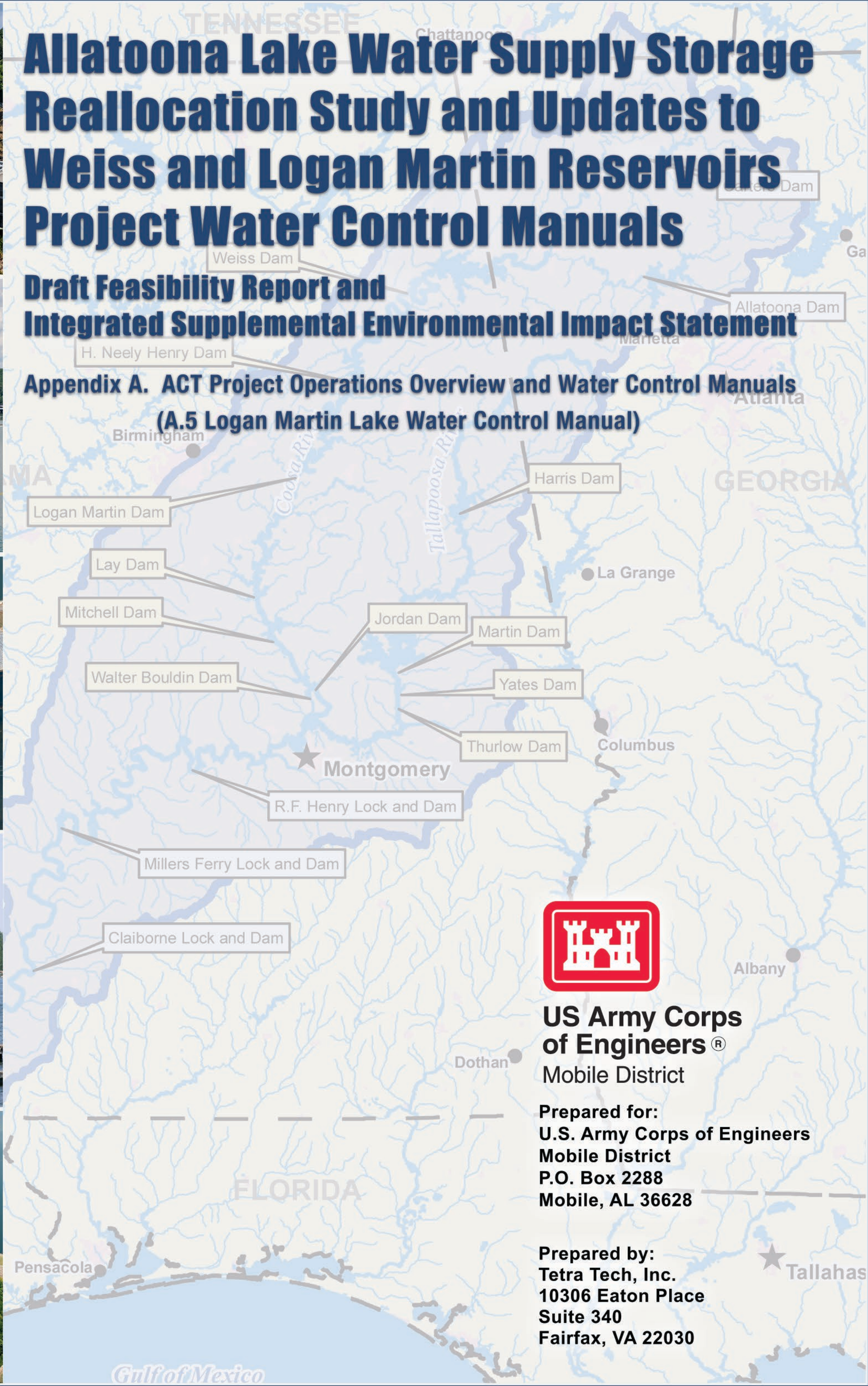
November 2019

Allatoona Lake Water Supply Storage Reallocation Study and Updates to Weiss and Logan Martin Reservoirs Project Water Control Manuals

Draft Feasibility Report and Integrated Supplemental Environmental Impact Statement

Appendix A. ACT Project Operations Overview and Water Control Manuals (A.5 Logan Martin Lake Water Control Manual)



US Army Corps of Engineers®
Mobile District

Prepared for:
U.S. Army Corps of Engineers
Mobile District
P.O. Box 2288
Mobile, AL 36628

Prepared by:
Tetra Tech, Inc.
10306 Eaton Place
Suite 340
Fairfax, VA 22030

US Army Corps of Engineers ®

Mobile District

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN WATER CONTROL MANUAL

Final

APPENDIX C

LOGAN MARTIN RESERVOIR

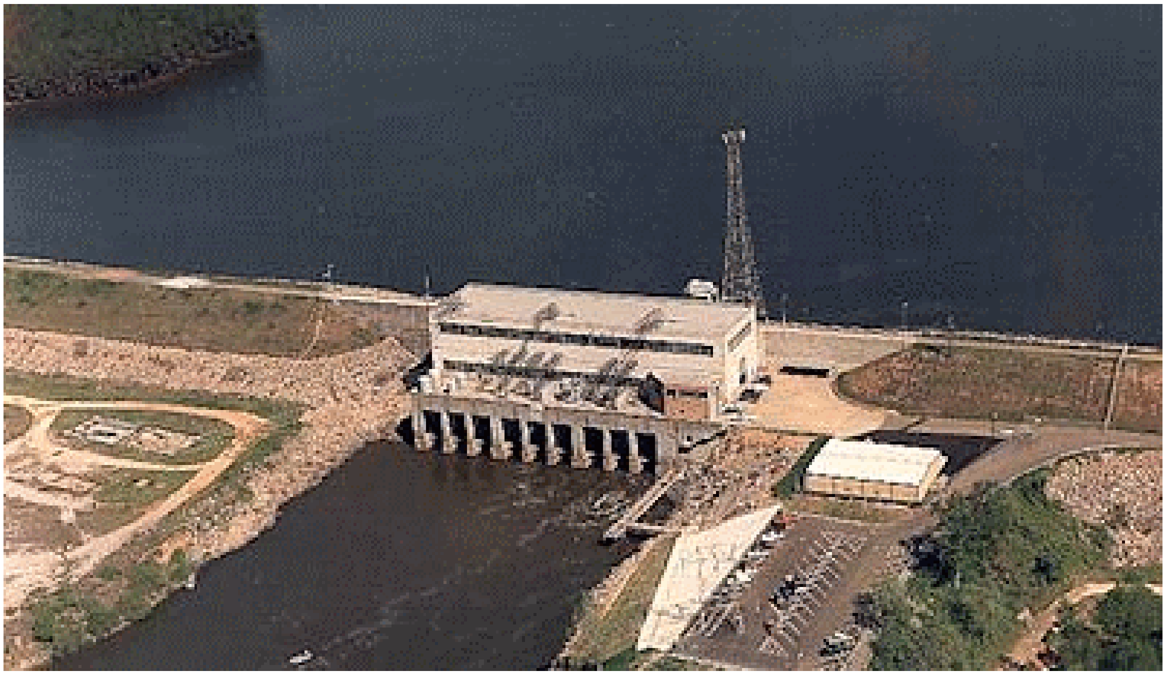
(Alabama Power Company)

COOSA RIVER ALABAMA

OCTOBER 1964

ADMINISTRATIVE UPDATE JUNE 2004

REVISED 2021



NOTICE TO USERS OF THIS MANUAL

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

REGULATION ASSISTANCE PROCEDURES

If unusual conditions arise, contact can be made with the Water Management Section, Mobile District Office by phoning (251) 690-2737 during regular duty hours and (251) 509-5368 during non-duty hours. The Allatoona Powerhouse personnel can be reached at (678) 721-6700 during regular duty hours.

METRIC CONVERSION

Although values presented in the text are shown in English units only, a conversion table is listed in Exhibit B for your convenience.

MEMORANDUM OF UNDERSTANDING

The Logan Martin Dam and Lake Project will be operated during floods and in support of navigation downstream in accordance with regulations prescribed by the Secretary of the Army and published in the Code of Federal Regulations, Title 33, Chapter II, Part 208, Section 208. A Memorandum of Understanding (MOU) concerning the design, construction, and operation of the Logan Martin development for flood control (now termed flood risk management) was adopted by the Alabama Power Company (APC) and the U.S. Army Corps of Engineers (herein referred to as the Corps of Engineers or Corps) on 27 September 1972 and later revised on 11 October 1990. This MOU is also intended to memorialize the functions and procedures for both the Corps and APC for implementing these plans and meeting their responsibilities with regard to the orderly exchange of hydrologic data. A copy of the MOU is included in this manual as Exhibit C.

LOGAN MARTIN DAM AND LAKE

WATER CONTROL MANUAL

APPENDIX C

COOSA RIVER, ALABAMA

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

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PERTINENT DATA

GENERAL

Other names of project	Kelly Creek
Dam site location	
State	Alabama
Basin	Alabama-Coosa
River	Coosa
Miles above mouth of Coosa River	98.5
Stream Miles above mouth of Mobile River	457.9
Drainage area above Allatoona Dam – square miles	1,110
Drainage area Weiss Dam to Allatoona Dam – Square miles	4,160
Drainage area H. Neely Henry Dam to Weiss Dam – Square miles	1,330
Drainage area Logan Martin Dam to H. Neely Henry Dam – Square Miles	1,170
Drainage area above dam site, sq. miles	7,770

Type of project	Dam, Reservoir and Power plant
Objectives of regulation	Hydropower and flood risk management
Project Owner	Alabama Power Company (APC)
Regulating Agencies	APC, Corps of Engineers, and FERC

STREAM FLOW AT CHILDERSBURG
(for Period of Record 1 Oct 1913 – 30 Sep 1978) (cfs)

Average for Period of Record	13,857
Maximum daily discharge (Mar. 1951)	143,000
Minimum daily discharge (Apr 1975)	378
Maximum annual discharge (1949 water year)	20,100
Minimum annual discharge (1941 water year)	7,255

FLOW AT DAMSITE
(1 Jan 1965 - 31 Dec 2009) (cfs)

Average for Period of Record	11,881
Maximum daily discharge (Apr 1979)	114,130
Minimum daily discharge (Several dates)	0
Maximum annual discharge (1979 calendar year)	18,078
Minimum annual discharge (2007 calendar year)	3,446
Bankfull capacity below dam	34,000
Prime flow	3,560

RESERVOIR

Maximum pool, spillway design flood (initial pool 465), ft above NGVD29	483.10
Full flood risk management (surcharge) pool, feet above NGVD 29	473.5
Top of conservation pool (summer), feet above NGVD 29	465.0
Top of conservation pool (winter), feet above NGVD 29	462.0
Area at pool elevation 465, acres	15,269
Area at pool elevation 462, acres	13,157
Total volume at elevation 473.5.0, acre-feet	433,572
Flood risk management (surcharge) storage (summer), elevation 465-473.5 ft NGVD 29 (0.58 in runoff), acre-ft	160,105
Storage below top of conservation (summer) 465 ft NGVD 29, acre-ft	273,467
Storage below top of conservation (winter) 462 ft NGVD 29, acre-ft	230,893
Available conservation storage (summer), elev 465 to 452.5, acre-tt	144,383
Inactive Storage, below elevation 452.5 ft NGVD29	129,084
Seasonal storage, elevation 460 to 465 ft NGVD 29 (0.16 in runoff), acre-ft	67,602
Length, miles	48.5

Note: The following change in terminology for Full Power pool, Minimum Power pool, Power storage and Dead storage has been made from previous versions of the Water Control Manual.

a. Full Power pool - Top of Conservation (Summer)
b. Minimum Power pool - Top of Conservation (Winter)
c. Power storage – Seasonal Storage
d. Dead storage – Inactive storage

MAXIMUM REGULATED FLOOD

Maximum flood of project record (April 1979)	
Peak inflow, cfs	145,640
Peak outflow, cfs	114,130
Peak pool elevation, feet above NGVD 29	474.0
Spillway design flood peak discharge (13.54 in of runoff)	464,100

SPILLWAY

Type	concrete-gravity
Net length, feet	240
Elevation of crest, feet above NGVD 29	432.0
Type of gates	Tainter
Number of gates (38'x 40')	6
Elevation of top of gates in closed position, feet above NGVD 29	470
Number of trashbay gates (21'x 17.5', fixed wheel)	1
Elevation, top of gate, closed-feet NGVD 29	473
Maximum discharge capacity (spillway and trashbay) (pool elev. 483.1), cfs	336,100

POWER PLANT AND DATA

(Lay Power Pool Raised to Elev. 396)	
Bankfull capacity, feet NGVD 29	404
Maximum spillway design flood, feet NGVD 29	453
Controlled discharge for flood risk management (50,000 cfs), feet NGVD 29	409
Full gate turbine discharge (1007 LF), feet NGVD 29	
1 unit operating (11,000 cfs), feet NGVD 29	400
2 units operating (22,000 cfs), feet NGVD 29	402
3 units operating (33,000 cfs), feet NGVD 29	404
Minimum (plant shutdown), feet NGVD 29	396

DAM

Total length including dikes, feet	6,279
Total length of non-overflow section, feet	5,667
Maximum height from roadway to foundation, feet	97
Elevation, top of dam, feet NGVD 29	487
Elevation, top of parapet, feet NGVD 29	489

POWER PLANT

Installation.

Three vertical fixed propeller water wheels each rated at 59,000 HP for a net operating head of 56.0’. Each water-wheel is connected to a 3-phase, 60 cycle, 13.8 kv generator rated at 47,500 kva and 90% power factor. The plant is connected to the system through a 3-phase 13.1 -115 1w 155,000 kva transformer.

Operating data (Lay power pool raised to elev. 396)

Gross static head - feet	69
Minimum head (full-gate discharge – 32,700 cfs) - feet	56

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1 - INTRODUCTION

1-01. Authorization for Manual. Public Law 436-83 provides for the private development of the Coosa River, Alabama and Georgia, and directs the Secretary of the Army to prescribe rules and regulations for project operation in the interest of flood control (now termed flood risk management) and navigation. Therefore, this water control manual has been prepared as directed in the Corps' Water Management Regulations, specifically Engineering Regulation (ER) 1110-2-240, Water Control Management (date enacted 30 May 2016). That regulation prescribes the policies and procedures to be followed in carrying out water management activities, including establishment and updating of water control plans for Corps and non-Corps projects, as required by Federal laws and directives. This manual is also prepared in accordance with pertinent sections of the Corps' Engineering Manual (EM) 1110-2-3600, Management of Water Control Systems (date enacted 10 October 2017); under the format and recommendations described in ER 1110-2-8156, Preparation of Water Control Manuals (date enacted 30 September 2018); and ER 1110-2-1941, Drought Contingency Plans (date enacted 02 February 2018). Revisions to this manual are to be processed in accordance with ER 1110-2-240.

1-02. Purpose and Scope. Logan Martin is a multiple—purpose project which constitutes one unit in the proposed total development of the power potential and other water resources of the Coosa River below Rome, Georgia. It was built by the Alabama Power Company principally for the production of hydro-electric power and to provide flood risk management benefits as required by Public Law 436-83. It was designed and constructed for the future installation of locks and appurtenances to facilitate development of the river for navigation when such development becomes economically feasible. The reservoir is a source of water supply for domestic, agricultural, municipal and industrial uses. The lake creates a large recreational area providing opportunities for fishing, boating and other water sports.

1-03. Related Manuals and Reports. Other manuals related to the Logan Martin Project water control regulation activities include the Operation and Maintenance manual for the project, and the ACT Master Water Control Manual for the entire basin.

