US Army Corps of Engineers ®
Mobile District

MASTER WATER CONTROL MANUAL

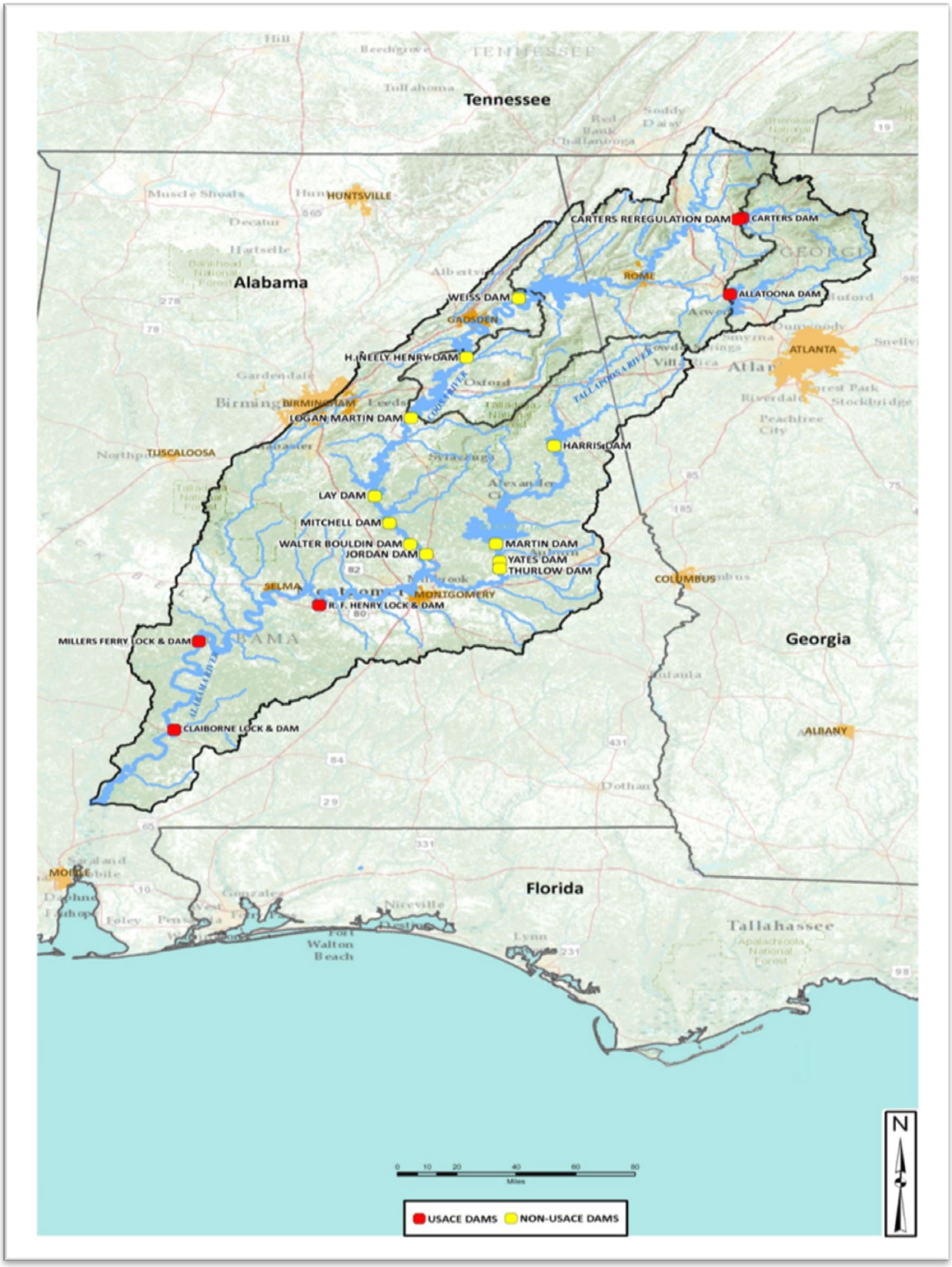
ALABAMA-COOSA-TALLAPOOSA (ACT) RIVER BASIN

ALABAMA, GEORGIA

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

Final Draft

March 2013



ACT River Basin

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 Division's approval date.

REGULATION ASSISTANCE PROCEDURES

If unusual conditions arise, contact can be made with the Water Management Section, Mobile District Office at (251) 690-2737 during regular duty hours and (251) 490-9535 during non-duty hours. The individual projects can be reached at the following telephone numbers during regular duty hours:

Allatoona Dam and Lake (Allatoona Powerhouse) - (770) 382-4700

Carters Dam and Lake and Reregulation Dam (Carters Powerhouse) - (706) 334-2640

Robert F. Henry Lock and Dam (Jones Bluff Powerhouse) - (334) 875-4400

Millers Ferry Lock and Dam (Millers Ferry Powerhouse) – (334) 682-9124

Claiborne Lock and Dam (Lock Foreman) – (334) 872-4017 or
(Millers Ferry Powerhouse) – (334) 682-9124.

UNIT CONVERSION

This manual uses the U.S. Customary System of Units (English units). Exhibit A contains a conversion table that can be used for common unit conversions and for unit conversion to the metric system of 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). It is the U.S. Army Corps of Engineers' (Corps) policy that the designed, constructed, and maintained elevation grades of projects be reliably and accurately referenced to a consistent nationwide framework, or vertical datum - i.e., the National Spatial Reference System (NSRS) or the National Water Level Observation Network (NWLON) maintained by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration. The current orthometric vertical reference datum within the NSRS in the continental United States is the North American Vertical Datum of 1988 (NAVD88). The current NWLON National Tidal Datum Epoch is 1983 - 2001. The relationships among existing, constructed, or maintained project grades that are referenced to local or superseded datums (e.g., NGVD29, MSL), the current NSRS, and/or hydraulic/tidal datums, have been established per the requirements of Engineering Regulation (ER) 1110-2-8160 and in accordance with the standards and procedures as outlined in Engineering Manual 1110-2-6056. A Primary Project Control Point (PPCP) has been established at each of the five federal projects and linked to the NSRS. Information on the PPCP, for each project, and the relationship between current and legacy datums are in Exhibit B of each project water control manual appendix.

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PERTINENT DATA
FOR EXISTING RESERVOIR PROJECTS IN THE
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

Allatoona Dam

Structure type	Gravity concrete
Length	1,250 feet
Maximum height	200 feet
Lake elevation (full summer pool)	840 feet NGVD29
Lake elevation (full winter pool)	823 feet NGVD29
Lake area acres (elev 840)	11,862 acres
Shoreline miles (elev 840)	270 miles
Drainage area	1,122 square miles
Generating capacity (declared)	82.2 MW

Carters Dam

Structure type	Rock fill and earth fill
Length	2,053feet
Maximum height	445 feet
Lake elevation (full summer pool)	1,074 feet NGVD29
Lake elevation (full winter pool)	1,072 feet NGVD29
Lake area acres (elev 1,074)	3,275 acres
Shoreline miles (elev 1,074)	62.7 miles
Drainage area	374 square miles
Generating capacity (declared)	600 MW

Carters Reregulation Dam

Structure type	Gated spillway with rock-fill dikes
Length	2,855 feet
Maximum pool elevation	698 feet NGVD29
Top of dike elevation	703 feet NGVD29
Lake area acres	870 acres
Usable Storage	17,210 acre-feet
Drainage area (local to reregulation pool)	148 square miles
Spillway Gates	4 @ 42 feet long by 36.5 feet high

Robert F. Henry Lock and Dam

Structure type	Gravity concrete and earth fill
Length (earth dikes)	15,290 feet
Length (concrete)	646 feet
Maximum height	105 feet
Lake elevation	126 feet NGVD29
Lake area acres	13,500 acres
Shoreline miles	368 miles
Drainage area	16,233 square miles
Generating capacity (declared)	82 MW

Millers Ferry Lock and Dam

Structure type	Gravity concrete and earth fill
Length (earth dikes)	15,300 feet
Length (concrete)	994 feet

Maximum height	140 feet
Lake elevation	80.8 feet NGVD29
Lake area acres	18,528 acres
Shoreline miles	516 miles
Drainage area	20,637 square miles
Generating capacity (declared)	90 MW

Claiborne Lock and Dam

Structure type	Gravity concrete and earth fill
Length (earth dikes)	2,550 feet
Length concrete)	916 feet
Maximum height	75 feet
Lake elevation	36 feet NGVD29
Lake area acres	6,290 acres
Shoreline miles	204 miles
Drainage area	21,473 square miles
Generating capacity	N/A

R. L. Harris Dam

Structure type	Gravity concrete
Length	1,142 feet
Maximum height	151 feet
Lake elevation	793 feet NGVD29
Lake area acres	10,660 acres
Shoreline miles	271 miles
Drainage area	1,453 square miles
Generating capacity	132 MW

Martin Dam

Structure type	Gravity concrete
Length	2,000 feet
Maximum height	168 feet
Lake elevation	491 feet NGVD29
Lake area acres	40,000 acres
Shoreline miles	700 miles
Drainage area	3,000 square miles
Generating capacity	182 MW

Yates Dam

Structure type	Gravity concrete
Length	1,260 feet
Maximum height	87 feet
Lake elevation	344 feet NGVD29
Lake area acres	1,980 acres
Shoreline miles	40 miles
Drainage area	3,250 square miles
Generating capacity	47 MW

Thurlow Dam

Structure type	Gravity concrete and earth fill
Length (concrete)	1,846 feet

Maximum height	62 feet
Lake elevation	288 feet NGVD29
Lake area acres	585 acres
Drainage area	3,325 square miles
Generating capacity	81 MW

Weiss Dam

Structure type	Gravity concrete and earth fill
Length (earth dikes)	30,506 feet
Length (concrete)	392 feet
Maximum height	126 feet
Lake elevation	564 feet NGVD29
Lake area acres	30,200 acres
Shoreline miles	447 miles
Drainage area	5,273 square miles
Generating capacity	87.75 MW

Neely Henry Dam

Structure type	Gravity concrete and earth fill
Length (earth dikes)	4,100 feet
Length (concrete)	605 feet
Maximum height	104 feet
Lake elevation	508 feet NGVD29
Lake area acres	11,200 acres
Shoreline miles	339 miles
Drainage area	6,600 square miles
Generating capacity	72.9 MW

Logan Martin Dam

Structure type	Gravity concrete and earth fill
Length (earth dikes)	5,464 feet
Length (concrete)	612 feet
Maximum height	97 feet
Lake elevation	465 feet NGVD29
Lake area acres	15,263 acres
Shoreline miles	275 miles
Drainage area	7,700 square miles
Generating capacity	135 MW

Lay Dam

Structure type	Gravity concrete
Length	2,260 feet
Maximum height	129.6 feet
Lake elevation	396 feet NGVD29
Lake area acres	12,000 acres
Shoreline miles	289 miles
Drainage area	9,087square miles
Generating capacity	177 MW

Mitchell Dam

Structure type	Gravity concrete

Length (concrete)	1,277 feet
Maximum height	106 feet
Lake elevation	312 feet NGVD29
Lake area acres	5,850 acres
Shoreline miles	147 miles
Drainage area	9,830 square miles
Generating capacity	170 MW

Jordan Dam

Structure type	Gravity concrete
Length (concrete)	2,066 feet
Maximum height	125 feet
Lake elevation	252 feet NGVD29
Lake area acres	6,800 acres
Shoreline miles	118 miles
Drainage area	10,165 square miles
Generating capacity	100 MW

Bouldin Dam

Structure type	Gravity concrete and earth fill
Length (earth dikes)	10,950 feet
Length (concrete)	228 feet
Maximum height	120 feet
Lake elevation	252 feet NGVD29
Lake area acres	6,800 acres
Shoreline miles	118 miles
Drainage area	10,165 square miles
Generating capacity	225 MW

I - INTRODUCTION

1-01. Authorization. This water control manual is prepared in accordance with the following U.S. Army Corps of Engineers (Corps) Engineering Regulations (ER) and Manuals:

- ER 1110-2-240, *Water Control Management* (8 October 1982). This regulation prescribes policies and procedures to be followed by the Corps in carrying out water control management activities, including establishment of water control plans for Corps and non-Corps projects, as required by federal laws and directives.
- ER 1110-2-241, *Use of Storage Allocated for Flood Control and Navigation at Non-Corps Projects* (24 May 1990). This regulation prescribes the responsibilities and general procedures for regulating reservoir projects for flood risk management or navigation and the user of storage allocated for such purposes. Excepted projects are those owned and operated by the Corps; the International Boundary and Water Commission, United States and Mexico; and those under the jurisdiction of the International Joint Commission, United States and Canada, and the Columbia River Treaty. The intent of this regulation is to establish an understanding among project owners, operating agencies, and the Corps.
- ER 1110-2-1150, *Engineering and Design for Civil Works Projects* (31 August 1999). This regulation defines engineering responsibilities, requirements, and procedures during the planning, design, construction, and operations phases of civil works projects. The regulation provides guidance for developing and documenting quality engineering analyses and designs for projects and products on time and in accordance with project management policy for civil works activities.
- ER 1110-2-1941, *Drought Contingency Plans* (15 September 1981). This regulation provides policy and guidance for preparing drought contingency plans as part of the Corps' overall water control management activities. This directive states the policy that water control managers will continually review and, when appropriate, adjust water control plans in response to changing public needs.
- ER 1110-2-8154, *Water Quality and Environmental Management for Corps Civil Works Projects* (31 May 1995). This regulation establishes a policy for the water quality management program at Corps civil works projects.
- ER 1110-2-8156, *Preparation of Water Control Manuals* (31 August 1995). This regulation standardizes the procedures to be followed when preparing Water Control Manuals (WCM).
- EM 1110-2-3600, *Management of Water Control Systems* (30 November 1987). This manual provides guidance to field offices for managing water control projects or systems authorized by Congress and construct and operated by the Corps. It also applies to certain water control projects constructed by other agencies or entities.

1-02. Purpose and Scope. This basin master water control manual describes the overall water control plan for the Alabama-Coosa-Tallapoosa (ACT) River Basin (referred to as the ACT River Basin or the ACT Basin). The descriptions of the basin, history of development, water control activities, and coordination with others are provided as supplemental information to enhance the knowledge and understanding of the basin water control plan. This manual provides a general reference source for ACT water control regulation. It is intended for use in day-to-day, real-time water management decision making and for training new personnel. The development and execution of the water control plan includes appropriate consideration for efficient water management in conformance with the emphasis on water conservation as a national priority.

1-03. Related Manuals and Reports. This master manual provides general information for the entire ACT River Basin. The following appendices have been prepared for individual federal reservoir projects and non-federal projects within the ACT Basin:

Appendix A - Allatoona Dam and Lake
Appendix B - Weiss Dam and Lake (Alabama Power Company)
(This Water Control Manual is not being updated at this time. See Section 3-05.)
Appendix C - Logan Martin Dam and Lake (Alabama Power Company)
(This Water Control Manual is not being updated at this time. See Section 3-05.)
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 ACT River Basin development is contained in operation and maintenance manuals and emergency action plans for each project. Historical, definite project reports and design memoranda also contain useful information.

Prior to the issuance of this manual and the individual water control plans as appendices, the Corps considered the environmental impacts of its revised operations with the preparation of an Environmental Impact Statement (EIS). The EIS was prepared in compliance with the National Environmental Policy Act (1969), Council on Environmental Quality guidelines, and Corps implementing regulations. Access to the final document is available by request from the Mobile District.

1-04. Project Owner. The Allatoona Dam and Lake; Carters Dam and Lake (and Reregulation Dam); Robert F. Henry Lock and Dam and R. E. “Bob” Woodruff Lake; Millers Ferry Lock and Dam and William “Bill” Dannelly Lake; and Claiborne Lock and Dam and Claiborne Lake projects are federally owned projects entrusted to the Corps. There are 11 privately developed dams with powerhouses located in the basin (seven on the Coosa River and four on the Tallapoosa River) that were built and are operated by the Alabama Power Company (APC). The projects in the ACT Basin are listed in Table 1-1.

Table 1-1. Existing Dams in the ACT Basin

Basin/river/project name	Owner/State/year initially completed	Total Drainage Area (sq mi)	Reservoir Size at Full Pool (acres)	Total storage at Full Pool (ac-ft)	Conservation Storage (ac-ft)	Declared Power Capacity (MW)	Full Pool elevation (ft NGVD29)	Federally authorized purposes of projects
Coosawattee River		*875*						
Carters Dam and Lake	Corps/GA/1974	374	3,275	383,565	141,402	600	1,074	FRM, HP, REC, NAV, WS, WQ, FW
Carters Reregulation Dam	Corps/GA/1974	521	884	19,300	17,210	None	696	
Etowah River		*1,860*						
Hickory Log Creek Dam (on Hickory Log Creek)	Canton, CCMWA/GA/2007	8	411	17,701	17,701	None	1,060	
Allatoona Dam and Lake	Corps/GA/1949	1,122	11,862	367,471	284,580	82.2	840	FRM, HP, NAV, REC, WQ, WS, FW
Thompson-Weinman Dam	Private/GA/early 1900's	1120				0.625 inactive		
Coosa River		*10,270*						
Weiss Dam and Lake	APC/AL/1961	5,273	30,200	306,651[d]	237,448	87.75[d]	564	HP, FRM, NAV
H. Neely Henry Dam and Lake	APC/AL/1966	6,600	11,200	121,860[d]	43,205	72.9[d]	508	HP, FRM, NAV
Logan Martin Dam and Lake	APC/AL/1964	7,700	15,263	273,500[d]	108,262	135[d]	465	HP, FRM, NAV
Lay Dam and Lake	APC/AL/1914	9,087	12.000	262,306[d]	77,478	177[d]	396	HP
Mitchell Dam and Lake	APC/AL/1923	9,830	5.850	170,422[d]	28,048	170[d]	312	HP
Jordan Dam and Lake	APC/AL/1928	10,165	6,800	235,780[d]	15,969	100[d]	252	HP
Walter Bouldin Dam and Lake	APC/AL/1967	10,165	6,800	235,780[d]	NA	225[d]	252	HP
Tallapoosa River		*4,660*						
Harris Dam and Lake	APC/AL/1982	1,453	10,660	425,503	191,129	132	793	HP, FRM, NAV
Martin Dam and Lake	APC/AL/1926	3,000	40,000	1,623,000	1,183,356	182	491	HP
Yates Dam and Lake	APC/AL/1928	3,250	1,980	53,770	5,976	47	344	HP
Thurlow Dam and Lake	APC/AL/1930	3,325	585	18,461	NA	81	288	HP
Alabama River		*22,800*						
Robert F. Henry Lock and Dam/R.E. "Bob" Woodruff Lake	Corps/AL/1972	16,233	12,510	247,210	36,450	82	125	NAV, REC, HP
Millers Ferry Lock and Dam/William "Bill" Dannelly Lake	Corps/AL/1969	20,637	18,528	346,254	46,704	90	80.8	NAV, REC, HP
Claiborne Lock and Dam and Lake	Corps/AL/1969	21,473	6,290	102,480	NA	None	36	NAV, REC, WQ
Cahaba River		*1,890*						
Purdy Dam and Lake	BWWB/AL/NA	43	990	24,000	NA	None	560	WS

a. As used in this table, the term "federally authorized purposes" includes purposes expressly identified in the project authorizing documents; incidental benefits recognized in project authorizations; and objectives that result from other authorities, such as general authorities contained in Congressional legislation, public law, or non-federal project FERC licenses, for which each listed project is operated. FRM = flood risk management; HP = hydropower; NAV = navigation; REC = recreation; WQ = water quality; WS = water supply; FW = fish and wildlife conservation.

b. NA = not applicable.

c. Source: Federal Storage Reservoir Critical Yield Analyses, Alabama-Coosa-Tallapoosa (ACT) and Apalachicola- Chattahoochee-Flint (ACF) River Basins, USACE, 2010, page B-7.

d. Source: Final Environmental Assessment for Hydropower License, Coosa River Hydroelectric Project—FERC Project No. 2146-111, Alabama and Georgia

e. Declared Power Capacity is defined as the plant's operational capacity declared on a weekly basis to the power marketing agency. The value may vary slightly from week to week depending on factors such as head and cooling capabilities; values shown are the nominal values reported.

1-05. Operating Agency. The Corps, Mobile District operates the five federally owned projects within the ACT Basin. Dam and reservoir project operation and maintenance are under the supervision of Operations Division. Allatoona and Carters fall under the direction of the Operations Project Manager at each Project. The Robert F. Henry, Millers Ferry and Claiborne facilities make up the Alabama River Lakes Project and fall under the direction of the Site Manager located at the Project Office in Haynesville, Alabama. The non-federal projects on the Coosa and Tallapoosa Rivers are owned and operated by APC except for the Hickory Log Creek Project which is owned and operated by the City of Canton and the Cobb County-Marietta Water Authority (CCMWA), and the Purdy Project which is owned and operated by the Birmingham Water Works Board (BWWB).

1-06. Regulating Agencies. Authority for water control regulation of all federal projects and for flood risk management water control regulation of four non-federal APC projects (Weiss, H. Neely Henry, Logan Martin, and Harris) has been delegated to the South Atlantic Division (SAD) Commander. Water control regulation activities for all federal projects and flood management regulation of the four APC projects are the responsibility of the Mobile District, Engineering Division, Water Management Section (Mobile District). APC regulates the four non-federal projects in compliance with the projects' Federal Energy Regulatory Commission (FERC) licenses and in accordance with Corps water control plans for flood management regulation and navigation support. It is the responsibility of the Mobile District to develop water control regulation procedures for the ACT federal projects for all foreseeable conditions and for the flood risk management plan and navigation support for the four authorized APC projects. The regulating instructions presented in the basin water control plan are issued by the Mobile District with approval of SAD. The Mobile District monitors the project for compliance with the approved water control plan and makes water control regulation decisions on the basis of that plan. The Mobile District advises project personnel, on an as needed basis, regarding operational procedures to perform during abnormal or emergency situations.

II - BASIN DESCRIPTION AND CHARACTERISTICS

2-01. General Characteristics. The ACT River Basin, made up of the Coosa, Tallapoosa, and Alabama Rivers and their tributaries, drains northeastern and east-central Alabama, northwestern Georgia, and a small portion of Tennessee. The drainage basin has a maximum length of about 330 miles, an average width of approximately 70 miles, and a maximum width of about 125 miles. The ACT Basin drains an area totaling approximately 22,800 square miles: 17,300 square miles in Alabama; 5,400 square miles in Georgia; and 100 square miles in Tennessee. The ACT Basin and its principal rivers are illustrated in Plate 2-1. Figure 2-1 provides longitudinal views of the Alabama, Coosa, Etowah, and Tallapoosa Rivers, including the locations of dams and reservoirs. The major tributaries within the ACT Basin are shown on Plate 2-2 and listed in Table 2-1.

The Coosa River is formed by the Etowah and Oostanaula Rivers at Rome, Georgia, and flows first westerly, then southwesterly, and finally southerly for a total of 286 miles before joining the Tallapoosa River to form the Alabama River south of Wetumpka, Alabama. The drainage area of the Coosa River is approximately 10,200 square miles. The main tributaries of the Coosa River are its headwater streams, the Etowah and Oostanaula Rivers.

The Etowah River lies entirely within Georgia and is formed by several small mountain creeks which rise on the southern slopes of the Blue Ridge Mountains at an elevation of about 3,250 feet. The Etowah River flows for 150 miles to Rome, Georgia, and has a drainage area of 1,860 square miles, with a maximum width of about 40 miles and a length of about 70 miles. Allatoona Dam and Lake Project is located on the Etowah River upstream of Cartersville, Georgia.

The Oostanaula River is formed by the Coosawattee and Conasauga Rivers at Newtown Ferry, Georgia, and meanders southwesterly through a broad plateau for 47 miles to its mouth at Rome, Georgia. The Carters Dam and Lake Project is located on the Coosawattee River about 27 miles upstream of the confluence of the Coosawattee and Conasauga Rivers.

The Tallapoosa River rises in northwestern Georgia at an elevation of about 1,250 feet, and flows westerly and southerly for 268 miles, joining the Coosa River south of Wetumpka, Alabama. The upper 55 miles of the stream are in Georgia and the lower 213 miles in Alabama. The river drains an area of 4,680 square miles. Projects on the Tallapoosa River include four large hydropower dams owned by the APC; the Harris, Martin, Yates, and Thurlow Dams and Lakes.

The Alabama River is formed by the confluence of the Coosa and Tallapoosa Rivers near Montgomery, Alabama, meandering westerly for about 100 miles to Selma, Alabama, then southwesterly for 214 miles to its mouth near Calvert, Alabama. There are three Corps projects on the Alabama River providing for hydropower and navigation; the Robert F. Henry Lock and Dam, the Millers Ferry Lock and Dam, and the Claiborne Lock and Dam. At low river stages, the effect of the tide in Mobile Bay is noticeable at the juncture of the Alabama and Tombigbee Rivers and up to the Claiborne tailwater. The principal tributaries of the Alabama River are its source streams, the Coosa and Tallapoosa Rivers.

The ACT Basin is approximately 57 percent forested lands, 16 percent pasture and row crops, nine percent shrubland, eight percent developed or built up, seven percent wetlands, and three percent water.

Physiographic provinces and other basin characteristics are addressed in the following paragraphs.

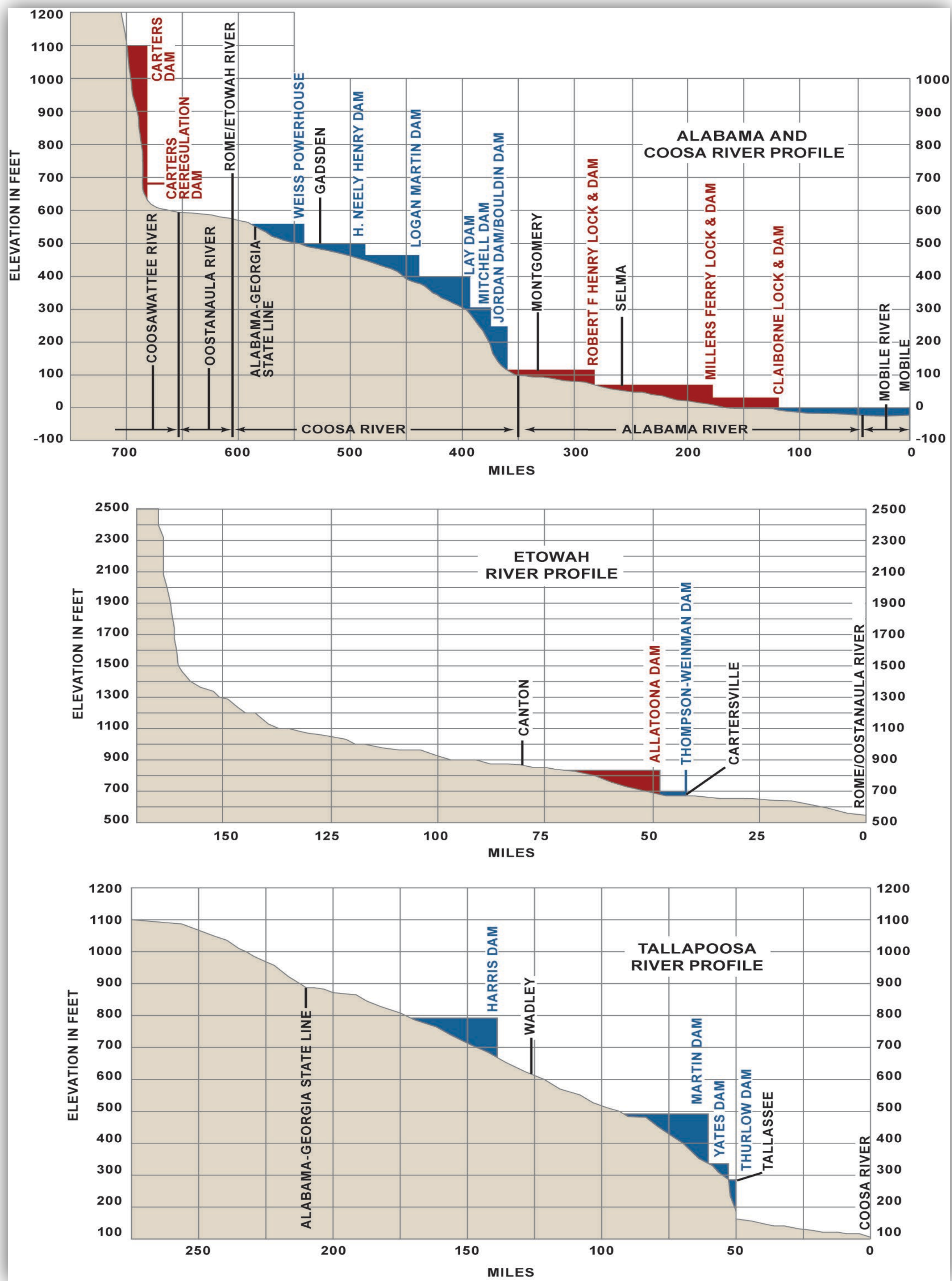

Figure 2-1. Longitudinal Profiles of the Alabama, Coosa, Etowah, and Tallapoosa Rivers

Table 2-1. Tributaries of the ACT Basin

Main Streams and Major Tributaries of the Alabama-Coosa-Tallapoosa River Basin		
Stream	Drainage Area Square Miles	Miles Above Mouth
Amicalola Creek	92	118
Settingdown Creek	50	105
Shoal Creek	64	72
Little River	215	63
Allatoona Creek	81	48
Pumpkinvine Creek	140	42
Euharlee Creek	180	31
Etowah River	**1860**	**286**
Jacks River	88	69
Sumac Creek	37	42
Coahulla Creek	178	27
Conasauga River	727	47
Ellijay River	92	45
Cartecay River	137	45
Talking Rock Creek	151	23
Coosawattee River	869	47
Sallacoa Creek	245	10
Oothkalooga Creek	59	35
Armuchee Creek	226	10
Oostanaula River	**2160**	**286**
Cedar Creek	208	258
Chattooga River	660	233
Terrapin Creek	286	220
Big Wills Creek	383	173
Big Canoe Creek	263	156
Ohatchee Creek	227	146
Choccolocco Creek	510	116
Kelly Creek	208	97
Talledega Creek	189	88
Yellowleaf Creek	190	78
Waxahatchee Creek	206	56
Weogufka Creek	135	4
Hatchet Creek	515	41
Coosa River	**10200**	**314**
Little Tallapoosa	406	149
Hillabee Creek	190	87
Uphapee Creek	330	44
Tallapoosa River	**4680**	**314**
Autauga Creek	121	284
Catoma Creek	340	282
Cahaba River	1825	198
Pine Barren Creek	363	166
Alabama River	**22781**	**45**

2-02. Topography.

a. <u>Coosa River Basin</u>. The river banks are stable and vary from 25 to 150 feet in height. The width between banks varies from 300 to 500 feet. The Coosa River has a total fall of 454 feet in 286 miles, giving an average slope of 1.59 feet per mile. The steepest slope occurs at the Fall Line in the lower reach. The valley, generally wide, is constricted by low hills at Greensport, Alabama, and the Fort William Shoals and at the existing dams developed by the

APC. In the vicinity of Greensport, the river valley cuts through Beaver Creek Mountain, where the floodplain narrows to less than 0.25 miles wide. During large rainfall events, high stages are built up immediately above this constriction in the floodplain. The floodplain between Rome, Georgia, and Childersburg, Alabama, varies generally from 0.5 to three miles in width with an average width of 12 miles. Between Childersburg and the mouth, the floodplain is narrow, varying from 0.25 to one mile wide with an average width of approximately 0.5 mile.

The Etowah River varies in width from 100 to 300 feet. The river banks are stable and vary in height from 25 to 300 feet. From the headwaters to Dawsonville, Georgia, (about 21 river miles), the Etowah River flows with moderately steep slopes through a hilly section, with a general elevation of about 2,000 feet NGVD29. From Dawsonville, Georgia, to Cartersville, Georgia, (about 85 river miles), the river flows through a flatter section with elevations averaging about 1,000 feet NGVD29. From Cartersville, Georgia to Rome, Georgia, the river flows 44 miles through a low, flat valley. The floodplain, in general, varies from 0.25 to two miles wide. The Etowah River has a fall of 2,690 feet in 150 miles or an average fall of 17.9 feet per mile.

The Oostanaula River is formed by the Coosawattee and Conasauga Rivers at Newtown Ferry, Georgia, and meanders southwesterly through a broad plateau for 47 miles to its mouth at Rome, Georgia. The river has a total drainage area of 2,160 square miles with stable banks from 20 to 60 feet high. The width of the river averages about 250 feet. The width of the floodplain varies from 0.5 to five miles with an average width of about 1.5 miles.

The Coosawattee River is 45 miles long; and has a fall of 650 feet, an average of 14.4 feet per mile. The Conasauga River is 95 miles long; and has a fall of 1,790 feet, an average of 19.2 feet per mile.

b. Tallapoosa River Basin. The Tallapoosa River rises in northwestern Georgia at an elevation of about 1,250 feet NGVD29 and flows westerly and southerly for 268 miles, joining the Coosa River south of Wetumpka, Alabama. North of Tallassee, Alabama, the river cuts through the crystalline rock area and the banks are high and stable. Below Tallassee, the river meanders through the upper regions of the coastal plain and the banks are relatively low. The total fall of the Tallapoosa River is 1,144 feet in 268 miles, giving an average slope of 4.27 feet per mile.

c. Alabama River Basin. The Alabama River floodplain is characterized by valleys varying in width from 0.5 to eight miles, with an average width of approximately three miles. The valleys are formed by low hills which seldom attain an elevation of more than 500 feet. The river falls a total of 106 feet with an average slope of 0.34 foot per mile.

From its source to a point about 150 miles below Selma, Alabama, the banks of the Alabama River are comparatively high, averaging more than 40 feet above mean low water. The width between banks in this reach varies from 500 to 1,000 feet. Below this point the banks become lower until, at the mouth of the river, they are less than 10 feet high. There are numerous bluffs along the river, some reaching over 100 feet in height.

2-03. Geology. Seldom can a greater diversity in topography and geology be found than in the watersheds of the Alabama-Coosa-Tallapoosa Rivers. These three rivers, with their major tributaries, drain five physiographic provinces which range in relief from well over 2,000 feet at the headwater tributaries of the Coosa River to a few feet at the mouth of the Alabama River. Equally diversified are the formations underlying the ACT Basin which ranges from crystalline to unconsolidated sands, marls, and clays of very recent geologic times. The physiographic provinces are shown in Plate 2-3 and described in the following paragraphs.

a. The Blue Ridge Province encompasses only a very small northeastern part of the Coosa drainage basin. The greater part of this province is characterized by irregular divides formed by isolated and poorly connected masses of highly metamorphosed and igneous rocks. The western boundary of this province is determined largely by the extent of over thrust of resistant crystalline rocks on the weaker sedimentary formations of the Valley and Ridge Province. The upper reaches of the Coosawattee and its headwater tributaries lie in this province.

b. Southwestern Appalachian Plateau Province encompasses only a small part of the Coosa Watershed. Little River and the headwaters of Big Wills Creek drain from the Valley Ridge Province. This province is characterized by elevated plateaus on massive and resistant sandstone of the Carboniferous period. The characteristic feature of the plateau is the even persistent skyline formed by the massive Pottsville sandstones which underlie it. The stream courses in the elevated sandstone plateaus are characterized by relatively little relief in their upper reaches. Progressing downstream, however, gorges and deep cuts are common where courses follow strike joints to their junctions with larger streams.

c. Ridge and Valley Province is bounded on the west by the Appalachian Plateau Province on the southwest by the Coastal Plain and on the southeast by the Piedmont Province. The general configuration of the province is that of sub-parallel and broken ridges separated by broad rather low valleys which form the principal stream courses for the Coosa River above Lay Dam and its tributaries below Rome, Georgia. In contrast to the Coastal Plain and Piedmont Provinces, the rocks underlying the Valley and Ridge Province are dominantly well-consolidated sandstones, shales, limestone, dolomites, and variable shales of Paleozoic periods. Of these materials, the most prominent in the area from Lay Dam to Lincoln, Alabama, are massive Cambro-ordovician dolomites. Erratic weathering of these materials in the stream beds, coupled with their universally intense weathering and fracturing valley walls, are considerable obstacles in the selection of suitable dam sites. Geologic conditions improve upstream from Lincoln, Alabama. Above that point, the Coosa River Valley has been incised into strata consisting of alternating shoals of sandstone, limestone, dolomite, and shale.

d. Piedmont Province lies immediately north of the Fall Line and directly east of the Appalachian Valley and Ridge Provinces. The rocks underlying the Piedmont are disorderly, ancient, crystalline, and metamorphic, with no particular conformity to erosional patterns. Vast, gently rolling hills separated by sub-mature valleys of moderate depth are most characteristic. Deep valleys are an exception. Agricultural areas are far more extensive on the uplands than on the valley bottoms. Towards and across the Fall Line a sharper and deeper configuration of valleys is characteristic. A combination of good foundations and general reservoir tightness explains the present development of the Coosa to the Piedmont. Lowermost tributaries of the Coosa River below Lay Dam, and the Etowah and Tallapoosa Rivers are located in this province. The soils consist of kaolinite and halloysite (aluminosilicate clay minerals) and of iron oxides. They result from the intense weathering of feldspar-rich igneous and metamorphic rocks. Such intense weathering dissolves or alters nearly all minerals and leaves behind a residue of aluminum-bearing clays and iron-bearing iron oxides because of the low solubilities of aluminum and iron at earth-surface conditions. Those iron oxides give the red color to the clay-rich soil that has come to be synonymous with central Georgia.

e. The Fall Line is the boundary between the Piedmont and the Southeastern Plains. Its name arises from the occurrence of waterfalls and rapids which developed where the rivers drop off the hard crystalline rocks of the Piedmont onto the more readily eroded sedimentary rocks of the Southeastern Plains. The Fall Line is a boundary of bedrock geology, but it can also be recognized from stream geomorphology. Upstream from the Fall Line, rivers and streams typically have very small floodplains, if any at all, and they do not have well-developed meanders. Within a mile or so downstream from the Fall Line, rivers and streams typically have floodplains or marshes across which they flow, and within three or four miles, they meander. In the ACT Basin, the Fall Line extends from approximately 15 miles southeast of Tuscaloosa, Alabama, southeastwardly to about 20 miles west of Columbus, Georgia. Historically, the rapids of the Fall Line were the head of navigation for river traffic and also provided opportunities to produce hydropower.

f. Southern Coastal Plain Province is bordered on the south by the Gulf Coast, its northern margin being the Fall Line which is the abrupt contact between the older Pre-Cambrian and Paleozoic rocks of the Appalachian Highland and the more recent gently dipping sediments of the Coastal Plain. Relief of this province ranges from 10 to 600 feet, but generally does not exceed 150 feet. The general surface configuration is that of parallel, crescent-shaped belts carved out of alternately hard and soft sediments which underlie the plain. North to south these belts consist first of isolated erosion remnants of harder Cretaceous sandstones protecting softer-underlying sediments of the same period. Immediately south of that is rather massive Selma Chalk that overlies older Cretaceous sands. The average width of this belt is approximately 25 miles. Continuing south, the underlying sediments are largely soft to medium-hard limestone, tough clays and fossiliforous sands. Continuing south, materials range from semi-indurated sands to beds of sandy siltstone, thence lie, the rough poorly-defined limestone hills. The next province seaward is a belt formed by erratic deposits of bright red erosion-resisting sands of the Citronelle formation. The extreme southern margin of the Coastal Plain consists of a series of meadows which lie only a few feet above sea level and is characterized by swamps and distributaries of the principal rivers. Sediments of this province consist of silt, clay, and sand of very recent geologic times. The entire Alabama River lies in the Coastal Plain Province as do all of its tributaries below its source, with the exception of the Cahaba River. The headwaters of the Cahaba River lie in the Valley and Ridge Province. The lower 10 to 20 miles of the Tallapoosa and Coosa Rivers lie in the Coastal Plain. Geologic hazards in the Coastal Plain are sinkholes and coastal erosion. Sinkholes can form in areas of limestone bedrock when subsurface dissolution of rock leads to collapse of the earth surface.

2-04. Sediment. Rivers and streams within the ACT have always carried silt and other particles downstream. The Alabama River is often discolored during high flow periods. In the natural state before dams and other developments, the particulate matter was deposited along the floodplain or carried to Mobile Bay, where it would be subject to the movements of the Gulf of Mexico. The natural process continues but is altered to some degree by development within the basin. The streams in the northern part of the basin, and especially metropolitan Atlanta area, have been severely affected by past and present urban development. Urban development generally increases the peak and volume of rainfall events, which increases the velocity and erosion potential of rainfall runoff. Results are generally a down-cutting and widening of the stream, which creates bank-caving and further erosion.

Other significant sources of sediment within the ACT Basin are agricultural land erosion, unpaved roads, and sliviculture, and variation in land uses that result in conversion of forests to lawns or pastures.

Faster flowing streams can move suspended particles where slower streams will deposit that material. Where dams and reservoirs have been constructed there is a tendency for the current to slow causing particulates to settle on the lake bottom. Farming practices and urbanization have changed the conditions for non-point source pollution. Both the volume and content of sediment material have changed over time. Below Claiborne Dam, the constantly moving siltation alters the navigation channel on a seasonal basis.

Both sedimentation and retrogression ranges have been established to monitor changes in reservoir and downstream channel conditions. They serve as a baseline to measure changes in reservoir volume (sedimentation ranges) and channel degradation (retrogression ranges). Reservoirs tend to slow river flow and accelerate deposition. Irregular releases for peaking power often have an erosive effect downstream. The locations of sedimentation and retrogression ranges are shown in individual appendices.

