US Army Corps of Engineers ®
Mobile District

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN WATER CONTROL MANUAL

Final Draft
APPENDIX I

R. L. HARRIS DAM AND LAKE
(ALABAMA POWER COMPANY)

COOSA RIVER, ALABAMA

U.S. ARMY CORPS OF ENGINEERS
SOUTH ATLANTIC DIVISION
MOBILE DISTRICT
MOBILE, ALABAMA

OCTOBER 1993
REVISED XXX 2013

R. L. Harris Dam and Lake

NOTICE TO USERS OF THIS MANUAL

Regulations specify that this Water Control Manual be published in a hard copy binder with loose-leaf form, and only those sections, or parts thereof; requiring changes will be revised and printed. Therefore, this copy should be preserved in good condition so that inserts can be made to keep the manual current. Changes to individual pages must carry the date of revision, which is the South Atlantic Division's approval date.

REGULATION ASSISTANCE PROCEDURES

If unusual conditions arise, contact can be made with the Water Management Section, Mobile District Office by phoning (251) 690-2730 during regular duty hours and (251) 509-5368 during non-duty hours. The Alabama Power Company Alabama Control Center Hydro Desk can be reached at (205) 257-4010 during regular duty hours.

METRIC CONVERSION

The values presented in the text are shown in English units only. Exhibit B contains a conversion table that can be used for metric units.

VERTICAL DATUM

All vertical data presented in this manual are referenced to the project's historical vertical datum, National Geodetic Vertical Datum of 1929 (NGVD29).

MEMORANDUM OF UNDERSTANDING

The R. L. Harris Dam and Lake Project will be operated during floods and in support of navigation downstream in accordance with regulations prescribed by the Secretary of the Army and published in the Code of Federal Regulations, Title 33, Chapter II, Part 208, Section 208. A Memorandum of Understanding (MOU) concerning the design, construction, and operation of the R. L. Harris development for flood control was adopted by the Alabama Power Company (APC) and the U.S. Army Corps of Engineers (Corps) on 27 September 1972 and later revised on 11 October 1990. An additional MOU with the purpose to delineate and affirm the regulation plan developed by the Corps and the APC for the APC Projects on the Coosa and Tallapoosa Rivers to support navigation on the Alabama River including periods of low flow or drought when navigation support may not be reduced was adopted XXX (date). This MOU is also intended to memorialize the functions and procedures for both the COE and APC for implementing these plans and meeting their responsibilities with regard to navigation and to provide direction for the orderly exchange of hydrologic data. A copy of the original and revised MOU and the MOU for navigation operations are included in this manual as Exhibit C.

R. L. HARRIS DAM AND LAKE

WATER CONTROL MANUAL
TALLAPOOSA RIVER, ALABAMA

U.S. Army Corps of Engineers, Mobile District, South Atlantic Division

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PERTINENT DATA

GENERAL

Other names of project	Crooked Creek
Dam site location	
Miles above mouth of Tallapoosa River	139.1
Miles above mouth of Mobile River	494
Drainage area above dam site, square miles	1,453

STREAM FLOW AT USGS GAGE at WADLEY, AL (cfs)

Average for Period of Record (calendar year 1924 – 2009)	2,562
Maximum daily discharge	103,000
Minimum daily discharge	41

RESERVOIR

Top of power pool (May through Sep) - feet NGVD29	793.0
Top of power pool (Dec through Mar) - feet NGVD29	785.0
Minimum operating pool elevation, feet NGVD29	768.0
Area at pool elevation 793.0, acres	10,660
Total volume at elevation 793.0, acre-feet	424,969
Power storage (elevation 768 to 793 ft NGVD29), acre-feet	206,944
Inactive Storage (below elevation 768 ft NGVD29), acre-feet	218,025
Length, miles	24
Shoreline distance at elevation 793 (summer pool), miles	271

SPILLWAY

Type	concrete-gravity
Net length, feet	310
Elevation of crest, feet above NGVD29	753.0
Type of gates	Tainter
Number of gates (40.5 ft x 40 ft)	6
Maximum discharge capacity (pool elev. 795.0), cfs	267,975

DAM

Total length including dikes, feet	2,142
Total length of non-overflow section, feet	1,832
Maximum height above stream bed, feet	151.5
Elevation, top of dam, feet NGVD29	810

POWER PLANT

Gross static head at full power pool (793 ft NGVD29), feet	131.7
Normal operating head at full turbine discharge, feet	124.0
Number of units	2
Maximum discharge per unit (best gate), cfs	6,500
Total installation, kW	135,000

I - INTRODUCTION

1-01. Authorization. The River and Harbor Act approved 2 March 1945 (59 Stat. 10) authorized the U.S. Army Corps of Engineers (Corps) to develop a site at Crooked Creek for flood control, hydropower, and other purposes. Section 12 of Public Law (P.L.) 89-789 (80 Stat., 1405), approved 7 November 1966, suspended for two years the authority as far as hydropower was concerned, to permit development of the Tallapoosa River by private concerns. The Alabama Power Company (APC) filed an application with the Federal Power Commission (FPC) for the proposed project on 5 November 1968, and was issued a license for the construction of the Crooked Creek Hydroelectric Project (later renamed R. L. Harris). Operations for flood risk management and navigation support are conducted in accordance with regulations prescribed by the Secretary of the Army and published in 33 CFR, Chapter II, Part 208, Section 208.65. Therefore, this water control manual has been prepared as directed and in accordance with the Corps Water Management Regulations, specifically Engineering Regulation (ER) 1110-2-241, *Use of Storage Allocated for Flood Control and Navigation at Non-Corps Projects*. Also, ER 1110-2-240, *Water Control Management* prescribes the policies and procedures to be followed in carrying out water management activities, including establishment and updating of water control plans for non-Corps projects, as required by federal laws and directives. This manual is also prepared in accordance with pertinent sections of the Corps' Engineering Manual (EM) 1110-2-3600, *Management of Water Control Systems*; under the format and recommendations described in ER 1110-2-8156, *Preparation of Water Control Manuals*; and ER 1110-2-1941, *Drought Contingency Plans*. This manual is subject to review and revision at any time upon request of APC or the District Commander. Revisions to this manual are processed in accordance with ER 1110-2-240.

Below is a complete list of pertinent regulations and guidance and the date enacted:

ER 1110-2-240	Water Control Management	8 October 1982
ER 1110-2-241	Use of Storage Allocated for Flood Control and Navigation at Non-Corps Projects	24 May 1990
ER 1110-2-8156	Preparation of Water Control Manuals	31 August 1995
ER 1110-2-1941	Drought Contingency Plans	15 September 1981
EM-1110-2-3600	Management of Water Control Systems	30 November 1987

1-02. Purpose and Scope. This individual project manual primarily describes the flood risk management water control plan for the APC R. L. Harris Dam and Lake Project. In addition, the manual includes descriptions of the plans for navigation support and drought contingency operations. The description of the project's physical components, history of development, water control activities, and coordination with others are provided as supplemental information to enhance the knowledge and understanding of the water control plan. R. L. Harris Dam water control regulations must be coordinated with the multiple projects in the Alabama-Coosa-Tallapoosa (ACT) Basin to ensure consistency with the purposes for which the system was authorized. In conjunction with the ACT Basin Master Water Control Manual, this manual provides a general reference source for R. L. Harris water control regulation. It is intended for use in day-to-day, real-time water management decision making and for training new personnel.

1-03. Related Manuals and Reports.

Other manuals related to the R. L. Harris Project water control regulation activities include the ACT Master Manual for the entire basin and nine appendices that compose the complete set of water control manuals for the ACT Basin:

Alabama-Coosa-Tallapoosa River Basin Master Manual	
Appendix A	Allatoona Dam and Lake Allatoona
Appendix B	Weiss Dam and Lake (Alabama Power Company)
Appendix C	Logan Martin Dam and Lake (Alabama Power Company)
Appendix D	H. Neely Henry Dam and Lake (Alabama Power Company)
Appendix E	Millers Ferry Lock and Dam and William “Bill” Dannelly Lake
Appendix F	Claiborne Lock and Dam and Lake
Appendix G	Robert F. Henry Lock and Dam and R. E. “Bob” Woodruff Lake
Appendix H	Carters Dam and Lake and Carters Reregulation Dam
Appendix I	R. L. Harris Dam and Lake (Alabama Power Company)

Other pertinent information regarding the R. L. Harris Project and other APC Tallapoosa River projects are contained within the Federal Energy Regulatory Commission (FERC) license for the Tallapoosa and Martin Projects. Historical, definite project reports and design memoranda also have useful information.

1-04. Project Owner. The R. L. Harris Dam and Lake Project is owned and operated by the APC under provisions of the licensing through the FERC for Project Number 2628.

1-05. Operating Agency. The R. L. Harris Project is operated for flood control and navigation support in accordance with regulations prescribed by the Secretary of the Army, which are published in the Code of Federal Regulations, Title 33, Chapter II, Part 208, Section 208.65. Day-to-day operation of the facility is assigned to the APC’s Alabama Control Center (ACC) in Birmingham, Alabama, which is part of the Power Delivery System under the direction of the Reservoir Operations Coordinator. Long-range water planning and flood control operation is assigned to Reservoir Management in Birmingham, Alabama, which is part of Southern Company Services GEM-Hydro, under the direction of the System Operations Supervisor. Operation of the project is in accordance with the FERC license and this water control manual.

1-06. Regulating Agencies. Regulating authority is shared between the Corps, the FERC, and the APC. Memorandums of Understandings (MOUs) have been adopted by the APC and the Corps concerning the operation of the project. The purpose of the MOUs was to clarify the responsibilities of the two agencies with regard to the operation of the project for flood control, navigation, and other purposes and to provide direction for the orderly exchange of hydrologic data. Those modifications agreed upon by both parties are contained in the regulation plan as presented in this manual. The MOUs and this manual will be used to provide direction to implement the prescribed flood control and low flow regulations. A copy of the MOUs are included in this manual as Exhibit C.

II - DESCRIPTION OF PROJECT

2-01. Location. R. L. Harris Dam is located on the Tallapoosa River at river mile 139.1, near Lineville in Randolph County, Alabama. It is located 77 river miles above Martin Dam. The 24-mile long reservoir extends up both the Tallapoosa and Little Tallapoosa Rivers and is contained within Randolph and Clay Counties, Alabama. The area of the watershed above the project is 1,453 square miles and the maximum depth at the dam is 135 feet. Crooked Creek is located just below the dam. The location of the dam is about midway between Montgomery, Alabama and Atlanta, Georgia and is shown on Plates 2-1 and 2-2. The dam is also shown in Figure 2.1.

Figure 2-1. R. L. Harris Dam

2-02. Purpose. R. L. Harris Dam is a multiple-purpose project which constitutes one unit in the proposed total development of the power potential and other water resources of the Tallapoosa River. The dam was built by the APC principally for the production of hydroelectric power but the dam also provides flood risk management benefits and supports navigational flow requirements downstream as prescribed by the Secretary of the Army, published in the Code of Federal Regulations, Title 33, Chapter II, Part 208, Section 208.65. The R. L. Harris Lake provides a source of water supply for domestic, agricultural, and municipal and industrial users.

The lake also creates a large recreational area providing opportunities for fishing, boating, and other water-based recreational activities.

2-03. Physical Components. The R. L. Harris Development consists of a dam having a concrete gated spillway section with compacted earth abutment dikes; a reservoir having a surface area of 10,660 acres and extends 24 miles upstream at full summer pool elevation of 793 feet NGVD29; a 135,000 kilowatt power plant, which is part of the main dam, located on the west side of the river between the spillway and the left bank earth abutment; a substation; and appurtenant electrical and mechanical facilities. The principal features of the project are described in detail in subsequent paragraphs. Sections and plan of the dam, powerhouse and appurtenant works are shown on Plates 2-3 and 2-4.

a. <u>Dam</u>. The dam is a concrete gravity-type structure having a top elevation of 810 feet NGVD29 and a length of 2,142 feet including the dikes. The maximum height above the existing river bed is 151.5 feet. Sections and plan of the dam and appurtenant works are shown on Plate 2-4. The dam is located at river mile 139.1 on the Tallapoosa River approximately midway between Montgomery, Alabama, and Atlanta, Georgia.

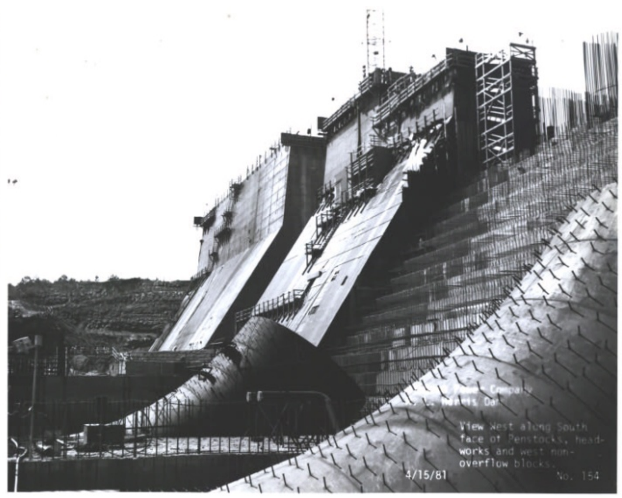

Figure 2-2. R. L. Harris Project under Construction

b. <u>Reservoir</u>. R. L. Harris Lake extends up the Tallapoosa River a distance of 24 miles with an arm also extending up the Little Tallapoosa River. The summertime elevation is 793 feet NGVD29 which provides a total storage of 424,969 acre-feet, covers a surface area of 10,660 acres, and has 271 miles of shoreline. During the flood season (December through March), the lake is normally maintained at elevation 785 feet NGVD29 which provides 100,108 acre-feet of storage for flood risk management operations between elevations 795 and 785 feet NGVD29. At elevation 795 feet NGVD29, the upper limits of the Induced Surcharge Curve, the lake has a total storage of 446,711 acre-feet, and a surface area of 11,120 acres. R. L. Harris Lake provides 206,944 acre-feet of power storage between elevations 768 and 793 feet NGVD29 during summer operation and 128,578 acre-feet between elevations 768 and 785 feet NGVD29 during winter operation. The lake drainage area is 1,453 square miles. Area-capacity curves and associated data points are shown on Plate 2-20.

c. <u>Spillway</u>. The spillway is 310 feet long and contains six tainter gates, each 40.5 feet wide and 40.0 feet high. The spillway crest is at elevation 753.0. A section and downstream elevation are shown on Plate 2-4. The gates are operated by plant personnel and are controlled from the powerhouse. One of the gates is split horizontally so that the upper section can be raised for the periodic passing of trash. The gate opening sequence and schedule are given on Plates 2-7 through 2-18. At elevation 795.0, the upper limits of the Induced Surcharge Curve, the spillway has a capacity of almost 270,000 cfs. A rating curve of the spillway discharge is shown on Plate 2-19.

d. Powerhouse and Penstocks. The powerhouse is situated on the right bank or west toe of the non-overflow section. The building is approximately 91 feet wide and 225 feet long and houses two 67,500 kW generators operating at a 121 feet net head with a best gate release of 13,000 cfs. The penstocks leading to the turbines are 27 feet in diameter with the invert of the intake at the upstream face of the dam at elevation 710.0 feet NGVD29. The centerline of the distributor is at elevation 659.0 feet NGVD29. A section of the powerhouse is shown on Plate 2-6. Performance curves for the turbines are shown on Plate 7-2.

2-04. Related Control Facilities. Operation of the R. L. Harris powerhouse and spillway gates can be operated either locally or remotely controlled from the Alabama Control Center in Birmingham, Alabama. Operation is closely coordinated with the operation of the other developments in the Tallapoosa Basin downstream.

2-05. Public Facilities. Many recreational advantages are inherent in an impoundment of this nature including fishing, hunting, boating, swimming, and picnicking and special attention has been given to the encouragement of recreational aspects where they do not conflict with major purposes. Development of project lands for recreational purposes is in accordance with the Recreational Development Plan approved by the FERC. There are presently five public boat ramps available with plans for additional ramps as recreational activity increases. Located on the west side of the dam is a public tailrace fishing platform and associated parking and restroom facilities. The APC has developed public hiking and nature trails on project lands.

III - HISTORY OF PROJECT

3-01. Authorization. Because of abundant streamflow and numerous excellent power sites, the ACT River System has long been recognized as having vast hydroelectric power potential. The system has been studied for the development of hydropower by both private interests and the Federal Government.

The Corps, as an agency of the United States Government, was authorized by the River and Harbor Act, approved 2 March 1945 (59 Stat. 10), to develop a site at Crooked Creek for flood control, hydropower and other purposes. The project was a part of the comprehensive plan for the development of Alabama-Coosa River System as contained in House Document No. 414, 77th Congress, 1st Session. Section 12 of Public Law 89-789 (80 Stat., 1405), approved 7 November 1966, suspended for two years the authority as far as hydropower was concerned, to permit development of the Tallapoosa River by private concerns. The APC filed an application for a preliminary permit with the Federal Power Commission (FPC) on 7 November 1966 to study the Crooked Creek site for development. Subsequently, APC filed an application for a license for the proposed project on 5 November 1968.

3-02. Planning and Design. On 28 December 1973, the FPC issued a license to APC for construction of the Crooked Creek Hydroelectric Project, No. 2628. At the request of APC, the project was renamed R. L. Harris Dam and Lake 15 February 1974.

3-03. Construction. Construction was started on 1 November 1974, and temporarily stopped on 22 December 1978. The construction then resumed on a limited basis on 11 August 1980 and fully resumed on 20 January 1981. The dam and spillway were completed on 27 October 1982. The powerhouse and appurtenance works were completed on 20 April 1983, with Units 1 and 2 available for commercial operation on 20 April 1983. Filling of the reservoir began on 27 October 1982 and the pool reached the minimum power guide curve elevation of 785 feet NGVD29 on 16 December 1982.

3-04. Related Projects. The R. L. Harris Dam and Lake Project is the most upstream of the APC projects on the Tallapoosa River at river mile 139.1. Downstream of the R. L. Harris Dam is the Martin Dam and Powerhouse at river mile 60.6, followed by the Yates Dam and Powerhouse at river mile 52.7, and the Thurlow Dam and Powerhouse at river mile 49.7. The sites are shown on Plate 2-1.

3-05. Modifications to Regulations. There have been no changes in the water control plan since the initial manual was published in 1993.

3-06. Principal Regulation Problems. There have been no significant regulation problems, such as erosion, boils, severe leakage, etc., at the R. L. Harris Project.

IV - WATERSHED CHARACTERISTICS

4-01. General Characteristics

a. ACT Basin. The head of the Coosa River is at Rome, Georgia at the confluence of the Etowah and Oostanaula Rivers. It flows west to the Alabama State line, then in a southwesterly then southerly direction for about 286 miles to join the Tallapoosa River near Wetumpka, Alabama. The Tallapoosa River forms in northwest Georgia about 40 miles west of Atlanta, Georgia. It flows in a southwesterly direction for about 195 miles into East Central Alabama and then westerly for about 40 miles to join the Coosa River to form the Alabama River. The Alabama River flows in a southwesterly direction about 310 miles where it joins the Tombigbee River to form the Mobile River. The Mobile River flows southerly about 45 miles where it empties into Mobile Bay at Mobile, Alabama, an estuary of the Gulf of Mexico. The entire ACT Basin with the Tallapoosa River Basin highlighted, and some of the other ACT projects are shown on Plate 2-1. The river mile and size of the drainage area above selected sites in the ACT Basin are shown on Table 4-1.

b. Tallapoosa Basin. The Tallapoosa Basin drains a total of 4,680 square miles of which 720 square miles are in Georgia and 3,960 square miles are in Alabama. The main river width varies from about 250 to over 700 feet with banks generally about 20 feet above the river bed. The total fall of the river is 1,144 feet in 268 miles, giving an average fall of about 4.3 feet per mile. The river's width varies from 250 feet to 700 feet and has banks that are 20 feet high along the flood plain. The principal tributary streams are the Little Tallapoosa River and Sougahatchee, South Sandy, Uphapee, and Hillabee Creeks. The width of the drainage area of the basin ranges from approximately 30 miles to 50 miles.

c. Principle Tributaries and Structures of the Tallapoosa River. The principal tributaries of the Tallapoosa River are the Little Tallapoosa River and Sougahatchee, South Sandy, Crooked, Uphapee and Hillabee Creeks. The APC operates three additional hydropower projects on the Tallapoosa River; Martin, Yates and Thurlow Dams, all of which are located below R. L. Harris Dam.

Table 4-1. River Mile and Drainage Area for Selected Sites in ACT Basin

River Mile and Drainage Area for Important Sites in the ACT Basin				
River Mile above mouth of Mobile River	**River**	**Location**	**Drainage Area (sq mi)**	**Owner**
693	Etowah	Allatoona Dam	1,122	CORPS
645.2	Etowah	Mouth	1,860	
672	Coosawattee	Carters Dam	374	CORPS
645.2	Oostanaula	Mouth	2,200	
638.1	Coosa	Mayos Bar	4,040	
585.1	Coosa	Weiss Dam	5,273	APC
506.2	Coosa	H Neely Henry Dam	6,600	APC
457.4	Coosa	Logan Martin Dam	7,700	APC
410.2	Coosa	Lay Dam	9,087	APC
396.2	Coosa	Mitchell Dam	9,830	APC
378.3	Coosa	Jordan Dam	10,165	APC
497.4	Tallapoosa	R. L. Harris	1,453	APC
420	Tallapoosa	Martin Dam	3,000	APC
412.1	Tallapoosa	Yates Dam	3,250	APC
409.1	Tallapoosa	Thurlow Dam	3,325	APC
281.2	Alabama	Robert F Henry Dam*	16,233	CORPS
178	Alabama	Millers Ferry Dam*	20,637	CORPS
117.5	Alabama	Claiborne Dam*	21,473	CORPS
* Navigation Lock at Project				
CORPS - Corps of Engineers; APC - Alabama Power Company				

4-02. Topography. The R. L. Harris Project is located in the Piedmont Upland physiographic province of the southern Appalachian Mountains (see Figure 4-1). The Piedmont Upland ecoregion is characterized by low, rolling hills in the north and broad rolling uplands in the south. Land surface altitudes range from 500 to 1,000 feet. Like the Blue Ridge, the Piedmont Upland is underlain by impervious metamorphic and igneous crystalline rocks. The regolith, composed of soils and saprolite, can be 10 to 150 feet depending on the differential weathering of the crystalline rocks. Groundwater is stored in the regolith and enters the crystalline rocks at fault zones. The ecoregion has a dissected upland with rounded interstream valleys with typically dendritic streams. The streams in the Piedmont Upland are fast flowing and are characterized by rapids and riffles, making them ideal for hydropower development.

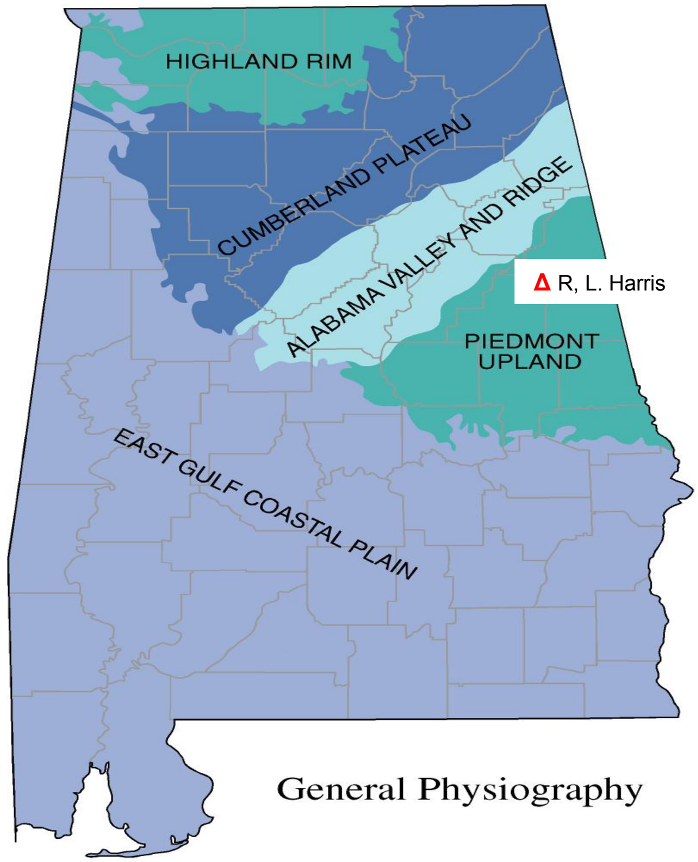

Figure 4-1. Topographic Regions in Alabama

The Piedmont Upland ecoregion is underlain by Precambrian and Paleozoic crystalline rocks, which include mica schist, felsic gneiss and schist, and granite and granite gneiss. Less extensive outcrops of quartzites are also present. The principal aquifers in the Piedmont Upland province are fracture-conduit aquifers in the bedrock, where water-bearing zones occur along geologic features such as lithologic contacts, joints, fractures, faults, folds, and veins.

4-03. Geology and Soils. Piedmont Upland soils are typically shallow and well drained, and water moves rapidly toward streams during precipitation events. The R. L. Harris Project area soils are dominantly Ultisols. 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 that is often acidic and low in plant nutrients. The surface has a low base status (a measure of fertility) due to high rainfall weathering that has occurred over long time periods and parent materials low in base forming minerals. Although Ultisols are not as fertile as many other soil orders they do support abundant forest growth and respond well to management for agriculture.

4-04. Sediment. Significant sources of sediment within the basin are agricultural land erosion, dredging and mining activities, unpaved roads, sliviculture, and variation in land uses that result in conversion of forests to lawns or pastures. In general, the quantity and size of sediment transported by rivers is influenced by the presence of dams. Impoundments behind dams serve as sediment traps where particles settle in the lake headwaters because of slower flows. Large impoundments typically trap coarser particles plus some of the silt and clay. Often releases from dams scour or erode the streambed downstream. Ultisols dominate the Piedmont Upland ecoregion. They generally lack the original topsoil because of erosion during intensive cotton farming beginning in the 18th century.

Siltation studies by APC have been limited to evaluating the recreational impact of siltation at the mouths of tributaries. Studies indicate that shoaling over the years is reduced because of increased vegetation in the basin. Siltation is the major impairment to meeting State water quality standards in the Tallapoosa River. Erosion studies indicate that sheet and rill erosion on cropland in Alabama fell by 17 percent from 1982 to 1997.

4-05. Climate. Chief factors that control the climate of the ACT Basin are its geographical position in the southern end of the temperate zone and its proximity to the Gulf of Mexico and South Atlantic Ocean. Another factor is the range in altitude from almost sea level at the southern end to higher than 3,000 feet in the Blue Ridge Mountains to the north. Frontal systems influence conditions throughout the year. During the warmer months, thunderstorms are a major producer of rainfall. Tropical disturbances and hurricanes also affect the region.

a. Temperature. The average annual temperature in the vicinity of the Harris watershed for the time period 1981-2010 is 61.9º F. Table 4-2 provides average, maximum and minimum monthly normal temperature data for six locations in or nearby the Harris watershed. Table 4-2 provides average maximum and minimum monthly normal temperature data for six locations in or around the project. Climatologists define a climatic normal as the arithmetic average of a climate element, such as temperature, over a prescribed 30-year time interval. The National Climatic Data Center (NCDC) uses a homogenous and complete dataset with no changes to the collection site or missing values to determine the 30-year normal values. When developing this 30-year normal dataset, the NCDC has standard methods available to them to make adjustments to the dataset for any inhomogeneities or missing data before computing normal values. Extreme temperatures recorded in the mid-ACT Basin range from 108º to -18º F. Both extremes occurred at Valley Head, Alabama. An interactive map showing the location of these stations and others is shown at: http://www.sercc.com/climateinfo/historical/historical.html.

Table 4-3 shows the extreme temperatures for four stations within the middle ACT Basin. The maximum and minimum recorded temperatures for each month are shown. These stations are Gadsden, Childersburg, and Valley Head in Alabama, and Calhoun Experiment Station in Georgia.

b. Precipitation. Due to the topographic lift of the Blue Ridge Mountains, the upland slopes are subject to intense local storms and to general storms of heavy rainfall lasting days. Heavy rains may occur at any time during the year, but are most frequent between late fall and mid-spring, when the majority of the large floods in the basin have been recorded. The large flood of March 1990 occurred when a storm front extended from Mobile, Alabama, to Montgomery, Alabama, to Rome, Georgia, and subtropical moisture was continuously drawn along the line producing an extended period of heavy rain. The normal monthly and annual precipitation in and around the Harris watershed is shown on Table 4-4. This is based on the arithmetical mean of the normals at six stations. These stations are the same as the temperature stations. About 40 percent of the normal annual precipitation occurs from January through April, while only about 30 percent occurs during the dry period August through November. The average annual snowfall is three to five inches, usually in January and February, but is of minor importance in producing runoff.