One master water control manual and nine individual project manuals, which are incorporated as appendices, compose the complete set of water control manuals for the ACT Basin:

Appendix A - Allatoona Dam and Lake

Appendix B - Weiss Dam and Lake (Alabama Power Company)

Appendix C - Logan Martin Dam and Lake (Alabama Power Company)

Appendix D - H. Neely Henry Dam and Lake (Alabama Power Company)

Appendix E - Millers Ferry Lock and Dam and William "Bill" Dannelly Lake

Appendix F - Claiborne Lock and Dam and Lake

Appendix G - Robert F. Henry Lock and Dam and R. E. "Bob" Woodruff Lake

Appendix H - Carters Dam and Lake and Carters Reregulation Dam

Appendix I - Harris Dam and Lake (Alabama Power Company)

Other pertinent information regarding the ACT River Basin development is in operation and maintenance manuals and emergency action plans for each project. Historical, definite project reports and design memoranda also have useful information.

1-04. Project Owner. The Logan Martin project was built and is owned by the Alabama Power company, under provisions of licensing through the Federal Energy Regulatory (FERC).

1-05. Operating Agency. The Logan Martin Dam and Lake project is operated for flood risk management and navigation support in accordance with regulations prescribed by the Secretary of the Army which are published in the Code of Federal Regulations, Title 33, Chapter II, Part 208, Section 208.65. Day-to-day operation of the facility is assigned to the APC's Alabama Control Center Hydro Desk in Birmingham, Alabama, which is part of the Transmission Department under the direction of the Reservoir Operations Coordinator. Long-range water planning and flood risk management operation is assigned to the APC Reservoir Management in Birmingham, Alabama, which is part of Southern Company Hydro Services, under the direction of the Reservoir Management Supervisor. Operation of the project is in accordance with the FERC license and this water control manual.

1-06. Regulating Agency. Regulating authority is shared between the Corps of Engineers, the Federal Energy Regulatory Commission and the Alabama Power Company. A Memorandum of Understanding (MOU) has been adopted by the APC and the Corps concerning the operation of the project. The purpose of the MOU was to clarify the responsibilities of the Corps and the APC with regard to the operation of the project for flood risk management and other purposes and to provide direction for the orderly exchange of hydrologic data. Those modifications agreed upon by both parties are contained in the regulation plan as presented in this manual. The MOU and this manual will be used to provide direction to implement the prescribed flood risk management operations at the project. A copy of the MOU is included in this manual as Exhibit C.

1-07. 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 (herein referred to as USACE or 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 1110-2-8160 and in accordance with the standards and procedures as outlined in Engineering Manual 1110-2-6056.

2 - DESCRIPTION OF PROJECT

2-01. Location. The Logan Martin Dam is located on the Coosa River at mile 98.5, about 13 miles upstream from the City of Childersburg, Alabama. The reservoir, extending upstream 48.5 miles to the H. Neely Henry Dam, is located in Talladega, St. Clair and Calhoun Counties. The powerhouse is located on the west side, or right bank, of the river. The area of the watershed above the project is 7,770 square miles. The location of the dam is shown on Plates 2-1 and 2-2 and on the profile of the Coosa River on Plate 2-3. The dam is also shown in Figure 2-1.

Figure 2-1 Logan Martin Dam

2-02. Purpose. Logan Martin is a multiple-purpose project which constitutes one unit in the proposed total development of the power potential and other water resources of the Coosa River below Rome, Georgia. It was built by the Alabama Power Company principally for the production of hydro-electric power and to provide flood risk management benefits as required by Public Law 436. It was designed and constructed with a provision for the future installation of locks and appurtenances to facilitate development of the river for navigation when such development becomes economically feasible. The reservoir is a source of water supply for domestic, agricultural, municipal and industrial uses. The lake creates a large recreational area providing opportunities for fishing, boating and other water sports.

2-03. Physical Components. The Logan Martin development consists of a dam having a concrete gated spillway section with compacted earth abutment dikes; a reservoir with full summer level power pool at elevation 465 feet NGVD29, having a surface area of approximately 15,300 acres, extending 48.5 miles upstream to H. Neely Henry Dam; a 128,250-kilowatt power plant which is part of the main dam, located on the west side of the river between the spillway and the right-bank earth abutment; a substation; and appurtenant electrical and mechanical facilities. The principal features of the project are described in detail in subsequent paragraphs. Sections and plan of the dam, powerhouse and appurtenant works are shown on Plate 2-4.

a. Dam. The main dam crossing the Coosa River valley consists of a concrete spillway section about 330 feet long situated in the main river channel with earth-fill non-overflow sections on either side of the spillway. The earth-fill sections have a maximum height of about 97 feet and a top elevation of 487.0 feet msl. The left bank section is about 4,567 feet long at an elevation of 487.0 feet msl. The right bank section is about 1,020 feet long and joins a concrete non-overflow section, 80 feet long, which ties in to the powerhouse.

b. Spillway. The spillway section of the dam with a total length of 330 feet has a net length of 257.5 feet. It consists of the principal spillway with 6 radial gates, 38 feet high by 40 feet wide, and overflow crest at elevation and a trash bay with 1 fixed-wheel gate, 21 feet high by 17.5 feet wide, with overflow crest at elevation. The piers between the spillway gate support a roadway bridge across the top of the dam at elevation 487. The top of the 6 radial gates in closed position is elevation 470. The top of the trash bay gate in closed position is elevation 473. The radial gates are operated by individual hoists. A discharge rating table showing six-gate discharge for various increments of gate opening is shown on Plate 2-5. The spillway has a discharge capacity of 274,500 cfs at elevation 473.5, the upper limit of induced surcharge storage. The discharge capacity of the trash bay is shown in tabular form on Plate 2-6. Spillway rating curves, with and without the trash bay discharge, are included on Plate 2-7. Figure 2-2 shows a view of the dam, spillway and tailrace looking downstream.

Figure 2-2 Logan Martin Dam, Spillway and Tailrace looking downstream

c. Earth Dike. Earth-fill non-overflow dikes extend from the powerhouse and spillway to high ground on both banks. These dikes have a maximum height of about 97 feet and a top elevation of 487 feet NGVD29 with upstream riprap parapet extending to elevation 489 feet NGVD29. The left or east bank section is 4,567 feet long and ties in to the spillway section; the right or west bank section is 1,020 feet long and joins a concrete non-overflow section, 80 feet long, which ties in to the powerhouse. Both sections are 36 feet wide at the top and are traversed by a paved roadway which continues across the powerhouse and spillway sections and serves as an access road to the powerhouse.

d. Reservoir. The total storage capacity of the reservoir at elevation 473.5, the upper limit of the induced surcharge storage, is 433,572 acre-feet. The total reservoir area at this level is 22,680 acres. The storage capacity of the reservoir at full summer-level power pool, elevation 465, is 273,467 acre-feet; and, at winter-level top-of-power-pool, elevation 462, the capacity is 230,893 acre-feet. Water surface areas at full summer-level power pool and winter-level top-of power-pool are 15,269 acres and 13,157 acres, respectively. The reservoir is shown on Plate 2-1. Area and capacity curves and data are shown on Plate 2-8.

e. Powerhouse. The powerhouse is situated on the west or right bank of the Coosa River and with its intake section forms part of the dam. It is joined on the east by the trash-bay section of the spillway and on the west by a short, non-overflow, concrete section. It is equipped with 3 vertical-type 47,500-kva generators each operated by a vertical, propeller-type, hydraulic turbine rated at 59,000 horsepower for a net head of 56.0 feet. The tailwater discharge rating is shown on Plate 2-9 and Performance curves for the turbines are shown on Plate 2-10. Immediately upstream from the powerhouse, running from the trashbay to the west bank, a sheet piling skimming weir has been constructed with top elevation at 445 feet NGVD29. The purpose of this weir is to ensure that water entering the turbine intakes is drawn from the upper levels of the reservoir where the dissolved oxygen content should be higher during periods of stratification.

2-04. Related Control Facilities. The power plant at Logan Martin Dam is operated by remote control from the Alabama Control Center located in Birmingham, Alabama. Personnel are available but not always on duty at the plant. Direct communication between these two points is provided by APC's SoLinc network telephone and email. Logan Martin's operation is closely coordinated with the operation of the other developments in the Coosa Basin, including the Allatoona, Carters, Weiss and H. Neely Henry projects upstream and the Lay, Mitchell, Jordan, and Bouldin projects downstream.

2-05. Real Estate Acquisition. Part of APC's operational requirements on their reservoir projects include purchasing flowage easements to ensure that they have all necessary rights in case land areas are inundated during high flow events or surcharge operations.

2-06. Public Facilities. In July of 2005, Alabama Power Company (APC) submitted to the Federal Energy Regulatory Commission (FERC) a recreational use plan (Plan) for the Coosa River Project (FERC Project Number 2146). This Plan was submitted as part of the Application for a New Project License. The Logan Martin Reservoir is one of the seven developments within the Coosa River Project. Within the relicensing process (leading up to the filing of the Application), APC, in conjunction with resource agencies and other stakeholders, evaluated numerous sites on the reservoir to determine the need for additional recreational access. This evaluation included boat access, parking, bank fishing, and other reservoir related recreational facilities. Many recreational opportunities are inherent in an impoundment of this nature, and attention has been given to recreational demand, as well as the many other demands placed on this public resource. The FERC requires its Project licensees to provide the public reasonable access, to project lands and waters for recreational purposes.

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3 - GENERAL HISTORY OF PROJECT

3-01. Authorization for Project. Because of abundant stream flow and numerous excellent power sites, the Alabama- Coosa River system has long been recognized as having vast hydro-electric power potentialities. In this connection the system has been studied by both private interests and the Federal Government. During 1925 the Alabama Power Company made a study of the storage possibilities of the Coosa River above their existing Lay Dam with a view to the development of 5 additional power dams. In 1928, the Alabama Power Company prepared a report on complete canalization of the Coosa River. That report included a study of a site, Radcliff Island, which was only 3 miles below the site of Logan Martin Dam.

3-02. Planning and Design. In 1934, the Corps of Engineers, under the provisions of House Document No. 308, 69th Congress, first session, developed a general plan for the over-all development of the Alabama-Coosa River system. That plan, which was submitted to Congress and published as House Document No. 66, 74th Congress, first session, included a low navigation dam on the Coosa River at Howell Mill Shoals, located 4 miles upstream from the site of Logan Martin Dam. This was apparently the earliest record of Federal interest in a navigation dam near the site of the present Logan Martin project.

Further studies were directed by Congress in resolutions adopted by the Committee on Rivers and Harbors, House of Representatives, on 1 April 1936 and 28 April 1936, and by the Committee on Commerce, United States Senate, on 18 January 1939. In response to those resolutions, an interim report was submitted to Congress in October 1941. That report, published as House Document No. 414, 77th Congress, first session, recommended development of the Alabama-Coosa River and tributaries for navigation, flood risk management, power generation and other purposes in accordance with plans being proposed by the Chief of Engineers. The improvement outlined in House Document No. 414 included a dam with a powerhouse at the Howell Mill Shoals site. Also in this report an investigation was made of a site, Bell Island, which was not included in the ultimate plan of improvement; but, it is the site finally selected for Logan Martin Dam. Development of the Alabama-Coosa River System as recommended in House Document No. 414 was authorized by Congress in Section 2 of the River and Harbor Act of March 1945, Public Law 14, 79th Congress, first session.

On 28 June 1954, the 83rd Congress, second session, enacted Public Law 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 the provision of 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. The complete text of Public Law 436 is contained in Exhibit D.

On 2 December 1955, the Alabama Power Company submitted an application to the Federal Power Commission for a license for development of the Coosa River in accordance with the provisions of Public Law 436. The development proposed by the Alabama Power Company, designated in the application as FPC Project No. 2146, included a dam named Kelly Creek, was later changed to Logan Martin and the site moved approximately 1.3 miles upstream. FPC Project No. 2146 also included plans for a dam at the site of old Lock 3. This dam which has now been completed is 48.5 miles upstream from Logan Martin Dam and is named H. Neely

Henry Dam. Logan Martin and H. Neely Henry Dams form reservoirs which extend up to Weiss Dam so that the series of 3 dams is essentially the same as the Corps of Engineers' earlier plans for dams at Howell Mill Shoals, Patlay and Leesburg sites. The ultimate Corps of Engineers' plan eliminated the Patlay Dam and substituted a higher dam at Howell Mill Shoals.

The Federal Power Commission issued a license to the Alabama Power Company on 4 September 1957, for the construction, operation and maintenance of Project No. 2l4. The license directed that construction of the Logan Martin (Kelly Creek) development commence within 3 years from 4 September 1957, and be completed within 7 years from that date. Portions of the license pertinent to flood risk management, navigation, water use and reservoir regulation are contained in Exhibit E.

3-03. Construction. Construction was started in July 1960 and the dam and spillway were completed in July 1964. Filling of the reservoir was commenced in early July 1964 reaching an operating level of 460 on 22 July 1964. All 3 generating units were placed in commercial operation on 10 August 1964.

3-04. Related Projects. The Logan Martin Dam and Lake is one of 11 privately owned dams are located in Alabama on the Coosa and Tallapoosa Rivers and operate mainly for the production of hydropower. USACE has flood risk management authority over 4 of these 11 privately owned dams; Weiss, H. Neely Henry, and Logan Martin Dams on the Coosa River, and Harris Dam on the Tallapoosa River. USACE operates five reservoir projects in the basin: Allatoona Lake and Dam on the Etowah River; Carters Dam and Lake (with Reregulation Dam) on the Coosawattee River; and Robert F. Henry, Millers Ferry and Claiborne Lock and Dam Projects are located on the Alabama River downstream. The Corps reservoirs are operated as a system to accomplish the authorized purposes of the projects. The sites are shown on Plate 2-1.

3-05. Dam Safety History/Issues. Dam safety oversight of the APC projects is covered under the Federal Energy Regulatory Commission (FERC) license.

3-06. Principal Regulation Issues. There have been no significant regulation problems, such as erosion, boils, severe leakage, etc., at the Logan Martin project.

3-07. Modification to Regulations. Prior to the update of Water Control Manuals (WCMs) in 2015, APC proposed to increase the project guide curve level during the winter months (December–February) at Logan Martin Dam and Lake from elevation 460 ft to elevation 462 ft and to reduce the maximum surcharge elevation (top of flood pool) from elevation 477 ft to elevation 473.5 ft. The request was to bring the maximum surcharge elevation, which was to 3.5 ft higher than the APC flowage easement elevation of 473.5 ft for Logan Martin Lake, in line with the flowage easement elevation. USACE did not include updates to the WCMs for the APC Weiss and Logan Martin reservoir projects in the 2015 ACT River Basin Master Manual update effort because changes to flood operations proposed by APC required further detailed study of flood risk at both projects.

In addition to the action mentioned above, USACE also deferred consideration of a pending request from the State of Georgia to reallocate multipurpose reservoir storage in Allatoona Lake to water supply to meet future demands in the region, which involved USACE modifying its reservoir storage accounting procedures. As a result of U.S. District Court ruling on the Allatoona issue in 2018 that directed the Corps to evaluate Georgia's request, the Corps commenced preparing a Feasibility Report and Integrated Supplemental Environmental Impact Statement (FR/SEIS) to address those two deferred actions and its impacts. The action to change the surcharge level and raise the winter guide curve were fully evaluated. The FR/EIS was approved and published in March 2021. A Record of Decision (ROD) for the action was signed in March 2021.

The changes at Logan Martin resulted in a 35-percent reduction in flood storage during the winter months and a 35 percent reduction in flood storage in the summer months. The maximum surcharge elevation is now the same elevation as the APC flowage easement elevation of 473.5 ft for Logan Martin Lake. In conjunction with these elevation changes, APC modified the Flood Regulation Schedule for Logan Martin Dam in order to operate with no appreciable increase in flood risk. The modified schedule is discussed in detail in the Sections 7-04 and 7.05.

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4 - WATERSHED CHARACTERISTICS

4-01. General Characteristics.

a. ACT River Basin. 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 22,739 square miles: 17,254 square miles in Alabama; 5,385 square miles in Georgia; and 100 square miles in Tennessee.

The head of the Coosa River is at Rome, Georgia at the confluence of the Etowah and Oostanaula Rivers. It flows east to the Alabama state line, then in a southwesterly then southerly direction for about 286 miles to join the Tallapoosa River near Wetumpka to form the Alabama River. The Alabama River flows in a southwesterly direction about 310 miles where it joins the Tombigbee River to form the Mobile River. The Mobile River flows southerly about 45 miles where it empties into Mobile Bay at Mobile, Alabama, an estuary of the Gulf of Mexico.