After ranges have been established, periodic re-surveys occur, and descriptive analyses are performed to determine the level of sedimentation occurring in the main body of the lake and to examine the erosion along the shoreline. Detailed reports are written after each re-survey to determine changes in reservoir geometry. That includes engineering analysis of the range cross-sections to estimate reservoir storage loss by comparing the earlier surveys of the existing ranges. The data provide the ability to compute new area/capacity curves for reservoirs.

Tables 2-2 and 2-3 lists the number of sedimentation and retrogression ranges for each project in the ACT Basin as well as when the surveys were made.

Table 2-2. Sedimentation Ranges

	Year Surveyed	Number of Ranges Surveyed	Total Number of Ranges Established
ALLATOONA	1949	132	132
	1981	34	116
	1983	23	116
	1984	31	116
	1986	28	116
	2009	Hydrographic bathymetric surface	N/A
CARTERS	2009	Hydrographic bathymetric surface	N/A
CARTERS-RR	1973	5	5
	1992	5	5
	2009	Hydrographic bathymetric surface	N/A
R. F. HENRY	1974	17	17
	1982	14	17
	1988	17	17
	2009	Hydrographic bathymetric surface	N/A
MILLERS FERRY	1973	30	30
	1982	16	30
	1988	30	30
	2009	Hydrographic bathymetric surface	N/A
CLAIBORNE	1982	16	16
	2009	Hydrographic bathymetric surface	N/A

Table 2-3. Retrogression Ranges

	Year Surveyed	Number of Ranges Surveyed	Total Number of Ranges Established
ALLATOONA	1950	15	15
	1953	11	15
	1961	12	15
	1962	10	15
	1963	15	15
	1964	15	15
	1965	13	15
	1968	14	15
	1987	18	23
CARTERS	1974	9	
	1987	9	
CLAIBORNE	1972	19	19
	1979	19	19
	1981	19	19

2-05. Climate. The climate of Alabama and Georgia, including all areas associated with the ACT Basin, is classified as humid subtropical and characterized by hot humid summers and cool winters. Significant amounts of precipitation occur in all seasons in most areas. Winter rainfall (and sometimes snowfall) is associated with large storms steering from west to east. Most summer rainfall occurs during thunderstorms and an occasional tropical storm or hurricane. Factors controlling the climate of the ACT River Basin are its geographical position in the southern end of the Temperate Zone, its proximity to the Gulf of Mexico and South Atlantic Ocean, and its range in altitude from almost sea level at the southern end to over 3,000 feet in the Blue Ridge Mountains to the north. The proximity of the warm South Atlantic and the semitropical Gulf of Mexico insures a warm, moist climate. Extreme temperatures range from near 110 degrees Fahrenheit (°F) to values in the teens below zero. Severe cold weather rarely lasts longer than a few days. In the southern end of the basin the average maximum January temperature is 57 °F and the average minimum January temperature is 35 °F.

a. Temperature. Tables 2-4, 2-5, and 2-6 show the average monthly maximum and minimum temperatures for the ACT Basin. The frost-free season varies in length from about 200 days in the northern valleys to about 250 days in the southern part of the basin. All climatic tables have been compiled from online records at the Southeast Regional Climate Center.

Table 2-4. Average Monthly Temperature (°F) for the Northern ACT Basin (max. and min.)

AVERAGE MONTHLY TEMPERATURE FOR NORTHERN ACT BASIN (MAX & MIN)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
BALL GROUND, GA 090603 (3/1947 – 12/2010)	MAX	50.0	50.8	62.4	70.1	75.9	82.1	84.8	85.5	78.9	70.1	62.1	50.4	68.6
	MIN	29.5	29.7	38.5	45.8	54.7	61.4	66.1	66.5	60.3	48.5	39.4	30.9	47.6
ALLATOONA DAM 2, GA 090181 (5/1952–12/2010)	MAX	50.8	54.4	62.7	73.2	79.3	85.8	88.8	88.3	82.1	72.2	62.6	52.3	71.0
	MIN	29.7	32.0	38.6	47.7	56.3	64.2	67.8	67.4	61.6	49.0	39.5	31.7	48.8
ROME, GA 097600 (1/1893-8/2010)	MAX	52.5	56.3	65.2	74.1	81.5	87.7	90.1	89.5	84.7	75.2	63.3	54.0	72.8
	MIN	31.7	33.3	40.2	47.7	56.2	64.2	67.9	67.2	61.1	48.7	38.9	33.1	49.2
GADSDEN STEAM PLANT, AL 013154 (3/1953-12/2010	MAX	51.0	55.9	65.0	74.5	81.4	87.5	90.4	90.1	84.6	74.5	63.7	54.7	72.8
	MIN	30.6	33.6	40.6	49.0	57.4	65.2	69.1	68.2	62.1	49.6	40.0	33.4	49.9
SCOTTSBORO, AL 017304 (10/1891-12/2010)	MAX	51.8	54.9	63.9	72.7	80.8	87.6	90.0	89.6	84.8	74.4	63.0	54.0	72.3
	MIN	30.3	32.4	39.4	46.9	55.4	63.4	67.0	66.0	59.9	47.3	37.4	31.9	48.1
VALLEY HEAD, AL 018469 (1/1893-12/2010)	MAX	50.3	53.5	62.2	71.4	79.3	86.0	88.6	88.4	83.8	73.8	62.2	52.5	71.0
	MIN	28.6	30.0	37.0	44.6	53.3	61.6	65.2	64.4	58.7	46.1	36.1	30.0	46.3
NORTHERN BASIN AVG	MAX	51.1	54.3	63.6	72.7	79.7	86.1	88.8	88.6	83.2	73.4	62.8	53.0	71.4
NORTHERN BASIN AVG	MIN	30.1	31.8	39.1	47.0	55.6	63.3	67.2	66.6	60.6	48.2	38.6	31.8	48.3

Table 2-5. Average Monthly Temperature (°F) for the Middle ACT Basin (max. and min.)

AVERAGE MONTHLY TEMPERATURE FOR MIDDLE ACT BASIN (MAX & MIN)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
WETUMPKA, AL 018859 (1/1893-10/2010)	MAX	60.3	61.9	70.0	77.1	84.9	91.7	92.4	92.0	88.7	79.4	68.5	60.1	77.2
	MIN	37.9	38.7	45.5	51.9	60.4	68.2	70.9	70.6	65.7	54.0	42.9	38.1	53.7
CHILDERSBURG WATER PLAN, AL 011620 (3/1957-12/2010)	MAX	56.5	61.1	69.7	77.9	83.9	89.6	92.1	91.6	86.9	77.9	67.9	59.2	76.2
	MIN	32.4	34.8	41.7	48.9	57.1	64.6	68.3	67.3	61.4	49.0	40.4	34.5	50.0
ROCK MILLS, AL 017025 (6/1938-12/2010)	MAX	55.6	59.3	67.2	76.7	83.8	89.9	91.4	91.1	85.7	76.8	66.4	57.2	75.1
	MIN	30.9	33.1	39.1	46.5	55.0	62.7	66.5	65.7	59.9	46.9	37.4	31.6	47.9
LAFAYETTE, AL 014502 (10/1944-12/2010)	MAX	56.0	60.3	67.9	76.1	82.6	88.5	90.4	90.0	84.9	76.0	66.2	57.6	74.7
	MIN	32.9	35.4	41.7	48.8	57.3	64.2	67.4	66.7	61.3	50.1	40.9	34.1	50.1
TUSCALOOSA OLIVER DAM , AL 018385 (1/1900-12/2010)	MAX	54.8	58.2	66.7	75.3	82.8	89.9	92.0	91.6	87.7	77.6	66.0	56.9	75.0
	MIN	33.1	35.1	42.4	50.3	58.8	66.8	69.9	69.3	63.9	51.5	41.0	35.1	51.4
CENTREVILLE WSMO, AL 011525 (12/1974-12/2010)	MAX	54.2	59.1	67.7	75.3	81.8	88.3	91.0	90.1	85.3	75.5	66.1	57.0	74.3
	MIN	32.0	35.2	41.8	48.5	57.8	65.4	68.9	68.4	62.5	50.0	41.4	34.3	50.5
CALERA 2 SW, AL 011288 (9/1900-12/2010)	MAX	54.5	60.0	67.4	76.7	83.5	89.0	91.7	90.7	86.0	76.6	66.0	58.4	75.0
	MIN	31.1	33.3	41.0	48.0	55.5	63.0	66.9	66.1	61.1	47.8	39.0	33.5	48.9
BESSEMER 3WSW, AL 010764 (2/1977-12/2010)	MAX	54.8	59.6	68.2	76.3	83.3	90.0	92.9	92.5	87.3	76.9	66.9	57.6	75.5
	MIN	31.5	34.6	41.2	48.5	58.0	65.1	69.1	68.2	62.2	49.9	41.0	33.8	50.2
BIRMINGHAM FAA ARPT , AL 010831 (1/1930-12/2010)	MAX	53.9	57.9	65.8	74.6	81.7	88.2	90.5	90.1	85.1	75.6	64.4	55.9	73.6
	MIN	34.3	36.6	43.0	50.7	59.2	66.8	70.3	69.6	63.9	52.1	42.1	36.1	52.1
MIDDLE BASIN AVG	MAX	55.6	59.7	67.8	76.2	83.1	89.5	91.6	91.1	86.4	76.9	66.5	57.8	75.2
MIDDLE BASIN AVG	MIN	32.9	35.2	41.9	49.1	57.7	65.2	68.7	68.0	62.4	50.1	40.7	34.6	50.5

Table 2-6. Average Monthly Temperature (°F) for the Southern ACT Basin (max. and min.)

AVERAGE MONTHLY TEMPERATURE FOR SOUTHERN ACT BASIN (MAX & MIN)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HIGHLAND HOME, AL 013816 (3/1892-12/2010)	MAX	58.7	61.7	69.2	76.4	83.5	88.9	90.2	89.9	86.4	77.8	67.8	59.9	75.9
	MIN	37.8	39.4	46.1	52.7	60.8	67.3	69.8	69.4	65.2	54.7	45.2	39.1	54.0
MILSTEAD, AL 015439 (7/1902-12/2010)	MAX	57.1	61.1	69.0	75.9	83.3	89.0	91.6	91.3	86.6	77.3	68.6	58.8	75.8
	MIN	33.9	36.5	42.7	49.1	58.7	66.7	70.4	69.5	63.7	51.2	42.6	35.7	51.7
OPELIKA, AL 016129 (3/1957-12/2010)	MAX	55.1	58.7	67.1	75.2	82.1	87.8	90.1	89.6	84.9	75.8	66.8	57.9	74.3
	MIN	31.7	33.6	40.1	47.5	56.0	63.6	67.4	67.1	62.1	49.5	40.5	33.9	49.4
SOUTHERN BASIN AVG	MAX	57.0	60.5	68.4	75.8	83.0	88.6	90.6	90.3	86.0	77.0	67.7	58.9	75.3
SOUTHERN BASIN AVG	MIN	34.5	36.5	43.0	49.8	58.5	65.9	69.2	68.7	63.7	51.8	42.8	36.2	51.7

b. Precipitation. The entire ACT Basin is in a region that ordinarily receives an abundance of precipitation with the average annual rainfall being heavy and well-distributed throughout the year. Winter and spring are the wettest periods and early fall is the driest. Light snow is not unusual in the northern part of the watershed, but it constitutes only a very small fraction of the annual precipitation and has little effect on runoff. Intense flood-producing storms occur mostly in the winter and spring. They are usually of the frontal-type, formed by the meeting of warm, moist air masses from the Gulf of Mexico with the cold, drier masses from the northern regions and can cause heavy precipitation over large areas. The storms that occur in summer or early fall are usually of the thunderstorm type with high intensities over smaller areas. Tropical disturbances and hurricanes can occur producing high intensities of rainfall over large areas. Tables 2-7, 2-8, and 2-9 show the average monthly and annual rainfall for the ACT Basin at the same gage locations as the temperature gages. About half the water that falls as precipitation in the ACT Basin is returned to the atmosphere as evapotranspiration (direct evaporation plus transpiration by plants). Evapotranspiration ranges from about 30 to 42 inches of water per year in the ACT Basin, generally increasing from north to south. Runoff varies monthly and ranges from less than one inch per month to almost four inches per month (or from 15 to 75 percent of precipitation); see Figures 2-10 and 2-11 for monthly values above Rome, Georgia and between Claiborne Dam and Rome, Georgia, respectively. Runoff is greatest in the Blue Ridge Mountains and near the Gulf Coast. All tables were compiled from online records at the Southeast Regional Climate Center.

Table 2-7. Average Monthly Rainfall for the Northern ACT Basin (in inches)

AVERAGE MONTHLY RAINFALL FOR NORTHERN ACT BASIN													
Gage Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
BALL GROUND, GA	5.37	4.96	6.10	4.80	4.30	3.88	4.83	4.18	4.08	3.59	4.29	4.67	55.04
ALLATOONA DAM 2, GA	5.02	4.37	5.29	4.64	4.03	3.61	4.89	3.83	3.98	3.26	3.63	4.24	50.80
ROME, GA	4.99	5.08	5.96	4.54	3.99	4.28	4.83	4.16	3.53	3.01	3.75	4.86	52.99
GADSDEN STEAM PLANT, AL	5.25	4.81	5.84	5.14	4.64	4.08	4.83	3.56	3.70	3.17	4.47	4.71	54.21
SCOTTSBORO, AL	5.41	5.33	6.04	4.81	4.36	4.25	4.74	3.76	3.87	3.01	4.12	5.49	55.17
VALLEY HEAD, AL	5.32	5.13	5.84	4.90	4.39	4.10	5.19	3.91	3.65	3.20	3.97	4.86	54.47
NORTHERN BASIN AVG	5.23	4.95	5.85	4.81	4.29	4.03	4.89	3.90	3.80	3.21	4.04	4.81	53.78

Table 2-8. Average Monthly Rainfall for the Middle ACT Basin (in inches)

AVERAGE MONTHLY RAINFALL FOR MIDDLE ACT BASIN													
Gage Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
WETUMPKA, AL	4.80	5.27	5.98	4.66	3.54	4.19	4.74	4.47	3.46	2.56	3.48	4.94	52.08
CHILDERSBURG WATER PLANT, AL	5.49	5.38	6.27	4.85	4.48	4.21	4.58	3.94	4.17	3.17	4.12	4.85	55.49
ROCK MILLS, AL	5.20	5.09	6.19	4.66	4.01	4.15	5.28	3.91	3.68	2.44	4.16	5.10	53.88
LAFAYETTE, AL	5.29	5.38	6.44	5.10	4.22	3.94	5.49	3.76	3.97	2.86	4.01	4.95	55.40
TUSCALOOSA OLIVER DAM, AL	5.16	5.18	5.95	4.90	4.30	3.94	4.87	3.84	3.16	3.06	4.02	5.06	53.45
CENTREVILLE WSMO, AL	5.51	5.52	6.49	5.00	4.42	4.35	4.94	4.49	4.56	3.32	5.04	4.77	58.40
CALERA 2SW, AL	5.06	5.32	6.50	5.15	4.02	4.15	5.36	4.23	3.76	2.76	3.70	5.09	55.12
BESSEMER 3WSW, AL	5.59	4.90	6.01	4.86	5.17	4.49	5.06	3.70	4.18	3.66	5.11	4.90	57.62
BIRMINGHAM FAA ARPT, AL	5.06	4.83	6.03	4.62	4.43	3.94	5.13	4.18	3.80	3.00	4.12	4.76	53.92
MIDDLE BASIN AVG	5.24	5.21	6.21	4.87	4.29	4.15	5.05	4.06	3.86	2.98	4.20	4.94	55.04

Table 2-9. Average Monthly Rainfall for the Southern ACT Basin (in inches)

AVERAGE MONTHLY RAINFALL FOR SOUTHERN ACT BASIN													
Gage Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HIGHLAND HOME, AL	4.85	5.17	6.38	4.57	3.81	4.61	5.48	4.61	3.57	2.62	3.90	4.66	54.22
MILSTEAD, AL	4.83	5.09	6.03	4.59	3.87	3.81	5.10	4.13	3.57	2.58	3.74	4.96	52.30
OPELIKA, AL	5.12	5.19	6.82	4.78	3.71	4.32	5.31	3.92	4.06	3.30	4.22	5.05	55.80
SOUTHERN BASIN AVG	4.93	5.15	6.41	4.65	3.80	4.25	5.30	4.22	3.73	2.83	3.95	4.89	54.11

2-06. Storms and Floods.

a. General. Major flood-producing storms over the ACT Basin are usually of the frontal type, occurring in the winter and spring and lasting from two to four days, with their effect on the basin depending on their magnitude and orientation. The axes of the frontal-type storms generally cut across the long, narrow basin. Frequently, a flood in the lower reaches is not accompanied by a flood in the upper reaches or vice versa. Occasionally, a summer storm of the hurricane type, such as the storms of July 1916 and July 1994, will cause major floods over practically the entire basin. However, summer storms are usually of the thunderstorm type with high intensities over small areas producing serious local floods. With normal runoff conditions, from five to six inches of intense and general rainfall are required to produce widespread flooding, but on many of the minor tributaries, three to four inches are sufficient to produce local floods.

b. Principal Storms. During most years, one or more flood events occur in the ACT Basin. However, on occasion, significant storms produce widespread flooding or unusually high river stages. Generalized descriptions of seven historical storms are presented for reference. Those storms are July 1916, December 1919, March 1929, February 1961, July 1994, May 2003, and September 2009. These storms represent both the hurricane and frontal types which produce the greatest floods in this area. Brief descriptions of the storms are given in the following paragraphs.

1) July 1916. The storm of 5 – 10 July 1916 resulted from a tropical hurricane, which formed in the Caribbean Sea and moved northwest across the Gulf of Mexico to enter the United States east of the mouth of the Mississippi River on the evening of 5 July. The disturbance continued inland across western Mississippi, turned eastward on the 7th and from the 8th to the 10th moved northeastward across Alabama. The heavy precipitation covered a remarkably large area. The 9-inch isohyets on the total-storm isohyetal map, shown in Figure 2-2, include practically all of Alabama, the northwestern part of Florida, and large areas in Mississippi and Georgia.

At the center of greatest intensities, the following amounts of precipitation were recorded over three and one-half days: Bonifay, Florida, 24 inches; Robertsdale, Alabama, 22.6 inches; Merrill, Mississippi, 19.9 inches; and Clanton, Alabama, 18.6 inches. The storm produced general flood conditions throughout the southeastern states and, because it occurred during the middle of the growing season, caused enormous damage. Flood stages were exceeded on practically all the streams in the ACT Basin.

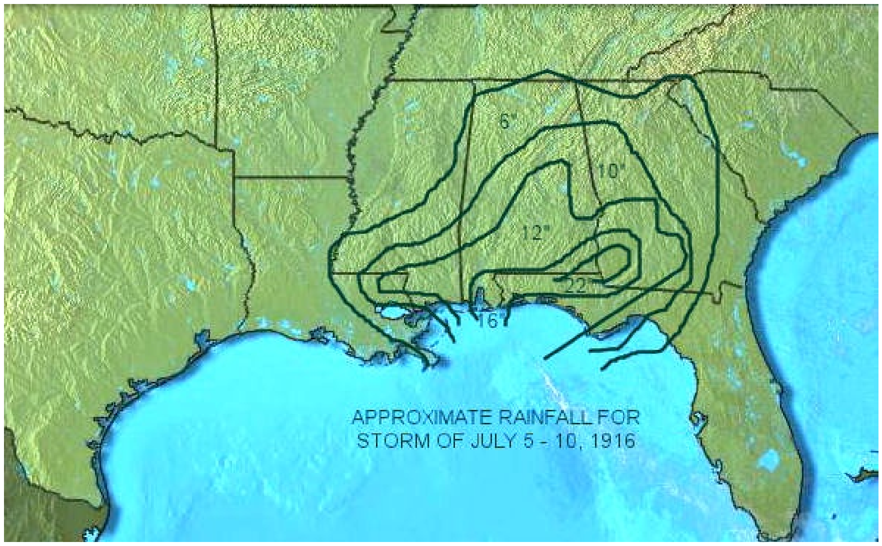

Figure 2-2. Storm of July 1916

2) December 1919. According to U.S. Weather Bureau reports, the storm of 6 – 10 December 1919, was caused by meteorological conditions that were not particularly remarkable, but the sequence in which they developed was the controlling factor. A cyclonic system moved across California and centered over Utah, Oklahoma, and western New Mexico on successive days. A weak cold front was associated with it on the morning of the 7th and extended across Pennsylvania, Maryland, Virginia, and western North Carolina, then became quasi-stationary over northern Georgia, central Alabama, Mississippi, and Louisiana. The front lay in that position the evening of the 9th. An anti-cyclonic system persisted during the period just off the Atlantic Coast, and the circulation set up thereby brought a convergent flow of heavily moisture-laden air from the Gulf region directly over the area. Overrunning and wave development over the initially shallow front brought only moderate precipitation during 6 – 8 December, but a fresh mass of continental, polar air thrust southward on the afternoon of the 8th and on the 9th. The intense convergence about the new development changed the situation to one in which flood-producing rainfall was experienced on 8 – 9 December, and then diminished on the 10th when the front passed eastward. The area of heaviest precipitation extended across southeastern Mississippi, central Alabama, and northern Georgia. The center of greatest rainfall was at Norcross, Georgia, with a total of 12.9 inches. Within the basin, rainfall amounts were recorded as follows: 12.4 inches at Talladega, Alabama; 12.2 inches at Selma, Alabama; and 12.1 inches at Tallassee, Alabama. An isohyetal map of the storm is shown in Figure 2-3.

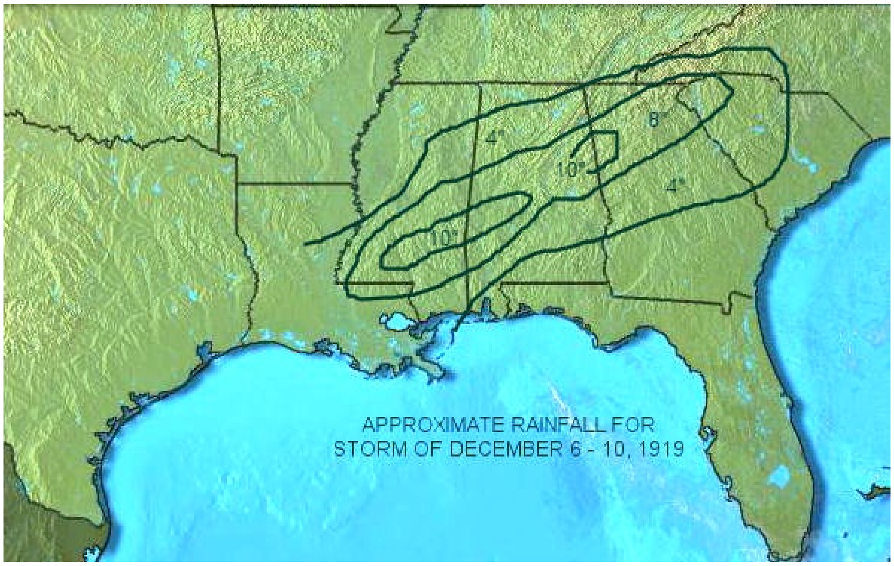

Figure 2-3. Storm of December 1919

3) March 1929. The storm of 11 – 16 March 1929, resulted from a widely extending low-pressure area that developed over eastern Colorado and moved rapidly eastward causing heavy rains, particularly in Alabama and parts of Mississippi, Georgia, and Tennessee. This was one of the greatest storms ever recorded in this country and is outstanding with regard to intensities of precipitation over large areas. The main center was at Elba, Alabama, about 40 miles southeast of the ACT River Basin, with a total of 29.6 inches in three days, of which 20 inches were estimated to have fallen in 24 hours. Other extraordinary amounts for a three-day period were recorded in Alabama in the vicinity of Elba with 20.2 inches at River Falls, 17.4 inches at Ozark, 16.3 inches at Brewton, and 14.2 inches at Newton. The area of intense precipitation included southeastern Mississippi, the southern half of Alabama, northwestern Florida, and southwestern Georgia. In the ACT Basin, the heaviest rainfall occurred in the vicinity of Auburn, Alabama, where a total of 10 inches in three days was recorded. Serious flooding occurred on streams in Georgia, Alabama, and northwest Florida, with many water levels reaching the greatest of record. In the ACT Basin, floods were moderate in the upper portion, becoming progressively more severe downstream, with record stages on the lower Alabama River. An isohyetal map of the storm is shown in Figure 2-4. The four-inch isohyet encompassed the entire ACT Basin.

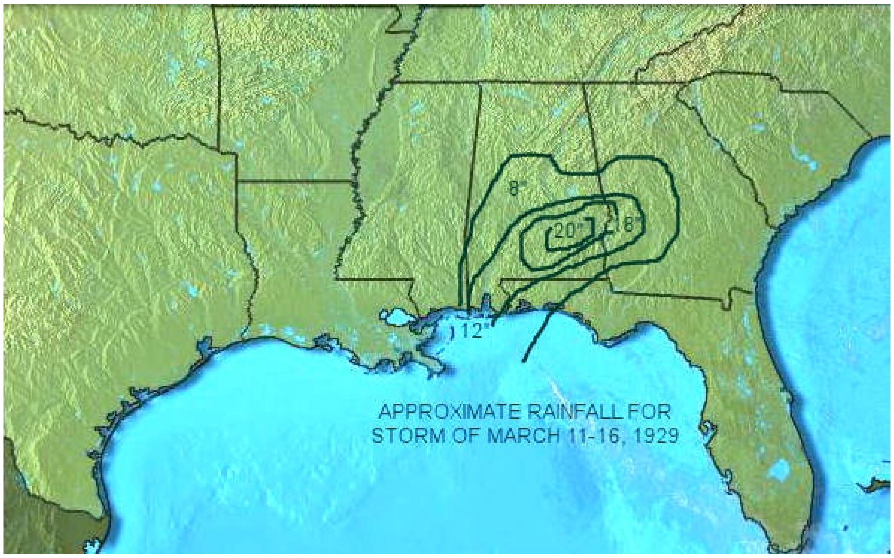

Figure 2-4. Storm of March 1929

4) <u>February 1961</u>. February 1961 was a month of extreme contrasts in the ACT Basin. The month began cold and dry, a continuation of the weather experienced over the area during most of December and January. Some scattered light rains occurred during the first week of February but not nearly enough to overcome the resulting moisture deficit. The drought condition was further intensified by a nine-day period beginning on the 9th that was almost completely devoid of rainfall. Beginning on the 18th, the dry period was abruptly followed by the rainiest eight-day period experienced in Georgia since weather records began. The rains were heaviest in the west central part of the state were both La Grange and West Point recorded more than 17 inches in eight days. More than seven inches fell in both places during a 24-hour period. Most locations northwest of Columbus reported more than eight inches of rain during the eight days. Several areas exceeded 12 inches. It was enough to make it the wettest February since 1929. The heavy rainfall caused flash flooding along many northern Georgia streams with major flooding developing on the Chattahoochee River in the West Point-Columbus area. An isohyetal map of the storm is shown in Figure 2-5.

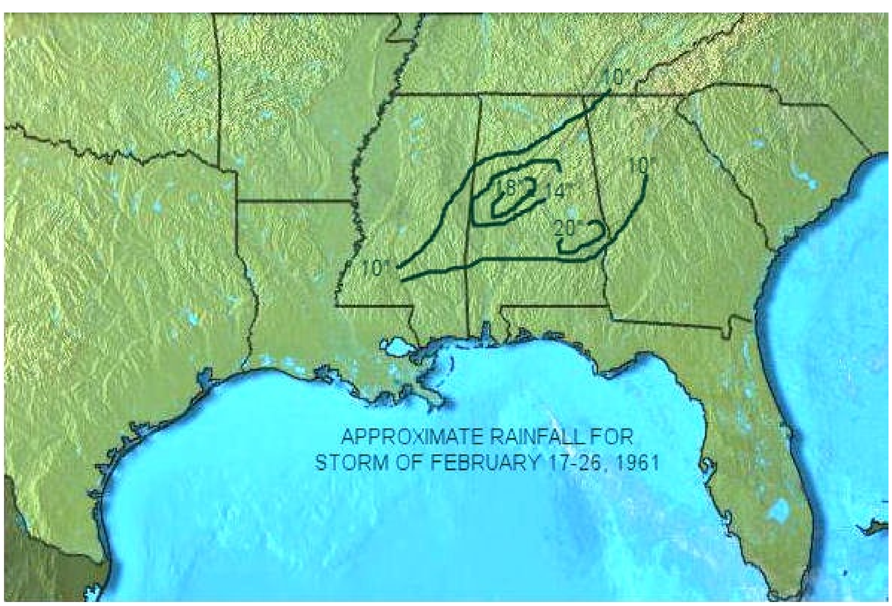

Figure 2-5. Storm of February 1961

5) July 1994. On the afternoon of 30 June 1994, Tropical Storm Alberto formed in the southeastern Gulf of Mexico between the Yucatan Peninsula and the western tip of Cuba. During the first 18 hours, the storm slowly drifted to the west, and then it began a more northwestward course. It continued that course until Saturday, 2 July when the storm began turning northerly. An isohyetal map of the storm is shown in Figure 2-6.

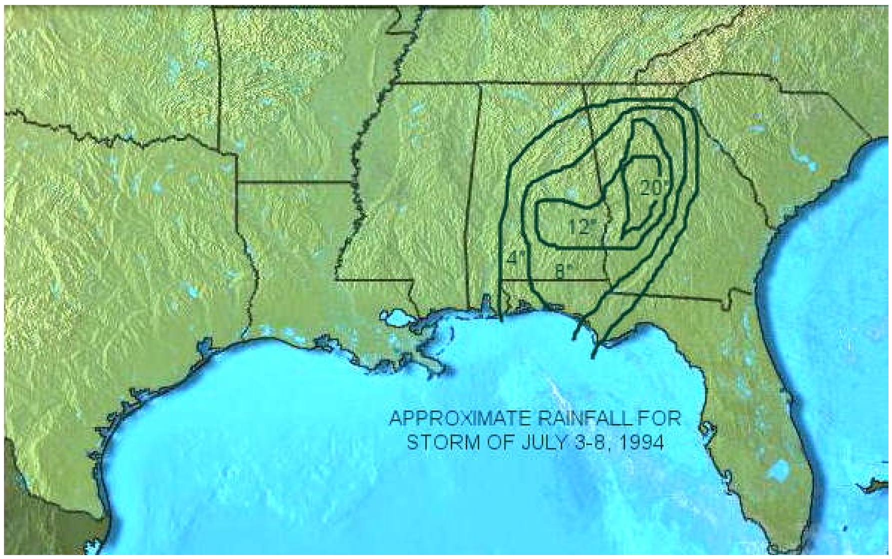

Figure 2-6. Storm of July 1994

Tropical Storm Alberto was near hurricane strength when it made landfall near Ft. Walton Beach, Florida, on Sunday, 3 July. The main threats over portions of Alabama, Florida, and Georgia were heavy rainfall and the possibility of tornados. The upper air patterns (which normally guide storms) were weak. Large areas of high pressure were to the west and the east of the storm. As a result, Tropical Storm Alberto became nearly stationary for several days as it moved over Georgia. Many places reported rainfall totals exceeding 10 inches. Atlanta received 12 - 15 inches, and other locations reported 20 - 26 inches of rainfall. Cuthbert, Georgia, in Randolph County reported 23.87 inches. The greatest flooding occurred in the Flint and Apalachicola Basins.

6) May 2003. Several rounds of thunderstorms occurred over the Morristown, Tennessee, area from 30 April through 4 May. The thunderstorms significantly soaked the ground and raised the level of streams and lakes in the area. On 5 May, a warm front lay across extreme east Tennessee with a cold front over Arkansas. The warm sector of the frontal system with dew point temperatures in the lower 60s (resulting in high atmospheric moisture content) covered most of east Tennessee. A large atmospheric blocking pattern was across the United States, which caused the normal west-to-east progression of weather systems to become nearly stationary.

During a three-day period of 5 – 7 May, heavy rain fell across north and central Georgia, especially in western and extreme northern counties. Some locations such as Troup and southern Meriwether Counties saw almost a foot of rain.

Soils were already saturated from previous rainfall, resulting in rapid rises on many of the small streams in the western half of North and Central Georgia. Many overflowed their banks. One example is in Bartow County where water spilled onto driveways and roads. Record flooding occurred on the Chickamauga near the Tennessee border. Moderate flooding was noted on several other rivers in Georgia. An isohyetal map of the storm is shown in Figure 2-7.

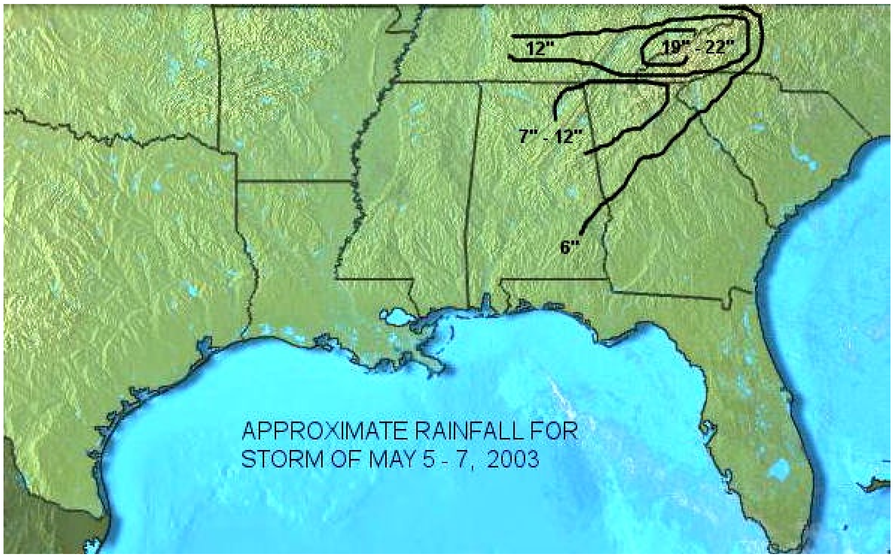

Figure 2-7. Storm of May 2003

7) September 2009. The floods of September 2009 resembled a tropical event but in reality were caused by steady rain for eight days.

During 15 – 18 September 2009, a constant rainfall fell but not in unusual amounts. Most areas had an inch or less on 15 – 16 September and very little on the 18th. By 19 September, the rainfall increased, resulting in three to five inches falling that day.

Rain began falling on the Atlanta area on the 15th, with the National Weather Service (NWS) reporting only 0.04-inch that day at the Hartsfield-Jackson Atlanta International Airport. Additional rain fell throughout the week, with only a trace amount recorded for 18 September. However, a large rain event began to inundate the area on 19 September. The official NWS monitoring station at the Atlanta airport recorded 3.70 inches of rainfall from daybreak to 8 p.m. (more than doubling the previous record for rainfall on that date), while outlying monitoring stations recorded five inches of rainfall in a 13-hour period.

The Governor of Georgia declared a State of Emergency, and requested a disaster declaration from the U.S. Government for 17 counties in Georgia. The counties were Bartow, Carroll, Cherokee, Cobb, Coweta, DeKalb, Douglas, Fulton, Gwinnett, Heard, Newton, Paulding, and Rockdale Counties around Metro Atlanta; Catoosa, Chattooga, and Walker Counties in far northwest Georgia; and Stephens County in northeast Georgia.

According to the United States Geological Survey (USGS), the rivers and streams had magnitudes so great that the odds of it happening were less than 0.2 percent in any given year. In other words, there was less than a one in 500 chance that parts of Cobb and Douglas Counties would experience such flooding. An isohyetal map of the storm is shown in Figure 2-8. A photo of the September 2009 flood near Acworth, Georgia, is shown in Figure 2-9 below.

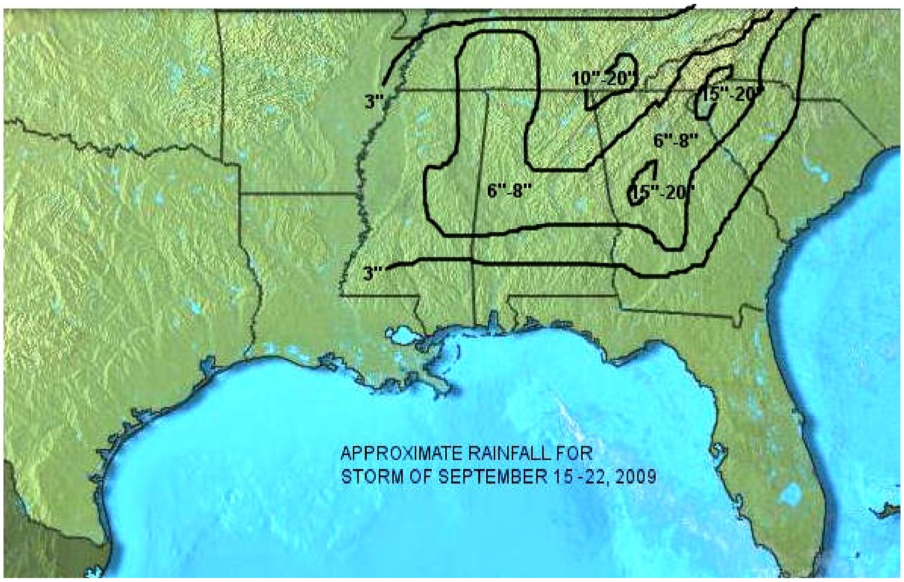

Figure 2-8. Storm of September 2009

Figure 2-9. Flooding near Acworth, Georgia - September 2009

2-07. Runoff Characteristics. Within the ACT Basin, rainfall occurs throughout the year but is less abundant during the August through November time-frame. The amount of rainfall that actually contributes to streamflow varies much more than the rainfall. Several factors such as plant growth, antecedent soil moisture conditions, and the seasonal rainfall patterns contribute to the volume of runoff. Tables 2-10, 2-11, and 2-12 present the mean monthly discharges (MMD) at selected stations throughout the basin. Figures 2-10, and 2-11 divide the basin at Rome, Georgia, and Claiborne, Alabama, to show the different percentages of runoff verses rainfall for the various sections. The mountainous areas exhibit flashier runoff characteristics and somewhat higher percentages of runoff.

Table 2-10. Mean Monthly Flows (cfs) at Selected Gage Stations in the Coosa River Basin

Gage station	Period of record	Discharge (cfs)	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
02382500 Coosawattee River at Carters, GA	1976 to 2009	Monthly Mean (MMD)	1,180	1,320	1,620	1,570	1,210	889	828	680	552	591	715	938
		Highest MMD	2,384	4,651	4,861	4,004	2,455	1,596	2,247	1,536	972	1,852	2,008	2,527
		(Year)	(1978)	(1990)	(1990)	(1977)	(2003)	(2003)	(1976)	(2003)	(2004)	(1989)	(1977)	(2004)
		Lowest MMD	250	247	248	296	425	327	328	332	299	224	222	248
		(Year)	(2008)	(2008)	(2008)	(2008)	(1988)	(2008)	(1988)	(2008)	(1998)	(1998)	(1998)	(2007)
02394000 Etowah River at Allatoona Dam above Cartersville, GA	1976 to 2009	Monthly Mean (MMD)	2,080	1,890	2,210	2,220	1,990	1,480	1,540	1,300	1,220	1,500	2,020	2,120
		Highest MMD	4,710	5,187	6,533	5,520	5,321	3,463	4,028	3,524	2,464	5,880	5,316	5,447
		(Year)	(1993)	(1996)	(1990)	(1976)	(1980)	(2003)	(2005)	(1984)	(2004)	(1989)	(1977)	(1983)
		Lowest MMD	322	306	493	360	445	541	430	423	399	448	635	339
		(Year)	(2008)	(2008)	(2002)	(1988)	(2007)	(2007)	(1986)	(1986)	(1986)	(1986)	(2007)	(2007)
02397000 Coosa River near Rome, GA	1976 to 2009	Monthly Mean (MMD)	8,660	9,370	11,400	9,580	6,980	4,560	4,430	3,280	3,110	3,610	5,180	6,780
		Highest MMD	16,950	31,130	29,220	24,630	23,490	11,700	14,470	9,360	8,013	15,440	14,130	18,640
		(Year)	(1993)	(1990)	(1990)	(1977)	(2003)	(1989)	(2003)	(1984)	(2004)	(1989)	(1977)	(1983)
		Lowest MMD	1,951	2,912	3,115	2,262	1,485	1,338	1,341	1,337	1,410	1,097	1,395	1,533
		(Year)	(2008)	(2000)	(1988)	(2007)	(2007)	(2007)	(1986)	(2007)	(1999)	(2007)	(2007)	(2007)

Table 2-11. Mean Monthly Flows (cfs) at Selected Gage Stations in the Tallapoosa River Basin

Gage station	Period of record	Discharge (cfs)	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
02414500 Tallapoosa River at Wadley, AL	1984 to 2009	Monthly Mean (MMD)	3,090	4,210	4,690	2,440	2,560	1,790	1,930	1,380	1,140	1,240	2,090	2,450
		Highest MMD	6,757	10,890	13,270	5,162	14,320	4,819	7,058	4,331	3,180	5,599	6,246	8,336
		(Year)	(1993)	(1990)	(1990)	(2005)	(2003)	(2003)	(2005)	(1984)	(2004)	(1995)	(1992)	(1983)
		Lowest MMD	299	1,607	1,294	542	380	520	527	383	320	234	185	220
		(Year)	(2008)	(1986)	(1988)	(1986)	(2007)	(1986)	(1988)	(2007)	(1990)	(1986)	(2007)	(2007)
02418500 Tallapoosa River below Tallassee, AL	1984 to 2009	Monthly Mean (MMD)	5,210	6,260	6,120	3,630	3,770	3,490	3,330	2,810	2,600	2,750	4,350	5,380
		Highest MMD	10,510	18,060	22,970	8,202	18,630	13,350	13,230	9,205	6,153	9,145	8,831	12,920
		(Year)	(1993)	(1990)	(1990)	(1998)	(2003)	(1989)	(2003)	(1984)	(2009)	(1995)	(1995)	(1983)
		Lowest MMD	404	651	613	432	381	1,336	814	638	923	681	488	407
		(Year)	(2008)	(2008)	(2007)	(2007)	(1988)	(1985)	(1988)	(2007)	(1986)	(1986)	(2007)	(2007)

Table 2-12. Mean Monthly Flows (cfs) at Selected Gage Stations in the Alabama and Cahaba River Basins

Gage station	Period of record	Discharge (cfs)	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
02420000 Alabama River near Montgomery, AL	1976 to 2009	Monthly Mean (MMD)	23,400	35,000	42,700	36,300	23,300	14,700	14,200	10,300	10,500	11,300	17,600	25,700
		Highest MMD	38,250	101,100	107,200	127,200	79,410	59,320	47,100	33,200	27,710	23,940	42,870	74,420
		(Year)	(2009)	(1990)	(1990)	(1979)	(2003)	(1989)	(2003)	(1984)	(2009)	(1979)	(2004)	(1983)
		Lowest MMD	6,098	12,400	10,510	6,186	4,681	4,513	4,929	4,210	4,113	3,646	2,430	2,294
		(Year)	(2008)	(2009)	(2007)	(2007)	(1986)	(1986)	(2008)	(1988)	(1986)	(2007)	(2007)	(2007)
02428400 Alabama River at Claiborne Lake lock and dam near Monroeville, AL	1976 to 2009	Monthly Mean (MMD)	46,500	53,100	64,800	48,600	27,600	18,000	15,200	12,200	11,700	14,800	21,000	32,300
		Highest MMD	90,120	126,000	145,000	147,600	62,250	62,470	59,580	44,030	37,580	49,420	65,300	93,480
		(Year)	(1993)	(1990)	(1990)	(1979)	(1980)	(1989)	(1989)	(1984)	(2009)	(1995)	(1992)	(1983)
		Lowest MMD	7,846	12,820	15,700	9,125	6,083	5,029	4,495	4,575	4,592	4,152	3,653	2,937
		(Year)	(2008)	(2009)	(2007)	(2007)	(2007)	(2007)	(2008)	(2007)	(2007)	(2007)	(2007)	(2007)
02425000 Cahaba River near Marion Junction, AL	1976 to 2009	Monthly Mean (MMD)	4,110	4,920	5,950	4,770	2,550	1,670	1,530	943	1.190	1,030	1,660	2,650
		Highest MMD	10,450	15,960	14,970	17,100	9,466	5,504	6,661	2,348	6,530	3,394	5,588	10,360
		(Year)	(1998)	(1990)	(1980)	(1979)	(2003)	(2003)	(2005)	(2003)	(2009)	(1995)	(2004)	(1983)
		Lowest MMD	816	1,324	1,333	645	461	304	399	278	305	302	313	408
		(Year)	(1981)	(2000)	(2007)	(1986)	(2007)	(2007)	(2008)	(2007)	(2000)	(2000)	(2008)	(2007)

Note: For the Montgomery gage, no data were available for water years 1991 through 2001.