The maximum annual rainfall recorded in the mid-ACT Basin was 80.88 inches at Wadley, Alabama in 1975 while the lowest was 32.72 inches recorded at Carrollton, Georgia in 1954.

The maximum basin average rainfall of 73.22 inches occurred in 1975 while the minimum of 33.96 inches occurred in 1954.

Flood-producing storms can occur over the basin at any time, but they are much more frequent in the winter and early spring. Major storms in the winter are usually of the frontal type. Summer storms consist mainly of convective thundershowers with occasional tropical storms affecting southern sections of the basin.

1 **Table 4-2. Monthly Temperatures for Various Locations in Middle ACT Basin**

NORMAL MONTHLY TEMPERATURE (ºF) FOR MIDDLE ACT BASIN (MAX & MIN), 1981-2010														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
WEST POINT, GA	MAX	53.5	57.8	65.7	73.0	80.3	86.7	89.2	88.1	83.0	73.7	65.3	55.9	72.8
USC00099291	MIN	32.1	35.2	41.5	48.0	57.5	65.7	69.7	69.1	62.7	50.9	41.8	34.6	50.8
	AVE	42.8	46.5	53.6	60.5	68.9	76.2	79.4	78.6	72.9	62.3	53.5	45.3	61.8
CARROLLTON, GA	MAX	51.3	56.0	64.0	71.9	79.0	85.3	87.6	86.7	81.0	71.9	63.2	53.5	71.0
USC00091640	MIN	29.4	32.9	38.5	46.5	55.2	63.4	67.3	67.0	59.9	47.9	38.8	32.0	48.3
	AVE	40.4	44.4	51.2	59.2	67.1	74.4	77.4	76.9	70.4	59.9	51.0	42.7	59.7
BANKHEAD LOCK & DAM, AL	MAX	53.2	57.9	66.0	74.1	81.2	88.2	91.0	90.7	85.4	75.4	65.6	55.5	73.8
USC00010505	MIN	32.3	36.2	41.9	48.7	58.3	66.5	70.3	69.7	63.3	51.6	42.6	35.4	51.5
	AVE	42.8	47.0	54.0	61.4	69.8	77.4	80.6	80.2	74.3	63.5	54.1	45.4	62.6
TUSCALOOSA ACFD, AL	MAX	56.3	61.2	69.7	77.2	84.1	90.2	92.7	92.6	87.7	77.7	67.7	58.2	76.3
USC00018380	MIN	34.9	38.4	45.1	51.6	61.0	68.5	72.1	71.6	65.3	53.5	44.1	37.3	53.7
	AVE	45.6	49.8	57.4	64.4	72.5	79.3	82.4	82.1	76.5	65.6	55.9	47.8	65.0
CENTRE, AL	MAX	50.7	55.3	64.7	73.2	80.4	87.1	90.3	89.6	84.1	73.9	63.6	52.7	72.2
USC00011490	MIN	27.9	30.5	37.5	44.9	53.6	62.8	66.8	66.1	59.4	47.1	37.7	30.3	47.1
	AVE	39.3	42.9	51.1	59.1	67.0	75.0	78.6	77.9	71.8	60.5	50.7	41.5	59.7
BESSEMER 3 WSW, AL	MAX	53.6	58.4	66.7	74.6	81.5	88.0	90.9	90.8	85.3	75.1	65.2	55.7	73.9
USC00010764	MIN	32.9	36.1	42.3	49.3	59.1	66.2	70.1	69.3	62.9	51.6	42.2	35.2	51.5
	AVE	43.2	47.2	54.5	61.9	70.3	77.1	80.5	80.1	74.1	63.3	53.7	45.5	62.7
BASIN AVG	MAX	53.1	57.8	66.1	74.0	81.1	87.6	90.3	89.8	84.4	74.6	65.1	55.3	73.3
BASIN AVG	MIN	31.3	34.9	41.1	48.2	57.5	65.5	69.4	68.8	62.3	50.4	41.2	34.1	50.5
BASIN AVG	AVE	42.4	46.3	53.6	61.1	69.3	76.6	79.8	79.3	73.3	62.5	53.2	44.7	61.9

Table 4-3. Extreme Temperatures within Middle ACT Basin

Extreme Temperatures (ºF) Within Middle ACT Basin								
Month	Station:(013151) GADSDEN		Station:(011620) CHILDERSBURG WATER PLAN		Station:(018469) VALLEY HEAD		Station:(091474) CALHOUN EXPERIMENT STN	
	High	Low	High	Low	High	Low	High	Low
Period	1893 To 1968		1957 To 2009		1893 To 2009		1953 To 1997	
January	80	-4	81	-4	79	-15	76	-10
February	91	-13	85	4	80	-18	80	-7
March	93	6	89	7	90	2	86	4
April	94	24	93	23	92	19	91	22
May	101	34	97	33	100	29	97	33
June	108	44	102	41	104	35	103	40
July	108	50	105	51	106	45	105	50
August	106	49	104	49	105	45	104	47
September	108	34	100	34	104	29	102	32
October	99	25	93	22	98	19	95	20
November	87	4	88	14	90	-2	85	12
December	82	5	83	2	85	-8	77	-2

Table 4-4. Normal Rainfall (inches) Based on 30-Year Period – 1981 Through 2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
WEST POINT, GA USC00099291	4.45	4.82	5.36	3.94	3.12	3.96	4.98	3.77	3.36	3.03	4.48	4.81	50.08
CARROLLTON, GA USC00091640	4.65	5.20	5.25	3.92	4.08	3.78	4.88	3.43	3.62	3.55	4.55	4.48	51.39
BANKHEAD LOCK & DAM, AL USC00010505	5.99	5.68	5.69	4.58	4.67	5.07	5.57	4.05	4.01	4.15	5.17	5.21	59.84
TUSCALOOSA ACFD, AL USC00018380	5.37	5.61	4.84	4.32	4.14	4.50	5.10	3.76	3.56	3.80	5.21	4.74	54.95
CENTRE, AL USC00011490	5.21	5.26	5.26	4.27	4.34	4.34	4.74	4.41	3.73	3.39	4.48	4.67	54.10
BESSEMER 3 WSW, AL USC00010764	5.53	5.15	5.61	4.62	5.04	4.51	5.07	3.72	3.85	3.74	5.08	5.20	57.12
BASIN AVG	5.19	5.15	6.10	4.90	4.18	4.16	5.28	3.95	3.63	2.84	4.07	4.93	54.58

Extreme rainfall events for three stations within the middle ACT Basin are shown on Table 4-5. Gadsden and Valley Head, Alabama, and Rome, Georgia, are shown with the monthly maximum and minimum values. Also shown is the one-day maximum rainfall for each location.

Table 4-5. Extreme Rainfall Events (inches), Period of Record

	Station:(013151)			Station:(018469)			Station:(097600)		
	GADSDEN			VALLEY HEAD			ROME		
	Monthly Maximum	Monthly Minimum	1 Day Maximum	Monthly Maximum	Monthly Minimum	1 Day Maximum	Monthly Maximum	Monthly Minimum	1 Day Maximum
Period	1893 To 1968			1893 To 2009			1893 To 2009		
January	13.95	1.40	5.60	12.05	1.70	5.00	12.42	0.85	4.65
February	14.10	0.71	4.86	14.73	0.74	7.39	13.45	0.74	5.30
March	12.87	1.26	6.65	15.87	0.89	4.78	17.98	1.07	6.22
April	11.84	0.06	4.57	11.40	0.58	5.15	13.60	0.30	4.30
May	8.59	0.00	4.69	11.27	0.12	4.19	11.33	0.22	2.99
June	9.09	0.43	2.75	12.47	0.54	3.60	10.85	0.23	3.31
July	17.57	0.69	4.88	12.50	0.66	4.52	14.76	0.87	4.05
August	10.44	0.56	3.12	13.80	0.00	8.05	14.54	0.49	4.92
September	10.30	0.00	3.36	11.02	0.00	8.06	11.33	0.00	4.95
October	13.43	0.00	4.98	9.91	0.00	6.02	10.37	0.00	6.67
November	20.03	0.03	4.60	11.72	0.51	4.72	16.26	0.36	5.58
December	14.13	0.57	8.38	13.67	0.77	4.28	16.47	0.58	5.96

4-06. Storms and Floods. Flood producing storms may occur over the Tallapoosa Basin at anytime but are more frequent during the winter and spring. Major storms in the winter are usually of the frontal type, which persist for several days and cover large areas. Summer thunderstorms are typically non-frontal convective type events that are normally short and intense, and usually cover small areas. In addition, during the summer and fall, tropical weather systems occasionally pass through the area and can produce major rainfall events over a period of several days. Gage records for the “Tallapoosa River near Heflin” gage (USGS gage 02412000) near Heflin, Alabama, approximately 59 miles upstream of the dam, are available from July 1952 to the present. The USGS gage “Tallapoosa River at Wadley” (02414500), at Wadley, Alabama is approximately 14 miles below the R. L. Harris Dam. Daily flow data at Wadley is available from 1 October 1923 through the present. The gage is used in determination of minimum flow requirements in the Tallapoosa River. Flow hydrographs at Wadley are shown from 1923 to 2012 on Plates 4-1 to 4-9. Mean monthly and average flows at this site are also presented on Plates 4-10 and 4-11. The rating curve at the gage is shown on Plate 4-12. Inflow and discharge records from 1983 to December 2012 at R. L. Harris Dam are shown on Plates 4-13 to 4-16. The tailwater rating curve for Harris Dam is shown on Plate 4-17.

A major storm system in the spring of 1990 produced record floods on the Alabama River. On 16 March 1990, with the river still high from previous rains, the entire basin received very heavy rainfall for two days. The Rock Mills, Alabama gage reported 5.3 inches for the one-day total. A flow of 60,100 cfs was recorded at the USGS Wadley gage. The greatest one-day precipitation at Rock Mills of 7 inches was recorded in February 1961. Plate 4-18 shows the pool elevation, inflow, and discharge for the March 1990 flood.

After a summer with very little rain, heavy rains from Hurricane Opal brought flash flooding to parts of Alabama and the Tallapoosa basin. Hurricane Opal made landfall as a marginal Category 3 hurricane near Pensacola, FL on Oct 4, 1995 and moved inland resulting in rainfall totals from 5 to 10 inches over portions of the Florida panhandle, Alabama and Georgia. Plate 4-19 shows the pool elevation, inflow, and discharge for the October 1995 flood.

In 2003, a storm over the basin produced a one day rainfall total of 6.3 inches at the Rock Mills gage. The corresponding flow at Wadley was recorded at 103,000 cfs. The largest flood recorded at the dam since construction is the flood of 2003. Plate 4-20 shows the pool elevation, inflow, and discharge for the May 2003 flood.

4-07. Runoff Characteristics. In the ACT Basin, rainfall occurs throughout the year but is less abundant from August through November. Only a portion of rainfall actually runs into local streams to form the major rivers. Factors that determine the percent of rainfall entering streams include the intensity of the rain, antecedent conditions, ground cover and time of year (plants growing or dormant). Intense storms will have high runoff potential regardless of other conditions while a slow rain can produce little measurable runoff. The annual runoff in the vicinity of the dam is about 21 inches or about 38 percent of the annual rainfall. Runoff is usually high during the winter and spring and relatively low during the summer and early fall. Ice and snow are somewhat common but have little effect on runoff.

4-08. Water Quality. Alabama Department of Environmental Management (ADEM) has designated various portions of R. L. Harris Lake with 'use classifications' of *swimming and other whole body water-contact sports*, and *fish and wildlife*. The lake meets all designated water use criteria established by the state of Alabama. Various portions of the Tallapoosa River above the lake have designated 'use classifications' of *outstanding Alabama waters*, *public water supply*, and *fish and wildlife*. Georgia sections of the Tallapoosa River and Little Tallapoosa River have been designated 'use classifications' of *drinking water* and *secondary trout waters* by the Georgia Environmental Protection Division. Tallapoosa River below R. L. Harris Dam has been designated 'use classification' of *fish and wildlife*, in accordance with Alabama Water Quality Control laws. Both Alabama and Georgia have promulgated water quality criteria with specific criteria related to the use classifications.

Total maximum daily loads (TMDLs) have been identified for various portions of the Tallapoosa and Little Tallapoosa Rivers. In the Alabama portion of the rivers, TMDLs for pathogens and siltation have been proposed. In Georgia, TMDLs have been finalized for fecal coliforms, and sedimentation for sections of the Tallapoosa and Little Tallapoosa Rivers. Several of the most important water quality parameters are discussed below.

a. <u>Dissolved Oxygen</u>: Alabama's water quality criteria regulations (ADEM Admin. Code R. 335-6-10-.09) states the following for segments designated with use classifications of Swimming, Fish and Wildlife and Public Water Supply:

> *For a diversified warm water biota, including game fish, daily dissolved oxygen concentrations shall not be less than 5.0 milligrams per liter (mg/l) at all times; except under extreme conditions due to natural causes, it may range between 5.0 mg/l and 4 mg/l, provided that the water quality is favorable in all other parameters. The normal seasonal and daily fluctuations shall be maintained above these levels. In no event shall the dissolved oxygen level be less than 4 mg/l due to discharges from existing hydroelectric generation impoundments. All new hydroelectric generation impoundments, including addition of new hydroelectric generation units to existing impoundments, shall be designed so that the discharge will contain at least 5.0 mg/l dissolved oxygen where practicable and technologically possible. The Environmental Protection Agency, in cooperation with the State of Alabama and parties responsible for impoundments, shall develop a program to improve the design of existing facilities.*

The dissolved oxygen criterion is established at a depth of 5 feet in water 10 feet or greater in depth; for those waters less than 10 feet in depth, the dissolved oxygen criterion is applied at mid-depth. Levels of organic materials may not deplete the daily dissolved oxygen concentration below this level, nor may nutrient loads result in algal growth and decay that violates the dissolved oxygen criterion.

For segments classified as *outstanding Alabama water*, the dissolved oxygen standard is at least 5.5 mg/l at all times with no less than 4 mg/l under extreme conditions from natural causes.

The Georgia dissolved oxygen standard for waters classified as *drinking water* is a daily average greater or equal to 5 mg/l and no less than 4 mg/l at all times. For waters classified as *secondary trout waters*, the dissolved oxygen standard is a daily average greater or equal to 6 mg/l and no less than 5 mg/l at all times.

In-lake water quality data collected by Alabama Department of Environmental Management (ADEM) and the Lake Wedowee Property Owners Association (Lake Wedowee is a local name for R. L. Harris Lake) indicate near saturated levels of dissolved oxygen in the epilimnion (upper portion of the water column) and reduced or near anoxic dissolved oxygen levels in the hypolimnion (lower portion of the water column) in the summertime. This is due to thermal stratification which occurs in relatively deep, lakes in the southeast during the summertime and is described further in paragraph 4.08.c. below. In the wintertime, the lake is completely mixed vertically (destratified) and high levels of dissolved oxygen occur throughout the water column.

b. Nutrients: R. L. Harris Lake is currently classified as mesotrophic, which indicates an intermediate level of productivity, greater than oligotrophic lakes, but less than eutrophic lakes. A mesotrophic lake is commonly clear with beds of submerged aquatic plants and medium levels of nutrients. R. L. Harris Lake was classified as eutrophic in the mid 1990's and early 2000's, but since 2005, nutrients and chlorophyll *a* levels have dropped to mesotrophic levels.

In 2001, ADEM established a lake nutrient standard (measured by concentration levels of chlorophyll *a,* a surrogate measure of algal biomass) for R. L. Harris Lake during the growing season (April – October) of an average of less than 10 micrograms per liter (µg/l) of chlorophyll *a* or an average of less than 12 ug/l if measured immediately upstream of the Tallapoosa River, Little Tallapoosa River confluence.

c. Lake Stratification. During the colder winter months, the water in R. L. Harris Lake is generally cold, relatively clear, and the same temperature from the top to the bottom. Water on the top and bottom of the reservoir has similar densities. Wind action keeps the lake well mixed, resulting in adequate dissolved oxygen levels throughout the water column. During winter-time, water temperature and oxygen concentrations do not limit fish movement in the lake. Lake water, which is released through the hydropower units from near the bottom of the lake into the Tallapoosa River below the dam, is cold, oxygenated, and relatively clear.

During spring and early summer, the lake warms and stratifies into three distinct layers: a surface layer called the epilimnion, a bottom layer called the hypolimnion, and a transition layer between the two called the metalimnion, or the thermocline. Figure 4-2 shows the summer stratification layers.

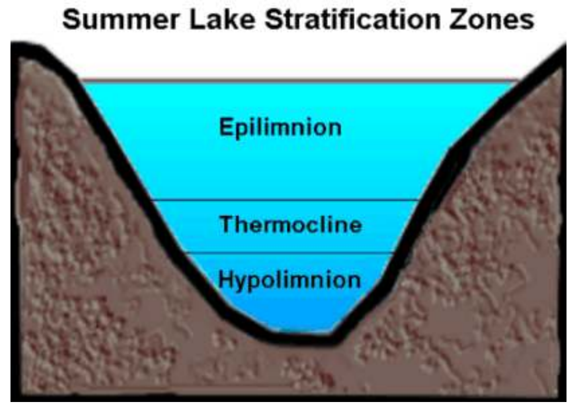

Figure 4-2. Lake stratification

The warm, upper layer is fairly uniform in temperature and varies from 15 to 30 feet thick throughout the summer. It is well oxygenated from wind action and photosynthesis.

The hypolimnion, the cold (45 to 55 °F) bottom layer, becomes isolated and no longer mixes with the warm, oxygenated epilimnion. Oxygen is not produced in the hypolimnion because the cold, deep layer does not receive sunlight and is devoid of phytoplankton production. Early in the lake stratification process, the hypolimnion still contains some oxygen but declines through the summer as biological and chemical processes consume oxygen. By summer's end, the lake is strongly stratified. The epilimnion is warm and well oxygenated. Water temperature and oxygen concentrations in the thermocline are both lower but still often provide acceptable habitat for cool-water fish species. In the hypolimnion, the water is cold and low in oxygen (less than 3 mg/l). As oxygen levels fall, some metals and sulfides in the lake sediments become soluble. They dissolve in the water and can be released downstream, entering the river. The river water becomes re-aerated rapidly as it flows downstream, thus releasing the metals and sulfides that have become soluble.

In the fall, the lake begins to lose heat, and the process of destratification begins. The warm water of the epilimnion cools and becomes deeper and denser. As the epilimnion's density approaches the density of the hypolimnion, mixing of the layers occurs and the stratification is broken. This event is called *lake turnover*, and generally occurs around November - December each year. After mixing, no layers exist, and the entire lake has a relatively uniform temperature and oxygen levels.

d. Downstream Water Quality Conditions. Water quality conditions in the releases from R. L. Harris Dam are typical for hydropower projects in the southeast; i.e., cold water year-round with low dissolved oxygen levels during summer-time lake stratification periods and high dissolved oxygen levels during winter-time lake destratification periods. Turbidity is relatively low year-round. The potential for sediment release of solubilized metals occurs during lake stratification periods when the hypolimnion reaches anoxic conditions. The water use classification established by the State of Alabama for the Tallapoosa River below R. L. Harris Dam is *fish and wildlife*, with corresponding water quality standards as described in Paragraph 4-08.a.

4-09. Channel and Floodway Characteristics. There are no major damage centers between R. L .Harris and Martin Dam downstream. Flooding during a potential dam failure is addressed in Chapter 9.

4-10. Upstream Structures. There are no federal or APC projects located on the Tallapoosa River above the R. L. Harris Dam and Lake Project.

4-11. Downstream Structures. The APC projects downstream of the R. L. Harris Project include Martin, Yates, and Thurlow Dams. Below those, on the Alabama River, are three federal projects, Robert F. Henry, Millers Ferry, and Claiborne Locks and Dams. Locations of these projects are shown on Plates 2-1 and 2-2.

The existing upstream and downstream Federal and APC projects and the drainage areas above them are shown on Table 4-6 below.

Table 4-6. Federal and APC Projects on the ACT

Agency	Alabama River Projects	Drainage Area (sq mi)
CORPS	Claiborne	21,473
CORPS	Millers Ferry	20,637
CORPS	R.F. Henry	16,233
	Coosa River Projects	
APC	Jordan/Bouldin*	10,165
APC	Mitchell	9,830
APC	Lay	9,087
APC	Logan Martin	7,700
APC	Henry	6,600
APC	Weiss	5,273
CORPS	Allatoona	1,122
CORPS	Carters	374
	Tallapoosa Projects	
APC	Thurlow	3,325
APC	Yates	3,250
APC	Martin	3,000
APC	Harris	1,453

* Jordan and Bouldin Dams share the same drainage area and reservoir

V - DATA COLLECTION AND COMMUNICATION NETWORKS

5-01. Hydrometeorological Stations. Management of water resources requires continuous, real-time knowledge of hydrologic conditions. Both the APC and the Corps collect and maintain records of hydrologic data and other information in connection with the operation of projects in the Coosa River Basin. Data collected by the APC and the Corps are used for project operations and monitoring flood risk management operations. It is therefore important for each agency to furnish the other with hydrologic and operating data as may be needed or found beneficial in its operation. This requires that communications facilities be available between the Mobile District Office (MDO) of the Corps and Reservoir Management. The U.S. Geological Survey (USGS) and National Weather Service (NWS), in cooperation with the APC, the Corps, and other federal and state agencies, maintain a network of real-time gaging stations throughout the ACT Basin.

a. Facilities APC's Hydrologic Data Acquisition System (HDAS) is a combination of over 100 rain, stage, and evaporation gages located in the river basins where APC dams and reservoirs are located. The largest majority of these gages are owned and operated by APC. APC also utilizes data from relevant USGS gages. The rainfall gages and river gages are equipped with data collecting platforms that store data on site and transmit to orbiting satellites. The stations continuously collect various types of data including stage, flow, and precipitation. All the rainfall, reservoir, and river stage reporting gages regularly used by the Corps and APC in the ACT Basin, including the Tallapoosa River Basin above R. L. Harris Dam, are shown on Plate 5-1. Figure 5-1 shows a typical encoder with wheel tape housed in a stilling well used for measuring river stage or lake elevation. Figure 5-2 shows a typical precipitation station, with rain gage, solar panel, and Geostationary Operational Environmental Satellite (GOES) antenna for transmission of data.

Figure 5-1. Encoder with wheel tape for measuring the river stage or lake elevation in the stilling well

Figure 5-2. Typical field installation of a precipitation gage

All rainfall gages equipped as data collecting platforms are capable of being part of the reporting network. Data are available from many stations in and adjacent to the ACT Basin. For operation of the R. L. Harris Project, APC operates the HDAS that delivers real time rainfall and river stage data through SouthernLINC packet data radios and dedicated network connections. The rainfall stations APC uses to operate the facility are listed in Table 5-1. The sites in the vicinity of R. L. Harris are shown on Plate 5-1, along with other gage locations.

Table 5-1. Rainfall Reporting Network for the Tallapoosa Basin above R. L. Harris Dam

Rainfall Reporting Network	
River Basin	**Station**
Little Tallapoosa	Villa Rica, GA
Little Tallapoosa	Carrollton, GA
Tallapoosa	Bremen, GA
Tallapoosa	Heflin, AL
Little Tallapoosa	Newell, AL
Tallapoosa	Harris Dam, AL

All river stage gages equipped as data collecting platforms are also capable of being part of the reporting network. Data are available from many stations in and adjacent to the ACT Basin. The river stage reporting network gages used for operation of the R. L. Harris Dam are shown in the Table 5-2 below. The locations of river stage stations are shown on Plate 5-1.

Table 5-2. River Stage Reporting Network for R. L. Harris Dam

River Reporting Network			
River	**Station**	**River Miles above Mouth**	**Drainage Area (sq miles)**
Tallapoosa	Heflin, AL	186.8	448
Little Tallapoosa	Newell, AL		406

Data are collected at sites throughout the ACT Basin through a variety of sources and integrated into one verified and validated central database. The basis for automated data collection at a gage location is the Data Collection Platform. The Data Collection Platform is a computer microprocessor at the gage site. A Data Collection Platform has the capability to interrogate sensors at regular intervals to obtain real-time information (e.g., river stage, reservoir elevation, water and air temperature, precipitation). The Data Collection Platform then saves the information, performs simple analysis of it, and then transmits the information to a fixed geostationary satellite. Data Collection Platforms transmit real-time data at regular intervals to the GOES System operated by the National Oceanic and Atmospheric Administration (NOAA). The GOES Satellite's Data Collection System sends the data directly down to the NOAA Satellite and Information Service in Wallops Island, Virginia. The data are then rebroadcast over a domestic communications satellite (DOMSAT). The Mobile District Water Management Section operates and maintains a Local Readout Ground System (LRGS) that collects the DCP-transmitted, real-time data from the DOMSAT. Figure 5-3 depicts a typical schematic of how the system operates.

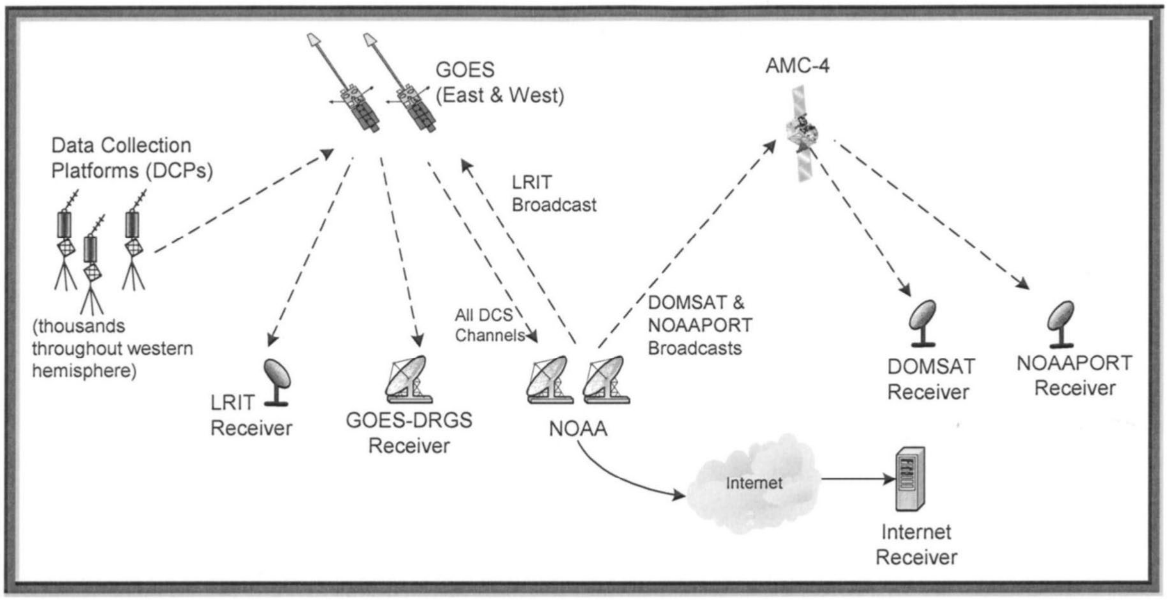

Figure 5-3. Typical configuration of the GOES System

b. Reporting. Central to APC hydro operations, monitoring, and reporting network is the Hydro Optimization Management System (HOMS), which is a complex and dynamic system of data collection, analysis and management tools, and an arrangement of hydrologic and flow monitoring systems and tools.

The Corps operates and maintains a Water Control Data System (WCDS) for the Mobile District that integrates large volumes of hydrometeorological and project data so the basin can be regulated to meet the operational objectives of the system. The WCDS, in combination with the new Corps Water Management System (CWMS), together automate and integrate data acquisition, data management, and data dissemination.

c. Maintenance. Maintenance of data reporting equipment in the Tallapoosa River Basin near R. L. Harris Dam is a cooperative effort among the USGS, NWS, Corps, and APC.

