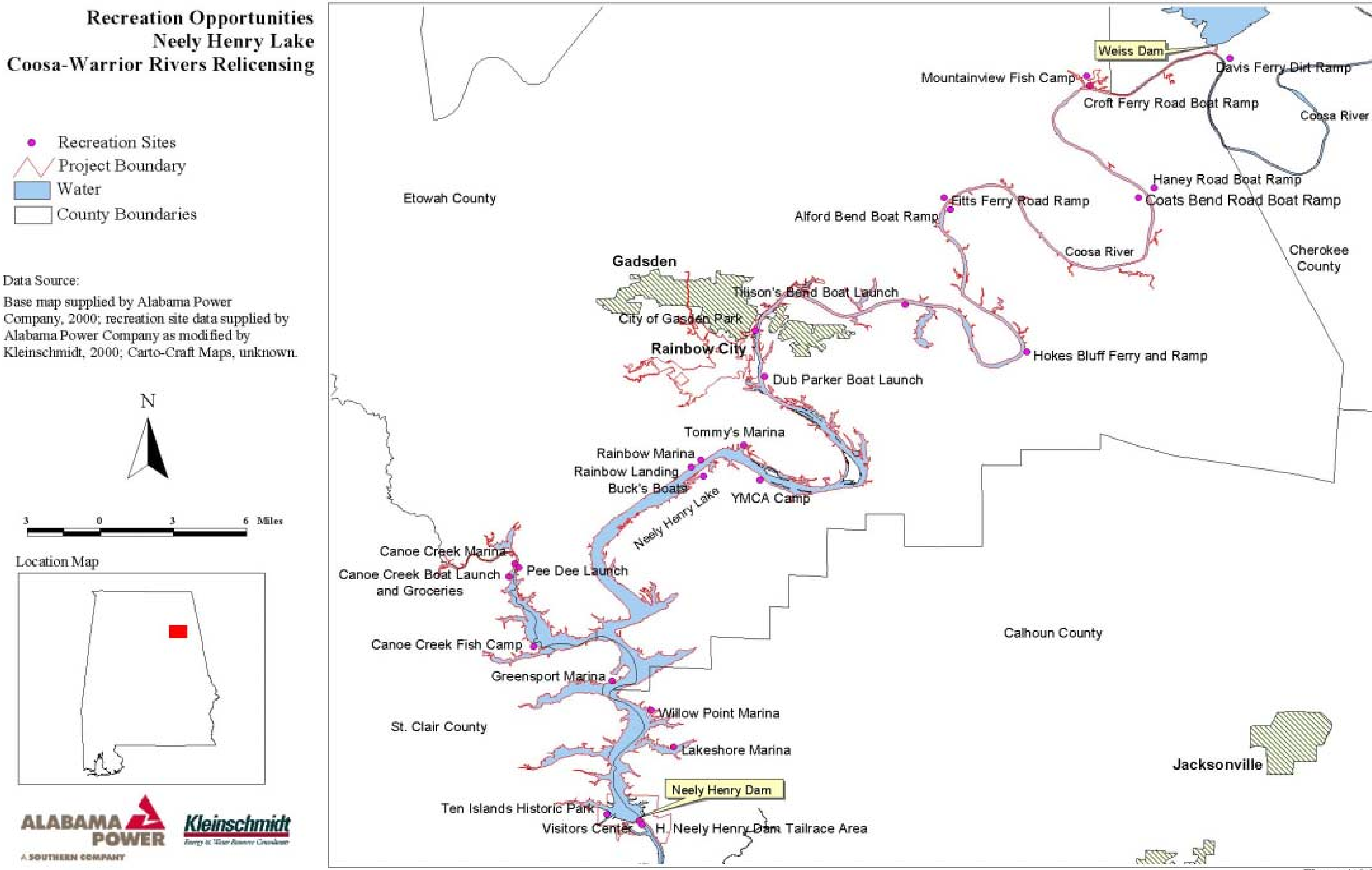


ALABAMA POWER
A SOUTHERN COMPANY

Kleinschmidt
Energy & Water Resource Consultants

Figure 4.6-1

Recreation Opportunities
Neely Henry Lake
Coosa-Warrior Rivers Relicensing



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

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Kleinschmidt
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, including 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.

Weiss Lake is located in the Coosa River Basin (Figure 4.7-1). The Basin extends approximately 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 86 percent forestland, 12 percent agricultural land, and one percent urban land[3] (personal communication, APC Reservoir Management Group, October, 2000).

Henry Lake (11,235 acres) is located on the Upper Coosa River and has a drainage basin of 6,600 square miles. The lake extends 78 miles upstream from the dam to the Weiss Dam and consists of over 339 miles of shoreline. The Project area including land and water, is approximately 12,941 acres (Figure 4.7-2).[4] The watershed of Henry is rural in nature with the exception of the City of Gadsden (Floyd and Catchings, 1989). The land in the watershed is approximately 77 percent forested and has very little agriculture (Floyd and Catchings, 1989) (Figure 4.7-2). Gadsden is the largest city in the area and borders the Lake. Other municipalities in close proximity of the lake include Ohatchee, Ragland, Rainbow City, Southside, Glencoe and Hokes Bluff.

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

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

The Project area lies within Cherokee, Etowah, St. Clair, and Calhoun Counties. Etowah County has an area of 542 square miles. Etowah County contains the City of Gadsden and twelve towns including Rainbow City, Hokes Bluff and Glencoe. Etowah County has a total of 928 farms with a total farm acreage of 100,517 and a total cropland acreage of 47,478 (Bayne *et al.*, 1995). The majority of the population in the county resides in an urban setting.

Calhoun County consists of 611 square miles. The county contains the City of Anniston and the 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 a 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 consists 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 a total cropland acreage of 39,773 (Bayne *et al.*, 1995). The majority of the county's population resides in a rural setting.

Cherokee County has an area of 600 square miles and is bordered by DeKalb, Etowah, Calhoun, and Cleburne in Alabama, and Chattooga, Floyd, and Polk Counties in Georgia (Bayne *et al*., 1993). The county contains the towns of Cedar Bluff, Centre, Gayesville, Leesburg, Sand Rock, and Spring Garden. Cherokee County has a total of 487 farms with a total farm acreage of 119,956 and a total cropland acreage of 72,603 (Bayne *et al*., 1993). The majority of the population resides in rural areas.

APC generally owns lands in fee up to normal lake elevation of el. 508 ft msl. It also has land in fee and easement for flood storage. Commercial and private development in the vicinity of the lake is moderate, but growing (APC, 1995). Much of the shoreline property directly adjacent to the lake is developed (Floyd and Catchings, 1989).

There are no land use plans for Cherokee, Calhoun, Etowah, or St. Clair Counties. However, the City of Gadsden has developed land use ordinances for properties within the municipality.

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.

The Shoreline Permitting Program was established in 1991. Since then, APC has issued approximately 1,396 permits for the Henry Project (personal communication, Walter Ramey, APC, April 11, 2000). 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 the above permitting process.

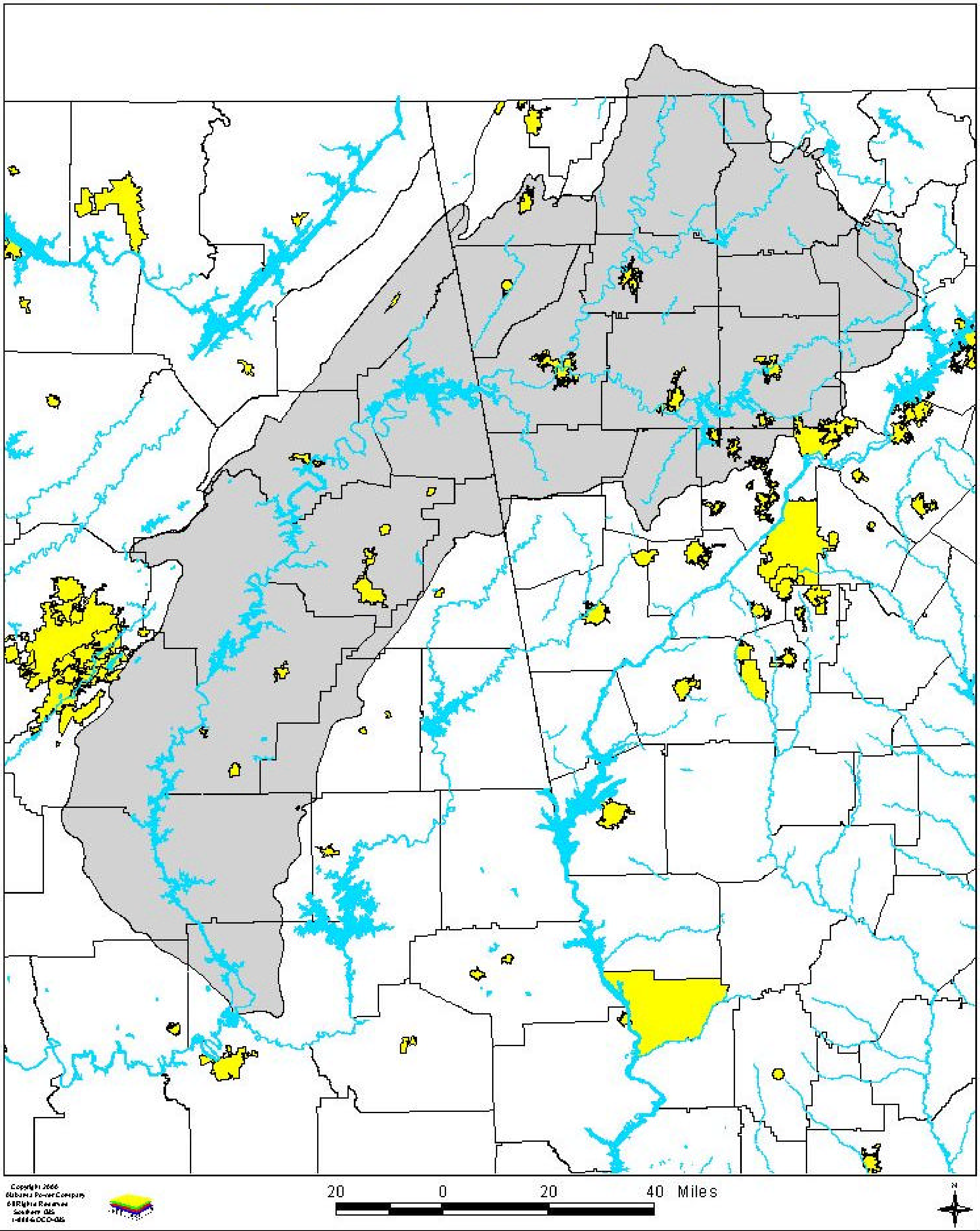
Privately owned shoreline property is subject to permitting by APC. The shoreline permitting program provides a proactive, ongoing plan for shoreline development by private property owners, commercial developers, and local, state and federal agencies that want to construct piers, boat ramps, seawalls, 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 his/her 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 offices, and other affected areas, as well as 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

Henry Lake is primarily riverine in nature with many creeks and tributaries dispersed along its entire length. Since the lake extends for 78 miles there are no single vantage points in which to view the entire lake. However, several vantage points located at recreation sites, near bridges, and in the adjacent City of Gadsden offer views of the shoreline, which is a mixture of forestland and development. State Route 144 crosses the dam and offers views of APC facilities, the downstream portion of the Lake and the tailrace area. State Route 77 spans the lake at several locations and offers views of the lake and various creeks. Several roads including Interstate 759, U.S. Routes 278, 431, and 411, and State Routes 25 and 74 all span the lake near the City of Gadsden. Boating around the lake offers diverse views from various creeks and tributaries. Vantage points above and below the dam offer views of the APC facilities.

Figure 4.7-1 Map of the Coosa River Basin



Project Area Land Cover
Neely Henry 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
- LAKES
- MIXED FOREST LAND
- MIXED URBAN OR BUILT-UP
- NONFORESTED WETLAND
- OTHER URBAN OR BUILT-UP
- RESIDENTIAL
- STRIP MINES
- TRANSPORTATION, COMMUNICATIONS & UTILITIES
- TRANSITIONAL AREAS

Data Source:

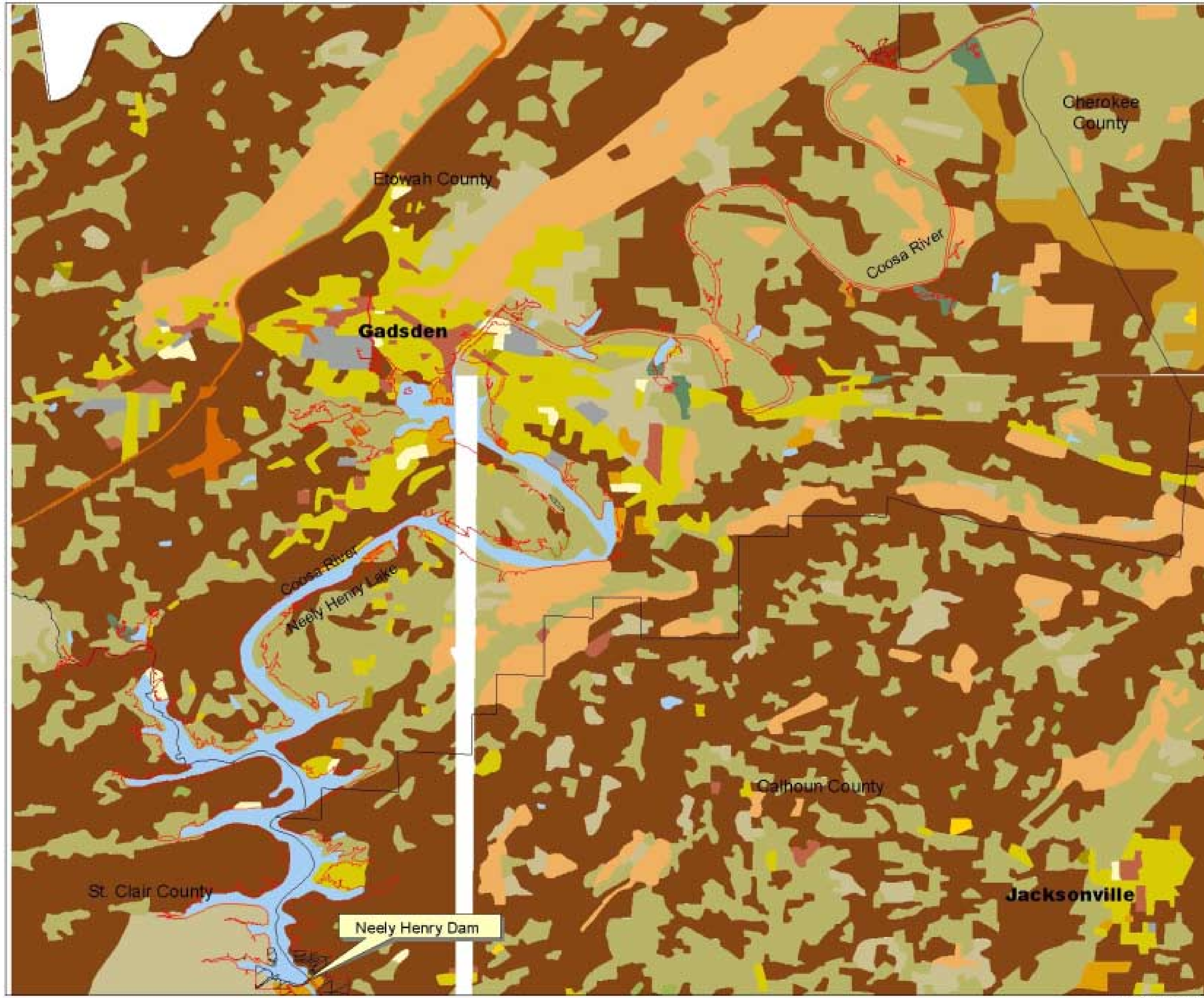
All data supplied by Alabama Power Company as modified by Kleinschmidt Associates, 2000

Note:

Project boundary for Neely Henry Lake is approximate to accomodate the scale of the land cover type data.