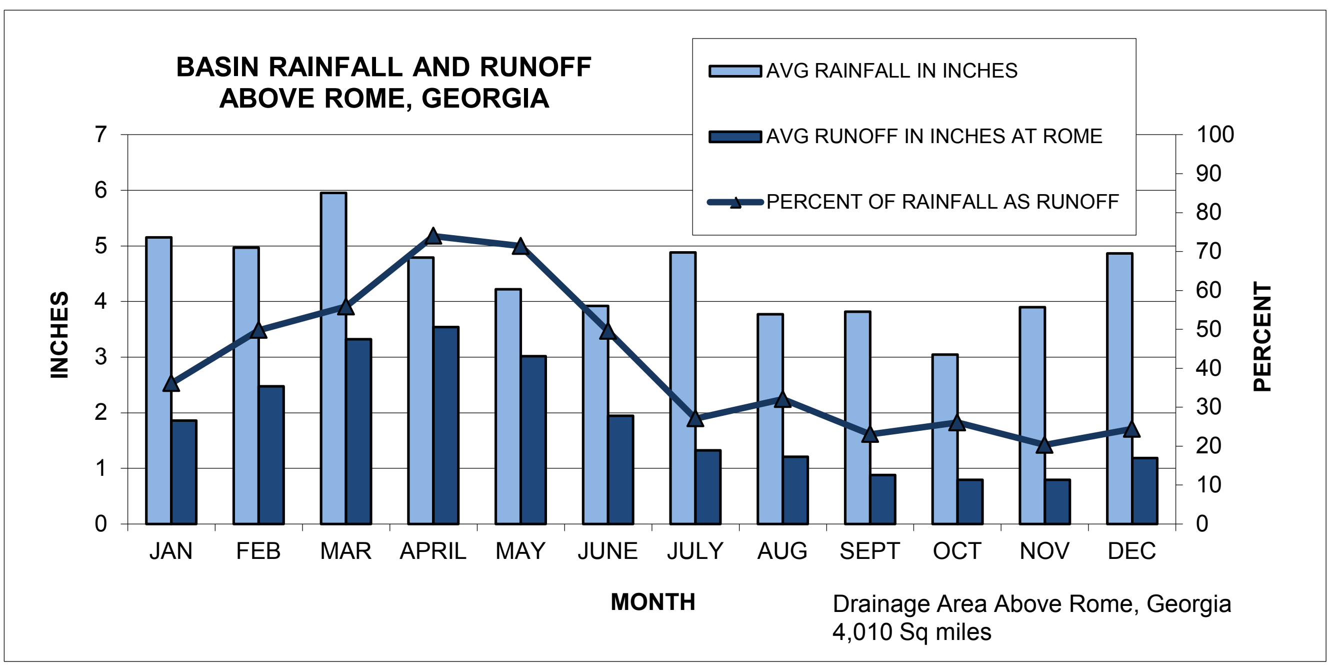

Figure 2-10. Basin Rainfall and Runoff Above Rome, Georgia

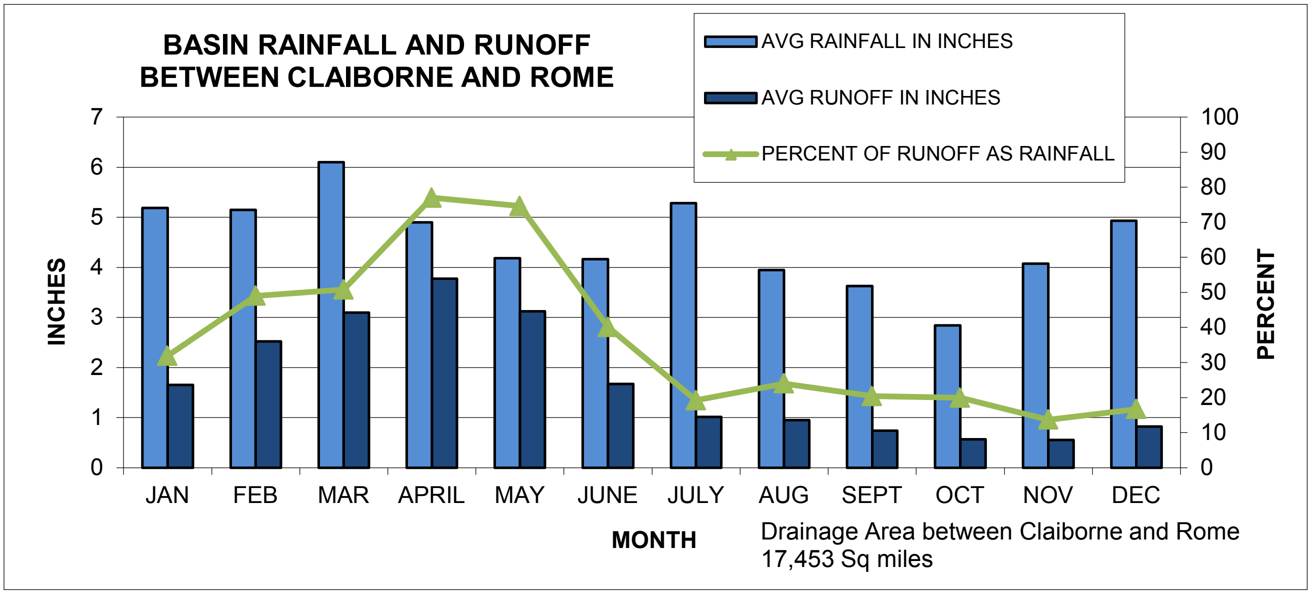

Figure 2-11. Basin Rainfall and Runoff Between Claiborne, Alabama and Rome, Georgia

2-08. Water Quality. Trends in water quality since the passage of the Clean Water Act in 1972 show improvement. An unpublished study to evaluate trends in water quality data collected by Alabama Department of Environmental Management (ADEM) from 1974 to 1998 indicates that overall total phosphorus, total suspended solids, and nitrate concentrations have improved. The USGS described water quality trends in a report published in 2009, entitled *Trends in Water Quality in the Southeastern United States, 1973* – 2005. This report included four sampling sites located in the ACT Basin: Alabama River at Claiborne, Alabama; Oostanaula River at Rome, Georgia; Etowah River at Canton, Georgia; and Etowah River at Hardin Bridge Road near Euharlee, Georgia. This investigation indicated an increasing trend in pH and specific conductance and a decreasing trend in nitrogen, phosphorus, and suspended sediments. Of course, these general trends may be different at specific site locations. Today, the focus of regulatory agencies is eutrophication in lakes and reservoirs, suspended sediment, nonpoint sources of pollution, and fecal coliform bacteria. Several total maximum daily loads (TMDLs) have been developed in the ACT Basin. TMDLs are developed for waterbodies to identify sources of impairment, the necessary reductions to sources, and methods to implement the reductions. The following paragraphs address water quality in the ACT Basin by the major rivers, the Coosa River, the Tallapoosa River, and the Alabama River.

a. Coosa River Basin. The upper part of the Coosa River Basin lies in Georgia and is impacted by growth from the metro Atlanta region. The Georgia Department of Natural Resources (GDNR) lists 1,127 miles of streams in the Coosa River Basin as not supporting their designated uses in the 2012, 305(b)/303(d) Integrated Report. Two segments in Allatoona Lake and two segments in Carters Lake do not support their designated uses (all nutrient related issues). Urban runoff and high Polychlorinated biphenyl (PCB) concentrations in fish are the most commonly cited problems. The three major tributaries of the Coosa River in Georgia have commercial fishing bans and fish consumption guidance because of PCBs. Alabama lists 136 miles of streams and 1,561 acres (Lay Lake) in the Coosa River Basin that do not support their designated uses (2012 report). In Georgia, 49 tributaries to the mainstem waterbodies are identified as biologically impaired from sedimentation. Fecal coliform bacteria, elevated nutrients, and metals are the principal parameters that are named for exceeding criteria.

At Carters Lake, two segments (Coosawattee River embayment and U.S. Woodring Branch/mid-lake) are listed in Georgia's 2012 Integrated Report as impaired for chlorophyll *a* and Phosphorus. Carters Lake does experience strong thermal stratification, and dissolved oxygen levels are reduced in the hypolimnetic zone during late summer. The reregulation pool downstream of the main lake serves as a buffer to improve water quality and flow condition downstream of the dam.

At Allatoona Lake, two segments (Little River embayment and Etowah River arm) are listed in Georgia's 2012 Integrated Report as impaired for chlorophyll *a*. The mid-lake and dam forebay portions of Allatoona Lake meet all designated water use criteria. The reservoir is transitioning from mesotrophic to eutrophic because of the influx of phosphorus nutrients. Phosphorus has increased in the reservoir and its tributaries because of increases in urban lands and broiler and beef cattle production. Dissolved oxygen levels in the tailwaters of Allatoona Dam drop below four mg/L during the summer and through early fall, and can reach as low as one mg/L.

Further down the Coosa River Basin, gravel mining, feedlots, cropland erosion, and hydroelectric power production are sources for organic enrichment and low concentrations in the basin. The Coosa River is generally more enriched in nutrients (nitrogen and phosphorus) than the Tallapoosa River. In 1990, a statewide ban on high phosphate detergents in Georgia was implemented to aid the phosphorus reduction process for all water in Georgia and further downstream.

For the APC projects in the Coosa River Basin (Weiss, Neely Henry, Logan Martin, Lay, Mitchell, and Jordan), the reservoirs are relatively shallow in depth and do not experience thermal stratification, although dissolved oxygen levels can still become depressed in lower portions of the reservoir. During the late summer, when APC releases water for hydropower generation, dissolved oxygen levels are often less than four mg/L in the deeper portions of the reservoirs. The dissolved oxygen levels in the reservoir tailwaters have occasionally violated water quality criteria, with violations typically occurring less than seven percent of the time (APC 2009).

The six APC project reservoirs form a continuous slackwater system on the Coosa River, which prevents significant reaeration in the reservoir tailwaters, with the exception of the Weiss tailwater. Aeration systems are in place on several of the reservoir dams (Logan Martin, Lay, Mitchell, Jordan, Harris, Martin, Yates), and APC has plans to install aeration measures on the Weiss and Neely Henry developments. This installation, along with continued and improved operation of the aeration systems should ensure that dissolved oxygen standards are met in the tailwaters of the APC reservoirs.

Five of the six APC reservoirs have been listed on the Alabama 303(d) list from PCB contamination, nutrient and organic enrichments, and pH and dissolved oxygen violations. TMDLs were completed in 2008 for Logan Martin, Neely Henry, Lay, Mitchell, and Weiss Lake to address the pH, nutrient, and organic enrichment violations. High levels of nutrient concentrations have increased eutrophication in the lakes.

b. Tallapoosa River Basin. Georgia has identified 121 miles of streams that do not support their designated uses (GADNR 2012) and seven stream segments as biologically impaired from sedimentation. A TMDL has also been developed for fecal coliforms. Alabama has identified 146 miles of streams in the Tallapoosa River Basin that do not support their designated uses (ADEM, 2012). ADEM's 2012 Section 303(d) list identifies Yates, Thurlow, and Martin Lakes are impaired due to mercury; and Yates Lake is also impaired due to high level of Organics.

Gravel mining, feedlots, and cropland erosion are major sources for nonpoint pollution in the Tallapoosa River.

c. Alabama River Basin. Within the Tallapoosa River Basin, Alabama has identified 147 miles of streams and 5,427 acres in Claiborne Lake that do not support their designated uses (ADEM, 2012). Claiborne Lake is impaired due to mercury and high organic levels. Logging and mining activities are major causes for impairments in the basin. Water quality indicators such as dissolved oxygen and biochemical oxygen demand have shown trends indicative of degrading conditions. Similar impairments, including high concentrations of metals and low pH values attributed to mining activities are found in the Cahaba River Basin. The Cahaba River Basin has 125 miles of streams that do not support their designated uses (ADEM, 2012).

2-09. Channel and Floodway Characteristics. Channel characteristics vary greatly throughout the basin from the steep, narrow, flashy Etowah and Coosawattee Rivers in the rocky strata in the upper reaches of the Blue Ridge Mountains, to the 1,000 foot-wide, meandering Alabama River below the Claiborne Lock and Dam.

a. Coosa River. The river banks are stable and vary from 25 to 150 feet in height. The width between banks varies from 300 to 500 feet. The Coosa River has a total fall of 454 feet in 286 miles, giving an average slope of 1.59 feet per mile. The steepest slope occurs at the Fall Line in the lower reach. The Coosa River at Wetumpka, Alabama is shown in Figure 2-12.

Figure 2-12. Coosa River at Wetumpka, Alabama

The main tributaries of the Coosa River are its headwater streams, the Etowah and Oostanaula Rivers. The Etowah River flows for 150 miles to Rome with a maximum width of about 40 feet and a length of about 70 miles. The Etowah River has a fall of 2,690 feet in 150 miles or an average fall of 17.9 feet per mile. The Oostanaula River is formed by the Coosawattee and Conasauga Rivers at Newtown Ferry, Georgia, and has a relatively flat slope of one foot per mile. The Coosawattee River is 45 miles long; and has a fall of 650 feet, an average of 14.4 feet per mile.

b. Tallapoosa River. The Tallapoosa River rises in northwestern Georgia at an elevation of about 1,250 feet NGVD29, and flows westerly and southerly for 268 miles, joining the Coosa River south of Wetumpka, Alabama. North of Tallassee, Alabama, the river cuts through the crystalline rock area and the banks are high and stable. Below Tallassee, the river meanders through the upper regions of the Coastal Plain and the banks are relatively low. The total fall of the Tallapoosa River is 1,144 feet in 268 miles, giving an average slope of 4.27 feet per mile. The Tallapoosa River at Tallassee, Alabama, is shown in Figure 2-13.

Figure 2-13. Tallapoosa River at Tallassee, Alabama

c. Alabama River. The Alabama River is formed by the confluence of the Coosa and Tallapoosa Rivers near Montgomery, Alabama, and meanders through the Coastal Plain westerly for about 100 miles to Selma, Alabama. From there it flows southwesterly 214 miles to its mouth near Calvert, Alabama. The floodplain is characterized by valleys varying in width from 0.5 to 8 miles, with an average width of approximately three miles. The river falls a total of 106 feet with an average slope of 0.34 foot per mile. At low stages, the effect of the tide in Mobile Bay is noticeable at the juncture of the Alabama and Tombigbee Rivers.

Figure 2-14. Alabama River at Dixie Landing

From its source to a point about 150 miles below Selma, Alabama, the banks of the Alabama River are comparatively high, averaging more than 40 feet above mean low water. The width between banks in this reach varies from 500 to 1,000 feet. Below this point the banks become lower until, at the mouth of the river, they are less than 10 feet high. There are numerous bluffs along the river, some of them over 100 feet high. The Alabama River at Dixie Landing, Alabama, is shown in Figure 2-14.

2-10. Economic Data. The ACT Basin drains approximately 22,800 square miles in parts of Tennessee, Georgia, and Alabama and covers 32 counties in Alabama, 18 counties in Georgia, and two counties in Tennessee. Water resources in the ACT Basin have been managed to serve a variety of purposes, including navigation, hydroelectric power, flood risk management, water supply, water quality, and recreation. Such water resources also provide important habitat for fish and wildlife.

Population in the southern states has increased dramatically since the 1940s. Figures 2-15 and 2-16 show the increase in housing density in the ACT Basin.

According to the U.S. Census Bureau, the population in the ACT Basin is 5,050,376 people (2006). The population has more than doubled in the region over the past 50 years. About 60 percent of the population in the ACT Basin resides in Alabama with the remainder in Georgia. While the overall percentage of population is larger in Alabama, the compound annual growth rate over the past 40 years averages about three percent for the Georgia portion of the basin compared to less than one percent for the Alabama portion. The overall annual growth rate for the ACT Basin is 1.28 percent for 1960 through 2006.

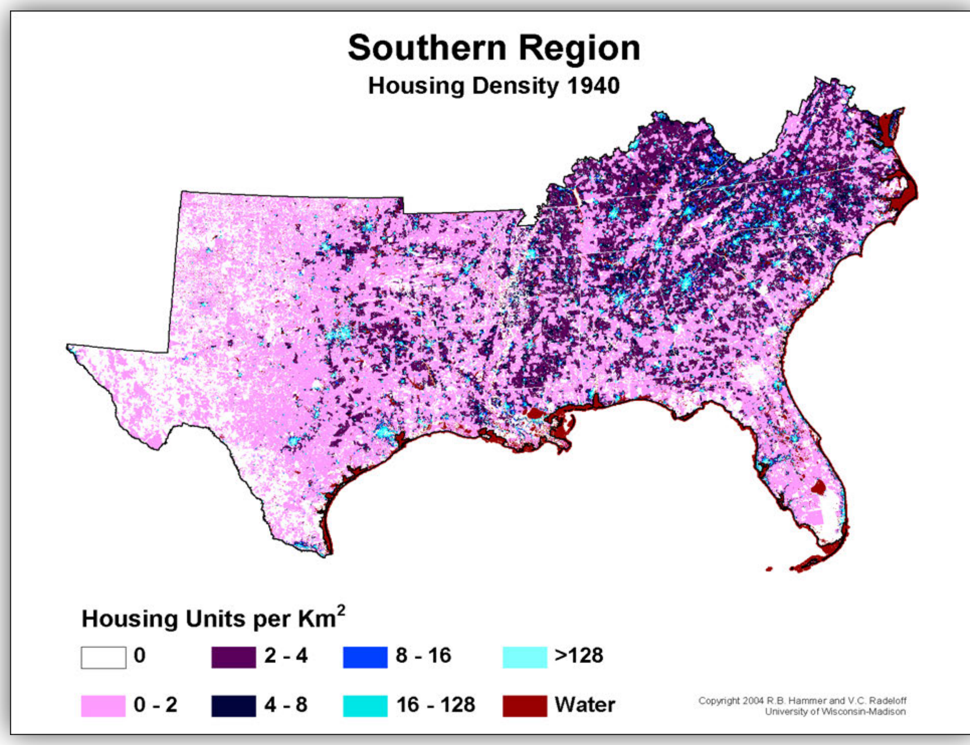

Figure 2-15. Houses per Kilometer in 1940

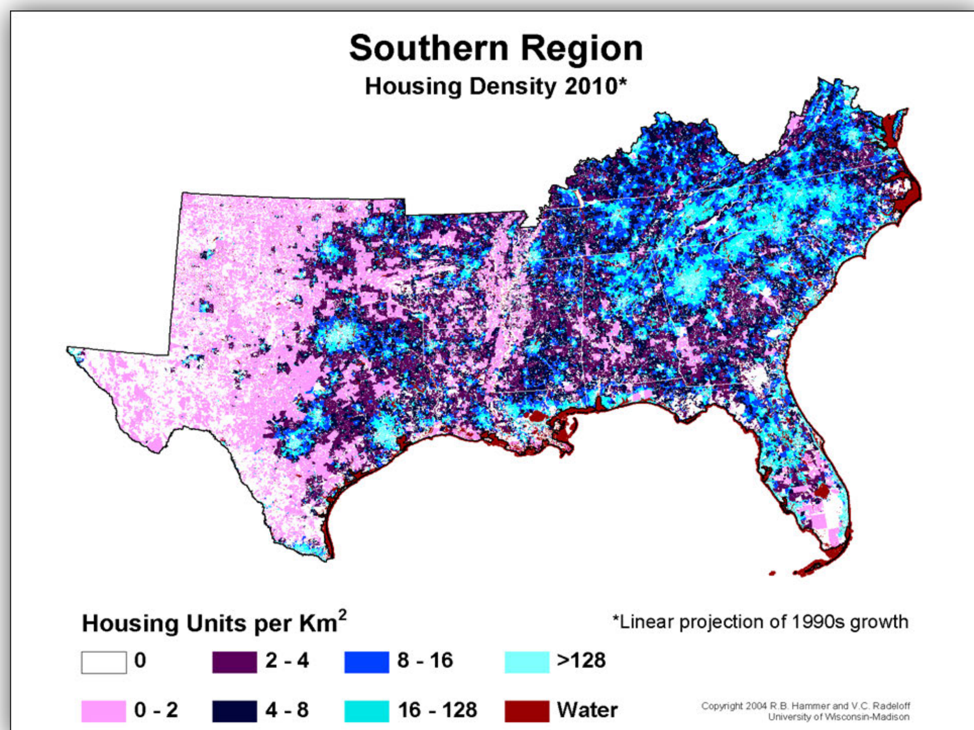

Figure 2-16. Houses per Kilometer in 2010

2-11. Land Use. ACT Basin land use data were compiled from the USGS 2001 National Land Cover Database (NLCD) which was specifically developed to provide consistent land use coverage for the United States. The NLCD land cover uses are categorized as water, developed, barren land, forested land, shrubland, cultivated herbaceous or planted (i.e., agricultural), and wetlands. The overall proportions of the land cover categories in the ACT Basin are illustrated in Figure 2-17, and the acreage associated with the land cover categories are summarized in Table 2-13.

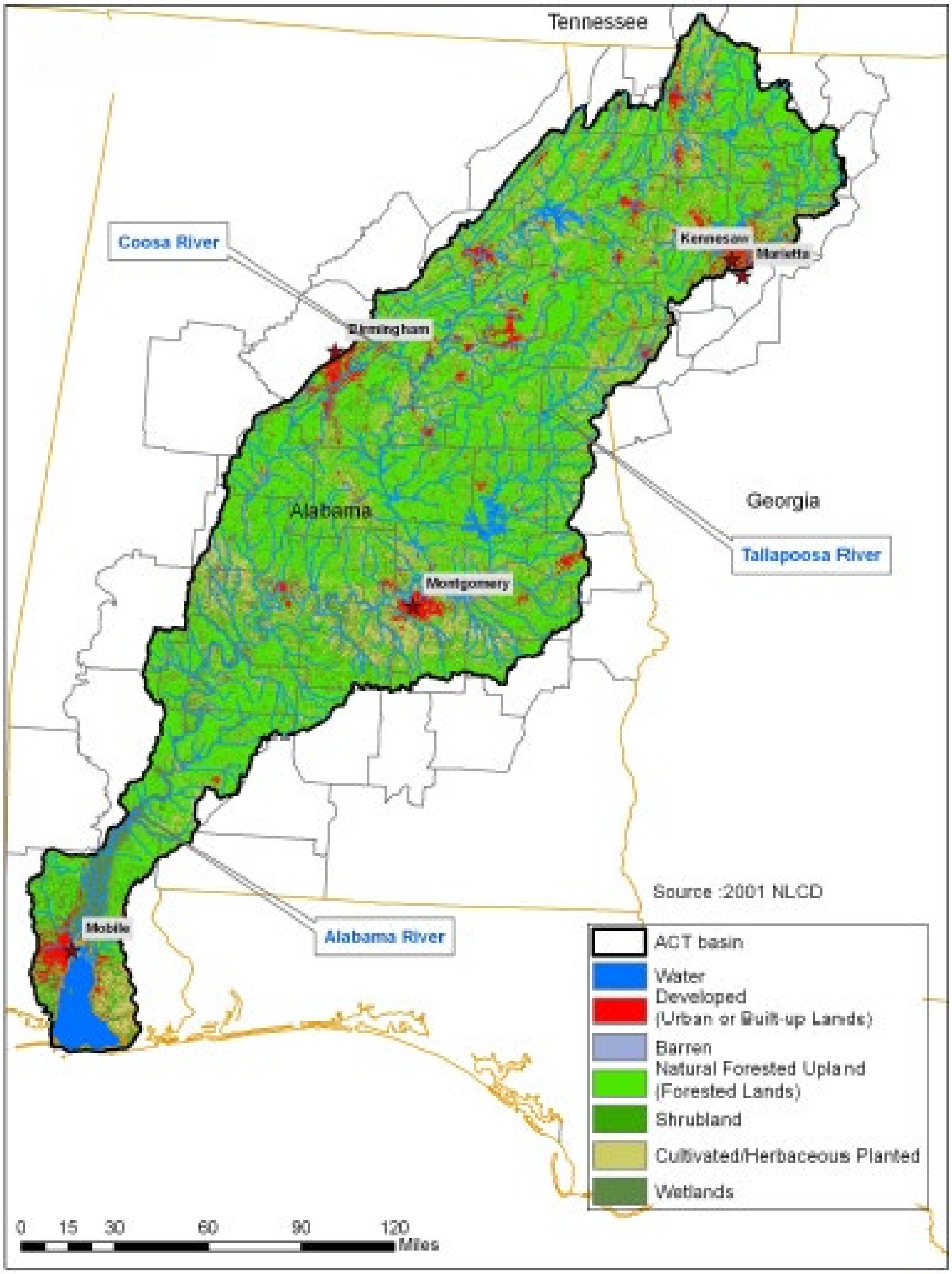

Figure 2-17. Land Use in the ACT Basin

Table 2-13. ACT Basin Land Use

	Acres	Percent of total acreage
Water	563,381	3.6%
Developed (urban or built-up land)	1,254,156	8.0%
Barren	73,980	0.5%
Natural forested upland (forested lands)	8,887,586	56.6%
Shrubland	1,439,520	9.2%
Cultivated herbaceous/planted	2,444,589	15.6%
Wetlands	1,030,440	6.6%
Total - ACT Basin	15,693,652	100.0%

Source: USGS NLCD 2001

As listed in Table 2-13, water covers approximately 563,400 acres or almost four percent of the ACT Basin. Developed land is urban or built-up land that consists of residential, commercial, industrial, and recreational land use. Developed land accounts for more than 1.25 million acres or eight percent of the ACT Basin land use. The largest developed areas in the ACT Basin are Kennesaw and Marietta, Georgia (considered suburbs of the Atlanta metropolitan area), which are in the northern portion of the ACT Basin, south of Allatoona Lake; Birmingham, Alabama (Alabama's largest city), in the west-central portion of the ACT Basin; Montgomery, Alabama (the capital of Alabama), in the east-central portion of the ACT Basin along the Alabama River; and Mobile, Alabama, at the southern end of the ACT Basin on Mobile Bay. Barren land consists of areas of bedrock, desert pavement, sand dunes, strip mines, gravel pits, and other accumulations of earthen material and covers approximately 73,980 acres or less than one percent of land in the ACT Basin.

The forested category of land use consists of deciduous forest (tree species that shed foliage in response to seasonal change), evergreen forest (tree species that maintain their foliage all year), and mixed forest. Forested land is the predominant land use in the ACT Basin and accounts for more than 8.8 million acres or almost 57 percent of land use.

Shrubland includes areas dominated by shrubs, young trees, or trees stunted from environmental conditions. Shrubland accounts for more than 1.4 million acres or about nine percent of the ACT Basin land.

Cultivated herbaceous or planted land is the second most predominant land use in the ACT Basin, accounting for more than 2.4 million acres or about 16 percent of land use. Cultivated herbaceous land consists of grazing land and herbaceous vegetation areas not subject to intensive management such as tilling. Cultivated planted land consists of all land being actively tilled for the production of annual crops such as corn, soybeans, vegetables, tobacco, cotton, and perennial woody crops such as orchards and vineyards.

Wetlands consist of palustrine and estuarine emergent wetlands and account for more than one million acres or almost seven percent of ACT Basin land. Palustrine wetlands are inland wetlands that lack flowing water, are non-tidal, and include inland marshes, swamps, bogs, and floodplains. Estuarine wetlands are coastal wetlands that are tidal and consist of vegetated and non-vegetated brackish and saltwater marshes, shoals, flats, estuaries, bays, and sounds.

2-12. Water Use. 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. Tables 2-14 and 2-

15 describe the primary water demands in the ACT Basin. Overall, the most significant water use within the ACT Basin is thermoelectric power generation (73 percent in Georgia and 72 percent in Alabama). Public water supply represents about 20 percent in Georgia and 13 percent in Alabama. Tables 2-16 and 2-17 summarize specific municipal and industrial (M&I) surface water withdrawals in the ACT Basin for Georgia and Alabama, based on data from 2005. Table 2-18 provides a summary of permitted surface water withdrawals for M&I uses in the ACT Basin in Georgia (GAEPD 2009). Surface water withdrawal permits are required by Georgia law for withdrawals in excess of 100,000 gallons per day. No similar permit requirement exists for Alabama.

Table 2-14. Surface Water Use - ACT Basin (Georgia, 2005) (mgd)

ACT Basin	USGS Hydrologic Unit Code (HUC)	Public supply	Industrial	Irrigation	Livestock	Thermo-electric	Total for Georgia
Georgia Portion		154.78	32.49	11.31	16.18	573.92	788.98
% of Total		19.6%	4.1%	1.4%	2.1%	72.8%	100%

Table 2-15. Surface Water Use - ACT Basin (Alabama, 2005) (mgd)

ACT subbasin	USGS Hydrologic Unit Code (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
% of Total		12.6%	13.1%	2.3%	03%	71.7%	100%

Table 2-16. 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
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)	City of Cave Spring (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 River Basin (Georgia)			
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 2-17. M&I Surface Water Withdrawals in the ACT Basin (Alabama)

Basin (sub-basin)	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	De Kalb	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
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

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Table 2-18. Permitted Water Users in 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
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	028-141601	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

River basin	Permit holder	Permit number	County	Source water	Permit limit max day (mgd)	Permit limit monthly average (mgd)
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	008-149101	Bartow	Etowah River	520.000	85.000
Coosa	CCMWA	008-1491-05	Bartow	Allatoona Lake	86.000	78.000
Coosa	Cartersville, City of	008-1491-06	Bartow	Allatoona Lake	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
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

III - GENERAL HISTORY OF BASIN

3-01. Authorization for Federal Development. Federal participation in developing the ACT River Basin began in 1870, when Congress assigned to the Corps the task of investigating and reporting on the practicability of improving the Coosa River for navigation. The River and Harbor Act of 14 August 1876 authorized the original project for improving the Coosa River from Rome, Georgia, to Childersburg, Alabama, by open-channel work and the construction of locks and dams. The River and Harbor Act of 19 September 1890 extended the authorization to include the improvement of the Coosa River from Childersburg, Alabama, to Wetumpka, Alabama, by the construction of locks and dams. Subsequent Acts between 1892 and 1902 modified various features of the project. The River and Harbor Act of 3 March 1909 provided for an examination and survey of the entire Alabama drainage basin to determine whether storage reservoirs could be utilized for the advantage of navigation and power. The report was printed as House Document No. 253, 63rd Congress, 1st Session, and recommended large storage reservoirs and 15 locks and dams between Gadsden, Alabama, and Wetumpka, Alabama, on the Coosa River.

Under various Acts for the improvement of the Coosa River, five locks and six dams were built between Rome, Georgia, and Childersburg, Alabama. Walls, floor, and a sill were also built for a lock at Wetumpka, Alabama. Dam number 4, near Lincoln, Alabama, was completed in 1886. Locks and Dams numbers 1, 2, and 3, near and below Greensport, Alabama, were completed in 1890. Work on the Wetumpka Lock was completed in 1892. The uppermost Lock and Dam at Mayo's Bar, located 7.5 miles below Rome, Georgia, was completed in 1913. Lock number 4 was completed in 1914, and Dam number 5 was completed in 1917. The fixed-crest dams were constructed of rock fill or rock-filled crib except for a concrete ogee weir section in Dam number 5. Lock number 4 and the Wetumpka Lock were made 280 feet long by 52 feet wide, with seven and eight feet minimum depth over the sills. The other locks were 176 feet long by 40 feet wide, with a 3.25 to 6.0 feet minimum depth over the sills.

In addition to the construction of those locks and dams, open-channel work was carried on from 1877 to 1920 between Rome, Georgia, and Lock number 4, with the objective of maintaining a channel depth of four feet at low water; but the work was not continuous and the whole length of the project was not completed. Commerce on the Coosa River was local due to no outlet to the Gulf of Mexico or even below Dam number 5, which was built across the river without a lock. The developments served a useful purpose as river transportation to Rome, Georgia, and were active until the advent of roads and railroads caused river traffic to practically disappear. The development became inadequate for modern navigation and deteriorated through lack of use. Much of the original construction has been removed or covered by later development.

Initial improvement of the Alabama River was also for navigation and was authorized by the River and Harbor Act of 18 June 1878, which provided for open-channel work to maintain a low-water depth of four feet on the-Alabama River and the Coosa River to Wetumpka, Alabama. The River and Harbor Act of 13 July 1892, increased the authorized depth to six feet, but subsequent Acts reduced it again to four feet. Work was begun in 1875 and consisted of dredging, snagging, and contraction works below Montgomery, Alabama, and snagging above Montgomery, Alabama.

Other early projects to maintain navigation by open-channel work were initiated between 1874 and 1884 on the Oostanaula and the Coosawattee Rivers between Rome, Georgia, and Carters Hill, Alabama, on the Tallapoosa River from the mouth to Tallassee, Alabama, and on the Cahaba River from the mouth to Centerville, Alabama. These projects carried little traffic and were soon abandoned.

The first comprehensive report on the optimum use of the water resources of the basin was prepared by the Corps in 1934, and was printed as House Document No. 66, 74th Congress, 1st session (308 Report). It presented a long-range plan for the ultimate complete development of the waterways of the system in the coordinated interests of navigation, flood risk management, hydroelectric power, and other beneficial uses of water. The plan contemplated: (1) five, low-lift dams with locks on the Alabama River and one hydropower dam with lock on the Coosa River at Wetumpka, Alabama; (2) a nine-foot depth for navigation from the Mobile Harbor to Jordan Dam, the lowermost of APC's three dams on the Coosa River; (3) locks in Jordan, Mitchell, and Lay Dams; (4) seven additional dams on the Coosa River, all with locks and four with power plants, to carry nine feet of navigation depth to Rome, Georgia.; and (5) four dams on tributary streams, three with power installations and the fourth to store water for opportune release as needed by power plants downstream.

The report concluded that, although the overall plan proposed would likely be economically justified in whole or in part as the basin developed in the future, the only feature then justified was a system of levees to protect the Fourth Ward at Rome, Georgia, from periodic inundation by floodwaters of the Oostanaula and Coosa Rivers. That improvement was authorized by Congress in the Flood Control Act of 1936 and was completed by the Corps in 1940 at a federal cost of $367,000. The project was turned over to the City of Rome, Georgia, for maintenance and operation. This levee continues under Rome's control with periodic federal inspection to ensure eligibility in PL 84-99.

The Corps provided two small local flood risk management projects under special authorities. Flood work at Collinsville, Alabama, on Little Wills Creek, authorized by the War Department Civil Appropriations Act of 19 July 1937, was completed in 1939 at a federal cost of $71,100. Channel improvement of the Cahaba River for a 29-mile reach below Centerville, Alabama, was completed in 1940, at a cost of $50,000, under the general allotment for snagging provided for by the Flood Control Act of 1939. Both improvements were turned over to local interests for maintenance and operation.

As a result of continued rapid expansion of economic activities in the valley, four reviews of the previous comprehensive report were assigned to the Corps by Congressional directives between 1936 and 1939. A single combined report was proposed in response to all four authorizations. However, pending completion of the full report, two interim reports were submitted covering especially urgent improvements for flood risk management; one at Prattville, Alabama, and the other to provide additional flood risk management at and in the vicinity of Rome, Georgia, by constructing a combination flood risk management and power dam and reservoir on the Etowah River above Rome, Georgia.

The work at Prattville, Alabama, on Autauga Creek, was authorized by the Flood Control Act of 1941 and was completed in 1944 at a federal cost of $649, 300. The improvement was turned over to local interests for maintenance and operation.

The dam and reservoir on the Etowah River (Allatoona Project) was authorized by the Flood Control Act of 1941. World War II delayed commencement of construction on the project until 1946. The project was essentially complete in 1950 at a cost of $32,000,000. The project is described in detail in Appendix A – Allatoona Dam and Lake Water Control Manual.

The Corps also provided a flood risk management project on Black Creek at Gadsden, Alabama, which was authorized in September 1950, under provisions of Section 205 of the Flood Control Act of 1948, as amended, and completed in December 1951.

In view of the rapid expansion of economic activities in the valley in the late 1930's, and in response to outstanding Congressional directives calling for review of earlier comprehensive reports to determine whether any change in previous recommendations was desirable in the light of changed conditions, the Secretary of War in 1941 submitted to Congress an interim report of the Corps printed as House Document No. 414, 77th Congress. That report outlined a comprehensive plan for ultimate development of the basin's water resources to be accomplished step-by-step over a period of years, with the development to be in accordance with plans being prepared by the Chief of Engineers. For initiation and partial accomplishment of the plan, an expenditure of $60,000,000 was recommended for approval for the construction of navigation and power dams on the lower river system (at and below Howell Shoals site). That project was federally adopted in the River and Harbor Act of 2 March 1945 (Public Law 14, 79th Congress), with the specific item reading as follows:

Alabama-Coosa River, Alabama: Initial and ultimate development of the Alabama-Coosa River and tributaries for navigation, flood control, power development, and other purposes, as outlined in House Document numbered 414, Seventy-seventh Congress, is hereby authorized substantially in accordance with the plans being prepared by the Chief of Engineers with such modifications thereof from time to time as in the discretion of the Secretary of War and the Chief of Engineers may be advisable for the purpose of increasing the development of hydroelectric power; and that for the initiation and accomplishment of the ultimate plan appropriations are authorized in such amounts as Congress may from time to time determine to be advisable, the total of such appropriations not to exceed the sum of $60,000,000. The aforesaid authorization and approval shall include authorities for all powerhouses, power machinery, and appurtenances found to be desirable by the Secretary of War upon the recommendation of the Chief of Engineers and the Federal Power Commission.

After the end of the war, the review of the comprehensive plan was resumed by the Corps. Several public hearings were held by the District Engineer at key points throughout the basin to afford those interested the opportunity to voice their desires. The comprehensive plan set forth in House Document No. 414, 77th Congress, was modified and expanded to make fuller use of the water resources of the basin, particularly for flood risk management and the production of hydroelectric power.

The Chief of Engineers in a report submitted on 15 October 1941, and printed as House Document No. 414, 77th Congress, 1st Session, recommended a general plan for the development of the basin. Congress authorized the initial and partial accomplishment of this plan in the River and Harbor Act of 2 March 1945 (Public Law 14, 79th Congress). Planning studies for the initially authorized projects on the Alabama River (to provide navigation facilities with the maximum hydroelectric power feasible) began in 1945.

A site selection report for the entire Alabama River was submitted on 10 December 1945, which determined that the overall project for the Alabama River should consist of dredging in the lower river, and navigation locks and dams at Claiborne, Millers Ferry, and Jones Bluff upstream, with hydropower plants at Millers Ferry and Jones Bluff.

On 28 June 1954, the 83rd Congress, 2nd Session, enacted Public Law (P.L.) 436, which suspended the authorization under the River and Harbor Act of 2 March 1945, insofar as it concerned federal development of the Coosa River for the generation of electric power, in order to permit development by private interests under a license to be issued by the Federal Power Commission. The law stipulates that the license shall require provisions for flood risk management storage and for future navigation. It further states that the projects shall be operated for flood risk management and navigation in accordance with reasonable rules and regulations of the Secretary of the Army.