If gages appear to be out of service, the following agencies can be contacted for repair:

USGS Georgia Water Science Center, 3039 Amwiler Road, Suite 130, Atlanta, GA 30022-5803
Phone: (770) 903-9100 Web: http://ga.water.usgs.gov

USGS Alabama Water Science Center, 75 Technacenter Drive, Montgomery, AL 36117
Phone: (334) 395-4120 Web: http://al.water.usgs.gov

NWS Southern Region, 819 Taylor Street, Room 10E09, Fort Worth, TX 76102
Phone: (817) 978-1100 Web: http://www.srh.noaa.gov/

U.S. Army Corps of Engineers, Mobile District, 109 Saint Joseph Street, Mobile, AL 36602-3630
Phone: (251) 690-2730 Web: http://www.sam.usace.army.mil/water/

5-02. Water Quality Stations. Water quality measurements are made at 14 USGS gaging stations within the Alabama River Basin. The data for these stations can be obtained from the USGS yearly publication, *Water Resources Data Alabama* and *Water Resources Data Georgia.*

5-03. Recording Hydrologic Data. The Water Control Data Support System (WCDSS) is an integrated system of computer hardware and software packages readily usable by water managers and operators as an aid for making and implementing decisions. An effective decision support system requires efficient data input, storage, retrieval, and capable information processing. Corps-wide standard software and database structure are used for real-time water control. For the ACT River Basin, this database includes data from various river gage locations and rainfall locations as well as data relative to the water control operations at the R. L. Harris Project. Time series hydrometeorological data are stored and retrieved using Hydrologic Engineering Center (HEC) Data Storage System (DSS) databases and programs.

To provide the data needed to support proper analysis, a DOMSAT Receive Station (DRS) is used to retrieve Data Collection Platform data from gages throughout the ACT Basin. The DRS equipment and software then receives the DOMSAT data stream, decodes the Data Collection Platforms of interest and reformats the data for direct ingest into a HEC-DSS database.

Most reservoir data are transmitted in hourly increments for inclusion in daily log sheets that are retained indefinitely. Gage data are transmitted in increments of 15 minutes, one hour, or other intervals. Reservoir data are examined and recorded in water control models every morning (or other times when needed). The data are automatically transferred to forecast models.

Automated timed processes also provide provisional real-time data needed for support of real-time operational decisions. Interagency data exchange has been implemented with the USGS and NWS Southeast River Forecast Center (SERFC). A direct link to SERFC is maintained to provide real-time products generated by NWS offices. Information includes weather and flood forecasts and warnings, tropical storm information, NEXRAD radar rainfall, graphical weather maps and more. Likewise, a direct link to USGS gages in the field allows for direct downloading of USGS data to Corps databases.

5-04. Communications

a. Regulating Office With Project Office. Direct communication between the APC and R. L. Harris Dam is provided by the company's SouthernLINC network telephone and email. The power plant at R. L. Harris Dam is operated by remote control from the Alabama Control Center located in Birmingham, Alabama. Personnel are available but not always on duty at the dam.

b. Between Project Office and Others. The Water Management Section communicates daily with the NWS and APC's Reservoir Management section to exchange data and forecasting information. Data exchange is normally accomplished by electronic transmission to the Mobile District server and is supplemented by telephone and facsimile when necessary. The Water Management Section also has a computer link with the NWS's AWIPS (Advanced Weather Interactive Processing System) communication system via the River Forecast Center in Atlanta, Georgia. The Water Management Section uses a telephone auto-answer recorded message to provide daily information to the public. Water resources information for the R. L. Harris Project is available to the public at the Corps' website, http://www.sam.usace.army.mil/water/. The site contains real-time information, historical data and general information. Information for the R. L. Harris Lake is also provided by the APC at https://lakes.alabamapower.com.

Emergency communication for the Corps and APC personnel during non-duty hours is available at the numbers found on the emergency contact information list located in Exhibit E.

The United States Geological Survey operates numerous stage and rain gages in the Tallapoosa River basin near Harris Dam which are funded by both the Corps and APC. These measurements are reported through the GOES system and are available to both APC and the Corps on the USGS web site.

APC operates the Hydrologic Data Acquisition System that delivers real time rain and stage data through Southern Linc packet data radios and dedicated network connections.

5-05. Project Reporting Instructions. Communications for exchange of data between the Corps Water Management Section and APC's Reservoir Management and ACC Hydro Desk will normally be accomplished by electronic transmission to the Corps' WCDS server. In addition to automated data, project operators maintain record logs of gate position, water elevation, and other relevant hydrological information including inflow and discharge. This information is stored by the APC and the Corps Water Management Section. Unforeseen or emergency conditions at the project that require unscheduled manipulations of the reservoir should be reported to the Corps Water Management Section as soon as possible.

If the automatic data collection and transfer are not working, projects are required to fax or email daily or hourly project data to the Water Management Section. Water Management staff will manually input the information into the database.

5-06. Warnings. During floods, dangerous flow conditions, or other emergencies, the proper authorities and the public must be informed. In general, flood warnings are coupled with river forecasting. The NWS has the legal responsibility for issuing flood forecast to the public, and that agency will have the lead role for disseminating the information. For emergencies involving the R. L. Harris Project, the operator on duty should notify the Alabama Control Center who will in turn, notify the Corps Water Management Section. A coordinated effort between APC and the Corps will insure proper notifications to local law enforcement, government officials and emergency management agencies are made in a timely manner.

5-07. Role of Regulating Office. Regulating authority for the R. L. Harris Project is shared between APC, FERC, and the Corps in accordance with the MOU that was adopted by APC and the Corps prior to the completion of the project. The purpose of the MOU is to clarify the responsibilities of the two agencies with regard to the operation of the project for flood risk management and navigation support and to provide direction for the orderly exchange of hydrologic data. The Water Management Section of the MDO is responsible for developing operating procedures for flood conditions and to prepare water control manuals, such as this one, that describe water management regulation for flood risk management and navigation support at the project. These water control manuals are regularly reviewed and updated as needed.

VI - HYDROLOGIC FORECASTS

6-01. General. Obtaining forecasts for the operation of the R. L. Harris Dam is the responsibility of the APC. The APC, the NWS, and the Corps exchange data daily to provide quality forecasts on inflows, headwater elevations, tailwater elevations and river stages.

a. Role of the Corps. The Corps Water Management Section obtains flow estimates for the APC projects on a daily basis. Sub-daily updates are obtained as necessary. The Water Management Section considers these inflows, local flows, current pool levels, and discharge requirements in scheduling releases from downstream federal projects on the Alabama River. The Water Management Section maintains records of precipitation, river stages, reservoir elevations and general stream-flow conditions throughout the Mobile District, with special emphasis on the areas affecting or affected by reservoir operation. The Water Management Section performs the following duties in connection with the operation of the R. L. Harris Project:

(1) Maintains liaison with personnel of APC Reservoir Management for the daily exchange of hydrologic data.

(2) Maintains records of rainfall and river stages for the Coosa River Basin, and records of pool level and outflow at R. L. Harris Dam and other impoundments in the basin.

(3) Monitors operation of the power plant and spillway at R. L. Harris Dam for compliance with the regulation schedule for flood control operation.

(4) Transmits to APC Reservoir Management any instructions for special operations which may be required due to unusual flood conditions. (Except in emergencies where time does not permit, these instructions will first be cleared with the Chief of Engineering Division.)

The Water Management Section maintains close liaison with the NWS's River Forecast Center in Peachtree City, Georgia, and their Birmingham, Alabama, offices at all times to receive forecast and other data as needed. A mutual exchange of information increases the forecasting capability of the NWS at NWS river stations which may be affected by operations at Corps projects.

b. Role of Alabama Power Company. The flood control regulation schedule that has been adopted is based on current reservoir level and inflows or forecasts of inflow. The APC has developed a computer model of the river system that utilizes rainfall and river gage stations located strategically throughout the basin. The model has the capability of forecasting inflow and the effects of discharge in accordance to flood control regulations on the reservoir as well as downstream locations. The model is used to assist in accomplishing the intent of the regulation plan and in the day-to-day operation. The APC is continually evaluating the results, and as experience is gained, improvements will be incorporated into the model.

c. Role of Other Agencies. The NWS is responsible for preparing and publicly disseminating forecasts relating to precipitation, temperatures, and other meteorological elements related to weather and weather-related forecasting in the ACT Basin. For the Tallapoosa River Basin, forecasts are prepared by the NWS Southeast River Forecast Center (SERFC) located in Peachtree City, Georgia, and are issued through their office in Birmingham, Alabama. The Water Management Section uses the NWS as a key source of information for weather forecasts. The meteorological forecasting provided by the NWS is considered critical to the Corps' water resources management mission. The 24- and 48-hour Quantitative Precipitation Forecasts (QPFs) are invaluable in providing guidance for basin release determinations. Using precipitation forecasts and subsequent runoff directly relates to project release decisions.

(1) The NWS is the federal agency responsible for preparing and issuing streamflow and river-stage forecasts for public dissemination. The SERFC routinely prepares and distributes five-day streamflow and river-stage forecasts at key gaging stations along the Alabama, Coosa, and Tallapoosa Rivers. Streamflow forecasts are available at additional forecast points during periods above normal rainfall. In addition, SERFC provides a revised regional QPF on the basis of local expertise beyond the NWS Hydrologic Prediction Center QPF. SERFC also provides the Water Management Section with flow forecasts for selected locations on request.

(2) The Corps and SERFC have a cyclical procedure for providing forecast data between federal agencies. As soon as reservoir release decisions have been planned and scheduled for the proceeding days, the release decision data are sent to SERFC. Taking release decision data, coupled with local inflow forecasts at forecast points along the ACT, SERFC can provide inflow forecasts into Corps and APC projects. Having revised inflow forecasts from SERFC, the Corps and APC have up-to-date forecast data to make the following days' release decisions.

6-02. Flood Condition Forecasts. During flood conditions, forecasts are made for two conditions; rainfall that has already fallen, and for potential rainfall (or expected rainfall). Decisions can be made on the basis of known events and *what if* scenarios. The Water Management Section prepares forecasts and receives the official forecasts from SERFC.

a. Requirements. Accurate flood forecasting requires a knowledge of antecedent conditions, rainfall and runoff that has occurred, and tables or unit hydrographs to apply the runoff to existing flow conditions. Predictive QPF data are needed for what if scenario.

b. Methods. The Corps provides a link to the NWS website so that the Water Management Section, the affected county emergency management officials, and the public can obtain this vital information in a timely fashion. When hydrologic conditions exist so that all or portions of the ACT Basin are considered to be flooding, existing Corps streamflow and short and long-range forecasting runoff models are run on a more frequent, as-needed basis. Experience demonstrates that the sooner a significant flood event can be recognized and the appropriate release of flows scheduled, an improvement in overall flood control can be achieved. Stored storm water that has accumulated from significant rainfall events must be evacuated following the event and as downstream conditions permit to provide effective flood risk management. Flood risk management carries the highest priority during significant runoff events that pose a threat to human health and safety. The accumulation and evacuation of storage for the authorized purpose of flood risk management is accomplished in a manner that will prevent, insofar as possible, flows exceeding those which will cause flood damage downstream. During periods of significant basin flooding, the frequency of contacts between the Water Management Section and SERFC staff are increased to allow a complete interchange of available data upon which the most reliable forecasts and subsequent project regulation can be based. Table 6-1 provides SERFC forecast locations in the Alabama River Basin.

Table 6-1. SERFC Forecast Locations for the Alabama River Basin

Daily Stage/Elevation Forecasts				
	Station	**Station ID**	**Critical Stage**	**Flood Stage**
	Montgomery	MGMA1	26	35
	R. F. Henry TW	TYLA1		122
	Millers Ferry TW	MRFA1		66
	Claiborne TW	CLBA1	35	42
Daily 24-hour Inflow in 1000 SFD Forecast				
Reservoir		**Station ID**		
R. F. Henry		TYLA1		
Millers Ferry		MRFA1		
Additional Stage Forecasts Only for Significant Rises				
River/Creek	**Station**	**Station ID**	**Critical Stage**	**Flood Stage**
Coosa	Weiss Dam	CREA1		564
Coosa	Gadsden	GAPA1		511
Coosa	Logan Martin Dam	CCSA1		465
Coosa	Childersburg	CHLA1		402
Coosa	Wetumpka	WETA1	40	45
Tallapoosa	Wadley	WDLA1		13
Tallapoosa	Milstead	MILA1	15	40
Tallapoosa	Tallapoosa Wt Pit	MGYA1	15	25
Catoma Creek	Montgomery	CATA1	16	20
Alabama	Selma	SELA1	30	45
Cahaba	Cahaba Hts	CHGA1		14
Cahaba	Centreville	CKLA1	20	23
Cahaba	Suttle	SUTA1	28	32
Cahaba	Marion Junction	MNJA1	15	36

VII - WATER CONTROL PLAN

7-01. General Objectives. The R. L. Harris Project will normally operate to produce peaking hydropower. During periods of low streamflow, the 207,000 acre-feet of storage within the 793 to 768 feet NGVD29 range of power-pool drawdown will be used to augment the flow of the river downstream as well as produce hydroelectric energy. The power guide curve, which is a firm division between normal hydropower production and flood control operation, varies seasonally and provides a maximum storage of about 100,000 acre-feet for flood control. When the reservoir is above the guide curve or is predicted to be above the guide curve in the near future, releases will be made in accordance to the prescribed operating plans for flood control. Reservoir regulation during major storms may require special consideration and the operation may deviate from these schedules with the approval of the Corps.

7-02. Constraints. APC releases water from the R. L. Harris Project in conjunction with other reservoirs to provide a weekly volume of flow to the Alabama River for navigation and environmental purposes.

7-03. Overall Plan for Water Control

a. General Regulation. The water control operations of R. L. Harris Dam are in accordance with the regulation schedule as outlined in the following paragraphs. Any deviation from the prescribed instructions during flood operations will be at the direction of the Water Management Section Mobile District, Corps of Engineers. Deviations during normal operations will be coordinated with the Alabama Control Center.

b. Basin Above R. L. Harris Project. There are no federal or APC projects located above the R. L. Harris Dam and Lake Project. The annual runoff from the 1,453 square-mile drainage area above the dam of about 21 inches or about 38 percent of the annual rainfall is controlled by the R. L. Harris Project to the maximum extent possible within its storage capability. Runoff is usually high during the winter and spring and relatively low during the summer and early fall.

7-04. Flood Risk Management. A summary of the basic regulation schedule for flood risk management procedures is provided in the table on Plate 7-3. This schedule provides detailed instructions to be used by the operating personnel of APC to carry out the operation of the project during floods. During floods, the project will operate to pass the inflow up to approximately 13,000 cfs by releasing water through the powerhouse to maintain the reservoir near the power guide curve. If the reservoir rises above the power guide curve or is predicted to in the near future but below elevation 790 feet NGVD29, the project will operate to discharge 13,000 cfs or an amount that will not cause the USGS river gage at Wadley, Alabama to exceed 13.0 feet, unless greater discharge amounts are required by the induced surcharge curves. When R. L. Harris Lake level rises above elevation 790 feet NGVD29 or is predicted to in the near future, the powerhouse discharge will be increased to the larger of approximately 16,000 cfs or the amount indicated by the induced surcharge curves, Plate 7-4. Once the lake level begins to fall, all spillway gate openings and the powerhouse discharge will be maintained at those settings until the lake level returns to the power guide curve as shown on Plate 7-1. If a second flood enters the lake prior to the complete evacuation of the stored flood waters, the release will be as directed by the induced surcharge curve or the flood control operating instructions described in section 7-05 below.

7-05. Alternative Flood Control Operation. APC has developed a real time computer model and data collection network for the basin above R. L. Harris Dam. The model has the capabilities of incorporating data from rainfall, both actual and predicted QPF, and river stations at upstream control gages and based on that data, prepares inflow forecasts for periods of up to 144 hours. The model then uses the forecasted inflow values to compute the anticipated storage requirements for the current rate of discharge. If it is determined that the anticipated storage requirement will exceed the available storage, the discharge is increased until the required storage and the available storage match. This balancing of storage has the same objective as the traditional induced surcharge method which is to reduce downstream flooding as much as reasonably possible while protecting the safety of the dam.

The flood risk management operation at the R. L. Harris Project may be in accordance with either of the plans identified in Paragraphs 7-04 or 7-05 and may be used interchangeably. However, if the alternative plan as described in Paragraph 7-05 is used, producing discharge rates in excess of those indicated in the induced surcharge schedule for a period of three consecutive hours and additional increases are indicated that will cause the USGS gage at Wadley, Alabama to exceed 13 feet, the operator will contact the Water Management Section of the Corps before increasing the release rate. If the operator is unable to contact the Water Management Section, the current discharge rate will be maintained until releases in excess of that amount are required by the induced surcharge schedule.

The flood risk management operating plans described above are designed to provide optimum benefits for the limited storage available in the project. However, in the event of a major storm over the basin, the APC and the District Commander will collaborate in the prompt analysis of all available information. Temporary modification in flood risk management regulations that will provide the most effective utilization of the flood risk management capacities at the project may be employed after receiving approval from the South Atlantic Division Office by telephone or electronic mail.

7-06. Correlation with Other Projects. R. L. Harris Dam is the farthest upstream of a series of four APC dams on the Tallapoosa River. Those dams; Harris, Martin, Yates, and Thurlow, utilize a large portion of the available head of the Tallapoosa River in Alabama. The three dams below R. L. Harris Dam provide a continuous series of pools in the Tallapoosa River. R. L. Harris and Martin are the only storage projects, while Yates and Thurlow essentially operate as run-of-the-river projects passing the inflow as it enters each lake. Operation of the R. L. Harris project affects the operation of all the downstream projects especially Martin, the closest downstream project. The operation of Yates and Thurlow are directly dependent upon the operation at Martin and are scheduled in accordance with the discharge from that project. The flood risk management operation at R. L. Harris is designed to be completely independent from downstream operations. Following a flood, emptying of flood storage from R. L. Harris Lake may prolong the time required to evacuate the stored flood waters in Martin Lake. The Corps and APC have arranged for regular and rapid exchange of data which will permit the maximum benefit for downstream projects during flood risk management operations.

7-07. Spillway Gate Operating Schedule. The operation of the spillway gates will be in accordance with the gate opening schedule as shown on Plates 2-7 through 2-18. The operator will determine the appropriate discharge from the induced surcharge schedule and set the gates to the step that will produce a discharge as near as practical to that rate.

7-08. Minimum Flow Agreement. Flow in the Alabama River is largely controlled by APC impoundments on the Coosa and Tallapoosa Rivers. Pursuant to articles in the FERC licenses for these impoundments, a minimum discharge must be released to support navigation on the Alabama River. These flows are also significant as an environmental or water quality minimum flow. Under the terms of the previous negotiated agreement, APC projects would provide releases from the Jordan/Bouldin Project on the Coosa and Thurlow Project on the Tallapoosa River equal to a continuous minimum 7-day average flow of 4,640-cfs (32,480 dsf/7 days). This minimum flow target of 4,640 cfs was originally derived from the7Q10 flow at Claiborne Lake of 6,600 cfs. Those flows were established with the understanding that if APC provided 4,640 cfs, the Corps and intervening basin inflow would be able to provide the remaining water to meet 6,600 cfs at Claiborne Lake. However, as dry conditions continued in 2007, water managers realized that, if the basin inflows from rainfall were insufficient, the minimum flow target would not likely be achievable. Therefore, in coordination with APC, drought operations for the middle reaches of the ACT Basin have been revised and are described in detail in Exhibit D, *ACT River Basin Drought Contingency Plan*. The Drought Contingency Plan is summarized in Paragraph 7-13 of this manual. The revisions to the minimum low flow requirements are described in Table 7-5, ACT Drought Management Plan.

7-09. Recreation. Recreational activities are best served by maintaining a full conservation pool. Lake levels above top of conservation pool invade the camping and park sites. When the lake recedes several feet below the top of conservation pool, access to the water and beaches becomes limited. Water management personnel are aware of recreational effects caused by reservoir fluctuations and attempt to maintain reasonable lake levels, especially during the peak recreational use periods, but there are no specific requirements relative to maintaining recreational levels. Other project functions usually determine releases from the dam and the resulting lake levels.

7-10. Water Quality. Water Quality Criteria established by the State of Alabama applicable to the R. L. Harris Project requires that the dissolved oxygen in the discharge from the project shall not be less than 5.0 mg/L. The APC has incorporated several design and operational features into the project in recognition of this criterion. Each hydroelectric turbine has been designed with a turbine aeration system to augment the discharged dissolved oxygen levels. This aeration system is designed to naturally aspirate air below the turbine wheel. A movable skimmer weir near the face of the dam can also be used during summer-time thermal stratification periods to make selective withdrawal from the upper layers of the lake where dissolved oxygen levels are higher. In addition, the APC is required to maintain a minimum continuous flow of 45 cfs downstream of R. L. Harris Dam at Wadley, Alabama. When conditions cause the USGS stream gage at Wadley, Alabama to approach a flow of 45 cfs, releases from the dam will be made so that flows do not fall below that amount. These flows are made in the interest of protecting and developing the downstream aquatic habitat.

7-11. Hydroelectric Power. A guide curve delineating the seasonally varying, top-of-power-pool level in R. L. Harris Lake is shown on Plate 7-1. Normally, the lake level will be maintained on or below the curve except when flood inflows exceeding the discharge capacity of the hydropower units cause the lake level to rise. The lake is lowered each year during the flood season to elevation 785 feet NGVD29 to provide additional flood storage capacity in the system. The hydropower performance curve is shown on Plate 7-2.

R. L. Harris Dam will normally operate on a weekly cycle with the hydropower generated available for use in the daily peak-load periods on Monday through Friday. When R. L. Harris Lake is below the top of the power pool curve, the power plant will be operated in accordance with APC system power requirements. Whenever the lake reaches the top of the power pool elevation, the power plant will operate as necessary, up to full-gate capacity, in order to discharge the amount of water required to keep the lake level from exceeding the top of the power pool curve elevation.

7-12. Navigation. Navigation is an important use of water resources in the ACT Basin. The Alabama River, from Montgomery downstream to the Mobile area, provides a navigation route for commercial barge traffic, serving as a regional economic resource. A minimum flow is required to ensure usable water depths to support navigation. APC releases water from the R. L. Harris Project in conjunction with other storage projects in the basin to provide a weekly volume of flow to the Alabama River. Congress has authorized continuous navigation on the river, when sufficient water is available. The three Corps locks and dams on the Alabama River and a combination of dredging, river training works, and flow augmentation together support navigation depths on the river. The lack of regular dredging and routine maintenance has led to inadequate depths at times in the Alabama River navigation channel.

When supported by maintenance dredging, ACT Basin reservoir storage, and hydrologic conditions, adequate flows will provide a reliable navigation channel. In so doing, the goal of the water control plan is to ensure a predictable minimum navigable channel in the Alabama River for a continuous period that is sufficient for navigation use. Figure 7-1 shows the effect of dredging on flow requirements for different navigation channel depths during normal hydrologic conditions (1992 - 1994). As shown on Figure 7-1, pre-dredging conditions exist between November and April; dredging occurs between May and August; and post-dredging conditions exist from September through October, until November rainfall causes shoaling to occur somewhere along the navigation channel.

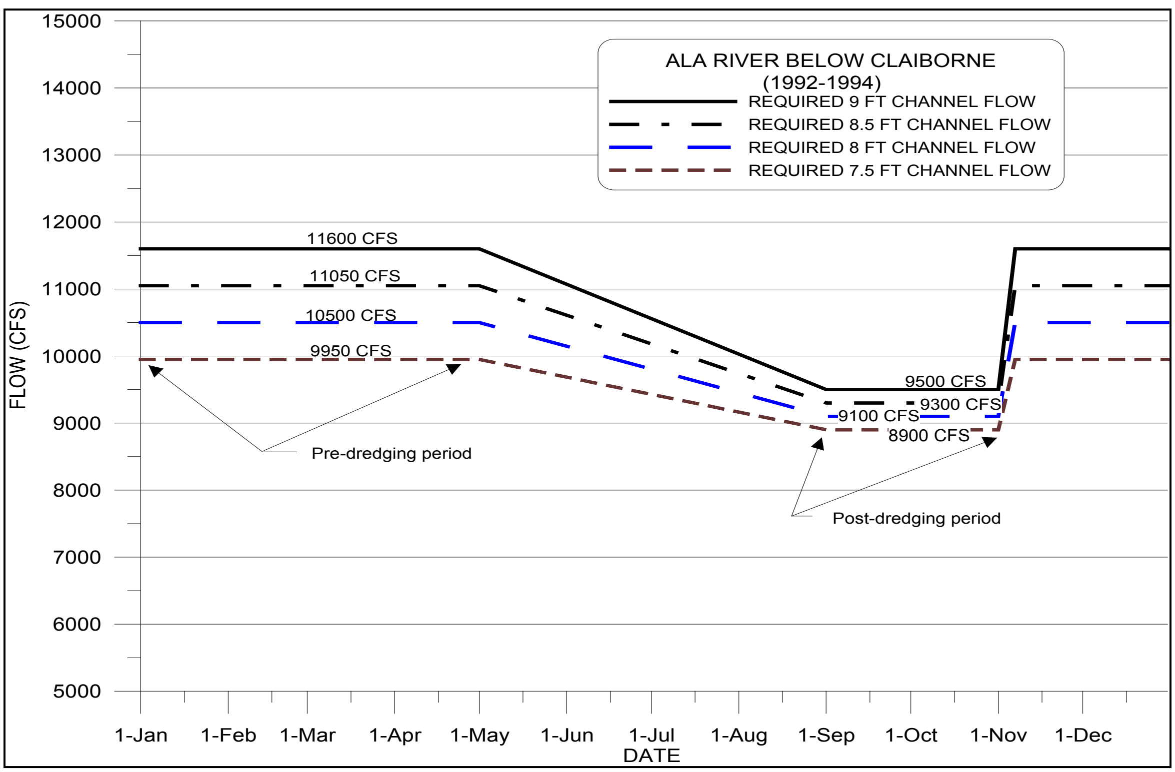

Figure 7-1. Flow-Depth Pattern (navigation template) during normal hydrologic conditions (1992–1994)

A 9-foot-deep by 200-foot-wide navigation channel is authorized on the Alabama River to Montgomery, Alabama. When a 9.0-foot channel cannot be met, a shallower 7.5-foot channel would still allow for light loaded barges moving through the navigation system. A minimum depth of 7.5 feet can provide a limited amount of navigation. Under low flow conditions, even the 7.5 feet depth has not been available at all times.

Flow releases from upstream APC projects have a direct influence on flows needed to support navigation depths on the lower Alabama River. Flows for navigation are most needed in the unregulated part of the lower Alabama River below Claiborne Lock and Dam. When flows are available, R. F. Henry, Millers Ferry, and Claiborne are regulated to maintain stable pool levels, coupled with the necessary channel maintenance dredging, to support sustained use of the authorized navigation channel and to provide the full navigation depth of nine feet. When river conditions or funding available for dredging of the river indicates that project conditions (9-foot channel) will probably not be attainable in the low water season, the three Alabama River projects are operated to provide flows for a reduced project channel depth as determined by surveys of the river. APC operates its reservoirs on the Coosa and Tallapoosa Rivers (specifically flows from their Jordan, Bouldin, and Thurlow (JBT) Projects) to provide a minimum navigation flow target in the Alabama River at Montgomery, Alabama. The monthly minimum navigation flow targets are shown in Table 7-1. However, flows may be reduced if conditions warrant in accordance with the navigation plan memorandum of understanding between the Corps and APC. Additional intervening flow or drawdown discharge from the R. F. Henry and Millers Ferry Projects must be used to provide a usable depth for navigation and/or meet the 7Q10 flow of 6,600 cfs below Claiborne Dam. However, the limited storage afforded in both the R. E. “Bob” Woodruff and William “Bill” Dannelly Lakes can only help meet the 6,600 cfs level at Claiborne Lake for a short period. As local inflows diminish or the storage is exhausted, a lesser amount would be released depending on the amount of local inflows. Table 7-2 and Figure 7-2 show the required basin inflow for a 9.0-foot channel; Table 7-3 and Figure 7-3 show the required basin inflow for a 7.5-foot channel.

During low-flow periods, it is not always possible to provide the authorized 9-foot deep by 200-foot-wide channel dimensions. In recent years, funding for dredging has been reduced resulting in higher flows being required to provide the design navigation depth. In addition, recent droughts in 2000 and 2007 had a severe impact on the availability of navigation depths in the Alabama River.

Historically, navigation has been supported by releases from storage in the ACT Basin. Therefore, another critical component in the water control plan for navigation involves using an amount of storage from APC storage projects similar to that which has historically been used, but in a more efficient manner.

The ACT Basin navigation regulation plan is based on storage and flow/stage/channel depth analyses using basin inflows and average storage usage by APC (e.g., navigation operations would not be predicated on use of additional storage) during normal hydrologic conditions. Under that concept, the Corps and APC make releases that support navigation when basin inflows meet or exceed seasonal targets for either the 9.0-foot or 7.5-foot channel templates. Triggers are also identified (e.g., when basin inflow are less than required natural flows) to change operational goals between the 9.0-foot and 7.5-foot channels. Similarly, basin inflow triggers are identified when releases for navigation are suspended and only 7Q10 (4,640 cfs) releases would occur. During drought operations, releases to support navigation are suspended until system recovery occurs as defined in the ACT Basin Drought Contingency Plan (Exhibit D).