2 0 2 4 Miles

Location Map



ALABAMA POWER
A SOUTHERN COMPANY

Kleinschmidt

Figure 4.7-2

4.8 Socioeconomics

4.8.1 Demographics

A summary of the demographic profile of Alabama, Cherokee, Calhoun, Etowah and St. Clair Counties is provided in Table 4.8-1 (Appendix C, pg. C-49). As of 1997, Alabama ranked 23rd in population within the United States (this ranking includes the District of Columbia) (REIS, 1999). Cherokee, Calhoun, Etowah and St. Clair Counties ranked 46th, 8th, 10th, and 19th in population in the state (out of 67 counties), respectively (REIS, 1999). The population growth rate of Calhoun County was a modest 0.4 percent, Etowah County experienced a moderate 3.6 percent increase, Cherokee County experienced a 12 percent growth rate, and St. Clair County experienced a growth rate of 27.7 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. 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, Cherokee, Calhoun, Etowah, and St. Clair Counties is provided in Table 4.8-2 (Appendix C, pg. C-50). 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 (REIS, 1999). 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 Cherokee County was $9,896 in 1987 and $15,832 in 1997, which ranked 49th and 58th in Alabama respectively. The average annual growth rate of per capita income for Cherokee County was 4.8 percent over this time period.

The per capita income for Etowah County was $11,891 in 1987 and $19,126 in 1997, which ranked 15th and 19th in the state respectively. The average annual growth rate of per capita income for Etowah 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.

Service and retail trade businesses comprised the largest number of business establishments in the vicinity of the lake (Bayne *et al*., 1995). Manufacturing businesses employed the largest number of individuals in the area followed by service and retail businesses (Bayne *et al*., 1995). Agriculture production in the area is primarily “broiler” chickens (Floyd and Catchings, 1989).

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 the NE Alabama Regional Medical Center, Springs Industries, Westinghouse and Bostrom Seating (Calhoun County Chamber of Commerce, Unknown).

Cherokee County is one of the fastest growing counties in the northeastern region. Agriculture remains the county's largest industry, producing cotton, cattle, hogs, broilers, corn, wheat, and soybeans (Bayne *et al*., 1993). The county has 288 business establishments. Retail trade businesses are most numerous, but manufacturing businesses employ the most individuals (Bayne *et al*., 1993). The county has two industrial parks.

Etowah County has approximately 1,948 business establishments and 928 farms (Bayne *et al*., 1995). 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 the most individuals (Bayne *et al.*, 1995).

4.8.3 Social Infrastructure

Cherokee, Calhoun, Etowah and St. Clair 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. Etowah County has three school systems, Gadsden, Attalla, and Etowah County schools, consisting of approximately 39 public schools. St. Clair County has two school systems, for St. Clair County and Pell City, consisting of approximately 16 and 5 public schools, respectively. Cherokee County has one school system that consists of approximately seven public schools. Post secondary institutions located in the three counties include the Gadsden State

Community College, Jacksonville State University, Jacksonville State University in Gadsden, Atlantic Baptist College, Gadsden Business College, Ayers State Technical College, and The University of Alabama, Gadsden Center.

4.8.4 Access and Transportation

Cherokee, Calhoun, Etowah, and St. Clair Counties are served by several railroads, five airports, various freight and trucking companies, and a system of highways. Interstates 20 and 59 connect the Project area with Birmingham. Interstate 20 and U.S. Routes 78 and 278 are the major east-west connectors, and Interstate 59 and U.S. Routes 431, 411, 11, and 231 are the major north-south connectors in the vicinity of the Project area. Other major routes in the counties include Alabama Highways 7, 25, 1, 179, 74, 132, 77, 21, 204, 9, 202, 4, 53, 174, and 23. The Gadsden Municipal Airport (Etowah County), McMinn Airport (Calhoun County), Centre Municipal Airport (Cherokee County) and the St. Clair County Airport are public airports and provide general air transportation. The Anniston Metro Airport (Calhoun County) is a commercial airport. Birmingham's International Airport is served by major commercial airlines is less than 55 miles from the Project area.

5.0 ENVIRONMENTAL PROGRAMS AND ACTIVITIES FOR HENRY

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' efforts at Henry Lake are also briefly described.

Alabama Water Watch

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

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.

Shoreline Management Program

APC maintains a Shoreline Permitting Program to protect the natural beauty of the reservoir shorelines. Practices that APC require in the permitting process may include shoreline stabilization and buffer zones that effectively limit erosion of soils, thereby decreasing the potential for increased turbidities in project reservoirs.

"Renew the Coosa"

What started as an Earth Day clean up on Jordan Lake eventually grew into a massive effort on all APC Lakes on the Coosa River. Each year, APC provides "garbage barges" and garbage bags and works closely with local homeowner associations and other interested groups to clean up the lakes and shorelines. In 2000, the "Renew the Coosa" project involved a week-long effort to clean up all of the lakes on the Coosa River. After the clean up of each lake, participants took the garbage back to a central location to help emphasize the need to discourage littering. A total of 14 tons of garbage at Henry Lake was collected by APC and other volunteers.

6.0 PRELIMINARY ISSUES AND POTENTIAL 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

Recreation

- Whether to provide additional opportunities for hunting, camping, biking and wildlife areas
- Establishing navigation/recreation channel (removal of tree stumps)

Operations

- Effect of changing current project operations
- Effect of trial pond elevations on recreation, energy and aquatic resources

Wildlife

- Project effects on threatened and endangered species

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
- Fisheries baseline information (tailrace)
- 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

APPENDIX C

Tables – Henry Development

Table 2.5-1 Henry Development – Standard Numbers

Description		Number or Fact
GENERAL INFORMATION		
FERC Number		2146
License Issued		September 4, 1957
License Expiration Date		July 31, 2007
Licensed Capacity		72,900 kw
Project Location		Near Town of Ohatchee; Counties of Cherokee, Etowah, Calhoun and St. Clair; Coosa River; 507 river miles above Mobile
Total Area Encompassed by Existing Project Boundary (* land and water)		12,941
Acres of Water Within Existing Project Boundary		11,235 acres
Acres of Mainland Within Existing Project Boundary		1,706
Henry Dam Drainage Basin		6,600 mi^2
Length of River From Henry Dam to Weiss Dam		78 mi
Length of River from Henry Dam to Logan Martin Dam		48.5 mi
1. DAM		
Date of Construction		August 1, 1962
In-service Date		June 2, 1966
Construction Type		Gravity concrete and earth-fill
Elevation Top of Abutments		539msl
Gross Head at Normal Pool Elevation (508 msl)		43 ft
Spillway Elevation (to top of gates)		509 msl
Total Length of Water Retaining Structures		4,705 ft
Length of nonoverflow sections	Right	133 ft
	Left	120 ft
Length of embankments	Right	3,200 ft
	Left	850 ft
Length of Powerhouse (substructure)		300 ft
Length of Spillway (total)		605 ft
Length of concrete spillway		305 ft
Length of Spillway (gated)		240 ft
Gates:	Spillway Gates	6 total

Description		Number or Fact
	Width by Height	40 ft x 29 ft
Hazard Classification		High
Spillway Capacity at 534.4 msl		310,700 cfs
2. HENRY LAKE – GENERAL INFORMATION		
Length of Impoundment		78 mi
Pool Elevations:	Normal	508 ft msl
Gross Storage:	Normal Pool @ Elevation 508 ft Minimum Pool @ Elevation 505 ft	121,860 acre-ft 91,220 acre-ft
Usable Storage Capacity (between 508 and 480 msl)		Approximately 112,000 Acre-ft
Surface Area (at msl)		11,235 acres
Miles Shoreline (including tributaries) at 508 msl		339 mi
Number of Boat Docks		1,396
Water Residence Time		5.8 days
Water Temperature Range:	Maximum Minimum	82ºF Aug 40ºF Jan-Feb
Existing Classification		PWS/F/S
3. POWERHOUSE		
Length (Superstructure)		300 ft
Width (Superstructure)		170 ft
Height		105 ft
Construction Type (Superstructure)		concrete
Draft Tube Invert Elevation		444.0 ft msl
Operating Floor Elevation		494.9 ft msl
Normal Tailwater Elevation		Between 460.0 & 468.0 ft msl
High Tailwater Elevation (three units generating)		470 ft msl
Discharge Capacity		26,000 cfs
Intake Openings:	Number of Openings Invert Elevation	9 Approximately 493 ft msl
Outdoor Gantry Crane Capacity		140 tons
4. TURBINES		3
Rated Net Head (Gross Static)		43ft
Turbines	Manufacturer	Newport News Propeller

Description		Number or Fact
	Type	
Rated Discharge Capacity:	Maximum	8,900 cfs each
Speed		81.8 rpm
Rated Output at 35 ft head		33,500 hp each
5. GENERATORS		3
Manufacturer		General Electric
Nameplate Rating		24,300 kW each
Rated Output		27,000 kva
Power Factor		0.9
Voltage		11,500 volts
Number of Phases		3
Frequency		60 cycle
Estimated average annual generation		210,935,000 kwh
6. TRANSFORMERS		
Transmission Voltage		Low side – 11,500 volts High side – 115,000 volts
Rating		90,000 kilovolt amp
7. FLOOD FLOWS – HENRY DAM		
Probable Maximum Flood	Elevation	Freeboard for the design PMF is 6.49 feet ft msl
	Flow	317,100 cfs

Table 4.2-1 Water quality criteria for Henry 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/Henry Reservoir Summary of Water Quality Dissolved Oxygen/Temperature Data at 5 feet 1990 through 1999 (Source: APC unpublished data, 2000)

Location	Count	Min	Avg	Max
Dissolved Oxygen				
25.5 miles Upstream of Henry Dam	13	5.1	8.47	12.4
15.4 miles Upstream of Henry Dam	13	5.7	8.67	12.2
Henry Dam Forebay	56	4.1	7.53	12.4
Henry Dam Tailrace	55	4.1	6.90	10.9
Temperature				
25.5 miles Upstream of Henry Dam	13	4.8	18.40	29.8
15.4 miles Upstream of Henry Dam	13	4.8	18.36	29.6
Henry Dam Forebay	56	6.6	25.13	32.9
Henry Dam Tailrace	55	8.1	24.72	31.8

Table 4.2-3 Coosa River/Henry Tailrace Summary of Water Quality Dissolved Oxygen/Temperature 1999 (Source: APC unpublished data, 2000).

Location	Count	Min	Avg.	Max
Dissolved Oxygen				
Henry Dam Tailrace	12242	1.89	5.74	11.95
Temperature				
Henry Dam Tailrace	12242	16.7	27.0	32.5

Table 4.2-4 Partial listing of the EPA's PCS database of reported dischargers into the Henry 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, 5 Day				
AL0024376	4.74	1.25	1639.00	192.44	165.00	22.72	PIEDMONT LAGOON
AL0062723	1.95	0.55	4749.60	365.26	335.00	87.90	CENTRE LAGOON
AL0023311	14.56	2.53	15834.00	2417.92	3269.00	78.90	FORT PAYNE WWTP
ALG150011	0.07				583.00		TYSON FOODS INC IVALEE MILL
ALG160138	0.05				5.00		US CASTINGS DIV US PIPE
ALG160130	2.69				12.70		THREE CORNERS AWDS
ALG160119					5.40		ETOWAH CO ESWDA LANDFILL
ALG160113	2.15				6.20		GADSDEN CITY OF CD LANDFILL
ALG160106	2000.00				106.00		FORT PAYNE SANITARY LANDFILL
ALG150067	3.13				2950.00		BAKERY FEEDS INC

Table 4.2-4 (Cont.) **Partial listing of the EPA's PCS database of reported dischargers into the Henry 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
AL0062723	1.95	0.55	1471.30	356.86	358.00	103.45	CENTRE LAGOON
AL0024376	4.74	1.25	9574.00	789.98	1640.00	90.09	PIEDMONT LAGOON
AL0023311	14.56	2.53	14869.00	2859.76	1161.00	147.61	FORT PAYNE WWTP
AL0022659	11.70	4.73	15930.23	1728.04	455.00	57.02	GADSDEN EAST WWTP
AL0002119	2057000.00	749595.72	1675.00	156.04	609.00		TYSON FOODS INC GADSDEN
ALG150097	2.02	0.40			260.00		EARTH GRAINS COMPANY
Chemical Oxygen Demand (COD)							
ALG160113	2.15				61.90		GADSDEN CITY OF CD LANDFILL
ALG180502							JOHNNYS SALVAGE
ALG180442	0.06	0.04			12.00		HEREFORD SCRAP METAL
ALG180340	0.43	0.14			64.00		REGIONAL RECYCLING LLC GADSDEN
ALG180320	0.05	0.05			98.00		BILLY CASH AUTO PARTS

Table 4.2-4 (Cont.) Partial listing of the EPA's PCS database of reported dischargers into the Henry 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
ALG180281	0.89	0.28			27.00		KELLEY AND SPURLOCK AUTO PARTS
ALG160138	0.05				29.00		US CASTINGS DIV US PIPE
ALG160119					187.00		ETOWAH CO ESWDA LANDFILL
ALG160106	2000.00				1560.00		FORT PAYNE SANITARY LANDFILL
ALG150097	2.02	0.40			50.00		EARTH GRAINS COMPANY
ALG150067	3.13				1669.20		BAKERY FEEDS INC
ALG150011	0.07				1080.00		TYSON FOODS INC IVALEE MILL
ALG020097	0.65				42.00		MCCARTNEY CONSTRUCTION GADSDEN
ALG160130	2.69						THREE CORNERS AWDS
			Nitrite + Nitrate, Total (as N)				
ALG150097	2.02	0.40			1.80		EARTH GRAINS COMPANY

Table 4.2-4 (Cont.) **Partial listing of the EPA's PCS database of reported dischargers into the Henry 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
ALG150067	3.13				9.41		BAKERY FEEDS INC
ALG150011	0.07				2.83		TYSON FOODS INC IVALEE MILL
			Nitrogen, Ammonia Total (as N)				
AL0002119	2057000.00	749595.72			63.60	8.85	TYSON FOODS INC GADSDEN
AL0022659	11.70	4.73			13.40		GADSDEN EAST WWTP
AL0023311	14.56	2.53	549.00	43.51	16.00	1.06	FORT PAYNE WWTP
AL0024376	4.74	1.25	268.10	13.94	10.40	1.44	PIEDMONT LAGOON
			Nitrogen, Kjeldahl Total (as N)				
AL0062723	1.95	0.55	94.30	12.29	18.00	2.44	CENTRE LAGOON
AL0023311	14.56	2.53	1367.00	106.38	41.00	4.86	FORT PAYNE WWTP
ALG150011	0.07				61.00		TYSON FOODS INC IVALEE MILL
ALG150067	3.13				32.90		BAKERY FEEDS INC

Table 4.2-4 (Cont.) Partial listing of the EPA's PCS database of reported dischargers into the Henry 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
ALG150097	2.02	0.40			3.90		EARTH GRAINS COMPANY
				Nitrogen, Total (as N)			
ALG140499	0.03	0.01			1.90	1.14	BAND BUSSES INC
ALG180340	0.43	0.14			2.80	2.27	REGIONAL RECYCLING LLC GADSDEN
ALG120380	0.27				1.50		SCHULER INDUSTRIES INC
ALG120352	0.31	0.31			4.17		GAMETIME
ALG120297	0.30	0.03			3.63	3.48	FRITZ STRUCTURAL STEEL
ALG120131	0.05	0.02			7.80	3.60	GADSDEN MACHINE AND ROLL CO
ALG120064	0.21	0.10			1.50	0.77	CRAFT PLATING & FINISHING
ALG180442	0.06	0.04			2.20	1.70	HEREFORD SCRAP METAL
ALG120017	0.46	0.40			7.30	4.08	OWENS PLATING CO
ALG120007	1.29	0.52			3.43	2.17	BOSTROM SEATING INC

Table 4.2-4 (Cont.) Partial listing of the EPA's PCS database of reported dischargers into the Henry 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
ALG120156	0.17	0.13			5.30	1.45	MID SOUTH ELECTRICS INC
			Phosphate, Ortho (as P)				
ALG150067	3.13				5.45		BAKERY FEEDS INC
ALG110126	3.00	0.04					SHERMAN INTERNATIONAL CORP
ALG110127	1.80				0.18		SHERMAN INTERNATIONAL CORP
ALG120131	0.05	0.02			1.30		GADSDEN MACHINE AND ROLL CO
ALG140500	0.04	0.01			0.10		BAND BUSES INC HWY 278
			Phosphate, Total (as PO4)				
AL0002119	2057000.00	749595.72			47.40	10.80	TYSON FOODS INC GADSDEN
ALG120131 0.05	0.02	1.60			0.45		GADSDEN MACHINE AND ROLL CO
			Phosphorus, Total (as P)				
ALG150097	2.02	0.40			13.00		EARTH GRAINS COMPANY