The Coosa basin drains a total of 14836 square miles of which 4362 square miles are in Georgia and 10474 square miles are in Alabama. The main river width varies from about 250 to over 1000 feet with banks generally about 20 feet above the river bed. The total fall of the river is 450 feet in 286 miles, giving an average fall of about 1.6 feet per mile. The basin above Logan Martin drains 7704 square miles and has a fall of approximately 1.0 ft per mile. The entire ACT Basin with the Coosa River Basin highlighted, and some of the other ACT projects are shown on Plate 2-1. The river mile and size of the drainage area above selected sites in the ACT Basin are shown on Table 4-1.

b. Coosa Basin. The Coosa Basin drains a total of 10,156 square miles of which 2,986 square miles are in Georgia and 7,170 square miles are in Alabama. The main river width varies from about 250 to over 1,000 feet with banks generally about 20 feet above the river bed. The total fall of the river is 450 feet in 286 miles, giving an average fall of about 1.6 feet per mile.

c. Coosa Basin above Logan Martin Dam. The basin above Logan Martin drains approximately 7,743 square miles. The Coosa River area extends 49 miles upstream to H. Neely Henry Dam, and contains 1,147 square miles of drainage area between the two dams. The 4,160 square miles of drainage area above Weiss Dam not controlled by Allatoona Dam are divided as follows: remainder in Etowah basin, 750 square miles; Oostanaula basin, 2,150 square miles; and Coosa River basin below Rome, 1,260 square miles. The Etowah River has a drainage area of 1,861 square miles of which 1,122 square miles is above the Allatoona Dam and Lake Allatoona Project, located 48 miles upstream from Rome, Georgia. The Oostanaula River total drainage area is 2,150 square miles. The Carters Dam and Lake Project on the Coosawattee River, a main tributary of the Oostanaula River, has a drainage area of 374 square miles.

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

River Mile and Drainage Area for Important Sites in the ACT Basin				
River Mile above mouth of ACT system	River	Location	Drainage Area (sq mi)	Owner
693	Etowah	Allatoona Dam	1,122	CORPS
645.2	Etowah	Mouth	1,861	
672	Coosawattee	Carters Dam	374	CORPS
645.2	Oostanaula	Mouth	2,150	
638.1	Coosa	Mayos Bar	4,040	
585.1	Coosa	Weiss Dam	5,270	APC
506.2	Coosa	H Neely Henry Dam	6,596	APC
457.4	Coosa	Logan Martin Dam	7,743	APC
410.2	Coosa	Lay Dam	9,053	APC
396.2	Coosa	Mitchell Dam	9,778	APC
378.3	Coosa	Jordan Dam	10,102	APC
497.4	Tallapoosa	R. L. Harris Dam	1,454	APC
420	Tallapoosa	Martin Dam	2,984	APC
412.1	Tallapoosa	Yates Dam	3,293	APC
409.1	Tallapoosa	Thurlow Dam	3,308	APC
281.2	Alabama	Robert F Henry Dam*	16,233	CORPS
178	Alabama	Millers Ferry Dam*	20,637	CORPS
117.5	Alabama	Claiborne Dam*	21,473	CORPS

* Navigation Lock at Project
CORPS - Corps of Engineers; APC - Alabama Power Company

4-02. Topography. The Logan Martin Project is located in the Valley and Ridge physiographic province of the southern Appalachian Mountains (see Figure 4-1). The Valley and Ridge ecoregion has a high relief, with altitudes ranging from 400 feet in valleys to 1,600 feet at ridge tops. The bedrock geology of this area is comprised dominantly of Paleozoic era sedimentary formations (primarily shales, with some other sedimentary rock such as sandstones) that have been extensively folded, faulted and thrusted. The geology results in ridges that are typically northeast-southwest oriented, and the stream patterns that are typically trellis-like or rectangular and their movement is controlled by the ridge features and weathering of the rocks. The Coosa River occupies a broad, flat, shale valley above the H. Neely Henry Dam. The bedrock consists dominantly of shale inter-bedded with localized layers of limestone and dolomite. The shale, which is of Mississippian age, is soft and tends to weather relatively rapidly where exposed. Portions of the region, particularly in the lowlands adjacent to the Coosa River, have floodplain alluvium and residuum (unconsolidated weathered material that accumulates over disintegrating rock) over the bedrock. Limestone deposits are mined in the region.

4-03. Geology and Soils. Valley and Ridge soils are typically shallow and well drained, and water moves rapidly toward streams during precipitation events. The Logan Martin Project area soils are dominantly Ultisols. This soil order, which covers the majority of the State of Alabama, has developed in forested, humid/high rainfall, subtropical conditions on old landscapes (e.g., not glaciated or recently flooded). These soils are characterized by a surface soil that is often acidic and low in plant nutrients. The surface has a low base status (a measure of fertility) due to high rainfall weathering that has occurred over long time periods and parent materials low in base forming minerals. Although Ultisols are not as fertile as many other soil orders they do support abundant forest growth and respond well to management for agriculture.

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

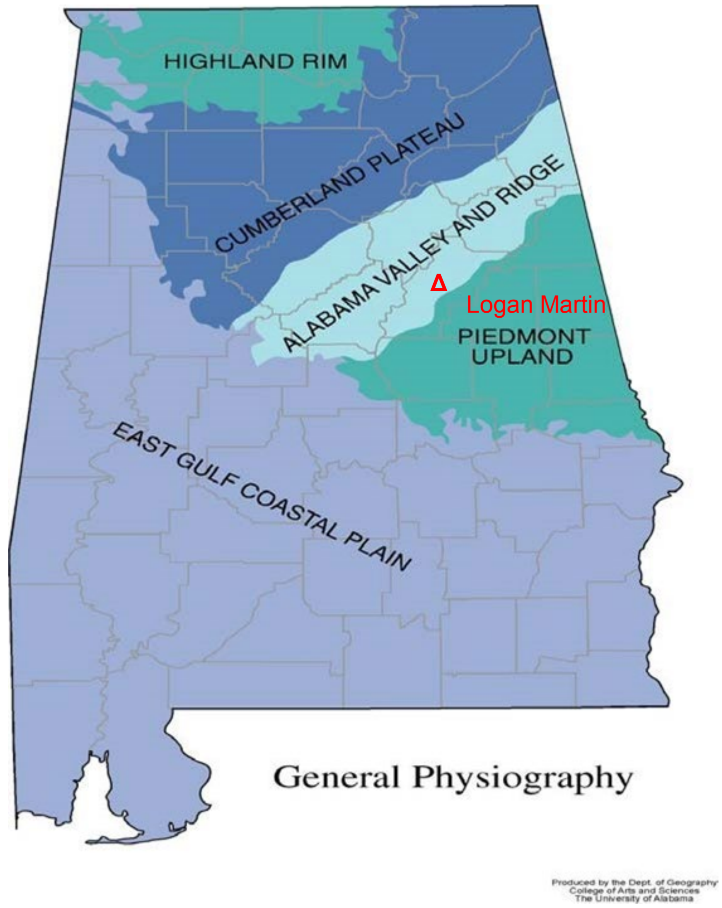

Figure 4-1 Topographic Regions in Alabama

Siltation studies by APC have been limited to evaluating the recreational impact of siltation at the mouths of tributaries. Studies indicate that shoaling over the years is reduced because of increased vegetation in the basin.

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

a. Temperature. The average annual temperature in the vicinity of Logan Martin Reservoir is about 61°F. Table 4-2 provides average, maximum, and minimum monthly normal temperature data for six locations in or around the project. Climatologists define a climatic normal as the arithmetic average of a climate element, such as temperature, over a prescribed 30-year time interval. The National Climatic Data Center (NCDC) uses a homogenous and complete dataset with no changes to the collection site or missing values to determine the 30-year normal values. When developing this 30-year normal dataset, the NCDC has standard methods available to them to make adjustments to the dataset for any inhomogeneities or missing data before computing normal values. Extreme temperatures recorded in the mid-ACT Basin range from

108º to - 18º F. An interactive map showing the location of these stations and others is shown at: http://www.sercc.com/climateinfo/historical/historical.html.

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

NORMAL MONTHLY TEMPERATURE (ºF) FOR MIDDLE ACT BASIN (MAX & MIN), 1981-2010														
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
ALEXANDER CITY, AL	MAX	55.2	59.3	67.6	74.8	81.7	87.7	90.7	89.9	84.8	76.0	66.8	57.3	74.4
USC00010160	MIN	31.6	34.6	41.2	47.9	57.4	65.6	69.5	68.4	62.0	50.0	41.1	33.9	50.3
	AVE	43.4	47.0	54.4	61.3	69.6	76.7	80.1	79.2	73.4	63.0	54.0	45.6	62.4
GADSDEN, AL	MAX	51.8	56.4	65.6	74.1	81.3	87.6	90.8	90.4	84.5	74.8	64.5	54.5	73.1
USC00013154	MIN	30.8	34.4	41.1	48.9	58.2	66.6	70.6	69.7	63.0	51.1	40.5	33.6	50.8
	AVE	41.3	45.4	53.4	61.5	69.8	77.1	80.7	80.0	73.8	62.9	52.5	44.0	61.9
ROCK MILLS, AL	MAX	54.3	58.7	67.8	75.4	82.2	87.8	90.0	89.0	83.9	75.1	65.2	56.3	73.9
USC00017025	MIN	30.8	34.8	41.1	46.9	55.3	63.6	67.1	66.1	59.4	47.6	39.2	33.7	48.9
	AVE	42.5	46.7	54.4	61.2	68.7	75.7	78.6	77.6	71.6	61.4	52.2	45.0	61.4
LAFAYETTE 2W, AL	MAX	55.5	59.9	67.9	75.4	82.2	87.9	90.7	89.6	84.7	75.6	66.4	57.1	74.5
USC00014502	MIN	29.5	33.1	39.2	45.9	55.1	63.2	66.9	66.6	59.7	48.4	39.0	31.6	48.3
	AVE	42.5	46.5	53.6	60.6	68.6	75.6	78.8	78.1	72.2	62.0	52.7	44.4	61.4
HEFLIN, AL	MAX	52.4	56.6	65.3	72.9	79.5	85.9	88.8	88.4	83.1	74.0	64.2	54.5	72.2
USC00013775	MIN	29.5	32.6	39.1	45.7	55.4	63.4	67.4	66.7	59.8	47.7	38.8	31.7	48.2
	AVE	40.9	44.6	52.2	59.3	67.4	74.7	78.1	77.6	71.4	60.9	51.5	43.1	60.2
TALLADEGA, AL	MAX	53.7	58.3	66.7	74.8	81.7	88.0	90.8	90.4	85.1	75.6	65.7	56.0	74.0
USC00018024	MIN	29.7	33.0	38.8	46.2	55.3	63.3	67.9	66.9	60.2	47.8	39.3	32.3	48.5
	AVE	41.7	45.6	52.7	60.5	68.5	75.6	79.3	78.6	72.7	61.7	52.5	44.1	61.2
BASIN AVG	MAX	53.8	58.2	66.8	74.6	81.4	87.5	90.3	89.6	84.4	75.2	65.5	56.0	73.7
BASIN AVG	MIN	30.3	33.8	40.1	46.9	56.1	64.3	68.2	67.4	60.7	48.8	39.7	32.8	49.2
BASIN AVG	AVE	42.1	46.0	53.5	60.7	68.8	75.9	79.3	78.5	72.5	62.0	52.6	44.4	61.4

Table 4-3 shows the extreme temperatures for four stations within the middle ACT Basin. The maximum and minimum recorded temperatures for each month are shown. These stations are Gadsden, Childersburg, and Valley Head in Alabama, and Calhoun Experiment Station in Georgia. All the middle Coosa Basin temperature stations are shown on Plate 4-1.

Table 4-3 Extreme Temperatures within the ACT

Extreme Temperatures (ºF) Within Middle ACT Basin								
Month	**Station:(013151) GADSDEN**		**Station:(011620) CHILDERSBURG WATER PLAN**		**Station:(018469) VALLEY HEAD**		**Station:(091474) CALHOUN EXPERIMENT STN**	
	High	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**
Period	**1893 To 1968**		**1957 To 2009**		**1893 To 2009**		**1953 To 1997**	
January	80	-4	81	-4	79	-15	76	-10
February	91	-13	85	4	80	-18	80	-7
March	93	6	89	7	90	2	86	4
April	94	24	93	23	92	19	91	22

Extreme Temperatures (ºF) Within Middle ACT Basin								
Month	**Station:(013151) GADSDEN**		**Station:(011620) CHILDERSBURG WATER PLAN**		**Station:(018469) VALLEY HEAD**		**Station:(091474) CALHOUN EXPERIMENT STN**	
	High	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**
Period	**1893 To 1968**		**1957 To 2009**		**1893 To 2009**		**1953 To 1997**	
May	101	34	97	33	100	29	97	33
June	108	44	102	41	104	35	103	40
July	108	50	105	51	106	45	105	50
August	106	49	104	49	105	45	104	47
September	108	34	100	34	104	29	102	32
October	99	25	93	22	98	19	95	20
November	87	4	88	14	90	-2	85	12
December	82	5	83	2	85	-8	77	-2

b. Precipitation. The normal monthly and annual precipitation over the basin above Logan Martin Dam is shown on Table 4-4. This is based on the arithmetical mean of the normals at six stations. These stations are the same as the temperature stations and are shown on Plate 4-1. About 41 percent of the normal annual precipitation occurs from December through March, while only about 18 percent occurs during the dry period September through November. The average annual snowfall is 3 to 4 inches (unmelted), with the greatest amount occurring in January and February. Snowfall is a relatively unimportant factor in producing floods.

The Coosa River basin lies in a region which is subject to intense local storms, as well as general storms of heavy rainfall extending over several days. The latter, which may occur at any time during the year but are more numerous and severe between the late fall and early spring, have been responsible for the major floods in the basin.

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
ALEXANDER CITY, AL USC00010160	5.21	5.35	5.49	4.11	4.33	4.45	5.31	4.50	4.10	3.08	4.79	4.90	55.62
GADSDEN, AL USC00013154	5.27	4.99	5.15	4.64	4.64	4.37	4.72	3.88	3.96	3.65	4.96	4.36	54.59
ROCK MILLS, AL USC00017025	4.02	5.04	5.15	4.03	3.46	5.46	5.65	3.85	3.79	2.86	4.51	5.14	52.96
LAFAYETTE, AL USC00014502	5.02	5.07	5.72	4.55	4.27	4.18	5.12	4.20	3.71	3.28	4.58	4.85	54.55
HEFLIN, AL USC00013775	5.09	5.76	5.32	4.42	4.95	4.31	5.50	3.55	3.27	3.45	4.71	4.72	55.05
TALLEDEGA, AL USC00018024	5.16	5.77	6.43	4.33	4.71	4.70	4.87	3.86	3.51	3.63	5.03	4.55	55.55
BASIN AVG	5.19	5.15	6.10	4.90	4.18	4.16	5.28	3.95	3.63	2.84	4.07	4.93	54.72

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

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

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

4-06. Storms and Floods. Flood producing storms may occur over the Coosa basin at any time but are more frequent during the winter and spring. Major storms in the winter are usually of the frontal type, which persist for several days and cover large areas. Summer storms are usually tropical in origin and are normally short and intense, and usually cover small areas.

Gage records at USGS gage 02407000 at Childersburg, AL, 13 miles downstream of the dam, are available from October 1913 through September 1978. This gage is jointly operated with the Alabama Power Company. Discharge records from January 1965 through June 2019 at Logan Martin Dam are shown on Plates 4-2 and 4-3.

From the discharge records from January 1965 through December 2009 at Logan Martin Dam, the highest discharges were in April 1977 (93,350 cfs), April 1979 (114,130 cfs), which was the highest post-construction flood, and February 1990 (94,820 cfs). The tailwater rating curve for Logan Martin Dam is shown on Plate 2-9. Frequency data is presented in Chapter 8. The average flow for the period Jan 1965 – Dec 2009 is 11,881. The maximum daily discharge was 114,130 in April 1979. The minimum daily discharge is 0 cfs. The maximum annual discharge for the 1979 water year is 18,078 cfs. The minimum annual discharge was 3,446 in water year 2007.