Table 7-1. Monthly navigation flow target in CFS

Month	9.0-ft target below Claiborne Lake (cfs)	9.0-ft JBT goal (cfs)	7.5-ft target below Claiborne Lake (cfs)	7.5-ft JBT goal (cfs)
Jan	11600	9280	9950	7,960
Feb	11600	9280	9950	7,960
Mar	11600	9280	9950	7,960
Apr	11600	9280	9950	7,960
May	11100	8880	9740	7,792
Jun	10600	8480	9530	7,624
Jul	10100	8080	9320	7,456
Aug	9600	7680	9110	7,288
Sep	9100	7280	8900	7,120
Oct	9100	7280	8900	7,120
Nov	11600	9280	9950	7,960
Dec	11600	9280	9950	7,960

Table 7-2. Basin inflow above APC Projects required to meet a 9.0-foot navigation channel

Month	APC navigation Target (cfs)	Monthly historic storage usage (cfs)	Required basin inflow (cfs)
Jan	9,280	–994	10,274
Feb	9,280	–1,894	11,174
Mar	9,280	–3,028	12,308
Apr	9,280	–3,786	13,066
May	8,880	–499	9,379
Jun	8,480	412	8,068
Jul	8,080	749	7,331
Aug	7,680	1,441	6,239
Sep	7,280	1,025	6,255
Oct	7,280	2,118	5,162
Nov	9,280	2,263	7,017
Dec	9,280	1,789	7,491

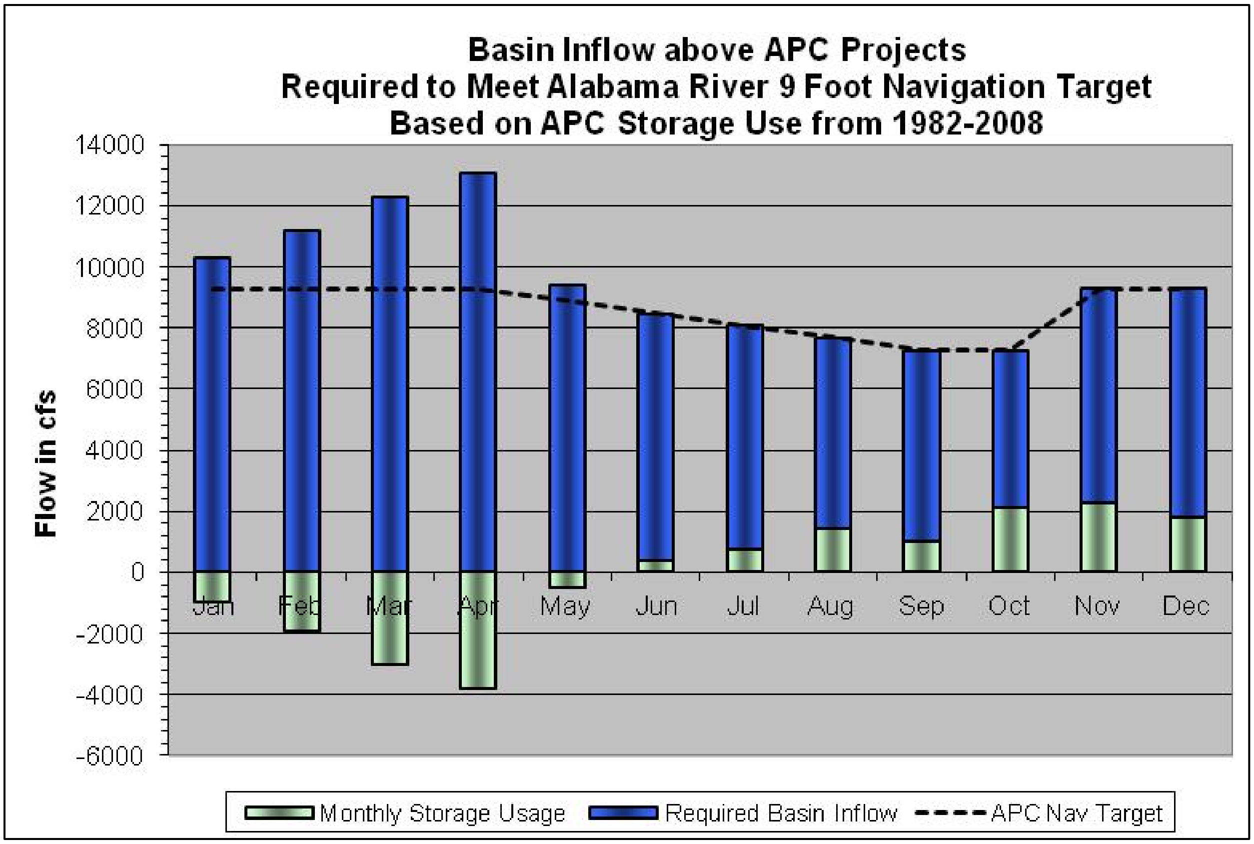

Figure 7-2. Flow requirements from rainfall (or natural sources) and reservoir storage to achieve the JBT goal for navigation flows for a 9-foot channel.

Table 7-3. Basin inflow above APC Projects required to meet a 7.5-foot navigation channel

Month	APC navigation Target (cfs)	Monthly historic storage usage (cfs)	Required basin inflow (cfs)
Jan	7,960	–994	8,954
Feb	7,960	–1,894	9,854
Mar	7,960	–3,028	10,988
Apr	7,960	–3,786	11,746
May	7,792	–499	8,291
Jun	7,624	412	7,212
Jul	7,456	749	6,707
Aug	7,288	1,441	5,847
Sep	7,120	1,025	6,095
Oct	7,120	2,118	5,002
Nov	7,960	2,263	5,697
Dec	7,960	1,789	6,171

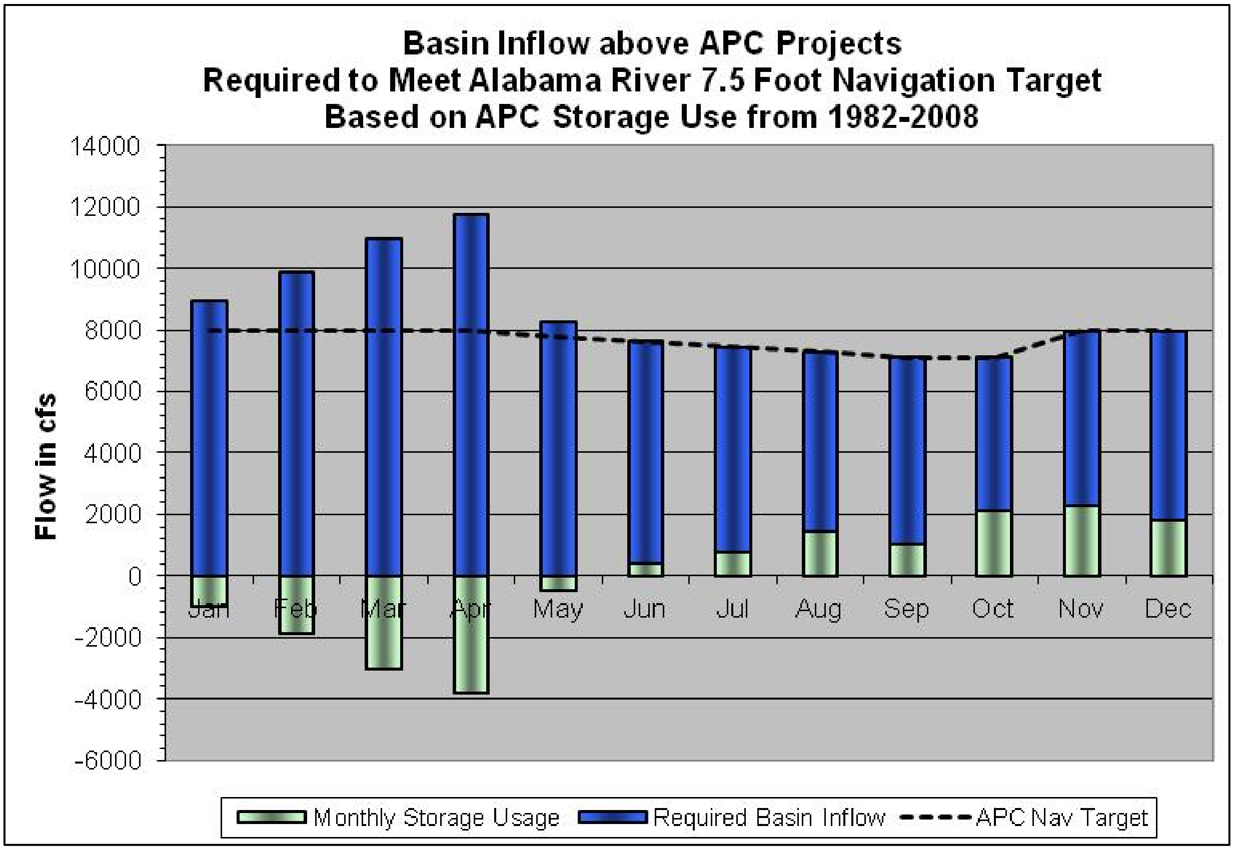

Figure 7-3. Flow requirements from Rainfall (or natural sources) and reservoir storage to achieve the JBT goal for navigation flows for a 7.5-foot channel.

During normal flow periods, no special water control procedures are required for navigation at the R. F. Henry Project other than maintaining the proper pool level. The normal maximum allowable drawdown at elevation 123.0 feet NGVD29 provides a clearance of 13.0 feet over the upper lock sill and should provide minimum depths for a 9-foot navigation channel at Montgomery and up to Bouldin Dam. Navigable depth is normally available downstream of the project if Millers Ferry is within its normal operating level. However, shoaling between Selma and R. F. Henry may result in the need to make water releases to increase the depth over any shoals. This will be accomplished by regular or specially scheduled hydropower releases when possible.

During high flow periods, navigation will be discontinued through the R. F. Henry lock during flood periods when the headwater reaches elevation 131.0 feet NGVD29. At this elevation the discharge will be 156,000 cfs which is expected to occur on an average of once every three years and the freeboard will be one-foot on the guide and lock walls.

In the event that the Mobile District Water Management Section determines upcoming reductions in water releases may impact the available navigation channel depth, they shall contact the Black Warrior/Tombigbee - Alabama/Coosa Project Office, and the Mobile District Navigation Section, to coordinate the impact. Water Management shall provide the Claiborne tailwater gage forecast to the project office and the Navigation Section. Using this forecast and the latest available project channel surveys, the project office and the Navigation Section will evaluate the potential impact to available navigation depths. Should this evaluation determine that the available channel depth is adversely impacted, the project office and the Navigation Section will work together, providing Water Management with their determination of the controlling depth. Thereafter, the project office and the Navigation Section will coordinate the issuance of a navigation bulletin. The notices will be issued as expeditiously as possible to give barge owners, and other waterway users, sufficient time to make arrangements to lighten loads or remove their vessels before action is taken at upstream projects to reduce flows. The bulletin will be posted to the Mobile District Navigation website at

http://navigation.sam.usace.army.mil/docs/index.asp?type=nn

Although special releases will not be standard practice, they could occur for a short duration to assist maintenance dredging and commercial navigation for special shipments if basin hydrologic conditions are adequate. The Corps will evaluate such requests on a case by case basis, subject to applicable laws and regulations and the basin conditions

7-13. Drought Contingency Plan.

An ACT Basin Drought Contingency Plan (DCP) has been developed to implement water control regulation drought management actions. The plan includes operating guidelines for drought conditions and normal conditions. The R. L. Harris Project operates in concert with other APC projects to meet the provisions of the DCP related to flow requirements from the Coosa and Tallapoosa Basins. APC and the Corps will coordinate water management during drought with other federal agencies, navigation interests, the states, and other interested parties as necessary. The following information provides a summary of the DCP water control actions for the ACT Basin projects. The drought plan is described in detail in Exhibit D Drought Contingency Plan.

The ACT Basin Drought Plan matrix defines monthly minimum flow requirements except where noted for the Coosa, Tallapoosa, and Alabama Rivers as a function of a Drought Intensity Level (DIL) and time of year. Such flow requirements are daily averages. The ACT Basin drought plan is activated when one or more of the following drought triggers is exceeded:

1. Low basin inflow
2. Low state line flow
3. Low composite conservation storage

Drought management actions would become increasingly more austere when two triggers are exceeded (Drought Level 2) or all three are exceeded (Drought Level 3). The combined occurrences of the drought triggers determine the DIL. Table 7-4 lists the three drought operation intensity levels applicable to APC projects.

Table 7-4. ACT Basin Drought Intensity Levels

Drought Intensity Level (DIL)	Drought Level	No. of Triggers Exceeded
-	Normal Regulation	0
DIL 1	Moderate Drought	1
DIL 2	Severe Drought	2
DIL 3	Exceptional Drought	3

Drought management measures for ACT Basin-wide drought regulation consists of three major components:

- Headwater regulation at Allatoona Lake and Carters Lake in Georgia
- Regulation at APC projects on the Coosa and Tallapoosa Rivers
- Regulation at Corps projects downstream of Montgomery on the Alabama River

The headwater regulation component includes water control actions in accordance with established action zones, minimum releases, and hydropower generation releases in accordance with project water control plans. Regulation of APC projects will be in accordance with Table 7-5 in which the drought response will be triggered by one or more of the three indicators - state line flows, basin inflow, or composite conservation storage. Corps operation of its Alabama River projects downstream of Montgomery will respond to drought operations of the APC projects upstream.

1 **Table 7-5. ACT Drought Management Plan**

<table>
<tr><th></th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th colspan="2">Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td rowspan="4">Drought Level Response[a]</td><td colspan="13">DIL 0 - Normal Operations</td></tr>
<tr><td colspan="13">DIL 1: Low Basin Inflows or Low Composite or Low State Line Flow</td></tr>
<tr><td colspan="13">DIL 2: DIL 1 criteria + (Low Basin Inflows or Low Composite or Low State Line Flow)</td></tr>
<tr><td colspan="13">DIL 3: Low Basin Inflows + Low Composite + Low State Line Flow</td></tr>
<tr><td rowspan="4">Coosa River Flow[b]</td><td colspan="3">Normal Operation: 2,000 cfs</td><td colspan="2">4,000 (8,000)</td><td colspan="2">4,000 – 2,000</td><td colspan="6">Normal Operation: 2,000 cfs</td></tr>
<tr><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="3">4,000 +/- cfs</td><td>6/15 Linear Ramp down</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="3">Jordan 2,000 +/-cfs</td></tr>
<tr><td colspan="3">Jordan 1,800 +/-cfs</td><td colspan="3">2,500 +/- cfs</td><td>6/15 Linear Ramp down</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="3">Jordan 1,800 +/-cfs</td></tr>
<tr><td colspan="3">Jordan 1,600 +/-cfs</td><td colspan="4">Jordan 1,800 +/-cfs</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="2">Jordan 1,800 +/-cfs</td><td>Jordan 1,600 +/- cfs</td></tr>
<tr><td rowspan="4">Tallapoosa River Flow[c]</td><td colspan="13">Normal Operations: 1200 cfs</td></tr>
<tr><td colspan="4">Greater of: 1/2 Yates Inflow or 2 x Heflin Gage(Thurlow Lake releases > 350 cfs)</td><td colspan="6">1/2 Yates Inflow</td><td colspan="3">1/2 Yates Inflow</td></tr>
<tr><td colspan="4">Thurlow Lake 350 cfs</td><td colspan="6">1/2 Yates Inflow</td><td colspan="3">Thurlow Lake 350 cfs</td></tr>
<tr><td colspan="7">Maintain 400 cfs at Montgomery WTP (Thurlow Lake release 350 cfs)</td><td colspan="3">Thurlow Lake 350 cfs</td><td colspan="3">Maintain 400 cfs at Montgomery WTP (Thurlow Lake release 350 cfs)</td></tr>
<tr><td rowspan="4">Alabama River Flow[d]</td><td colspan="13">Normal Operation: Navigation or 7Q10 flow</td></tr>
<tr><td colspan="4">4,200 cfs (10% 7Q10 Cut) - Montgomery</td><td colspan="6">7Q10 - Montgomery (4,640 cfs)</td><td colspan="3">Reduce: Full – 4,200 cfs</td></tr>
<tr><td colspan="5">3,700 cfs (20% 7Q10 Cut) - Montgomery</td><td colspan="5">4,200 cfs (10% 7Q10 Cut) - Montgomery</td><td colspan="3">Reduce: 4,200 cfs-> 3,700 cfs Montgomery (1 week ramp)</td></tr>
<tr><td colspan="4">2,000 cfs Montgomery</td><td colspan="3">3,700 cfs Montgomery</td><td colspan="3">4,200 cfs (10% 7Q10 Cut) - Montgomery</td><td colspan="3">Reduce: 4,200 cfs -> 2,000 cfs Montgomery (1 month ramp)</td></tr>
<tr><td rowspan="4">Guide Curve Elevation</td><td colspan="13">Normal Operations: Elevations follow Guide Curves as prescribed in License (Measured in Feet)</td></tr>
<tr><td colspan="13">Corps Variances: As Needed; FERC Variance for Lake Martin</td></tr>
<tr><td colspan="13">Corps Variances: As Needed; FERC Variance for Lake Martin</td></tr>
<tr><td colspan="13">Corps Variances: As Needed; FERC Variance for Lake Martin</td></tr>
</table>

a. Note these are base flows that will be exceeded when possible.
b. Jordan flows are based on a continuous +/- 5% of target flow.
c. Thurlow Lake flows are based on continuous +/- 5% of target flow: flows are reset on noon each Tuesday based on the prior day's daily average at Heflin or Yates.
d. Alabama River flows are 7-Day Average Flow.

VIII - EFFECT OF WATER CONTROL PLAN

8-01. General. The River and Harbor Act, approved 2 March 1945 (59 Stat. 10) authorized the Corps of Engineers to develop a site at Crooked Creek for flood control, hydropower, and other purposes. Section 12 of Public Law 89-789 (80 Stat., 1405), approved 7 November 1966, suspended for two years the authority as far as hydropower was concerned, to permit development of the Tallapoosa River by private concerns. The APC filed an application with the Federal Power Commission for the proposed project on 5 November 1968, and was issued a license for the construction, operation and maintenance of the Crooked Creek Hydroelectric Project (later renamed R. L. Harris). The R. L. Harris Project is a peaking hydropower peaking project with operating lake elevations that range from 793 to 785 feet NGVD29.

The impacts of the *ACT Master Water Control Manual* and its Appendices, including this water control plan have been fully evaluated in an Environmental Impact Statement (EIS) that was published on (date). A Record of Decision (ROD) for the action was signed on (date). During the preparation of the EIS, a review of all direct, secondary and cumulative impacts was made. As detailed in the EIS, the decision to prepare the Water Control Manual and the potential impacts was coordinated with Federal and State agencies, environmental organizations, Indian tribes, and other stakeholder groups and individuals having an interest in the basin. The ROD and EIS are public documents and references to their accessible locations are available upon request.

8-02. Flood Risk Management. R. L. Harris Dam controls approximately eight percent of the conservation storage in the ACT basin (see Table 4-7). The discharge frequency curve at the dam site for the period 1983 – 2010 is shown on Plate 8-1. The curve was developed from average daily discharge data from the APC. The pre-dam and post-dam discharge frequency curves at Wadley, Alabama, 14 miles below the dam are shown on Plate 8-2. The data were taken from the USGS “Tallapoosa River at Wadley” gage, No. 02414500. The floods of 1977 and 1979 were routed through the reservoir using the Induced Surcharge Regulation as well as Basin Model Regulation. Results are shown on Plates 8-3 through 8-6. The observed maximum post-construction flood of 2003 is also presented on Plate 4-20. The data for this flood were APC hourly values. Regulation of the probable maximum flood is shown on Plate 8-7. Headwater and tailwater stage frequency curves are shown on Plates 8-8 and 8-9.

8-03. Recreation. R. L. Harris Lake is an important recreational resource, providing significant economic and social benefits for the region and the Nation. The project contains 10,660 acres of water at the summer power pool elevation of 793.0 feet NGVD29. A wide variety of recreational opportunities are provided at the lake including boating, fishing, camping, picnicking, water skiing, hunting, and sightseeing. The local and regional economic benefits of recreation at R. L. Harris Lake are significant. The effects of the R. L. Harris water control operations on recreation opportunities are minimal between the maximum and minimum power pool elevations of 793 to 785 feet NGVD29.

8-04. Water Quality. The water quality conditions that are generally present in R. L. Harris Lake are typical of water quality conditions and trends that exist in reservoirs throughout the ACT Basin that are relatively deep with thermal stratification during the summer and completely mixed during the winter. Water quality conditions in the main body of the lake are typically better than in the arms because of nutrient and sediment-rich, riverine inflows. Sediment and phosphorus concentrations are also highest in the upper arms and decrease toward the main pool as velocity is lowered and sediment is removed from suspension. During summer-time, dissolved oxygen levels and water temperatures are typically highest near the top of the water column, with colder, less oxygenated water existing near the bottom. Additionally, chlorophyll *a* concentrations vary both seasonally and spatially and are highest from July to October during periods of low flow. Point and nonpoint sources from urban areas increase sediment and pollutant loads in the rivers immediately downstream. Reservoirs in the ACT Basin, including R. L. Harris Lake, typically act as a sink, removing pollutant loads and sediment.

Total maximum daily loads (TMDLs) have been identified for various portions of the Tallapoosa and Little Tallapoosa Rivers. In the Alabama portion of the rivers, TMDLs for pathogens and siltation have been proposed. In Georgia, TMDLs have been finalized for fecal coliforms, and sedimentation for sections of the Tallapoosa and Little Tallapoosa Rivers. R. L. Harris Lake is currently classified as mesotrophic, which indicates an intermediate level of productivity in the lake. ADEM has established a lake chlorophyll *a* criterion for R. L. Harris Lake during the growing season (April – October) of an average of less than 10 micrograms per liter (µg/l) of chlorophyll *a* or an average of less than 12 ug/l if measured immediately upstream of the Tallapoosa River, Little Tallapoosa River confluence.

8-05. Fish and Wildlife. The Tallapoosa River, a 4,680-square-mile watershed, originates in Paulding County located in western Georgia. The upper portion of the river (above Harris Dam) represents the last unimpounded and unregulated habitat in the watershed. Recent surveys estimate 86 fish species below the fall line (geographical boundary between the Piedmont and Southeastern Plains) and 42 fish species above the fall line. Twenty species of mussels have also been documented from the river and its tributaries, including the federally threatened fine-lined pocketbook.

The four reservoirs (R.L. Harris, Martin, Yates, and Thurlow) in this sub-basin impound 71 of the 268 miles of the Tallapoosa River to create 53,234 acres of reservoir habitat. R. L. Harris Lake contains an abundance of Alabama spotted bass and largemouth bass. Lake Martin is known for producing great Alabama spotted bass fishing during the winter. Lake Martin spills immediately into two smaller lakes, Yates and Thurlow. Fisheries at the two lakes are dictated by the flow from Lake Martin. Rising or steady water levels can produce good fishing for striped bass, Alabama spotted bass, white bass, and various sunfish species.

The Tallapoosa River below R. L. Harris Dam represents one of the longest and highest quality segments of Piedmont River habitat remaining in the Mobile River drainage, one of the most biologically diverse river drainages in North America. Extensive areas of shoal habitat, river features that typically support high faunal diversity are characteristic along this portion of the river. The native fish assemblage includes at least 57 species, including at least five species endemic to the Tallapoosa River System. The invertebrate fauna is less well known; however, the fine-lined pocketbook (*Hamiota altilis*), which is listed as Threatened under the Endangered Species Act, and at least two endemic species of crayfishes occur in the Piedmont reach.

Operational flow changes affect habitat for reservoir fisheries and other aquatic resources mainly through changes in water levels, changes in reservoir flushing rates (retention times), and associated changes in water quality parameters, such as primary productivity, nutrient loading, dissolved oxygen concentrations, and vertical stratification. Seasonal water level fluctuations can substantially influence littoral (shallow-water) habitats, decreasing woody debris deposition, restricting access to backwaters and wetlands, and limiting seed banks and stable water levels necessary for native aquatic vegetation. Those limitations, in turn, significantly influence the reproductive success of resident fish populations. High water levels inundating shoreline vegetation during spawning periods frequently have been associated with enhanced reproductive success and strong year class development for largemouth bass, spotted bass, bluegill, crappie, and other littoral species. Conversely, low or declining water levels can adversely affect reproductive success by reducing the area of available littoral spawning and rearing habitats. Substantial daily or weekly fluctuations in lake levels associated with hydropower peaking operations can negatively affect lake fisheries by dewatering spawning and nursery habitats for littoral species, exposing nests and eggs deposited in shallow-water habitats, and reducing the availability of shoreline cover and its associated invertebrate food supply.

8-06. Hydroelectric Power. The R. L. Harris Dam Hydropower Project, along with 13 other hydroelectric facilities throughout the State of Alabama, provides six percent of the Alabama Power Company's power generation. The State of Alabama depends on these facilities as a source of dependable and stable electricity. Hydroelectric power is also one of the cheaper forms of electrical energy, and it can be generated and supplied quickly as needed in response to changing demand.

Hydropower is produced as peak energy at R. L. Harris Dam, i.e., power is generated during the hours that the demand for electrical power is highest, causing significant variations in downstream flows. Daily hydropower releases from the dam vary from zero during off-peak periods to as much as 13,000 cfs, which is best gate turbine discharge. Often, the weekend releases are lower than those during the weekdays. Lake elevations can vary 0.5 to 1.5 feet during a 24-hour period as a result of hydropower releases. Tailwater levels can also vary significantly daily because of peaking hydropower operations at R. L. Harris Dam, characterized by a rapid rise in downstream water levels immediately after generation is initiated and a rapid fall in stage as generation is ceased. Except during high flow conditions when hydropower may be generated for more extended periods of time, this peaking power generation scenario with daily fluctuating stages downstream is repeated nearly every week day (not generally on weekends).

Hydropower generation by the R. L. Harris Dam Hydropower Plant, in combination with the other hydropower power projects in the ACT Basin, helps to provide direct benefits to a large segment of the basin's population in the form of dependable, stable, and relatively low-cost power. Hydropower plays an important role in meeting the electrical power demands of the region.

8-07. Navigation. APC releases water from R. L. Harris Project in conjunction with their other storage projects in the Tallapoosa River to provide flows to support navigation in accordance with the Memorandum of Understanding for navigation support. The navigation plan provides the flexibility to support flow targets when the system experiences normal flow conditions, reduced support as basin hydrology trends to drier conditions, and suspension of navigation support during sustained low flow conditions.

8-08. Drought Contingency Plans. The importance of drought contingency plans has become increasingly obvious as more demands are placed on the water resources of the basin. During low flow conditions, the reservoirs within the basin may not be able to fully support all project purposes. Several drought periods have occurred since construction of the R. L. Harris Project in 1983. The duration of low flows can be seasonal or they can last for several years. Some of the more extreme droughts occurred in the early and mid 1980's, and most of the time period between late-1998 to mid-2009. There were periods of high flows during these droughts but the lower than normal rainfall trend continued.

The purpose of drought planning is to minimize the effect of drought, to develop methods for identifying drought conditions, and to develop both long- and short-term measures to be used to respond to and mitigate the effects of drought conditions. During droughts, reservoir regulation techniques are planned to preserve and ensure the more critical needs. Minimum instream flows protect the area below R. L. Harris Dam and conservation efforts strengthen the ability to supply water supply needs.

For the R. L. Harris Project, the APC and the Corps will coordinate water management activities during the drought with other private power companies and federal agencies, navigation interests, the States, and other interested state and local parties as necessary. Drought operations will be in compliance with the plan for the entire ACT Basin.

8-09. Flood Emergency Action Plans. Normally, all flood control operations are directed by the Water Management Section. If, however, a storm of flood-producing magnitude occurs and all communications are disrupted between the Corps and the APC, flood risk management measures, as previously described in Chapter VII of this appendix, will begin. If communication is broken after some instructions have been received from the Corps, those instructions will be followed for as long as they are applicable.

The R. L. Harris Dam is well maintained and has not experienced unusual events or problems. Discharges from the dam are released into the Tallapoosa River which flow into Lake Martin. Most of the area between R. L. Harris Dam and Lake Martin is largely undeveloped rural and agricultural land. The most immediate downstream development is the City of Wadley, Alabama. Dam failure at R. L. Harris would pose little impact to roads and highways immediately downstream, with the exception of County road 15, and Highway 77/22 in the Wadley, Alabama area.