On 2 December 1955, the APC submitted an application to the Federal Power Commission (FPC) for a license for development of the Coosa River in accordance with the provisions of P.L. 436. The development proposed by the APC, designated in the application as APC Project No. 2146; included plans for the Leesburg Dam (later renamed Weiss Dam), a dam at old Lock 3 (renamed H. Neely Henry Dam), and the Kelly Creek Dam (renamed Logan Martin Dam).

3-02. Planning and Design. The authorizations for developing the federal projects in the ACT Basin provided for the specific multiple purposes of flood risk management, hydropower, and navigation. During the planning stages, each project was designed to fulfill its authorized purposes and to form an integrated, mutually interrelated system that will make the most complete practicable use of the water resources in the basin.

a. Allatoona Dam. Early planning and design for the Allatoona Dam and Reservoir presented a multi-purpose project for hydropower, navigation and flood risk management. Construction was authorized in the Flood Control Act of 18 August 1941, now known as Public Law No. 228, 77th Congress, 1st session, H. R. 4911. In December 1941, the District Engineer submitted to the Chief of Engineers a report entitled "Definite Project Report, Allatoona Dam and Reservoir, Etowah River, in the Alabama-Coosa River Basin, Georgia", and work was initiated on plans and specifications. This report described a project with total storage of 722,000 acre-feet with the top of the flood risk management pool at 860 feet NGVD29. This total storage was allocated as 212,000 acre-feet for flood risk management storage between elevations 848 and 860 feet NGVD29, 456,000 acre-feet for conservation storage between elevations 788 and 848 feet NGVD29, and 54,000 acre-feet for inactive “dead” storage below elevation 788 feet NGVD29.

b. Carters Dam. Early studies limited the location of a project on the Coosawattee River to the reach between miles 26 and 35. The possibilities of a single dam, two dams and a single dam with a long tunnel to develop the full head in the reach, as well as the possibility of pumped storage were investigated. Design Memorandum No. 5, "General Design", dated 22 July 1963, presented plans for a dam at mile 26.8 on the Coosawattee River. Maximum and minimum power pools would be at elevations 1072 and 1022 feet NGVD29 respectively and maximum flood risk management pool would be at elevation 1099. This project would have a powerhouse containing two 52,000-kilowatt (kW) units.

Approval for installation of 250,000 kW of generating capacity at Carters Dam on the Coosawattee River together with a reregulation dam to limit power discharges to the downstream channel capacity was given by the Secretary of the Army on 25 July 1964. Revisions to the project were described in the supplement to Design Memorandum No. 5, submitted 30 September 1964. This plan provided for an intake structure for two powerhouse units. Subsequently, major modifications of the plan were authorized which increased the number of turbine units at the project to four, with two being pumped storage units. Design Memorandum No. 22, dated July 1968, was prepared to present the design considerations involved with the addition of the two units.

c. Robert F. Henry, Millers Ferry, and Claiborne Locks and Dams. The 308 Report contemplated five navigation dams on the Alabama River. A resolution of the Committee on Commerce, U. S. Senate, adopted 18 January 1939, requested a review to determine the advisability of constructing reservoirs on the Alabama-Coosa Rivers and tributaries for development of hydroelectric power and improvement for navigation. The Chief of Engineers, in a report submitted on 15 October 1941, and printed as House Document No. 414, 77th Congress, 1st Session recommended a general plan for the development of the basin.

Congress authorized in the River and Harbor Act of 2 March 1945 (Public Law 14, 79th Congress) the initial and partial accomplishment of this plan.

Planning studies for the initially authorized projects on the Alabama River to provide navigation facilities with the maximum hydroelectric power feasible began in 1945. A site selection report for the entire Alabama River was submitted on I0 December 1945, which determined that the overall project for the Alabama River should consist of dredging in the lower river, and navigation dams and locks at Claiborne, Millers Ferry and Jones Bluff upstream with power plants added to the latter two projects. Design Memorandums for the three projects were developed between 1963 and 1971 which described the particular features for each project.

3-03. Construction of Federal Projects. Allatoona Dam was the first of the existing, Federal Government reservoir projects in the ACT River Basin. Allatoona was authorized in 1941, but due to delays during World War II, the dam was not completed until 1949. The reservoir was slowly filled and normal operation began in June 1950. The project reached full conservation pool (840 feet NVGD) on April 3, 1951.

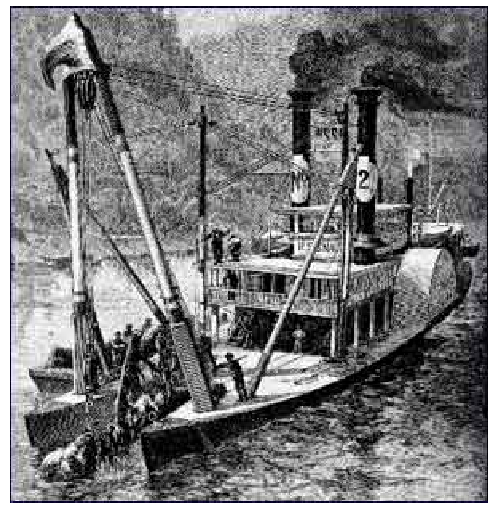

Figure 3-1. Early snag boat

Millers Ferry Lock and Dam construction began in 1964, and was completed in May 1970. Hydropower production began in 1970.

Claiborne Lock and Dam construction began in 1964, and was completed in May 1970.

Robert F. Henry Lock and Dam (Jones Bluff Lock and Dam) construction began in 1966 and was officially opened to navigation in April 1972. Hydropower production began in 1975.

At Carters Dam, the first construction contract was awarded in 1962, and construction of the main dam, the reregulation dam, and the powerhouse was completed in 1975. The conventional generating units were declared commercially available in 1975, and the pump turbine units became commercially available in 1977.

3-04. Related Projects. In addition to the five Corps projects in the basin, there are 11 dams owned by the APC mostly in the vicinity of the Fall Line, to take advantage of the steep vertical gradient in the area. Six of the projects, three on the Coosa River and three on the Tallapoosa River were constructed between 1914 and 1931. The Corps has no flood risk management responsibility or authority for these six projects which include Martin, Yates, Thurlow, Lay, Mitchell and Jordan. A second phase of development occurred in the 1950-1960 time period with the construction of five additional projects. Four of these projects were constructed on the Coosa River and one project was constructed on the Tallapoosa River. The Corps has a flood risk management responsibility and authority at four of these projects (Weiss, H. Neely Henry, Logan Martin, and Harris) under P.L. 83-436.

3-05. Modifications to Regulations. Section 3-02 describes some of the early planning criteria for the federal reservoirs. Early planning recognized that full development of the basin would create a system of reservoirs where downstream projects would be affected by upstream storage; therefore some system-wide regulation would be necessary to insure the integrity of each project purpose.

With the development of the Alabama River for navigation, see Figure 3-1 for an example of an early snag boat, came the necessity to provide more dependable channel depths provided by river flows. Requirements were developed to insure adequate weekly and three-day releases from the upstream projects into the Alabama River. Storage in R. E. “Bob” Woodruff and William “Bill” Dannelly Lakes is used to regulate the flows on a daily basis. Different required flow volumes have been used in the past and it is likely that additional adjustments to the required flows will be made in the future.

Early design for the three locks and dams prescribed run-of-river regulation plans. One foot of storage was to be used to regulate unsteady inflows and this storage is commonly referred to as “pondage”. However, this regulation plan was abandoned once the generators were placed online. The power production was sold and scheduled as peaking energy with several hours of production followed by complete shutdown. This mode of operation contributes to unsteady flows and stages in the river and is responsible for the lowest recorded flow at Claiborne. Regulation techniques are used at Claiborne Lock and Dam to help smooth out downstream flows.

Modifications to water control operations in the ACT Basin have largely been documented in the revised Master Water Control Manual Appendices prepared for each of the five federal projects in the basin and the four APC Projects with flood risk management responsibilities. Appendix A for Allatoona Dam and Lake was prepared in March 1952 and revised in August 1962, December 1993, and XXXX 2013. Appendix B for Weiss Dam and Lake was prepared in October 1965 and revised in 2009. The 2009 revision was administrative in nature and did not make substantial changes to the operation of the project. Appendix C for Logan Martin Dam and Lake was prepared in January 1968. Appendix D for H. Neely Henry Dam and Lake was prepared in January 1979 and revised in XXXX 2013. Appendix E for Millers Ferry Lock and Dam was prepared in December 1990 and revised in XXXX 2013. Appendix F for Claiborne Lock and Dam was prepared in October 1993 and revised in XXXX 2013. Appendix G for Robert F. Henry Lock and Dam was prepared in March 1999 and revised in XXXX 2013. Appendix H for Carters Dam and Lake (and Reregulation Dam) was prepared in July 1979 and revised in XXXX 2013. Appendix I for Harris Dam and Lake was prepared in December 2003 and revised in XXXX 2013.

Over the span of years since 1950 when the Corps reservoirs in the ACT Basin began to become operational, changes in needs and conditions in the basin have influenced certain modifications to the regulation of the projects. The following describe the major factors influencing modifications to project regulation that have occurred in the basin.

a. <u>Metro Atlanta Population Growth</u>. The significant population growth in the Metropolitan Atlanta area, and to a lesser degree in Montgomery, Alabama, has resulted in increased water demands for M&I water supply, for additional flows in the river to better maintain water quality and aquatic life, and for higher pool levels to support recreational needs. Concerns associated with flooding also increase with increases in population.

b. <u>In re Tri-State Water Rights Litigation</u>. In 1989, proposals by the Corps to reallocate storage to M&I water supply at Carters Lake and Allatoona Lake, and by Georgia to develop a regional reservoir in the Tallapoosa River Basin near the Alabama state line (West Georgia Regional Reservoir) caused controversy among various federal agencies, the States of Alabama and Florida, and various water user groups. A final Water Supply Reallocation Report and final Environmental Assessment were prepared for the Carters Lake and Allatoona Lake proposals and submitted to SAD for approval in August 1991. Alabama filed a lawsuit against the Corps in June 1990 to halt those proposed actions. As a result of the litigation, the proposed revisions to the ACT Basin Water Control Manual were deferred during party negotiations. After many attempts at reaching a negotiated settlement failed, including a comprehensive study, compact negotiations, and court-ordered mediation, the lawsuit before the U. S. District Court for the Northern District of Alabama (N.D. AL) proceeded. The Federal Defendants filed motions to dismiss the majority of the litigation based on a decision by the 11th Circuit concerning the Apalachicola-Chattahoochee-Flint River Basin, In re MDL-1824 Tri-State Water Rights Litigation, 644 F.3d 1160 (11th Cir. 2011). On 3 July 3 2012, the N.D. AL Court dismissed all counts of primary complaints except one regarding the permitting of the Hickory Log Creek Reservoir, which is still pending.

c. Hydropower. The Southeastern Power Administration (SEPA) negotiates contracts for the sale of power from the Corps hydropower projects in accordance with the Flood Control Act of 1944. Under the provisions of the Act, the Corps determines the amount of energy available at the ACT projects each week and advises SEPA of the amount available, and SEPA arranges the sale. In the early years, power generation was conducted at each hydropower project for a set number of hours per day as long as sufficient water was in conservation storage to accommodate the hydropower operation. In dry years, conservation storage was depleted at some projects to the point that release requirements for other project purposes could not be met. In 1989 a system of action zones was developed and implemented to guide operations at Allatoona Lake. As a result, power generation demands have been balanced between the projects weekly to enhance long-term generating capability of the entire system and to provide for the needs of other project purposes in the system.

d. Fish Spawn Operations. The Corps' South Atlantic Division Regulation DR 1130-2-16 (31 May 2010) and Mobile District Draft Standard Operating Procedure (SOP) 1130-2-9 (February 2005) were developed to address lake regulation and coordination for fish management purposes. The SOP specifically applies to the Allatoona Project and addresses procedures necessary to gather and disseminate water temperature data and manage lake levels during the annual fish spawning period between March and May, primarily targeted at largemouth bass. The major goal of the operation is to not lower the lake level more than six inches in elevation during the reproduction period to prevent stranding or exposing fish eggs.

Minimum flow requirements of 240 cubic feet per second (cfs) below the Allatoona and Carters Projects for water quality purposes also support fish and wildlife conservation downstream of the projects, particularly during periods of extremely dry weather.

Even though the remaining Corps reservoirs in the ACT Basin (Woodruff, Dannelly, and Claiborne Lakes) do not have specific water management procedures directed at fish and wildlife conservation, they do conduct natural resource management activities to improve fishery conditions and support healthy sport fisheries. The pools are maintained at fairly constant levels, except during floods when high inflows cause reservoir levels to rise due to the limited storage capacity at each project. Relatively stable pools during the spring spawning season are beneficial to the production of crappie, largemouth and smallmouth bass, shellcracker, warmouth, and sunfishes.

3-06. Principal Regulation Problems. The following describe the principal regulation problems that exist at the Corps projects in the ACT Basin.

a. Allatoona Dam. The initial regulation plan called for evacuation of flood waters stored above the conservation pool as soon as practicable by releasing at rates not to exceed the downstream bankfull capacity estimated at 12,000 cfs. However, through actual operating experience, particularly the April 1964 flood, the channel capacity below Allatoona Dam was reevaluated and the defined stream capacity was reduced from 12,000 cfs to 9,500 cfs. A survey and real estate appraisal was made to determine the acreage involved and the cost of acquiring easements to permit emptying releases up to 12,000 cfs. This higher release rate, which would expedite the evacuation of flood storage, would be necessary to permit operation of the power plant at full capacity if the third generating unit was installed. Until such easements are acquired, flood storage will continue to be emptied at a maximum rate of 9,500 cfs.

b. Carters Dam and Reregulation Dam. There is a head limitation, difference between headwater and tailwater, for the main dam of 395 feet that can impact the ability to pump-back during major flood events.

The swelling and fracturing of the concrete in the Reregulation Dam, caused by “alkali aggregate reaction”, has resulted in the weakening of the bridge across the spillway which is used to support the crane that places the stoplogs in the spillway gates. Also, displacement of the abutment and one of the monoliths has resulted in caution regarding fully raising the spillway gates. The spillway bridge has been cut to allow for expansion and concrete expansion is monitored.

The previous problem of a lack of action zones within the conservation storage to better distribute the storage during dry periods has been rectified with the current revision of the regulation manual.

c. Robert F. Henry Lock and Dam. Full discharge capacity of the spillway is 124,500 cfs (elevation 125.0 feet NGVD29), the equivalent of a 1.5-year recurrence interval. Flows above these levels are not impacted or impeded by project operations.

There is a head limitation at the project, difference between headwater and tailwater, of 47 feet.

Due to low flow vibrations, gates 1-3 are not used until all the gates can be opened to step five, which corresponds to a tailwater elevation of 98 feet NGVD29.

d. Millers Ferry Lock and Dam. Full discharge capacity of the spillway is 185,500 cfs (elevation 80.8 feet NGVD29), the equivalent of a 15-year recurrence interval. Flows above these levels are not impacted or impeded by project operations. There is also a head limitation of 48 feet at the project.

e. Claiborne Lock and Dam. Full discharge capacity of the spillway is 67,111 cfs (elevation 36.0 feet NGVD29), not including the flow over the fixed crest spillway the equivalent of a 1.5-year recurrence interval. Flows above these levels are not impacted or impeded by project operations. There is also a head limitation of 30 feet at the project.

IV - DESCRIPTION OF PROJECTS

4-01. Location. The Coosa River is formed by the Etowah and Oostanaula Rivers at Rome, Georgia, and flows first westerly, then southwesterly, and finally southerly for a total of 286 miles before joining the Tallapoosa River to form the Alabama River. The Etowah River lies entirely within Georgia and is formed by several small mountain creeks which rise on the southern slopes of the Blue Ridge Mountains at an elevation of about 3,250 feet. The Etowah River flows for 150 miles to Rome, Georgia. The Oostanaula River is formed by the Coosawattee and Conasauga Rivers at Newtown Ferry, Georgia, and meanders southwesterly through a broad plateau for 47 miles to its mouth at Rome, Georgia. The Tallapoosa River rises in northwestern Georgia at an elevation of about 1,250 feet, and flows westerly and southerly for 268 miles, joining the Coosa River south of Wetumpka, Alabama. The upper 55 miles of the stream are in Georgia and the lower 213 miles in Alabama. The Alabama River is formed by the confluence of the Coosa and Tallapoosa Rivers near Montgomery, Alabama, meandering westerly for about 100 miles to Selma, Alabama, then southwesterly for 214 miles to its mouth near Calvert, Alabama. Suburbs of Atlanta extend into the upper portions of the basin with extensive development in the Allatoona region. Farther downstream is Rome, Georgia. Birmingham, Alabama is on the western edge of the basin and Montgomery, Alabama is located on the Alabama River below the confluence of the Coosa and Tallapoosa Rivers.

4-02. Purpose. Federal plans for the ACT River Basin further the goal of coordinating existing development and any future development to form a mutually interrelated system. The intention is to make the most complete practicable use of water resources. Federal interest in the ACT River Basin dates back to 1870, when Congress assigned the Corps the task of investigating and reporting on the practicability of improving the Coosa River for navigation. Subsequent River and Harbor Acts provided for the initiation of construction of a series of multipurpose impoundments on the system to meet the purposes of navigation, flood risk management, and hydropower. Other project purposes of the projects include water quality, recreation, water supply, and fish and wildlife. Modifications of those plans have resulted in the completion of five federal dams, one on the Etowah River, one on the Coosawattee River, and three on the Alabama River. In addition, authorizations of those modified plans included flood risk management and navigation at four non-federal hydropower projects; three on the Coosa River and one on the Tallapoosa River.

4-03. Physical Components. Plate 2-1 present the locations of the major dam projects in the ACT River Basin, and Figure 2-1 in Chapter II presents a profile view of the river and reservoir developments. A brief summary of the key features of each project are provided below. Details of the physical components of each project are provided in the project appendices.

4-04. Overview. The ACT Basin extends approximately 330 miles from northwest Georgia to the mouth of the Alabama River, where it joins the Tombigbee River to form the Mobile River. The total drainage area of the ACT Basin is approximately 22,800 square miles. Plate 4-1 shows the drainage areas associated with the ACT projects. The Corps operates five projects in the ACT Basin; Allatoona Dam and Lake, Carters Dam and Lake and Carters Reregulation Dam, Robert F. Henry Lock and Dam and R. E. “Bob” Woodruff Lake, Millers Ferry Lock and Dam and William “Bill” Dannelly Lake, and Claiborne Lock and Dam and Lake. APC owns and operates four projects with federal flood risk management and navigation authorizations; Weiss Dam and Lake, H. Neely Henry Dam and Lake, and Logan Martin Dam and Lake on the Coosa River and Harris Dam and Lake on the Tallapoosa River. APC also owns and operates six other projects which have no similar Corps flood risk management authorization as their construction preceded P.L. 83-436. These include Martin, Yates and Thurlow on the Tallapoosa River and Jordan/Bouldin on the Coosa River.

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 (see Table 4-1 and Figure 4-1). Thurlow and Purdy Lakes are not included because of their negligible storage capacity relative to the other projects. Each reservoir is discussed individually below. APC controls 77 percent of the available conservation storage; federal 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.

Table 4-1. ACT Basin Conservation Storage Percent by Acre-Feet

Project	Conservation Storage (acre-feet)	Percentage
*Allatoona	284,580	11.7%
*Carters	141,402	5.8%
**Weiss	237,448	9.8%
**H. Neely Henry	43,205	1.8%
**Logan Martin	108,262	4.5%
Lay	77,478	3.2%
Mitchell	28,048	1.2%
Jordan/Bouldin	15,969	0.7%
**Harris	191,129	7.9%
Martin	1,183,356	48.7%
Yates	5,976	0.2%
*R.F. Henry	36,450	1.9%
*Millers Ferry	46,704	2.6%
Total	**2,400,007**	**100.0%**

Note: * = federal (Corps) project ** = APC projects with Corps flood risk management authorizations

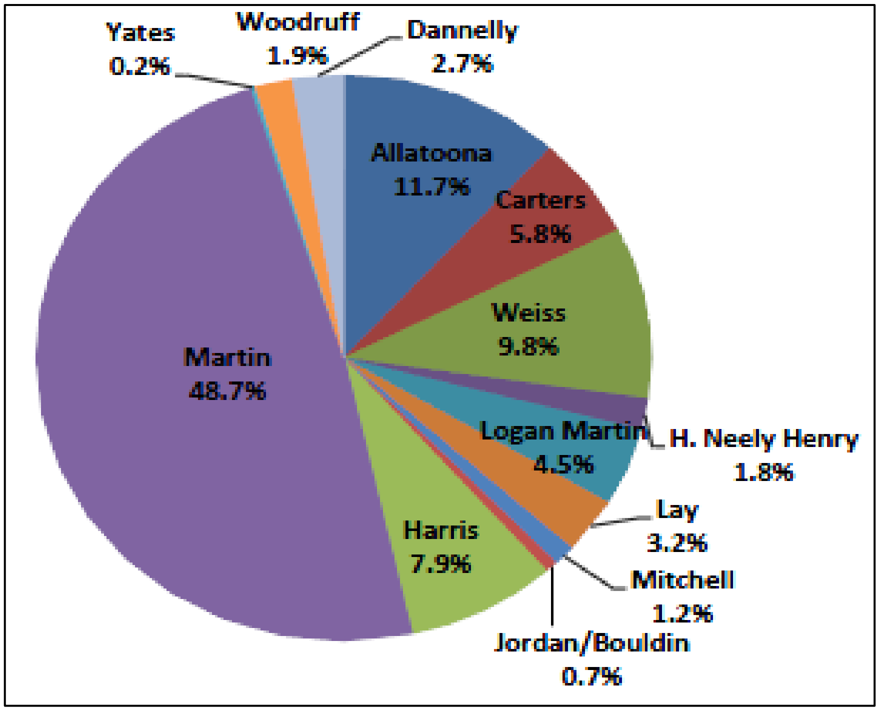

Figure 4-1. ACT Basin Reservoir Conservation Storage (Percent of Total Conservation Storage by Project)

a. Etowah River. The Etowah River, with a drainage area of 1,860 square miles, joins the Oostanaula River at Rome, Georgia, to form the Coosa River. The Allatoona Dam and Lake Project is located on the Etowah River upstream of Cartersville, Georgia. It is a multiple-purpose Corps project placed in operation in 1950. Allatoona Lake provides approximately 12 percent of the basin’s conservation storage.

b. Coosawattee River. The Coosawattee River, with a drainage area of 869 square miles, is 45 miles long; and joins the Conasauga River at Newton Ferry, Georgia, to form the Oostanaula River. The Carters Dam and Lake and Carters Reregulation Dam Project is located on the Coosawattee River at river mile 27. This project consists of an earth fill main dam, and a downstream reregulation dam and reservoir that accommodate pump-back operation. Carters Lake provides approximately six percent of the basin’s conservation storage.

c. Oostanaula River. From its source at the confluence of the Coosawattee and Conasauga Rivers at Newtown Ferry, Georgia, the Oostanaula River meanders southwesterly through a broad plateau for 47 miles to its mouth at Rome, Georgia. Its total drainage area is 2,160 square miles.

d. Coosa River. The Coosa River, with a drainage area of 10,200 square miles, is formed by the Etowah and Oostanaula Rivers at Rome, Georgia. The river flows 286 miles to its mouth, 11 miles below Wetumpka, Alabama, where it joins the Tallapoosa River to form the Alabama River. There are existing improvements on the Coosa River for flood risk management and hydropower and an abandoned navigation project. There is a flood risk management improvement project at Rome, Georgia, consisting of a levee system along the Coosa and Oostanaula Rivers. APC has built six reservoirs on the Coosa River (Weiss, H. Neely Henry, Logan Martin, Lay, Mitchell, and Jordan-Bouldin) which provide a total of approximately 23 percent of the basin’s conservation storage (10, 4, 4, 3, 1, and 1 respectively). Weiss, Logan Martin, and Neely Henry Projects have flood risk management provisions and are further described in Appendices B, C, and D to this manual.

e. Tallapoosa River. The Tallapoosa River, with a drainage area of 4,680 square miles, rises in northwestern Georgia at an elevation of about 1,250 feet, and flows westerly and southerly for 268 miles, joining the Coosa River south of Wetumpka, Alabama. There are four projects on the Tallapoosa River, all owned by the APC. The projects are Harris Dam, Martin Dam, Yates Dam, and Thurlow Dam. Martin, Yates, and Thurlow Dams are located on the lower end of the Tallapoosa River near the Fall Line, and develop a total head of 293 feet. Martin provides approximately 48 percent of the basin's conservation storage. Yates and Thurlow are essentially run-of-river projects with little storage. Harris Dam is located in the headwater area and provides about eight percent of the basin's conservation storage. Harris Dam also provides flood risk management and is described in Appendix I to this manual.

f. Alabama River. The Alabama River, with a total drainage area of 7,940 square miles (excluding the Coosa and Tallapoosa Rivers tributary areas), is formed by the confluence of the Coosa and Tallapoosa Rivers near Wetumpka, Alabama, and meanders for 314 miles where it joins the Tombigbee River near Calvert, Alabama, to form the Mobile River. There are three Corps projects on the Alabama River. The projects are the Robert F. Henry Lock and Dam and R. E. "Bob" Woodruff Lake, the Millers Ferry Lock and Dam and William "Bill" Dannelly Lake, and the Claiborne Lock and Dam and Lake. Robert F. Henry and Millers Ferry Projects provide two and three percent of the basin's conservation storage respectively. Claiborne is a run-of-river project with essentially no conservation storage available.

4-05. Federal Dams.

a. Carters Dam and Carters Reregulation Dam. The Corps' Carters Lake and Carters Reregulation Dam on the Coosawattee River is a multipurpose project that provides flood risk management, hydropower, navigation, water supply, water quality, fish and wildlife conservation, and recreation. The project consists of a rock fill dam and earth fill saddle dikes having a total length of 2,053 feet. The dam rises 445 feet above the streambed. Power installation consists of two conventional 140,000-kW generators and two reversible 160,000-kW pump-turbine units (declared values). The reregulation dam is 208 feet long and has a crest elevation of 662.5 feet NGVD29. The drainage area above the main dam is 374 square miles. The drainage area above the reregulation dam is 521 square miles, which includes the 148 square mile drainage area of Talking Rock Creek. The Carters Project is a pumped-storage peaking facility. Water is released from Carters Lake, flows through the penstock, and generates power as it is discharged to the reregulation dam pool. The Corps generates power at Carters Lake only a few hours each weekday, when demand for electricity is greatest. When demand for electricity is low, usually during the night or on weekends, the pump-turbines are reversed to pump water back up from the reregulation pool to Carters Lake. Water is then available again for hydropower generation in the next peak use period, and Carters Lake is maintained at its optimal power generation level. The reregulation dam serves two purposes: as a lower pool for the pumped storage operation and to reregulate peaking flows from Carters Lake to provide a more stable downstream flow.

Carters Lake has a total storage capacity of 472,756 acre-feet at elevation 1,099 feet NGVD29. Of that, 141,402 acre-feet are usable for power generation, 89,191 acre-feet are reserved for flood risk management, and 242,163 acre-feet are inactive storage. The minimum conservation pool elevation is 1,022 feet NGVD29, and the maximum conservation pool elevation is 1,074 feet NGVD29 in the summer and 1,072 feet NGVD29 in the winter. Carters Lake has a surface area of 3,275 acres at elevation 1,074 feet NGVD29. The normal yearround operating range for the reregulation pool is 677 to 698 feet NGVD29. The Carters Reregulation Dam provides a seasonal varying minimum continuous flow under normal conditions to the Coosawattee River for downstream fish and wildlife benefits. The minimum flow requirement of the project is 240 cfs. The total generating capacity of the project is 600 MW (declared value). 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 one to two feet per day. The reregulation pool will likely reach a normal maximum of 696 feet NGVD29 and a minimum level of 677 feet NGVD29 at least once during the course of the week. Levels can rise more than that during flooding events, however, as the lake captures and retains flood flows. Carters Dam is further described in Appendix H. The project is shown in Figure 4-2.

Figure 4-2. Carters Dam

b. Allatoona Dam. The Corps' Allatoona Dam on the Etowah River creates the 11,860 acres Allatoona Lake. Authorized by the Flood Control Act of 1941 (P.L. 77-228, 55 Stat 638), Allatoona Dam and Lake is a multipurpose project that provides flood risk management, navigation, hydropower, recreation, water supply, water quality, and fish and wildlife conservation. In 2008 nearly seven million visitors were reported at Allatoona Lake. The project consists of a gravity-type concrete dam 1,250 feet long having a top elevation of 880 feet NGVD29. Power installation consists of two 40,000-kW generators and a 2,200-kW service unit (declared values). The lake has a flood risk management storage capacity of 302,576 acre-feet and conservation storage of 284,580 acre-feet. 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, for water quality purposes. Allatoona's major flood risk management areas downstream are Cartersville, Kingston, and Rome, Georgia. Allatoona Dam is further described in Appendix A. The project is shown in Figure 4-3.

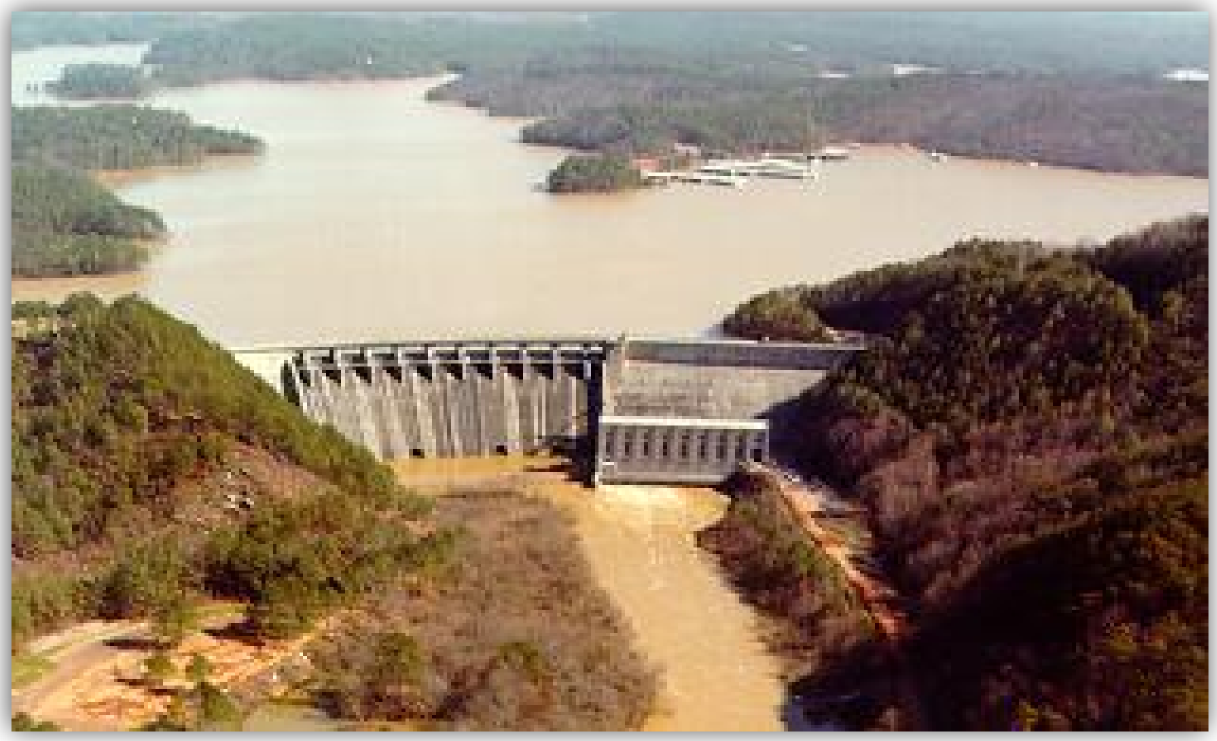

Figure 4-3. Allatoona Dam

c. Robert F. Henry Lock and Dam. Robert F. Henry Lock and Dam. (R. E. "Bob" Woodruff Lake) is located on the Alabama River in south central Alabama, 236.3 miles above the mouth and approximately 15 miles east-southeast of Selma, Alabama. The project is a multipurpose project providing hydropower, navigation, recreation, and fish and wildlife conservation. The drainage area above Robert F. Henry Lock and Dam is 16,233 square miles. The project consists of a gravity-type concrete dam, gated spillway, and a single-lift lock. Earth dikes extend approximately 2,661 feet on the right overbank and 12,639 feet on the left overbank. Power installation consists of four 20,500-kW generators (declared value). Public Law 97-383, dated December 22, 1982, changed the name of the project from Jones Bluff Lock and Dam to Robert F. Henry Lock and Dam. The powerhouse retained the name Jones Bluff Powerhouse. Robert F. Henry Lock and Dam Project is further described in Appendix G. The lock provides a maximum lift of 47.0 feet. The project is shown in Figure 4-4. .

d. Millers Ferry Lock and Dam. Millers Ferry Lock and Dam is located 133 miles above the mouth of the Alabama River in the southwestern part of Alabama, about 10 miles northwest of Camden, Alabama, and 30 miles southwest of Selma, Alabama. The dam and the lower 25 miles of the reservoir are in Wilcox County and the upper 80 miles of the reservoir is in Dallas County. The drainage area above the dam is 20,637 square miles. The project is a multipurpose project providing hydropower, navigation, recreation, and wildlife mitigation. The project consists of a concrete gravity-type dam with a gated spillway, supplemented by earth dikes, a navigation single-lift lock and a powerhouse with a single tainter gate adjacent to the powerhouse for debris bypass. Power installation includes three 30,000-kW generators (declared value). In December 1970, P.L. 91-583 changed the name of the lake to William "Bill" Dannelly Reservoir. The lock provides a maximum lift of 48.8 feet. Millers Ferry Lock and Dam Project is further described in Appendix E. The project is shown in Figure 4-5.

Figure 4-4. Robert F. Henry Lock and Dam

Figure 4-5. Millers Ferry Lock and Dam

e. Claiborne Lock and Dam. Claiborne Lock and Dam is located about 72.5 miles above the mouth of the Alabama River in the southwestern part Alabama. Most of the reservoir is in Monroe and Wilcox Counties. The Claiborne Project is primarily a navigation structure. The reservoir provides navigation depths upstream and the dam reregulates peaking power releases from Millers Ferry. Other project purposes include recreation, water quality, and fish and wildlife conservation. The project consists of concrete gravity-type dam with both a gated spillway section and a free overflow section, supplemented by earth dikes, and a navigation single-lift lock. The lock provides a maximum lift of 30.0 feet. Claiborne Lock and Dam is further described in Appendix F. The project is shown in Figure 4-6.

Figure 4-6. Claiborne Lock and Dam

4-06. Non-Federal Dams. Between 1914 and 1931, the Alabama Power Company constructed three hydropower dams on the Coosa River and three on the Tallapoosa River. These plants are located to take advantage of the comparatively steep river slopes along the Fall Line. These projects are: Jordan Dam, Mitchell Dam and Lay Dam on the Coosa River; and Thurlow Dam, Yates Dam, and Martin Dam on the Tallapoosa River.

A second phase of development occurred during the 1950s and 1960s with the construction of five additional reservoir projects. Four of these projects; Weiss, Neely Henry, Logan Martin and Bouldin Dams are located on the Coosa River. One project, Harris Dam is located in the upper part of the Tallapoosa Basin.

These projects are briefly described in the following paragraphs. They are listed in Table 1-1, and their locations are shown on Figure 2-1 in Chapter II.

a. R.L. Harris Dam. R.L. Harris Dam is the newest of the APC hydroelectric developments in the ACT Basin, with construction completed in 1982. The dam is located on the Tallapoosa River at river mile 139.1. The reservoir extends up both the Tallapoosa and the Little Tallapoosa Rivers, and is contained in Randolph and Clay Counties. Harris Lake covers about 10,660 acres and has a drainage area of 1,453 square miles. Generating capacity at the project is 132,000 kW. Under P.L. 89-789, the operation and maintenance of R.L. Harris Dam is subject to the rules and regulations of the Secretary of the Army in the interest of navigation and flood risk management. Additional information on this project can be found in Appendix I. The project is shown in Figure 4-7.

Figure 4-7. R. L. Harris Dam

b. Martin Dam. The Cherokee Bluffs was a perfect place to construct the first of four dams on the Tallapoosa River. When it was completed in 1927, the Martin Dam created the world's largest man-made body of water at that time. The dam is located on the Tallapoosa River, 11 miles north of the Town of East Tallassee. The project has a maximum head of 146 feet and a drainage area of 3,000 square miles. The reservoir formed by this dam impounds approximately 1,623,000 acre-feet, of which 1,275,000 acre-feet, corresponding to a drawdown of 60 feet, is available for power storage. By virtue of this vast storage, the reservoir is capable of regulating a large percentage of the flow of the Tallapoosa River. The spillway is equipped with 20 – 16’ x 30' gates and the generating capacity is 182,000 kW. The project is shown in Figure 4-8.

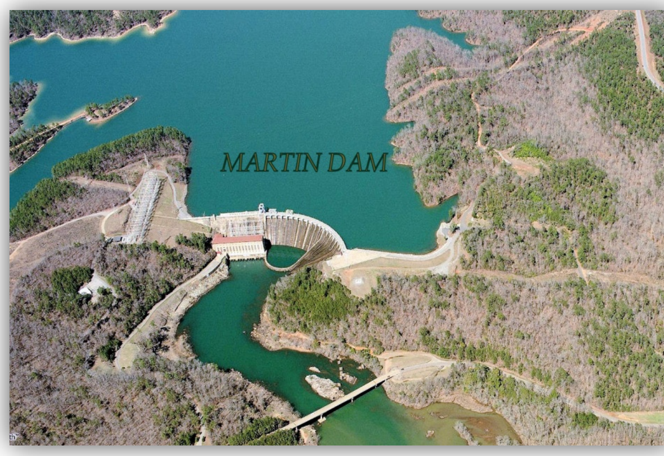

Figure 4-8. Martin Dam

c. Yates Dam. Yates Dam is located on the Tallapoosa River, three miles north of Tallassee and about nine miles below Martin Dam. The drainage area is 3,250 square miles. This project is a result of raising an old mill dam in

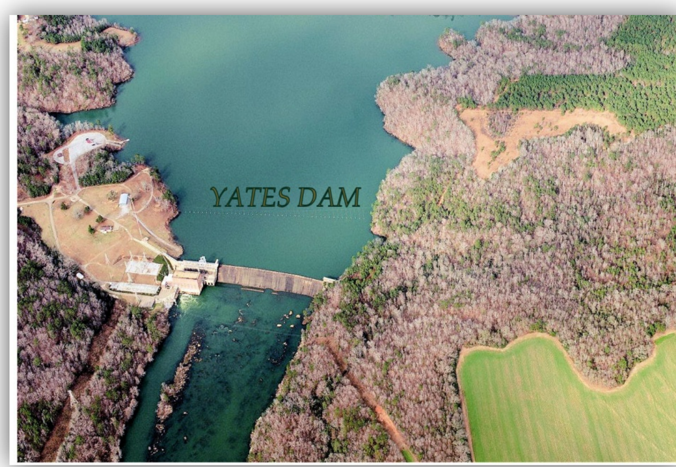

Figure 4-9. Yates Dam

1928 which had a head of 36 feet. The reservoir covers 1,980 acres and the plant retains a constant head of 55 feet when in full operation, using only the water regulated by Martin Dam and the flow of the tributaries between the two projects. The spillway is uncontrolled. The work of raising the original dam allowed more effective use of regulated flow from Martin Dam. The project is shown in Figure 4-9 on the previous page.

d. Thurlow Dam. Thurlow Dam is located on the Tallapoosa River at the Town of East Tallassee, three miles below Yates Dam. The drainage area is 3,325 square miles. The reservoir covers approximately 585 acres. No storage is available for pondage and the plant operates on regulated flows from Martin Dam and runoff from the intervening area. The present dam, completed in 1931, is superimposed on an old power dam which had a head of 56 feet. The plant has a constant head of 92 feet when in full operation. The spillway crest is provided with five-foot semi-automatic flash boards. Generating capacity at the project is 81,000 kW. The project is shown in Figure 4-10.

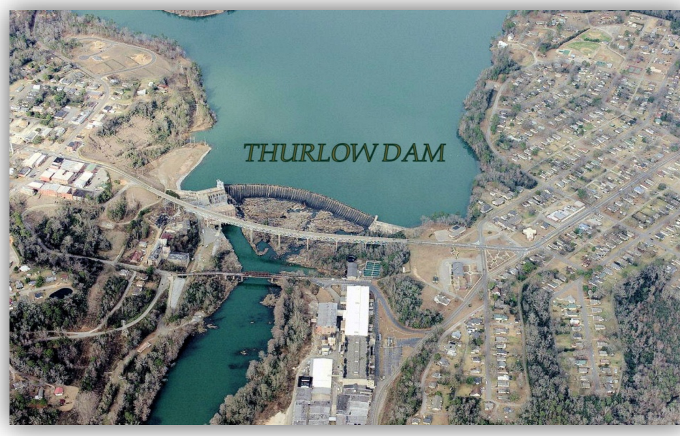

Figure 4-10. Thurlow Dam

e. Weiss Dam. Weiss Dam was part of APC's second phase of construction in the ACT Basin. That phase further developed the Coosa River in the late 1950s and the 1960s. Weiss Dam was completed in June 1961. The project is located on the Coosa River at mile 226, about 50 miles upstream from Gadsden, Alabama. The reservoir extends about 52 miles upstream to Mayo's Bar, Georgia, and is contained in Cherokee County, Alabama and Floyd County, Georgia. Weiss is a multiple-purpose project for hydropower, flood risk management, and navigation. Under P.L. 83-436, the operation and maintenance of Weiss Dam is subject to the rules and regulations of the Secretary of the Army in the interest of navigation and flood risk management. The project was designed for the future installation of a navigation lock. Weiss Dam and Powerhouse are separated by about three miles, across one of the meanders of the Coosa River. The dam was constructed in the main river and a channel was excavated across the meander. This allows the power plant to release water farther downstream. The generating capacity is 87,750 kW. Additional details are provided in Appendix B. The project is shown in Figure 4-11.