From average daily flow records for the Childersburg gage for the period Oct 1913 to Sep 1978, the largest storms at Childersburg, prior to dam construction were the floods of November 1938 (139,000 cfs), April 1951 (143,000 cfs) and February 1961 (136,000 cfs). The largest post-construction discharges recorded at Childersburg was the April 1979 flood (150,000 cfs). The average flow for the period is 13,857 cfs. The minimum daily discharge is 378 cfs. The maximum annual discharge for the 1949 water year is 20,100 cfs. The minimum annual discharge was 7,255 in water year 1941.

4-07. Runoff Characteristics. In the ACT Basin, rainfall occurs throughout the year but is less abundant from August through November. Only a portion of rainfall actually runs into local streams to form the major rivers. Factors that determine the percent of rainfall that runs into the streams include the intensity of the rain, antecedent conditions, ground cover and time of year (plants growing or dormant). Intense storms will have high runoff potential regardless of other conditions while a slow rain can produce little measurable runoff. The rating curve for the Coosa River at Rome, Georgia is shown on Plate 4-4. Rating curves for the Etowah River at Allatoona Dam, at GA 1 Loop near Rome, Georgia, and at Kingston, Georgia, are shown on Plates 4-5 thru 4-7 respectively. The Oostanaula River at US 27, at Rome, Georgia gage provides the relation of stage on the Oostanaula River at US 27 Bridge in Rome, Georgia to the flow at the confluence of the Oostanaula and Etowah Rivers.

4-08. Water Quality. A total maximum daily load (TMDL) was finalized for Logan Martin Lake in 2008. The State of Alabama has not established a lake nutrient standard for Logan Martin Lake. Therefore, for TMDL development a standard of 17 micrograms per liter (µg/L) of chlorophyll a in the upper reservoir and dam forebay was set as the target.

Data collected in a 1984 ADEM study from Logan Martin Lake indicated DO and temperature stratification in the reservoir forebay and incidences of low DO from June to August in the dam's tailrace. Since that study in 1991, APC constructed an aeration weir that added approximately 2 mg/l of DO. The weir was intended to provide supplemental DO during the summer and fall to water entering the tailrace. Several studies conducted in the Basin indicate that the source of historic pollutants in the reservoir is upstream industrial activities. Profile data collected by the APC during the 1990s in the Logan Martin Lake forebay support historical water quality data. Data collected by ADEM since 2000 is also consistent with historical water quality data where pollutant concentrations in Logan Martin Lake.

The data collected by APC observed stratification in the lower depths of Logan Martin Lake that affects DO downstream. Downstream of Logan Martin Lake, in the tailrace, DO concentrations have been measured below the State standard of 4.0 mg/l in summer months. Continuous monitoring from 1995 to 1999 observed an average tailrace DO of 5.9 mg/l with violations of the State standard in less than one percent of data collected.

In 1990, APC began using an oxygenation system in the tailrace of Logan Martin Lake. The speece cone oxygenation system is used during summer months to increase seasonally low DO. DO from this system typically results in a DO increase of 1 to 2 mg/l.

Finally, in the 2008 TMDL, seven municipal point sources were identified as discharges directly to Logan Martin Lake. Of these point sources two were identified as discharging greater than 1 million gallons per day (Lincoln South Wastewater Treatment Plan AL0054356 and Pell City Dye Creek Wastewater Treatment Plant AL0045993). The ability of Logan Martin Lake to assimilate pollutant loads from these facilities was considered in the TMDL process. Though there are no site-specific criteria for nutrients in Logan Martin Lake, chlorophyll *a* is used as an indicator of algal presence. Therefore, as part of the TMDL process, allocations of nutrients were given to the point sources to achieve the chlorophyll *a* standard set in the TMDL. Pollutant loads from point sources are expected to decrease in the future based on the TMDL reductions.

4-09. Channel and Floodway Characteristics. The flood risk management operation of Logan Martin will provide benefits downstream to Childersburg, Alabama.

4-10. Upstream Structures. The Corps' Allatoona Dam and Lake Allatoona Project and the Carters Dam and Lake and Reregulation Dam are located on the Etowah and Coosawattee Rivers, respectively, in Georgia. APC has the Weiss Dam and H. Neely Henry projects located upstream of Logan Martin. Other dams upstream from Logan Martin include Hickory Log Creek above Allatoona Dam and Richland Creek Dam located on a tributary below Allatoona Dam.

4-11. Downstream Structures. The APC projects downstream of the Logan Martin Dam Project on the Coosa River Project include, Lay, Mitchell, Bouldin and Jordan. Corps projects downstream of the Logan Martin Project include Robert F. Henry, Millers Ferry, and Claiborne Locks and Dams. The Alabama River is navigable to Montgomery, Alabama, near river mile 342.0. Locations of these projects are shown on Plates 2-1 and 2-2. The existing upstream and downstream federal and APC projects and the drainage areas above them are shown on Table 4-1.

4-12. Economic Data.

a. Flood Damages. Childersburg is the largest town between Logan Martin Dam and the downstream Lay Dam. Flooding impacts at Childersburg associated with the USGS gage 02407000, Coosa River at Childersburg, AL are shown in the following Table 4-6.

Table 4-6 Flooding Impacts and Associated Childersburg Gage Elevation

Gage Ht (ft)	Elevation (ft NGVD 29)		Flooding Impacts
29.55	412		Widespread residential flooding occurs...and evacuations are needed.
27.55	410	Major flood	Residential and street flooding becomes widespread. Extensive flooding of farmlands also occurs.
24.55	407	Moderate flood	Flooding of some homes in the area begins
19.55	402	Flood	Flooding of low lying areas begins. At 404 feet flooding of some low lying roads in the area begins...and the yards of some homes near the river become flooded

SOURCE - http://water.weather.gov/ahps2/hydrograph.php?wfo=bmx&gage=chla1&view=1,1,1,1,1

5 - DATA COLLECTION AND COMMUNICATION NETWORKS

5-01. Hydrometeorologic Stations. Management of water resources requires continuous, real-time knowledge of hydrologic conditions. Both the APC and the Corps collect and maintain records of hydrologic data and other information in connection with the operation of projects in the Coosa River Basin. Since the data collected by the APC are needed by the Corps in carrying out its responsibility of monitoring the flood risk management operations of the Weiss Project, and the data collected by the Corps supplements that being collected by the APC and is of value to them in planning their project operations. It is important that each agency furnish the other with such of its hydrologic and operating data as may be needed or found beneficial in its operation. This requires that communications facilities be available between the Mobile District Office of the Corps of Engineers and APC Reservoir Management. The USGS and National Weather Service (NWS), in cooperation with the APC, the Corps, and other federal and state agencies, maintain a network of real-time gaging stations throughout the ACT Basin.

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

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

Figure 5-2 Typical Field Installation of a Precipitation Gage

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

Table 5-1 Rainfall Reporting Network

Basin	Station
Etowah River (Below Allatoona Dam)	Dallas, GA
Oostanaula River	Dalton, GA
	Adairsville, GA
Coosa River (Above Weiss Dam)	LaFayette, GA
	Mt. Alto
	Cedartown, GA
	Menlo, AL
	Gaylesville, AL
	Fort Payne, AL
	Blue Pond, AL
	Weiss Dam, AL
Coosa River Weiss Dam to Gadsden	Collinsville, AL
	Rock Run, AL
	Ellisville, AL
	Colvin Gap, AL
	Gadsden, AL
	Gadsden SP., AL

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

Table 5-2 River Gage Reporting Network

Stream	Station	River Miles Above Mouth	Drainage Area
Etowah River Basin Below Allatoona Dam			
Etowah River	Allatoona	47.00	1110
Etowah River	Cartersville (Nr)	38.22	1330
Etowah River	Cartersville (Nr)(2)	38.22	1330
Etowah River	Kingston (Nr) (4)	21.51	1630
Etowah River	Rome (So RR)	1.80	1810
Etowah River	Rome (2nd Ave)	0.90	1816
Oostanaula River Basin			
Talking Rock Cr	Talking Rock		119
Coosawattee R	Ellijay	1.00	90
Coosawattee P.	Carters	26.60	376
Coosawattee R.	Carters	24.91	531
Coosawattee R.	Pine Chapel	6.60	856
Conasauga R	Eton		252
Conasauga R.	Tilton	12.14	682
Oostanaula R.	Resaca	43.16	1610
Oostanaula R	Calhoun		1624
Oostanaula R.	Rome	4.50	2120
Oostanaula R.	ROME (5th Ave.) (4)	0.35	2150
Oostanaula R.	ROME (5th Ave.)	0.35	2150
Coosa River Basin Above Weiss Powerhouse			
Coosa B.	Mayo’s Bar	278.8	4040
Chattooga R.	Summerville	(3)	193
Chattooga B.	Gaylesville	(3)	368
Little River	Blue Pond	(3)	194
Terrapin Creek	Ellisville	(3)	258
Coosa River Basin Gadsden to Weiss Powerhouse			
Coosa River	Gadsden	174.6	5800
Coosa River	Gadsden SP	174.6	5800

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

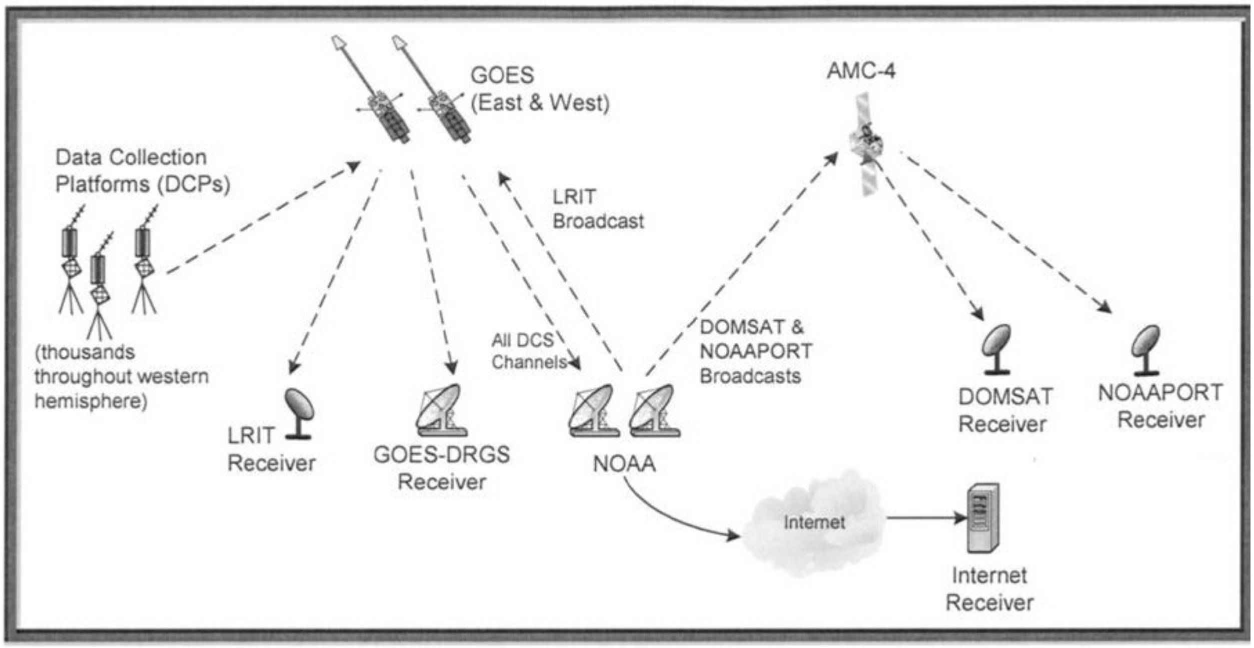

Figure 5-3 Typical configuration of the GOES System

<u>b. Reporting.</u> Central to APC hydro operations, monitoring, and reporting network is the Hydro Optimization Management System (HOMS). HOMS is a complex and dynamic system of data collection, analysis, and management tools, and includes an arrangement of hydrologic and flow monitoring systems and tools as well. HOMS exists for the purpose of real time monitoring, and as a decision tool and support for computer applications related to the operation of Alabama Power's 14 hydroelectric facilities located within the Coosa, Tallapoosa and Black Warrior River Basins.

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

<u>c. Maintenance.</u> Maintenance of data reporting equipment in the Coosa River Basin near Logan Martin Dam is a cooperative effort among the USGS, NWS, Corps, and APC.

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

USGS South Atlantic Water Science Center - Georgia, 1770 Corporate Dr., Suite 500, Norcross, Georgia 30093 Phone: (678) 924-6700 Web: http://ga.water.usgs.gov

USGS Lower Mississippi-Gulf Water Science Center - Alabama, 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, TX 76102
Phone: (817) 978-1100 Web: http://www.srh.noaa.gov/

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

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

5-03. Sediment Stations. APC has made provision for such surveys, if required in the future, by identifying 5 sediment ranges in the Logan Martin Reservoir. These ranges were surveyed on the ground prior to impoundment and are intended to be background data for any subsequent surveys when made.

5-04. Recording Hydrologic Data. At Logan Martin Dam, the plant control system is equipped with one or more programmable logic controllers (PLC). The PLC receives data from various inputs from the dam; then a server located at the Alabama Power's corporate headquarters polls the plant PLC for data. Additional data essential to HOMS is collected through HDAS, a combination of over 100 rain, stage, and evaporation gages located in the river basins where Alabama Power dams and reservoirs are located. The largest majority of these gages are owned and operated by Alabama Power. Where physically practical, Alabama Power pulls data from adjacent USGS rain and stage gages to enhance the viability of the overall HDAS. All data collected in the field is transmitted either via Alabama Power's dedicated network connections, where available, or the SouthernLINC Wireless radio network. Data is stored on servers located at the Alabama Power Company facilities.

Data collected from the various sources are then rendered into web and desktop applications to monitor operations and activities at the Alabama Power hydro facilities. These applications are provided to the Power System Coordinator (PSC) at the Alabama Control Center Hydro Desk (ACC or Hydro Desk) to monitor the operations and activities at hydropower facilities 24 hours per day, seven days per week.

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

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

The Water Management Section maintains a Data Storage System, DSS, containing various hydrologic data from the different projects and river basins within the Mobile District. For the ACT River Basin this database includes data from various river gage locations and rainfall locations as well as data relative to the water control operations at Logan Martin. The data is input into the database either automatically via computer program or manually by entering the data.

5-05. Communication Network. APC communicates with its projects via Southern Linc Wireless radios and dedicated network connections that interfaces with its Alabama Control Center Hydro Desk located in Birmingham, Alabama. Data is stored on servers located at the Alabama Power Company facilities.

5-06. Communication with Project.

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

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

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

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

5-07. Project Reporting Instructions. Communications for exchange of data between the Corps Water Management Section and APC Reservoir Management and ACC Hydro Desk will normally be accomplished by electronic transmission to the Corps' WCDS server. The APC provides the Corps with hourly and daily reservoir data for all of their ACT projects. This includes reservoir pool and tailwater elevations, inflows, discharges and precipitation. APC also provides 7-day discharge forecasts for each project. The hourly data is transmitted and stored in the Corps database once every hour, 24 hours a day. Daily data, including the 7-day forecast for each project, is provided once a day around 0800 hours, and includes both midnight and 0600 hours data for the APC projects.

In addition to automated data, project operators maintain record logs of gate position, water elevation, and other relevant hydrological information including inflow and discharge. This information is stored by the APC and the Corps Water Management Section. Unforeseen or emergency conditions at the project that require unscheduled manipulations of the reservoir should be reported to the Corps Water Management Section as soon as possible.

If the automatic data collection and transfer are not working, operators will, upon request, fax or email daily or hourly project data to the Water Management Section for manual input into the database.

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 will have the lead role for disseminating the information. For emergencies involving the Weiss Project, the APC Reservoir Management and ACC Hydro Desk will begin notifications of local law enforcement, government officials, and emergency management agencies in accordance with APC's Emergency Action Plan for Logan Martin Dam.