Table 4.2-4 (Cont.) Partial listing of the EPA's PCS database of reported dischargers into the Henry 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
ALG120116	8308634.00	1002390.03			1.91	0.35	HEIL COMPANY
ALG120168	0.68	0.13			1.60	0.39	GARCY CORPORATION
ALG120297	0.30	0.03			0.11	0.07	FRITZ STRUCTURAL STEEL
ALG140108	0.79	0.12			1.42	0.30	OSBORN TRANSPORTATION INC
ALG140288	0.24				0.06		CONSOLIDATED FREIGHTWAYS GADSDEN
ALG140499	0.03	0.01			2.85	0.59	BAND BUSSES INC
ALG140500	0.04	0.01			5.41	0.66	BAND BUSES INC HWY 278
ALG150011	0.07				9.50		TYSON FOODS INC IVALEE MILL
ALG150067	3.13				3.75		BAKERY FEEDS INC

Table 4.2-5 Major NPDES Dischargers Based on Flow Rates in the Henry Sub-Basin (Source: EPA, 2000)

Max Reported Flow (mgd)	Facility Name	Permit #	DSN	Receiving Water
8308634	HEIL COMPANY	ALG120116	3	BIG WILLS CREEK
6923862	HEIL COMPANY	ALG120116	2	BIG WILLS CREEK
2057000	TYSON FOODS INC GADSDEN	AL0002119	1	COOSA RIVER LAKE HENRY
1598900	TYSON FOODS INC GADSDEN	AL0002119	4	COOSA RIVER LAKE HENRY
2000	FORT PAYNE SANITARY LANDFILL	ALG160106	1	UT BIG WILLS CREEK
188.83	APCO - Gadsden Plant.	AL0002887	1	COOSA RIVER
14.56	FORT PAYNE WWTP	AL0023311	1	BIG WILLS CREEK
11.7	GADSDEN EAST WWTP	AL0022659	1	COOSA RIVER
9.67	APCO - Gadsden Plant.	AL0002887	2	COOSA RIVER
4.74	PIEDMONT LAGOON	AL0024376	1	NANCES CREEK
3.13	BAKERY FEEDS INC	ALG150067	8	T TERRAPIN CREEK
3	SHERMAN INTERNATIONAL CORP	ALG110126	2	UT LITTLE COVE CREEK
2.69	THREE CORNERS AWDS	ALG160130	1	LITTLE BALLPLAY CREEK
2.25	BAKERY FEEDS INC	ALG150067	1	T TERRAPIN CREEK
2.15	GADSDEN CITY OF CD LANDFILL	ALG160113	1	UT COOSA RIVER
2.02	EARTH GRAINS COMPANY	ALG150097	5	T SULPHER SPRINGS
2.02	EARTH GRAINS COMPANY	ALG150097	1	T SULPHER SPRINGS
1.945	CENTRE LAGOON	AL0062723	1	COOSA RIVER
1.8	SHERMAN INTERNATIONAL CORP	ALG110127	2	UT BIG WILLS CREEK
1.75	MCENTYRE LUMBER CO	ALG060192	1	UT LITTLE COVE CREEK

Table 4.2-5 (Cont.) Major NPDES Dischargers Based on Flow Rates in the Henry Sub-Basin (Source: EPA, 2000)

Max Reported Flow (mgd)	Facility Name	Permit #	DSN	Receiving Water
1.286	BOSTROM SEATING INC	ALG120007	1	NANCES CREEK
1.05	KIRKPATRICK CONCRETE INC	ALG110139	2	UT BEESON BRANCH
0.9	KIRKPATRICK CONCRETE INC	ALG110100	2	UT BIG WILLS CREEK
0.888	KELLEY & SPURLOCK AUTO PARTS	ALG180281	1	LINE CREEK
0.794	OSBORN TRANSPORTATION INC	ALG140108	1	BIG WILLS CREEK
0.68	GARCY CORPORATION	ALG120168	2	TERRAPIN CREEK
0.65	MCCARTNEY CONSTRUCTION Gadsden	ALG020097	1	UT COOSA RIVER
0.511	BUILDERS SUPPLY CO FT PAYNE	ALG110233	2	DYE BRANCH
0.456	OWENS PLATING CO	ALG120017	1	UT BIG WILLS CREEK
0.45	APCO - Gadsden Plant.	AL0002887	6	COOSA RIVER
0.43	TYSON FOODS INC GADSDEN	AL0002119	3	COOSA RIVER LAKE HENRY
0.4287	REGIONAL RECYCLING LLC Gadsen	ALG180340	6	COOSA RIVER
0.34675	REGIONAL RECYCLING LLC Gadsden	ALG180340	2	COOSA RIVER
0.312	GAMETIME	ALG120352	1	BIG WILLS CREEK
0.30035	FRITZ STRUCTURAL STEEL	ALG120297	1	UNKNOWN DITCH WILLS CREEK
0.27	MEAD WOODLANDS Portersville	ALG060085	1	UT MUSH CREEK
0.27	SCHULER INDUSTRIES INC	ALG120380	1	LITTLE WILLIS VALLEY BRANCH
0.261	FRITZ STRUCTURAL STEEL	ALG120297	3	UNKNOWN DITCH WILLS CREEK

Table 4.2-5 (Cont.) Major NPDES Dischargers Based on Flow Rates in the Henry Sub-Basin (Source: EPA, 2000)

Max Reported Flow (mgd)	Facility Name	Permit #	DSN	Receiving Water
0.239	CONSOLIDATED FREIGHTWAYS Gadsden	ALG140288	1	COOSA RIVER
0.224	NORTHSIDE SALVAGE	ALG180300	1	WILLS CREEK
0.21	KIRKPATRICK CONCRETE INC	ALG110100	1	UT BIG WILLS CREEK
0.21	CRAFT PLATING & FINISHING	ALG120064	1	UT BIG WILLS CREEK
0.174	MID SOUTH ELECTRICS INC	ALG120156	1	UT BIG WILLS CREEK
0.17	TYSON FOODS INC GADSDEN	AL0002119	2	COOSA RIVER LAKE HENRY
0.15	KIRKPATRICK CONCRETE INC	ALG110139	1	UT BEESON BRANCH
0.122	APCO - Gadsden Plant.	AL0002887	8	COOSA RIVER
0.086	T D BROWN OIL CO	ALG340103	2	TOWN CREEK CHANNEL
0.078	APCO - Gadsden Plant.	AL0002887	7	COOSA RIVER
0.06625	TYSON FOODS INC IVALEE MILL	ALG150011	1	BROWN CREEK
0.0603	HEREFORD SCRAP METAL	ALG180442	2	UT BIG WILLS CREEK
0.054	GADSDEN MACHINE AND ROLL CO	ALG120131	1	BLACK CREEK
0.047	US CASTINGS DIV US PIPE	ALG160138	1	UT LITTLE COVE CREEK
0.047	BILLY CASH AUTO PARTS	ALG180320	1	WHORTE CREEK
0.046	FRITZ STRUCTURAL STEEL	ALG120297	2	UNKNOWN DITCH WILLS CREEK
0.045	SHERMAN INTERNATIONAL CORP	ALG110126	1	UT LITTLE COVE CREEK
0.038	BAND BUSES INC HWY 278	ALG140500	7	BIG COVE CREEK

Table 4.2-5 (Cont.) Major NPDES Dischargers Based on Flow Rates in the Henry Sub-Basin (Source: EPA, 2000)

Max Reported Flow (mgd)	Facility Name	Permit #	DSN	Receiving Water
0.027	BAND BUSSES INC	ALG140499	2	UT COOSA RIVER
0.027	BAND BUSSES INC	ALG140499	1	UT COOSA RIVER
0.015	BAND BUSES INC HWY 278	ALG140500	1	BIG COVE CREEK
0.008	BAND BUSSES INC	ALG140499	8	UT COOSA RIVER
0.0078	TYSON FOODS INC IVALEE MILL	ALG150011	3	BROWN CREEK
0.003	SHERMAN INTERNATIONAL CORP	ALG110127	1	UT BIG WILLS CREEK
0.003	SHERMAN INTERNATIONAL CORP	ALG110127	9	UT BIG WILLS CREEK
0.003	SHERMAN INTERNATIONAL CORP	ALG110127	6	UT BIG WILLS CREEK
0.001	GADSDEN MACHINE AND ROLL CO	ALG120131	9	BLACK CREEK
0.000396	RAINBOW FOOD MART NO 109	ALG340310	1	COOSA RIVER
0.0003	DEKALB COUNTY COMMISSION	ALG340319	1	BIG WILLS CREEK
0.0002	SOUTHERN NATURAL GAS CO	ALG670028	3	UT COOSA RIVER
	APCO - Gadsden Plant.	AL0002887	4	COOSA RIVER
	VALLEY TIMBER INC	ALG060324	1	UT WILLS CREEK
	SHERMAN INTERNATIONAL CORP	ALG110126	9	UT LITTLE COVE CREEK
	SHERMAN INTERNATIONAL CORP	ALG110126	6	UT LITTLE COVE CREEK
	ETOWAH CO ESWDA LANDFILL	ALG160119	1	UT LINE CREEK
	JOHNNYS SALVAGE	ALG180502	1	UT TERRAPIN CREEK

Table 4.2-5 (Cont.) Major NPDES Dischargers Based on Flow Rates in the Henry Sub-Basin (Source: EPA, 2000)

Max Reported Flow (mgd)	Facility Name	Permit #	DSN	Receiving Water
	HOKES BLUFF OIL COMPANY	ALG340139	2	UT COOSA RIVER
	IRA PHILLIPS INC	ALG340149	2	COOSA RIVER

Table 4.2-6 Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Weiss Lake (Source: EPA, 2000)

Classification	***Industrial***
Permit #	***Facility Name***
AL0001007	GOODYEAR TIRE RUBBER GADSDEN
AL0002119	TYSON FOODS INC GADSDEN
AL0002241	CAGLES COLLINSVILLE
AL0002887	APCO - GADSDEN PLNT.
AL0026042	AAA PLUMBING POTTERY CO GADSDN
AL0031534	NATIONAL CEMENT CO BEAVER CK
AL0054542	M AND M CHEMICAL CO
AL0055239	GULF STATES STEEL, INC.
AL0056103	JORDAN HATCHERY INC FT PAYNE
AL0066214	FISHER INDUSTRIAL SERVICE INC
AL0068365	ETOWAH CHEMICAL SALES AND SVC
ALG020097	MCCARTNEY CONSTRUCTION GADSDEN
ALG030012	MARINE ONE BUCKS ISLAND
ALG060085	MEAD WOODLANDS PORTERSVILLE
ALG060167	JONES SAWMILL INC
ALG060192	MCENTYRE LUMBER CO
ALG060240	MACK BURGESS STRUCTURAL
ALG060324	VALLEY TIMBER INC
ALG110100	KIRKPATRICK CONCRETE INC
ALG110126	SHERMAN INTERNATIONAL CORP
ALG110127	SHERMAN INTERNATIONAL CORP
ALG110139	KIRKPATRICK CONCRETE INC
ALG110233	BUILDERS SUPPLY CO FT PAYNE
ALG120007	BOSTROM SEATING INC

Table 4.2-6 (cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Weiss Lake (Source: EPA, 2000)

ALG120017	OWENS PLATING CO
ALG120064	CRAFT PLATING & FINISHING
ALG120116	HEIL COMPANY
ALG120131	GADSDEN MACHINE AND ROLL CO
ALG120156	MID SOUTH ELECTRICS INC
ALG120168	GARCY CORPORATION
ALG120297	FRITZ STRUCTURAL STEEL
ALG120352	GAMETIME
ALG120380	SCHULER INDUSTRIES INC
ALG120416	2K STEEL PRODUCTS INC
ALG120426	SIEMENS WESTINGHOUSE POWER COR
ALG140108	OSBORN TRANSPORTATION INC
ALG140288	CONSOLIDATED FREIGHTWAYS GADSD
ALG140499	BAND BUSSES INC
ALG140500	BAND BUSES INC HWY 278
ALG140614	FISHER AVIATION INC
ALG150011	TYSON FOODS INC IVALEE MILL
ALG150067	BAKERY FEEDS INC
ALG150097	EARTH GRAINS COMPANY
ALG160106	FORT PAYNE SANITARY LANDFILL
ALG160113	GADSDEN CITY OF CD LANDFILL
ALG160119	ETOWAH CO ESWDA LANDFILL
ALG160130	THREE CORNERS AWDS
ALG160138	US CASTINGS DIV US PIPE
ALG180281	KELLEY AND SPURLOCK AUTO PARTS

Table 4.2-6 (cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Weiss Lake (Source: EPA, 2000)

ALG180300	NORTHSIDE SALVAGE
ALG180320	BILLY CASH AUTO PARTS
ALG180340	REGIONAL RECYCLING LLC GADSDEN
ALG180432	GIBBS SALVAGE
ALG180442	HEREFORD SCRAP METAL
ALG180502	JOHNNYS SALVAGE
ALG180530	DAVES 278 SALVAGE AND REPAIR
ALG340103	T D BROWN OIL CO
ALG340139	HOKES BLUFF OIL COMPANY
ALG340149	IRA PHILLIPS INC
ALG340157	MORRIS OIL COMPANY
ALG340256	PETERS OIL CO INC
ALG340310	RAINBOW FOOD MART NO 109
ALG340319	DEKALB COUNTY COMMISSION
ALG670028	SOUTHERN NATURAL GAS CO

Classification	*Mining/Other Nonpoint*
Permit #	***Facility Name***
AL0002020	VULCAN MATERIALS GLENCOE QURRY
AL0060585	SIMS PIT
AL0066851	J.D. DOLLAR CHERT MINE
AL0070157	ELLIS PIT
AL0070165	FRINAK PIT
AL0070432	SEWELL PIT
AL0070611	AGGREGATE OPERATION

Table 4.2-6 (cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Weiss Lake (Source: EPA, 2000)

AL0070793	BORDEN SPRINGS TEST FACILITY
AL0072214	MCGINNIS QUARRY
AL0072273	GLENCOE QUARRY
AL0073032	CLAYTON QUARRY
ALR100297	CHEROKEE CO COMM HURRICANE CR
ALR100300	CHEROKEE CO BALLPLAY CREEK
ALR100301	CHEROKEE CO COOSA RV SUBWATER
ALR100306	CHEROKEE CO LOWER TERRAPIN CR
ALR100416	CALHOUN CO UPPER TERRAPIN CR
ALR100418	CALHOUN CO COMM BALLPLAY CREEK
ALR100420	CALHOUN CO TALLASSEEHATCHEE CR
ALR100984	ADVANCE AUTO PARTS DIST CENTER
ALR101211	ST CLAIR CO COMM CANOE CR 120
ALR101212	ST CLAIR CO COMM CANOE CR 110
ALR101213	ST CLAIR CO COMM BIG CANOE 100
ALR101214	ST CLAIR CO COMM BIG CONOE 140
ALR101220	ST CLAIR CO COMM COOSA RV 180
ALR101678	KELL PAUL SOUTHRIDGE SUBD
ALR101856	BUTLER N A BIG SKY LANDING SUB
ALR101934	JAMES F KNIGHT CROSSROADS CAMP
ALR102066	ADOT NHF 212 12
ALR102235	ALA BRG BLDRS ODENVILLE ELEM
ALR102245	MOORE DEVEL CO FERN CREEK 1 5
ALR102645	MCCARTNEY CONST CO ELLIS PIT
ALR102775	AGRICOLA PROPERTIES NEWMAN SIT

Table 4.2-6 (cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Weiss Lake (Source: EPA, 2000)

ALR102815	TALLADEGA COMM IA 061 000 003
ALR102914	ST CLAIR CO BOE ODENVILLE ELEM
ALR103055	LYNCH VERNON L PROPERTY
ALR103137	ETOWAH CNTY BOE GYM GASTON H S
ALR103375	MACDONALD FARMS LLC SUBD
ALR103385	JOHNSON MIKE HIDDEN MEADOW
ALR103401	WINDHAM REAL EST MORRIS MEADOW
ALR103407	KELL P BEASON COVE PROPERTIES
ALR103424	MCCARTNEY CONST NE ETOWAH PLT
ALR103525	MOODY REALTY POPLAR CREST SUBD
ALR103551	HARPER JOHNNIE ROLLING HILLS E
ALR103576	LAWSON DEV MOUNTAIN CREST EST
ALR103614	PUTMAN BUILDING SOUTHERN LAKES
ALR103662	ADOT NHF 387 14
ALR104324	AGC PEACEFUL MEADOWS 1ST PHASE
ALR104392	AGC HOKES BLUFF CAST IRON
ALR104477	JESCO INC SAKS INC DIST CENTER
ALR320096	APAC ALABAMA INC 431 PIT
ALR320108	US ALLIANCE COOSA CORP PROPST
ALR320111	U S ALLIANCE CORP FLATWOODS
ALR320266	J W MARKHAM AND SONS ETOWAH 1
ALR320307	MCCARTNEY CONST CO FRINAK PIT
ALR320311	R E GRILLS CONST FIRESTONE PIT
ALR320336	AGRICOLA PROPERTIES JDA PIT 1
ALR320375	GOOD HOPE CONT V ENTERPRISES