IX - WATER CONTROL MANAGEMENT

9-01. Responsibilities and Organization. Many agencies in federal and state governments are responsible for developing and monitoring water resources in the ACT Basin. Some of the federal agencies are the Corps, U.S. Environmental Protection Agency, National Parks Service, U.S. Coast Guard, USGS, U.S. Department of Energy, U.S. Department of Agriculture, USFWS, and NOAA. In addition to the federal agencies, each state has agencies involved: the Georgia Environmental Protection Division (GAEPD), The Middle Chattahoochee Regional Water Planning Council (includes Tallapoosa and Little Tallapoosa River Basins in Georgia), and the Alabama Department of Environmental Management, Alabama Office of Water Resources.

a. Alabama Power Company. The R. L. Harris Project was constructed and is operated by the APC. Day-to-day operation of the project is assigned to the APC's Alabama Control Center in Birmingham, Alabama, as part of the Power Delivery System under the direction of Reservoir Operations Supervisor. Long-range water planning and flood risk management operation is assigned to APC's Reservoir Management in Birmingham, Alabama, as part of Southern Company Services Hydro Services, under the direction of the System Operations Supervisor.

b. U.S. Army Corps of Engineers. Authority for water control regulation of federal projects in the ACT Basin has been delegated to the South Atlantic Division (SAD) Commander. The responsibility for water control regulation activities has been entrusted to the Mobile District, Engineering Division, Water Management Section. Water control actions for federal projects are regulated to meet the authorized project purposes in coordination with federally authorized ACT Basin-wide system purposes and public law. It is the responsibility of the Water Management Section to coordinate with APC to develop Coosa River Project water control regulation procedures for flood risk management and navigation. The Water Management Section monitors the Coosa River projects for compliance with the approved water control plans and agreements. The Water Management Section will perform the following specific duties in connection with the operation of the R. L. Harris Project:

(1) Maintain liaison with personnel of APC's Reservoir Management for the daily exchange of hydrologic data.

(2) Maintain records of rainfall and river stages for the Coosa River Basin, and records of pool level and outflow at R. L. Harris Dam and other impoundments in the basin.

(3) Monitor operations of the power plant and spillway at R. L. Harris Dam for compliance with the regulation schedule for flood control operations, Plate 7-2.

(4) Transmit to APC Reservoir Management any instructions for special operations which may be required due to unusual flood conditions (except in emergencies where time does not permit, these instructions will first be cleared with the Chief of Hydrology and Hydraulics Branch and the Chief of Engineering Division).

(5) Evaluate special water control plan variance requests submitted by APC Reservoir Management and provide approval or disapproval

c. Other Federal Agencies. Other federal agencies work closely with APC and the Corps to provide their agency support for the various project purposes of R. L. Harris and to meet the federal requirements for which they might be responsible. The responsibilities and interagency coordination between the Corps and the federal agencies are discussed in Paragraph 9-02.

d. State and County Agencies

(1) Alabama. The Alabama Office of Water Resources (OWR) administers programs for river basin management, river assessment, water supply assistance, water conservation, flood mapping, the National Flood Insurance Program and water resources development. Further, OWR serves as the state liaison with federal agencies on major water resources related projects, conducts any special studies on instream flow needs, and administers environmental education and outreach programs to increase awareness of Alabama's water resources.

i. The Alabama Department of Environmental Management Drinking Water Branch works closely with the more than 700 water systems in Alabama that provide safe drinking water to four million citizens.

ii. The Alabama Chapter of the Soil and Water Conservation Society fosters the science and the art of soil, water, and related natural resource management to achieve sustainability.

(2) Georgia. Georgia Environmental Protection Division (GAEPD) conducts water resource assessments to determine a sound scientific understanding of the condition of the water resources, in terms of the quantity of surface water and groundwater available to support current and future in-stream and off-stream uses and the capacity of the surface water resources to assimilate pollution. Regional water planning councils in Georgia (Middle Chattahoochee Planning Council covers the Tallapoosa and Little Tallapoosa River Basins) prepare recommended Water Development and Conservation Plans. Those regional plans promote the sustainable use of Georgia's waters by selecting an array of management practices, to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.

e. Stakeholders. Many non-federal stakeholder interest groups are active in the ACT Basin. The groups include lake associations, M&I water users, navigation interests, environmental organizations, and other basin-wide interests groups. Coordinating water management activities with the interest groups, state and federal agencies, and others is accomplished as required on an ad-hoc basis and on regularly scheduled water management teleconferences when needed to share information regarding water control regulation actions and gather stakeholder feedback. The Master Manual includes a list of state and federal agencies and active stakeholders in the ACT Basin that have participated in the ACT Basin water management teleconferences and meetings.

9-02. Interagency Coordination

a. Local Press and Corps Bulletins. The local press includes any periodic publications in or near the R. L. Harris Watershed and the ACT Basin. Montgomery, Alabama, and Atlanta, Georgia, have some of the larger daily papers. These papers often publish articles related to the rivers and streams. Their representatives have direct contact with the Corps and APC through their respective Public Affairs offices. In addition, the local press and the public can access current project information on the Corps and APC web pages.

b. National Weather Service (NWS). NWS is the federal agency in NOAA that is responsible for weather and weather forecasts. The NWS along with its River Forecast Center maintains a network of reporting stations throughout the Nation. It continuously provides current weather conditions and forecasts. It prepares river forecasts for many locations including the ACT Basin. Often, it prepares predictions on the basis of *what if* scenarios. Those include rainfall that is possible but has not occurred. In addition, the NWS provides information on hurricane tracts and other severe weather conditions. It monitors drought conditions and provides the information. Information is available through the Internet, the news, and the Mobile District's direct access.

c. U.S. Geological Survey (USGS). The USGS is an unbiased, multidisciplinary science organization that focuses on biology, geography, geology, geospatial information, and water. The agency is responsible for the timely, relevant, and impartial study of the landscape, natural resources, and natural hazards. Through the APC-USGS partnership and the Corps-USGS Cooperative Gaging program, the USGS maintains a comprehensive network of gages in the ACT Basin. The USGS Water Science Centers in Georgia and Alabama publish real-time reservoir levels, river and tributary stages, and flow data through the USGS National Water Information Service (NWIS) web site.

d. U.S. Fish and Wildlife Service (USFWS). The USFWS is an agency of the Department of the Interior whose mission is working with others to conserve, protect and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The USFWS is the responsible agency for the protection of federally listed threatened and endangered species and federally designated critical habitat in accordance with the Endangered Species Act of 1973. The USFWS also coordinates with other federal agencies under the auspices of the Fish and Wildlife Coordination Act. APC and the Corps, Mobile District, with support from the Water Management Section, coordinate water control actions and management with USFWS in accordance with both laws.

9-03. Framework for Water Management Changes. Special interest groups often request modifications of the basin water control plan or project specific water control plan. The R. L. Harris Project and other ACT Basin projects were constructed to meet specific, authorized purposes, and major changes in the water control plans would require modifying, either the project itself or the purposes for which the projects were built. However, continued increases in the use of water resources demand constant monitoring and evaluating reservoir regulations and reservoir systems to insure their most efficient use. Within the constraints of the FERC regulating license for the R. L. Harris Project, Congressional authorizations, and engineering regulations, the water control plan and operating techniques are often reviewed to see if improvements are possible without violating authorized project functions. When deemed appropriate, temporary variances to the water control plan approved by FERC and the Corps can be implemented to provide the most efficient regulation while balancing the multiple purposes of the ACT Basin-wide System.

EXHIBIT A

SUPPLEMENTARY PERTINENT DATA

EXHIBIT A
SUPPLEMENTARY PERTINENT DATA

GENERAL

Other names of project	Crooked Creek
Dam site location	
State	Alabama
Basin	Alabama-Tallapoosa
River	Tallapoosa
Miles above mouth of Tallapoosa River	139.1
Miles above mouth of Mobile River	494
Drainage area above dam site, sq. miles	1,453
Drainage area above Martin Dam, sq. miles	2,984
Drainage area above mouth of Tallapoosa, sq. miles	4,680
1 inch of runoff equals, acre-ft (1,453 sq mi)	77,493
Type of project	Dam, Reservoir and Power plant
Objectives of regulation	Hydropower, Navigation, and Flood Risk Management
Project Owner	Alabama Power Company (APC)
Regulating Agencies	APC, Corps of Eng, and FERC

STREAM FLOW AT USGS Gage at WADLEY, AL (cfs)

Average for Period of Record (calendar yr 1924 – 2009)	2,562
Maximum daily discharge	103,000
Minimum daily discharge	41
Maximum annual discharge (calendar yr 1975)	4,904
Minimum annual discharge (calendar yr 2007)	790

REGULATED FLOODS

Maximum flood of project record (May 2003)	
Peak inflow, cfs	106,494
Peak outflow, cfs	98,454
Peak pool elevation, feet above NGVD29	794.9
Peak discharge of Probable Maximum Flood, cfs	310,300

RESERVOIR

Elevation of probable maximum flood, ft above NGVD29	800.3
Full pool elevation May through September, feet above NGVD29	793.0
Full pool elevation December through March, feet above NGVD29	785.0
Maximum operating pool elevation, feet above NGVD29	793.0

Minimum operating pool elevation, feet above NGVD29	768.0
RESERVOIR (Cont'd)	
Area at pool elevation 793.0, acres	10,660
Total volume at elevation 793.0, acre-feet	424,969
Power storage (elevation 768 to 793 ft NGVD29)	206,944
Inactive Storage (below elevation 768 ft NGVD29)	218,025
Length, miles	24
Shoreline distance at elevation 793 (summer pool), miles	271
Shoreline distance at elevation 785 (winter pool), miles	229

SPILLWAY

Type	concrete-gravity
Net length, feet	310
Elevation of crest, feet above NGVD29	753.0
Type of gates	Tainter
Number of gates	6
Length of gates, feet	40.5
Height of gates, feet	40.0
Maximum discharge capacity (pool elev. 795.0), cfs	267,975
Elevation of top of gates in closed position, feet above NGVD29	793.8

DAM

Total length including dikes, feet	2,142
Total length of non-overflow section, feet	1,832
Maximum height above stream bed, feet	151.5
Elevation, top of dam, feet	810

POWER PLANT

Maximum power pool elevation, feet above NGVD29	793.0
Gross static head at full power pool (793 ft NGVD29), feet	131.7
Normal operating head at full turbine discharge, feet	124.0
Length of powerhouse, feet	225
Width of powerhouse, feet	91
Number of units	2
Maximum discharge per unit (best gate) cfs	6,500
Diameter of penstock leading to the turbines, ft	27
Elevation of centerline of intake to turbine	710.0
Elevation of centerline of distributor	659.0
Total installation, kW	135,000

1

EXHIBIT B

UNIT CONVERSIONS

AREA CONVERSION

UNIT	m^2	km^2	ha	in^2	ft^2	yd^2	mi^2	ac
1 m^2	1	10^{-6}	10^{-4}	1550	10.76	1.196	3.86 X 10^{-7}	2.47 X 10^{-4}
1 km^2	10^6	1	100	1.55 X 10^9	1.076 X 10^7	1.196 X 10^6	0.3861	247.1
1 ha	10^4	0.01	1	1.55 X 10^7	1.076 X 10^7	1.196 X 10^4	3.86 X 10^{-3}	2,471
1 in^2	6.45 X 10^{-4}	6.45 X 10^{10}	6.45 X 10^{-8}	1	6.94 X 10^{-3}	7.7 X 10^{-4}	2.49 X 10^{-10}	1.57 X 10^7
1 ft^2	.0929	9.29 X 10^{-8}	9.29 X 10^{-6}	144	1	0.111	3.59 X 10^{-8}	2.3 X 10^{-5}
1 yd^2	0.8361	8.36 X 10^{-7}	8.36 X 10^{-5}	1296	9	1	3.23 X 10^{-7}	2.07 X 10^{-4}
1 mi^2	2.59 X 10^6	2.59	259	4.01 X 10^9	2.79 X 10^7	3.098 X 10^6	1	640
1 ac	4047	0.004047	0.4047	6. 27 X 10^6	43560	4840	1.56 X 10^{-3}	1

LENGTH CONVERSION

UNIT	cm	m	Km	in.	ft	yd	mi
Cm	1	0.01	0.00001	0.3937	0.0328	0.0109	6.21 X 10^{-6}
M	100	1	0.001	39.37	3.281	1.094	6.21 X 10^{-4}
Km	10^5	1000	1	39,370	3281	1093.6	0.621
in.	2.54	0.0254	2.54 X 10^{-5}	1	0.0833	0.0278	1.58 X 10^{-5}
Ft	30.48	0.3048	3.05 X 10^{-4}	12	1	0.33	1.89 X 10^{-4}
Yd	91.44	0.9144	9.14 X 10^{-4}	36	3	1	5.68 X 10^{-4}
Mi	1.01 X 10^5	1.61 X 10^3	1.6093	63,360	5280	1760	1

FLOW CONVERSION

UNIT	m^3/s	m^3/day	l/s	ft^3/s	ft^3/day	ac-ft/day	gal/min	gal/day	mgd
m^3/s	1	86,400	1000	35.31	3.05 X 10^6	70.05	1.58 X 10^4	2.28 X 10^7	22.824
m^3/day	1.16 X 10^{-5}	1	0.0116	4.09 X 10^{-4}	35.31	8.1 X 10^{-4}	0.1835	264.17	2.64 X 10^{-4}
l/s	0.001	86.4	1	0.0353	3051.2	0.070	15.85	2.28 X 10^4	2.28 X 10^{-2}
ft^3/s	0.0283	2446.6	28.32	1	8.64 X 10^4	1.984	448.8	6.46 X 10^5	0.646
ft^3/day	3.28 X 10^{-7}	1233.5	3.28 X 10^{-4}	1.16 X 10^{-5}	1	2.3 X 10^{-5}	5.19 X 10^{-3}	7.48	7.48 X 10^{-6}
ac-ft/day	0.0143	5.451	14.276	0.5042	43,560	1	226.28	3.26 X 10^5	0.3258
gal/min	6.3 X 10^{-5}	0.00379	0.0631	2.23 X 10^{-3}	192.5	4.42 X 10^{-3}	1	1440	1.44 X 10^{-3}
gal/day	4.3 X 10^{-8}	3785	4.38 X 10^{-4}	1.55 X 10^{-6}	11,337	3.07 X 10^{-6}	6.94 X 10^{-4}	1	10^{-6}
Mgd	0.0438		43.82	1.55	1.34 X 10^5	3.07	694	10^6	1

VOLUME CONVERSION

UNIT	liters	m^3	in^3	ft^3	gal	ac-ft	million gal
Liters	1	0.001	61.02	0.0353	0.264	8.1 X 10^{-7}	2.64 X 10^{-7}
m^3	1000	1	61,023	35.31	264.17	8.1 X 10^{-4}	2.64 X 10^{-4}
in^3	1.64 X 10^{-2}	1.64 X 10^{-5}	1	5.79 X 10^{-4}	4.33 X 10^{-3}	1.218 X 10^{-8}	4.33 X 10^{-9}
ft^3	28.317	0.02832	1728	1	7.48	2.296 X 10^{-5}	7.48 X 10^6
Gal	3.785	3.78 X 10^{-3}	231	0.134	1	3.07 X 10^{-6}	10^6
ac-ft	1.23 X 10^6	1233.5	75.3 X 10^6	43,560	3.26 X 10^5	1	0.3260
million gallon	3.785 X 10^6	3785	2.31 X 10^8	1.34 X 10^5	10^6	3.0684	1

COMMON CONVERSIONS

1 million gallons per day (MGD) = 1.55 cfs
1 day-second-ft (DSF) = 1.984 acre-ft
1 cubic foot per second of water falling 8.81 feet = 1 horsepower
1 cubic foot per second of water falling 11.0 feet at 80% efficiency = 1 horsepower
1 inch of depth over one square mile = 2,323,200 cubic feet
1 inch of depth over one square mile = 0.0737 cubic feet per second for one year.

EXHIBIT C

MEMORANDUM OF UNDERSTANDINGS BETWEEN CORPS OF ENGINEERS AND ALABAMA POWER COMPANY

INSERT SIGNED COPIES: MOU DATED 27 SEP 1972; REVISION TO MOU DATED 11 OCT 1990; AND 2011 "ATTACHMENT"

EXHIBIT D

ALABAMA-COOSA-TALLAPOOSA (ACT) RIVER BASIN

DROUGHT CONTINGENCY PLAN

DROUGHT CONTINGENCY PLAN

FOR

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

ALLATOONA DAM AND LAKE
CARTERS DAM AND LAKE
ALABAMA POWER COMPANY COOSA RIVER PROJECTS
ALABAMA POWER COMPANY TALLAPOOSA RIVER PROJECTS
ALABAMA RIVER PROJECTS

U.S. Army Corps of Engineers
South Atlantic Division
Mobile District

June 2011

DRAFT
DROUGHT CONTINGENCY PLAN
FOR
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN
ALLATOONA DAM AND LAKE
CARTERS DAM AND LAKE
ALABAMA POWER COMPANY COOSA RIVER PROJECTS
ALABAMA POWER COMPANY TALLAPOOSA RIVER PROJECTS
ALABAMA RIVER PROJECTS

I – INTRODUCTION

1-01. Purpose of Document. The purpose of this Drought Contingency Plan (DCP) is to provide a basic reference for water management decisions and responses to water shortage in the Alabama-Coosa-Tallapoosa (ACT) River Basin induced by climatological droughts. As a water management document it is limited to those drought concerns relating to water control management actions for federal U.S. Army Corps of Engineers (Corps) and Alabama Power Company (APC) dams. Because of the long-term nature of a drought and the specific problems that may result, this document details only a limited number of specific actions that can be carried out related to water control. The primary value of this DCP is in documenting the overall ACT Basin Drought Management Plan for the system of Corps and APC projects; in documenting the data needed to support water management decisions related to drought regulation; and in defining the coordination needed to manage the ACT project's water resources to ensure that they are used in a manner consistent with the needs which develop during a drought. This DCP addresses the water control regulation of the five Corps impoundments and the APC Coosa and Tallapoosa projects (Table 1) in regard to water control regulation during droughts. Details of the drought management plan as it relates to each project and its water control regulation during droughts are provided in the water control plan within the respective project appendix to the ACT Basin Master Water Control Manual.

II – AUTHORITIES

2-01. Authorities. The following list provides the policies and guidance that are pertinent to the development of drought contingency plans and actions directed therein.

A. ER 1110-2-1941, "Drought Contingency Plans", dated 15 Sep 1981. This regulation provides policy and guidance for the preparation of drought contingency plans as part of the Corps of Engineers' overall water management activities.

B. ER 1110-2-8156, "Preparation of Water Control Manuals", dated 31 Aug 1995. This document provides a guide for preparing water control manuals for individual water resource projects and for overall river basins to include drought contingency plans.

C. ER 1110-2-240, "Water Control Management", dated 8 Oct 1982. This regulation prescribes the policies and procedures to be followed in water management activities including special regulations to be conducted during droughts. It also sets the responsibility and approval authority in development of water control plans.

D. EM 1110-2-3600, "Management of Water Control Systems", dated 30 Nov 1987. This guidance memorandum requires that the drought management plan be incorporated into the project water control manuals and master water control manuals. It also provides guidance in formulating strategies for project regulation during droughts.

Table 1. Reservoir impoundments within the ACT River Basin

River/Project Name	Owner/State/ Year Initially Completed	Total storage at Top of Conservation Pool (summer) (ac-ft)	Conservation Storage (ac-ft)	Percentage of ACT Basin Conservation Storage (%)
Coosawattee River				
Carters Dam and Lake	Corps/GA/1974	383,565	141,400	6
Carters Reregulation Dam	Corps/GA/1974	19,300	17,210	1
Etowah River				
Allatoona Dam and Lake	Corps/GA/1949	670,047	284,589	12
Coosa River				
Weiss Dam and Lake	APC/AL/1961	306,651	237,448	10
H. Neely Henry Dam and Lake	APC/AL/1966	121,860	43,205	2
Logan Martin Dam and Lake	APC/AL/1964	273,500	108,262	4
Lay Dam and Lake	APC/AL/1914	262,306	77,478	3
Mitchell Dam and Lake	APC/AL/1923	170,422	28,048	1
Jordan Dam and Lake	APC/AL/1928	235,780	15,969	1
Walter Bouldin Dam	APC/AL/1967	235,780	NA	--
Tallapoosa River				
Harris Dam and Lake	APC/AL/1982	425,503	191,129	8
Martin Dam and Lake	APC/AL/1926	1,623,000	1,183,356	49
Yates Dam and Lake	APC/AL/1928	53,770	5,976	0.2
Thurlow Dam and Lake	APC/AL/1930	18,461	NA	--
Alabama River				
Robert F. Henry Lock and Dam/R.E. “Bob” Woodruff Lake	Corps/AL/1972	234,200	47,179	2
Millers Ferry Lock and Dam/William “Bill” Dannelly Lake	Corps/AL/1969	331,800	64,900	3
Claiborne Lock and Dam and Lake	Corps/AL/1969	96,360	NA	--

III – DROUGHT IDENTIFICATION

3-01. Definition. Drought can be defined in different ways - meteorological, hydrological, agricultural, and socioeconomic. In this DCP, the definition of drought used in the *National Study of Water Management During Drought* is used:

> "Droughts are periods of time when natural or managed water systems do not provide enough water to meet established human and environmental uses because of natural shortfalls in precipitation or streamflow."

That definition defines drought in terms of its impact on water control regulation, reservoir levels, and associated conservation storage. Water management actions during droughts are intended to balance the water use and water availability to meet water use needs. Because of hydrologic variability, there cannot be 100 percent reliability that all water demands are met. Droughts occasionally will be declared and mitigation or emergency actions initiated to lessen the stresses placed on the water resources within a river basin. Those responses are tactical measures to conserve the available water resources (USACE 2009).

3-02. Drought Identification. There is no known method of predicting how severe or when a drought will occur. There are, however, indicators that are useful in determining when conditions are favorable: below normal rainfall; lower than average inflows; and low reservoir levels, especially immediately after the spring season when rainfall and runoff conditions are normally the highest. When conditions indicate that a drought is imminent, the Corps Water Management Section (WMS) and APC will increase the monitoring of the conditions and evaluate the impacts on reservoir projects if drought conditions continue or become worse for 30-, 60-, or 90-day periods. Additionally, WMS and APC will determine if a change in operating criteria would aid in the total regulation of the river system and if so, what changes would provide the maximum benefits from any available water.

Various products are used to detect and monitor the extent and severity of basin drought conditions. One key indicator is the U.S. Drought Monitor available through the U.S. Drought Portal, www.drought.gov. The National Weather Service (NWS) Climate Prediction Center (CPC) also develops short-term (6- to 10-day and 8- to 14-day) and long-term (1-month and 3-month) precipitation and temperature outlooks and a U.S. Seasonal Drought Outlook, which are useful products for monitoring dry conditions. The Palmer Drought Severity Index is also used as a drought reference. The Palmer index assesses total moisture by using temperature and precipitation to compute water supply and demand and soil moisture. It is considered most relevant for non-irrigated cropland and primarily reflects long-term drought. However, the index requires detailed data and cannot reflect an operation of a reservoir system. The state climatologists also produce a Lawn and Garden Index, which gives a basin-wide ability to determine the extent and severity of drought conditions. The runoff forecasts developed for both short- and long-range periods reflect drought conditions when appropriate. There is also a heavy reliance on the latest El Niño Southern Oscillation (ENSO) forecast modeling to represent the potential effects of La Niña on drought conditions and spring inflows. Long-range models are used with greater frequency during drought conditions to forecast potential effects on reservoir elevations, ability to meet minimum flows, and water supply availability. A long-term, numerical model, Extended Streamflow Prediction, developed by the NWS, provides probabilistic forecasts of streamflow and reservoir stages on the basis of climatic, streamflow, and soil moisture. Extended Streamflow Prediction results are used in projecting possible future drought conditions. Other parameters and models can indicate a lack of rainfall and runoff and the degree of severity and continuance of a drought. Models using data of previous droughts or a percent of current to mean monthly flows with several operational schemes have proven helpful in forecasting reservoir levels for water management planning purposes. Other parameters considered during drought management are the ability of the various lakes to meet the demands placed on storage, the probability that lake elevations will return to normal seasonal levels, basin streamflows, basin groundwater table levels, and the total available storage to meet hydropower marketing system demands.

3-03. Historical Droughts. Drought events have occurred in the ACT Basin with varying degrees of severity and duration. Five of the most significant historical basin wide droughts occurred in 1940-1941, 1954-1958, 1984-1989, 1999-2003, and 2006-2009. The 1984 to 1989 drought caused water shortages across the basin in 1986. This resulted in the need for the Corps to make adjustments in the water management practices. Water shortages occurred again from 1999 through 2002 and during 2007 through 2008. The 2006 to 2009 drought was the most devastating recorded in Alabama and western Georgia. Precipitation declines began in December 2005. These shortfalls continued through winter 2006-07 and spring 2007, exhibiting the driest winter and spring in the recorded period of record. The Corps and APC had water levels that were among the lowest recorded since the impoundments were constructed. North Georgia received less than 75 percent of normal precipitation (30-year average). The drought reached peak intensity in 2007, resulting in a D-4 Exceptional Drought Intensity (the worst measured) throughout the summer, 2007.

3-04. Severity. Water shortage problems experienced during droughts are not uniform throughout the ACT River Basin. Even during normal, or average, hydrologic conditions, various portions of the basin experience water supply problems. The severity of the problems are primarily attributed to the pattern of human habitation within the basin; the source of water utilized (surface water vs. ground water); and the characteristics of the water resources available for use. During droughts, these problems can be intensified. A severe drought in the basin develops when a deficiency of rainfall occurs over a long time period and has a typical duration of 18 to 24 months. The number of months of below normal rainfall is more significant in determining the magnitude of a drought in the basin than the severity of the deficiency in specific months. However, the severity of the rainfall deficiency during the normal spring wet season has a significant impact on the ability to refill reservoirs after the fall/winter drawdown period. Another confounding factor which influences droughts in the basin is the variability of rainfall over the basin, both temporarily and spatially.

IV – BASIN AND PROJECT DESCRIPTION

4-01. Basin Description. The headwater streams of the Alabama-Coosa-Tallapoosa (ACT) River Basin rise in the Blue Ridge Mountains of Georgia and Tennessee and flow southwest, combining at Rome, Georgia, to form the Coosa River. The confluence of the Coosa and Tallapoosa Rivers in central Alabama forms the Alabama River near Wetumpka, Alabama. The Alabama River flows through Montgomery and Selma and joins with the Tombigbee River at the mouth of the ACT Basin to form the Mobile River about 45 miles above Mobile, Alabama. The Mobile River flows into Mobile Bay at an estuary of the Gulf of Mexico. The total drainage area of the ACT Basin is approximately 22,800 square miles: 17,300 square miles in Alabama; 5,400 square miles in Georgia; and 100 square miles in Tennessee. A detailed description of the ACT River Basin is provided in the ACT Master Water Control Manual, Chapter II – Basin Description and Characteristics.

4-02. Project Description. The Corps operates five projects in the ACT Basin: Allatoona Dam and Lake on the Etowah River; Carters Dam and Lake and Reregulation Dam on the Coosawattee River; and Robert F. Henry Lock and Dam, Millers Ferry Lock and Dam, and

Claiborne Lock and Dam on the Alabama River. Claiborne is a lock and dam without any appreciable water storage behind it. Robert F. Henry and Millers Ferry are operated as run-of-river projects and only very limited pondage is available to support hydropower peaking and other project purposes. APC owns and operates eleven hydropower dams in the ACT Basin: seven dams on the Coosa River and four dams on the Tallapoosa River. Figure 1 depicts the percentage of conservation storage of each project in the ACT Basin. Figure 2 shows the project locations within the basin. Figure 3 provides a profile of the basin and each project.

A. General. Of the 16 reservoirs (considering Jordan Dam and Lake and Bouldin Dam as one reservoir and Carters Lake and Carters Reregulation Dam as one reservoir), Lake Martin on the Tallapoosa River has the greatest amount of storage, containing over 48 percent of the conservation storage in the ACT Basin. Allatoona Lake, R.L. Harris Lake, Weiss Lake, and Carters Lake are the next four largest reservoirs in terms of storage. APC controls approximately 77 percent of the available conservation storage; Corps projects (Robert F. Henry Lock and Dam, Millers Ferry Lock and Dam, Allatoona Lake, and Carters Lake) control 23 percent. The two most upstream Corps reservoirs, Allatoona Lake and Carters Lake, account for 18 percent of the total basin conservation storage.