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6 - HYDROLOGIC FORECASTS

6-01. General.

a. Role of USACE. The Water Management Section maintains real-time observation of river and weather conditions in the Mobile District. The Water Management Section has capabilities to make forecasts for several areas in the ACT Basin. Those areas include all the Federal projects and other locations. Observation of real-time stream conditions provides guidance of the accuracy of the forecasts. The Corps maintains contact with the River Forecast Center to receive forecast and other data as needed. Daily operation of the ACT River Basin during normal, flood risk management, and drought conservation regulation requires accurate, continual short-range and long-range elevation, streamflow, and river-stage forecasting. These short-range inflow forecasts are used as input in computer model simulations so that project release determinations can be optimized to achieve the regulation objectives stated in this manual. The Water Management Section continuously monitors the weather conditions occurring throughout the basin and the weather and hydrologic forecasts issued by the NWS. The Water Management Section then develops forecasts that are to meet the regulation objectives of regulating the ACT projects. The Water Management Section prepares five-week inflow and lake elevation forecasts weekly based on estimates of rainfall and historical observed data in the basin. These projections assist in maintaining system balance and providing project staff and the public lake level 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 preparing and publicly disseminating forecasts relating to precipitation, temperatures, and other meteorological elements related to 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 Birmingham, Alabama and Peachtree City, Georgia offices of 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 proactive management of basin release determinations. Using precipitation forecasts and subsequent runoff directly relates to project release decisions.

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 Southeast River Forecast Center (SERFC) co-located in Peachtree City, Georgia with the Peachtree City Weather Forecast Office. SERFC is responsible for the supervision and coordination of streamflow and river-stage forecasting services provided by the NWS Weather Service Forecast Office in Peachtree City, Georgia. SERFC routinely prepares and distributes five-day streamflow and river-stage forecasts at key gaging stations along the Alabama, Coosa, and Tallapoosa Rivers. Streamflow forecasts are available at additional forecast points during periods of above normal rainfall. In addition, SERFC provides a revised regional QPF on the basis of local expertise beyond the NWS Hydrologic Prediction Center QPF. SERFC also provides the Water Management Section with flow forecasts for selected locations on request.

c. Role of Alabama Power. The flood regulation schedule that has been adopted is based on current reservoir level and inflows or forecasts of inflow. The APC has developed a computer model of the river system that utilizes rainfall and river gage stations located strategically throughout the basin. The APC is continually evaluating the results, and as experience is gained, improvements will be incorporated into the model.

6-02. Flood Condition Forecasts. During flood conditions, quantifiable flow forecasts are prepared based on rainfall that has already fallen. Operational decisions are made on the basis of actual streamflow and/or stage data. Streamflow and/or stage forecasts resulting from rainfall that has already occurred are considered in the planning process of potential future operations including any variances that may need to be obtained. APC prepares flow and stage forecasts on an as needed basis for internal use and decision support, where applicable. The NWS SERFC produces official forecasts that are made publicly available on their website.

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

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

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

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

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7 - WATER CONTROL PLAN

7-01. General Objectives. The Logan Martin project will normally operate to produce peaking power. During periods of low stream flow the storage within the range of power-pool drawdown between elevations 465.0 and 462.0, amounting to 42,574 acre-feet (0.16 inch), will augment the flow of the river downstream. This storage will also be available seasonally for flood risk management. Above the top-of-power pool and extending to elevation 473.5, there is available for control of floods surcharge storage totaling 160,105 acre-feet (0.58 inches), within which reservoir releases will be scheduled as dictated by an induced surcharge schedule which will achieve significant improvement in downstream flow resulting from high to moderate frequency floods. Reservoir operations during large floods resulting from major storms will require special consideration and may deviate from the induced surcharge schedule when firm forecasts of reservoir inflows and hydrographs of flows into the Coosa River from sub-basins downstream from Logan Martin Dam show that the flood risk management operation can be improved. Deviations from normal operations are discussed in more detail in Section 7-15.

7-02. Constraints. APC releases water from Weiss project in conjunction with other reservoirs to provide a weekly volume of flow to the Alabama River for navigation.

7-03. Overall Plan for Water Control Management. The water control operations of Logan Martin Dam are in accordance with the regulation schedule as outlined in the following paragraphs. Any deviation from the prescribed instructions during flood operations, which can occur due to planned or unplanned events as described in section 7-15, will be at the direction of the Water Management Section Mobile District, Corps of Engineers. Deviations during normal operations will be coordinated with the APC Reservoir Management. Mobile Water Management Section will notify South Atlantic Division (SAD) regarding all deviations.

The conservation storage pool at Logan Martin was designed to provide the necessary capacity to store water for subsequent use to meet the multiple conservation purposes for which the project was constructed. The top of conservation pool elevation, also known as the top of power pool elevation, is the reservoir’s normal maximum operating level for conservation storage purposes. If the elevation is higher than the conservation limit, the reservoir level is in the flood pool. The conservation pool is regulated between a minimum elevation of 452.5 feet NGVD29 and a seasonal variable top-of-conservation pool ranging between elevations 462 to 465 feet NGVD29. The Logan Martin guide curves are shown on Plate 7-1.

7-04. Standing Instructions to Project Operator.

a. Power operations. Power operations at Logan Martin are scheduled as outlined in Section 7-10. The seasonally varying top-of-power-pool curve is shown on Plate 7-1.

b. Flood regulation schedule. Table 7-1 contains the basic regulation schedule for flood risk management showing required operations and reservoir outflows for the various pool elevations and inflow rates. This schedule, in a modified form which includes detailed operating instructions, is used by Alabama Power Company operating personnel in carrying out the flood risk management operations. The induced surcharge schedule is shown on Plate 7-2.

Table 7-1 Logan Martin Flood Regulation Schedule

Rule	Condition	Outflow	Operation
1	Below the project guide curve	Up to Plant capacity.	Operate power plant as required to satisfy normal system load requirements.
2	Below the project guide curve and Weiss above elev. 564.0 ft and inflow into Logan Martin and Weiss at plant capacity and increasing	70,000 cfs	Pull Logan Martin to elev. 460.0 ft by discharging 70,000 cfs. Once at elev. 460.0 ft hold the elevation by passing the hourly inflow.
3	At the project guide curve	Ranging up to 70,000 cfs	Maintain reservoir stage at top-of-power pool elevation by passing the inflow up to 70,000 cfs.
4	Above the project guide curve and rising	Rate specified by Induced surcharge schedule	Operate according to induced surcharge schedule passing the required outflow through the power plant and spillway.
5	Above the project guide curve elevation with downstream control in place	Reduce up to 50% of surcharge schedule	Operation dictated by high downstream stages. Reduction in release not to exceed 11,000 cfs-days in added storage.
6	Above the project guide curve elevation and falling		When the reservoir level begins to fall maintain the gate openings in effect at time of peak reservoir stage and continue power plant discharge in effect at that time until reservoir level recedes to project guide curve elevation.

7-05. Flood Risk Management. When the reservoir level is at the elevation designated by the guide curve, the inflow up to a total of plant capacity will be passed. Normally, the inflow will be passed through the power plant until its discharge capacity is exceeded, after which the excess will be passed through the spillway with gate positions adjusted at the end of each 6-hour period as required to maintain the reservoir at the elevation designated by the guide curve.

If, for any reason, the power plant is inoperative, the total required discharge will be passed through the spillway. If the reservoir level is at the elevation designated by the guide curve, and Weiss Lake is above elevation 564 ft and the inflow into Weiss and Logan Martin is at plant capacity and increasing, the discharge will be 70,000 cfs until Logan Martin reaches elevation 460 ft and held there.

As long as the inflow continues to equal or exceed 70,000 cfs, the release rate will be limited to 70,000 cfs until the reservoir rises and/or the inflow increases to a point where a higher release rate is dictated by the induced surcharge curve shown on Plate 7-2. Every 6 hours thereafter the release rate will be adjusted to conform to the induced surcharge schedule.

When the rate of reservoir inflow reduces to the reservoir release rate, the positions of the spillway gates in effect at that time will be maintained during the evacuation of flood storage until the reservoir level recedes to the elevation designated by the guide curve. In the event a second flood enters the reservoir prior to completion of evacuation to the elevation designated by the guide curve, the position of the spillway gates will not be changed unless a greater release is dictated by the induced surcharge schedule. When the reservoir level has receded to the elevation designated by the guide curve the spillway gates and the power plant will be operated as required to maintain the reservoir on or below the limits designated by the guide curve. Table 7-1 shows a summary of the flood regulation for Logan Martin Dam as discussed above.

The regulation plan described above and in Table 7-1 will achieve significant improvement in downstream flow conditions resulting from minor to moderate frequency floods. A moderate flood can be expected to occur on average once in 2 to 3 years (natural peak flow of 50,000 cfs to 60,000 cfs). However, in the event of a major storm over the Coosa River basin, APC and the District Engineer, USACE Mobile District will collaborate in the prompt analysis of all available information and in the formulation of special operating procedures appropriate to the circumstances as they relate to the maintenance of power output and most effective utilization of flood risk management capacities. A major flood can be expected to occur on average once in 10 years. During the real-time operation of the project, a major storm event will be characterized by firm forecasted surcharge release exceeding 40,000 cfs.

Normally flood risk management operation will be in accordance with the regulation plan described above. However, since the limited amount of storage available for flood risk management will generally not affect any appreciable reduction in major flood peaks, it is important that special consideration be given to operation of the reservoir during a major flood. When firm forecasts indicate that a major flood is in progress APC and the District Engineer, USACE Mobile District will collaborate in the prompt analysis of all available information and in determining whether a deviation from the induced surcharge schedule will improve the flood risk management operation. The collaboration includes but is not limited to exchange of forecasted releases of upstream USACE projects, projected APC pool elevations, inflows and discharges, joint communication with SERFC staff, sharing forecast modeling results, and relevant ground observations.

Any departure from the regulation schedule will require approval by the District Engineer, USACE Mobile District and is coordinated by the Water Management Section Chief. Details of the forecasting procedures, which will be developed by APC with the concurrence of the District Engineer, USACE Mobile District and which will be revised from time to time as experience dictates, will be contained in Section 6-02.

7-06. Recreation. The lake at Logan Martin Dam creates a large recreational area providing opportunities for fishing, boating and other water sports. Recreational activities are best served by maintaining a full conservation pool. Lake levels above top of conservation pool invade the camping and park sites. When the lake recedes several feet below the top of conservation pool, access to the water and beaches may become limited. Water management personnel are aware of recreational impacts resulting from reservoir fluctuations and attempt to maintain reasonable lake levels, especially during the peak recreational use periods, but there are no specific requirements relative to maintaining recreational levels. Other project functions usually determine releases from the dam and the resulting lake levels.

7-07. Water Quality. Logan Martin Dam is an integral project in the overall basin development for use of water resources. Water quality within the ACT basin requires a system analysis and response plan. The reservoir developments must be coordinated to insure compliance with statuary requirements. During late summer, dissolved oxygen levels are often less than 4 mg/L in the deeper portions of the lake, while the upper portions of the water column will have dissolved oxygen levels above 4 mg/L. Dissolved oxygen levels in the releases from the dam can result in tailwater dissolved oxygen levels that are at times less than State dissolved oxygen criteria. Alabama enforces minimum DO concentrations in waterbodies designated for recreation with a standard of no less than 5 mg/L at all times in. APC has added aeration blower systems to their projects at Logan Martin and at H. Neely Henry and Weiss dams to ensure that dissolved oxygen standards are met.

7-08. Fish and Wildlife. While there are no specific operations at Logan Martin for Fish and Wildlife activities, APC's flow target of 4,640 cfs (minimum 7-day average from Jordan, Bouldin, and Thurlow Projects), while principally intended to support downstream navigation and water quality needs, also provides sustained flows for fish and wildlife.

7-09. Water Conservation/Water Supply.

7-10. Hydroelectric Power. The guide curve delineating the storage in Logan Martin Reservoir allocated to power generation and to flood risk management throughout the year is shown on Plate 7-1. This seasonally varying top-of-power-pool curve is a firm division between the power and flood risk management pools and normally the reservoir level will be maintained at or below the curve except when storing flood water. The compulsory drawdown each year is to elevation 462.

Normally, the plant will operate on a weekly cycle and the power generated will be available for use in daily peak-load periods Monday through Friday. At such times as the reservoir level is below that shown on the guide curve (top-of-power-pool), the power plant will be operated in accordance with system requirements. Whenever the reservoir reaches the elevation shown on the guide curve, the power plant will be operated as necessary up to full-gate capacity to discharge the amount of water required to keep the reservoir level from exceeding that shown on the guide curve.

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 a navigation route for commercial barge traffic, serving as a regional economic resource. A minimum flow is required to ensure usable water depths to support navigation. APC releases water from their storage projects in conjunction with other reservoirs to provide a weekly volume of flow to the Alabama River. Congress has authorized continuous navigation on the river, when sufficient water is available. The three Corps locks and dams on the Alabama River and a combination of dredging, river training works, and flow augmentation together support navigation depths on the river. The lack of regular dredging and routine maintenance has led to inadequate depths at times in the Alabama River navigation channel.

When supported by maintenance dredging, ACT Basin reservoir storage, and hydrologic conditions, adequate flows will provide a reliable navigation channel. In so doing, the goal of the water control plan is to ensure a predictable minimum navigable channel in the Alabama River for a continuous period that is sufficient for navigation use. Figure 7-1 shows the effect of dredging on flow requirements for different navigation channel depths using 2004 – 2010 survey data. As shown on Figure 7-1, pre-dredging conditions exist between November and April; dredging occurs between May and August; and post-dredging conditions exist from September through October, until November rainfall causes shoaling to occur somewhere along the navigation channel.

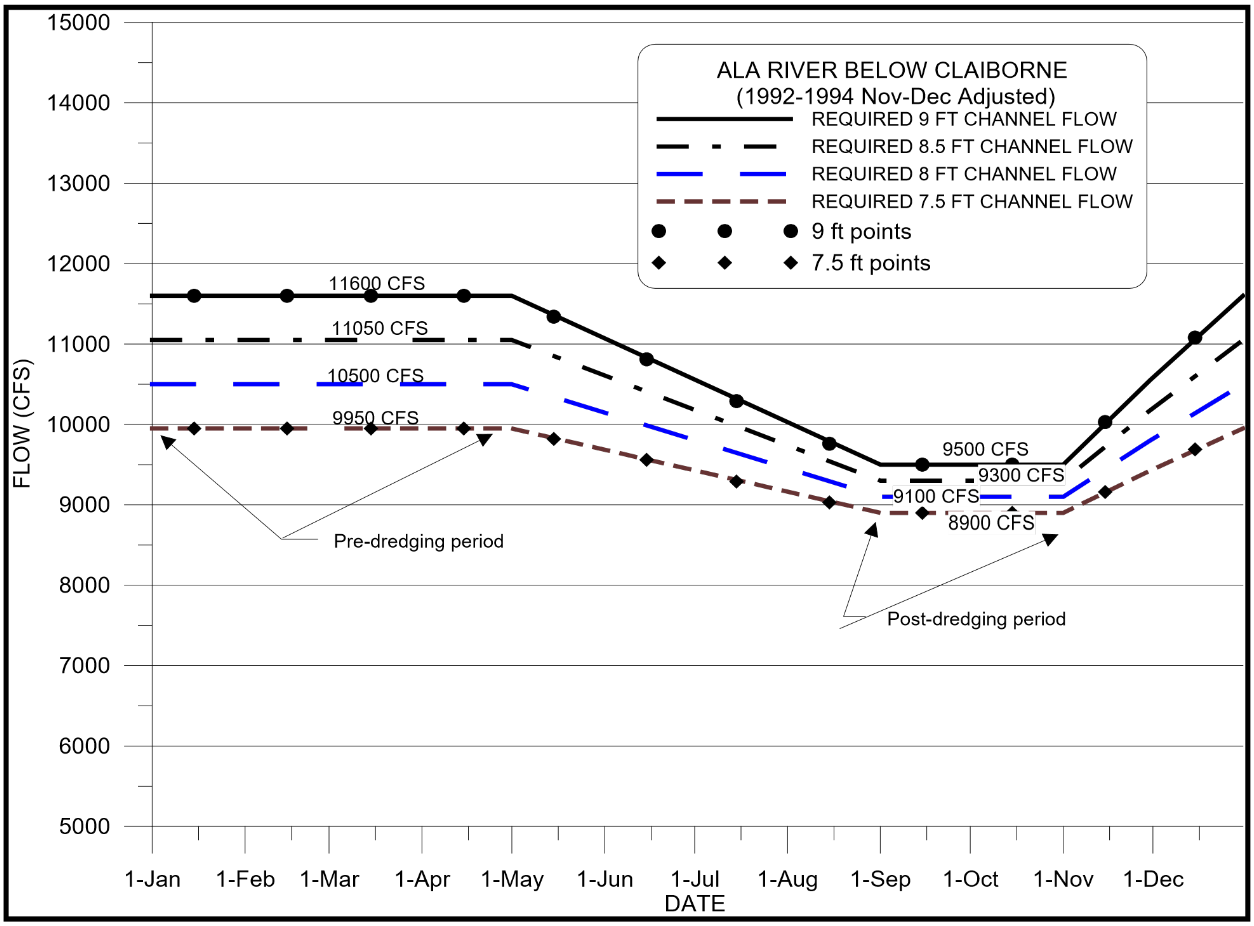

Figure 7-1 Flow-Depth Pattern (Navigation Template) Using 2004 – 2010 Survey Data

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.