Table 4.2-6(cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Weiss Lake (Source: EPA, 2000)

ALR320377	GOOD HOPE CONT JONES BORROW PT
ALR320381	NATIONAL CEMENT DUPONT KAOLIN
ALR320423	GOOD HOPE BURNS BARROW PIT
ALR320434	JAMES E WATTS AND SONS CHERT P
ALR320462	R E GRILLS CONS EDWARDS BORROW

Classification *Municipal/Semi-Public*

Permit #	***Facility Name***
AL0021334	GLENCOE LAGOON
AL0022659	GADSDEN EAST WWTP
AL0023302	ASHVILLE LAGOON
AL0023311	FORT PAYNE WWTP
AL0024236	COLLINSVILLE LAGOON
AL0024376	PIEDMONT LAGOON
AL0043061	ASHVILLE SCHOOL
AL0043494	ST CLAIR CORRECTIONAL FACILITY
AL0048275	CAMP SUMATANGA WWTP
AL0050903	SPRINGVILLE LAGOON
AL0052493	TERRAPIN HILLS GOLF ESTATES
AL0052736	BIG OAK BOY'S RANCH
AL0052914	FORT PAYNE WATER WORKS BD WTP
AL0053201	GADSDEN WEST WWTP
AL0055867	SOUTHSIDE LAGOON
AL0056839	RAINBOW CITY LAGOON
AL0057657	ATTALLA LAGOON

Table 4.2-6(cont.) Permitted Industrial, Mining/Other Nonpoint and Municipal/Semi-Public Dischargers into Weiss Lake (Source: EPA, 2000)

AL0057975	ASHVILLE MANOR NURSING HOME
AL0059544	MOUNTAIN VIEW BAPTIST HOSPITAL
AL0062723	CENTRE LAGOON
AL0070084	ODENVILLE SCHOOLS

Table 4.3-1 An annotated list of fish species present in Henry Lake (Source: Floyd and Catchings, 1989; Bayne *et al*., 1997 as modified by Kleinschmidt)

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

Table 4.3-2 Fish stockings in Henry 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[3]	1981	1		18,860
	1984	1-3		25,800
	1986	1-2		30,032
	1987	1		11,400
	1988	2		22,470
	1989	1-2		36,300
	1990	1-2		10,555
	1991	1-2		22,446
	1992	1-2		22,240
	1993	1		22,240
			Total	222,343
striped bass[3]	1976	1-2		11,000
	1977	1-2		57,025
	1983	1-2		58,530
	1984	1-2		55,000
	1985	2		55,000
	1995[2]	2		33,700
			Total	270,255
hybrid striped bass	1982	1		112,360
	1983	1-3		56,000
	1984	2		55,695
	1985	1-2		55,352
	1986	1-2		59,031
	1988	1-3		60,752
	1989	1-2		44,940
	1990	1-2		56,100
	1991	1-3		22,084
	1993	1		33,806
			Total	556,120

[1]In some years, the lake was stocked on more than one occasion, sometimes using different size classes. This table presents total number and size range stocked within a particular year.
[2]Florida strain (all largemouth bass stocked)
[3]Gulf Coast strain

Table 4.3-3 Threatened and endangered aquatic wildlife spe cies in Alabama counties occupied by the Henry Project (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	Chrokee, Calhoun, Etowah, St. Clair	T
Medionidus parvulus	Coosa moccasinshell mussel	Cherokee	E
Medionidus acutissimus	Alabama moccasinshell mussel	Cherokee, Etowah	T
Pleurobema georgianum	southern pigtoe mussel	Cherokee, Calhoun, Etowah, St. Clair	E
Pleurobema decisum	southern clubshell mussel	Cherokee, Etowah	E
Pleurobema perovatum	ovate clubshell mussel	St. Clair	E
Epioblasma othcaloogensis	southern acornshell mussel	Cherokee, St. Clair	E
Epioblasma penita	southern combshell mussel	Cherokee, Etowah	E
Epioblasma metastriata	upland combshell mussel	Cherokee, St. Clair	E
Ptychobranchus greeni	triangular kidneyshell mussel	Cherokee, Etowah, St. Clair	E
Tulotoma magnifica	tulotoma snail	Calhoun, St. Clair	E
Leptoxis taeniata	painted rocksnail	Calhoun	T
Cottus pygmaeus	pygmy sculpin	Calhoun	T
Cyprinella caerulea	blue shiner	Cherokee, Calhoun	T

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

Family	Scientific name	Vernacular name	Nativity	Community type
Acanthaceae (water-willow)	Justicia americana	water-willow	Native	Lowland
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 copallina	winged sumac	Native	Disturbed upland
Anacardiaceae (cashew)	Rhus glabra	shining sumac	Native	Disturbed upland
Anacardiaceae (cashew)	Toxicodendron radicans	poison-ivy	Native	Upland, disturbed upland, lowland, disturbed lowland
Araliaceae (sarsparilla)	Aralia spinosa	devil's-walking-stick	Native	Upland, disturbed upland
Arecaceae (palm)	Sabal minor	dwarf palmetto	Native	Lowland
Asteraceae (sunflower)	Bidens bipinnata	spanish-needle	Native	Lowland, disturbed lowland
Asteraceae (sunflower)	Bidens frondosa	spanish-needle	Native	Lowland, disturbed lowland
Asteraceae (sunflower)	Mikania scandens	climbing hemp vine	Native	Lowland, disturbed lowland
Asteraceae (sunflower)	Senecio glabellus	butter-weed	Native	Lowland, disturbed lowland
Asteraceae (sunflower)	Solidago canadensis	goldenrod	Native	Upland, disturbed upland, lowland, disturbed lowland
Asteraceae (sunflower)	Solidago uliginosa	goldenrod	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

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

Family	Scientific name	Vernacular name	Nativity	Community type
Betulaceae (birch)	Ostrya virginiana	hop-hornbeam	Native	Lowland
Bignoniaceae (trumpet-creeper)	Bignonia capreolata	cross-vine	Native	Upland, disturbed upland, lowland, disturbed lowland
Bignoniaceae (trumpet-creeper)	Campsis radicans	cow-itch	Native	Upland, disturbed upland, lowland, disturbed lowland
Calycanthaceae (sweet shrub)	Calycanthus floridus	sweet shrub	Native	Upland
Caprifoliaceae (honeysuckle)	Lonicera japonica	japanese honeysuckle	Alien	Disturbed upland, lowland, disturbed lowland
Clusiaceae (St. John's wort)	Hypericum walteri	St. John's wort	Native	Lowland, disturbed 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 microcarpa	spikerush	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
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

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

Family	Scientific name	Vernacular name	Nativity	Community type
Ericaceae (heath)	Vaccinium stamineum	deerberry	Native	Upland
Fabaceae (legume)	Gleditsia triacanthos	honey-locust	Native	Upland, lowland
Fabaceae (legume)	Glycine max	soybean	Alien	Cultivated, disturbed upland
Fabaceae (legume)	Robinia pseudoacacia	black locust	Native	Upland, disturbed 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
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

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

Family	Scientific name	Vernacular name	Nativity	Community type
Juncaceae (rush)	Juncus gymnocarpus	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)	Gossypium hirsutum	cotton	Alien	Cultivated, disturbed upland
Malvaceae (mallow)	Hibiscus moscheutos	marsh mallow	Native	Lowland
Moraceae (mulberry)	Morus rubra	red mulberry	Native	Lowland, disturbed lowland
Nelumbonaceae (lotus-lily)	Nelumbo nucifera	sacred-lotus	Alien	Lowland, disturbed lowland
Nyssaceae (gum)	Nyssa sylvatica	black gum	Native	Upland
Oleaceae (olive)	Fraxinus americana	white ash	Native	Upland, disturbed upland
Oleaceae (olive)	Fraxinus pensylvanica	green ash	Native	Lowland
Oleaceae (olive)	Ligustrum sinense	privet	Alien	Disturbed upland, lowland, disturbed lowland
Onagraceae (evening-primrose)	Ludwigia palustris	marsh seedbox	Native	Lowland, disturbed lowland
Pinaceae (pine)	Pinus echinata	shortleaf pine	Native	Upland, disturbed upland
Pinaceae (pine)	Pinus taeda	loblolly	Native	Upland, disturbed upland, lowland
Pinaceae (pine)	Pinus virginiana	scrub pine	Native	Upland, disturbed upland
Platanaceae (plane-tree)	Platanus occidentalis	sycamore	Native	Lowland, disturbed lowland
Poaceae (grass)	Glyceria striata	manna grass	Native	Lowland, disturbed lowland

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

Family	Scientific name	Vernacular name	Nativity	Community type
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
Polygonaceae (knotweed)	Brunnichia ovata	buckwheat-vine	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 argutus	blackberry	Native	Disturbed upland, lowland
Rosaceae (rose)	Rubus flagellaris	dewberry	Native	Disturbed upland
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
Simaroubaceae (Quassia)	Ailanthus altissima	tree-of-heaven	Alien	Disturbed upland
Typhaceae (cat-tail)	Typha angustifolia	cat-tail	Native	Disturbed lowland
Typhaceae (cat-tail)	Typha latifolia	cat-tail	Native	Disturbed lowland
Ulmaceae (elm)	Celtis laevigata	hackberry	Native	Upland, disturbed upland
Ulmaceae (elm)	Ulmus alata	winged elm	Native	Upland, disturbed upland
Vitaceae (grape)	Ampelopsis arborea	pepper-vine	Native	Lowland

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

Family	Scientific name	Vernacular name	Nativity	Community type
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 Henry drainage area (Source: APC, 2000d)

Family	Species	Vernacular name	Category	Location
Dryopteridaceae	Dryopteris cristata	shield fern	S1	Neely Henry Lake
Lygodiaceae	Lygodium palmatum	hartford fern	S1	Neely Henry Lake
Pteridaceae	Cheilanthes alabamensis	Alabama lip fern	xS3	Neely Henry Lake
Asteraceae	Aster georgianus	Georgia aster	S2/S3	Neely Henry Lake
Asteraceae	Bigelowia nuttallii	rayless goldenrod	S3	Neely Henry Lake
Asteraceae	Coreopsis pulchra	tickseed	S2	Neely Henry Lake
Asteraceae	Echinacea pallida	purple coneflower	S2	Neely Henry Lake
Asteraceae	Echinacea purpurea	purple coneflower	S2	Neely Henry Lake
Asteraceae	Helianthus longifolius	sunflower	S1/S2	Neely Henry Lake
Asteraceae	Marshallia mohrii	Barbara’s buttons	S3/LT	Neely Henry Lake
Asteraceae	Polymnia laevigata	leafcup	S2/S3	Neely Henry Lake
Asteraceae	Prenanthes barbata	rattlesnake-root	S1/S2	Neely Henry Lake
Buxaceae	Pachysandra procumbens	Allegheny-spurge	S2/S3	Neely Henry Lake
Caprifoliaceae	Lonicera flava	yellow honeysuckle	S3	Neely Henry Lake
Caprifoliaceae	Triosteum angustifolium	horse-gentian	S1	Neely Henry Lake
Caprifoliaceae	Viburnum rafinesquianum	arrow-wood	S1	Neely Henry Lake
Fabaceae	Orbexilum onobrychis	french-grass	S1	Neely Henry Lake
Fumariaceae	Dicentra cucullaria	dutchman's-breeches	S2	Neely Henry Lake
Gentianaceae	Sabatia capitata	rose-gentian	S2	Neely Henry Lake
Grossulariaceae	Ribes cynosbatii	gooseberry	S1/S2	Neely Henry Lake
Hippocastanaceae	Aesculus parviflora	bottle-brush buckeye	S2/S3	Neely Henry Lake

Table 4.4-2 Botanical species of special concern in the Henry drainage area (Source: APC, 2000d)

Family	Species	Vernacular name	Category	Location
Orobanchaceae	Orobanche uniflora	cancer-root	S2	Neely Henry Lake
Polygalaceae	Polygala boykinii	milkwort	S3/S3	Neely Henry Lake
Portulacaceae	Talinum mengesii	fameflower	S2/S3	Neely Henry Lake
Ranunculaceae	Clematis socialis	Alabama leather flower	S1/LE	Neely Henry Lake
Ranunculaceae	Delphinium alabamicum	larkspur	S2	Neely Henry Lake
Ranunculaceae	Enemion biternatum	windflower	S1	Neely Henry Lake
Rosaceae	Prunus alabamensis	Alabama cherry	S1	Neely Henry Lake
Sarraceniaceae	Sarracenia oreophila	green pitcher-plant	S2/LE	Neely Henry Lake
Saxifragaceae	Boykinia aconitifolia	brook-saxifrage	S1	Neely Henry Lake
Liliaceae	Trillium decumbens	trailing trillium	S2/S3	Neely Henry Lake
Liliaceae	Xerophyllum asphodeloides	turkey-beard	S1	Neely Henry Lake
Orchidaceae	Corallorhiza wisteriana	coral-root orchid	S2	Neely Henry Lake
Orchidaceae	Ponthieva racemosa	shadow-witch orchid	S2	Neely Henry Lake

Table 4.4-3 Mammal species typical of the Henry development vicinity area (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*
house mouse	*Mus musculus*

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

Common Name	Scientific Name
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 Henry 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*
greater yellowlegs	M	(S, F, W)	*Tringa melenoleuca*

Table 4.4-4 Bird Species typical of the Henry development vicinity (Source: Imhof, 1976; Mount, 1984)[1]

Common Name	Status[2]	Season[3]	Scientific Name
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*
blue jay	PR		*Cyanocitta cristata*
American crow	PR		*Corvus brachyrhynchos*

Table 4.4-4 Bird Species typical of the Henry development vicinity (Source: Imhof, 1976; Mount, 1984)[1]

Common Name	Status[2]	Season[3]	Scientific Name
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*
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*

Table 4.4-4 Bird Species typical of the Henry development vicinity (Source: Imhof, 1976; Mount, 1984)[1]

Common Name	Status[2]	Season[3]	Scientific Name
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*
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*

Table 4.4-4 Bird Species typical of the Henry development vicinity (Source: Imhof, 1976; Mount, 1984)[1]

Common Name	Status[2]	Season[3]	Scientific Name
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 Henry 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*
mud salamander	*Pseudotriton montanus flavissimus*

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

Common Name	Scientific Name
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 Henry 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 Henry 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 Henry Lake and the Facilities Located at Each Site (Source: APC, 2000d; Carto-Craft Maps, unknown)

Facilities	Parking	Boat Launch	Boat Slips	Boat Rental	Boat Repair	Boat Sales and Servic	Boat Storage	Fuel Services	Dock Pumps	Tackle & Bait	Fishing Pier	General Pier	Fishing Guide Services	Marine Sports Supplies	Groceries/Food Serv.	Camping Areas	Rental Cabins/Rooms	RV or Trailer Park	Dump Station	Swimming Pool	Swimming Area	Picnic Area	Outdoor grills/BBQ	Playground	Trail	Restrooms	Bathhouse	Other
Alford Bend Boat Ramp	✍	✍																										
Buck's Boat	✍	✍	✍		✍		✍	✍				✍		✍	✍											✍		
Canoe Creek Boat Launch and Groceries	✍	✍								✍		✍			✍													
Canoe Creek Fish Camp	✍	✍								✍		✍														✍		
Canoe Creek Marina	✍	✍	✍									✍														✍		
City of Gadsden Park	✍	✍		✍				✍		✍		✍		✍	✍											✍		
Coats Bend Road Boat Ramp		✍																										
Croft Ferry Road Boat Ramp	✍	✍																										
Davis Ferry Dirt Ramp		✍																										
Dub Parker Boat Launch	✍	✍									✍	✍										✍	✍	✍		✍		
Fitts Ferry Road Boat Ramp		✍																										
Greensport Marina	✍	✍	✍				✍	✍		✍		✍		✍	✍	✍					✍	✍				✍		
H. Neely Henry Tailrace Area	✍										✍																	
Haney Road Boat Ramp		✍																										
Hokes Bluff Ferry and Ramp	✍	✍									✍											✍	✍					
Lakeshore Marina	✍	✍	✍				✍	✍		✍		✍		✍	✍	✍					✍	✍	✍			✍		
Mountainview Fish Camp	✍	✍																										
Pee Dee Launch	✍	✍										✍																
Rainbow Landing	✍	✍									✍	✍										✍	✍	✍		✍		
Rainbow Marina	✍	✍	✍					✍		✍		✍		✍	✍											✍		
Ten Islands Historic Park	✍	✍									✍	✍				✍					✍	✍	✍			✍		
Tilson's Bend Boat Launch	✍	✍										✍																
Tommy's Marina	✍	✍	✍					✍				✍		✍	✍						✍					✍		
Visitors Center	✍																											✍
Willow Point Marina	✍	✍	✍	✍				✍		✍		✍		✍	✍	✍					✍	✍	✍			✍	✍	
YMCA Camp	NA																											