Figure 4-11. Weiss Dam

f. <u>H. Neely Henry Dam</u>. H. Neely Henry Dam is located on the Coosa River at mile 148, about 27 miles downstream from Gadsden, Alabama. The reservoir extends about 78 miles upstream to Weiss Dam, and is contained in St. Clair, Calhoun, Etowah and Cherokee Counties. The project was completed in 1966. H. Neely Henry is a multipurpose project with hydropower, flood risk management and navigation. Under P.L. 83-436, the operation and maintenance of H. Neely Henry is subject to the rules and regulations of the Secretary of the Army in the interest of navigation and flood risk management. The project was designed for the future installation of a navigation lock. The generating capacity is 72,900 kW. Additional information is provided in Appendix D. The project is shown in Figure 4-12.

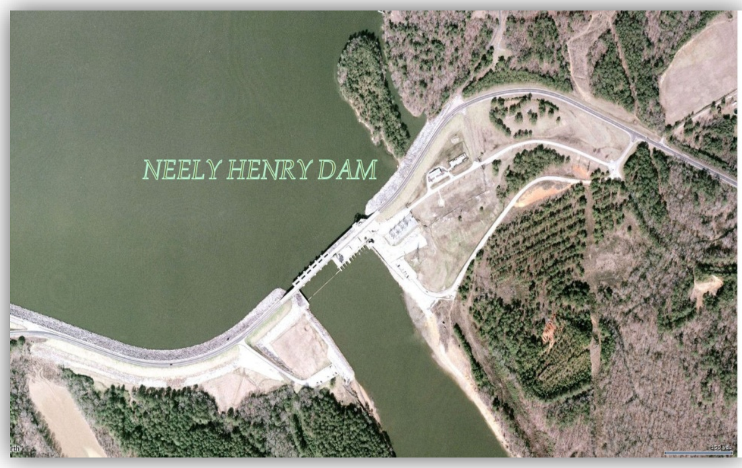

Figure 4-12. H. Neely Henry Dam

g. <u>Logan Martin Dam</u>. Logan Martin Dam is located on the Coosa River at mile 99.5, about 13 miles upstream from the City of Childersburg, Alabama. The reservoir, extends upstream about 48 miles to the H. Neely Henry Dam, and is contained in Talladega, St. Clair and Calhoun Counties. The powerhouse is located on the west side, or right bank, of the river.

Construction began in July 1960, and the dam and spillway were completed in July 1964. Filling of the reservoir commenced in early July 1964, reaching an operating level of 460 feet NGVD29 on 22 July 1964. Power generation began in August 1964. Under P.L. 83-436, the operation and maintenance of Logan Martin is subject to the rules and regulations of the Secretary of the Army in the interest of navigation and flood risk management. The generating capacity is 135,000 kW. Greater detail is provided in Appendix C. The project is shown in Figure 4-13.

Figure 4-13. Logan Martin Dam

h. Lay Dam. Lay Dam is located on the Coosa River, 13 miles east of Clanton, Alabama. Construction was started in March 1910 and completed in April 1914. This is a run-of-river plant with a gross static head of 70 feet. The drainage area above the dam is 9,087 square miles. The reservoir covers approximately 12,000 acres and to some extent regulates the minimum flow overnight and on weekends. The spillway is equipped with 26 – 14' x 30' gates. The generating capacity is 177,000 kW. The project is shown in Figure 4-14.

Figure 4-14. Lay Dam

i. Mitchell Dam. In 1921, the FPC granted APC a license to construct a dam across the Coosa River near Clanton, Alabama, downstream from Lay Lake. Construction of Mitchell Dam, APC's second hydroelectric plant, was completed in August 1923. Mitchell Dam is a run-of-river project with a gross static head of 67 feet. Drainage area above the dam is 9,830 square miles. The reservoir covers an area of approximately 5,850 acres. The spillway has 26 - 15' x 30' gates and extends practically the entire length of the dam. A unique feature of the new powerhouse, which was completed in 1985, is a 1,140-foot floating trash boom that deflects trash from the powerhouse intakes. The generating capacity is 170,000 kW. The project is shown in Figure 4-15.

Figure 4-15. Mitchell Dam

j. Jordan Dam. Jordan Dam is located on the Coosa River, eight miles north of Wetumpka, Alabama. Construction was started in June 1926, and completed in January 1929. It is a run-of-river plant with a gross static head of 100 feet. Drainage area above the dam is 10,160 square miles, and the reservoir covers approximately 4,900 acres. The spillway has 17 – 18' x 30' gates. Forty years later, a second dam was constructed on Jordan Lake, Walter Bouldin Dam. The generating capacity is 100,000 kW. The project is shown in Figure 4-16.

Figure 4-16. Jordan Dam

k. Walter Bouldin Dam. Walter Bouldin Dam was the last dam built as part of APC's efforts to develop the Coosa River. Bouldin Dam has the largest generating capacity of Alabama Power's 14 hydro facilities (11 in the ACT Basin). It is unusual in design because it was built on a canal. The generating capacity is 225,000 kW. The project is shown in Figure 4-17.

Figure 4-17. Bouldin Dam

4-07. **Real Estate Acquisition**. Land acquisitions and flowage easements were established for each project. A more complete real estate acquisition description is included in the individual appendices for each project.

4-08. Public Facilities. The Corps has developed and maintains public use recreation areas along the shoreline of each project it owns. The public use areas include overlook sites, campgrounds, boat launch facilities, day use parks, and rest rooms. Some areas have been leased to other agencies and local communities. Detailed information regarding the Corps public use areas is available at the Operations Project Management offices for each project. A summary of public facilities is included in the individual appendices for each project.

4-09. Economic Data. The ACT River Basin drains areas of southeastern Tennessee, northwest Georgia and diagonally across Alabama from the northeast to the southwest corner of the state. The basin includes a total of 45 impacted counties: 28 in Alabama and 17 in Georgia. The 17 counties in Georgia are located on the Tallapoosa and Coosa River Basins. In Alabama, eight of the counties are in the Tallapoosa River Basin, eight are on the Coosa River Basin and the remaining 12 counties are on the Alabama and Cahaba Rivers.

The ACT River Basin is largely rural, containing a relatively small number of cities with populations greater than 25,000 persons scattered throughout the basin. The predominate land uses are developed land, agricultural land, forests and timber and water.

a. Population. The 2010 population of the 45 counties composing the ACT River Basin totaled 4,282,163 persons. Approximately 62 percent of the population resides in the Alabama portion of the basin, and 38 percent is in the Georgia portion. Table 4-2 shows the total 2010 population and the 2009 per capita income for each of the three ACT sub-basins.

Table 4-2. Population and Per Capita Income

River Basin	2010 Population	2009 Per capita Income
Alabama	1,468,946	$20,857
Coosa	2,305,260	$21,970
Tallapoosa	507,957	$19,620
Total	**4,282,163**	
Source: U.S. Census Bureau, 2010		

There are nine cities with populations greater than 25,000 persons in the ACT River Basin. Table 4-3 lists the major cities in the basin and the 2010 population for each.

Table 4-3. Major Cities

City, State	2010 Population
Auburn, Alabama	53,380
Birmingham , Alabama	212,237
Gadsden, Alabama	36,856
Hoover, Alabama	81,619
Montgomery, Alabama	201,568
Prattville, Alabama	33,960
Vestavia Hills, Alabama	34,033
Dalton, Georgia	33,128
Rome, Georgia	36,303

b. Agriculture. The ACT River Basin contains approximately 22,500 farms averaging 172 acres per farm. In 2005, the area produced about $1.6 billion in farm products sold and a total farm income of more than $604.5 million. Agriculture in the ACT River Basin consists primarily of livestock which account for approximately 72 percent of the value of farm products sold, while row crops account for approximately 23 percent of products sold. Table 4-4 contains agricultural production information and farm earnings for each of the river sub-basins in the ACT River Basin.

Table 4-4. Farm Earnings and Agricultural Production

						% Sold from	
River Basin	**2005 Farm Earnings ($1,000)**	**Number of Farms**	**Total Farm Acres (1,000)**	**Average Acres per Farm**	**Value of Farm Products Sold ($1,000)**	**Crops**	**Livestock**
Alabama	$72,189	5,164	1,521	117	$199,000	31.85%	68.15%
Coosa	$393,293	13,050	1,482	303	$1,132,000	16.43%	79.22%
Tallapoosa	$139,042	4,330	892	235	$330,000	20.75%	69.25%
Total	**$604,524**	**22,544**	**3,895**	**172**	**$1,661,000**	**23.01%**	**72.21%**
Source: U.S. Census Bureau, County and City Data Book: 2007							

c. Industry. The leading industrial sector in the ACT River Basin that provides non-farm employment are wholesale and retail trade, services and manufacturing. The remaining non-farm employment is provided by construction, finance, insurance, real estate, transportation and public utilities. In 2005, the basin contained 4,460 manufacturing establishments that provided about 253,000 jobs with total earnings of more than $14.2 billion. Additionally, the value added by the area manufactures totaled approximately $23.7 billion. Table 4-5 contains information on the manufacturing activity for each of the river sub-basins in the ACT River Basin.

Table 4-5. Manufacturing Activity

River Basin	No. of Manufacturing Establishments	Total Manufacturing Employees	Total Earnings ($1,000)	Value Added by Manufactures ($1,000)
Alabama	1,337	68,384	$4,321,899	$6,337,733
Coosa	2,730	154,619	$8,430,260	$14,738,364
Tallapoosa	393	30,215	$1,438,354	$2,653,361
Total	**4,460**	**253,218**	**$14,190,513**	**$23,729,458**
Source: U.S. Census Bureau, County and City Data Book: 2007				

d. Flood Damages. Within the ACT Basin, Allatoona Lake provides important flood risk management storage with spillway capacities sufficient to discharge floods with return intervals of 500 years. According to the Draft Environmental Impact Statement, Water Allocation for the Allatoona-Coosa-Tallapoosa River Basin Appendices Volume 2, September 1998, the floodplain downstream of Allatoona Dam consists of 1,132 residential structures, nine public structures and 189 commercial structures. The tax assessor's appraised residential structure values total approximately $65,804,000. Residential content values have a floodplain total value of approximately $29,149,000. Allatoona floodplain public structures had a total value of $847,000. The respective structures ranged in value from a $35,000 utility building to a $150,000 sewage treatment facility. Public Structure inventory and equipment values total $169,000 and $741,000, respectively. The floodplain tax appraised commercial structures had a total value of $213, 691,000. Commercial structure values range from a $10,000 office building to a $119 million industrial plant. Commercial structure inventory and equipment values total $25,066,000 and $54,389,000, respectively. All estimated values are in 1997 dollars. Table 4-6 displays the floodplain value data downstream of Allatoona Dam broken out by residential, public and commercial structure and content value.

Table 4-6. Allatoona Dam Floodplain Value Data

	Structure ($)	Content ($)	Inventory ($)	Equipment ($)
Residential	65,804,000	29,149,000	-	-
Public	847,000	-	169,000	741,000
Commercial	213,691,000	-	25,066,000	54,389,000
Total	**$280,342,000**	**$29,149,000**	**$25,235,000**	**$55,130,000**

The Corps' Water Management Office has developed an annual damage reduction summary that estimates the flood damages prevented by Allatoona and Carters Projects. Flood damages prevented have not been calculated for the Alabama Power Company Projects. Table 4-7 shows the Allatoona and Carters flood damages prevented by year from 1986 - 2009.

Table 4-7. Flood Damages Prevented by Allatoona and Carters Projects

Year	Flood Damages Prevented*		
	Allatoona	Carters	Total
1986	$0	$0	$0
1987	$2,626,000	$0	$2,626,000
1988	$0	$0	$0
1989	$0	$0	$0
1990	$14,620,100	$219,000	$14,839,100
1991	$0	$22,900	$22,900
1992	$142,580	$0	$142,580
1993	$0	$13,000	$13,000
1994	$0	$20,100	$20,100
1995	$433,046	$20,100	$453,146
1996	$33,200	$22,300	$55,500
1997	$0	$0	$0
1998	$628,127	$0	$628,127
1999	$0	$0	$0
2000	$0	$0	$0
2001	$0	$0	$0
2002	$0	$0	$0
2003	$21,706,008	$0	$21,706,008
2004	$11,002,375	$0	$11,002,375
2005	$20,033,559	$0	$20,033,559
2006	$0	$0	$0
2007	$0	$0	$0
2008	$0	$0	$0
2009	$32,666,192	$8,800	$32,674,992
2010	$20,330,262	$285,400	$20,615,662
2011	$18,354,891	$28,300	$18,383,191

*Dollar values not adjusted for inflation

V - DATA COLLECTION AND COMMUNICATION NETWORKS

5-01. Hydrometeorological Stations.

a. Facilities. Management of water resources requires continuous, real-time knowledge of hydrologic conditions. The Mobile District contracts out the majority of basin data collection and maintenance to the USGS and NWS through cooperative stream gaging and precipitation network programs. The USGS, in cooperation with other federal and state agencies, maintains a network of real-time gaging stations throughout the ACT Basin. Those stations continuously collect various types of data including stage, flow, and precipitation. The data are stored at the gage location and are transmitted to orbiting satellites. 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 GOES antenna for transmission of data. The gage locations are discussed further in Chapter VI related to hydrologic forecasting.

Reservoir project data are obtained through each project's Supervisory Control and Data Acquisition (SCADA) system and provided to the Mobile District both daily and in real-time.

Figure 5-1. Typical Encoder with Wheel Tape for Measuring the River Stage or Lake Elevation in a Stilling Well

Figure 5-2. Typical Field Installation of a Precipitation Gage

Through the Corps-USGS Cooperative stream gage program, the Mobile District and the USGS operate and maintain stream gages throughout the ACT Basin. Corps personnel, in addition to APC and the NWS, also maintain precipitation gages at locations throughout the ACT Basin.

Plate 5-1 shows the location of rainfall and stream gage stations used to monitor conditions in the ACT Basin. Tables 5-1 and 5-2 list the stations along with pertinent information.

Table 5-1. Rainfall Reporting Network (Upper ACT)

Station	Latitude		Longitude		Elevation	Operating Agency	Agency ID	Type*
	Degrees	Minutes	Degrees	Minutes	NGVD			
Etowah River Basin								
Cleveland	34	36	83	46	1570	NWS	92006	Non-Recording
Dahlonega	34	32	83	59	1430	NWS	92475	Non-Recording
Amicacola	34	33	84	15	1350	COE	AMIG1	Recording
Wahsega	34	38	84	5	1600	COE	WAHG1	Recording
Mountaintown	34	46	84	32	1520	COE	MTNG1	Recording
Dawsonville	34	25	84	7	1370	NWS	92578	Recording
Jasper 1 NNW	34	29	84	27	1465	NWS	94648	Non Recording
Ball Ground	34	21	84	23	1175	NWS	90603	Non Recording
Waleska	34	19	84	33	1100	NWS	99077	Non Recording
Canton	34	14	84	30	870	COE	CTNG1	Recording
Woodstock	34	7	84	31	1055	NWS	99524	Non Recording
Allatoona Dam	34	9	84	43	832	COE	CVLG1	Recording
Allatoona Dam 2	34	10	84	44	975	NWS	90181	Non Recording
Carters Dam	34	36	84	40	852	COE	CTRG1	Recording
Cartersville #2	34	10	84	47	730	NWS	91670	Non Recording
Dallas 7NE	33	59	84	45	1100	NWS	92485	Recording
Taylorsville	34	5	84	59	710	NWS	98600	Non Recording
Kingston	34	14	84	56	720	NWS	94854	Non Recording
Oostanaula River Basin								
Dalton	34	46	84	57	720	NWS	92493	Non Recording
Chatsworth 2	34	46	84	47	765	NWS	91863	Recording
Ellijay	34	42	84	29	1300	NWS	93115	Non Recording
Carters 1 WSW	34	33	84	42	740	NWS	91657	Non Recording
Fairmont	34	26	84	42	735	NWS	93295	Non Recording
Resaca	34	34	84	57	650	NWS	97430	Non Recording
Adairsville 5 SE	34	21	84	56	720	NWS	90044	Non Recording
Curryville 3W	34	27	85	6	650	NWS	92429	Non Recording
Rome WSO Arpt	34	21	85	10	637	NWS	93801	Recording
Rome	34	15	85	10	610	NWS	97600	Non Recording
Coosa River Basin								
Summerville	34	29	85	22	780	NWS	98436	Non Recording
Lafayette 4SSSW	34	38	85	18	890	NWS	94941	Recording
Cedartown	34	1	85	15	785	NWS	91732	Recording

Table 5-1 (continued). Rainfall Reporting Network (Middle ACT)

Station	Latitude		Longitude		Elevation	Operating Agency	Agency ID	Type*
	Degrees	Minutes	Degrees	Minutes	NGVD			
Coosa River Basin								
Menlo	34	28	85	29		APCO		Recording
Valley Head	34	34	85	37	1040	NWS	18469	Recording
Fort Payne	34	27	85	43	934	NWS	13046	Recording
Collbran	34	23	85	46		APCO		Non Recording
Gaylesville	34	0	85	33		APCO		Non Recording
Jamestown	34	23	85	34		APCO		Non Recording
Leesburg	34	11	85	46	589	NWS	14627	Non Recording
Weiss Dam	34	8	85	48		APCO		Non Recording
Attalla	34	2	86	5		APCO		Non Recording
Collinsville	34	16	85	52		APCO		Recording
Rock Run	34	3	85	28		APCO		Recording
Gadsden	34	1	86	0	570	NWS	13154	Non Recording
Gadsden Power Co.	34	1	85	58		APCO		Non Recording
Ashville	33	48	86	19		APCO		Recording
Ashville 4W	33	51	86	20	590	NWS	10377	Non Recording
H. Neely Henry Dam	33	47	86	3		APCO		Non Recording
Jacksonville 1NW	33	49	85	47	610	NWS	14209	Non Recording
Anniston FAA Arpt	33	35	85	51	599	NWS	10272	Non Recording
DeArmanville	33	36	85	45		APCO		Recording
Logan Martin Dam	33	25	86	20		APCO		Non Recording
Sylacauga 4 NE	33	12	86	12	490	NWS	17999	Recording
Childersburg	33	17	86	22	480	NWS	11615	Non Recording
Jordan Dam	32	37	86	15	290	NWS	14306	Non Recording
Tallapoosa River Basin								
Embry	33	52	84	59	1200	NWS	93147	Recording
Carrollton	33	36	85	5	995	NWS	91640	Recording
Bremen	34	43	85	0	1400	APCO		Recording
Heflin	33	59	85	36	950	NWS	13775	Recording
Hightower	33	32	85	24	1175	NWS	13842	Recording
Newell	33	26	85	27	1100	APCO		Recording
Harris Dam	33	15	85	38	858	APCO		Recording

Table 5-1 (continued). Rainfall Reporting Network (Lower ACT)

Station	Latitude		Longitude		Elevation	Operating Agency	Agency ID	Type*
	Degrees	Minutes	Degrees	Minutes	NGVD			
Alabama and Cahaba River Basins								
Billingsley	32	40	86	43	445	NWS	10823	Non Recording
Mathews	32	16	86	0	190	NWS	15172	Non Recording
Montgomery WSO	32	18	86	24	221	NWS	15547	Recording
Autaugaville 3N	32	28	86	41	200	NWS	10440	Non Recording
Robert F. Henry L&D	32	19	86	47	146	COE	TYLAD	Recording
Plantersville 2SSE	32	37	86	54	230	NWS	16508	Non Recording
Selma	32	25	86	0	147	NWS	17366	Non Recording
Palmerdale	33	45	86	39	720	NWS	16246	Non Recording
Pinson	33	41	86	41	608	NWS	16478	Non Recording
Cahaba Heights	33	25	86	44	461	NWS	11220	Non Recording
Oak Mtn. St. Park	33	20	86	45	660	NWS	16000	Non Recording
Helena	33	16	86	50	480	NWS	13781	Non Recording
Calera	33	6	86	45	530	NWS	11288	Non Recording
Montevallo	33	6	86	52	410	NWS	15537	Non Recording
West Blocton	33	7	87	8	500	NWS	18809	Non Recording
Centreville 6 SW	32	52	87	14	456	NWS	11525	Non Recording
Thorsby Ex. Stn	32	53	86	42	680	NWS	18209	Recording
Marion 7NE	32	42	87	16	172	NWS	15112	Recording
Perryville	32	36	87	9	500	NWS	16362	Non Recording
Suttle	32	32	87	11	145	NWS	17963	Non Recording
Marion Junction 2NE	32	28	87	13	200	NWS	15121	Non Recording
Millers Ferry L&D	32	6	87	25	115	NWS	15420	Recording
Uniontown	32	27	87	31	280	NWS	18446	Non Recording
Alberta	32	14	87	25	175	NWS	10140	Recording
Camden 3NW	32	2	87	19	235	NWS	11301	Non Recording
Pine Apple	31	52	86	59	250	NWS	16436	Non Recording
Thomasville	31	55	87	44	405	NWS	18178	Recording
Whatley	31	39	87	43	170	NWS	18867	Non Recording
Claiborne L&D	31	37	87	33	50	NWS	11690	Recording
Frisco City 3SSW	31	23	87	25	275	NWS	13105	Non Recording

***The "type" of gage indicates if rainfall is collected and transmitted electronically (recording) or read by a human observer and transmitted by that observer to the appropriate agency (non-recording).**

Table 5-2. ACT Basin Stream Gage Reporting Network

Stream Gage Reporting Network (data in feet)							
Name	**USGS Station ID**	**Gage Zero**	**Flood Stage**	**Record High**	**Date of Record**	**Record Low**	**Date of Record**
CANTON	2392000	844.6	16	26.7	1/1/1946	0.2	10/27/2009
ALLATOONA RES	2393500	0		861.2	4/1/1964	809.3	12/1/1954
CARTERSVILLE	2393500	650.8	18	30.4	1/1/1946	3.8	10/1/1949
KINGSTON	2395000	610		31	12/19/2009	4	10/3/2009
ELLIJAY	2380500	1216		20.7	3/1/1951	0.9	8/1/1986
CARTERS DAM	2381400	0		1099.2	4/1/1977	1056.4	11/1/1984
TALKING ROCK	2382200	893.7		15.7	7/3/2009		
CARTERS REREG U	2382400	0		699.4	4/1/1977	667	6/1/1983
CARTERS 411	2382500	650.7		30.6	11/3/2009		
REDBUD (PINE CHAPEL)	2383500	616.2		34.2	3/1/1951		
ETON	2384500	672.6		20.5	3/1/1994	2	7/1/1986
TILTON	2387000	622.3		30.2	3/1/1951	2.1	7/1/1986
RESACA	2387500	604.1	22	34.6	3/1/1951	0.5	9/3/2009
ROME at US 27	2388525	561.7	25	34.5	1/1/1947	2.4	8/1/1986
MAYO BAR	2397000	553.1		37	1/1/1947	10.8	9/1/1986
WEISS (LEESBURG)	2399500	0	567	570.9	4/1/1979	556.3	1/1/1970
GADSDEN	2400500	486	25	31.1	4/1/1936		
NEELY HENRY DAM	N/A	0		508.5	10/1/1966	499.9	4/1/1966
LOGAN MARTIN DAM	N/A	0	467	475.3	4/1/1977	458.3	10/1/1972
CHILDERSBURG	2407000	382.5	402	412.8	2/1/1961	7.5	4/1/1975
LAY U	N/A	0		396.5	4/1/1979		
MITCHELL DAM	N/A	0		316.6	4/1/1979		
JORDAN/BOULDIN DAMS	N/A	0					
WETUMPKA	2411600	113.5	45	57.9	4/1/1938	2.5	8/25/2009
HARRIS U	N/A	0					
WADLEY	2411600	599.9	13	37.3	5/3/2009	2	10/1/1954
MARTIN DAM	N/A	0		490.7	4/1/1979	452	6/1/1941
THURLOW DAM	N/A						
YATES DAM	N/A						
MILSTEAD	2419500	153.8	40	54	12/3/2009	-5.9	9/1/1977
TALLAPOOSA	2419890	129.1	25	42.1	3/1/1990	0.1	10/1/1978
MONTGOMERY	2419988	103.3	35	58.1	2/1/1961	-4	9/25/2009
CATOMA CREEK	2421000	151	20	29.8	3/1/1990	1.4	8/1/1986
R.F. HENRY L&D	2421350	0		136.7	3/1/1990	121.8	11/1/1978
SELMA	2423000	61.8	45	58.4	3/1/1961	-3	8/18/2009
CENTREVILLE	2424000	180.7	23	37.8	7/16/2009	-0.4	10/3/2009
MARION JUNCTION	2425000	86.7	36	43.8	2/1/1961	0.8	9/1/1954
MILLERS FERRY L&D	2427505	0		83.2	3/1/1990		
CLAIBORNE L&D	2428400	0		56.6	3/1/1990		
CHOCTAW BLUFF	2429540	0		31.5	3/1/1990		

b. Reporting. The Mobile District 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 and retrieval to best meet all Corps water management activities.

Data are collected at Corps sites and 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 (DCP). The DCP is a computer microprocessor at the gage site. The DCP has the capability to interrogate sensors at regular intervals to obtain real-time information (e.g., river stage, reservoir elevation, water and air temperature, and precipitation). The DCP then saves the information, performs simple analysis of it, and then transmits the information to a fixed geostationary satellite. DCPs transmit real-time data at regular intervals to the Geostationary Operational Environmental Satellite (GOES) System operated by the National Oceanic and Atmospheric Administration (NOAA). The GOES Data Collection System (DCS) sends the data directly down to the NOAA Satellite and Information Service in Wallops Island, Virginia. The data are then re-broadcast over a domestic communications satellite (DOMSAT). The Mobile District operates and maintains a Local Readout Ground Station (LRGS), which collects the DCP-transmitted, real-time data from the DOMSAT. Figure 5-3 depicts a typical schematic of how the system operates.

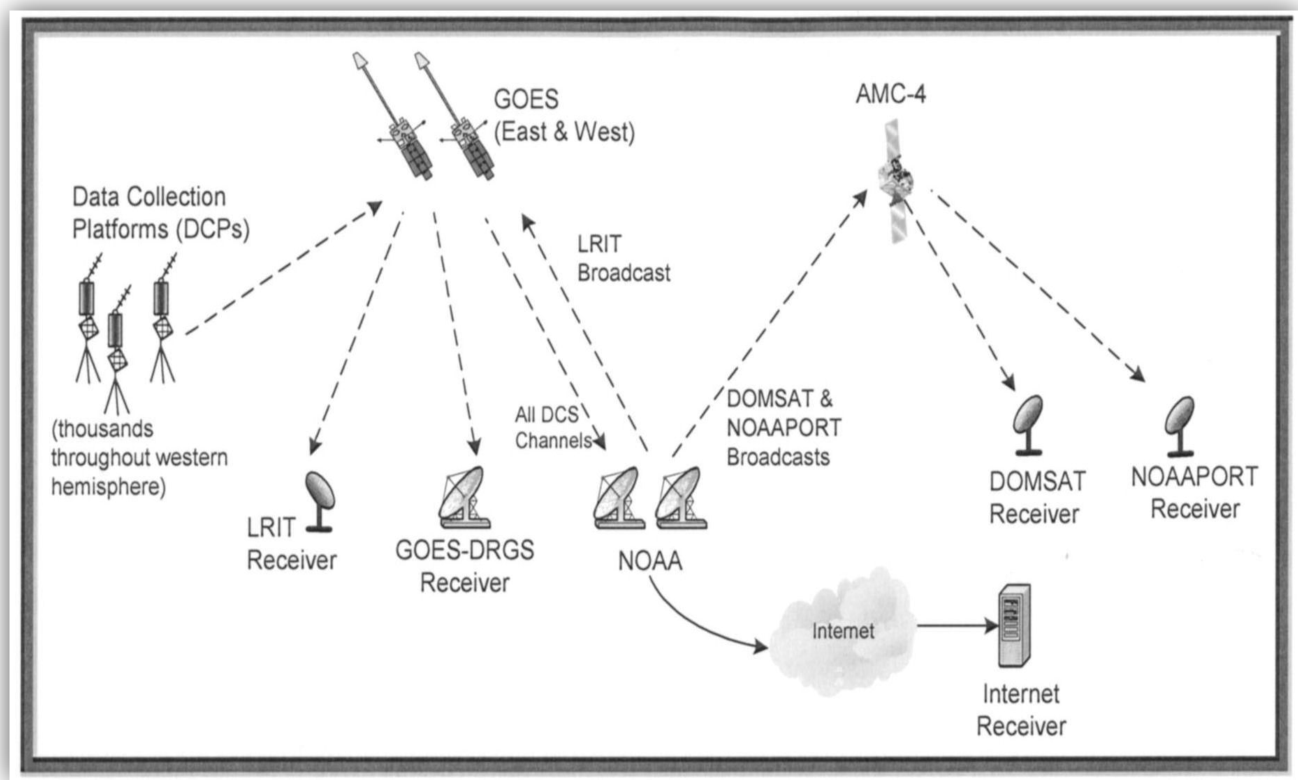

Figure 5-3. Typical Configuration of the GOES System

Typically, reporting stations log 15-minute data that are transmitted hourly. A few remaining gages report every four hours, but they are being transitioned to the hourly increment. All river stage and precipitation gages equipped with a DCP and GOES antenna are capable of being part of the reporting network.

Other reservoir project data are obtained directly at a project and are collected through each project's Supervisory Control and Data Acquisition (SCADA) System. The Mobile District downloads the data both daily and hourly through the Corps server network.

c. Maintenance. Maintenance of data reporting equipment is a cooperative effort among the Corps, the USGS, and the NWS. The USGS, in cooperation with other federal and state agencies, maintains a network of real-time DCP stream gaging stations throughout the ACT Basin. The USGS is responsible for the supervision and maintenance of the real-time DCP gaging stations and the collection and distribution of streamflow data. In addition, the USGS maintains a systematic measurement program at the stations so the stage-discharge relationship for each station is current. Through cooperative arrangements with the USGS, discharge measurements at key ACT Basin locations are made to maintain the most current stage-discharge relationships at the stations. The NWS also maintains precipitation data for the FC-13 precipitation network. For Corps-maintained facilities in the ACT, gages are typically visited six to eight times a year to validate stage, flow, and accuracy of gage equipment.

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

U.S. Army Corps of Engineers, Mobile District, 109 St. Joseph Street, Mobile, Alabama 36602-3630. Phone: (251) 690-2737 Web: http://water.sam.usace.army.mil

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

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

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

5-02. Water Quality Stations. Water quality monitoring by the Corps in the ACT Basin is limited to one station located in the Allatoona tailrace which reports temperature, ph, dissolved oxygen, and conductivity. In most cases, other federal and state agencies maintain water quality stations for general water quality monitoring in the ACT Basin. In addition, some real-time water quality parameters are collected at several stream gage locations maintained by the USGS.

5-03. Sediment Stations. The Corps does not maintain sediment stations in the ACT Basin.

5-04. Recording Hydrologic Data. The WCDS/CWMS 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. Time series hydrometeorological data are stored and retrieved using 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 DCP data from gages throughout the ACT Basin. The DRS equipment and software then receives the DOMSAT data stream, decodes the DCPs 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 time 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 supporting real-time operational decisions. Interagency data exchange has been implemented with the USGS and NWS Southeast River Forecast Center (SERFC). A direct link to the 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.

5-05. Communication Network. The global network of the Corps consists of private, dedicated, leased lines between every Division and District office worldwide. These lines are procured through a minimum of two General Services Administration approved telephone vendors, and each office has a minimum of two connections, one for each vendor. The primary protocol of the entire Corps network is Ethernet. The reliability of the Corps' network is considered a command priority and, as such, supports a dedicated 24-hours-per-day Network Operations Center. The use of multiple telephone companies supplying the network connections minimizes the risk of a one cable cut causing an outage for any office. Such redundancy, plus the use of satellite data acquisition, makes for a very reliable water control network infrastructure.

The Mobile District has a critical demand for emergency standby for operation of the ACT Basin and to ensure data acquisition and storage remain functional. Water Management must be able to function in cases of flooding or other disasters, which typically are followed by the loss of commercial electricity. The WCDS/CWMS servers and LRGS each have individual UPS (uninterruptable power supply), and a large UPS unit specifically for the portion of Mobile District Office in which Water Management resides to maintain power for operational needs.

5-06. Communication With Project.

a. Regulating Office With Project Office. The Water Management Section is the regulating office for the Corps' projects in the ACT Basin. Daily routine communication between the Water Management Section and project offices occur thru electronic mail, telephone, and facsimile. Daily hydropower generation schedules are issued by SEPA. During normal conditions on weekends, hydropower generation schedules can be sent out on Friday to cover the weekend period of project regulation, but it can change if deemed appropriate. If loss of network communications occurs, orders can be given via telephone.

During critical reservoir regulation periods and to assure timely response, significant coordination is often conducted by telephone between the project office and the Water Management Section. That direct contact assures that issues are completely coordinated and concerns by both offices are presented and considered before final release decisions are made.

The Chief of the Water Management Section is generally available by cell phone during critical reservoir operation periods.

b. Between Project Office and Others. Each reservoir project office is generally responsible for local notification and for maintaining lists of those individuals who require notification under various project regulation changes. In addition, the project office is responsible for notifying the public including project recreation areas, campsites, and other facilities that could be affected by various project conditions.

5-07. Project Reporting Instructions. In addition to automated data, project operators maintain record logs of gate position, water elevation, and other relevant hydrological information including inflow and discharge. That information is stored and available to the Water Management Section through the Corps' network. Operators have access to Mobile District Water Managers via email, land line and cell phone and notify the Water Management Section if changes in conditions occur. Unforeseen or emergency conditions at the project that require unscheduled manipulations of the reservoir should be reported to the Mobile District 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 Mobile District. Water Management staff will manually input the information into the database. In addition, Mobile District Power Projects must verify pool level gauge readings each week, in accordance with *Standard Operating Procedure, Weekly Verification of Gauge Readings, Mobile District Power Projects* dated 19 February 2008, and CESAD SOP 1130-2-6 dated 21 July 2006. Those procedures require that powerhouse operators check the accuracy of pool monitoring equipment by verifying readings of the equipment against gage readings at each plant. That information is logged into the Official Log upon completion and furnished to the master plant. A Trouble Report to management communicates any discrepancies with the readings. Operations Division, Hydropower Section will be notified by electronic mail when verification is complete. The e-mail notification will include findings of the verification.

Project personnel or the Hydropower Section with Operations Division, or both, are responsible for requesting any scheduled system hydropower unit outages in excess of two hours. The Water Management Section out-of-service times are reported back to Water Management Section upon completion of outages. Forced outages are also reported with an estimated return time, if possible. Any forced or scheduled outages causing the project to miss scheduled water release targets must be immediately reported to the Water Management Section and to SEPA. In such cases, minimum flow requirements can be met through spill or sluicing or both.

5-08. 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 project, the operator on duty should notify the Water Management Section, Operations Division, and the Power Project Manager at the project. A coordinated effort among those offices and the Corps, Mobile District's Emergency Management Office will develop notifications to make available to local law enforcement, government officials, and emergency management agencies.

VI - SYSTEM HYDROLOGIC FORECASTS

6-01. General. Reservoir operations are scheduled by the Water Management Section in accordance with forecasts of reservoir inflow and pool stages. The NWS's River Forecast Center prepares river forecasts for the general public and for use by the Corps. In addition, the Water Management Section maintains the capability to prepare forecasts for District use only. Knowledge of total basin inflows affects reservoir regulation decisions. Flow requirements at the lower end of the basin, below Claiborne Lock and Dam, are determined by conditions in the basin. The observed outflows of upstream projects on the Coosa and Tallapoosa Rivers provide an estimate of future flows and requirements in the Alabama River. Authorized navigation functions require knowledge of river depths (or stages) throughout the Alabama River. During stable flow conditions, accurate forecasts permit relatively uniform releases into the Alabama River. The Corps has developed techniques to conduct forecasting in support of the regulation of the ACT Basin. In addition, the Corps has a strong cooperative relationship with APC and with the NWS SERFC and the USGS to help maintain accurate data and forecast products to aid in making the most prudent water management decisions. The regulation of multipurpose projects requires scheduling actual releases on the basis of observed inflows and planning forecasted releases based on both observed and forecasted hydrologic events throughout the basin. During both normal and below-normal runoff conditions, releases through the power plants are scheduled on the basis of water availability, to the extent reasonably possible, during peak periods to enhance revenue returned to the Federal Government. The release level and schedules are dependent on current and anticipated hydrologic events. The most efficient use of water is always a goal, especially during the course of a hydrologic cycle when below-normal streamflow is occurring. Reliable forecasts of reservoir inflow and other hydrologic events that influence streamflow are critical to efficiently regulate the ACT Basin.

a. Role of Corps. The Water Management Section maintains real-time observation of reservoir, river, and weather conditions in the Mobile District. The Water Management Section makes reservoir level, outflow, inflow, and hydropower forecasts for all the federal projects and tailwater forecasts at Claiborne. Observation of real-time stream conditions provides guidance of the accuracy of the forecasts. The Corps maintains contact with the SERFC to receive forecast and other data as needed. Daily operation of the ACT Basin during normal, flood-damage reduction, and drought conservation regulation requires accurate, continual short-range and long-range elevation, streamflow, and river-stage forecasting. Those short-range inflow forecasts are used as input in computer model simulations so that project forecast release determinations can be optimized to achieve the regulation objectives. Actual release determinations are made based on observed pool elevation, inflow, and river stage data. The Water Management Section continuously monitors the weather conditions occurring throughout the ACT Basin and the forecasts issued by the NWS. Whenever possible, the NWS weather and hydrologic forecasts are used for planning purposes. The Water Management Section develops forecasts that are used to meet the regulation objectives of the Corps reservoirs. Daily, the Water Management Section develops seven-day forecasts for inflow, project releases, pool elevation, and hydropower generation. The Water Management Section prepares five-week inflow and reservoir elevation forecasts weekly on the basis of rainfall estimates and historical observed data in the basin. Those projections assist in making water management decisions and providing project staff and the public trends based on the current hydrology and operational goals of the period. In addition, the Water Management Section provides weekly hydropower generation forecasts based on current power plant capacity, latest hydrological conditions, and system water availability.

b. Role of Other Agencies. The NWS is responsible for all preparation and public dissemination of forecasts relating to precipitation, temperatures, and other meteorological elements related to river level, weather, and weather-related forecasting in the ACT Basin. 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 forecasted project release estimates. The use of precipitation forecasts and subsequent runoff relates to planning forecasted release decisions.

1) The NWS is the federal agency responsible for preparing and issuing streamflow and river-stage forecasts for public dissemination. That role is the responsibility of the SERFC co-located in Peachtree City, Georgia, with the Peachtree City Weather Forecast Office (WFO). The SERFC is responsible for supervising and coordinating streamflow and river-stage forecasting services provided by the NWS WFO in Peachtree City, Birmingham, and Mobile. The SERFC routinely prepares and distributes five-day streamflow and river-stage forecasts at key gaging stations along the Etowah, Coosawattee, Coosa, Tallapoosa, and Alabama Rivers during periods of above normal rainfall. In addition, the SERFC provides a revised regional QPF based on local expertise beyond the NWS Hydrologic Prediction Center QPF. The SERFC also provides the Water Management Section with flow forecasts for selected locations upon 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 the SERFC. Taking release decision data coupled with local inflow forecasts at forecast points along the ACT Basin, the SERFC can provide inflow forecasts into Corps projects. Having revised inflow forecasts from the SERFC, the Corps has up-to-date forecast data to estimate the following day's release decisions. The Water Management Section monitors observed conditions and routinely adjust release decisions based on observed data.

6-02. Flood Condition Forecasts. The NWS has the primary responsibility to issue flood forecasts to the public. The Water Management Section and APC use the forecasts as much as possible for regulating the system for flood risk management. The Water Management Section monitors observed conditions and adjusts release decisions based on observed data. The Corps also provides a link to the NWS website so that the Water Management Section and the public can obtain this vital information in a timely fashion. The information is relayed to affected county emergency management officials. 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 risk management can be achieved. Consequently, the Corps and the SERFC constantly run models and examine data to include QPF's, "water on the ground", rainfall/runoff relationships, timing of peaks, and other appropriate data. The selected operation is made on all data available and the perceived quality of such data. System storage 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, as much as possible, flows exceeding those that 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 on which the most reliable forecasts and subsequent project regulation can be based.

6-03. Conservation Purpose Forecasts. The ACT Basin is typically regulated for normal or below normal runoff conditions. Therefore, the majority of the forecasting and runoff modeling simulation is for conservation regulation decisions. Whenever possible, the NWS weather and hydrologic forecasts are used. Because the NWS is the Federal agency responsible for the preparing and issuing streamflow and river-stage forecasts, the Water Management Section uses SERFC forecasted inflows for general conservation forecasts. When needed, the Water Management Section has developed a Corps' Hydrologic Modeling System (HMS) streamflow forecasting model at several reaches along the ACT Basin for additional guidance relative to projected reservoir inflow. In addition, the Water Management Section provides weekly hydropower generation forecasts on the basis of current power plant capacity, latest hydrological conditions, and system water availability. Property owners, fishermen, recreation enthusiasts, and developers use weekly elevation forecasts for a variety of purposes.