Flow releases from upstream APC projects have a direct influence on flows needed to support navigation depths on the lower Alabama River. Flows for navigation are most needed in the unregulated part of the lower Alabama River below Claiborne Lock and Dam. When flows are available, R. F. Henry, Millers Ferry, and Claiborne are regulated to maintain stable pool levels, coupled with the necessary channel maintenance dredging, to support sustained use of the authorized navigation channel and to provide the full navigation depth of nine feet. When river conditions or funding available for dredging of the river indicates that project conditions (9foot channel) will probably not be attainable in the low water season, the three Alabama River projects are operated to provide flows for a reduced project channel depth as determined by surveys of the river. APC operates its reservoirs on the Coosa and Tallapoosa Rivers (specifically flows from their Jordan, Bouldin, and Thurlow (JBT) Projects) to provide a minimum navigation flow target in the Alabama River at Montgomery, Alabama. The monthly minimum navigation flow targets are shown in Table 7-2.

However, flows may be reduced if conditions warrant. Additional intervening flow or drawdown discharge from the R. F. Henry and Millers Ferry Projects must be used to provide a usable depth for navigation and/or meet the 7Q10 flow of 6,600 cfs below Claiborne Dam. However, the limited storage afforded in both the R. E. "Bob" Woodruff and William "Bill" Dannelly Lakes can only help meet the 6,600 cfs level at Claiborne Lake for a short period. As local inflows diminish or the storage is exhausted, a lesser amount would be released depending on the amount of local inflows. Table 7-3 and Figure 7-2 show the required basin inflow for a 9.0-foot channel; Table 7-4 and Figure 7-3 show the required basin inflow for a 7.5-foot channel.

Table 7-2 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	11,600	9,280	9,950	7,960
Feb	11,600	9,280	9,950	7,960
Mar	11,600	9,280	9,950	7,960
Apr	11,600	9,280	9,950	7,960
May	11,340	9,072	9,820	7,856
Jun	10,810	8,648	9,560	7,648
Jul	10,290	8,232	9,290	7,432
Aug	9,760	7,808	9,030	7,224
Sep	9,500	7,600	8,900	7,120
Oct	9,500	7,600	8,900	7,120
Nov	10,030	8,024	9,160	7,328
Dec	11,080	8,864	9,690	7,752

Table 7-3 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	9,072	–499	9,571
Jun	8,648	412	8,236
Jul	8,232	749	7,483
Aug	7,808	1,441	6,367
Sep	7,600	1,025	6,575
Oct	7,600	2,118	5,482
Nov	8,024	2,263	5,761
Dec	8,864	1,789	7,075

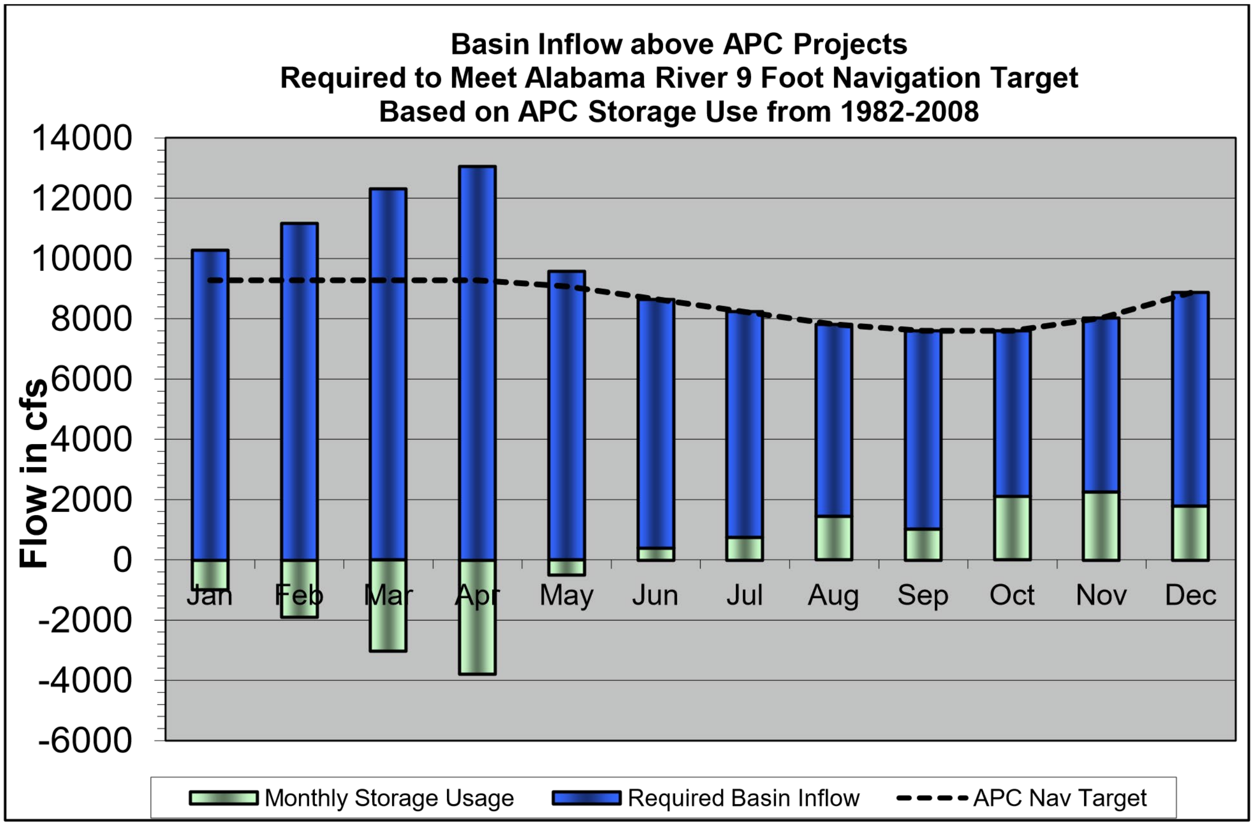

Figure 7-2 Flow Requirements from Rainfall (or Natural Sources) and Reservoir Storage to Achieve the JBT Goal for Navigation Flows for a 9-foot Channel

Table 7-4 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	7,856	–499	8,355
Jun	7,648	412	7,236
Jul	7,432	749	6,683
Aug	7,224	1,441	5,783
Sep	7,120	1,025	6,095
Oct	7,120	2,118	5,002
Nov	7,328	2,263	5,065
Dec	7,752	1,789	5,963

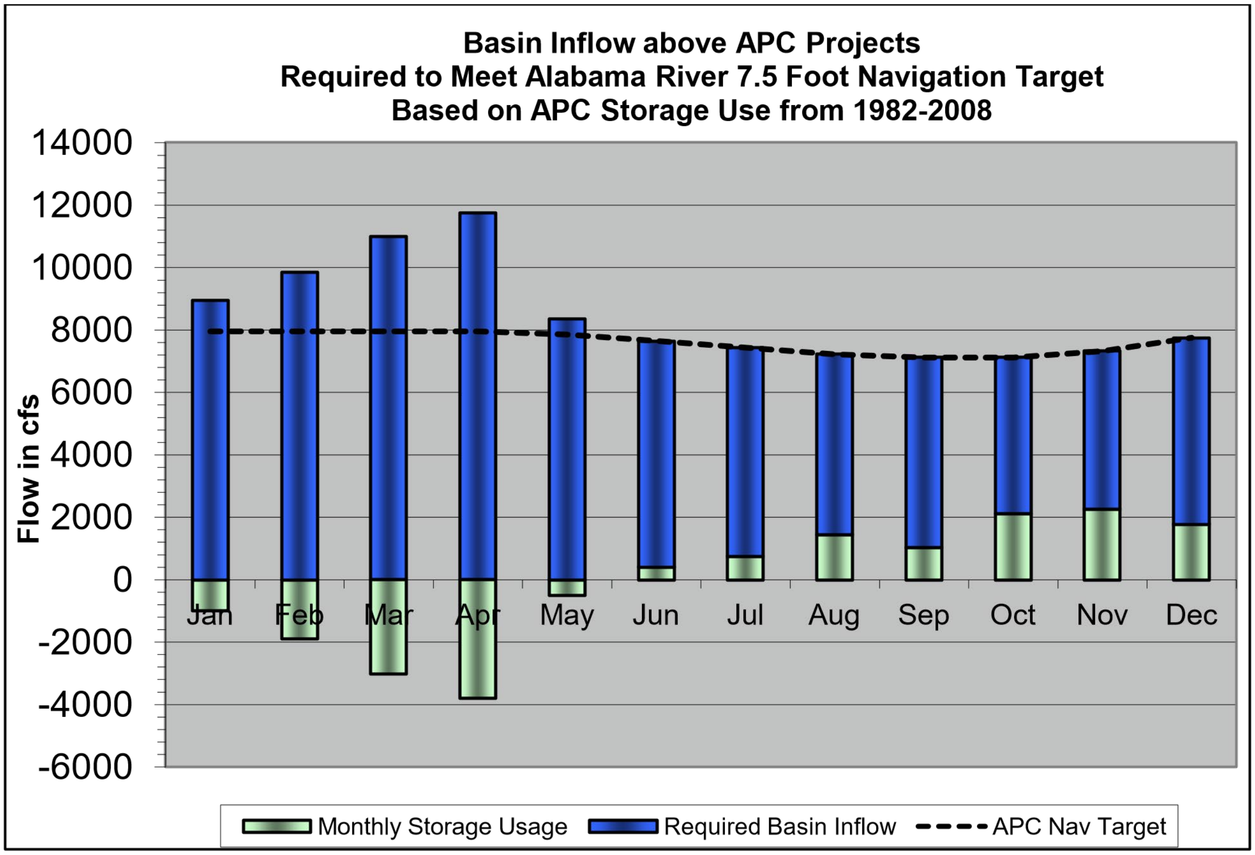

Figure 7-3 Flow Requirements from Rainfall (or Natural Sources) and Reservoir Storage to Achieve the JBT Goal for Navigation Flows for a 7.5-foot Channel

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

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

The ACT Basin navigation regulation plan is based on storage and flow/stage/channel depth analyses using basin inflows and average storage usage by APC (e.g., navigation operations would not be predicated on use of additional storage) during normal hydrologic conditions. Under that concept, the Corps and APC make releases that support navigation when basin inflows meet or exceed seasonal targets for either the 9.0-foot or 7.5-foot channel templates. Triggers are also identified (e.g., when basin inflow are less than required natural flows) to change operational goals between the 9.0-foot and 7.5-foot channels. Similarly, basin inflow triggers are identified when releases for navigation are suspended and only 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 (ACT River

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

During high flow periods, navigation will be discontinued through the R. F. Henry Lock during flood periods when the headwater reaches elevation 131.0 feet NGVD29. At this elevation the discharge will be 156,000 cfs which is expected to occur on an average of once every three years and the freeboard will be 1-foot on the guide and lock walls.

In the event that the Mobile District Water Management Section determines upcoming reductions in water releases may impact the available navigation channel depth, they shall contact the Black Warrior/Tombigbee - Alabama/Coosa Project Office, and the Mobile District Navigation Section, to coordinate the impact. Water Management shall provide the Claiborne tailwater gage forecast to the project office and the Navigation Section. Using this forecast and the latest available project channel surveys, the project office and the Navigation Section will evaluate the potential impact to available navigation depths. Should this evaluation determine that the available channel depth is adversely impacted, the project office and the Navigation Section will work together, providing Water Management with their determination of the controlling depth. Thereafter, the project office and the Navigation Section will coordinate the issuance of a navigation bulletin. The notices will be issued as expeditiously as possible to give barge owners, and other waterway users, sufficient time to make arrangements to 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 web site at https://www.sam.usace.army.mil/Missions/Civil-Works/Navigation/Navigation-Notices/.

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

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

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

Drought management actions would become increasingly more austere when two triggers are exceeded (Drought Level 2) or all three are exceeded (Drought Level 3). The combined occurrences of the drought triggers determine the DIL. Table 7-5 lists the three drought operation intensity levels applicable to APC projects.

Table 7-5 ACT Basin Drought Intensity Levels

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

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

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

The headwater regulation component includes water control actions in accordance with established action zones, minimum releases, and hydropower generation releases in accordance with project water control plans. Regulation of APC projects will be in accordance with Table 7-6, ACT Drought Management Plan, in which the drought response will be triggered by one or more of the three indicators - state line flows, basin inflow, or composite conservation storage. Corps operation of its Alabama River projects downstream of Montgomery will respond to drought operations of the APC projects upstream.

Table 7-6 ACT Drought Management Plan

<table>
<tr><th></th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th colspan="2">Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td rowspan="4">Drought Level Response[a]</td><td colspan="13">DIL 0 - Normal Operations</td></tr>
<tr><td colspan="13">DIL 1: Low Basin Inflows or Low Composite or Low State Line Flow</td></tr>
<tr><td colspan="13">DIL 2: DIL 1 criteria + (Low Basin Inflows or Low Composite or Low State Line Flow)</td></tr>
<tr><td colspan="13">DIL 3: Low Basin Inflows + Low Composite + Low State Line Flow</td></tr>
<tr><td rowspan="4">Coosa River Flow[b]</td><td colspan="3">Normal Operation: 2,000 cfs</td><td colspan="2">4,000 (8,000)</td><td colspan="2">4,000 – 2,000</td><td colspan="6">Normal Operation: 2,000 cfs</td></tr>
<tr><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="3">4,000 +/- cfs</td><td>6/15 Linear Ramp down</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="3">Jordan 2,000 +/-cfs</td></tr>
<tr><td colspan="3">Jordan 1,600 to 2,000 +/-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 1,600 to 2,000 +/-cfs</td></tr>
<tr><td colspan="3">Jordan 1,600 +/-cfs</td><td colspan="4">Jordan 1,600 to 2,000 +/-cfs</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="2">Jordan 1,600 to 2,000 +/-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 4,640 cfs flow</td></tr>
<tr><td colspan="4">4,200 cfs (10% Cut) - Montgomery</td><td colspan="6">4,640 cfs - Montgomery</td><td colspan="3">Reduce: Full – 4,200 cfs</td></tr>
<tr><td colspan="5">3,700 cfs (20% Cut) - Montgomery</td><td colspan="5">4,200 cfs (10% 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% 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>

7-13. Flood Emergency Action Plans. APC maintains the Flood Emergency Action Plan for the Logan Martin Project. The plan was developed and is updated in accordance with FERC guidelines. APC is responsible for notifying the appropriate agencies/organizations in the unlikely event of an emergency at the Logan Martin Dam. The Flood Emergency Action Plan is updated at least once a year, with a full reprint every five years. Inundation maps, developed by APC and updated as necessary, are also provided in the Logan Martin Flood Emergency Action Plan.