Source: FIMS, unpublished database; APC, 1999; Carto-Craft Maps, Unknown

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

	Alabama	Calhoun County	Etowah County	Cherokee County	St. Clair County
1999 Population	4,369,862	116,541	103,472	21,894	63,852
1997 Population	4,322,113	117,227	103,756	21,590	60,694
1990 Population	4,040,389	116,032	99,840	19,543	50,009
Percent Population Change (1990 to 1999)	8.2%	0.4%	3.6%	12.0%	27.7%
Persons per Occupied Housing Unit (1990)	2.62	2.59	2.55	2.61	2.74
Resident population per square mile (1992)	81.5	191.3	186.7	35.9	84.1
Percent Urban (1990)	67.7%	71.3%	72.2%	14.8%	28.3%
Percent Rural (1990)	32.3%	28.7%	27.8%	85.3%	71.7%
High School Graduates[1]	66.9%	67.4%	64.1%	53.5%	61.0%
College Graduates[1]	15.7%	14.2%	10.2%	6.7%	8.5%

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

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

	Alabama	Calhoun County	Etowah County	Cherokee County	St. Clair County
Per Capita Personal Income (1997)	$20,672	$18,855	$19,126	$15,832	$18,496
Per Capita Personal Income (1987)	$12,394	$11,640	$11,891	$9,896	$10,545
Civilian Labor Force (1994)	2,031,000	52,545	47,826	9,795	25,669
Unemployment Rate (1999)	4.8%	4.8%	6.8%	5.1%	3.2%
Unemployment Rate (1994)	6.0%	7.1%	6.3%	6.2%	4.2%
Unemployment Rate (1990)	6.9%	7.2%	11.1%	10.0%	5.6%
Percent persons below poverty (1993)	18.8%	18.0%	17.9%	15.4%	16.2%
Total units of housing (1990)	1,670,379	46,753	41,787	9,379	20382
Occupied units/households (1990)	1,506,790	42,983	38,675	7,466	17,666
Owner-Occupied	70.5%	70.3%	74.0%	79.8%	83.1%
Renter-Occupied	29.5%	29.7%	26.0%	20.2%	16.9%
Vacant	9.8%	8.1%	7.4%	20.4%	13.3%
Median value	$53,700	$51,600	$42,700	$44,700	$53,400
Occupations (percent Employed 16 and over in 1990)	1,741,794	46,899	40,902		21,593
Technical, Sales & Administrative Support	29.4%	28.0%	27.4%	8,444	29.6%
Operators, Fabrications & Laborers	20.7%	22.7%	26.1%	22.2%	23.0%
Managerial & Professional Specialty	22.7%	21.3%	18.4%	36.5%	16.4%
Service	11.9%	12.6%	12.3%	13.0%	9.5%
Precision Production Craft & Repair	13.0%	14.0%	14.4%	8.1%	19.1%
Farming, Forestry & Fishing	2.3%	1.4%	1.4%	14.7%	2.5%

[1] This information pertains to the percent of individuals 16 and over employed in 1990.

APPENDIX D

Henry Reservoir Profiles

Alabama Power Company

Henry Reservoir Profiles

1990-1999

Location Definitions

25.5 miles Upstream of N. Henry Dam	CORNH532.9
15.4 miles Upstream of N. Henry Dam	CORNH522.8
N. Henry Dam Forebay	COFNH507.4
N. Henry Dam Tailrace	COTNH507.2

Alabama Power Company

Henry Reservoir

1990-1999

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	6/5/90 3:20:00 PM	0	27.3	10.8
COFNH507.4	6/5/90 3:20:00 PM	3	26.9	10.8
COFNH507.4	6/5/90 3:20:00 PM	5	25.6	11.4
COFNH507.4	6/5/90 3:20:00 PM	10	23.2	7.1
COFNH507.4	6/5/90 3:20:00 PM	15	23.2	7.1
COFNH507.4	6/5/90 3:20:00 PM	20	24.3	6.9
COFNH507.4	6/5/90 3:20:00 PM	30	24.3	6.9
COFNH507.4	6/5/90 3:20:00 PM	35	24.3	6.5
COFNH507.4	7/10/90 1:55:00 PM	0	33	8.5
COFNH507.4	7/10/90 1:55:00 PM	3	33	8.4
COFNH507.4	7/10/90 1:55:00 PM	5	32	8.3
COFNH507.4	7/10/90 1:55:00 PM	10	31.2	6.6
COFNH507.4	7/10/90 1:55:00 PM	15	31	5.6
COFNH507.4	7/10/90 1:55:00 PM	20	30.9	2.5
COFNH507.4	7/10/90 1:55:00 PM	30	30	0.4
COFNH507.4	8/14/90 2:48:00 PM	0	29.1	8.4
COFNH507.4	8/14/90 2:48:00 PM	3	29	5.7
COFNH507.4	8/14/90 2:48:00 PM	5	29	5.4
COFNH507.4	8/14/90 2:48:00 PM	10	29	5.2
COFNH507.4	8/14/90 2:48:00 PM	15	28.7	4.6
COFNH507.4	8/14/90 2:48:00 PM	20	28.5	3.7
COFNH507.4	8/14/90 2:48:00 PM	30	28.5	2.5
COFNH507.4	8/14/90 2:48:00 PM	40	28.5	2
COFNH507.4	9/26/90 12:35:00 PM	0	26	7.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	9/26/90 12:35:00 PM	3	25.5	7.3
COFNH507.4	9/26/90 12:35:00 PM	5	25.2	6.5
COFNH507.4	9/26/90 12:35:00 PM	10	25.2	6.4
COFNH507.4	9/26/90 12:35:00 PM	15	25.2	6.4
COFNH507.4	9/26/90 12:35:00 PM	20	25.2	6.1
COFNH507.4	9/26/90 12:35:00 PM	30	25.2	6
COFNH507.4	9/26/90 12:35:00 PM	40	25.1	5.7
COFNH507.4	10/15/90 2:45:00 PM	0	23.9	6.4
COFNH507.4	10/15/90 2:45:00 PM	3	22.7	5.4
COFNH507.4	10/15/90 2:45:00 PM	5	22.7	5.3
COFNH507.4	10/15/90 2:45:00 PM	10	22.7	5.3
COFNH507.4	10/15/90 2:45:00 PM	15	22.7	5.2
COFNH507.4	10/15/90 2:45:00 PM	20	22.7	5.1
COFNH507.4	10/15/90 2:45:00 PM	30	22.7	4.8
COFNH507.4	10/15/90 2:45:00 PM	40	22.7	4.7
COFNH507.4	10/15/90 2:45:00 PM	50	22.7	3.3
COFNH507.4	6/4/91 2:00:00 PM	0	30.3	11.1
COFNH507.4	6/4/91 2:00:00 PM	3	28.8	10.3
COFNH507.4	6/4/91 2:00:00 PM	5	29.4	10.1
COFNH507.4	6/4/91 2:00:00 PM	10	27.4	6.9
COFNH507.4	6/4/91 2:00:00 PM	15	27.2	6.5
COFNH507.4	6/4/91 2:00:00 PM	20	28	6.1
COFNH507.4	6/4/91 2:00:00 PM	30	28.1	5.7
COFNH507.4	6/4/91 2:00:00 PM	40	28	5.8
COFNH507.4	6/4/91 2:00:00 PM	50	26.8	5.2
COFNH507.4	7/24/91 1:40:00 PM	0	32.1	9.3
COFNH507.4	7/24/91 1:40:00 PM	3	29.7	6.1
COFNH507.4	7/24/91 1:40:00 PM	5	29.7	5.6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	7/24/91 1:40:00 PM	10	29.5	4.6
COFNH507.4	7/24/91 1:40:00 PM	15	29.5	4.6
COFNH507.4	7/24/91 1:40:00 PM	20	29.5	4.5
COFNH507.4	7/24/91 1:40:00 PM	30	29.5	4.2
COFNH507.4	7/24/91 1:40:00 PM	40	29.3	1.7
COFNH507.4	8/22/91 2:55:00 PM	0	29.1	9.6
COFNH507.4	8/22/91 2:55:00 PM	3	28.9	9.2
COFNH507.4	8/22/91 2:55:00 PM	5	28.5	8.1
COFNH507.4	8/22/91 2:55:00 PM	10	28.3	7.1
COFNH507.4	8/22/91 2:55:00 PM	15	28	5.7
COFNH507.4	8/22/91 2:55:00 PM	20	27.9	5.7
COFNH507.4	8/22/91 2:55:00 PM	30	27.9	5.6
COFNH507.4	8/22/91 2:55:00 PM	40	27.9	5.6
COFNH507.4	9/24/91 2:20:00 PM	0	24.6	6.6
COFNH507.4	10/22/91 1:40:00 PM	0	19.4	9.9
COFNH507.4	10/22/91 1:40:00 PM	3	19.2	9.8
COFNH507.4	10/22/91 1:40:00 PM	5	18.9	9
COFNH507.4	10/22/91 1:40:00 PM	10	18.6	8.7
COFNH507.4	10/22/91 1:40:00 PM	15	18.3	7
COFNH507.4	10/22/91 1:40:00 PM	20	18.3	6.9
COFNH507.4	10/22/91 1:40:00 PM	30	18.2	6.8
COFNH507.4	10/22/91 1:40:00 PM	40	18.2	6.8
COFNH507.4	6/18/92 2:26:00 PM	0	26.2	8.3
COFNH507.4	6/18/92 2:26:00 PM	3	26.2	8.3
COFNH507.4	6/18/92 2:26:00 PM	5	26.1	8.2
COFNH507.4	6/18/92 2:26:00 PM	10	25.5	8
COFNH507.4	6/18/92 2:26:00 PM	15	25.5	6.6
COFNH507.4	6/18/92 2:26:00 PM	20	25.4	6.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	6/18/92 2:26:00 PM	30	25.4	6.2
COFNH507.4	6/18/92 2:26:00 PM	40	25.5	6.2
COFNH507.4	7/28/92 1:00:00 PM	0	29.9	7.8
COFNH507.4	7/28/92 1:00:00 PM	3	29.5	7.8
COFNH507.4	7/28/92 1:00:00 PM	5	29.3	6.4
COFNH507.4	7/28/92 1:00:00 PM	10	29.2	5.7
COFNH507.4	7/28/92 1:00:00 PM	15	29.2	5.5
COFNH507.4	7/28/92 1:00:00 PM	20	29.2	4.9
COFNH507.4	7/28/92 1:00:00 PM	30	29.1	3.5
COFNH507.4	7/28/92 1:00:00 PM	40	28.9	1.8
COFNH507.4	7/28/92 1:00:00 PM	50	28.9	0.8
COFNH507.4	8/25/92 1:25:00 PM	0	27.9	8.2
COFNH507.4	8/25/92 1:25:00 PM	3	27.8	8.2
COFNH507.4	8/25/92 1:25:00 PM	5	27.6	8
COFNH507.4	8/25/92 1:25:00 PM	10	27.4	6.5
COFNH507.4	8/25/92 1:25:00 PM	15	27.2	5.9
COFNH507.4	8/25/92 1:25:00 PM	20	27.2	5.6
COFNH507.4	8/25/92 1:25:00 PM	30	27.2	5.6
COFNH507.4	8/25/92 1:25:00 PM	40	27.2	5
COFNH507.4	8/25/92 1:25:00 PM	50	27.2	2.8
COFNH507.4	9/1/92 2:00:00 PM	0	27.2	9
COFNH507.4	9/1/92 2:00:00 PM	3	25.9	7
COFNH507.4	9/1/92 2:00:00 PM	5	25.7	6.4
COFNH507.4	9/1/92 2:00:00 PM	10	25.7	6.3
COFNH507.4	9/1/92 2:00:00 PM	15	25.7	6.3
COFNH507.4	9/1/92 2:00:00 PM	20	25.7	6.2
COFNH507.4	9/1/92 2:00:00 PM	30	25.7	5.9
COFNH507.4	9/1/92 2:00:00 PM	40	25.6	5.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	9/1/92 2:00:00 PM	45	25.7	2
COFNH507.4	10/21/92 2:15:00 PM	0	20.5	10.5
COFNH507.4	10/21/92 2:15:00 PM	3	18.7	10.3
COFNH507.4	10/21/92 2:15:00 PM	5	18.2	8.7
COFNH507.4	10/21/92 2:15:00 PM	10	18.1	8.1
COFNH507.4	10/21/92 2:15:00 PM	15	18.1	8
COFNH507.4	10/21/92 2:15:00 PM	20	18.1	8
COFNH507.4	10/21/92 2:15:00 PM	30	18.1	8
COFNH507.4	10/21/92 2:15:00 PM	40	18.1	8.2
COFNH507.4	6/15/93 10:29:00 AM	0	29.6	8
COFNH507.4	6/15/93 10:29:00 AM	3	29.2	8.3
COFNH507.4	6/15/93 10:29:00 AM	5	28.9	6.7
COFNH507.4	6/15/93 10:29:00 AM	10	28.8	6.4
COFNH507.4	6/15/93 10:29:00 AM	15	28.5	4.3
COFNH507.4	6/15/93 10:29:00 AM	20	28.2	3.4
COFNH507.4	6/15/93 10:29:00 AM	30	27.9	2.3
COFNH507.4	6/15/93 10:29:00 AM	40	27.6	1.3
COFNH507.4	7/26/93 10:10:00 AM	0	31.7	7.3
COFNH507.4	7/26/93 10:10:00 AM	3	31.6	7.2
COFNH507.4	7/26/93 10:10:00 AM	5	31.3	6.7
COFNH507.4	7/26/93 10:10:00 AM	10	31.3	5.5
COFNH507.4	7/26/93 10:10:00 AM	15	31.2	2.3
COFNH507.4	7/26/93 10:10:00 AM	20	31.1	1.9
COFNH507.4	7/26/93 10:10:00 AM	30	31	1.3
COFNH507.4	8/10/93 1:20:00 PM	0	29.7	9.5
COFNH507.4	8/10/93 1:20:00 PM	3	29.3	9.2
COFNH507.4	8/10/93 1:20:00 PM	5	28.7	7.9
COFNH507.4	8/10/93 1:20:00 PM	10	28.6	5.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	8/10/93 1:20:00 PM	15	28.5	5.5
COFNH507.4	8/10/93 1:20:00 PM	20	28.2	2.4
COFNH507.4	8/10/93 1:20:00 PM	30	28.2	2
COFNH507.4	8/10/93 1:20:00 PM	40	28.6	2
COFNH507.4	8/10/93 1:20:00 PM	50	28.6	2.1
COFNH507.4	9/14/93 12:41:00 PM	0	27.3	6.2
COFNH507.4	9/14/93 12:41:00 PM	3	27.3	5.8
COFNH507.4	9/14/93 12:41:00 PM	5	27.2	5.5
COFNH507.4	9/14/93 12:41:00 PM	10	27	4.6
COFNH507.4	9/14/93 12:41:00 PM	15	27	4.5
COFNH507.4	9/14/93 12:41:00 PM	20	27	4.5
COFNH507.4	9/14/93 12:41:00 PM	30	27	2.7
COFNH507.4	9/14/93 12:41:00 PM	40	27	3.5
COFNH507.4	9/14/93 12:41:00 PM	45	27	1
COFNH507.4	10/20/93 9:51:00 AM	0	20.7	7.9
COFNH507.4	10/20/93 9:51:00 AM	3	20.5	7.7
COFNH507.4	10/20/93 9:51:00 AM	5	20.4	6.8
COFNH507.4	10/20/93 9:51:00 AM	10	20.2	5.7
COFNH507.4	10/20/93 9:51:00 AM	15	20.2	5.3
COFNH507.4	10/20/93 9:51:00 AM	20	20.1	4.7
COFNH507.4	10/20/93 9:51:00 AM	30	20	4.6
COFNH507.4	10/20/93 9:51:00 AM	40	20	4.3
COFNH507.4	10/20/93 9:51:00 AM	50	20.1	2.1
COFNH507.4	10/20/93 9:51:00 AM	60	20.5	4.5
COFNH507.4	6/13/94 12:18:00 PM	0	28.4	9.1
COFNH507.4	6/13/94 12:18:00 PM	3	28.2	8.9
COFNH507.4	6/13/94 12:18:00 PM	5	27.9	8
COFNH507.4	6/13/94 12:18:00 PM	10	27.4	5.6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	6/13/94 12:18:00 PM	15	27.3	4.5
COFNH507.4	6/13/94 12:18:00 PM	20	27.2	4.1
COFNH507.4	6/13/94 12:18:00 PM	30	26.9	3.3
COFNH507.4	6/13/94 12:18:00 PM	40	26.3	1.8
COFNH507.4	6/13/94 12:18:00 PM	50	26	0.3
COFNH507.4	6/13/94 12:18:00 PM	60	25.4	0.3
COFNH507.4	7/19/94 1:40:00 PM	0	29.9	12
COFNH507.4	7/19/94 1:40:00 PM	3	28.3	11
COFNH507.4	7/19/94 1:40:00 PM	5	27.5	6.9
COFNH507.4	7/19/94 1:40:00 PM	10	27.1	5.4
COFNH507.4	7/19/94 1:40:00 PM	15	26.9	5.2
COFNH507.4	7/19/94 1:40:00 PM	20	26.9	4.8
COFNH507.4	7/19/94 1:40:00 PM	30	26.8	4.2
COFNH507.4	7/19/94 1:40:00 PM	40	26.9	4.2
COFNH507.4	7/19/94 1:40:00 PM	50	26.9	3.2
COFNH507.4	8/23/94 2:40:00 PM	0	29.5	9.2
COFNH507.4	8/23/94 2:40:00 PM	3	28	5.5
COFNH507.4	8/23/94 2:40:00 PM	5	28	5.6
COFNH507.4	8/23/94 2:40:00 PM	10	28	5.7
COFNH507.4	8/23/94 2:40:00 PM	15	28	5.7
COFNH507.4	8/23/94 2:40:00 PM	20	28	5.5
COFNH507.4	8/23/94 2:40:00 PM	30	28	5.5
COFNH507.4	8/23/94 2:40:00 PM	40	27.9	5.1
COFNH507.4	8/23/94 2:40:00 PM	50	27.9	5
COFNH507.4	9/19/94 1:50:00 PM	0	27	6.8
COFNH507.4	9/19/94 1:50:00 PM	3	26.9	5.9
COFNH507.4	9/19/94 1:50:00 PM	5	26.8	5.1
COFNH507.4	9/19/94 1:50:00 PM	10	26.7	5.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	9/19/94 1:50:00 PM	15	26.7	4.9
COFNH507.4	9/19/94 1:50:00 PM	20	26.6	4.6
COFNH507.4	9/19/94 1:50:00 PM	30	26.6	3.6
COFNH507.4	6/20/95 9:40:00 AM	0	26.9	5
COFNH507.4	6/20/95 9:40:00 AM	3	26.9	4.9
COFNH507.4	6/20/95 9:40:00 AM	5	26.8	4.9
COFNH507.4	6/20/95 9:40:00 AM	10	26.8	4.9
COFNH507.4	6/20/95 9:40:00 AM	15	26.8	4.7
COFNH507.4	6/20/95 9:40:00 AM	20	26.8	4.7
COFNH507.4	6/20/95 9:40:00 AM	30	26.8	4.6
COFNH507.4	6/20/95 9:40:00 AM	40	22.7	4.6
COFNH507.4	6/20/95 9:40:00 AM	50	22.7	4.6
COFNH507.4	6/20/95 9:40:00 AM	60	22.7	4.6
COFNH507.4	6/22/95 10:00:00 AM	0	27.1	7.8
COFNH507.4	6/22/95 10:00:00 AM	3	26.8	7.8
COFNH507.4	6/22/95 10:00:00 AM	5	26.5	7.2
COFNH507.4	6/22/95 10:00:00 AM	10	26.5	6.7
COFNH507.4	6/22/95 10:00:00 AM	15	26.4	7.7
COFNH507.4	6/22/95 10:00:00 AM	20	26.4	9.1
COFNH507.4	6/22/95 10:00:00 AM	30	26.3	7.9
COFNH507.4	6/22/95 10:00:00 AM	40	26.2	7
COFNH507.4	6/22/95 10:00:00 AM	50	26.2	5.8
COFNH507.4	7/24/95 10:35:00 AM	0	31.3	9.2
COFNH507.4	7/24/95 10:35:00 AM	3	31.3	9.1
COFNH507.4	7/24/95 10:35:00 AM	5	31.1	8.8
COFNH507.4	7/24/95 10:35:00 AM	10	30.7	7.3
COFNH507.4	7/24/95 10:35:00 AM	15	30.2	3.7
COFNH507.4	7/24/95 10:35:00 AM	20	30.1	3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	7/24/95 10:35:00 AM	30	30.1	3.2
COFNH507.4	7/24/95 10:35:00 AM	40	30.1	2.1
COFNH507.4	7/31/95 12:04:00 PM	0	30.9	7.8
COFNH507.4	7/31/95 12:04:00 PM	3	30.6	7.8
COFNH507.4	7/31/95 12:04:00 PM	5	30.5	7.2
COFNH507.4	7/31/95 12:04:00 PM	10	30.4	6.6
COFNH507.4	7/31/95 12:04:00 PM	15	30.3	5.7
COFNH507.4	7/31/95 12:04:00 PM	20	30.3	5.2
COFNH507.4	7/31/95 12:04:00 PM	30	30.3	4.4
COFNH507.4	7/31/95 12:04:00 PM	40	30.2	4.4
COFNH507.4	7/31/95 12:04:00 PM	50	30.1	2.4
COFNH507.4	7/31/95 12:04:00 PM	60	30	0.2
COFNH507.4	7/31/95 12:04:00 PM	70	29.7	0.2
COFNH507.4	7/31/95 12:04:00 PM	80	29.2	0.18
COFNH507.4	9/25/95 12:55:00 PM	0	24.4	5.8
COFNH507.4	9/25/95 12:55:00 PM	3	24.3	5.6
COFNH507.4	9/25/95 12:55:00 PM	5	24.1	5.2
COFNH507.4	9/25/95 12:55:00 PM	10	24	4.9
COFNH507.4	9/25/95 12:55:00 PM	15	24	4.7
COFNH507.4	9/25/95 12:55:00 PM	20	23.9	4.7
COFNH507.4	9/25/95 12:55:00 PM	30	23.8	4.7
COFNH507.4	9/25/95 12:55:00 PM	40	23.7	4.4
COFNH507.4	6/26/96 8:50:00 AM	0	29.5	4.8
COFNH507.4	6/26/96 8:50:00 AM	3	29.4	4.5
COFNH507.4	6/26/96 8:50:00 AM	5	29.3	4.3
COFNH507.4	6/26/96 8:50:00 AM	10	29.3	4.1
COFNH507.4	6/26/96 8:50:00 AM	15	29.3	4
COFNH507.4	6/26/96 8:50:00 AM	20	29.3	3.9