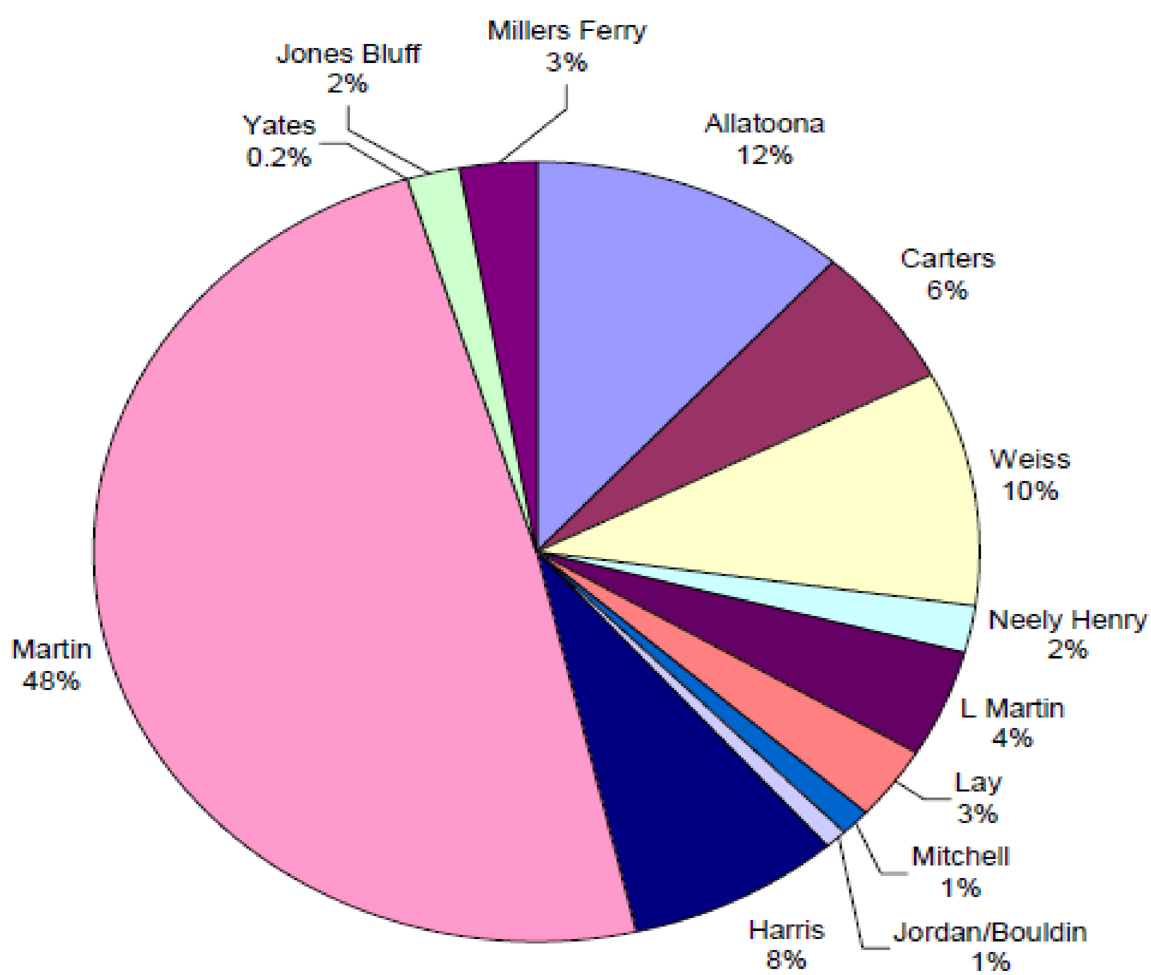

Figure 1. Percentage of conservation storage of each project in the ACT Basin

Figure 2. Alabama-Coosa-Tallapoosa River Basin Project Location Map

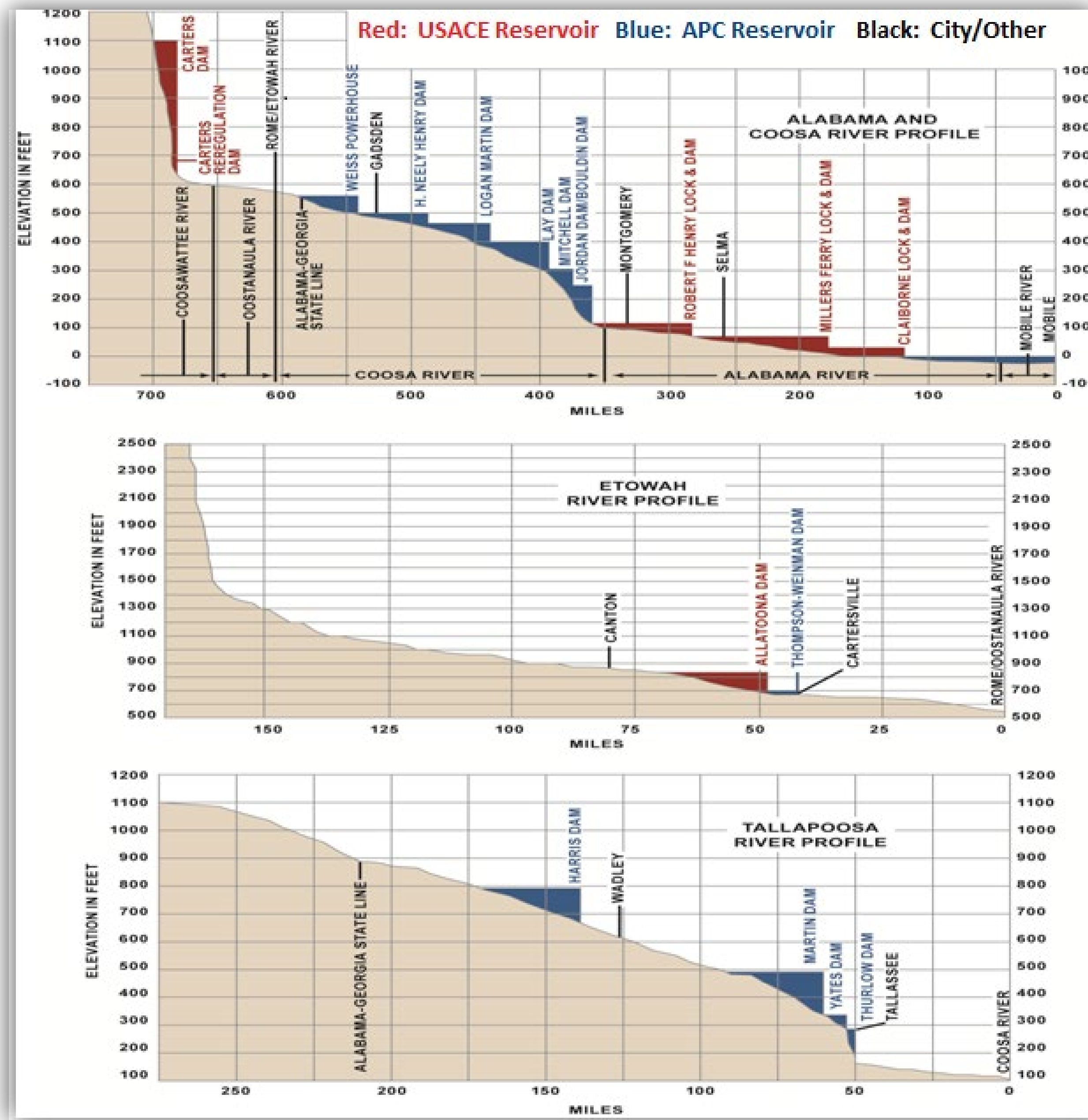

Figure 3. Alabama-Coosa-Tallapoosa River Basin Profile Map

B. Allatoona Dam and Lake. The Corps' Allatoona Dam on the Etowah River creates the 11,862-ac Allatoona Lake. The project's authorization, general features, and purposes are described in the Allatoona Dam and Lake Water Control Manual. The Allatoona Lake top of conservation pool is elevation 840 feet during the late spring and summer months (May through August); transitions to elevation 835 feet in the fall (October through mid-November); transitions to a winter drawdown to elevation 823 feet (1-15 January); and refills back to elevation 840 feet during the winter and spring wet season as shown in the water control plan guide curve (Figure 4). However, the lake level may fluctuate significantly from the guide curve over time, dependent primarily upon basin inflows but also influenced by project operations, evaporation, withdrawals, and return flows. A minimum flow of about 240 cfs is continuously released through a small unit, which generates power while providing a constant flow to the Etowah River downstream. Under drier conditions when basin inflows are reduced, project operations are adjusted to conserve storage in Allatoona Lake while continuing to meet project purposes in accordance with four action zones as shown on Figure 4.

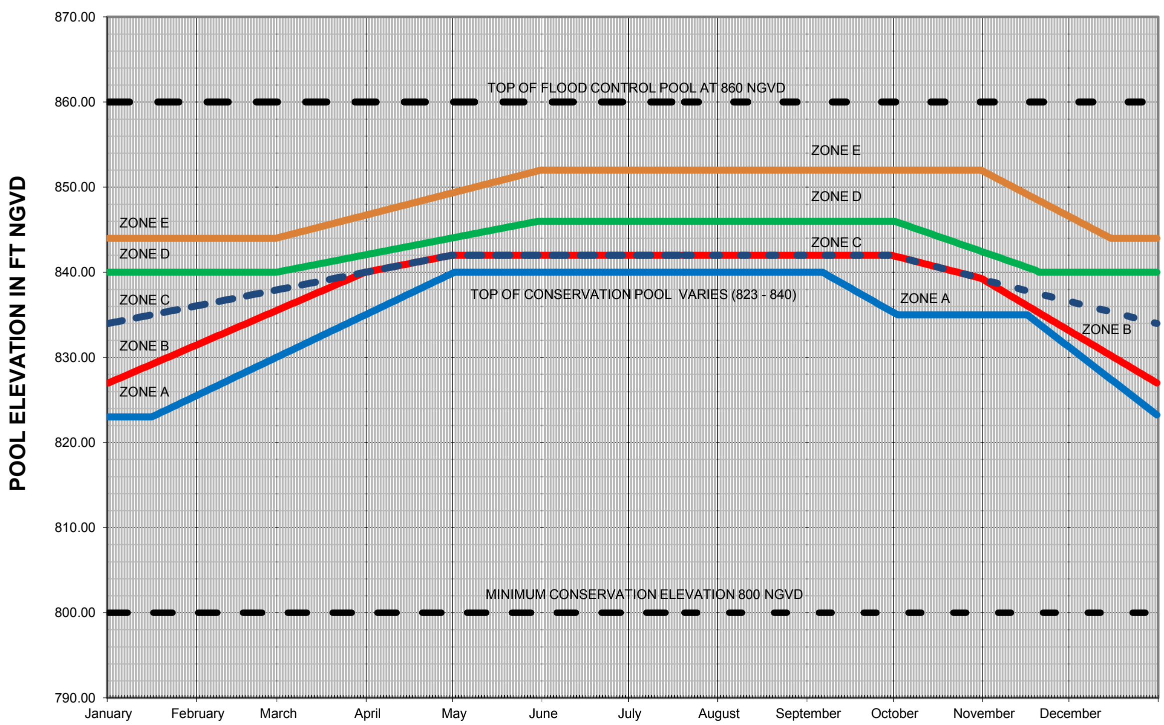

Figure 4. Allatoona Lake Guide Curve and Action Zones

C. Carters Dam and Lake and Reregulation Dam. Carters Lake is formed by Carters Dam, a Corps' reservoir on the Coosawattee River in northwest Georgia upstream of Rome, Georgia. The Carters Project is a pumped-storage peaking facility that utilizes a Reregulation Dam and storage pool in conjunction with the main dam and lake. The project's authorization, general features, and purposes are described in the Carters Dam and Lake and Regulation Dam water control manual. The Carters Lake top of conservation pool is elevation 1074 feet from May through September transitioning to elevation 1072 feet from mid October through mid April as shown in the water control plan guide curve (Figure 5). As expected with a peaking/pumped storage operation, both Carters Lake and the reregulation pool experience frequent elevation changes. Typically, water levels in Carters Lake vary no more than 1 to 2 feet per day. The reregulation pool will routinely fluctuate by several feet (variable) daily as the pool receives peak hydropower discharges from Carters Lake and serves as the source for pumpback operations into Carters Lake during non-peak hours. The reregulation pool will likely reach both its normal maximum elevation of 696 feet and minimum elevation of 677 feet at least once each week. However, the general trend of the lake level may fluctuate significantly from the guide curve over time, dependent primarily upon basin inflows but also influenced by project operations and evaporation. Carters Regulation Dam provides a seasonal varying minimum release to the Coosawattee River for downstream fish and wildlife enhancement. Under drier conditions when basin inflows are reduced, project operations are adjusted to conserve storage in Carters Lake while continuing to meet project purposes in accordance with action zones as shown on Figure 5. In Zone 2, Carters Regulations Dam releases are reduced to 240 cfs.

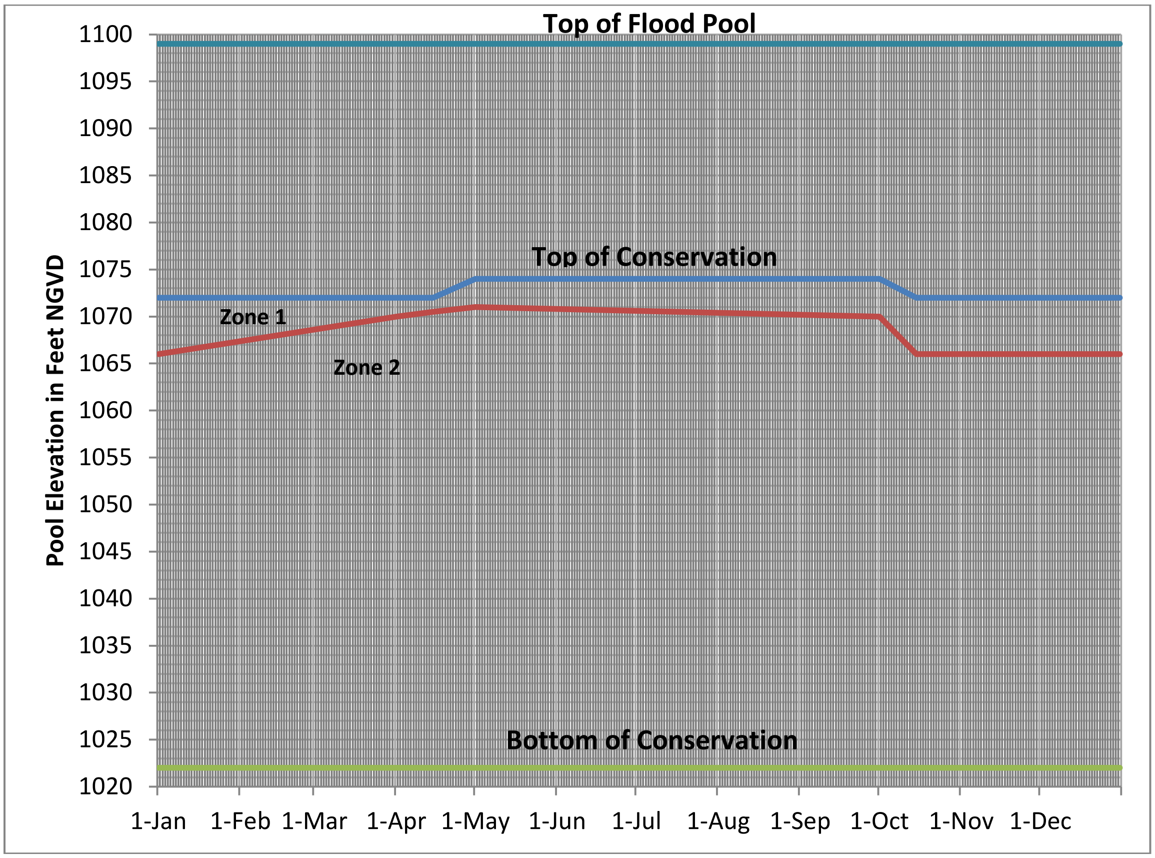

Figure 5. Carters Lake Guide Curve and Action Zones

D. APC Coosa River Projects. APC owns and operates the Coosa Hydro system of projects at Weiss Lake, H. Neely Henry Lake, Logan Martin Lake, Lay Lake, Mitchell Lake, and Jordan/Bouldin Dam and Lake on the Coosa River in the ACT Basin. APC Coosa River projects function mainly to generate electricity by hydropower. In addition, the upper 3 projects (Weiss, H. Neely Henry, and Logan Martin) operate pursuant to Public Law 83-436 regarding the requirement for the projects to be operated for flood risk management and navigation in accordance with reasonable rules and regulations of the Secretary of the Army. The rules and regulations are addressed in a memorandum of agreement between the Corps and APC, in individual water control manuals for the three projects, and in this ACT Basin DCP. The Weiss Lake is on the Coosa River in northeast Alabama, about 80 miles northeast of Birmingham, Alabama, and extends into northwest Georgia for about 13 miles upstream on the Coosa River.

The dam impounds a 30,200-ac reservoir (Weiss Lake) at the normal summer elevation of 564 feet as depicted in the regulation guide curve shown in Figure 6. The H. Neely Henry Lake is on the Coosa River in northeast Alabama, about 60 mi northeast of Birmingham, Alabama. The dam impounds an 11,200-acre reservoir at the normal summer elevation of 508 feet as depicted in the regulation guide curve shown in Figure 7. The Logan Martin Lake is in northeast Alabama on the Coosa River, about 40 miles east of Birmingham, Alabama. The dam impounds a 15,263-acre reservoir at the normal summer elevation of 465 feet as depicted in the regulation guide curve shown in Figure 8. The projects' authorizations, general features, and purposes are described in the Weiss, H. Neely Henry, and Logan Martin water control manual appendices to the ACT Basin Master Water Control Manual.

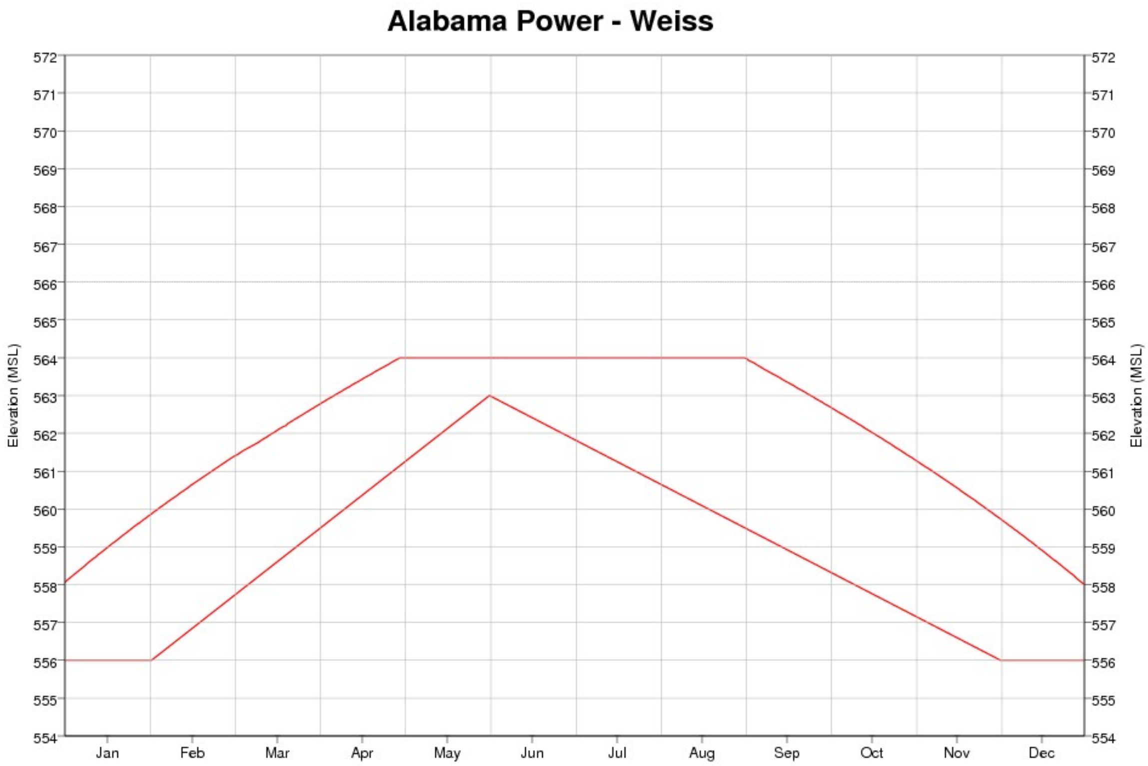

Figure 6. Weiss Lake Guide Curve

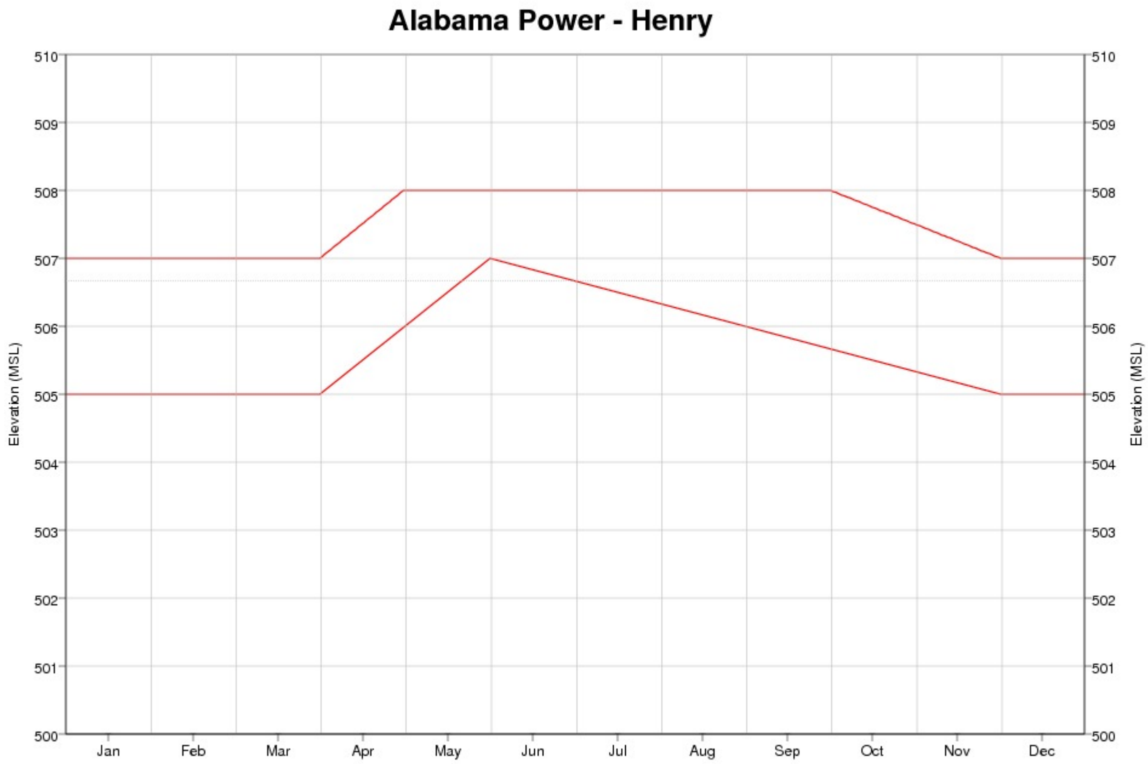

Figure 7. H. Neely Henry Lake Guide Curve

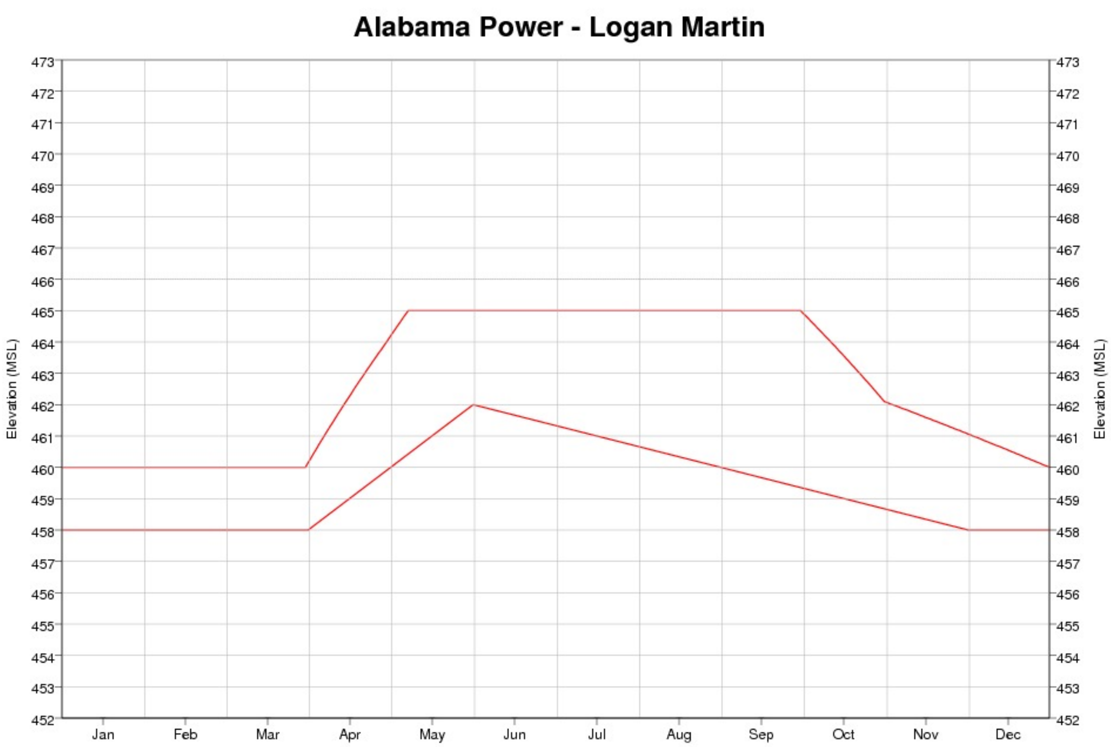

Figure 8. Weiss Lake Guide Curve

The downstream Coosa River APC run-of-river hydropower projects (Lay Dam and Lake, Mitchell Dam and Lake, and Jordan/Bouldin Dams and Lake) have no appreciable storage and are operated in conjunction with the upstream Coosa projects to meet downstream flow requirements and targets in support of the ACT Basin Drought Plan and navigation.

E. APC Tallapoosa River Projects. APC owns and operates the Tallapoosa River system of projects at Harris Dam and Lake, Martin Dam and Lake, Yates Dam, and Thurlow Dam in the ACT Basin. APC Tallapoosa River projects function mainly to generate electricity by hydropower. In addition, the Robert L. Harris Project operates pursuant to Public Law 83-436 regarding the requirement for the project to be operated for flood risk management and navigation in accordance with reasonable rules and regulations of the Secretary of the Army. The rules and regulations are addressed in a memorandum of agreement between the Corps and APC, in individual water control manual for the APC project, and in this ACT Basin DCP.