6-04. Long-Range Forecasts. During normal conditions, the current long-range outlook produced by the Corps is a five-week forecast. For normal operating conditions, a forecast longer than that incorporates a greater level of uncertainty and unreliability. In extreme conditions, three-month and six-month forecasts can be produced on the basis of observed hydrology and comparative percentage hydrology inflows into the ACT Basin. One-month and three-month outlooks for temperature and precipitation produced by the NWS Climate Prediction Center are used in long-range planning for prudent water management of the ACT Basin.

6-05. Drought Forecasts. Various products are used to detect the extent and severity of basin drought conditions. One key indicator is the U.S. Drought Monitor. The Palmer Drought Severity Index is also used as a drought reference. 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. The runoff forecasts developed for both short- and long-range periods reflect drought conditions when appropriate. There is also a heavy reliance on latest El Nino Southern Oscillation (ENSO) forecast modeling to represent the potential effects of La Nina 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 historical rainfall, 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 planning. Other parameters 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.

VII - SYSTEM WATER CONTROL PLAN

7-01. General Objectives. Many factors must be evaluated in determining project or system reservoir regulation procedures, including project requirements, time of year, climate conditions and trends, downstream needs, the amount of water remaining in storage, all to meet the authorized purposes of the projects. Various interests and project conditions must be continually considered and balanced when making water control decisions for the basin and individual projects. The water control plan seeks to equitably meet the needs of all project purposes of the ACT Basin. Project purposes and basic parameters guiding water management activities at each of the Corps projects in the ACT Basin are discussed below. This master water control plan summarizes general project water control regulation and management objectives at Corps projects in the basin from the perspective of the authorized project purposes. Individual project appendices to this master manual provide specific guidance and instructions for each project.

7-02. Constraints. Individual project physical project constraints and limitations are addressed in each project specific appendix.

7-03. Overall Plan for Water Control. The Corps operates six dams in the ACT Basin (in downstream order): Carters and Carters Reregulation on the Coosawattee River, Allatoona on the Etowah River, Robert F. Henry, Millers Ferry and Claiborne on the Alabama River. Carters and Allatoona Dams have multi-purpose storage reservoirs. Woodruff (R. F. Henry) and Dannelly (Millers Ferry) Lakes have small conservation storage capacities to regulate hydropower production. Claiborne Lock and Dam is a run-of-river project without any appreciable conservation storage; however, regulation techniques are used at Claiborne to help smooth downstream flows. In addition, the Corps has federal authority for flood risk management regulation at four APC projects; Weiss Dam and Lake, H. Neely Henry Dam and Lake, and Logan Martin Dam and Lake on the Coosa River and R. L. Harris Dam and Lake on the Tallapoosa River. The Corps also has the federal responsibility to ensure adequate water control regulation to support navigation on the Alabama River.

Principal purposes for which the federal projects in the ACT Basin are operated consist of flood risk management, hydropower, navigation, fish and wildlife conservation, recreation, water supply, and water quality. Flood risk management, hydropower, and navigation were purposes specifically cited in the original authorizations of the ACT Basin projects. Functions such as recreation, water quality, water supply, and fish and wildlife conservation are considered purposes under general legislation (Flood Control Act of 1944, P.L. 89-72, and P.L. 85-624). Each of the legally authorized project purposes is considered when making water control regulation decisions, and the decisions affect how water is stored and released from the projects.

ACT Basin water control regulation considers all project functions and accounts for the full range of hydrologic conditions, from flood to drought. In general, to provide the authorized project purposes, flow must be stored during wetter times of each year and released from storage during drier periods of each year. Traditionally, that means that water is stored in the upstream storage lakes during the spring and released for authorized project purposes in the summer and fall months. Some authorized project purposes such as lakeside recreation, water supply, and lake fish spawn are achieved by retaining water in the lakes, either throughout the year or during specified periods of each year. The flood risk management purposes at certain reservoirs require drawing down reservoirs in the fall through winter months to store possible flood waters.

Because actions taken at the upstream portion of the basin affect conditions downstream, the ACT projects (including APC projects) are operated in a coordinated manner to the maximum extent possible rather than as a series of individual, independent projects. Balancing water control actions to meet each of the project purposes varies between the individual projects and time of year. Water Management considers the often-competing purposes and makes water control decisions accordingly. When possible, the Corps manages reservoir water control regulation to complement and accommodate those purposes. For example, flood waters are evacuated to the greatest extent practicable through the powerhouse turbines to produce electricity. In addition to specific authorized purposes for which the projects are operated, over the years a variety of activities (industrial and municipal water supply, in-stream recreation, water quality, and the like) have become dependent on the operational patterns of the projects. The Corps considers these needs when regulating the federal projects in an attempt to meet all authorized purposes, while continuously monitoring the total system water availability to ensure that project purposes can at least be minimally satisfied during critical drought periods. This water management strategy does not prioritize any project function, but seeks to balance all project authorized purposes. The intent is to maintain a balanced use of conservation storage rather than to maintain the pools at or above certain predetermined elevations. However, in times of high-flow conditions, flood risk management regulation will supersede all other project functions. At all times, the Corps seeks to conserve the water resources entrusted to its regulation authority.

The individual project water control plans for the ACT Basin projects prescribe regulation guide curves and action zones to facilitate the water control regulation for both of the major Corps storage projects in the ACT Basin; Allatoona Lake (Figure 7-1) and Carters Lake (Figure 7-2) and for the four APC projects with federal flood management and navigation support requirements. The guide curve for each federal project defines the top of conservation storage water surface elevation. Water management regulation decisions strive to maintain the pool elevation at the top of conservation elevation or at the highest elevation possible while meeting project purposes. Normally, the pool elevation will be lower than the top of conservation guide curve as available conservation storage is utilized to meet project purposes except when storing flood waters or when conservative lake level regulation is performed for drought conditions within the project watershed during the winter-spring refill period. For example, the full conservation pool at Allatoona is elevation 840, but about 80% of the time in August the pool has been below 840. The water control plan also establishes action zones within the conservation storage for Allatoona and Carters. The action zones are used to manage the lakes at the highest level possible within the conservation storage pool while balancing the needs of all authorized purposes with water conservation as a national priority used as a guideline. The actions zones at Allatoona and Carters provide water control regulation guidance to meet this water conservation plan while balancing the use of available conservation storage to meet the project purposes. A general description of each zone for Allatoona and Carters are described in general terms below:

a. <u>Lake Allatoona Action Zones</u>.

Zone 1: While Allatoona is in Zone 1, the project conditions are likely to be normal to wetter than normal during the late summer and fall months. Most likely, other projects in the basin and within the federal hydropower system will be in similar condition. Full consideration will be given to meeting hydropower demand by typically providing up to four hours of peak generation. Peak generation could exceed four hours based on various factors or activities, such as, maintenance and repair of turbines; emergency situations such as a drowning or chemical spill; drawdowns because of shoreline maintenance; drought operations; increased or decreased hydropower demand; and other circumstances.

Zone 2: While Allatoona is in Zone 2, a reduced amount of peaking generation will be provided to meet system hydropower demand. The typical peak generation schedule will provide up to three hours of peak generation. Peak generation could exceed three hours based on various factors or activities, such as, maintenance and repair of turbines; emergency situations such as a drowning or chemical spill; draw-downs because of shoreline maintenance; drought operations; increased or decreased hydropower demand; and other circumstances.

Zone 3: Zone 3 at Allatoona will typically indicate drier than normal conditions or impending drought conditions. Careful, long range analyses and projections of inflows, pool levels, and upstream and downstream water needs will be made when pool levels are in Zone 3. While in Zone 3 during the months of Jan-Apr, a reduced amount of peaking generation will be provided to meet system hydropower demand while making water control regulation decisions to ensure refilling the reservoir to elevation 840 feet NGVD29 by 1 May. Should drier than normal hydrologic conditions exist or persist, the reduced peak generation will continue until the reservoir level rises to a higher action zone. The typical peak generation schedule will provide up to two hours of peak generation. Peak generation could exceed two hours based on various factors or activities, such as, maintenance and repair of turbines; emergency situations such as a drowning or chemical spill; draw-downs because of shoreline maintenance; drought operations; increased or decreased hydropower demand; and other circumstances.

Zone 4: Allatoona Lake elevations in Zone 4 indicate severe drought conditions. Careful, long range analyses and projections of inflows, pool levels, and upstream and downstream water needs will be made when pool levels are in Zone 4. Peak generation will typically be suspended. Small unit continuous operation will continue in order to maintain the 240 cfs minimum flow release.

b. <u>Carters Lake Action Zones</u>.

Zone 1: Hydrologic conditions are likely to be normal to wetter than normal. Within Zone 1, a seasonally variable release will be made from the Reregulation Dam.

Zone 2: Hydrologic conditions are likely to indicate severe drought conditions. Careful, long range analyses and projections of inflows, pool levels, and upstream and downstream water needs will be made when pool levels are in Zone 2. The seasonally-varying minimum flow is suspended, and a continuous minimum flow of 240 cfs is released from the Reregulation Dam.

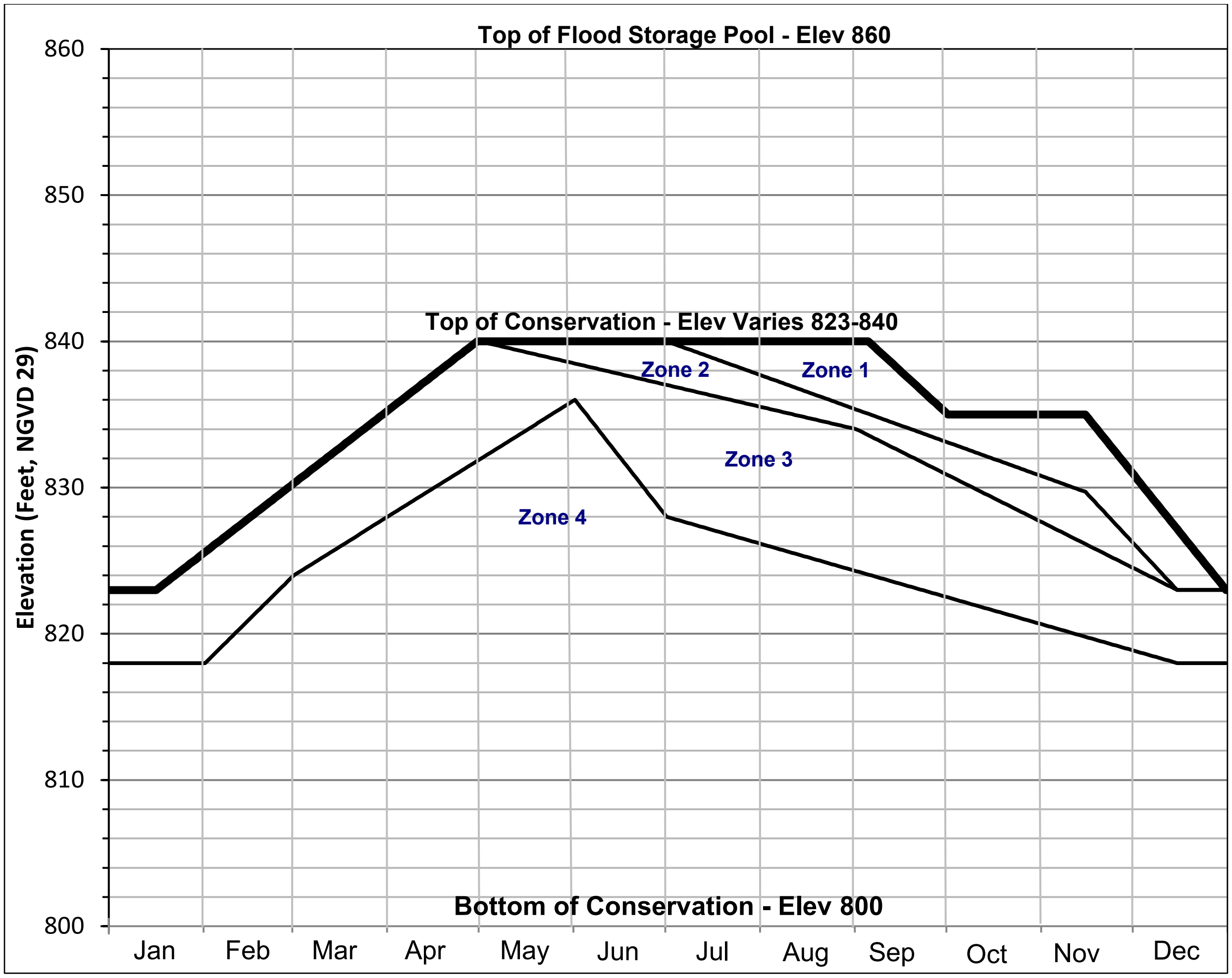

Figure 7-1. Allatoona Lake Water Control Regulation Guide Curve and Action Zones

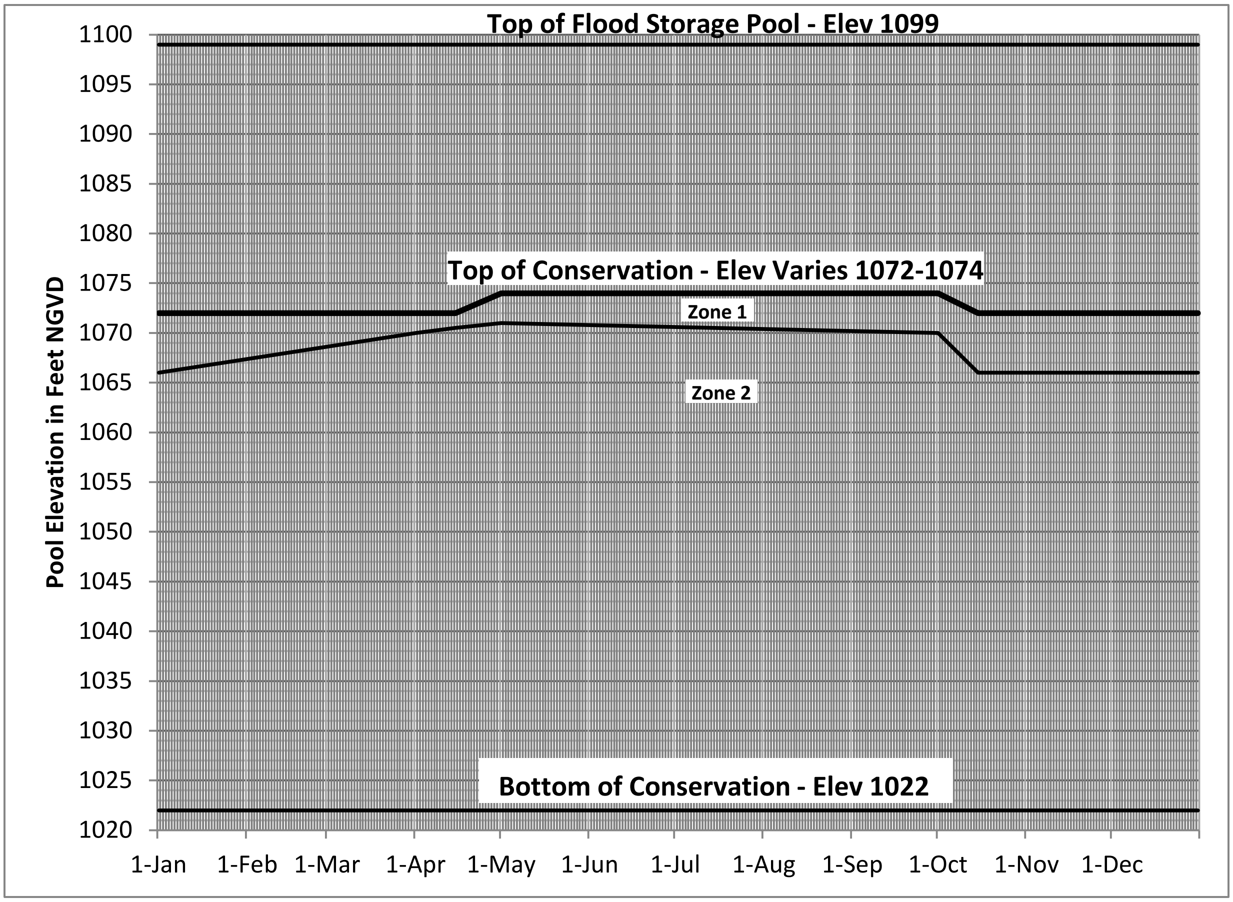

Figure 7-2. Carters Lake Water Control Guide Curve and Action Zones

The action zones were based on the ability of the reservoirs to refill (considering hydrology, watershed size, and physical constraints of each reservoir), recreation effects and hazard levels. Other factors or activities might cause the lakes to operate differently than the action zones described. Examples of the factors or activities include exceptional flood damage reduction measures; fish spawn operations; maintenance and repair of turbines; emergency situations such as a drowning or chemical spill; draw-downs because of shoreline maintenance; drought recovery; increased or decreased hydropower demand; and other circumstances.

APC has two additional guide curves; the drought contingency curve and the operating inactive curve. The drought contingency curve is used to trigger drought operation at the project and is a component of the Low Composite Storage Trigger. The operational inactive curve reflects the level of storage required to support an APC system limit for 12 hours of hydropower generation needed for system reliability. While these curves are not labeled as action zones, they have a similar purpose.

7-04. Standing Instructions to Damtender. During normal operations, the powerhouse operators will operate the COE Projects in accordance with the daily hydropower schedule. Any deviation from the schedule must come through the Water Management Section. Normally, flood control instructions are issued by the Water Management Section in the Mobile District Office. However, if a storm of flood-producing magnitude occurs and all communications are disrupted between the Mobile District and the powerhouse operators, the operators will follow detailed instructions provided in the “Standing Instructions to the Damtender for Water Control” exhibit found in the individual project manuals.

7-05. Flood Management. The objective of flood management regulation on the ACT System is to store excess flows thereby reducing downstream river levels below flood stage and producing no higher stages than would otherwise occur naturally. Whenever flood conditions occur, flood management to reduce flood damages takes precedence over all other project functions. Of the five Corps reservoirs, only Allatoona and Carters were designed with space to store flood waters. Flood management regulation for those projects are described in each project water control manual, Appendices A and H, respectively. Annual drawdown of reservoir storage is 17 feet at Allatoona and two feet at Carters in the fall through winter to provide additional storage capacity to protect life and property downstream of the projects. Robert F. Henry and Millers Ferry Projects have no storage dedicated for flood management and, along with the Claiborne Project, essentially pass inflows during high flow conditions. The operation of four APC dams (Weiss, Logan Martin, and H. Neely Henry on the Coosa and Robert L. Harris on the Tallapoosa) are subject to rules and regulations in the interest of flood management reduction and navigation as described in individual water control manuals for those projects, Appendices B, C, D, and I, respectively.

The timing, magnitude and location of flood peaks in the ACT System is of considerable importance in determining the effectiveness of reservoir flood management regulation and the degree to which such regulation can be coordinated. During a flood event, excess water above normal pool elevation, or guide curve, should be evacuated through the use of the turbines and spillways in a manner consistent with other project needs as soon as downstream waters have begun to recede so that releases from the reservoirs do not increase the height of flooding downstream. Under certain instances, induced surcharge operations will be required to assure project integrity. During induced surcharge operations, flows may increase the height of flooding levels downstream.

7-06. Recreation. All the Corps lakes have become important recreational resources. The five Corps projects in the basin account for 110,595 total acres of land and water. A wide variety of recreational opportunities is provided at the lakes including boating, fishing, picnicking, sightseeing, water skiing, and camping. The reservoirs support popular sport fisheries, some of which have achieved national acclaim for trophy-size catches of largemouth bass. Recreation benefits are maximized at the lakes by maintaining full or nearly full pools during the primary recreation season of May to September. In response to meeting other authorized project purposes, lake levels can and do decline during the primary recreation period, particularly during drier than normal years.

Allatoona Lake fluctuates significantly during the year, and the fluctuations can be even more extreme during periods of extremely dry weather. During peak recreation season, generally Memorial Day through Labor Day, the Corps considers recreational needs at the Allatoona Lake project in making water management decisions. The Corps has developed a series of threshold impact elevations that serves as a guide to understanding the recreational effects of water management decisions

Although the Carters pool level typically fluctuates on a weekly basis, Carters Lake is designed to operate at a relatively stable pool level throughout the year under normal conditions (conservation pool level at elevation 1,074 feet NGVD29 during the summer and 1,072 feet NGVD29 during the winter). However, the pool level can drop significantly below those elevations under extremely dry conditions. In such cases, the use of water-related recreation facilities can be adversely affected. While these effects are considered in water management decisions at the project, the Carters Lake water control plan does not contain specific threshold impact elevations to guide water management decisions.

R.E. "Bob" Woodruff, William "Bill" Dannelly, and Claiborne Lakes all have water-based recreation facilities. The lakes all have relatively stable pools except during flooding events. Water management activities for these run-of-river reservoirs are limited and have no measurable effect on recreational use.

When pool levels must be lowered, the rates at which the drawdowns occur are as steady as possible.

7-07. Water Quality. Minimum flows of 240 cfs are released from Allatoona Dam to maintain downstream water quality. The minimum continuous release from Allatoona Dam and Lake is accomplished by operating the small turbine-generator unit continuously. If the small unit is out of service, one of the sluice gates will be opened to ensure that a minimum flow of 240 cfs is released from the dam. Releases can also be made over the spillway to maintain minimum flows.

At Carters, a 240 cfs water quality minimum flow is maintained at all times from continuous minimum releases from the reregulation dam spillway. When Carters is in Zone 1, seasonal varying flows for downstream fish and wildlife purposes provides additional water quality benefits.

Robert F. Henry and Millers Ferry Lock and Dam projects are not regulated with specific water quality discharge requirements. However, flows from these projects are used downstream to help provide the 7Q10 flow of 6,600 cfs below Claiborne Dam. Several industries on the Alabama River also depend on releases from these projects for their water use needs. Whenever flow below Claiborne recedes to the 6,600 cfs level, conditions are closely monitored so that adequate warning can be given to water users if it is necessary to reduce the flows even further in response to extremely dry conditions. As projections indicate that drought conditions could intensify and that further flow reductions might be required, the ACT Basin Drought Contingency Plan (DCP) and the WCMs for the Robert F. Henry and Millers Ferry Lock and Dam projects prescribe a process for notification of, and coordination with, state and federal agencies and affected industries along the river.

7-08. Fish and Wildlife.

a. Fish Spawning. Fish and wildlife conservation is an authorized purpose of the reservoirs in the ACT Basin in accordance with P.L. 85-64 (Fish and Wildlife Coordination Act of 1958). All the Corps reservoirs in the ACT Basin support important fisheries and are operated accordingly, consistent with other project purposes. In addition to fishery management, such operations include aquatic plant control and waterfowl management activities. The various projects in the basin have specific operations for fish and wildlife conservation, which are described in the individual reservoir regulation manuals for the projects.

The Corps' South Atlantic Division Regulation SADR 1130-2-16 (31 May 2010) and Mobile District Draft Standard Operating Procedure (SOP) 1130-2-9 (February 2005) were developed to address lake regulation and coordination for fish management purposes. The SOP specifically applies to the Allatoona Dam and Lake Project in the ACT Basin and addresses procedures necessary to gather and disseminate water temperature data and manage lake levels during the annual fish spawning period between March and May, primarily targeted at largemouth bass. The major goal of the operation is to not lower the lake level more than six inches in elevation during the reproduction period to prevent stranding or exposing fish eggs.

Continuous minimum flow requirements of 240 cfs below Allatoona Dam and the seasonal varying minimum flow release from Carters Reregulation Dam support fish and wildlife conservation downstream of the projects, particularly during periods of extremely dry weather. APC's flow target of 4,640 cfs at Montgomery, Alabama (at the headwaters of the R.E. "Bob" Woodruff Lake), while principally intended to support downstream navigation and water quality needs, also provides sustained flows for fish and wildlife conservation.

While each of the remaining Corps reservoirs in the ACT Basin (R.E. "Bob" Woodruff, William "Bill" Dannelly, and Claiborne Lakes) conduct natural resource management activities to improve fishery conditions, they do not have specific water management procedures directed at fish and wildlife conservation. The impoundments support a healthy sport fishery. The pools are maintained at fairly constant levels, except during floods when high inflows cause reservoir levels to rise. The relatively stable pool during the spring spawning season is beneficial to the production of crappie, largemouth and smallmouth bass, shellcracker, warmouth, and sunfishes. However, because of the regulation of the project for navigation and hydropower, it might not be possible to maintain the optimum conditions for fish spawning that can be accomplished at other projects.

b. Fish Passage. If flow conditions allow from March through May, the Corps can operate the locks on the Alabama River to facilitate downstream to upstream passage of Alabama shad and other migratory species. There can be slight differences in the locking technique each year. However, in general two fish locking cycles are performed each day between 8 a.m. and 4 p.m. - one in the morning and one in the afternoon. The operation consists of opening the lower lock gates and getting fish into the lock in one of three ways; transporting them into the lock by boat, using attraction flows to entice the fish into the lock, or leaving the lower gate open for a period before a lockage and allowing the fish to move in without an attraction flow. Once the fish are in the lock (or assumed to be in the lock), the downstream doors are closed. The lock is filled to the lake elevation, and the upper gates are opened. Studies are ongoing to determine the most appropriate technique and timing for the locks, but the number of lock cycles per day will not change.

7-09. Water Supply. The City of Chatsworth, Georgia, has a storage contract with the Corps for 818 acre-feet (expected yield of 2.0 mgd) at Carters Lake for water supply. The City of Cartersville, Georgia, and CCMWA have contracts with the Corps for 6,371 acre-feet (expected yield of 16.76 mgd) and 13,140 acre-feet (expected yield of 34.5 mgd) respectively, from Allatoona Lake. Water storage contracts are based on daily water withdrawals and the amount of storage (in acre-feet) required to provide these withdrawals. Water supply storage accounting is a systematic accounting record to track valid storage users when the lake is in the conservation pool. Users get a proportion of any inflow and any losses as well as measured use. To assure that one contracted water user is not encroaching on the rights of other contracted users. This accounting is especially critical during drought. A component of the accounting is to notify users of the need for conservation measures or the need for additional water supply sources, when available water supply storage drops below 30%. Formula used to calculate water supply storage: Ending Storage – Beginning Storage + Inflow Share – Loss Share – User's Usage. The conservation pool is drawn down as water usage exceeds inflow. The entire pool is drawn down and the individual accounts are also drawn down at different rates based on their usage. Users will be notified on a weekly base once the storage account drops below 30%. Details regarding contract storage accounting to monitor withdrawals are described in the project water control plans contained in Appendix A (Allatoona) and Appendix H (Carters).

Minimum flows associated with Corps and APC projects in the ACT Basin (240 cfs from Allatoona; seasonal varying minimum flow from Carters; target flows at Montgomery, Alabama, from APC projects; and 6,600 cfs 7Q10 flow below Claiborne Dam) are generally associated with water quality, fish and wildlife conservation, and navigation needs in the system. However, the minimum flows also support water supply needs of users throughout the system.

7-10. Hydroelectric Power. The ACT Basin is in the southern sub-region of the Southeastern Electrical Reliability Corporation (SERC, formerly the Southeastern Electrical Reliability Council) and the larger North American Electrical Reliability Council. The southern sub-region of the SERC consists of five smaller control areas that are each individually managed by Alabama Electric Cooperative, Oglethorpe Power Corporation, South Mississippi Electrical Power Association, Walton Electric Membership Corporation, and the Southern Company. Southern Company's APC Division is the primary private operator in the ACT Basin. Through the Department of Energy's Southeast Power Administration (SEPA), the federal power plants provide power to more than 300 power preference customers throughout the southeastern United States. Hydroelectric power generation is achieved by passing flow releases to the maximum extent possible through the turbines at each project, even when making releases to support other project purposes.

The Corps operates four hydropower peaking plants in the ACT Basin. The Jones Bluff Power Project (Robert F. Henry Lock and Dam) and Millers Ferry Power Project (Millers Ferry Lock and Dam) on the Alabama River work together with a combined generating capacity of 172 MW (declared value) in supporting peak hydropower demand and other project purposes. The Allatoona Powerhouse at Allatoona Dam has an installed generating capacity of 82.2 MW (declared value). Carters Dam is operated as a peaking plant and pump storage plant. This plant consists of two dams and reservoirs, Carters Dam and Lake and Carters Reregulation Dam. During peak loading hours, water is released from Carters Lake to the reregulation pool generating energy. When demand is low and energy is relatively cheap, energy is purchased to pump water back into the Carters Lake from the reregulation pool. This plant has a total generating capacity of 600 MW (declared value). Each project's water control plan for hydropower is described in the individual project water control manual appendices.

Eleven non-Corps projects, located on the Tallapoosa and Coosa Rivers, owned and operated by APC. The APC power plants have a combined installed generating capacity of approximately 1410 MW. APC regulates its hydropower projects on the Coosa and Tallapoosa Rivers in accordance with those projects respective licenses from FERC. The Corps receives a data summary report and forecast hydro release data electronically each morning to aid in the water control regulation and hydropower scheduling of the downstream Corps power projects on the Alabama River. This information is also updated during the day if conditions warrant.

Because Robert F. Henry and Millers Ferry do not have the ability to store appreciable amounts of inflow, these projects are operated as run-of-river with pondage power plants. Hydroelectric power operation occurs as the projects receive increased inflows as a result of hydropower releases from upstream projects. Under normal and dryer conditions, hydropower generation at these projects is not continuous. While operating as a run-of-river facility, generation may occur several hours a day, seven days per week, followed by hours of non-generation. During high flow events, these projects will operate around the clock with 24-hour power generation. As the project head decreases, the generation capacity of the units will decrease until it becomes inefficient to operate the hydropower units. At that time, the units will be shutdown, and all releases will be made through the spillway.

Peaking plants provide electricity during the peak demand periods of each day and week. Hydroelectric power peaking involves increasing the discharge for a few hours each day to near the full capacity of one or more of the turbines. Typically, the Allatoona and Carters power projects provide generation each day for five days a week at plant capacity throughout the year to support the hydropower demand, as long as their respective lake levels are in Zone 1 and drought operations have not been triggered. For example, demand for peak hydroelectric power at Allatoona Dam typically occurs on weekdays from 5:00 a.m. to 9:00 a.m. and from 3:00 p.m. to 10 p.m. between 1 October and 1 March, and on weekdays from 1:00 p.m. to 7:00 p.m. between 1 April and 30 September. This typical amount of generation represents releases that normally meet water demands within the system and provide the capacity specified in marketing arrangements. During dry periods, as the lake levels drop below Zone 1, hydroelectric power generation is reduced proportionally as pool levels decline during extreme low flow conditions. Peak generation could be eliminated or limited to conjunctive releases during severe drought conditions.

In addition to hydroelectric power generation being governed by action zone, there are also physical limitations that factor into the power generation decisions. Scheduled and unscheduled unit outages occur throughout the year affecting the ability to release flow through some or all the turbines.

7-11. Navigation. Navigation is an important use of water resources in the ACT Basin. The Alabama River, from Montgomery downstream to the Mobile area, provides an important navigation route for commercial barge traffic, serving as a valuable regional economic resource. A minimum flow is required to ensure usable water depths to support navigation. 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. Achieving this goal is dependent on receiving adequate funding for dredging activities. Figure 7-3 shows the effect of dredging on flow requirements for different navigation channel depths during normal hydrologic conditions (1992 - 1994). As shown on Figure 7-3, 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.

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-foot depth has not been available at all times.

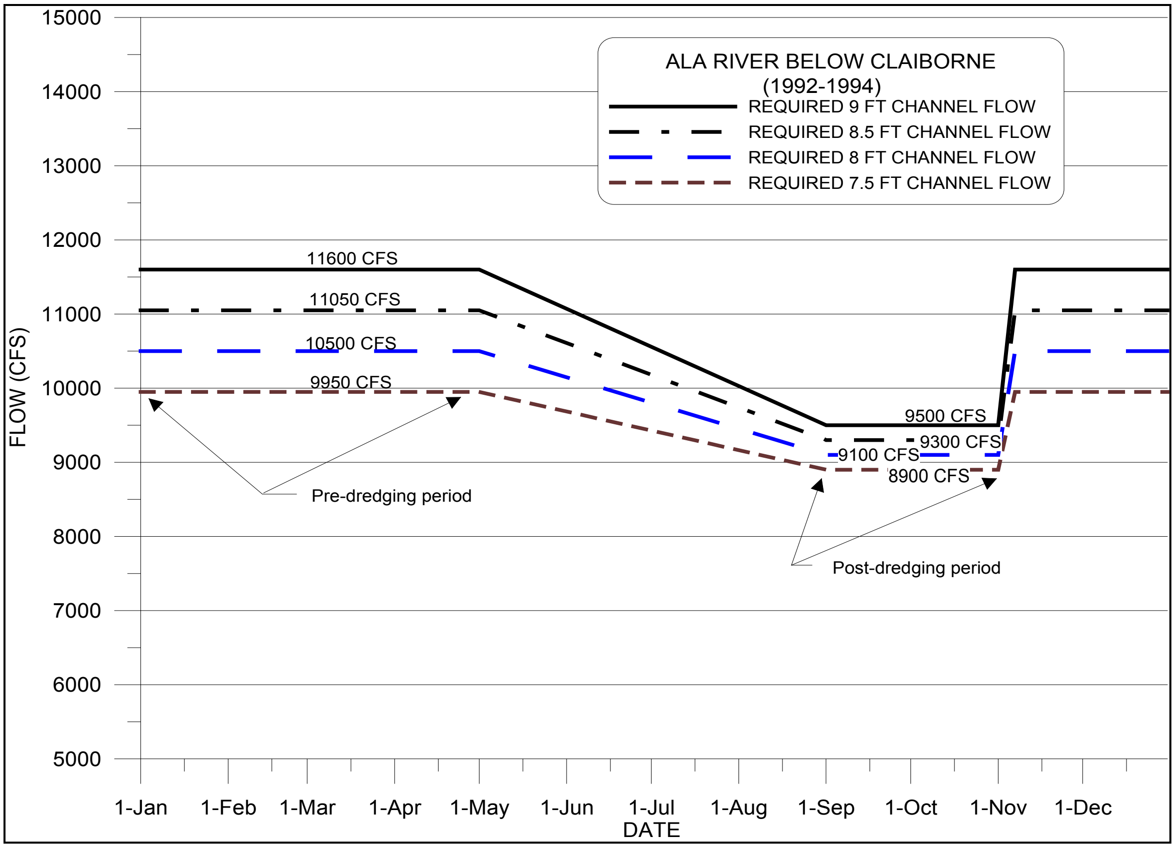

Figure 7-3. Flow-Depth Pattern (Navigation Template) During Normal Hydrologic Conditions (1992–1994)

Allatoona Dam and Carters Dam, while originally authorized to support downstream navigation, are not regulated for navigation purposes because they are distant from the navigation channel, and any releases for that purpose would be captured and reregulated by APC reservoirs downstream. Downstream navigation in the Alabama River benefits indirectly from the operation of the Allatoona and Carters Projects for the other authorized purposes. 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, Robert 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 9 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 it 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 (Exhibit B). Additional intervening flow or drawdown discharge from the Robert 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

Table 7-1. Monthly Navigation Flow Target in CFS

Month	9.0-ft target below Claiborne Lake (from Navigation Template) (cfs)	9.0-ft Jordan, Bouldin, Thurlow goal (cfs)	7.5-ft target below Claiborne Lake (from Navigation Template) (cfs)	7.5-ft Jordan, Bouldin, Thurlow 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

the Robert F. Henry and Millers Ferry reservoirs (R.E. “Bob” Woodruff Lake and William “Bill” Dannelly Lake, respectively) 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 7-4 show the required basin inflow for a 9.0-foot channel; Table 7-3 and Figure 7-5 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 plan does not include flow requirements from Allatoona and Carters Lakes because, as explained earlier, they are not regulated specifically for navigation.

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 C).

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

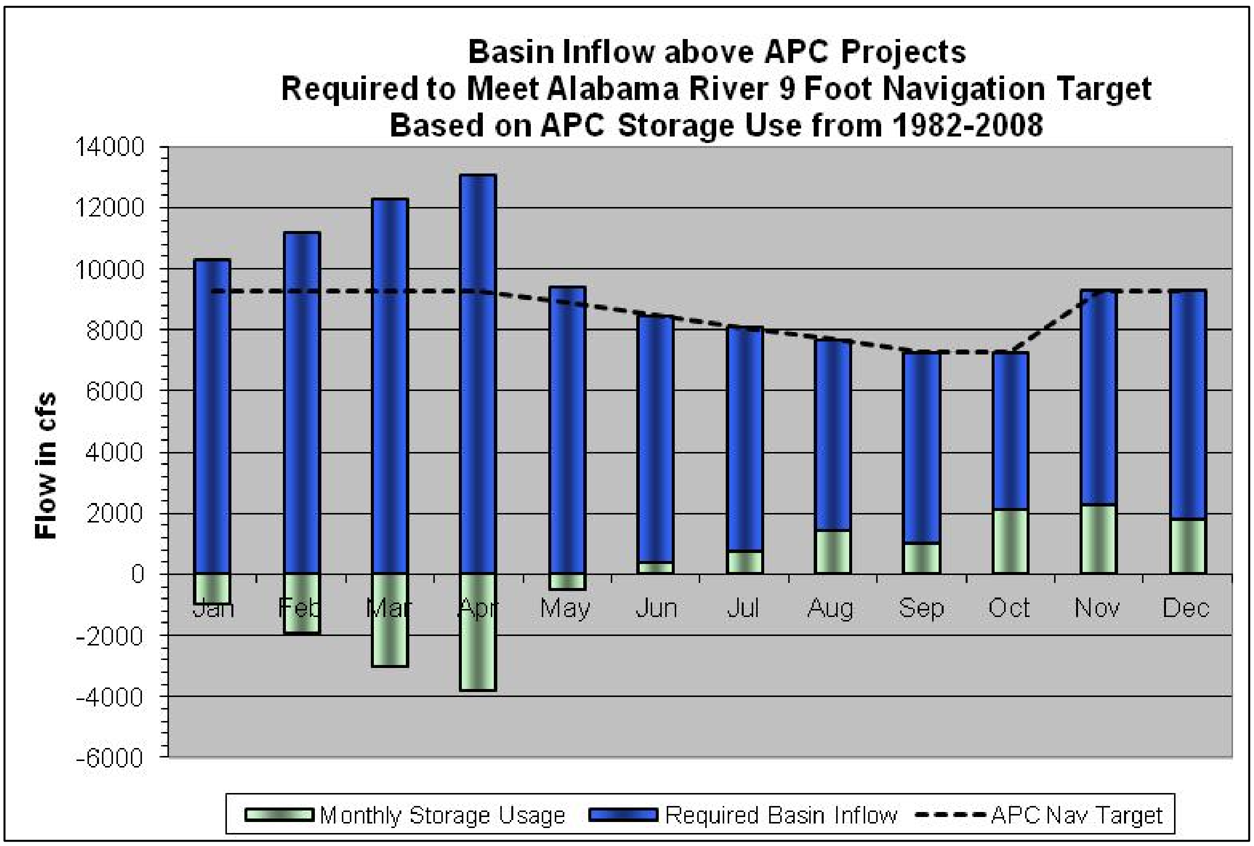

Figure 7-4. Flow Requirements from Rainfall (or Natural Sources) and Reservoir Storage to Achieve the JBT Goal for Navigation Flows for a 9-Foot Channel

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	–994	8,954

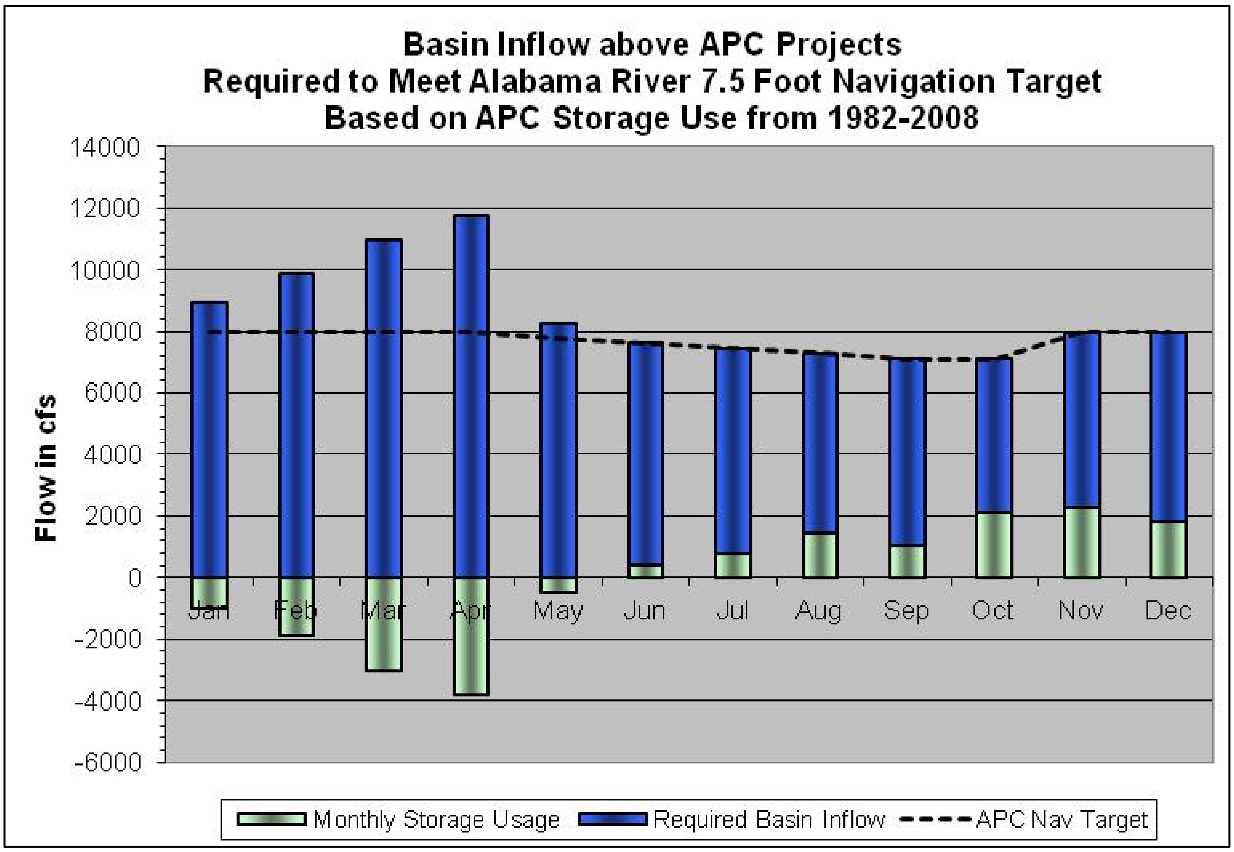

Figure 7-5. Flow Requirements from Rainfall (or Natural Sources) and Reservoir Storage to Achieve the JBT Goal for Navigation Flows for a 7.5-Foot Channel

In the event that the Mobile District Water Management Section (EN-HW) determines upcoming reductions in water releases may impact the available navigation channel depth, they shall contact the Black Warrior/Tombigbee - Alabama/Coosa Project Office (OP-BA), and the Mobile District Navigation Section (OP-TN), to coordinate the impact. EN-HW shall provide the Claiborne tailwater gage forecast to OP-BA and OP-TN. Using this forecast and the latest available project channel surveys, OP-BA and OP-TN will evaluate the potential impact to available navigation depths. Should this evaluation determine that the available channel depth is adversely impacted, OP-BA and OP-TN will work together, providing EN-HW with their determination of the controlling depth. Thereafter, OP-BA and OP-TN 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 light load 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.