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	6/26/96 8:50:00 AM	30	29.2	3.6
COFNH507.4	6/26/96 8:50:00 AM	40	28.7	1.5
COFNH507.4	7/29/96 8:52:00 AM	0	28.9	4.3
COFNH507.4	7/29/96 8:52:00 AM	3	28.9	4.1
COFNH507.4	7/29/96 8:52:00 AM	5	28.9	4.1
COFNH507.4	7/29/96 8:52:00 AM	10	28.9	4
COFNH507.4	7/29/96 8:52:00 AM	15	28.9	4.1
COFNH507.4	7/29/96 8:52:00 AM	20	28.9	4.2
COFNH507.4	7/29/96 8:52:00 AM	30	28.9	4.2
COFNH507.4	7/29/96 8:52:00 AM	40	28.9	4
COFNH507.4	8/22/96 1:28:00 PM	0	30.4	8.8
COFNH507.4	8/22/96 1:28:00 PM	3	30.3	8.5
COFNH507.4	8/22/96 1:28:00 PM	5	30.1	8.5
COFNH507.4	8/22/96 1:28:00 PM	10	29.8	8.5
COFNH507.4	8/22/96 1:28:00 PM	15	29.4	5.9
COFNH507.4	8/22/96 1:28:00 PM	20	29.3	4.8
COFNH507.4	8/22/96 1:28:00 PM	30	29.3	4.5
COFNH507.4	8/22/96 1:28:00 PM	40	29.3	4.4
COFNH507.4	8/22/96 1:28:00 PM	50	29.3	4.4
COFNH507.4	9/5/96 1:08:00 PM	0	27.8	7.4
COFNH507.4	9/5/96 1:08:00 PM	3	27.7	7.2
COFNH507.4	9/5/96 1:08:00 PM	5	27.6	7.1
COFNH507.4	9/5/96 1:08:00 PM	10	27.4	6.5
COFNH507.4	9/5/96 1:08:00 PM	15	27.4	6.4
COFNH507.4	9/5/96 1:08:00 PM	20	27.2	5.2
COFNH507.4	9/5/96 1:08:00 PM	30	27.2	4.6
COFNH507.4	9/5/96 1:08:00 PM	40	27.1	3.8
COFNH507.4	9/5/96 1:08:00 PM	50	27	2.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	9/5/96 1:08:00 PM	60	27	2.6
COFNH507.4	10/16/96 8:35:00 AM	0	19.7	7.8
COFNH507.4	10/16/96 8:35:00 AM	3	19.6	7.8
COFNH507.4	10/16/96 8:35:00 AM	5	19.6	7.8
COFNH507.4	10/16/96 8:35:00 AM	10	19.5	7.8
COFNH507.4	10/16/96 8:35:00 AM	15	19.5	7.6
COFNH507.4	10/16/96 8:35:00 AM	20	19.5	7.6
COFNH507.4	10/16/96 8:35:00 AM	30	19.5	7.4
COFNH507.4	10/16/96 8:35:00 AM	40	19.5	4.6
COFNH507.4	10/16/96 8:35:00 AM	50	19.5	5
COFNH507.4	6/18/97 9:30:00 AM	0	22.8	7.3
COFNH507.4	6/18/97 9:30:00 AM	3	22.8	7.3
COFNH507.4	6/18/97 9:30:00 AM	5	22.8	7.2
COFNH507.4	6/18/97 9:30:00 AM	10	22.8	7.1
COFNH507.4	6/18/97 9:30:00 AM	15	22.7	7.1
COFNH507.4	6/18/97 9:30:00 AM	20	22.7	7.2
COFNH507.4	6/18/97 9:30:00 AM	30	22.7	6.9
COFNH507.4	6/18/97 9:30:00 AM	40	22.7	6.2
COFNH507.4	7/14/97 9:40:00 AM	0	31.3	8.8
COFNH507.4	7/14/97 9:40:00 AM	3	30.7	8.5
COFNH507.4	7/14/97 9:40:00 AM	5	30	7.8
COFNH507.4	7/14/97 9:40:00 AM	10	29.5	6.5
COFNH507.4	7/14/97 9:40:00 AM	15	29.1	5
COFNH507.4	7/14/97 9:40:00 AM	20	28.6	3.7
COFNH507.4	7/14/97 9:40:00 AM	30	28.4	2.7
COFNH507.4	7/14/97 9:40:00 AM	40	28.2	0.3
COFNH507.4	8/14/97 10:00:00 AM	0	28.3	8.3
COFNH507.4	8/14/97 10:00:00 AM	3	27.5	7.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	8/14/97 10:00:00 AM	5	27.3	6.5
COFNH507.4	8/14/97 10:00:00 AM	10	27.3	6.3
COFNH507.4	8/14/97 10:00:00 AM	15	27.3	6.2
COFNH507.4	8/14/97 10:00:00 AM	20	27.3	6.3
COFNH507.4	8/14/97 10:00:00 AM	30	27.3	5.9
COFNH507.4	8/14/97 10:00:00 AM	40	27.2	4.3
COFNH507.4	9/22/97 10:15:00 AM	0	27.5	8.3
COFNH507.4	9/22/97 10:15:00 AM	3	27.4	8.3
COFNH507.4	9/22/97 10:15:00 AM	5	27.4	8.2
COFNH507.4	9/22/97 10:15:00 AM	10	27.3	7.8
COFNH507.4	9/22/97 10:15:00 AM	15	27	4.5
COFNH507.4	9/22/97 10:15:00 AM	20	26.9	1.7
COFNH507.4	9/22/97 10:15:00 AM	30	26.7	1.4
COFNH507.4	9/22/97 10:15:00 AM	40	26.6	0.5
COFNH507.4	10/14/97 9:45:00 AM	0	23.4	7.1
COFNH507.4	10/14/97 9:45:00 AM	3	23.4	7.1
COFNH507.4	10/14/97 9:45:00 AM	5	23.4	7
COFNH507.4	10/14/97 9:45:00 AM	10	23.4	7
COFNH507.4	10/14/97 9:45:00 AM	15	23.4	7
COFNH507.4	10/14/97 9:45:00 AM	20	23.4	7
COFNH507.4	10/14/97 9:45:00 AM	30	23.4	7
COFNH507.4	10/14/97 9:45:00 AM	40	23.4	6.9
COFNH507.4	1/20/98 12:18:00 PM	0	8.5	11.2
COFNH507.4	1/20/98 12:18:00 PM	1	8.4	10.8
COFNH507.4	1/20/98 12:18:00 PM	3	8.2	11
COFNH507.4	1/20/98 12:18:00 PM	5	8.2	11.1
COFNH507.4	1/20/98 12:18:00 PM	10	8.1	10.9
COFNH507.4	1/20/98 12:18:00 PM	15	8.1	11.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	1/20/98 12:18:00 PM	20	8.1	11.1
COFNH507.4	1/20/98 12:18:00 PM	25	8.1	11.2
COFNH507.4	2/9/98 3:15:00 PM	0	6.7	12.2
COFNH507.4	2/9/98 3:15:00 PM	1	6.6	12.1
COFNH507.4	2/9/98 3:15:00 PM	3	6.6	12.3
COFNH507.4	2/9/98 3:15:00 PM	5	6.6	12.4
COFNH507.4	2/9/98 3:15:00 PM	10	6.5	12.2
COFNH507.4	2/9/98 3:15:00 PM	15	6.6	12.2
COFNH507.4	2/9/98 3:15:00 PM	20	6.6	12.4
COFNH507.4	2/9/98 3:15:00 PM	25	6.6	12.4
COFNH507.4	2/9/98 3:15:00 PM	30	6.7	12.4
COFNH507.4	3/3/98 2:30:00 PM	0	12	10.5
COFNH507.4	3/3/98 2:30:00 PM	1	12	10.5
COFNH507.4	3/3/98 2:30:00 PM	3	12	10.5
COFNH507.4	3/3/98 2:30:00 PM	5	12	10.4
COFNH507.4	3/3/98 2:30:00 PM	10	12	10.4
COFNH507.4	3/3/98 2:30:00 PM	15	12	10.4
COFNH507.4	3/3/98 2:30:00 PM	20	12	10.5
COFNH507.4	3/3/98 2:30:00 PM	25	12	10.5
COFNH507.4	3/3/98 2:30:00 PM	35	12	10.5
COFNH507.4	3/3/98 2:30:00 PM	45	11.9	10.5
COFNH507.4	4/8/98 10:18:00 AM	0	18	9.6
COFNH507.4	4/8/98 10:18:00 AM	1	17.9	9.5
COFNH507.4	4/8/98 10:18:00 AM	3	17.9	9.5
COFNH507.4	4/8/98 10:18:00 AM	5	17.8	9.5
COFNH507.4	4/8/98 10:18:00 AM	10	17.8	9.2
COFNH507.4	4/8/98 10:18:00 AM	15	17.8	9
COFNH507.4	4/8/98 10:18:00 AM	20	17.8	9