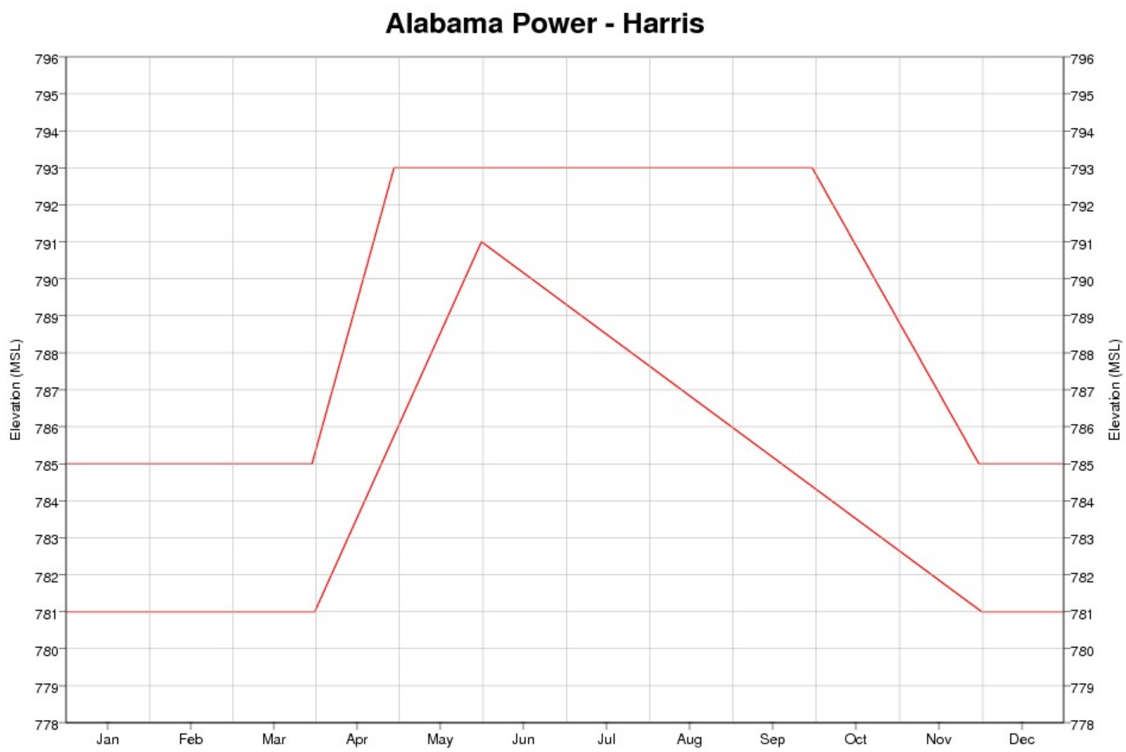

Figure 9. Robert L. Harris Lake Guide Curve

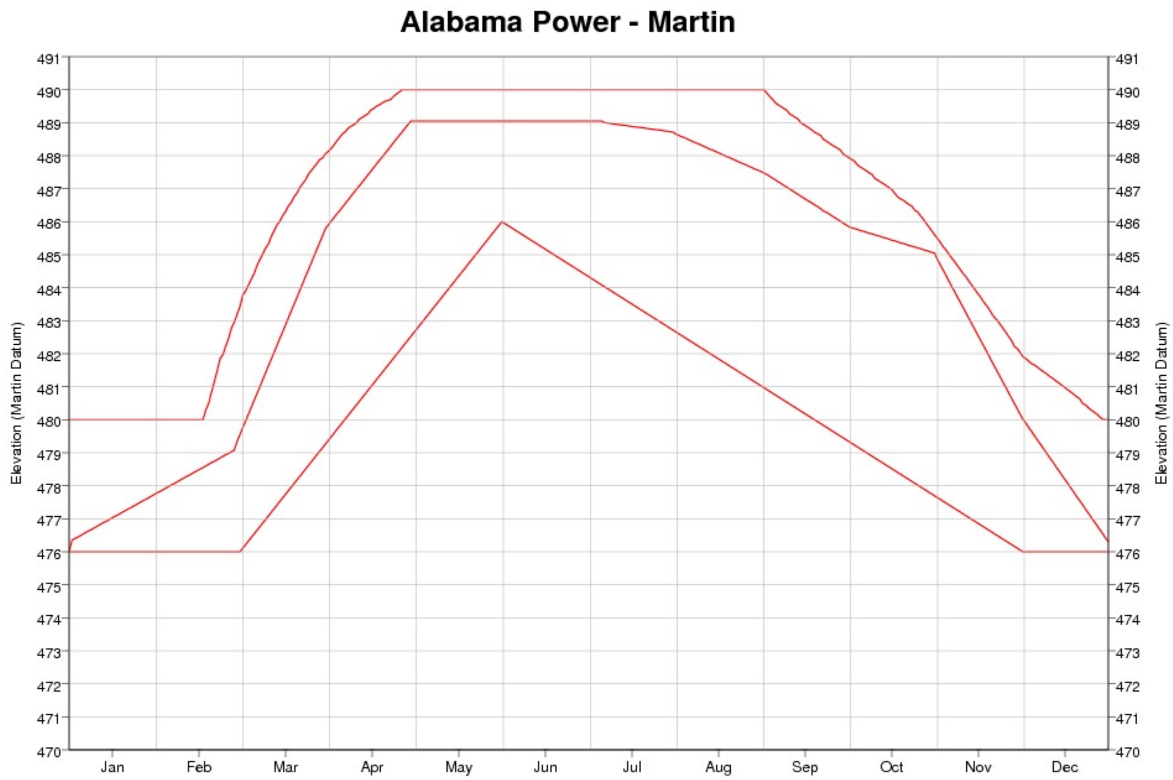

Figure 10. Martin Lake Guide Curve

F. Corps Alabama River Projects. The Corps operates three run-of-river lock and dam projects (Robert F. Henry, Millers Ferry, Claiborne) on the Alabama River in the lower ACT Basin to support commercial navigation. Claiborne Lake, together with R.E. "Bob" Woodruff Lake and William "Bill" Dannelly Lake, are collectively referred to as the Alabama River Lakes. The primary location used for communicating the available reliable navigation depth is the Claiborne Lock and Dam tailwater elevation. The water surface elevation is related to the available navigation depth based on the latest hydrographic surveys of the lower Alabama River reach downstream of Claiborne.

(1) Robert F. Henry. The R.E. "Bob" Woodruff Lake is created by the Robert F. Henry Lock and Dam on the Alabama River, 281 miles upstream of Mobile Bay. R.E. "Bob" Woodruff Lake extends from the Robert F. Henry Lock and Dam upstream to the Walter Bouldin Dam. In addition to hydropower and navigation, R.E. "Bob" Woodruff Lake provides recreation and fish and wildlife conservation. R.E. "Bob" Woodruff Lake is 77 miles long and averages 1,300 feet wide. It has a surface area of 12,500 ac and a storage capacity of 234,200 acre-feet (ac-ft) at a normal pool elevation of 125 feet. Lake levels are typically fairly stable with minimal fluctuation between the operating pool elevation limits, 123 feet to 126 feet. The emergency drawdown pool elevation is 122 feet. An authorized 9-foot deep by 200-foot wide navigation channel exists over the entire length of the lake. The Jones Bluff hydropower plant generating capacity is 82 MW. The lake is a popular recreation destination, receiving up to two million visitors annually.

(2) Millers Ferry. The William "Bill" Dannelly Lake is created by the Millers Ferry Lock and Dam on the Alabama River, 178 miles upstream of Mobile Bay. William "Bill" Dannelly Lake is 103 miles long and averages almost 1,400 feet wide. The reservoir has a surface area of

18,528 ac and a storage capacity of 346,254 ac-ft at a normal full pool elevation of 80.8 feet. Lake levels remain fairly stable on a day-to-day basis with minimal fluctuation between the operating pool elevation limits, 79 feet to 80.8 feet. An authorized 9-foot deep by 200-foot wide navigation channel extends the entire length of the reservoir. The facility is a multipurpose reservoir constructed by the Corps for both navigation and hydropower. The reservoir also provides recreational benefits and has lands managed for wildlife mitigation. The Millers Ferry hydropower plant generating capacity is 90 MW. The reservoir provides ample recreation opportunities. Recreation visitors number three million annually.

(3) Claiborne. Claiborne Lake is created by the Claiborne Lock and Dam on the Alabama River about 118 miles upstream of Mobile Bay. The lake is similar to a wide river, averaging about 800 feet wide, with a surface area of 5,930 acres. Claiborne Lake extends 60 miles upstream to the Millers Ferry Lock and Dam. Storage capacity in the lake is 96,360 acre-feet (ac-ft) at a normal pool elevation of 35 feet. The operating pool elevation limits are between 32 feet and 36 feet. The lake has an authorized 9-foot deep, 200-foot wide navigation channel extending its entire length. The primary purpose of the Corps project is navigation. No hydropower generating capability exists at the project. The lake also provides recreation benefits and lands managed for wildlife mitigation.

G. As other ACT water management objectives are addressed, lake levels might decline during prime recreation periods. Drought conditions will cause further drawdowns in lake levels. While lake levels will be slightly higher than what would naturally occur if no specific drought actions are taken, reservoir levels will decline thus triggering impacts associated with reaching initial recreation and water access limited levels. Large reservoir drawdowns impact recreational use: access to the water for boaters and swimmers is inhibited; submerged hazards (e.g., trees, shoals, boulders) become exposed or nearly exposed, posing safety issues; and exposed banks and lake bottoms become unsightly and diminish the recreation experience. Consequently certain levels are identified in each Corps impoundment at which recreation would be affected. The *Initial Impact level* (IIL) represents the level at which recreation impacts are first observed (i.e., some boat launching ramps are unusable, most beaches are unusable or minimally usable, and navigation hazards begin to surface). The *Recreation Impact level* (RIL) defines the level at which major impacts on concessionaires and recreation are observed (more ramps are not usable, all beaches are unusable, boats begin having problems maneuvering in and out of marina basin areas, loss of retail business occurs). The level at which severe impacts are observed in all aspects of recreational activities is called the *Water Access Limited level* (WAL). At this point, all or almost all boat ramps are out of service, all swimming beaches are unusable, major navigation hazards occur, channels to marinas are impassable and/or wet slips must be relocated, and a majority of private boat docks are unusable. The individual project water control manuals describe the specific impact levels at each project and provides information regarding the effects of the water control plans on recreation.

V – WATER USES AND USERS

5-01. Water Uses and Users.

A. Uses – The ACT Basin rivers and lakes are a major source of water supply by many cities, industries, and farms for wastewater dilution, municipal water supply, fish and wildlife propagation, hydropower generation, and recreational boating and fishing.

B. Users – The following tables list the surface water uses and water users within Georgia and Alabama in the ACT Basin.

Table 2. Surface water use: ACT Basin (Georgia 2005)

Water use category	Quantity (mgd)	% of total
Total Use	788.98	100%
Public Supply	154.78	19.6%
Domestic and Commercial	0.30	0.0%
Industrial and Mining	32.49	4.1%
Irrigation	11.31	1.4%
Livestock	16.18	2.1%
Thermoelectric Power Generation	573.92	72.8%

Table 3. M&I surface water withdrawal permits in the ACT Basin (Georgia)

River basin	Permit holder	Permit number	County	Source water	Permit limit max day (mgd)	Permit limit monthly average (mgd)
Coosa River Basin (Georgia)—upstream counties to downstream counties						
Coosa	Dalton Utilities - Conasauga R	155-1404-01	Whitfield	Conasauga River	49.400	40.300
Coosa	Dalton Utilities - Mill Creek	155-1404-02	Whitfield	Mill Creek	13.200	7.500
Coosa	Dalton Utilities - Coahulla Cr	155-1404-03	Whitfield	Coahulla Creek	6.000	5.000
Coosa	Dalton Utilities - Freeman Springs	155-1404-04	Whitfield	Freeman Springs	2.000	1.500
Coosa	Dalton Utilities - River Road	155-1404-05	Whitfield	Conasauga River	35.000	18.000
Coosa	Chatsworth Water Works Commission	105-1405-01	Murray	Holly Creek	1.100	1.000
Coosa	Chatsworth Water Works Commission	105-1405-02	Murray	Eton Springs	1.800	1.800
Coosa	Chatsworth Water Works Commission	105-1409-01	Murray	Carters Lake	2.550	2.300
Coosa	Chatsworth, City of	105-1493-02	Murray	Coosawattee River	2.200	2.000
Coosa	Ellijay, City of - Ellijay R	061-1407-01	Gilmer	Ellijay River	0.550	0.450
Coosa	Ellijay - Gilmer County W & S Authority	061-1408-01	Gilmer	Cartecay River	4.000	4.000
Coosa	Calhoun, City of	064-1411-03	Gordon	Big Spring	7.000	6.000
Coosa	Calhoun, City of	064-1412-01	Gordon	City Of Calhoun Spring	0.638	0.537
Coosa	Calhoun, City of	064-1492-02	Gordon	Oostanaula River	6.200	3.000

Table 3 (continued). M&I surface water withdrawal permits in the ACT Basin (Georgia)

River basin	Permit holder	Permit number	County	Source water	Permit limit max day (mgd)	Permit limit monthly average (mgd)
Coosa	Calhoun, City of	064-1493-01	Gordon	Coosawattee River	18.000	16.000
Coosa	Jasper, City of	112-1417-02	Pickens	Long Swamp Creek	1.000	1.000
Coosa	Bent Tree Community, Inc.	112-1417-03	Pickens	Chestnut Cove Creek and unnamed creek	0.250	0.230
Coosa	Bent Tree Community, Inc.	112-1417-04	Pickens	Lake Tamarack	0.250	0.230
Coosa	Big Canoe Utilities Company, Inc.	112-1417-05	Pickens	Lake Petit	1.000	1.000
Coosa	Big Canoe Utilities Company, Inc.	112-1417-06	Pickens	Blackwell Creek	2.650	2.650
Coosa	Etowah Water & Sewer Authority	042-1415-01	Dawson	Etowah River	5.500	4.400
Coosa	Cherokee County Water & Sewerage Auth	028-1416-01	Cherokee	Etowah River	43.200	36.000
Coosa	Gold Kist, Inc	028-1491-03	Cherokee	Etowah River	5.000	4.500
Coosa	Canton, City of	028-1491-04	Cherokee	Etowah River	23.000	18.700
Coosa	Canton, City of (Hickory Log Creek)	028-1491-05	Cherokee	Etowah River	39.000	39.000
Coosa	Bartow County Water Department	008-1411-02	Bartow	Bolivar Springs	0.800	0.800
Coosa	Adairsville, City of	008-1412-02	Bartow	Lewis Spring	5.100	4.100
Coosa	New Riverside Ochre Company, Inc.	008-1421-01	Bartow	Etowah River	5.000	5.000
Coosa	New Riverside Ochre Company, Inc.	008-1421-02	Bartow	Etowah River	6.000	6.000
Coosa	Emerson, City of	008-1422-02	Bartow	Moss Springs	0.630	0.500
Coosa	Gerdau AmeriSteel US, Inc. – Cartersville Steel Mill	008-1423-01	Bartow	Pettit Creek	2.000	1.500
Coosa	Baroid Drilling Fluids, Inc.	008-1423-02	Bartow	Etowah River	3.400	2.500
Coosa	Cartersville, City of	008-1423-04	Bartow	Etowah River	26.420	23.000
Coosa	Georgia Power Co. - Plant Bowen	008-1491-01	Bartow	Etowah River	520.000	85.000
Coosa	CCMWA	008-1491-05	Bartow	Lake Allatoona	86.000	78.000
Coosa	Cartersville, City of	008-1491-06	Bartow	Lake Allatoona	21.420	18.000
Coosa	La Fayette, City of - Dry Creek	146-1401-01	Walker	Dry Creek	1.000	0.900
Coosa	La Fayette, City of - Big Spring	146-1401-02	Walker	Big Spring	1.650	1.310
Coosa	Mount Vernon Mills - Riegel Apparel Div.	027-1401-03	Chattooga	Trion Spring	9.900	6.600
Coosa	Summerville, City of	027-1402-02	Chattooga	Raccoon Creek	3.000	2.500
Coosa	Summerville, City of	027-1402-04	Chattooga	Lowe Spring	0.750	0.500
Coosa	Mohawk Industries, Inc.	027-1402-05	Chattooga	Chattooga R./ Raccoon Cr.	4.500	4.000
Coosa	Oglethorpe Power Corp.	057-1402-03	Floyd	Heath Creek	3,838.000	3,030.000
Coosa	Floyd County - Brighton Plant	057-1414-02	Floyd	Woodward Creek	0.800	0.700

Table 3 (continued). M&I surface water withdrawal permits in the ACT Basin (Georgia)

River basin	Permit holder	Permit number	County	Source water	Permit limit max day (mgd)	Permit limit monthly average (mgd)
Coosa	Cave Spring, City of	057-1428-06	Floyd	Cave Spring	1.500	1.300
Coosa	Floyd County	057-1428-08	Floyd	Old Mill Spring	4.000	3.500
Coosa	Berry Schools, The (Berry College)	057-1429-01	Floyd	Berry (Possum Trot) Reservoir	1.000	0.700
Coosa	Inland-Rome Inc.	057-1490-01	Floyd	Coosa River	34.000	32.000
Coosa	Georgia Power Co. - Plant Hammond	057-1490-02	Floyd	Coosa River	655.000	655.000
Coosa	Rome, City of	057-1492-01	Floyd	Oostanaula & Etowah R	18.000	16.400
Coosa	Rockmart, City of	115-1425-01	Polk	Euharlee Creek	2.000	1.500
Coosa	Vulcan Construction Materials, L.P.	115-1425-03	Polk	Euharlee Creek	0.200	0.200
Coosa	Cedartown, City of	115-1428-04	Polk	Big Spring	3.000	2.600
Coosa	Polk County Water Authority	115-1428-05	Polk	Aragon, Morgan, Mulco Springs	1.600	1.100
Coosa	Polk County Water Authority	115-1428-07	Polk	Deaton Spring	4.000	4.000
Tallapoosa River Basin (Georgia)						
Tallapoosa	Haralson County Water Authority	071-1301-01	Haralson	Tallapoosa River	3.750	3.750
Tallapoosa	Bremen, City of	071-1301-02	Haralson	Beech Creek & Bremen Reservoir (Bush Creek)	0.800	0.580
Tallapoosa	Bowdon, City of - Indian	022-1302-01	Carroll	Indian Creek	0.400	0.360
Tallapoosa	Southwire Company	022-1302-02	Carroll	Buffalo Creek	2.000	1.000
Tallapoosa	Villa Rica, City of	022-1302-04	Carroll	Lake Paradise & Cowens Lake	1.500	1.500
Tallapoosa	Carrollton, City of	022-1302-05	Carroll	Little Tallapoosa River	12.000	12.000
Tallapoosa	Bowdon, City of - Lake Tysinger	022-1302-06	Carroll	Lake Tysinger	1.000	1.000

Source: GAEPD 2009a

Table 4. M&I surface water withdrawals in the ACT Basin (Georgia)

Basin (subbasin)	Withdrawal by	County	Withdrawal (mgd)
Coosa River Basin (Georgia)			
Coosa (Conasauga)	Dalton Utilities	Whitfield	35.38
Coosa (Conasauga)	City of Chatsworth	Murray	1.26
Coosa (Coosawattee)	Ellijay-Gilmer County Water System	Gilmer	3.12
Coosa (Coosawattee)	City of Fairmount	Gordon	0.06
Coosa (Oostanaula)	City of Calhoun	Gordon	9.10
Coosa (Etowah)	Big Canoe Corporation	Pickens	0.48
Coosa (Etowah)	City of Jasper	Pickens	1.00
Coosa (Etowah)	Bent Tree Community	Pickens	0.07
Coosa (Etowah)	Lexington Components Inc (Rubber))	Pickens	0.01
Coosa (Etowah)	Etowah Water and Sewer Authority	Dawson	1.50
Coosa (Etowah)	Town of Dawsonville	Dawson	0.10
Coosa (Etowah)	City of Canton	Cherokee	2.83
Coosa (Etowah)	Cherokee County Water System	Cherokee	15.81
Coosa (Etowah)	Gold Kist, Inc.	Cherokee	1.94

Table 4 (continued). M&I surface water withdrawals in the ACT Basin (Georgia)

Basin (subbasin)	Withdrawal by	County	Withdrawal (mgd)
Coosa (Etowah)	City of Cartersville	Bartow	13.26
Coosa (Etowah)	New Riverside Ochre Company, Inc (Chemicals)	Bartow	1.67
Coosa (Etowah)	Gerdau AmeriSteel US, Inc. – Cartersville Steel Mill (Primary metals)	Bartow	0.16
Coosa (Etowah)	Georgia Power Co – Plant Bowen	Bartow	38.92
Coosa (Etowah)	CCMWA	Bartow	44.42
Coosa (Upper Coosa)	City of Lafayette	Walker	1.20
Coosa (Upper Coosa)	City of Summerville	Chattooga	2.05
Coosa (Upper Coosa)	Mount Vernon Mills – Riegel Apparel Division (Textiles)	Chattooga	2.74
Coosa (Oostanaula)	(Domestic/Commercial)	Floyd	0.30
Coosa (Etowah / Oostanaula)	City of Rome	Floyd	9.98
Coosa (Upper Coosa)	Floyd County Water System	Floyd	2.57
Coosa (Upper Coosa)	Inland-Rome Inc. (Paper)	Floyd	25.74
Coosa (Upper Coosa)	Georgia Power Co - Plant Hammond	Floyd	535.00
Coosa (Upper Coosa)	Polk County Water Authority	Polk	2.22
Coosa (Etowah)	Vulcan Construction Materials	Polk	0.09
Tallapoosa River Basin (Georgia)			
Tallapoosa (Upper)	City of Bremen	Haralson	0.32
Tallapoosa (Upper)	Haralson County Water Authority	Haralson	2.05
Tallapoosa (Upper)	City of Bowdon	Carroll	0.75
Tallapoosa (Upper)	Southwire Company	Carroll	0.09
Tallapoosa (Upper)	City of Carrollton	Carroll	5.37
Tallapoosa (Upper)	City of Temple	Carroll	0.26
Tallapoosa (Upper)	City of Villa Rica	Carroll	0.58
Tallapoosa (Upper)	Carroll County Water System	Carroll	4.08

Table 5. Surface water use - ACT Basin (Alabama, 2005) (mgd)

ACT subbasin	HUC	Public supply	Industrial	Irrigation	Livestock	Thermo-electric	Total, by subbasin
Upper Coosa	03150105	2.12	0	3.10	0.40	0	5.62
Middle Coosa	03150106	33.24	65.83	7.91	0.87	142.68	250.53
Lower Coosa	03150107	10.96	0.89	5.10	0.35	812.32	829.62
Upper Tallapoosa	03150108	0.90	0	0.15	0.40	0	1.45
Middle Tallapoosa	03150109	19.09	0	0.52	0.32	0	19.93
Lower Tallapoosa	03150110	38.22	2.23	4.22	0.28	0	44.95
Upper Alabama	03150201	10.40	30.63	3.84	0.84	4.14	49.85
Cahaba	03150202	52.90	0	3.49	0.25	0	56.64
Middle Alabama	03150203	0	21.04	1.73	0.48	0	23.25
Lower Alabama	03150204	0	54.61	0.64	0.02	0	55.27
Total - By Use Category		167.83	175.23	30.70	4.21	959.14	1337.11

Source: Hutson et al. 2009

Table 6. M&I surface water withdrawals in the ACT Basin (Alabama)

Basin (subbasin)	Withdrawal by	County	Withdrawal (mgd)
Coosa River Basin (Alabama)			
Coosa (Upper)	Centre Water Works & Sewer Board	Cherokee	1.19
Coosa (Upper)	Piedmont Water Works & Sewer Board	Calhoun	0.93
Coosa (Middle)	Jacksonville Water Works & Sewer Board	Calhoun	1.34
Coosa (Middle)	Anniston Water Works & Sewer Board	Calhoun	0.08
Coosa (Middle)	Fort Payne Water Works Board	DeKalb	8.10
Coosa (Middle)	Goodyear Tire and Rubber Company	Etowah	9.87
Coosa (Middle)	Gadsden Water Works & Sewer Board	Etowah	14.86
Coosa (Middle)	Alabama Power Co – Gadsden Steam Plant	Etowah	142.68
Coosa (Middle)	SIC 32 – Unnamed Stone, Glass, Clay, and/or Concrete Products	St. Clair	3.49
Coosa (Middle)	Talladega/Shelby Water Treatment Plant	Talladega	6.44
Coosa (Middle)	Talladega County Water Department	Talladega	0.81
Coosa (Middle)	Talladega Water Works & Sewer Board	Talladega	1.62
Coosa (Middle)	Bowater Newsprint, Coosa Pines Operation	Talladega	52.47
Coosa (Lower)	Sylacauga Utilities Board	Talladega	3.25
Coosa (Lower)	SIC 22 – Unnamed Textile	Talladega	0.89
Coosa (Lower)	Goodwater Water Works & Sewer Board	Coosa	0.46
Coosa (Lower)	Alabama Power Co – E.C. Gaston Plant	Shelby	812.32
Coosa (Lower)	Clanton Waterworks & Sewer Board	Chilton	1.79
Coosa (Lower)	Five Star Water Supply	Elmore	5.46
Tallapoosa River Basin (Alabama)			
Tallapoosa (Upper)	Heflin Water Works	Cleburne	0.51
Tallapoosa (Upper)	Wedowee Gas, Water, and Sewer	Randolph	0.39
Tallapoosa (Middle)	Roanoke Utilities Board	Randolph	1.29
Tallapoosa (Middle)	Clay County Water Authority	Clay	1.87
Tallapoosa (Middle)	Lafayette	Chambers	0.53
Tallapoosa (Middle)	Central Elmore Water & Sewer Authority	Elmore	4.83
Basin (subbasin)	**Withdrawal by**	**County**	**Withdrawal (mgd)**
Tallapoosa (Middle)	Alexander City Water Department	Tallapoosa	10.57
Tallapoosa (Lower)	West Point Home, Inc	Lee	2.23
Tallapoosa (Lower)	Opelika Water Works Board	Lee	2.61
Tallapoosa (Lower)	Auburn Water Works Board	Lee	5.75
Tallapoosa (Lower)	Tallassee	Tallapoosa	1.98
Tallapoosa (Lower)	Tuskegee Utilities	Macon	2.71
Tallapoosa (Lower)	Montgomery Water Works & Sewer Board	Montgomery	25.17
Alabama River Basin			
Alabama (Upper)	Montgomery Water Works & Sewer Board	Montgomery	10.40
Alabama (Upper)	International Paper	Autauga	30.63
Alabama (Upper)	Southern Power Co – Plant E. B. Harris	Autauga	4.14
Alabama (Cahaba)	Birmingham Water Works & Sewer Board	Shelby	52.90
Alabama (Middle)	International Paper – Pine Hill	Wilcox	21.04
Alabama (Lower)	Alabama River Pulp Company	Monroe	54.61

Source: Hutson et al. 2009

VII – DROUGHT MANAGEMENT PLAN

7-01. General. The Drought Contingency Plan (DCP) for the ACT Basin implements drought conservation actions on the basis of composite system storage, state line flows, and basin inflow as triggers to drive drought response actions. The DCP also recognizes that a basin-wide drought plan must incorporate variable hydropower generation requirements from its headwater projects in Georgia (Allatoona Dam and Carters Dam), a reduction in the level of navigation service provided on the Alabama River as storage across the basin declines, and that environmental flow requirements must still be met to the maximum extent practicable. The Act basin-wide drought plan is composed of three components - Headwater regulation at Allatoona Lake and Carters Lake in Georgia; Regulation at APC projects on the Coosa and Tallapoosa Rivers; and Downstream Alabama River regulation at Corps projects downstream of Montgomery, Alabama.

A. Headwater Regulation for Drought at Allatoona Lake and Carters Lake. Drought regulation at Allatoona Lake and Carters Lake consists of progressively reduced hydropower generation as pool levels decline in accordance with the conservation storage action zones established in the projects' water control plans. For instance, when Allatoona Lake is operating in normal conditions (Conservation storage Zone 1); hydropower generation typically ranges from 0 to 4 hours per day. However, as the pool drops to lower action zones during drought conditions, generation could be reduced to 0 to 2 hours per day. As Carters Lake pool level might drop into a conservation storage Zone 2, seasonal varying minimum target flows would be reduced to 240 cfs. The water control plan for each project describes the drought water control regulation plan in more detail.

B. Drought Regulation at APC Projects on the Coosa, Tallapoosa, and Alabama River. Regulation guidelines for the Coosa, Tallapoosa, and Alabama Rivers have been defined in a drought regulation matrix (Table 7) on the basis of a Drought Intensity Level (DIL). The DIL is a drought indicator, ranging from zero to three. The DIL is determined on the basis of three basin drought criteria (or triggers). A DIL 0 indicates normal regulation, while a DIL from 1 to 3 indicates some level of drought conditions. The DIL increases as more of the drought indicator thresholds (or triggers) are exceeded. The drought regulation matrix defines minimum average daily flow requirements on a monthly basis for the Coosa, Tallapoosa, and Alabama Rivers as a function of the DIL and time of year. The combined occurrences of the drought triggers determine the DIL. Three intensity levels for drought operations are applicable to APC projects.

- DIL 0 — (normal operation) no triggers exceeded
- DIL 1 — (moderate drought) 1 of 3 triggers exceeded
- DIL 2 — (severe drought) 2 of 3 triggers exceeded
- DIL 3 — (exceptional drought) all 3 triggers exceeded

(1) Drought Indicators. The indicators used to determine drought intensity include the following:

1. **Low basin inflow**. The total basin inflow needed for navigation is the sum of the total filling volume plus 7Q10 flow (4,640 cfs). Table 8 lists the monthly low basin inflow criteria. All numbers are in cfs-days. The basin inflow value is computed daily and checked on the 1st and 15th of the month. If computed basin inflow is less than the value required, the low basin inflow indicator is triggered. The basin inflow is total flow above the APC projects excluding Lake Allatoona and Carters Lake. It is the sum of local flows, minus lake evaporation and diversions. Figure 11 illustrates the local inflows to the Coosa and Tallapoosa Basins. The basin inflow computation differs from the navigation basin inflow, because it does not include releases from Lake Allatoona and Carters Lake. The intent is to capture the hydrologic condition across APC projects in the Coosa and Tallapoosa Basins.