7-12. Drought Contingency Plans. In accordance with ER 1110-2-1941, Drought Contingency Plans, dated September 15, 1981, an ACT Basin Drought Contingency Plan (DCP) has been developed to implement water control regulation drought management actions. The following information provides a summary of the DCP water control actions for the ACT Basin projects. Figure 7-6 provides a general schematic of the ACT Basin Drought Plan.

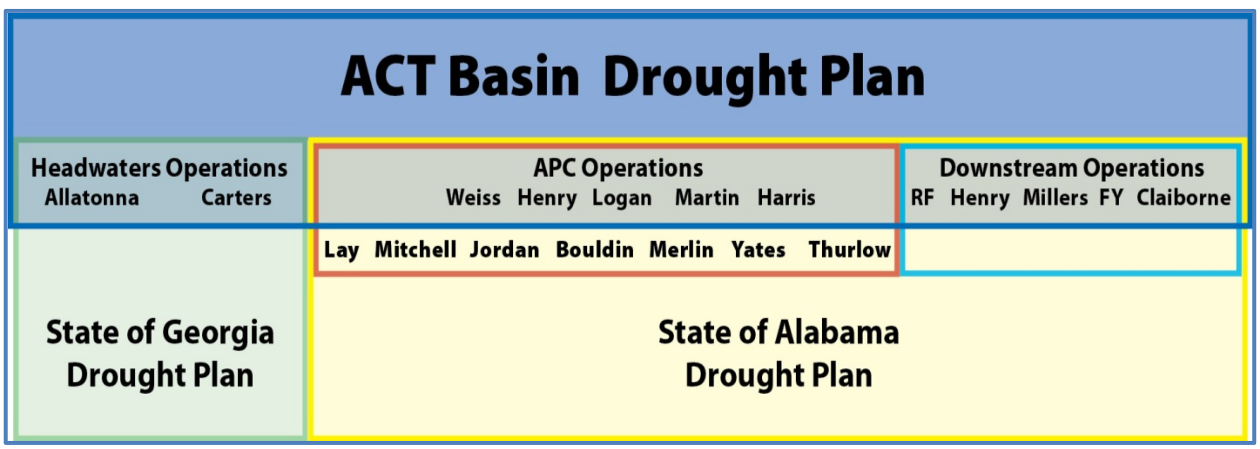

Figure 7-6. Schematic of the ACT Basin Drought Plan

The ACT Basin Drought Plan defines monthly minimum flow requirements 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 key features of the drought plan are described in detail in Exhibit C - Drought Contingency Plan. The ACT Basin Drought Plan is activated when one or more of the following drought triggers occur: (1) basin inflow trigger; (2) composite conservation storage trigger in APC reservoirs; and (3) state line flow trigger. Drought management actions would become increasingly more austere when two triggers occur (Drought Level 2) or all three occur (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 7-5 schematically depicts the ACT Basin Drought Plan matrix.

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. 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 three indicators - state line flows, basin inflow, or composite conservation storage.

Table 7-4. ACT Basin Drought Intensity Levels

Drought Intensity Level (DIL)	Drought Level	No. of Triggers Occurring
DIL 1	Moderate Drought	1
DIL 2	Severe Drought	2
DIL 3	Exceptional Drought	3

1

Table 7-5. ACT Basin Drought Management 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 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 350 cfs</td><td colspan="6">1/2 Yates Inflow</td><td colspan="3">Thurlow 350 cfs</td></tr>
<tr><td colspan="7">Maintain 400 cfs at Montgomery WTP (Thurlow release 350 cfs)</td><td colspan="3">Thurlow 350 cfs</td><td colspan="3">Maintain 400 cfs at Montgomery WTP (Thurlow 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 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.

2

7-13. Flood Emergency Action Plans. The Corps is responsible for developing Flood Emergency Action Plans for the ACT System. The plans are included in the Operations and Maintenance Manuals for each system project. Example data available are emergency contact information, flood inundation information, and so on.

7-14. Other. Other considerations than just serving the authorized project purposes must be served from the basin as needed. For example, adjustments are made to system regulation at times for downstream construction, to aid in rescue or recovery from drowning accidents; for environmental studies; or for cultural resource investigation.

7-15. Deviation from Normal Regulation. Water management inherently involves adapting to unforeseen conditions. The development of water control criteria for the management of water resource systems is carried out throughout all phases of a water control project. The water control criteria are based on sound engineering practice utilizing the latest approved models and techniques for all foreseeable conditions. There may be further refinements or enhancements of the water control procedures, in order to account for changed conditions resulting from unforeseen conditions, new requirements, additional data, or changed social or economic goals. However, it is necessary to define the water control plan in precise terms at a particular time in order to assure carrying out the intended functional commitments in accordance with the authorizing documents (EM 1110-2-3600 Management of Water Control Systems). Adverse impacts of the water control plan may occur due to unforeseen conditions. When this occurs, actions will be taken within applicable authority, policies, and coordination to address these conditions when they occur through the implementation of temporary deviations to the water control plan, such as interim operation plans. Such deviations may require additional environmental compliance prior to implementation.

The Corps is occasionally requested to deviate from the water control plan. Prior approval for a deviation is required from the Division Commander except as noted in subparagraph a. Deviation requests usually fall into the following categories:

a. <u>Emergencies</u>. Examples of some emergencies that can be expected at a project are drowning and other accidents, failure of the operation facilities, failure of another ACT project, chemical spills, treatment plant failures, and other temporary pollution problems. Water control actions necessary to abate the problem are taken immediately unless such action would reasonably be expected to create equal or worse conditions. The Mobile District will notify the Division office as soon as practicable.

b. <u>Unplanned Deviations</u>. Unplanned instances can create a temporary need for deviations from the normal regulation plan. Unplanned deviations may be classified as either major or minor but do not fall into the category of emergency deviations. Construction accounts for many of the minor deviations and typical examples include utility stream crossings, bridge work, and major construction contracts. Minor deviations can also be necessary to carry out maintenance and inspection of facilities. The possibility of the need for a major deviation mostly occurs during extreme flood events. Requests for changes in release rates generally involve periods ranging from a few hours to a few days, with each request being analyzed on its own merits. In evaluating the proposed deviation, consideration must be given to impacts on project and system purposes, upstream watershed conditions, potential flood threat, project condition, and alternative measures that can be taken. Approval for unplanned deviations, either major or minor, will be obtained from the Division Office by telephone or electronic mail prior to implementation.

c. Planned Deviations. Each condition should be analyzed on its merits. Sufficient data on flood potential, lake and watershed conditions, possible alternative measures, benefits to be expected, and probable effects on other authorized and useful purposes, together with the district recommendation, will be presented by letter or electronic mail to the Division office for review and approval.

7-16. Rate of Release Change. Gradual changes are important when releases are being decreased and downstream conditions are very wet, resulting in saturated riverbank conditions. The Corps acknowledges that a significant reduction in project releases over a short period can result in some bank sloughing, and release changes are scheduled accordingly when a slower rate of change does not significantly affect downstream flood risk. Overall, the effect of project regulation on streambank erosion has been reduced by the regulation of the project because higher peak-runoff flows into the project are captured and metered out more slowly.

VIII - EFFECT OF WATER CONTROL PLAN

8.01. General. ACT Basin multi-purpose reservoir and navigation projects have produced major effects on the basin's water and land resources and have provided significant local, regional, and national benefits. The following generally describe the effects and benefits produced by the federal water control regulation conducted in the ACT Basin.

The impacts of the *ACT Master Water Control Manual* and its Appendices 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 Management. One of the major benefits of the water control regulation in the ACT System is flood management for the purpose of flood risk management benefits. During most years, one or more flood events occur in the ACT Basin. While most of the events are of minor significance, on occasion, major storms produce widespread flooding or unusually high river stages.

Carters Lake provides flood risk management benefits to the rich farm lands along the Coosawattee and Oostanaula Rivers and to the areas of Resaca, Georgia, and Rome, Georgia. Peak flood stages are reduced as far downstream as Rome, Georgia, about 72 river miles downstream from the project. Flood risk management regulation at Allatoona Dam and Lake reduces peak stages of the Etowah River below the dam downstream to its confluence with the Oostanaula River at Rome. Releases of stored flood waters would not be made until the Rome stage falls below flood stage, except in extreme floods to protect the integrity of the dams. Except for large floods, such as the March 1990 event, the Allatoona Lake flood storage can usually be evacuated in several weeks. Flood level reductions at Rome are primarily effected by operations at Allatoona Dam. Carters Lake usually provides for incidental flood stage reductions at Rome. Allatoona Lake controls about 28 percent of the total combined drainage area of the Etowah and Oostanaula Rivers at Rome (4,010 square miles), and Carters Lake controls about nine percent of that area. The evacuation of flood storage from Allatoona Lake and Carters Lake is coordinated so that the combined discharges will not cause or aggravate flooding at Rome. As a general rule, the flood inflows into Allatoona Lake will be stored longer than the Carters Lake flood inflows because Allatoona Lake has a larger flood storage capacity and a shorter routing time to Rome. Flood regulation at the Allatoona and Carters Projects also assists in the flood risk management regulation at Weiss Lake on the Coosa River by reducing the inflows into that project during flood events. The extent to which the Allatoona and Carters Projects can manage flood risk from a storm depends on the initial conditions, the rainfall distribution and movement, storm centering, and flood characteristics. General area storms tend to be better managed because the local runoff below Allatoona Dam will have flowed through Weiss Lake before the flood evacuation releases are required at Allatoona Dam.

8-03. Flood Emergency Action Plans. The Mobile District is responsible for developing Flood Emergency Action Plans for the ACT System. Individual Flood Emergency Action Plans have been developed for each of the system dams. The plans are presented in the individual project manuals in Appendices A through I. The plans are for use in coordination with the Mobile District Water Management Section during a flood emergency or for guidance if that communication with the District is lost. The plans are intended to serve only as temporary guidance for operating a project in an emergency until Mobile District staff can assess the results of real-time hydrologic model runs and issue more detailed instructions to project personnel. The benefits of Flood Emergency Action Plans are to minimize uncertainties in how to operate a project in a flood emergency, to facilitate quick action to mitigate the adverse impacts of a flood event, and to provide for emergency action exercises to train operating personnel on how to respond in an actual emergency flood situation.

8-04. Recreation. The Corps lakes in the ACT Basin are important recreational resources, providing significant economic and social benefits for the region and the nation. The five Corps projects in the basin contain more than 235,000 total acres of land and water, most of which are available for public use. A wide variety of recreational opportunities are provided at the lakes including boating, fishing, hunting, camping, picnicking, water skiing, and sightseeing. Mobile District rangers and other project personnel conduct numerous environmental and historical educational tours and presentations, as well as water safety instructional sessions each year for the benefit of area students and project visitors. The reservoirs support popular sport fisheries, some of which have achieved national acclaim for trophy-size catches of largemouth bass. Allatoona Lake is one of the most visited Corps lakes in the United States. Table 8-1 displays visitor days at Corps projects from FY 2003 through FY 2011. Allatoona Lake has the highest number of visitor days each year.

Table 8-1. ACT Corps Project Visits

	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011
Alabama River Lakes	3,758,863	3,121,828	3,160,605	3,251,704	3,107,910	3,094,869	3,502,623	3,455,705	3,487,877
Allatoona Lake	5,942,789	5,650,029	5,663,215	6,129,733	6,431,973	6,929,550	5,281,347	6,245,913	6,004,769
Carters Lake	566,310	536,863	561,237	547,745	538,337	431,529	622,962	598,878	700,251

The effects of the ACT Basin water control operations on recreation facilities and use at the projects are described as impact lines - Initial Impact Line, Recreation Impact Line, and Water Access Limited Line. The impact lines are defined as pool elevations with associated effects on recreation facilities and exposure to hazards within each lake. The first impact level is generally characterized by marginal effects on designated swimming areas, increased safety awareness regarding navigation hazards, minimal effects on Corps boat ramps, and minimal effects on private marina and dock owners. More substantial impacts begin to occur at the second and third impact levels. Recreation impact levels at the Corps reservoir projects in the ACT Basin are described further in the individual project water control manual appendices. The following are general descriptions of each impact line:

1). <u>Initial Impact Line</u> - Reduced swim areas, some recreational navigation hazards are marked, boat ramps are minimally affected, a few private boat docks are affected.

2) <u>Recreation Impact Line</u> - All swim areas are unusable, recreational navigation hazards become more numerous, boat ramps significantly affected, 20 percent of private boat docks affected.

3) Water Access Impact Line - Most water-based recreational activities are severely restricted, most boat ramps are unusable, navigation hazards become more numerous, 50 percent of private boat docks affected.

8-05. Water Quality. Water control regulation of the ACT projects is not performed to meet specific water quality standards. However, the objective of water quality sustainability of the ACT River Basin mainstem streams is a goal through specific continuous minimum releases and other incidental releases that provide benefits to water quality in the basin. Water releases made during hydropower generation from Allatoona Dam provide Etowah River flows beneficial for downstream water uses. Allatoona Dam and Carters Reregulation Dam provide benefits to water quality by providing continuous minimum flow releases. At Allatoona Dam, the small turbine-generator is run continuously to provide a 240 cfs minimum discharge from the dam. At Carters Reregulation Dam, spillway releases provide a continuous minimum release of 240 cfs for downstream water quality benefits. Seasonal varying minimum environmental flow releases provide additional water quality benefits. Although there are no minimum flow provisions downstream of Robert F. Henry and Millers Ferry Dams on the Alabama River, flows from these projects are used downstream to help provide the 7Q10 flow of 6,600 cfs below Claiborne Dam. Several industries on the Alabama River have designed effluent discharges on the basis of these flows along the Alabama River.

8-06. Fish and Wildlife. Minimum flow requirements of 240 cfs below the Allatoona Lake and Carters Lake projects for water quality purposes also support fish and wildlife conservation downstream of the projects, particularly during periods of extremely dry weather. In addition, the seasonal varying environmental minimum flow targets below Carters Reregulation Dam provide benefits to downstream fish and wildlife and their habitat. APC's minimum flow targets at Montgomery, Alabama (at the headwaters of the R.E. "Bob" Woodruff Lake), while principally intended to support downstream navigation, also provides sustained flows for water quality needs, fish and wildlife conservation and environmental flow benefits for threatened and endangered species and their critical habitat.

a. Fish Spawning. The water control plan for Allatoona improves the ability to maintain steady reservoir pool levels during the spring fish spawning period. When climatic conditions preclude a favorable operation for fish spawning, the Corps consults with the state fishery agencies and the USFWS on balancing needs in the system and minimizing the effects of fluctuating lake levels. Water control regulation for fish spawning helps to increase the population of fish in the lake.

b. Fish Passage. When Alabama River and project conditions allow, the Corps operates the locks on the Alabama River from March through May to facilitate downstream to upstream passage of Alabama shad and other migratory species. While there can be slight differences in the locking technique each year, generally two fish locking cycles are performed each day between 8 a.m. and 4 p.m.; one in the morning and one in the afternoon. The fish passage operations provide the benefit of allowing the fish to migrate upstream for spawning.

8-07. Water Supply. While the Corps does not operate the ACT System specifically for M&I water supply, the water control regulation of the ACT projects provides both direct and incidental benefits for M&I water supply uses along the mainstem rivers. Municipalities draw water from the rivers and reservoir pools for their water supplies. Industrial plants, such as pulp and paper mills, use water in their production processes. Recreation-related businesses, such as country clubs, use water to irrigate golf courses. Various state and county parks use water for irrigation and water supply. In many ways, such water uses support local jobs and contribute to the economy. M&I water supply withdrawals in the ACT Basin outside the federal projects are limited by applicable state-issued water withdrawal permits and to the available flows of water in the rivers that are largely incidental to the Corps and APC water control regulation.

8-08. Hydroelectric Power. Hydropower generation by the ACT Basin hydropower plants provide direct benefits to a large segment of the basin's population in the form of relatively low-cost power and the annual return of revenues to the Treasury of the United States. Hydropower plays an important role in meeting the electrical power demands of the region. The projects provide peaking power generation, i.e., power is generated during the hours that the demand for electrical power is highest. Table 8-2 displays generation over the past several years at federal projects in the ACT Basin. The ACT Basin hydropower projects, along with 20 other hydropower dams in the southeastern United States, compose the SEPA service area. Hydroelectric power generated at the Corps dams in the ACT Basin is sold by SEPA to a number of cooperatives and municipal power providers, referred to as preference customers. Hydroelectric power is one of the cheaper forms of electrical energy, and it can be generated and supplied quickly as needed in response to changing demand.

Table 8-2. ACT Federal Project Power Generation (MWh)

	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011
Alabama River Power Projects	465,864	627,148	571,701	826,003	708,004	885,777	633,618	464,458	444,314	645,867	660,838	506,146
Allatoona Dam	80,418	116,857	76,417	203,245	120,092	223,257	92,795	71,453	50,541	100,222	174,927	86,790
Carters Dam	413,225	387,964	385,928	380,276	481,001	434,571	434,088	484,652	535,959	577,565	610,566	544,692

The projects with hydropower capability provide three principal power generation benefits:

1) Hydropower helps to ensure the reliability of the electrical power system in the SEPA service area by providing dependable capacity to meet annual peak power demands. For most plants, that condition occurs when the reservoir is at its maximum elevation. Dependable capacity at hydropower plants reduces the need for additional coal, gas, oil, or nuclear generating capacity.

2) The projects provide a substantial amount of energy at a small cost relative to thermal electric generating stations, reducing the overall cost of electricity. Hydropower facilities reduce the burning of fossil fuels, thereby reducing air pollution.

3) Hydropower has several valuable operating characteristics that improve the reliability and efficiency of the electric power supply system, including efficient peaking, a rapid rate of unit unloading, and rapid power availability for emergencies on the power grid.

8-09. Navigation. The Alabama River from Montgomery, Alabama, downstream to the Mobile, Alabama, area provides a navigation route for commercial barge traffic, cruising yachters, recreational power boaters and paddlers serving as a valuable regional economic resource. A minimum flow is required to ensure usable water depths to support navigation. Congress has authorized continuous navigation on the river, when sufficient water is available. There are three locks and dams on the Alabama River, and a combination of dredging, river training works, and flow augmentation from upstream storage projects, which together support navigation depths on the river.

The Alabama River is a terminus on the inland waterway system. It is accessed by the Black Warrior Tombigbee Waterway and Mobile Harbor and the Gulf Intracoastal Waterway

(GIWW). Its major value as a water transportation resource is its ability to carry traffic to and from inland waterway points in Mississippi, Louisiana, and Texas. The bulk of the traffic on the Alabama River is linked to resources originating along the river, which makes barge transportation essential and convenient for moving these resources. As shown on Tables 8-3 and 8-4, the use of the ACT System for navigation declined from 2000 to 2010.

Table 8-3. Alabama River System Navigation – Tons per Year

Alabama River System (Transported Tons by Calendar Year)											
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
All Commodities	39,719	52,245	68,645	118,050	72,324	141,749	46,215	31,194	62,664	117,278	3,050
Crude Materials, Inedible, Except Fuels	39,675	40,450	54,760	117,250	68,181	141,047	45,900	27,650	62,564	117,278	
Primary Manufactured Goods						22					
Manufactured Equip. & Mach.	44	10,695	13,885	300	4,143	680	315	3,544	100		3,050
Waste Material		1,100									
Unknown or Not Elsewhere Classified				500							

Table 8-4. Alabama River System Navigation – Lockages/Vessels per Year

Alabama River System (Lockages/Vessels by Calendar Year)											
Calendar Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total Lockages (#)	344	366	317	254	399	299	240	259	218	233	155
Total Vessels (#)	481	512	418	334	583	358	342	334	263	265	199

Because of river bends and shoaling at the bends, typical tow size is a four-barge tow, except during very low water conditions when tow sizes can be reduced to two barges. Coast Guard regulations restrict tow widths to one-half of the 200-foot channel width. Those restrictions, however, would still allow most GIWW tows to navigate the Alabama River without breaking up tows.

Flows for navigation are most needed in the unregulated part of the lower Alabama River below Claiborne Lock and Dam. When flows are available, Claiborne Lock and Dam is operated 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 dam is operated to provide flows for a reduced project channel depth as determined by surveys of the river. In recent years funding for dredging has been cut resulting in higher flows being required to provide the design navigation depth. In addition to annual seasonal low flow impacts, droughts have a severe impact on the availability of navigation depths in the Alabama River.

A 9-foot-deep by 200-foot-wide navigation channel is authorized on the Alabama River to Montgomery, Alabama. A minimum depth of 7.5 feet can provide a limited amount of navigation. Under low flow conditions, even the 7.5-foot depth has not been available at all times. Over the period from 1976 to 1993, based upon river stage, the 7.5-foot navigation channel was available 79 percent of the time and the 9-foot navigation channel was available 72 percent of the time. Since 1993, the percentage of time that these depths have been available has declined further. Full navigation channel availability on the Alabama River is dependent upon seasonal flow conditions and channel maintenance. The ACT Basin water control plan will provide a 9-foot channel depth annual availability approximately 90 percent of the time in January and over 50 percent of the time in September. A 7.5-foot channel, based upon river stage, is expected approximately 90 percent of the time in January and 56 percent of the time in September. Because of higher flows in the winter and spring, channel availability is much higher from December through May.

Figure 8-1 depicts the historic annual channel depth availabilities for the Alabama River below Claiborne Lock and Dam, based upon river stage, computed for 1970 - 2007.

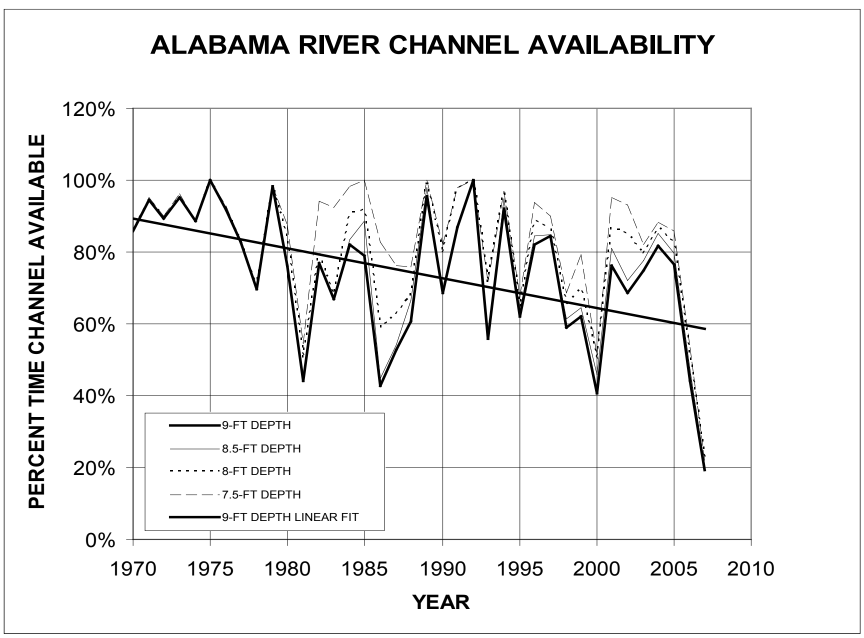

Figure 8-1. Alabama River Channel availability from 1970 to 2007

Extreme high-flow conditions also limit availability of the project for commercial navigation, principally related to the ability to use the navigation locks at the three locks and dams on the Alabama River. Those conditions are temporary and far more short term (usually lasting no more than a few days) than low-water limitations resulting from extended periods of drought and low basin inflows. At Robert F. Henry Lock and Dam, use of the navigation lock is discontinued when the tailwater below the dam reaches elevation 131.0 feet NGVD29. That elevation equates to a flow of about 156,000 cfs, which occurs on average about once every three years. At Millers Ferry Lock and Dam, use of the navigation lock is discontinued when the tailwater below the dam reaches elevation 81.0 feet NGVD29. That tailwater elevation equates to a flow of about 220,000 cfs, which occurs on average about once every 18 years. At Claiborne Lake, use of the navigation lock is temporarily discontinued when the tailwater below the dam reaches elevation 47.0 feet NGVD29. That tailwater elevation equates to a flow of about 130,000 cfs, which occurs on average about once every 1.8 years.

8-10. Drought Contingency Plans. The ACT Basin DCP increases the Corps' and APC's water control regulation capability to respond to droughts in a timely manner under current administrative, legislative, or other constraints. Provisions are included for coordinating with appropriate federal, state, and local stakeholders during the occurrence of drought conditions.

The importance of DCPs has become increasingly obvious as more demands are placed on the water resources of the basin. During low-flow conditions, the system might not be able to fully support all project purposes. The ACT Basin DCP includes methods for identifying drought conditions; includes measures to be used to respond to and mitigate the effects of drought conditions; and helps minimize the effect of drought on the ACT Basin water resources.

IX – SYSTEM WATER CONTROL MANAGEMENT

9-01. Responsibilities and Organization. Responsibilities for developing and monitoring water resources and the environment in the ACT Basin are shared by many agencies in the Federal and State Governments. Some of the federal agencies include the Corps, U.S. Environmental Protection Agency (EPA), National Park Service, U.S. Coast Guard, U.S. Geological Survey (USGS), U.S. Department of Energy, U.S. Department of Agriculture, U.S. Fish and Wildlife Service (USFWS), and National Oceanic and Atmospheric Administration (NOAA). In addition to the federal agencies, each State has agencies involved in the basin. They include the Georgia Environmental Protection Division (GAEPD) for the State of Georgia, and the Alabama Office of Water Resources (OWR) for the State of Alabama.

a. U.S. Army Corps of Engineers. Authority for water control regulation of the federally authorized reservoir projects in the ACT Basin has been delegated to the SAD Commander. The responsibility for water control regulation activities has been entrusted to the Mobile District, Engineering Division, Water Management Section (Mobile District). Water control actions for each project are regulated in a system-wide, balanced approach to meet the federally authorized purposes. The Water Management Section is required to developing water control regulation procedures for the ACT Basin projects for all foreseeable conditions and to jointly develop flood management and navigation support procedures for non-federal projects when that responsibility has been entrusted to the Secretary of the Army through their authorizing legislation or license. The Mobile District monitors the projects for compliance with the approved water control plan. In accordance with the water control plan, the Mobile District performs water control regulation activities that include daily declarations of water availability for hydropower generation and other purposes; daily and weekly reservoir pool elevation and release projections; weekly river basin status reports; tracking composite conservation storage and projections; determining and monitoring basin inflow; managing flood risk management operations and regulation; and coordinating with other District elements, APC, and basin stakeholders. When necessary, the Mobile District instructs the project operator regarding normal water control regulation procedures and emergencies, such as flood operations. The federal projects are tended by operators under direct supervision of a powerhouse superintendant and operations project manager. The Mobile District communicates directly with the powerhouse operators and with other project personnel as necessary. The Mobile District is also responsible for collecting historical project data and disseminating water control information, such as, historical data, lake level and flow forecasts, and weekly basin reports within the agency; to other federal, state, and local agencies; and to the general public.

b. Other Federal Agencies

1) National Weather Service (NWS). The NWS is the federal agency in NOAA that is responsible for weather warnings and weather forecasts. With support from the Corps-NWS Cooperative Gaging Program, the NWS forecast offices, along with the Southeast River Forecast Center (SERFC), maintain a network of rainfall and flood reporting stations throughout the ACT Basin. NWS continuously provides current weather conditions and forecasts. The SERFC prepares river forecasts for many locations throughout the ACT Basin and provides the official flood stage forecasts along the ACT Rivers. Often, the SERFC prepares predictions on the basis of *what if scenarios*, such as Quantitative Precipitation Forecasts (QPFs). The QPF is a prediction of the spatial precipitation across the United States and the region. The Corps, NWS, and SERFC share information regarding rainfall, project data, and streamflow forecasts. In addition, the NWS provides information on hurricane forecasts and other severe weather

conditions. They monitor drought conditions and provide the information to the public. The National Integrated Drought Information System is being developed for the ACT Basin. Its web portal will provide a single source of information regarding drought conditions by sharing information gathered from the NOAA Climate Prediction Center, the Corps, state agencies, universities, and other pertinent sources of data through the drought portal.

2) U.S. Geological Survey (USGS). The USGS is an unbiased, multi-disciplinary 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 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 System (NWIS) Web site. The Mobile District uses the USGS to operate and maintain project water level gaging stations at each federal reservoir to ensure the accuracy of the reported water levels.

3) Southeastern Power Administration (SEPA). SEPA was created in 1950 by the Secretary of the Interior to carry out the functions assigned to the Secretary by the Flood Control Act of 1944. In 1977, SEPA was transferred to the newly created U.S. Department of Energy. SEPA, headquartered in Elberton, Georgia, is responsible for marketing electric power and energy generated at reservoirs operated by the Corps. The power is marketed to nearly 500 preference customers in Georgia, Florida, Alabama, Mississippi, southern Illinois, Virginia, Tennessee, Kentucky, North Carolina, and South Carolina.

a. The objectives of SEPA are to market electricity generated by the federal reservoir projects, while encouraging its widespread use at the lowest possible cost to consumers. Power rates are formulated using sound financial principles. Preference in the sale of power is given to public bodies and cooperatives, referred to as preference customers. SEPA does not own transmission facilities and must contract with other utilities to provide transmission, or *wheeling* services, for the federal power.

b. SEPA's responsibilities include the negotiation, preparation, execution, and administration of contracts for the sale of electric power; preparation of repayment studies to set wholesale rates; the provision, by construction, contract or otherwise, of transmission and related facilities to interconnect reservoir projects and to serve contractual loads; and activities pertaining to the operation of power facilities to ensure and maintain continuity of electric service to its customer.

c. SEPA schedules the hourly generation schedules for each federal project within the system at the direction of the Corps on the basis of daily and weekly water volume availability declarations.

4) U.S. Fish and Wildlife Service (USFWS). The USFWS is a bureau within 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 threatened and endangered species in accordance with the Endangered Species Act. The USFWS also coordinates with other federal agencies under the auspices of the Fish & Wildlife Coordination Act. The Corps Mobile District coordinates water control actions and management with USFWS in accordance with both laws.

c. State 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.

a. The Alabama Department of Environment Management (ADEM) Drinking Water Branch works closely with more than 700 water systems in Alabama that provide safe drinking water to four million citizens.

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

c. The Alabama Department of Conservation and Natural Resources has jurisdiction over both freshwater and saltwater fisheries in the state.

2) Georgia. The Department of Natural Resources (GADNR) has statewide responsibilities for the management and conservation of Georgia's natural and cultural resources. Within GADNR, the 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 prepare recommended Water Development and Conservation Plans. Those regional plans promote the sustainable use of Georgia's waters through the selection of 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. Georgia Wildlife Resources Division protects non-game and endangered wildlife in the state.

d. Alabama Power Company (APC). APC is an electric utility headquartered in Birmingham, Alabama. It is the second largest of four electric utilities owned and operated by the Southern Company, one of the Nation's largest producers of electricity. APC is an investor-owned, tax-paying public utility serving more than 1.3 million customers in the southern two-thirds of Alabama. Its hydroelectric generating plants encompass several lakes on the Tallapoosa, Coosa, and Black Warrior Rivers. The utility also has coal, oil, natural gas, nuclear and cogeneration plants in various parts of Alabama. In addition to generating electricity, the waters surrounding the plants offer recreational opportunities for Alabama residents and visitors.

e. Stakeholders. Many nonfederal 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, Federal and State 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. Table 9-1 lists state and federal agencies and active stakeholders in the ACT Basin that have participated in the ACT Basin water management teleconferences and meetings associated with the 2007-2009 drought. Federal and State political representatives also participated in the teleconferences. The ACT stakeholder teleconferences were held from 11 July 2007 to 14 April 2010.

Table 9-1. ACT Basin Water Management Teleconference Stakeholder Participants

State of Alabama	Others
Office of Governor	AL Rivers Alliance
AL OWR (Office of Water Resources)	Alabama Power Company
AL DEM (Department of Environmental Management	Alabama Forestry Association
AL DCNR (Department of Conservation and Natural Resources)	ARC (Atlanta Regional Commission)
AL DECA (Department of Economic and Community Affairs	Alabama Municipal Electric Association
	Alabama Pulp and Paper
	Bartow County GA
	City of Cartersville, GA
	City of Ellijay, GA
	City of Rome, GA
State of Georgia	Cobb County GA
Office of Governor	CCMWA (Cobb County – Marietta Water Authority)
GA DNR	Coosa-Alabama River Improvement Assoc
GA EPD	International Paper
	Lake Martin Homeowners Association
Federal Agencies	Mead Westvaco
EPA	MEAG Power
FERC - Atlanta	Metro Atlanta Chamber of Commerce
FERC - DC	Mobile Area Water and Sewer Service
NPS (Chattahoochee Nat Recreational Area)	Montgomery Water Works and Sanitary Sewer Board
SEPA	Oglethorpe Power Company
US Coast Guard	Pine Hill Water Department
	SeFPC (Southeastern Federal Power Customers)
USFWS-AL	Southern Company
USFWS-GA	Victoria Harbour Marina
USGS-AL	Weyerhaeuser Corp.
USGS-GA	

9-02. Local Press and Corps Bulletins. The local press consists of periodic publications in or near the ACT Basin. Montgomery 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. The Corps and the Mobile District publish e-newsletters regularly which are made available to the general public via email and postings on various websites. Complete, real-time information is available at the Mobile District's Water Management homepage http://water.sam.usace.army.mil/. The Mobile District Public Affairs Office issues press releases as necessary to provide the public with information regarding Water Management issues and activities.

9-03. Framework for Water Management Changes. Continued increases in the use of water resources demand constant monitoring and evaluating reservoir regulations and reservoir systems to ensure their most efficient use. Also, special interest groups often request modifications of the basin water control manual or project specific water control plans which could impact project purposes. Therefore, within the constraints of 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. This review can result in a revision to the basin manual or to the project specific, water control plans. When deemed appropriate, temporary deviations to the water control plan, as discussed in 7-15 “Deviation from Normal Regulation”, can be implemented to provide the most efficient regulation while balancing the multiple purposes of the ACT Basin-wide System and individual projects.

EXHIBIT A

UNIT CONVERSIONS

EXHIBIT A
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	0.0001	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	8.1×10^{-7}	2.64×10^{-7}
m^3	1000	1	61,023	35.31	264.17	8.1×10^{-4}	2.64×10^{-4}
in^3	1.64×10^{-2}	1.64×10^{-5}	1	5.79×10^{-4}	4.33×10^{-3}	1.218×10^{-8}	4.33×10^{-9}
ft^3	28.317	0.02832	1728	1	7.48	2.296×10^{-5}	7.48×10^{6}
gal	3.785	3.78×10^{-3}	231	0.134	1	3.07×10^{-6}	10^{6}
ac-ft	1.23×10^{6}	1233.5	75.3×10^{6}	43,560	3.26×10^{5}	1	0.3260
million gallon	3.785×10^{6}	3785	2.31×10^{8}	1.34×10^{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 = 0.737 cubic feet per second for one year

EXHIBIT B

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

USACE AND APC MEMORANDUM OF UNDERSTANDING

EXHIBIT C

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

DROUGHT CONTINGENCY PLAN

FOR THE

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

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. This DCP does not prescribe all possible actions that might be taken in a drought situation due to the long-term nature of droughts and unique issues that may arise. 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) (acre-feet)	Conservation Storage (acre-feet)	Percentage of ACT Basin Conservation Storage (%)
Coosawattee River				
Carters Dam and Lake	Corps/GA/1974	383,565	141,402	6
Carters Reregulation Dam	Corps/GA/1974	17,460	15,980	1
Etowah River				
Allatoona Dam and Lake	Corps/GA/1949	367,471	284,580	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	247,210	36,450	2
Millers Ferry Lock and Dam/William "Bill" Dannelly Lake	Corps/AL/1969	346,254	46,704	3
Claiborne Lock and Dam and Lake	Corps/AL/1969	102,480	NA	--

III – DROUGHT IDENTIFICATION

3-01. **<u>Definition</u>**. 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. For example, 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 of 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.

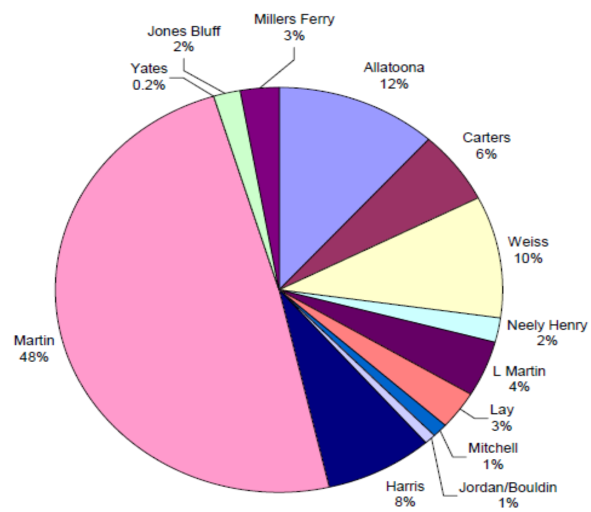

Figure 1. Alabama-Coosa-Tallapoosa River Basin Percent Conservation Storage

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

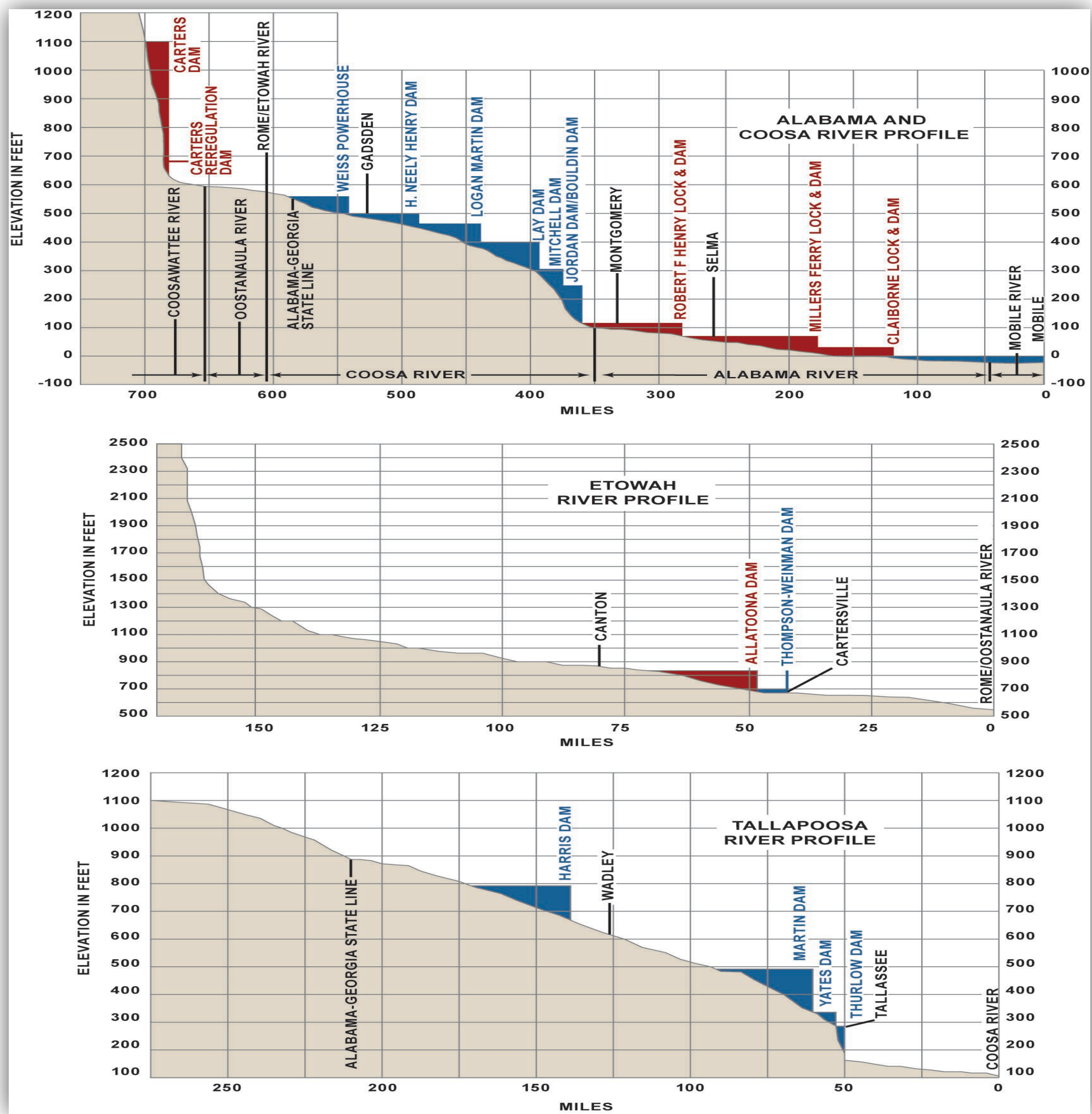

Figure 3. Alabama-Coosa-Tallapoosa River Basin Profile Map

B. **Allatoona Dam and Lake**. The Corps' Allatoona Dam on the Etowah River creates the 11,862 acres 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 NGVD29 during the late spring and summer months (May through August); transitions to elevation 835 feet NGVD29 in the fall (October through mid-November); transitions to a winter drawdown to elevation 823 feet NGVD29 (1-15 January); and refills back to elevation 840 feet NGVD29 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.