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	4/8/98 10:18:00 AM	25	17.8	9
COFNH507.4	4/8/98 10:18:00 AM	35	17.8	9.4
COFNH507.4	5/5/98 11:07:00 AM	0	21	9.8
COFNH507.4	5/5/98 11:07:00 AM	1	19.8	10.4
COFNH507.4	5/5/98 11:07:00 AM	3	19.2	10.1
COFNH507.4	5/5/98 11:07:00 AM	5	18.7	8.8
COFNH507.4	5/5/98 11:07:00 AM	10	18.6	8.8
COFNH507.4	5/5/98 11:07:00 AM	15	18.6	8.8
COFNH507.4	5/5/98 11:07:00 AM	20	18.6	8.7
COFNH507.4	5/5/98 11:07:00 AM	25	18.6	8.7
COFNH507.4	5/5/98 11:07:00 AM	35	18.5	8.5
COFNH507.4	5/5/98 11:07:00 AM	45	18.5	8.6
COFNH507.4	6/2/98 10:55:00 AM	0	28.5	7.8
COFNH507.4	6/2/98 10:55:00 AM	1	28.5	7.8
COFNH507.4	6/2/98 10:55:00 AM	3	28.4	7.8
COFNH507.4	6/2/98 10:55:00 AM	5	28.4	7.7
COFNH507.4	6/2/98 10:55:00 AM	10	28.4	7.7
COFNH507.4	6/2/98 10:55:00 AM	15	28.6	7.6
COFNH507.4	6/2/98 10:55:00 AM	20	28.3	7.6
COFNH507.4	6/2/98 10:55:00 AM	25	28.2	7.1
COFNH507.4	6/2/98 10:55:00 AM	35	27.3	3.6
COFNH507.4	6/2/98 10:55:00 AM	45	27.1	3.3
COFNH507.4	7/15/98 10:30:00 AM	0	29.9	5.2
COFNH507.4	7/15/98 10:30:00 AM	1	29.9	5
COFNH507.4	7/15/98 10:30:00 AM	3	29.8	4.8
COFNH507.4	7/15/98 10:30:00 AM	5	29.8	4.8
COFNH507.4	7/15/98 10:30:00 AM	10	29.7	4.8
COFNH507.4	7/15/98 10:30:00 AM	15	29.7	4.8

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	7/15/98 10:30:00 AM	20	29.7	4.8
COFNH507.4	7/15/98 10:30:00 AM	25	29.7	4.7
COFNH507.4	7/15/98 10:30:00 AM	35	29.7	4.4
COFNH507.4	7/15/98 10:30:00 AM	45	29.5	3.8
COFNH507.4	8/6/98 11:43:00 AM	0	30.5	8.7
COFNH507.4	8/6/98 11:43:00 AM	1	30.4	8.6
COFNH507.4	8/6/98 11:43:00 AM	3	29.9	7.8
COFNH507.4	8/6/98 11:43:00 AM	5	29.9	7.5
COFNH507.4	8/6/98 11:43:00 AM	10	29.8	6
COFNH507.4	8/6/98 11:43:00 AM	15	29.6	3.3
COFNH507.4	8/6/98 11:43:00 AM	20	29.6	3
COFNH507.4	8/6/98 11:43:00 AM	25	29.5	2.8
COFNH507.4	8/6/98 11:43:00 AM	35	29.5	2.7
COFNH507.4	9/9/98 2:25:00 PM	0	29.1	7.6
COFNH507.4	9/9/98 2:25:00 PM	1	29.1	7.6
COFNH507.4	9/9/98 2:25:00 PM	3	29	7.4
COFNH507.4	9/9/98 2:25:00 PM	5	28.6	6.2
COFNH507.4	9/9/98 2:25:00 PM	10	28.2	4.1
COFNH507.4	9/9/98 2:25:00 PM	15	28.2	4
COFNH507.4	9/9/98 2:25:00 PM	20	28.2	4.2
COFNH507.4	9/9/98 2:25:00 PM	25	28.1	4.3
COFNH507.4	9/9/98 2:25:00 PM	35	28.1	4.1
COFNH507.4	10/14/98 9:45:00 AM	0	23.5	7.3
COFNH507.4	10/14/98 9:45:00 AM	1	23.5	7.1
COFNH507.4	10/14/98 9:45:00 AM	3	23.4	6.8
COFNH507.4	10/14/98 9:45:00 AM	5	23.3	6.6
COFNH507.4	10/14/98 9:45:00 AM	10	23.3	6.6
COFNH507.4	10/14/98 9:45:00 AM	15	23.3	6.5

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	10/14/98 9:45:00 AM	20	23.3	6.3
COFNH507.4	10/14/98 9:45:00 AM	25	23.3	6
COFNH507.4	10/14/98 9:45:00 AM	30	23.3	5.1
COFNH507.4	10/14/98 9:45:00 AM	40	23.2	4.8
COFNH507.4	11/3/98 11:55:00 AM	0	19.8	7.9
COFNH507.4	11/3/98 11:55:00 AM	1	19.8	7.9
COFNH507.4	11/3/98 11:55:00 AM	3	19.7	7.9
COFNH507.4	11/3/98 11:55:00 AM	5	19.7	7.8
COFNH507.4	11/3/98 11:55:00 AM	10	19.7	7.8
COFNH507.4	11/3/98 11:55:00 AM	15	19.7	7.7
COFNH507.4	11/3/98 11:55:00 AM	20	19.6	7.5
COFNH507.4	11/3/98 11:55:00 AM	25	19.5	7.1
COFNH507.4	11/3/98 11:55:00 AM	30	19.5	7.1
COFNH507.4	11/3/98 11:55:00 AM	40	19.5	7
COFNH507.4	12/2/98 2:35:00 PM	0	15.7	10.5
COFNH507.4	12/2/98 2:35:00 PM	1	15.7	10.5
COFNH507.4	12/2/98 2:35:00 PM	3	15.5	10.1
COFNH507.4	12/2/98 2:35:00 PM	5	15.1	9.6
COFNH507.4	12/2/98 2:35:00 PM	10	14.9	9.2
COFNH507.4	12/2/98 2:35:00 PM	15	14.8	9.1
COFNH507.4	12/2/98 2:35:00 PM	20	14.8	9
COFNH507.4	12/2/98 2:35:00 PM	25	14.8	9
COFNH507.4	12/2/98 2:35:00 PM	35	14.8	8.9
COFNH507.4	12/2/98 2:35:00 PM	45	14.8	9
COFNH507.4	1/19/99 9:30:00 AM	0	8.8	10.4
COFNH507.4	1/19/99 9:30:00 AM	1	8.7	10.4
COFNH507.4	1/19/99 9:30:00 AM	3	8.6	10.4
COFNH507.4	1/19/99 9:30:00 AM	5	8.6	10.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	1/19/99 9:30:00 AM	10	8.6	10.4
COFNH507.4	1/19/99 9:30:00 AM	15	8.6	10.4
COFNH507.4	1/19/99 9:30:00 AM	20	8.6	10.4
COFNH507.4	1/19/99 9:30:00 AM	25	8.6	10.4
COFNH507.4	1/19/99 9:30:00 AM	30	8.5	10.4
COFNH507.4	1/19/99 9:30:00 AM	40	8.5	10.4
COFNH507.4	6/8/99 10:25:00 AM	0	28.5	9
COFNH507.4	6/8/99 10:25:00 AM	1	27.7	9
COFNH507.4	6/8/99 10:25:00 AM	3	27.2	8.2
COFNH507.4	6/8/99 10:25:00 AM	5	27.1	6.6
COFNH507.4	6/8/99 10:25:00 AM	10	26.7	5.3
COFNH507.4	6/8/99 10:25:00 AM	15	26.2	3.7
COFNH507.4	6/8/99 10:25:00 AM	20	26	2.7
COFNH507.4	6/8/99 10:25:00 AM	25	25.9	2.7
COFNH507.4	6/8/99 10:25:00 AM	30	25.8	2.5
COFNH507.4	6/8/99 10:25:00 AM	40	25.8	1.4
COFNH507.4	7/6/99 1:36:00 PM	0	31.9	11.7
COFNH507.4	7/6/99 1:36:00 PM	1	31.5	12
COFNH507.4	7/6/99 1:36:00 PM	3	30.4	12
COFNH507.4	7/6/99 1:36:00 PM	5	28.6	10.9
COFNH507.4	7/6/99 1:36:00 PM	10	27.4	6.5
COFNH507.4	7/6/99 1:36:00 PM	15	27.3	5.4
COFNH507.4	7/6/99 1:36:00 PM	20	27.1	4.9
COFNH507.4	7/6/99 1:36:00 PM	25	27.1	4.8
COFNH507.4	7/6/99 1:36:00 PM	35	26.9	4.2
COFNH507.4	7/6/99 1:36:00 PM	45	26.6	3.3
COFNH507.4	8/2/99 1:15:00 PM	0	33	11
COFNH507.4	8/2/99 1:15:00 PM	1	33.1	11.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COFNH507.4	8/2/99 1:15:00 PM	3	33	11.1
COFNH507.4	8/2/99 1:15:00 PM	5	32.9	11.1
COFNH507.4	8/2/99 1:15:00 PM	10	32.7	10.7
COFNH507.4	8/2/99 1:15:00 PM	15	31.4	4.8
COFNH507.4	8/2/99 1:15:00 PM	20	31	3.4
COFNH507.4	8/2/99 1:15:00 PM	25	31	3.3
COFNH507.4	8/2/99 1:15:00 PM	35	30.9	2.8
COFNH507.4	8/2/99 1:15:00 PM	45	30.7	1.2
COFNH507.4	9/1/99 12:55:00 PM	0	30.7	9.2
COFNH507.4	9/1/99 12:55:00 PM	1	30.6	9.2
COFNH507.4	9/1/99 12:55:00 PM	3	29	6.7
COFNH507.4	9/1/99 12:55:00 PM	5	28.8	5.2
COFNH507.4	9/1/99 12:55:00 PM	10	28.8	4.7
COFNH507.4	9/1/99 12:55:00 PM	15	28.8	4.7
COFNH507.4	9/1/99 12:55:00 PM	20	28.8	4.7
COFNH507.4	9/1/99 12:55:00 PM	25	28.8	4.7
COFNH507.4	9/1/99 12:55:00 PM	35	28.7	5.1
COFNH507.4	9/1/99 12:55:00 PM	45	28.8	5.1
COFNH507.4	10/4/99 1:22:00 PM	0	24.8	9.6
COFNH507.4	10/4/99 1:22:00 PM	1	23.4	8.8
COFNH507.4	10/4/99 1:22:00 PM	3	23	7
COFNH507.4	10/4/99 1:22:00 PM	5	23	6.6
COFNH507.4	10/4/99 1:22:00 PM	10	22.8	5.1
COFNH507.4	10/4/99 1:22:00 PM	15	22.8	4.8
COFNH507.4	10/4/99 1:22:00 PM	20	22.7	4.7
COFNH507.4	10/4/99 1:22:00 PM	25	22.7	4.4
COFNH507.4	10/4/99 1:22:00 PM	35	22.7	3.7
COFNH507.4	10/4/99 1:22:00 PM	45	22.8	3.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORNH522.8	1/20/98 10:25:00 AM	0	8	11.3
CORNH522.8	1/20/98 10:25:00 AM	1	8	11.4
CORNH522.8	1/20/98 10:25:00 AM	3	8	11.3
CORNH522.8	1/20/98 10:25:00 AM	5	8	11.3
CORNH522.8	1/20/98 10:25:00 AM	10	8	11.3
CORNH522.8	1/20/98 10:25:00 AM	15	8	11.4
CORNH522.8	1/20/98 10:25:00 AM	20	8	11.4
CORNH522.8	1/20/98 10:25:00 AM	25	8	11.4
CORNH522.8	1/20/98 10:25:00 AM	30	8	11.4
CORNH522.8	1/20/98 10:25:00 AM	35	8	11.5
CORNH522.8	2/9/98 2:15:00 PM	0	6.8	12
CORNH522.8	2/9/98 2:15:00 PM	1	6.7	12.2
CORNH522.8	2/9/98 2:15:00 PM	3	6.7	12.2
CORNH522.8	2/9/98 2:15:00 PM	5	6.7	12.2
CORNH522.8	2/9/98 2:15:00 PM	10	6.7	12.1
CORNH522.8	2/9/98 2:15:00 PM	15	6.7	12
CORNH522.8	2/9/98 2:15:00 PM	20	6.7	12.4
CORNH522.8	2/9/98 2:15:00 PM	25	6.7	12.4
CORNH522.8	2/9/98 2:15:00 PM	35	6.7	12.5
CORNH522.8	3/3/98 10:33:00 AM	0	11.7	10.5
CORNH522.8	3/3/98 10:33:00 AM	1	11.7	10.4
CORNH522.8	3/3/98 10:33:00 AM	3	11.7	10.5
CORNH522.8	3/3/98 10:33:00 AM	5	11.7	10.5
CORNH522.8	3/3/98 10:33:00 AM	10	11.7	10.5
CORNH522.8	3/3/98 10:33:00 AM	15	11.7	10.5
CORNH522.8	3/3/98 10:33:00 AM	20	11.7	10.5
CORNH522.8	3/3/98 10:33:00 AM	25	11.7	10.4
CORNH522.8	3/3/98 10:33:00 AM	30	11.7	10.4

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORNH522.8	4/8/98 9:20:00 AM	0	16.9	9
CORNH522.8	4/8/98 9:20:00 AM	1	16.9	9
CORNH522.8	4/8/98 9:20:00 AM	3	16.9	9
CORNH522.8	4/8/98 9:20:00 AM	5	16.9	9
CORNH522.8	4/8/98 9:20:00 AM	10	16.9	9
CORNH522.8	4/8/98 9:20:00 AM	15	16.9	9
CORNH522.8	4/8/98 9:20:00 AM	20	16.9	9
CORNH522.8	4/8/98 9:20:00 AM	25	16.9	9
CORNH522.8	4/8/98 9:20:00 AM	30	16.9	9.2
CORNH522.8	5/5/98 9:40:00 AM	0	19.3	9
CORNH522.8	5/5/98 9:40:00 AM	1	19	9
CORNH522.8	5/5/98 9:40:00 AM	3	18.7	8.9
CORNH522.8	5/5/98 9:40:00 AM	5	18.3	8.5
CORNH522.8	5/5/98 9:40:00 AM	10	18.3	8.4
CORNH522.8	5/5/98 9:40:00 AM	15	18.2	8.4
CORNH522.8	5/5/98 9:40:00 AM	20	18.2	8.4
CORNH522.8	5/5/98 9:40:00 AM	25	18.2	8.4
CORNH522.8	5/5/98 9:40:00 AM	35	18.2	8.4
CORNH522.8	6/2/98 9:50:00 AM	0	27.8	6.7
CORNH522.8	6/2/98 9:50:00 AM	1	27.8	6.6
CORNH522.8	6/2/98 9:50:00 AM	3	27.8	6.6
CORNH522.8	6/2/98 9:50:00 AM	5	27.7	6.5
CORNH522.8	6/2/98 9:50:00 AM	10	27.7	6.3
CORNH522.8	6/2/98 9:50:00 AM	15	27.6	6
CORNH522.8	6/2/98 9:50:00 AM	20	27.5	5.6
CORNH522.8	6/2/98 9:50:00 AM	25	27.5	5.9
CORNH522.8	6/2/98 9:50:00 AM	35	27.5	6.2
CORNH522.8	7/14/98 2:38:00 PM	0	29.5	6