Table 7. ACT Basin Drought Regulation Plan Matrix

<table>
<tr><th></th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th colspan="2">Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td rowspan="4">Drought Level Response[a]</td><td colspan="13">DIL 0 - Normal Operations</td></tr>
<tr><td colspan="13">DIL 1: Low Basin Inflows or Low Composite or Low State Line Flow</td></tr>
<tr><td colspan="13">DIL 2: DIL 1 criteria + (Low Basin Inflows or Low Composite or Low State Line Flow)</td></tr>
<tr><td colspan="13">DIL 3: Low Basin Inflows + Low Composite + Low State Line Flow</td></tr>
<tr><td rowspan="4">Coosa River Flow[b]</td><td colspan="3">Normal Operation: 2,000 cfs</td><td colspan="2">4,000 (8,000)</td><td colspan="2">4,000 – 2,000</td><td colspan="6">Normal Operation: 2,000 cfs</td></tr>
<tr><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="3">4,000 +/- cfs</td><td>6/15 Linear Ramp down</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="3">Jordan 2,000 +/-cfs</td></tr>
<tr><td colspan="3">Jordan 1,800 +/-cfs</td><td colspan="3">2,500 +/- cfs</td><td>6/15 Linear Ramp down</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="3">Jordan 1,800 +/-cfs</td></tr>
<tr><td colspan="3">Jordan 1,600 +/-cfs</td><td colspan="4">Jordan 1,800 +/-cfs</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="2">Jordan 1,800 +/-cfs</td><td>Jordan 1,600 +/- cfs</td></tr>
<tr><td rowspan="4">Tallapoosa River Flow[c]</td><td colspan="13">Normal Operations: 1200 cfs</td></tr>
<tr><td colspan="4">Greater of: 1/2 Yates Inflow or 2 x Heflin Gage(Thurlow Lake releases > 350 cfs)</td><td colspan="6">1/2 Yates Inflow</td><td colspan="3">1/2 Yates Inflow</td></tr>
<tr><td colspan="4">Thurlow Lake 350 cfs</td><td colspan="6">1/2 Yates Inflow</td><td colspan="3">Thurlow Lake 350 cfs</td></tr>
<tr><td colspan="7">Maintain 400 cfs at Montgomery WTP (Thurlow Lake release 350 cfs)</td><td colspan="3">Thurlow Lake 350 cfs</td><td colspan="3">Maintain 400 cfs at Montgomery WTP (Thurlow Lake release 350 cfs)</td></tr>
<tr><td rowspan="4">Alabama River Flow[d]</td><td colspan="13">Normal Operation: Navigation or 7Q10 flow</td></tr>
<tr><td colspan="4">4,200 cfs (10% 7Q10 Cut) - Montgomery</td><td colspan="6">7Q10 - Montgomery (4,640 cfs)</td><td colspan="3">Reduce: Full – 4,200 cfs</td></tr>
<tr><td colspan="5">3,700 cfs (20% 7Q10 Cut) - Montgomery</td><td colspan="5">4,200 cfs (10% 7Q10 Cut) - Montgomery</td><td colspan="3">Reduce: 4,200 cfs-> 3,700 cfs Montgomery (1 week ramp)</td></tr>
<tr><td colspan="4">2,000 cfs Montgomery</td><td colspan="3">3,700 cfs Montgomery</td><td colspan="3">4,200 cfs (10% 7Q10 Cut) - Montgomery</td><td colspan="3">Reduce: 4,200 cfs -> 2,000 cfs Montgomery (1 month ramp)</td></tr>
<tr><td rowspan="4">Guide Curve Elevation</td><td colspan="13">Normal Operations: Elevations follow Guide Curves as prescribed in License (Measured in Feet)</td></tr>
<tr><td colspan="13">Corps Variances: As Needed; FERC Variance for Lake Martin</td></tr>
<tr><td colspan="13">Corps Variances: As Needed; FERC Variance for Lake Martin</td></tr>
<tr><td colspan="13">Corps Variances: As Needed; FERC Variance for Lake Martin</td></tr>
</table>

a. Note these are based flows that will be exceeded when possible.
b .Jordan flows are based on a continuous +/- 5% of target flow.
c. Thurlow Lake flows are based on continuous +/- 5% of target flow: flows are reset on noon each Tuesday based on the prior day's daily average at Heflin or Yates. d. Alabama River flows are 7-Day Average Flow.

Table 8. Low Basin Inflow Guide (in cfs-days)

Month	Coosa Filling Volume	Tallapoosa Filling Volume	Total Filling Volume	7Q10 flow	Required Basin Inflow
Jan	629	0	629	4,640	5,269
Feb	647	1,968	2,615	4,640	7,255
Mar	603	2,900	3,503	4,640	8,143
Apr	1,683	2,585	4,268	4,640	8,908
May	242	0	242	4,640	4,882
Jun			0	4,640	4,640
Jul			0	4,640	4,640
Aug			0	4,640	4,640
Sep	–602	–1,304	–1,906	4,640	2,734
Oct	–1,331	–2,073	–3,404	4,640	1,236
Nov	–888	–2,659	–3,547	4,640	1,093
Dec	–810	–1,053	–1,863	4,640	2,777

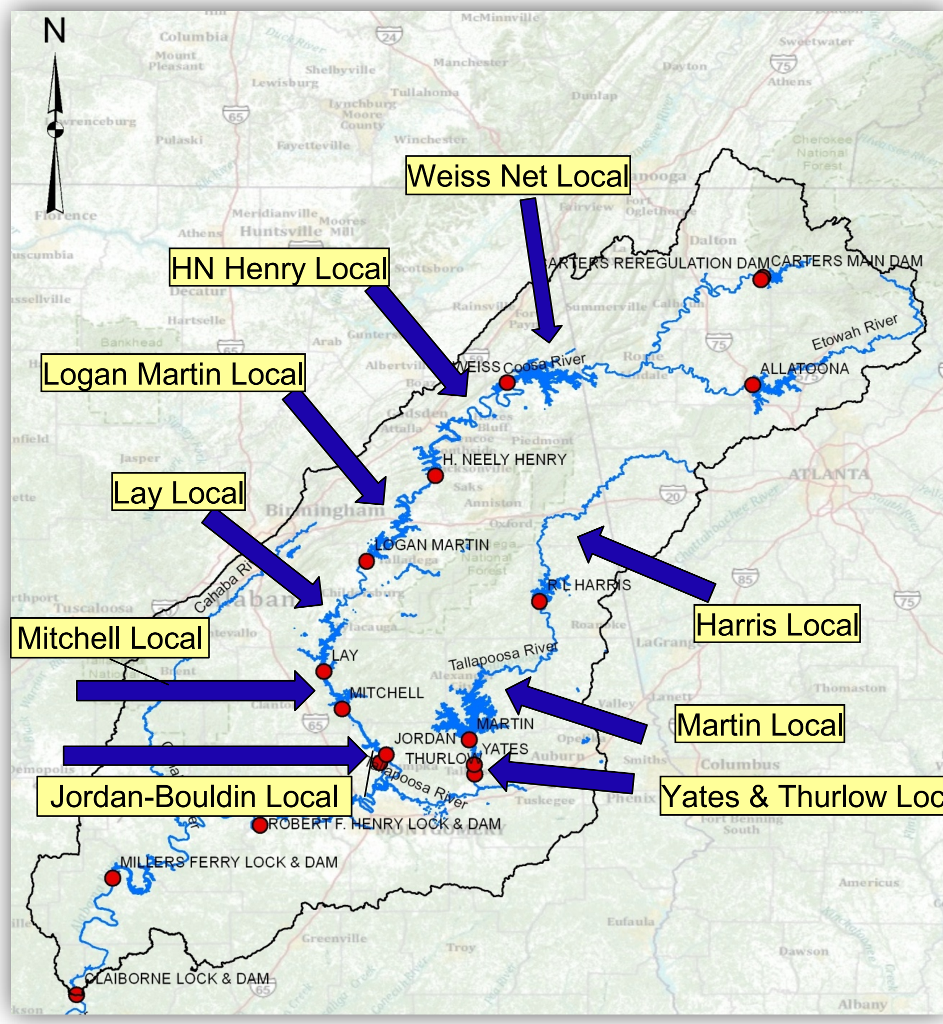

Figure 11. ACT Basin Inflows

2. **Low composite conservation storage**. Low composite conservation storage occurs when the APC projects' composite conservation storage is less than or equal to the storage available within the drought contingency curves for the APC reservoirs. Composite conservation storage is the sum of the amounts of storage available at the current elevation for each reservoir down to the drought contingency curve at each APC major storage project. The reservoirs considered for the trigger are R.L. Harris Lake, H. Neely Henry Lake, Logan Martin Lake, Lake Martin, and Weiss Lake. Figure 12 plots the APC composite zones. Figure 13 plots the APC low composite conservation storage trigger. If the actual active composite conservation storage is less than or equal to the active composite drought zone storage, the low composite conservation storage indicator is triggered. That computation is performed on the 1st and 15th of each month, and is considered along with the low state line flow trigger and basin inflow trigger.

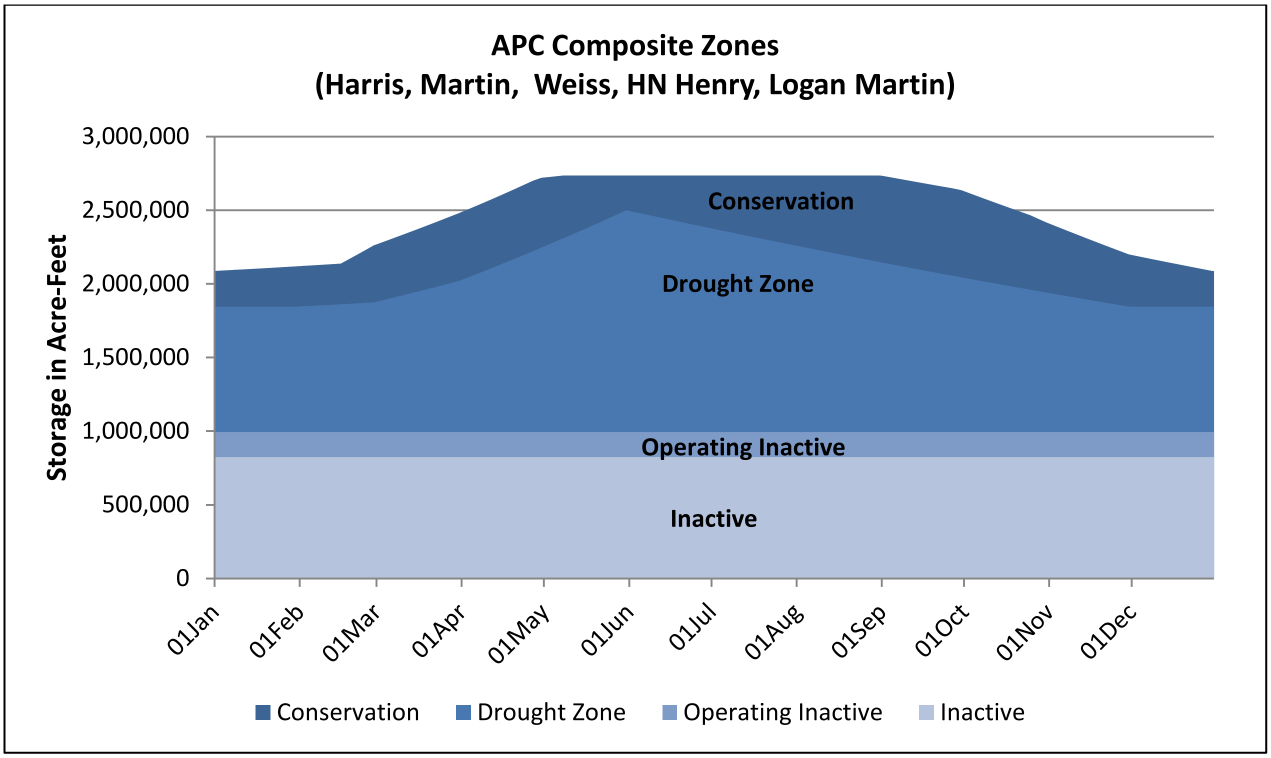

Figure 12. APC Composite Zones

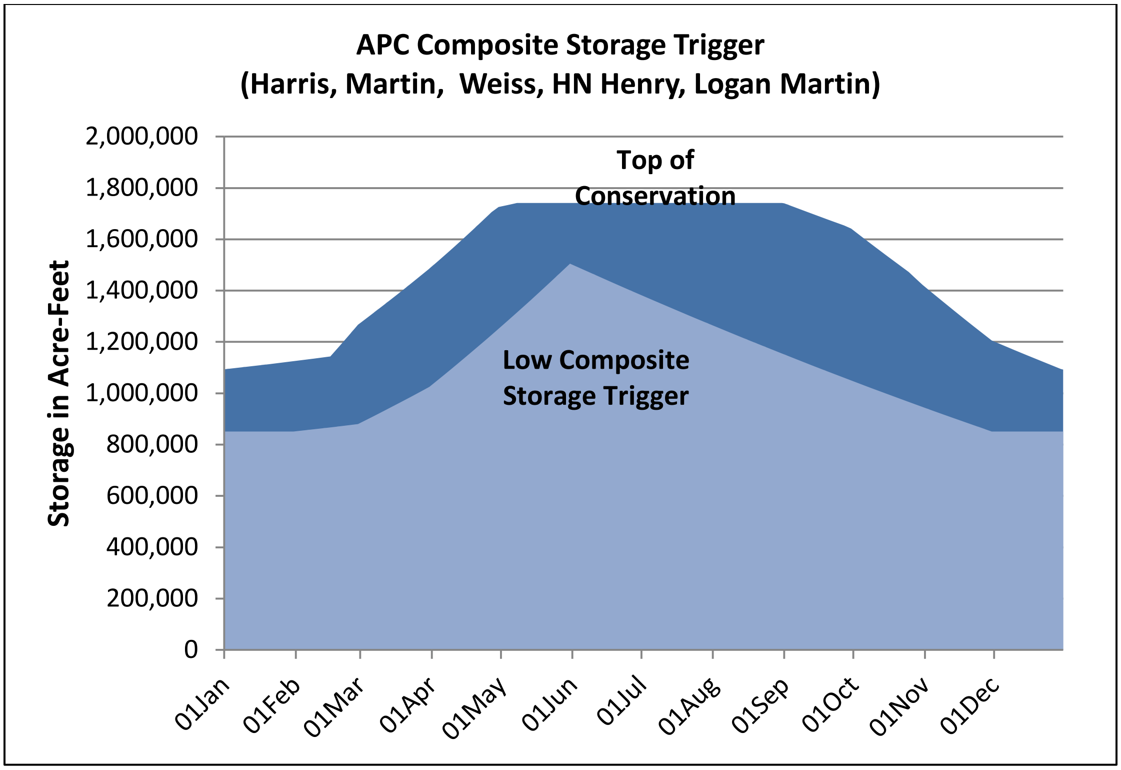

Figure 13. APC Low Composite Conservation Storage Drought Trigger

3. **Low state line flow**. A low state line flow trigger occurs when the Mayo's Bar USGS gage measures a flow below the monthly historical 7Q10 flow. The 7Q10 flow is defined as the lowest flow over a 7-day period that would occur once in 10 years. Table 9 lists the Mayo's Bar 7Q10 value for each month. The lowest 7-day average flow over the past 14 days is computed and checked at the 1st and 15th of the month. If the lowest 7-day average value is less than the Mayo's Bar 7Q10 value, the low state line flow indicator is triggered. If the result is greater than or equal to the trigger value from Table 9, the flow is considered normal, and the state line flow indicator is not triggered. The term state line flow is used in developing the drought management plan because of the proximity of the Mayo's Bar gage to the Alabama-Georgia state line and because it relates to flow data upstream of the Alabama-based APC reservoirs. State line flow is used only as a source of observed data for one of the three triggers and does not imply that targets exist at that geographic location. The ACT Basin drought matrix does not include or imply any Corps regulation that would result in water management decisions at Carters Lake or Lake Allatoona.

Table 9. State Line Flow Trigger

Month	Mayo's Bar (7Q10 in cfs)
Jan	2,544
Feb	2,982
Mar	3,258
Apr	2,911
May	2,497
Jun	2,153
Jul	1,693
Aug	1,601
Sep	1,406
Oct	1,325
Nov	1,608
Dec	2,043

Note: Based on USGS Coosa River at Rome Gage (Mayo's Bar, USGS 02397000) observed flow from 1949 to 2006

(2) Drought Regulation. The DIL is computed on the 1st and 15th of each month. Once a drought operation is triggered, the DIL can only recover from drought condition at a rate of one level per period. For example, as the system begins to recover from an exceptional drought with DIL 3, the DIL must be stepped incrementally back to zero to resume normal operations. In that case, even if the system triggers return to normal quickly, it will still take at least a month before normal operations can resume — conditions can improve only to DIL 2 for the next 15 days, then DIL 1 for the next 15 days, before finally returning to DIL 0.

For DIL 0, the matrix shows a Coosa River flow between 2,000 cfs and 4,000 cfs with peaking periods up to 8,000 cfs occurring. The required flow on the Tallapoosa River is a constant 1,200 cfs throughout the year. The navigation flows on the Alabama River are applied to the APC projects. The required navigation depth on the Alabama River is subject to the basin inflow.

For DIL 1, the Coosa River flow varies from 2,000 cfs to 4,000 cfs. On the Tallapoosa River, part of the year, the required flow is the greater of one-half of the inflow into Yates Lake and twice the Heflin USGS gage. For the remainder of the year, the required flow is one-half of Yates Lake inflow. The required flows on the Alabama River are reduced from the amounts when DIL 0.

For DIL 2, the Coosa River flow varies from 1,800 cfs to 2,500 cfs. On the Tallapoosa River, the minimum is 350 cfs for part of the year and one-half of Yates Lake inflow for the remainder of the year. The requirement on the Alabama River is between 3,700 cfs and 4,200 cfs.

For DIL 3, the flows on the Coosa River range from 1,600 cfs to 2,000 cfs. A constant flow of 350 cfs on the Tallapoosa River is required. It is assumed an additional 50 cfs will occur between Thurlow Lake and the city of Montgomery, Alabama. Required flows on the Alabama River range from 2,000 cfs to 4,200 cfs

In addition to the flow regulation for drought conditions, the DIL affects the flow regulation to support navigation operations. When the DIL is equal to zero, APC projects are operated to meet the needed navigation flow target or the 7Q10 flow as defined in the navigation measure section. Once DIL is greater than zero, drought operations will occur, and flow regulation to support navigation operations is suspended.

7-02. Extreme Drought Conditions. An extreme drought condition exists when the remaining composite conservation storage is depleted, and additional emergency actions may be necessary. When conditions have worsened to this extent, utilization of the inactive storage must be considered. Such an occurrence would typically be contemplated in the second or third year of a drought. Inactive storage capacities have been identified for the two federal projects with significant storage (Figures 14 and 15). The operational concept established for the extreme drought impact level and to be implemented when instituting the use of inactive storage is based on the following actions:

(1) Inactive storage availability is identified to meet specific critical water use needs within existing project authorizations.

(2) Emergency uses and users will be identified in accordance with emergency authorizations and through stakeholder coordination. Typical critical water use needs within the basin are associated with public health and safety.

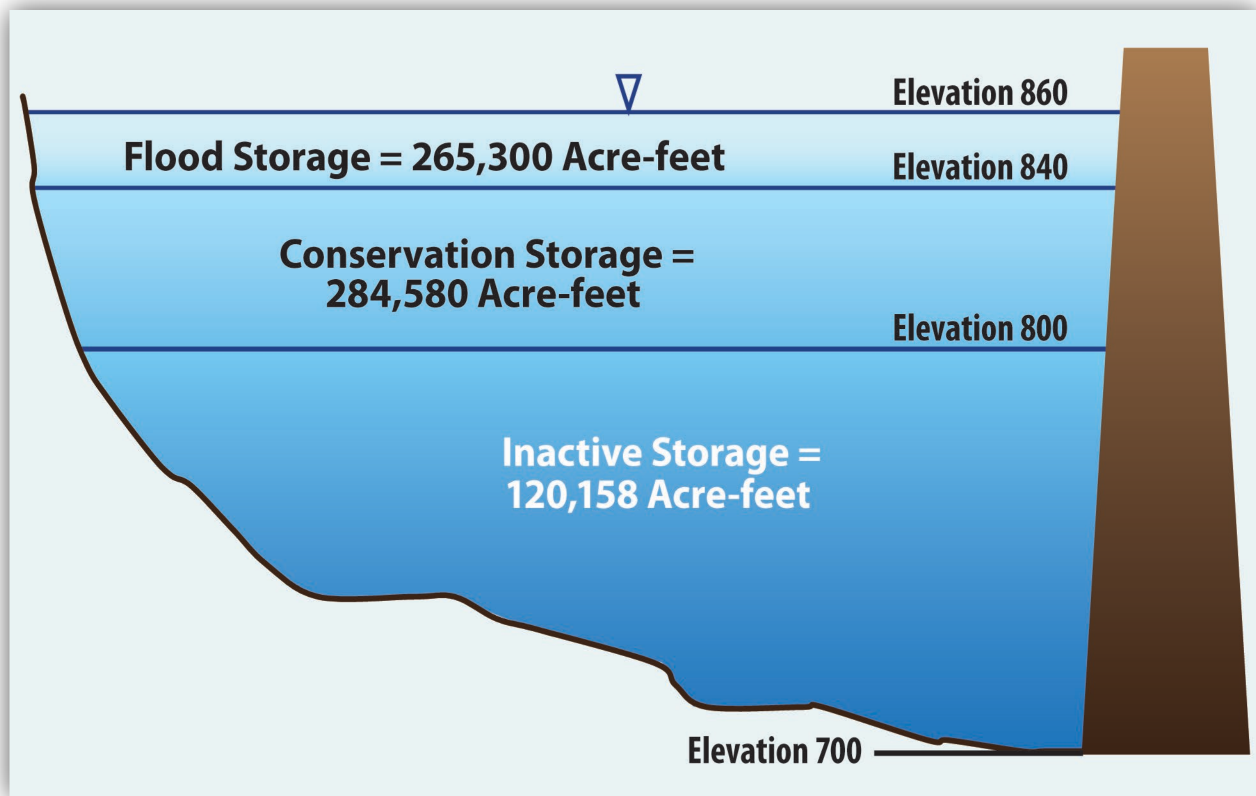

Figure 14. Storage in Lake Allatoona

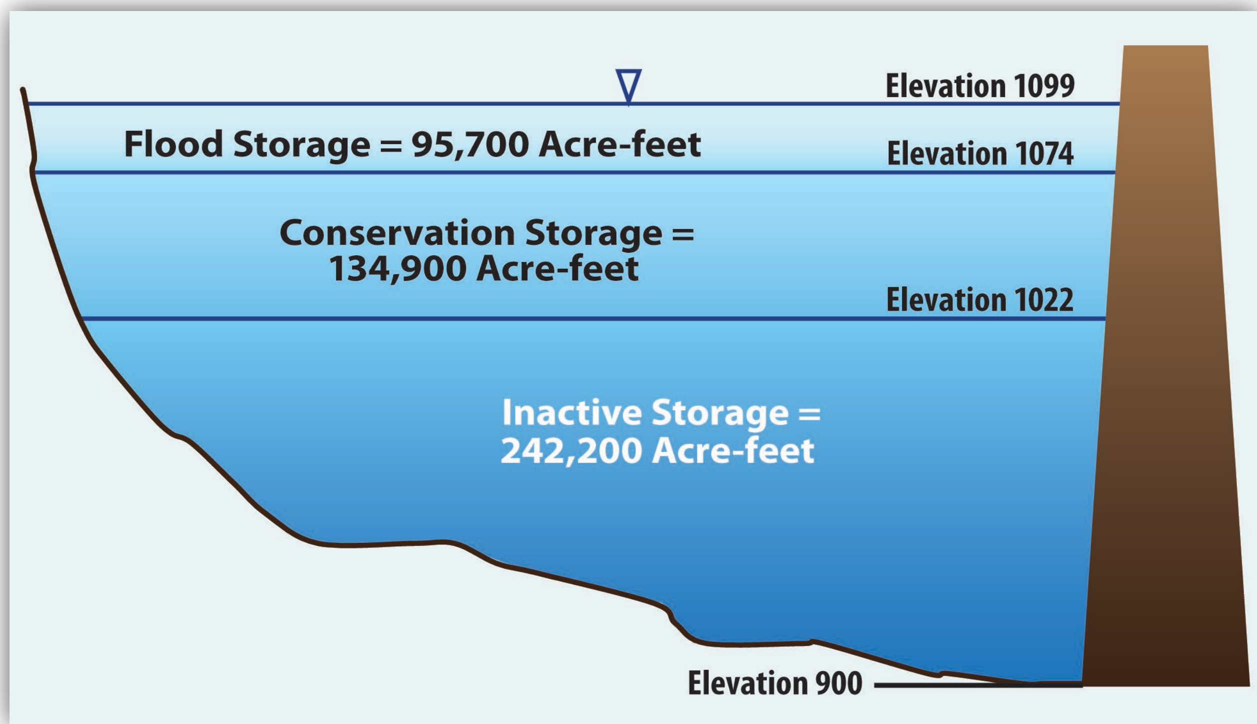

Figure 15. Storage in Carters Lake

(3) Weekly projections of the inactive storage water availability to meet the critical water uses in the ACT Basin will be utilized when making water control decisions regarding withdrawals and water releases from the federal reservoirs.

(4) The inactive storage action zones will be developed and instituted as triggers to meet the identified priority water uses (releases will be restricted as storage decreases).

(5) Dam safety considerations will always remain the highest priority. The structural integrity of the dams due to static head limitations will be maintained.

VIII – DROUGHT MANAGEMENT COORDINATION AND PROCEDURES

8-01. USACE Coordination. It is the responsibility of the Mobile District Water Management Section and APC to monitor climatological and hydrometeorological conditions at all times to make prudent water management decisions with water conservation as a priority. The Water Management Section makes daily decisions and coordinates regularly with APC and with other district representatives from the various areas for which the river systems are operated -- hydropower, recreation, navigation, environmental, and others to exchange information concerning the operation of the river system. This coordination includes conducting weekly meetings with these other district elements. Daily water management decisions regarding water availability, lake level forecasts, and storage forecasts are determined using the information obtained along with current project and basin hydrometeorological data. A weekly District River System Status report is prepared that summarizes the conditions in each of the river basins. When conditions become evident that normal low flow conditions are worsening, the Water Management Section will elevate the district coordination to a heightened awareness. When drought conditions are imminent, Emergency Management representatives will be notified of the conditions and will be included in the regular coordination activities.

8-02. Interagency Coordination. The Water Management Section will support the environmental team regarding actions that require coordination with the U.S. Fish and Wildlife Service (USFWS) for monitoring threatened and endangered species and with the Environmental Protection Agency (EPA), Georgia Environmental Protection Division (GAEPD), and Alabama Department of Environmental Management (ADEM) regarding requests to lower water quality minimum flow targets below Claiborne Dam.

8-03. Public Information and Coordination. When conditions determine that a change in the water control actions from normal regulation to drought regulation is imminent, it is important that various users of the system are notified so that any environmental or operational preparations can be completed prior to any impending reduction in reservoir discharges, river levels, and reservoir pool levels. In periods of severe drought within the ACT Basin it will be within the discretion of the Division Commander to approve the enactment of ACT Basin Water Management conference calls. The purposes of the calls are to share ongoing water management decisions with basin stakeholders and to receive stakeholder input regarding needs and potential impacts to users within the basin. Depending upon the severity of the drought conditions, the calls will be conducted at regular monthly or bi-weekly intervals. Should issues arise, more frequent calls would be implemented.

a. Local Press and Corps Bulletins. The local press consists of periodic publications in or near the ACF Basin. Montgomery, Columbus, and Atlanta have some of the larger daily papers. The papers often publish articles related to the rivers and streams. Their representatives have direct contact with the Corps through the Public Affairs Office. In addition, they can access the Corps Web pages for the latest project information. The Corps and the

Mobile District also publish e-newsletters regularly, but they are not widely distributed to the general public. Complete, real-time information is available at the Mobile District's Water Management homepage http://www.sam.usace.army.mil/water/. The Mobile District Public Affairs Office issues press releases as necessary to provide the public with information regarding Water Management issues and activities and also provides information via the Mobile District web site.

IX – REFERENCES

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EXHIBIT E

EMERGENCY CONTACT INFORMATION

Emergency Contact Information

<u>Alabama Power Company:</u>

Reservoir Operations Supervisor	(205) 257-1401
Reservoir Operations Supervisor Alternate Daytime	(205) 257-4010
Reservoir Operations Supervisor After-Hours	(205) 257-4010

<u>US Army Corps of Engineers:</u>

Water Management Section	(251) 690-2737
Chief of Water Management	(251) 690-2730 or (251) 509-5368
R. L. Harris Powerhouse	(256) 396-0081