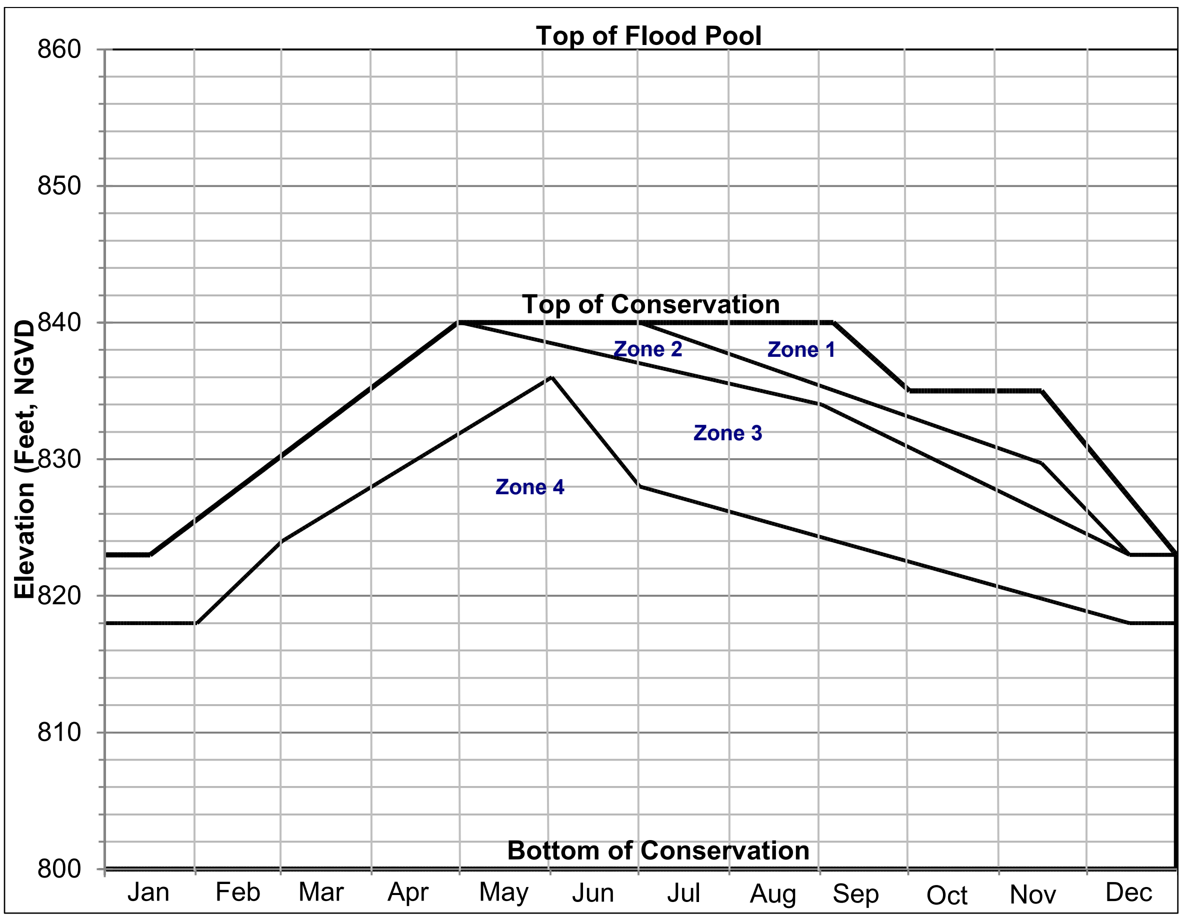

Figure 4. Allatoona Lake Guide Curve and Action Zones

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 NGVD29 from May through September transitioning to elevation 1072 feet NGVD29 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 NGVD29 and minimum elevation of 677 feet NGVD29 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.

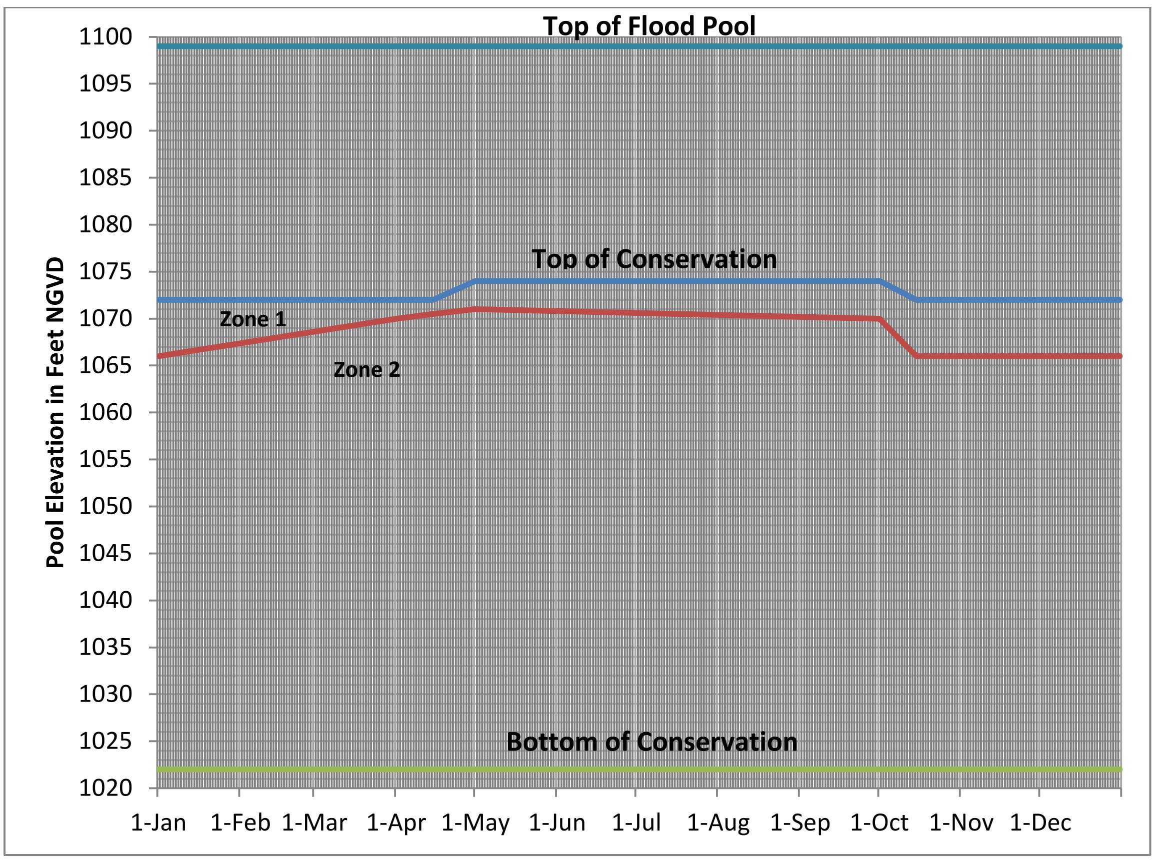

Figure 5. Carters Lake Guide Curve and Action Zones

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 mi northeast of Birmingham, Alabama, and extends into northwest Georgia for about 13 miles upstream on the Coosa River. The dam impounds a 30,200 acres reservoir (Weiss Lake) at the normal summer elevation of 564 feet NGVD29 as depicted in the regulation guide curve shown in Figure 6 (source APC). The H. Neely Henry Lake is on the Coosa River in northeast Alabama, about 60 miles northeast of Birmingham, Alabama. The dam impounds an 11,200 acres reservoir at the normal summer elevation of 508 feet NGVD29 as depicted in the regulation guide curve shown in Figure 7 (source APC). 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 NGVD29 as depicted in the regulation guide curve shown in Figure 8 (source APC). 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.

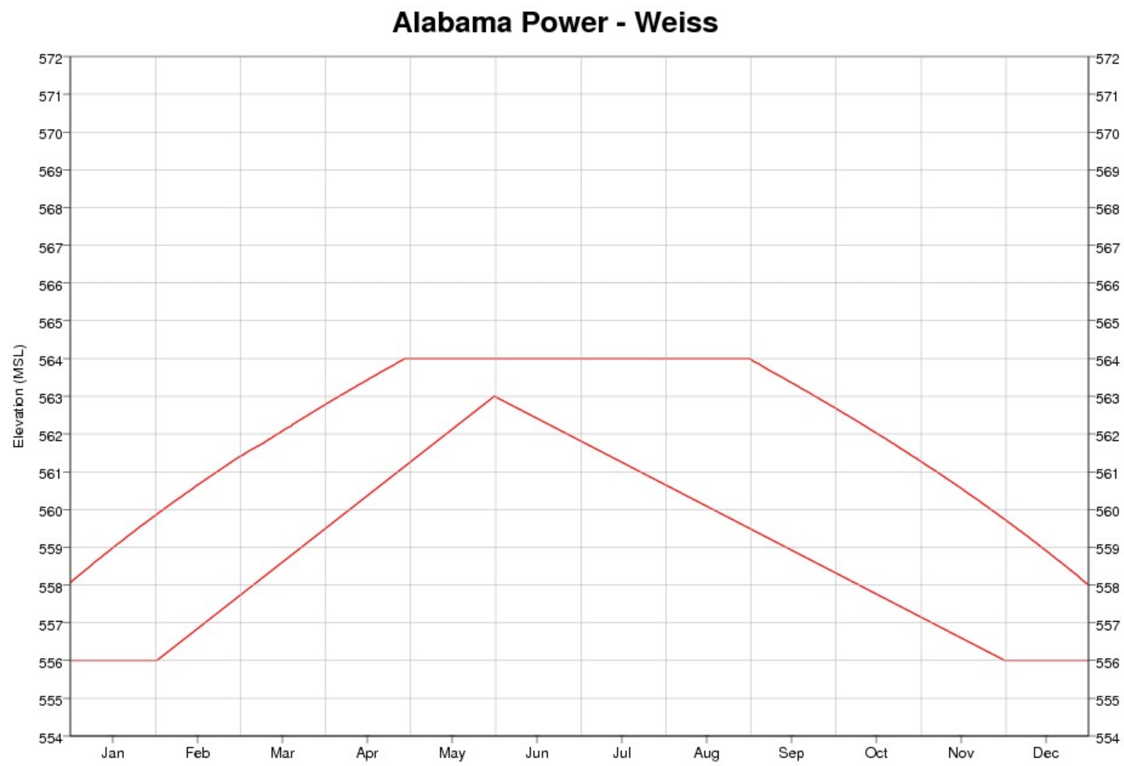

Figure 6. Weiss Lake Guide Curve

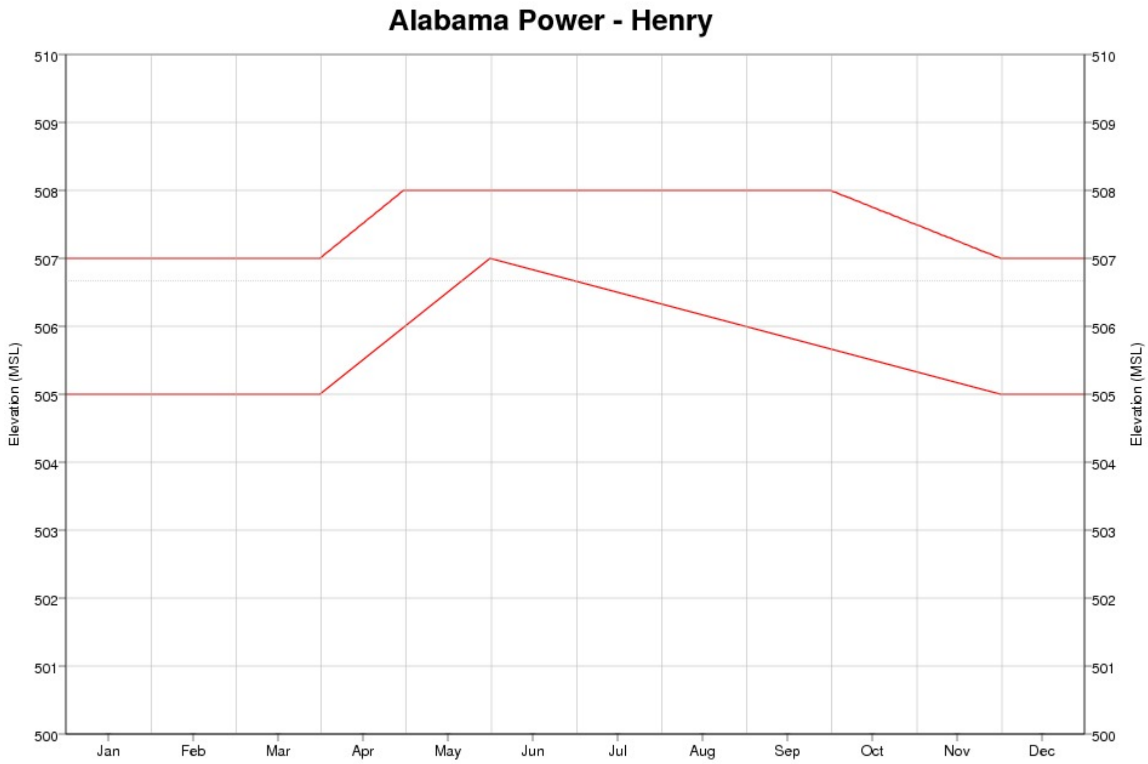

Figure 7. H. Neely Henry Lake Guide Curve

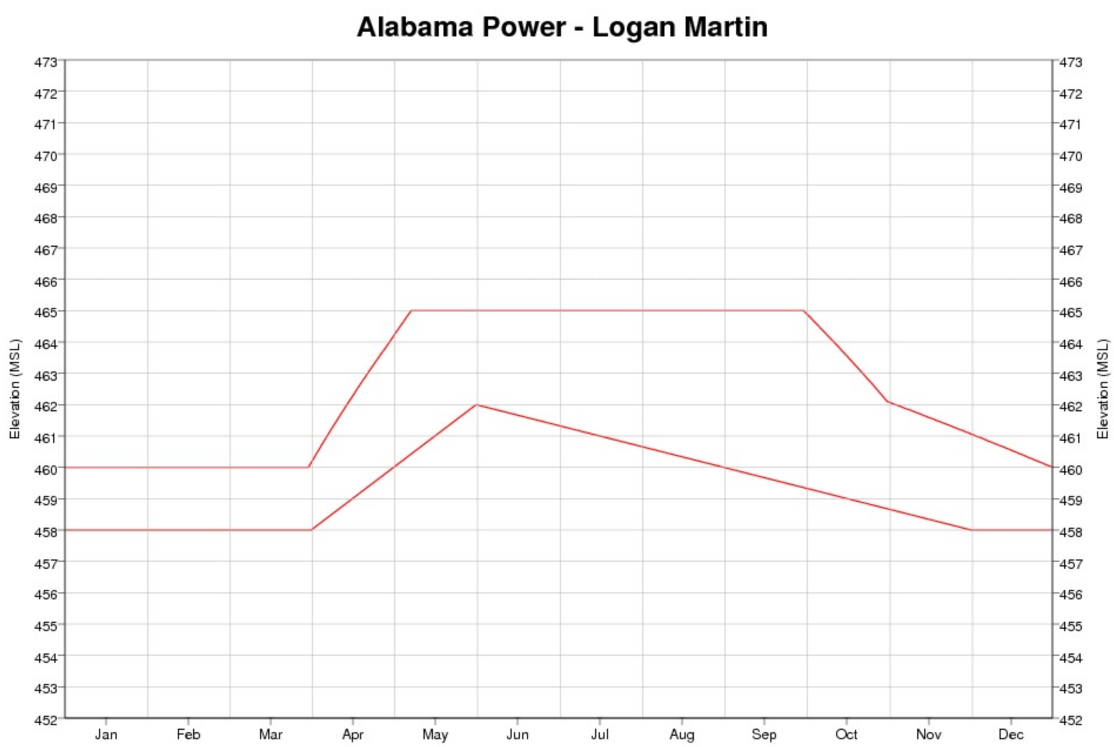

Figure 8. Logan Martin Lake Guide Curve

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 33 CFR, Chapter II, Part 208, Section 208.65 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 prescribed are described in memorandums of understanding between the Corps and APC, individual water control manuals for the APC projects, and this DCP.

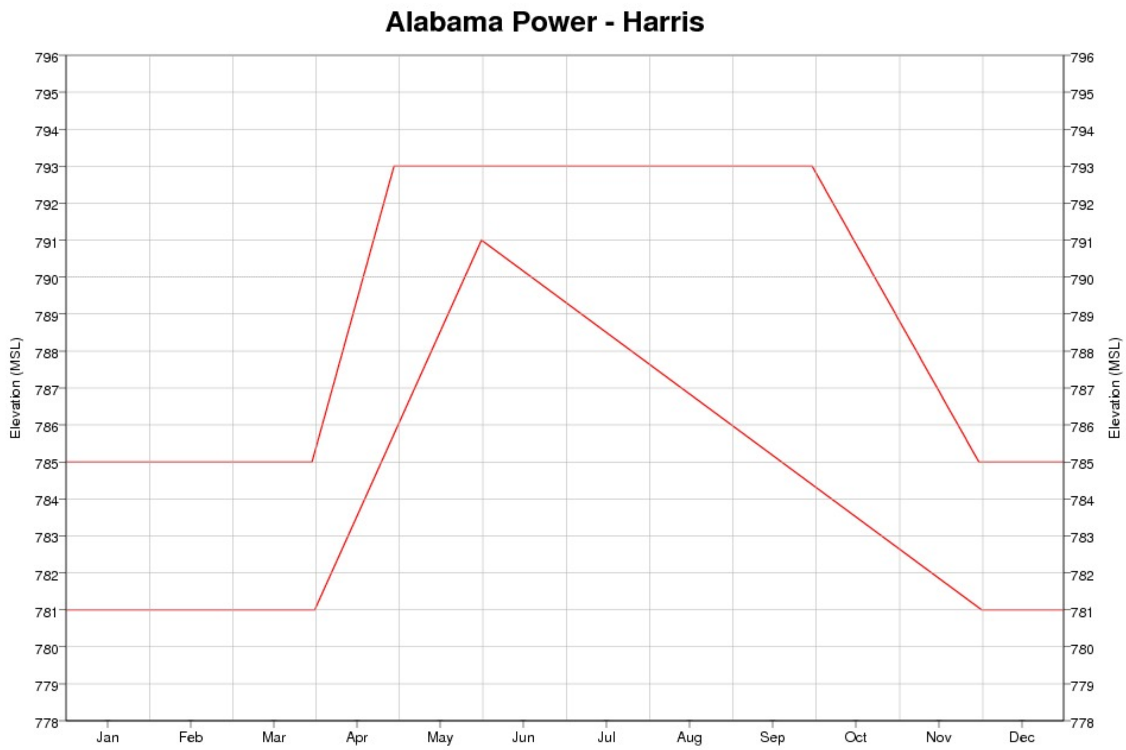

Figure 9. Robert L. Harris Lake Guide Curve

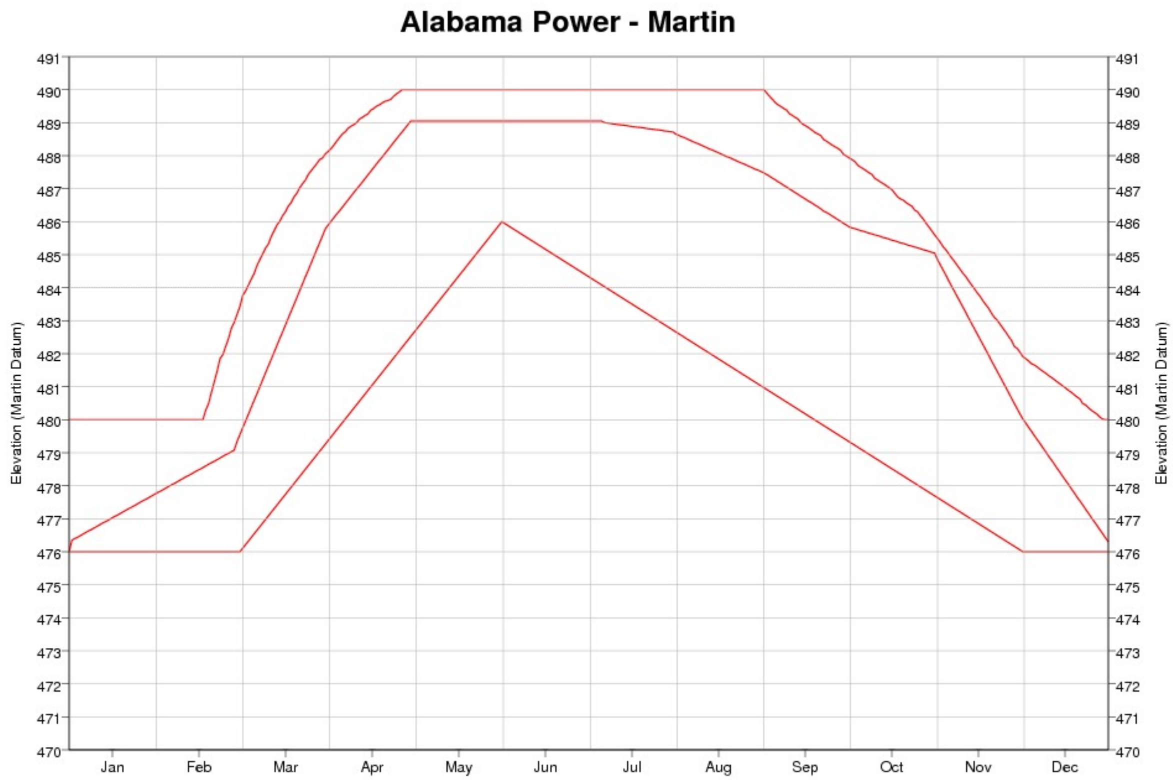

Figure 10. Martin Lake Guide Curve

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 at river mile 236.3. 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 12,510 acres and a storage capacity of 234,200 acre-feet at a normal pool elevation of 125 feet NGVD29. Lake levels are typically fairly stable with minimal fluctuation between the operating pool elevation limits, 123 feet NGVD29 to 126 feet NGVD29. The emergency drawdown pool elevation is 122 feet NGVD29. 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 (declared value). 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 at river mile 133. William "Bill" Dannelly Lake is 103 miles long and averages almost 1,400 feet wide. The reservoir has a surface area of 18,500 acres and a storage capacity of 346,254 acre-feet at a normal full pool elevation of 80 feet NGVD29. Lake levels remain fairly stable on a day-to-day basis with minimal fluctuation between the operating pool elevation limits, 79 feet NGVD29 to 80 feet NGVD29. It has an authorized 9-foot-deep by 200-foot-wide navigation channel which 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 (declared value). 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 at river mile 72.5. 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 at a normal pool elevation of 35 feet NGVD29. The operating pool elevation limits are between 32 feet NGVD29 and 36 feet NGVD29. 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 provide 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 provide for wastewater dilution, M&I 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	Allatoona Lake	86.000	78.000
Coosa	Cartersville, City of	008-1491-06	Bartow	Allatoona Lake	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)a	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)	City of Cave Spring (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) occur. 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) 0 triggers occur
DIL 1 — (moderate drought) 1 of 3 triggers occur
DIL 2 — (severe drought) 2 of 3 triggers occur
DIL 3 — (exceptional drought) all 3 triggers occur

(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). The total filling volume is defined as the volume of water required to return the pool to the top of the conservation guide curve and is calculated using the area-capacity tables for each project. Table 8 lists the monthly low basin inflow criteria. 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 Allatoona Lake 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 Allatoona Lake 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 on 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

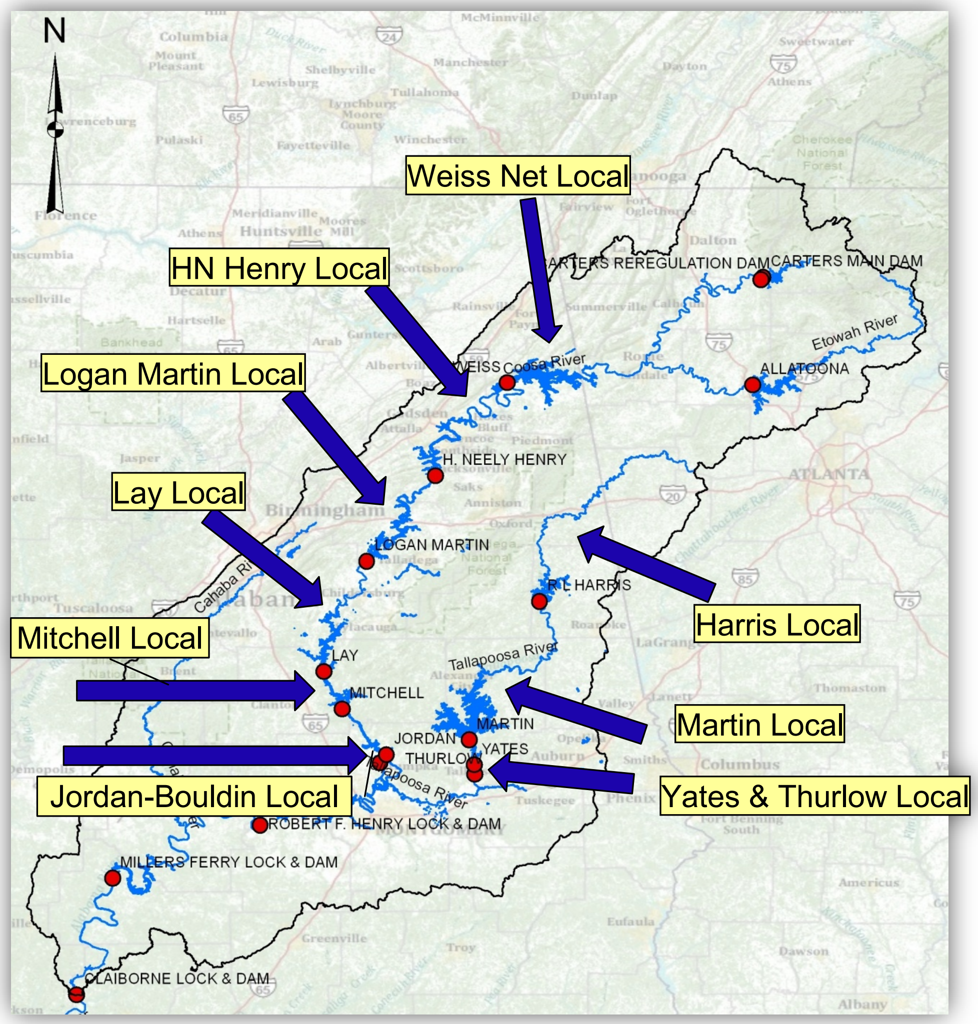

Figure 11. ACT Basin Inflows

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.

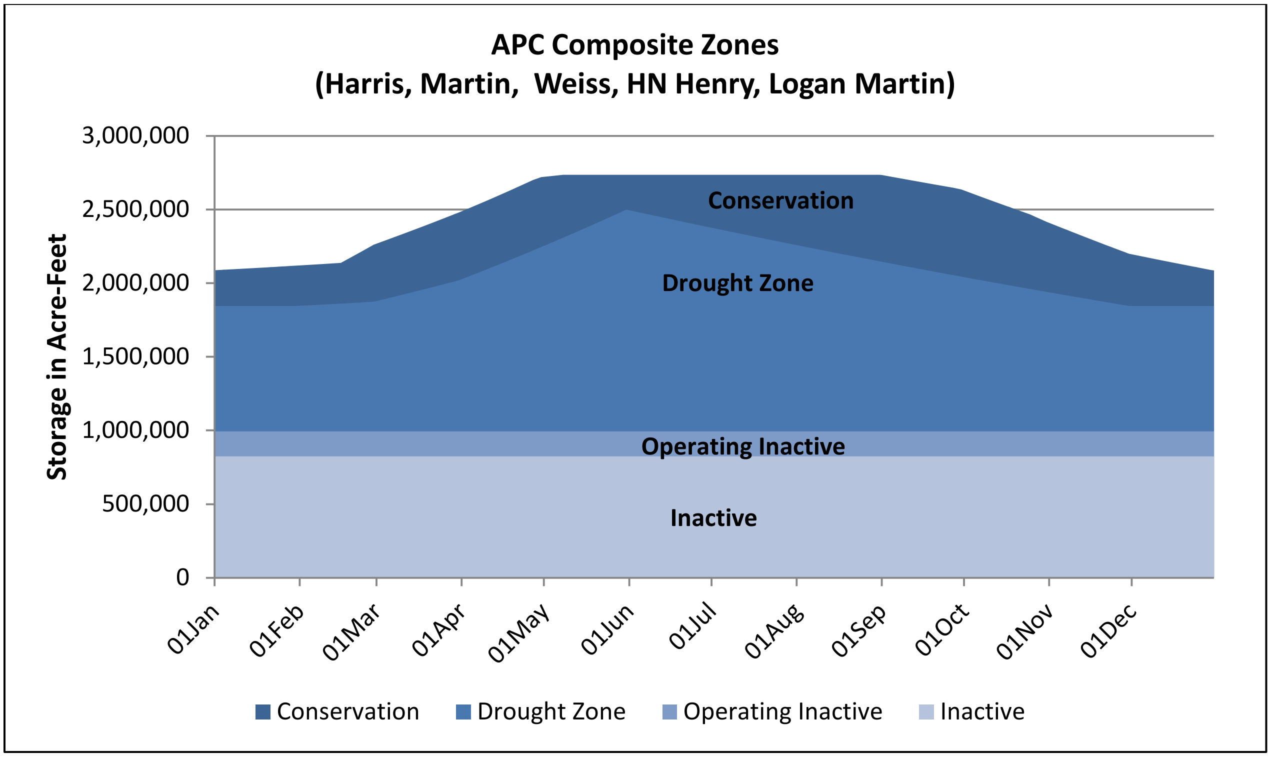

Figure 12. APC Composite Zones

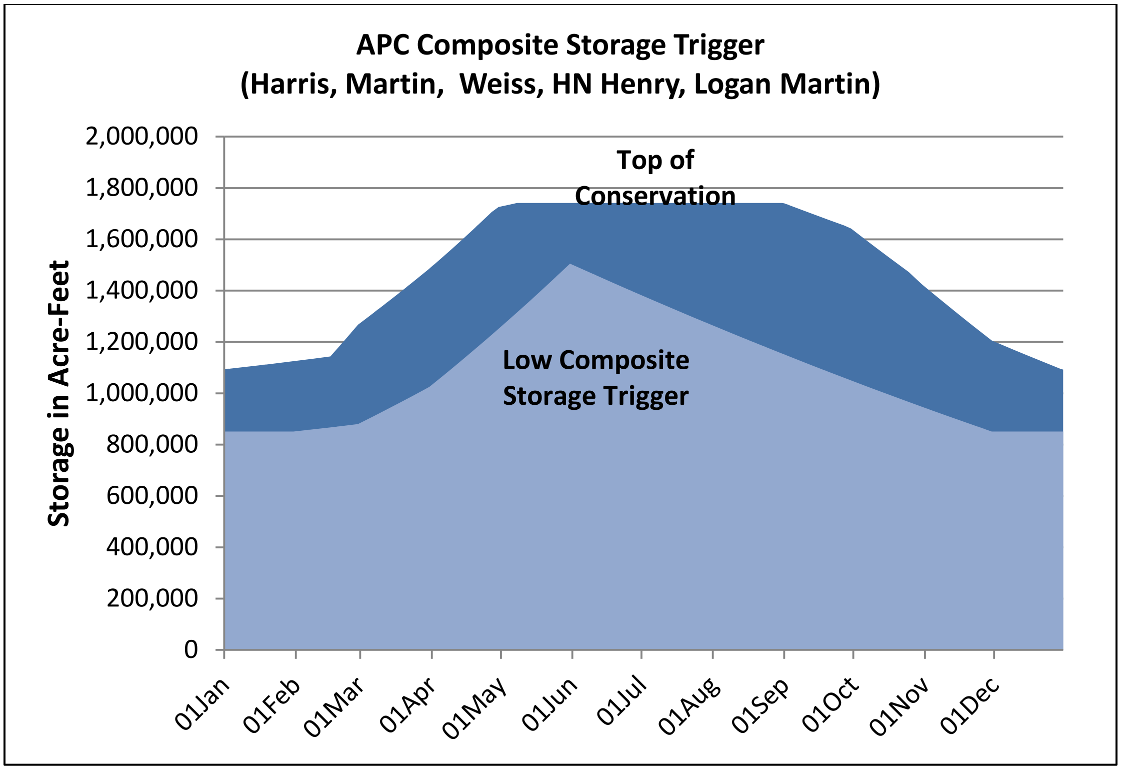

Figure 13. APC Low Composite Conservation Storage Drought Trigger

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 flow 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 Allatoona Lake.

Table 9. State Line Flow Triggers

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, the required flow is the greater of one-half of the inflow into Yates Lake and twice the Heflin USGS gage from January thru April. 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 required for 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 water supply intake. 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.

(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.

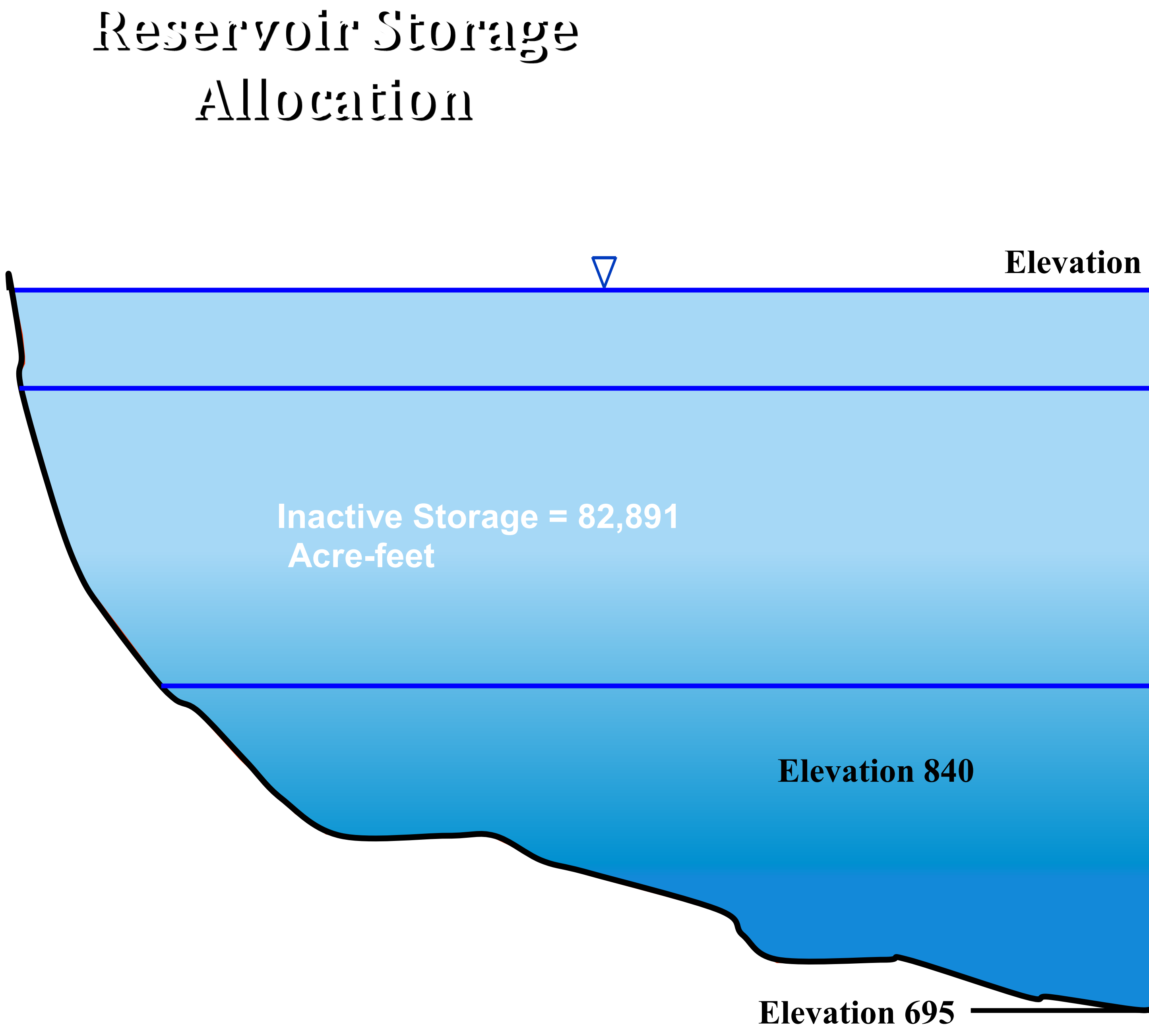

Figure 14. Storage in Allatoona Lake

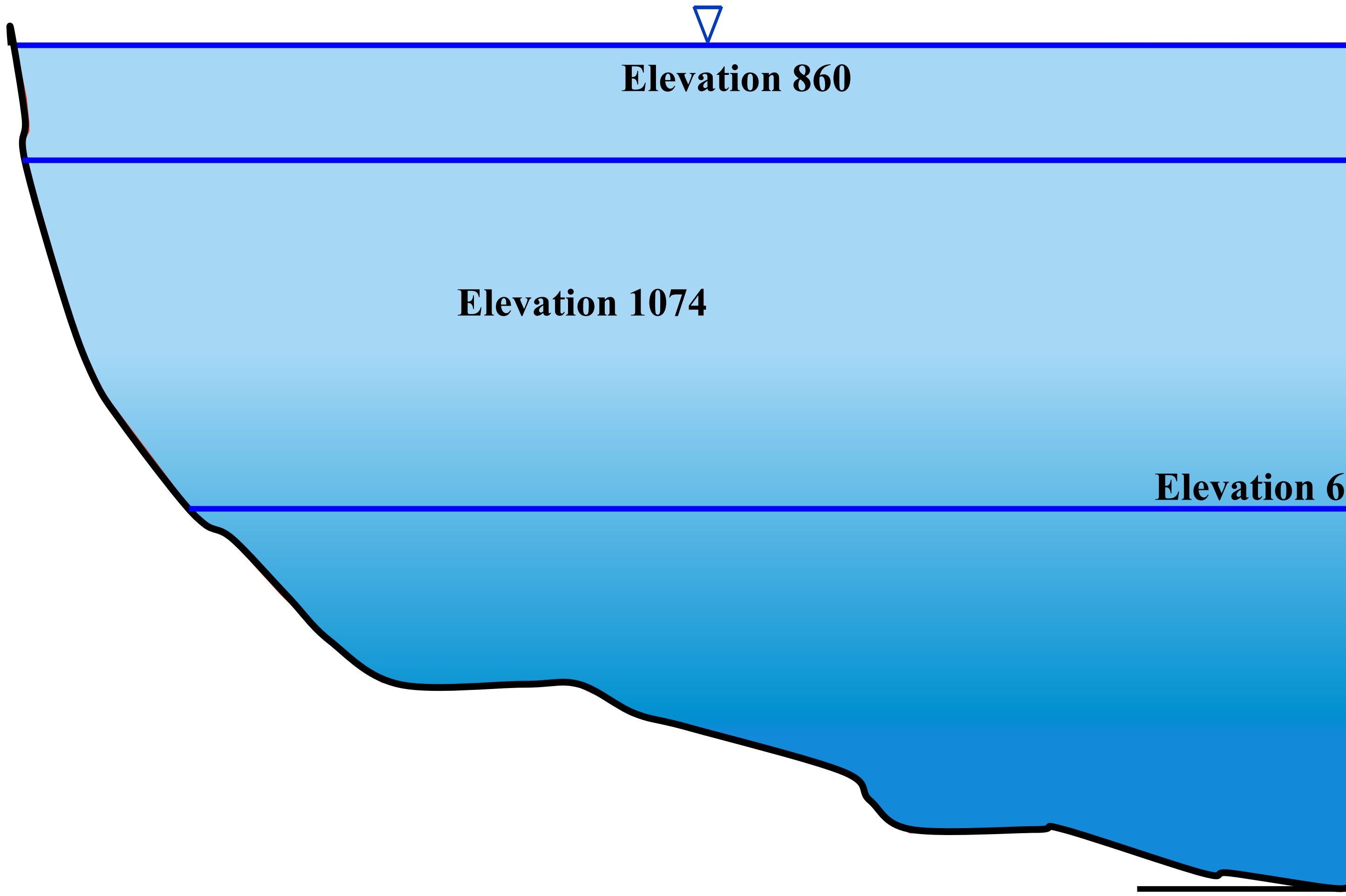

Figure 15. Storage in Carters Lake

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. The Water Management Section makes daily decisions and coordinates with APC every two weeks or more often if conditions warrant 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 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 ACT 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 publish e-newsletters regularly which are made available to the general public via email and postings on various websites. Complete, real-time information is available at the

Mobile District's Water Management homepage http://water.sam.usace.army.mil/. 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.

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