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORNH522.8	7/14/98 2:38:00 PM	1	29.5	6
CORNH522.8	7/14/98 2:38:00 PM	3	29.5	5.8
CORNH522.8	7/14/98 2:38:00 PM	5	29.5	5.7
CORNH522.8	7/14/98 2:38:00 PM	10	29.4	5.6
CORNH522.8	7/14/98 2:38:00 PM	15	29.5	5.6
CORNH522.8	7/14/98 2:38:00 PM	20	29.3	5.5
CORNH522.8	7/14/98 2:38:00 PM	25	29.3	5.6
CORNH522.8	7/14/98 2:38:00 PM	35	29.2	5.5
CORNH522.8	8/6/98 10:25:00 AM	0	29.7	6.5
CORNH522.8	8/6/98 10:25:00 AM	1	29.7	6.4
CORNH522.8	8/6/98 10:25:00 AM	3	29.6	6.2
CORNH522.8	8/6/98 10:25:00 AM	5	29.6	6
CORNH522.8	8/6/98 10:25:00 AM	10	29.6	6
CORNH522.8	8/6/98 10:25:00 AM	15	29.5	5.7
CORNH522.8	8/6/98 10:25:00 AM	20	29.5	5.8
CORNH522.8	8/6/98 10:25:00 AM	25	29.5	5.8
CORNH522.8	8/6/98 10:25:00 AM	35	29.4	5.6
CORNH522.8	9/9/98 1:28:00 PM	0	28.8	7.6
CORNH522.8	9/9/98 1:28:00 PM	1	28.8	7.8
CORNH522.8	9/9/98 1:28:00 PM	3	28.7	7.4
CORNH522.8	9/9/98 1:28:00 PM	5	28.6	7
CORNH522.8	9/9/98 1:28:00 PM	10	28.3	6
CORNH522.8	9/9/98 1:28:00 PM	15	28.3	6.1
CORNH522.8	9/9/98 1:28:00 PM	20	28.2	6.1
CORNH522.8	9/9/98 1:28:00 PM	25	28.1	6.3
CORNH522.8	9/9/98 1:28:00 PM	35	28.1	6.1
CORNH522.8	10/14/98 8:50:00 AM	0	22.9	7.2
CORNH522.8	10/14/98 8:50:00 AM	1	22.9	7.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORNH522.8	10/14/98 8:50:00 AM	3	22.9	7.2
CORNH522.8	10/14/98 8:50:00 AM	5	22.9	7.2
CORNH522.8	10/14/98 8:50:00 AM	10	22.8	7.1
CORNH522.8	10/14/98 8:50:00 AM	15	22.8	7
CORNH522.8	10/14/98 8:50:00 AM	20	22.8	7
CORNH522.8	10/14/98 8:50:00 AM	25	22.7	7
CORNH522.8	10/14/98 8:50:00 AM	35	22.6	7.2
CORNH522.8	11/3/98 11:04:00 AM	0	19.3	8.5
CORNH522.8	11/3/98 11:04:00 AM	1	19.3	8.4
CORNH522.8	11/3/98 11:04:00 AM	3	19.3	8.2
CORNH522.8	11/3/98 11:04:00 AM	5	19.2	8.1
CORNH522.8	11/3/98 11:04:00 AM	10	19.1	7.6
CORNH522.8	11/3/98 11:04:00 AM	15	19	7.5
CORNH522.8	11/3/98 11:04:00 AM	20	19	7.4
CORNH522.8	11/3/98 11:04:00 AM	25	19	7.4
CORNH522.8	11/3/98 11:04:00 AM	30	19	7.6
CORNH522.8	12/2/98 1:38:00 PM	0	14.9	9.5
CORNH522.8	12/2/98 1:38:00 PM	1	14.9	9.5
CORNH522.8	12/2/98 1:38:00 PM	3	14.8	9.4
CORNH522.8	12/2/98 1:38:00 PM	5	14.8	9.4
CORNH522.8	12/2/98 1:38:00 PM	10	14.8	9.3
CORNH522.8	12/2/98 1:38:00 PM	15	14.7	9.3
CORNH522.8	12/2/98 1:38:00 PM	20	14.7	9.3
CORNH522.8	12/2/98 1:38:00 PM	25	14.7	9.4
CORNH522.8	12/2/98 1:38:00 PM	30	14.8	9.5
CORNH522.8	1/7/99 3:25:00 PM	0	4.8	11.3
CORNH522.8	1/7/99 3:25:00 PM	1	4.8	11.3
CORNH522.8	1/7/99 3:25:00 PM	3	4.8	11.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORNH522.8	1/7/99 3:25:00 PM	5	4.8	11.3
CORNH522.8	1/7/99 3:25:00 PM	10	4.8	11.3
CORNH522.8	1/7/99 3:25:00 PM	15	4.8	11.3
CORNH522.8	1/7/99 3:25:00 PM	20	4.8	11.2
CORNH522.8	1/7/99 3:25:00 PM	25	4.8	11.3
CORNH522.8	1/7/99 3:25:00 PM	35	4.8	11.3
CORNH532.9	1/19/98 2:55:00 PM	0	8.3	11.1
CORNH532.9	1/19/98 2:55:00 PM	1	8.3	11.2
CORNH532.9	1/19/98 2:55:00 PM	3	8.3	11.4
CORNH532.9	1/19/98 2:55:00 PM	5	8.3	11.4
CORNH532.9	1/19/98 2:55:00 PM	10	8.3	11.4
CORNH532.9	1/19/98 2:55:00 PM	15	8.3	11.3
CORNH532.9	1/19/98 2:55:00 PM	20	8.3	11.5
CORNH532.9	1/19/98 2:55:00 PM	25	8.3	12
CORNH532.9	2/9/98 12:45:00 PM	0	6.5	12.1
CORNH532.9	2/9/98 12:45:00 PM	1	6.4	12.2
CORNH532.9	2/9/98 12:45:00 PM	3	6.4	12.3
CORNH532.9	2/9/98 12:45:00 PM	5	6.4	12.4
CORNH532.9	2/9/98 12:45:00 PM	10	6.4	12.4
CORNH532.9	2/9/98 12:45:00 PM	15	6.4	12.5
CORNH532.9	2/9/98 12:45:00 PM	20	6.4	12.5
CORNH532.9	2/9/98 12:45:00 PM	25	6.4	12.5
CORNH532.9	2/9/98 12:45:00 PM	30	6.4	13.3
CORNH532.9	3/3/98 9:18:00 AM	0	12	10.5
CORNH532.9	3/3/98 9:18:00 AM	1	12	10.6
CORNH532.9	3/3/98 9:18:00 AM	3	12	10.7
CORNH532.9	3/3/98 9:18:00 AM	5	12	10.7
CORNH532.9	3/3/98 9:18:00 AM	10	12	10.7

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORNH532.9	3/3/98 9:18:00 AM	15	12	10.7
CORNH532.9	3/3/98 9:18:00 AM	20	12	10.7
CORNH532.9	3/3/98 9:18:00 AM	25	12	11
CORNH532.9	4/8/98 8:08:00 AM	0	17.6	9.5
CORNH532.9	4/8/98 8:08:00 AM	1	17.6	9.5
CORNH532.9	4/8/98 8:08:00 AM	3	17.6	9.5
CORNH532.9	4/8/98 8:08:00 AM	5	17.6	9.3
CORNH532.9	4/8/98 8:08:00 AM	10	17.6	9
CORNH532.9	4/8/98 8:08:00 AM	15	17.7	9.3
CORNH532.9	4/8/98 8:08:00 AM	20	17.6	9.4
CORNH532.9	4/8/98 8:08:00 AM	25	17.6	9.4
CORNH532.9	5/5/98 8:30:00 AM	0	18.2	9.1
CORNH532.9	5/5/98 8:30:00 AM	1	18.1	9.1
CORNH532.9	5/5/98 8:30:00 AM	3	18	9
CORNH532.9	5/5/98 8:30:00 AM	5	17.9	8.8
CORNH532.9	5/5/98 8:30:00 AM	10	17.9	8.8
CORNH532.9	5/5/98 8:30:00 AM	15	17.9	8.7
CORNH532.9	5/5/98 8:30:00 AM	20	17.9	8.8
CORNH532.9	5/5/98 8:30:00 AM	25	17.9	8.7
CORNH532.9	6/2/98 8:45:00 AM	0	27.5	6
CORNH532.9	6/2/98 8:45:00 AM	1	27.4	5.5
CORNH532.9	6/2/98 8:45:00 AM	3	27.2	5.8
CORNH532.9	6/2/98 8:45:00 AM	5	27.3	5.3
CORNH532.9	6/2/98 8:45:00 AM	10	27.2	5.3
CORNH532.9	6/2/98 8:45:00 AM	15	27.3	5.2
CORNH532.9	6/2/98 8:45:00 AM	20	27.2	5.3
CORNH532.9	6/2/98 8:45:00 AM	25	27.1	5.2
CORNH532.9	7/14/98 1:55:00 PM	0	30.5	6.1

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
CORNH532.9	7/14/98 1:55:00 PM	1	30.4	5.8
CORNH532.9	7/14/98 1:55:00 PM	3	30.2	5.5
CORNH532.9	7/14/98 1:55:00 PM	5	29.8	5.1
CORNH532.9	7/14/98 1:55:00 PM	10	29.5	4.6
CORNH532.9	7/14/98 1:55:00 PM	15	29.7	4.6
CORNH532.9	7/14/98 1:55:00 PM	20	29.5	4.6
CORNH532.9	7/14/98 1:55:00 PM	25	29.5	4.6
CORNH532.9	8/6/98 9:00:00 AM	0	29.3	5.5
CORNH532.9	8/6/98 9:00:00 AM	1	29.3	5.6
CORNH532.9	8/6/98 9:00:00 AM	3	29.3	5.4
CORNH532.9	8/6/98 9:00:00 AM	5	29.3	5.4
CORNH532.9	8/6/98 9:00:00 AM	10	29.3	5.2
CORNH532.9	8/6/98 9:00:00 AM	15	29.3	5.3
CORNH532.9	8/6/98 9:00:00 AM	20	29.3	5.2
CORNH532.9	8/6/98 9:00:00 AM	25	29.3	5
CORNH532.9	9/9/98 11:37:00 AM	0	28.7	7.4
CORNH532.9	9/9/98 11:37:00 AM	1	28.7	7.4
CORNH532.9	9/9/98 11:37:00 AM	3	28.5	7.1
CORNH532.9	9/9/98 11:37:00 AM	5	28.4	6.6
CORNH532.9	9/9/98 11:37:00 AM	10	28.3	5.6
CORNH532.9	9/9/98 11:37:00 AM	15	28.2	5.5
CORNH532.9	9/9/98 11:37:00 AM	20	28.2	5.3
CORNH532.9	9/9/98 11:37:00 AM	25	28.1	5
CORNH532.9	10/13/98 6:15:00 PM	0	23.6	7
CORNH532.9	10/13/98 6:15:00 PM	1	23.6	7
CORNH532.9	10/13/98 6:15:00 PM	3	23.6	6.9
CORNH532.9	10/13/98 6:15:00 PM	5	23.6	6.8
CORNH532.9	10/13/98 6:15:00 PM	10	23.5	6.7

LOCATION	*Date/Time*	*Feet*	*Temperature deg F*	*Dissolved Oxygen*
CORNH532.9	10/13/98 6:15:00 PM	15	23.4	6.6
CORNH532.9	10/13/98 6:15:00 PM	20	23.4	6.7
CORNH532.9	10/13/98 6:15:00 PM	25	23.4	6.7
CORNH532.9	11/3/98 9:58:00 AM	0	19.2	7.5
CORNH532.9	11/3/98 9:58:00 AM	1	19.1	7.5
CORNH532.9	11/3/98 9:58:00 AM	3	19.1	7.5
CORNH532.9	11/3/98 9:58:00 AM	5	19	7.2
CORNH532.9	11/3/98 9:58:00 AM	10	18.9	7.1
CORNH532.9	11/3/98 9:58:00 AM	15	18.9	7
CORNH532.9	11/3/98 9:58:00 AM	20	18.9	7
CORNH532.9	11/3/98 9:58:00 AM	25	18.9	7.3
CORNH532.9	12/2/98 12:31:00 PM	0	15.5	9.6
CORNH532.9	12/2/98 12:31:00 PM	1	14.9	9.7
CORNH532.9	12/2/98 12:31:00 PM	3	14.8	9.6
CORNH532.9	12/2/98 12:31:00 PM	5	14.8	9.6
CORNH532.9	12/2/98 12:31:00 PM	10	14.8	9.6
CORNH532.9	12/2/98 12:31:00 PM	15	14.8	9.7
CORNH532.9	12/2/98 12:31:00 PM	20	14.8	9.7
CORNH532.9	12/2/98 12:31:00 PM	25	14.8	9.8
CORNH532.9	1/7/99 2:46:00 PM	0	4.8	11.5
CORNH532.9	1/7/99 2:46:00 PM	1	4.8	11.5
CORNH532.9	1/7/99 2:46:00 PM	3	4.8	11.5
CORNH532.9	1/7/99 2:46:00 PM	5	4.8	11.5
CORNH532.9	1/7/99 2:46:00 PM	10	4.8	11.5
CORNH532.9	1/7/99 2:46:00 PM	15	4.8	11.5
CORNH532.9	1/7/99 2:46:00 PM	20	4.8	11.5
CORNH532.9	1/7/99 2:46:00 PM	25	4.9	11.4
COTNH507.2	6/5/90 3:52:00 PM	0	25	8.3

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COTNH507.2	7/10/90 1:35:00 PM	0	31.2	5.5
COTNH507.2	8/14/90 12:01:00 AM	0	29.1	5.9
COTNH507.2	9/26/90 1:34:00 PM	0	25.2	7.2
COTNH507.2	9/26/90 1:34:00 PM	0	25.2	7.2
COTNH507.2	9/26/90 1:34:00 PM	3	25.2	7.2
COTNH507.2	9/26/90 1:34:00 PM	3	25.2	7.2
COTNH507.2	9/26/90 1:34:00 PM	5	25.2	7.2
COTNH507.2	9/26/90 1:34:00 PM	5	25.2	7.2
COTNH507.2	10/15/90 2:20:00 PM	0	23.3	6.4
COTNH507.2	6/4/91 1:25:00 PM	0	27.8	8
COTNH507.2	7/24/91 1:07:00 PM	0	29.9	5.4
COTNH507.2	8/22/91 2:20:00 PM	0	28.9	8.3
COTNH507.2	9/24/91 2:20:00 PM	0	23.4	6.6
COTNH507.2	10/22/91 12:50:00 PM	0	18.6	7.8
COTNH507.2	6/18/92 1:50:00 PM	0	25.6	7.2
COTNH507.2	7/28/92 12:10:00 PM	0	29.2	5.3
COTNH507.2	8/25/92 1:12:00 PM	0	27.2	5.3
COTNH507.2	9/1/92 1:35:00 PM	0	26	7.6
COTNH507.2	10/21/92 1:35:00 PM	0	18.3	8.5
COTNH507.2	6/15/93 10:14:00 AM	0	28.6	4.7
COTNH507.2	8/10/93 12:59:00 PM	0	28.6	4.9
COTNH507.2	9/14/93 1:08:00 PM	0	27.2	6.2
COTNH507.2	10/20/93 11:15:00 AM	0	20.9	6.5
COTNH507.2	6/13/94 1:00:00 PM	0	28.7	6.7
COTNH507.2	7/19/94 1:00:00 PM	1	28.2	8.7
COTNH507.2	8/23/94 12:01:00 AM	0	28	6.2
COTNH507.2	9/19/94 1:20:00 PM	0	26.9	6.4
COTNH507.2	10/24/94 3:50:00 PM	0	19.5	8.2

LOCATION	Date/Time	Feet	Temperature deg F	Dissolved Oxygen
COTNH507.2	6/22/95 11:00:00 AM	0	26.2	6.2
COTNH507.2	7/24/95 10:00:00 AM	0	30.3	4.3
COTNH507.2	7/31/95 11:59:00 AM	5	30.2	4.98
COTNH507.2	9/25/95 1:30:00 PM	0	24.1	5.1
COTNH507.2	8/22/96 2:10:00 PM	0	28.8	6.6
COTNH507.2	9/5/96 1:38:00 PM	0	27.9	6.9
COTNH507.2	6/18/97 8:52:00 AM	0	22.8	7.2
COTNH507.2	10/14/97 10:20:00 AM	0	23.4	7.4
COTNH507.2	1/20/98 1:00:00 PM	0	8.8	10.1
COTNH507.2	2/9/98 3:55:00 PM	0	8.1	10.3
COTNH507.2	3/3/98 1:55:00 PM	0	11.7	9.4
COTNH507.2	4/8/98 11:03:00 AM	0	18.7	7.6
COTNH507.2	5/5/98 12:25:00 PM	0	19.6	6.9
COTNH507.2	6/2/98 11:27:00 AM	0	29	5.2
COTNH507.2	7/15/98 10:45:00 AM	0	29.5	4.1
COTNH507.2	8/6/98 12:15:00 PM	0	30.5	4.9
COTNH507.2	9/9/98 2:55:00 PM	0	28.7	7
COTNH507.2	10/14/98 10:20:00 AM	0	22.5	6.3
COTNH507.2	11/3/98 12:19:00 PM	0	19.8	8
COTNH507.2	12/2/98 3:10:00 PM	0	17.3	10.5
COTNH507.2	1/19/99 9:59:00 AM	0	8.6	10.9
COTNH507.2	6/8/99 11:03:00 AM	0	26.7	5.6
COTNH507.2	7/6/99 2:25:00 PM	0	29.3	6.6
COTNH507.2	8/2/99 1:46:00 PM	0	31.8	6.3
COTNH507.2	9/1/99 1:30:00 PM	0	29.1	6.4
COTNH507.2	10/6/99 4:59:00 PM	0	24.8	7

APPENDIX E

Additional Information for Coosa River Basin

Additional Available Study Reference List for Coosa River Basin

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