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

7-15. Deviation from Normal Regulation.

Advance approval by USACE is required prior to any deviation from the plan of regulation prescribed or approved by USACE in the interest of flood control or navigation, except in emergency situations. Requests for deviation from the approved water control plan shall comply with the requirements described in subparagraphs below. Any departure from the regulation schedule will require approval by the Division Engineer or delegated authority which is coordinated by the Water Management Section Chief. Prior approval for a deviation is required except as noted in subparagraph a below.

a. Emergencies. Examples of some emergencies that can be expected to occur at a project are drowning and other accidents, failure of the operation facilities, 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 create equal or worse conditions. APC will notify the Mobile District and SAD office as soon as practicable.

b. Unplanned Deviations. 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 SAD through the Mobile District Water Management Section 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 SAD for review and approval. Components of APC deviation request will include: a statement of current and forecasted weather conditions; rainfall or drought status; charts indicating forecast of pool elevations, inflows and discharge with and without deviation; indication of the benefits or impacts to the downstream reach(es); statement of benefit of deviation; rationale for request;

expected duration of the request; conditions of communication/updates; conditions of suspension of request; and contact information to discuss details.

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 basin 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 basin regulation on streambank erosion has been reduced by the regulation of the basin because higher peak-runoff flows into the basin are captured and metered out more slowly.

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8 - EFFECT OF WATER CONTROL PLAN

8-01. General. In 1954, Public Law 436 suspended the authorization for 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 FPC. In December 1955, APC submitted an application to the FPC for a license for development of the Coosa River in accordance with the provisions of Public Law 436. The FPC issued a license to APC on 4 September 1957, for the construction, operation and maintenance of Project 2146, which included the Logan Martin site. Logan Martin Dam is a peaking project with maximum and minimum operating pool elevations of 465.0 and 460.0 NGVD29. Drainage areas at principal points and tributary junctions in the area influenced by the Logan Martin project are listed in Table 8-1.

Table 8-1 Drainage Areas of Coosa River Basin above Childersburg, Alabama

COOSA RIVER				
River Miles above Mouth	Point on River	Tributary	Drainage Area in square miles	
			Tributary	Coosa
86.29	USGS gage, Childersburg, AL	-	-	8390
99.50	Logan Martin Dam	-	-	7750
148.00	Henry Dam	-	-	6620
174.76	USGS gage, Gadsden, AL	-	-	5800
206.25	Weiss Powerhouse	-	-	5610
220.20	Below junction, Terrapin Creek	Terrapin Creek	289	5571
-	(USGS gage at Ellisville, AL)	Terrapin Creek	258	-
225.65	Weiss Dam	-	-	5270
232.98	Below junction, Chattooga River	Chattooga River	675	5208
-	(USGS gage above Gaylesville, AL)	Chattooga River	368	-
278.65	Mayo’s Bar	-	-	4040
285.78	Confluence Etowah & Oostanaula , Rome, GA	-	-	4010

ETOWAH RIVER		
River Miles above Mouth	Point on River	Drainage Area in square miles
0.00	Junction, Oostanaula River, Rome, GA	1860
47.86	Allatoona Dam	1110

OOSTANAULA RIVER		
River Miles above Mouth	Point on River	Drainage Area in square miles
0.00	Junction, Etowah River, Rome, GA	2150
0.35	USGS gage, Rome 5th Ave, GA	2150
43.16	USGS gage, Resaca, GA	1610
46.95	Confluence Conasauga & Coosawattee Rivers	1596

COOSAWATEE RIVER		
River Miles above Mouth	Point on River	Drainage Area in square miles
0.00	Junction, Conasauga River	859
24.90	USGS gage, Carters, GA	531
26.80	Carters Dam	376

The impacts of the *ACT Master Water Control Manual* and its Appendices, including this water control manual have been fully evaluated in the FR/SEIS that was published in March 2021. A Record of Decision (ROD) for the action was signed in May 2021. During the preparation of the EIS, a review of all direct, secondary and cumulative impacts was made. As detailed in the FR/EIS, the decision to prepare the Water Control Manual and the potential impacts was coordinated with Federal and State agencies, environmental organizations, Native American tribes, and other stakeholder groups and individuals having an interest in the basin. The ROD and EIS are public documents and references to their accessible locations are available upon request.

8-02. Flood Risk Management. The Logan Martin Dam project contains less than 6 percent of the conservation storage in the ACT Basin. The discharge percent chance exceedance curve at the dam site for the period 1967 – 2009 is shown on Plate 8-1. [Preparer's Note: Need an updated chart.] The flood regulation plan for Logan Martin Reservoir will provide substantial reductions in downstream flood peaks during minor and moderate floods. The limited amount of storage allocated to flood risk management will generally not affect any appreciable reduction in major flood peaks, but the available storage will be utilized through an induced surcharge schedule so that the peak discharge for major floods will not be any greater than would have occurred under natural conditions. Since the amount of flood risk management storage varies seasonally, the degree of control that Logan Martin Dam can exercise on floods of the same magnitude will vary with the time of the year.

a. Spillway Design Flood. Regulation of the spillway design flood is shown on Plate 8-2. The initial pool for the spillway design flood was assumed to be maximum summer-level power pool, elevation 465.0 NGVD29.

b. Other Floods. The effects of reservoir regulation on three floods of record, March-April 1944, November-December 1948 and March-April 1951, are shown on Plates 8-3 to 8-5. In computing the effect of reservoir regulation on these three floods, it was assumed that the initial pool level was at top-of conservation-pool. The initial pool for the spillway design flood was assumed to be maximum summer-level power pool, elevation 465.0 NGVD29.

8-03. Recreation. Logan Martin Lake is an important recreational resource, providing significant economic and social benefits for the region and the nation. The project contains 15,269 acres of water at the summer power pool elevation of 465.0 feet NGVD29. A wide variety of recreational opportunities are provided at the lake including boating, fishing, camping, picnicking, water skiing, hunting, and sightseeing. The effects of the Logan Martin water control operations on recreation opportunities are minimal between the maximum and minimum power pool elevations of 465 to 462 feet NGVD29.

8-04. Water Quality. One of the water quality requirements in the ACT River basin is maintenance of a minimum flow in the lower river reaches. The natural low, seven-day-duration, flow expected to occur every ten years is the focus of regulation for water quality. This flow requirement is measured at Claiborne, on the Alabama River.

8-05. Fish and Wildlife. The Coosa River consists of 255 river miles between its beginning at the confluence of the Etowah and Oostanaula Rivers to its confluence with the Tallapoosa River forming the Alabama River. Of these 255 river miles, 238 miles are impounded through a series of six APC dams. These six impoundments have a total of 81,300 acres of water. The Logan Martin Lake comprises 48.5 of the 238 lake impounded river miles (20 percent) and 15,269 of the 81,300 acres of water (19 percent) within the Coosa River Basin. There are 147 species of fish, 53 species of freshwater mussels, and 91 species of aquatic snails within the Coosa River Basin.

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

In reservoirs like Weiss with relatively stable water levels and short hydraulic retention, longer post-winter retention is associated with greater crappie production, possibly related to reduced flushing of young-of-year fish in the discharge from the impoundment and more stable feeding conditions.

8-06. Water Conservation/Water Supply.

8-07. Hydroelectric Power. The Logan Martin Dam hydropower Project, along with 13 other hydroelectric facilities throughout the State of Alabama, provides approximately six percent of the APC's power generation. The State of Alabama depends on these facilities as a source of dependable and stable electricity. Hydroelectric power is also one of the cheaper forms of electrical energy, and it can be generated and supplied quickly as needed in response to changing demand.

Hydropower is typically produced as peak energy at Logan Martin Dam, i.e., power is generated during the hours that the demand for electrical power is highest, causing significant variations in downstream flows. Daily hydropower releases from the dam vary from zero during off-peak periods to as much as 33,000 cfs, which is approximately turbine capacity. Often, the weekend releases are lower than those during the weekdays. Lake elevations can vary on average about 0.65 feet during a 24-hour period as a result of hydropower releases. Tailwater levels can also vary significantly daily because of peaking hydropower operations at H. Neely Henry Dam, characterized by a rapid rise in downstream water levels immediately after generation is initiated and a rapid fall in stage as generation is ceased. Except during high flow conditions when hydropower may be generated for more extended periods of time, this peaking power generation scenario with daily fluctuating stages downstream is repeated nearly every week day (not generally on weekends). The project generates an estimated 210,935 megawatt hours of energy annually. [Preparer's Note: Need updated info from USACE/APC.]

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

8-08. Navigation. APC releases water from Logan Martin Project in conjunction with their other storage projects in the ACT Basin to provide flows to support navigation. The navigation plan provides the flexibility to support flow targets when the system experiences normal flow conditions, reduced support as basin hydrology trends to drier conditions, and suspension of navigation support during sustained low flow conditions.

8-09. Drought Contingency Plans. The importance of drought contingency plans has become increasingly obvious as more demands are placed on the water resources of the basin. During low flow conditions, the reservoirs within the basin may not be able to fully support all project purposes. Several drought periods have occurred since construction of the Weiss Project in 1961. The duration of low flows can be seasonal or they can last for several years. Some of the more extreme droughts occurred in the early and mid 1980's, and most of the time period between late-1998 to mid-2009. There were periods of high flows during these droughts but the lower than normal rainfall trend continued.

The purpose of drought planning is to minimize the effect of drought, to develop methods for identifying drought conditions, and to develop both long- and short-term measures to be used to respond to and mitigate the effects of drought conditions. During droughts, reservoir regulation techniques are planned to preserve and ensure the more critical needs.

For the Weiss Project, the APC and the Corps will coordinate water management activities during the drought with other private power companies and federal agencies, navigation interests, the states, and other interested state and local parties as necessary. Drought operations will be in accordance with Table 7-6, ACT Drought Management Plan. The Alabama-Coosa-Tallapoosa (ACT) River Basin, Drought Contingency Plan is also found in Exhibit F.

8-10. Flood Emergency Action Plans. Normally, all flood risk management operations are directed by APC Reservoir Management following the flood risk management procedures outlined in this manual with data sharing and communication between APC and the Water Management Section of the Corps. If, however, a storm of flood-producing magnitude occurs and all communications are disrupted between APC and the Corps, flood risk management measures, as previously described in Chapter 7 of this appendix, will begin and/or continue.

An emergency contact information list is shown in Exhibit G.

9 - WATER CONTROL MANAGEMENT

9-01. Responsibilities and Organization.

a. USACE. It is the responsibility of the Secretary of the Army to prescribe the aforementioned rules and regulations for the proper operation of the Logan Martin development in the interest of flood risk management and navigation. This responsibility is administered through the District Engineer, USACE Mobile District who will monitor the operation of the Weiss project for compliance with the established rules and regulations. The Hydrology and Hydraulics Section maintains daily records of precipitation, river stages, reservoir elevations and general stream-flow conditions throughout the Mobile District, with special emphasis on the areas affecting or affected by reservoir operation. This section will perform the following duties in connection with the operation of the Weiss development:

a. Maintain liaison with personnel of Reservoir Management for the daily exchange of hydrologic data.

b. Maintain records of rainfall and river stages for the Coosa River Basin, and records of pool level and outflow at Weiss Dam and other impoundments in the basin.

c. Monitor operations of the power plant and spillway at Weiss Dam for compliance with the regulation schedule for flood risk management operation, chart 20.

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

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

c. State, County and Local Agencies. 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.

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

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

d. Alabama Power Company. As stated in Public Law 436, 83rd Congress, and in the Federal Power Commission's license for the construction, operation and maintenance of Project No. 2146, it is the responsibility of the Alabama Power Company to operate and maintain the Weiss development in accordance with such reasonable rules and regulations as may be prescribed by the Secretary of the Army in the interest of flood risk management and navigation. The license further specifies certain terms and conditions to be met by the licensee in operating and maintaining the project in the interest of navigation. Day to day operation of the plant is assigned to the Alabama Control Center (ACC) in Birmingham as part of the Power Delivery System under the direction of Reservoir Operations Coordinator. Long range water planning and flood risk management operation is assigned to Reservoir Management in Birmingham as part of Southern Company Services (SCS) GEM-Hydro under the direction of System Operations Supervisor.

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

9-02. Interagency Coordination.

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

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

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

EXHIBIT A

SUPPLEMENTARY PERTINENT DATA

GENERAL INFORMATION

FERC License Number	2146
License Issued	4, Sep 1957
License Expiration Date	31, July 2007
Licensed Capacity, kw	128,250
Project Location	Near Town of Vincent; Counties of Calhoun, St. Clair and Talladega; Coosa River 459 river miles above Mobile
Total Area Encompassed by Existing Project Boundary (land and water), acres	27,000
Acres of Water within Existing Project Boundary	15,263
Acres of Mainland within Existing Project Boundary	11,737
Logan Martin Dam Drainage Basin, square miles	7,700
Length of River from Logan Martin Dam to Neely Henry Dam, miles	48.5
Length of River from Logan Martin Dam to Lay Dam, miles	48

DAM

Date of Construction	July 18, 1960
In-service Date	August 10, 1964
Construction Type	Gravity concrete and earth-fill
Elevation Top of Abutments, NGVD29	487
Gross Head at Normal Pool Elevation (465 NGVD29, when Lay Lake is at elevation 396.0), feet	69
Spillway Elevation (to top of gates), NGVD29	470
Total Length of Water Retaining Structures, feet	6,225
Length of Abutments	
East embankment, feet	4,650
West embankment, feet	870
Length of Powerhouse (substructure), feet	295
Length of concrete spillway, feet	330

1 **DAM (continued)**

Length of Spillway (gated), feet	240
Gates: Spillway Gates	6 total
Width by Height, feet	40 x 38
Hazard Classification	High
Spillway Capacity at 483.1 ft NGVD29, cfs	336,100

2 **RESERVOIR – LOGAN MARTIN LAKE**

Length of Impoundment, mile	48.5
Pool Elevations: Normal, feet NGVD29	465
Gross Storage:	
Normal Pool @ Elev 465 ft, acre-feet	273,467
Minimum Pool @ Elev 452.5 ft, acre-feet	131,522
Usable Storage Capacity (between 465 and 452.5 NGVD29), acre-feet	141,945
Surface Area (at 465 NGVD29), acres	15,260
Miles Shoreline (including tributaries) at 465 NGVD29	275
Water Residence Time, days	13
Existing Classification	PWS/F&W/S

3 **POWERHOUSE**

Length (Superstructure), feet	295
Width (Superstructure), feet	168.5
Height, feet	65
Construction Type (Superstructure)	Concrete gravity
Draft Tube Invert Elevation, feet NGVD29	TBD
Operating Floor Elevation, feet NGVD29	TBD
Normal Tailwater Elevation, feet NGVD29	396
High Tailwater Elevation (three units 471.3 generating), feet NGVD29	404
Discharge Capacity, cfs	33,000
Intake Invert Elevation, feet NGVD29	- Approximately 450
Outdoor Gantry Crane Capacity, tons	235

TURBINES (3)

Rated Net Head (Gross Static), feet	56
Manufacturer	Allis Chalmers
Type	Propeller
Rated Discharge Capacity: Maximum, cfs	11,000 each
Speed, rpm	90
Rated Output at 56 ft head, hp	59,000 each

GENERATORS (3)

Manufacturer	Allis Chalmers
Nameplate Rating, kw	42,750 each
Rated Output, kva	47,500
Power Factor	0.9
Voltage, volts	13,800
Number of Phases	3
Frequency	60 cycle
Estimated average annual generation, kwh	400,200,000

TRANSFORMERS

Transmission Voltage	
Low side, volts	13,800
High side, volts	115,000
Rating, kilovolt amp	155,000

FLOOD FLOWS – LOGAN MARTIN DAM

Probable Maximum Flood	
Inflow, cfs	408,600
Outflow. Cfs	361,200
Maximum Elevation, feet NGVD29	485.2
Top of Embankment and Spillway, feet NGVD29	487.0

EXHIBIT B

UNIT CONVERSIONS

AREA CONVERSION

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

LENGTH CONVERSION

UNIT	cm	m	km	in.	ft	yd	mi
cm	1	0.01	0.0001	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 cfs for 24 hours
1 cubic foot per second of water falling 8.81 feet = 1 horsepower
1 cubic foot per second of water falling 11.0 feet at 80% efficiency = 1 horsepower
1 inch of depth over one square mile = 2,323,200 cubic feet
1 inch of depth over one square mile = 0.0737 cubic feet per second for one year

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EXHIBIT C

MEMORANDUM OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING

Between

U, S. ARMY ENGINEER DISTRICT, MOBILE, CORPS OF ENGINEERS

And

ALABAMA POWER COMPANY

Concerning

OPERATION OF LOGAN MARTIN DAM

For

Section 1 FLOOD CONTROL AND NAVIGATION
Section 2 PURPOSE
Section 3 REFERENCES
Section 4 DESCRIPTION OF PROJECT
Section 5 RESPONSIBILITIES OF ALABAMA POWER COMPANY AND CORPS OF ENGINEERS
Section 6 REGULATION PLAN
Section 7 COLLECTION AND EXCHANGE OF DATA
Section 8 EXHIBITS

SECTION 1 – PURPOSE

1.1 The purpose of this memorandum of understanding is to delineate and affirm:

a, The responsibilities of the Alabama Power Company and the Corps of Engineers in fulfilling their obligations under Public Law 436, 83rd Congress, insofar as they concern the operation of Logan Martin Dam for flood control and navigation; and

b, The functions and procedures of the two agencies in carrying out their responsibilities.

SECTION 2 – REFERENCES

2.1 Public Law 436, 83 Congress, approved 28 June 1954. Suspends the authorization of Federal development of the Coosa River for the development of electric power, to permit development by private interests under a license to be issued by the Federal Power Commission requires the licensee to provide flood control storage in the dams constructed; and provides that the operation and maintenance of the dams shall be subject to reasonable rules and regulations of the Secretary of the Army in the interest of flood control and navigation

2.2 Application of the Alabama Power Company to the Federal Power Commission for a license for the development of the Coosa River, Project No. 2146. Describes the proposed projects, their interrelationship with other developments, and contains a statement of the proposed reservoir operation plans.

2.3 Federal Power Commission's Order Issuing License to Alabama Power Company, Project No. 2146, as amended, including exhibits. Describes the projects, designates the elevation of full power pool and the amount of storage to be allocated for flood control and states that "The operation of the dams constituting the project in the interest of flood control, including the control of the level of the pool caused by each of the dams, and the discharge of water through the spillways or any outlet structures of such dams, shall be in accordance with such reasonable rules and regulations as may be prescribed by the Secretary of the Army". The license further specifies certain terms and conditions concerning the operation of the project for navigation, and states that such operation shall at all times be controlled by such reasonable rules and regulations in the interest of navigation as may be made from time to time by the, Secretary of the Army.

2.4 Corp of Engineers' Reservoir Regulation Manual for the Alabama-Coosa River Basin, Appendix C, Reservoir Regulation Manual for Logan Martin Dam. Describes in detail the procedures to be followed in carrying out the rules and regulations for operation of Logan Martin Dam for flood control and navigation as set forth in this memorandum of understanding.

SECTION 3 – DESCRIPTION OF PROJECT

3.1 The Logan Martin development is situated on the Coosa River at river mile 99.5, approximately 13 miles upstream from Childersburg, Alabama. It consists of a dam having a concrete gated spillway section with compacted earth abutment dikes; a reservoir, with full power pool at elevation 465 feet msl, having a surface area of approximately 15,300 acres; a 128,250 kw power plant; a substation, and appurtenant electrical and mechanical facilities. The total drainage area above the dam, including the area controlled by H. Neely Henry, Weiss and Allatoona Dams, is 7,770 square miles. The reservoir, extending upstream 48.5 miles to H. Neely Henry Darn, is located in Talladega, St. Clair and Calhoun counties. Exhibit I presents a general layout of the Logan Martin project.

SECTION 4 – RESPONSIBILITIES OF ALABAMA POWER COMPANY AND CORPS OF ENGINEERS

4.1 As stated In Public Law 436, 83rd Congress, and in the Federal Power ComrnissiOn’5 license for the construction, operation and maintenance of Project No 2146, it is the responsibility of the Alabama Power Company to operate and maintain the Logan Martin development in accordance with such reasonable rules and regulation as may be prescribed by the Secretary of the Army in the interest of flood control and navigation The license further specifies certain terms and conditions to be met by the licensee in operating and maintaining the project in the interest of navigation

4.2 It is the responsibility of the Secretary of the Army to prescribe the aforementioned rules and regulations for the proper operation of the Logan Martin development in the interest of flood control and navigation. This responsibility is administered through the District Engineer of the Mobile District who will monitor the operation of the Logan Martin project for compliance with the established rules and regulations.

SECTION 5 – REGULATION PLAN

5.1 General. The Logan Martin project will normally operate to produce peaking power. During periods of low stream flow the storage within the range of power pool drawdown between elevations 465.0 and 462.0 amounting to 42,574 acre-feet (0.16 inch), will augment the flow of the river downstream. This storage will also be available seasonally for flood control. Above the top of the power pool and extending to elevation 473.5, there is available for control of floods surcharge storage totaling 160,105 acre-feet (0.58 inches), within which reservoir releases will be scheduled as dictated by an induced surcharge schedule which will achieve significant improvement in downstream flow resulting from high to moderate frequency floods. Reservoir operations during large floods resulting from major storms will require special consideration and may deviate from the induced surcharge schedule when firm forecasts of reservoir inflows and hydrographs of flows into the Coosa River from sub-basin downstream from Logan Martin Dam show that the flood control operation can be improved

5.2 <u>Reservoir operation for power production.</u> A curve delineating the storage in Logan Martin reservoir allocated to power generation and to flood control throughout the year is shown on Exhibit 2. This seasonally varying top-of-power pool curve is a firm division between the power and flood control pools and normally the reservoir level will be maintained at or below the curve except when storing flood waters. The compulsory drawdown each year is to elevation 460.0. Normally, the plant will operate on a weekly cycle and the power generated will be available for use in daily peak-load periods Monday through Friday. At such times as the reservoir level is below that shown on the storage delineation curve (top-of-Power-Pool) the power plant will be operated in accordance with the system requirements. Whenever the reservoir reaches the elevation shown on the storage delineation curve the power plant will be operated as necessary up to full-gate capacity to discharge the amount of water required to keep the reservoir level from exceeding that shown on the storage delineation curve (top-of-power-Pool).

5.3 <u>Reservoir operation for flood control</u>. When the reservoir is at the elevation indicated by the storage delineation curve, the inflow up to a total of 50,000 cfs will be passed. Normally the inflow will be passed through the power plant until its discharge capacity is exceeded after which the excess will be passed through the spillway with gate positions adjusted at the end of each 6-hour period as required to maintain the reservoir at the elevation indicated by the storage delineation curve If for any reason the power plant is inoperative, the total required discharge will be passed through the spillway Thereafter, as long as the inflow continues to equal or exceed 50,000 cfs, the release rate will be limited to 50,000 cfs until the reservoir rises and/or the in f low increases to a point where a higher release rate is dictated by the induced surcharge schedule shown on Exhibit 3. Every 6 hours thereafter the release rate will be adjusted to conform with the induced surcharge schedule,

5.4 When the rate of reservoir inflow reduces to the reservoir release rate, the position of the spillway gates in effect at that time will be maintained during the evacuation of flood storage until the reservoir level recedes to the elevation indicated by the storage delineation curves In the event a second flood enters the reservoir prior to completion of evacuation to the elevation indicated by the storage delineation curve, the position of the spillway gates will not be changed unless a greater release is dictated by the induced surcharge schedule, When the reservoir level has receded to the elevation indicated by the storage delineation curve, the spillway gates and the power plant will be operated as required to maintain the reservoir on or below the limits shown on the storage delineation curve.

5.5 <u>Reservoir operation for major floods.</u> Normally all flood control operation will be in accordance with the regulation plan described above. However, since the limited amount of storage allocated to flood control will generally not effect any appreciable reduction in major flood peaks, it is important that special consideration be given to operation of the reservoir during a major flood. When firm forecasts indicate that a major flood is in progress APC and the District Engineer will collaborate in the prompt analysis of all available information and in determining whether a deviation from the induced surcharge schedule will improve the flood control operation. Any departure from the regulation schedule will require approval by the District Engineer. Details of the forecasting procedures which will be developed by APC with the concurrence of the District Engineer and which will be revised from time to time as experience dictates, will be contained in the regulation manual.

5.6 Reservoir operation for navigation. Specific rules for operation of the reservoir in the interest of navigation will be prescribed and listed in the reservoir regulation manual, as navigation develops on the Coosa River.

SECTION 6 – COLLECTION AND EXCHANGE OF DATA

6.1 Both the Alabama Power Company and the Corps of Engineers collect and maintain records of hydrologic data and other information in connection with the operation of projects in the Coosa River basins In order to properly operate the Logan Martin project and follow the regulation plan described in Section 5, the Alabama Power Company collects and maintains records of the reservoir level, river levels below the dam, inflow to the reservoir, discharge from the powerhouse and through the spillway, and rainfall over the Coosa River basin below Rome, GeorgiaThe Mobile District collects and maintains records of rainfall and stream flow in the Coosa River basin above Rome, Georgia, and the reservoir level, inflow and discharge at Allatoona Dam on the Etowah River.

6.2 Since the data collected by the Power Company are needed by the Corps of Engineers in carrying out its responsibility of monitoring the flood control operations of the Logan Martin project, and the data collected by the Corps of Engineers supplements the data being collected by APC and is of value to them in planning their project operations, each agency will furnish the other with such of its hydrologic and operating data as may be needed or found beneficial in its operation.

6.3 The regulation manual describes the procedures to be followed and lines of communication to be used in exchanging data and in issuing reservoir regulation instructions. Existing and future communication facilities of APC will be utilized to the maximum practicable extent, supplemented where necessary by facilities provided by the Corps of Engineers and/or commercial communication facilities.

ALABAMA POWER COMPANY	UNITED STATES OF AMERICA
WALTER BOULDIN	ROBERT ESNETZER
President	COL, Corps of Engineers
	District Engineer
Date November 13, 1967	Date October 20, 1967

EXHIBIT D

PUBLIC LAW 436 83RD

CONGRESS, 2ND SESSION

PUBLIC LAW 436 - 83D CONGRESS

CHAPTER 408 - 2D SESSION

H. R. 8923

AN ACT

To provide for the development of the Coosa River, Alabama and Georgia

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in connection with the comprehensive program for the development of the water resources of the Alabama-Coosa River and tributaries, authorized by the Rivers and Harbors Act, approved March 2, 1945 (59 Stat. 10), it is hereby declared to be the policy of the Congress, where private interests are considering applying for authority to undertake the development of resources covered by such authorization, that the power from such development shall be considered primarily for the benefit of the people of the section as a whole and shall be sold to assure the widest possible use, particularly by domestic and rural consumers, and at the lowest possible cost.

Sec. 2. The authorization of the comprehensive plan for the Alabama-Coosa River and tributaries, as provided in the Rivers and Harbors Act, approved March 2, 1945, insofar as it provides for the development of the Coosa River for the development of electric power, is hereby suspended to permit the development of the Coosa River, Alabama and Georgia, by a series of dams in accordance with the conditions of a license, if issued, pursuant to the Federal Power Act and in accordance with the provisions and requirements of this Act.

Sec. 3. The series of dams, together with the existing hydroelectric power dams on the Coosa River, shall, in the judgment of the Federal Power Commission, be best adapted to the comprehensive plan for the development of the Coosa River for the use or benefit of interstate commerce, for the improvement and utilization of waterpower development, and for other beneficial public uses, including recreational purposes.

Sec 4. The dams constructed by the licensee shall provide a substantially continuous series of pools and shall include basic provisions for the future economical construction of navigation facilities.

Sec. 5. The license relating to such development shall require the maximum flood control storage which is economically feasible with respect to past floods. of record but in no event shall flood control storage be less than that required to compensate for the effects of valley storage displaced by the proposed reservoirs of the licensee, or less in quantity and effectiveness than the amount of flood control storage which could feasibly be provided by the currently authorized federal multiple purpose project at Howell Mills Shoals constructed to elevation 490, with surcharge storage to elevation 495.

Sec. 6. Before a license is issued, the applicant for the license shall submit a report on the details of its plan of development to the Federal Power Commission.

Sec 7. The Chief of Engineers shall review any plan of development submitted to the Federal Power Commission for the purpose of acquiring a license and shall make recommendations with respect to such plan to such Commission with particular regard to flood control and navigation, and its adaptability to the comprehensive plan for the entire basin development.

Sec. 8. The license may provide for the construction of the series of dams in sequence on the condition that the dam or dams providing the maximum flood control benefits shall be constructed first unless a different order of construction is approved by the Secretary of the Army.

Sec. 9. The operation and maintenance of the dams shall be subject to reasonable rules and regulations of the Secretary of the Army in the interest of flood control and navigation.

Sec. 10. An allocation of cost of flood control provided in addition to that required to compensate for displaced valley storage and of cost of navigation shall be approved by the Federal Power Commission, taking into consideration recommendations of the Chief of Engineers based upon flood control and navigation benefits estimated by the Chief of Engineers.

Sec 11. If the Federal Power Commission shall issue a license under this Act, the Commission shall simultaneously make a full report to the Public Works Committees of the Senate and House of Representatives of the Congress, setting out the major provisions and conditions inserted in such license, and a copy of the Commission's report shall forthwith be submitted to the Chief of Engineers who shall review the same and promptly submit to said committees his views as to whether the major provisions and conditions in such license are adaptable to the comprehensive plan. In the event the Congress by legislative enactment adopts a policy of compensating such licensees for navigation and flood control costs, any such allocated navigation and flood control costs are hereby authorized to be compensated through annual contributions by the United States.

Sec 12. Unless it is beyond the reasonable control of a licensee acting in good faith and exercising due diligence: (1) an application for a preliminary permit under the Federal Power Act relating to the development of the Coosa River shall be prosecuted with reasonable diligence before the Federal Power Commission; (2) an application for a license to construct such dams shall be filed with such Commission within two years after the date of the enactment of this Act; (3) construction of one such dam shall be commenced within a period of one year subsequent to the date of the issuance of a license by such Commission, (4) at least one such dam and its power plant shall be completed and in operation in accordance with the terms of the license within five years from the date of the issuance of such license by such Commission; and (5) the remaining dams included in the license issued by such Commission shall be completed within ten years from the date of the commencement of construction of the first dam, subject to the provisions of Section 13 of the Federal Power Act: "Provided," That if any such conditions are not fulfilled, or if the Commission denies the application for a license, the authorization relating to the Alabama-Coosa River provided for in the Act, approved March 2, 1945, shall have the same status as it would have had if this Act had not been enacted, so far as the uncompleted project works are concerned; in which event the outstanding license may be terminated or revoked and the uncompleted and completed project may be sold or acquired by the United States as provided in Sections 13 and 26 of the Federal Power Act.

Sec. 13. Nothing in this Act shall be deemed to affect in any way the authorization of the development of the Alabama-Coosa River and tributaries other than that portion of the development involving projects on the Coosa River or the authority of the Federal Power Commission to issue a license for the complete development of the Coosa River by States or municipalities under section 7 (a) of the Federal Power Act or to find under section 7 (b) of said Act that the development should be under taken by the United States itself.

Approved June 28, 1954

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EXHIBIT E

EXTRACTS FROM PROJECT LICENSE

EXTRACTS FROM PROJECT LICENSE

Federal Energy Regulatory Commission Project License for major project No. 2146-111, Issued 20 June 2013, authorizes the continued operation and maintenance by the Alabama Power Company of the H. Neely Henry Project, an existing development on the Coosa River near Gadsden, Alabama. Extracts from the project license especially pertinent to flood risk management, navigation, water use and reservoir regulation concerning the H. Neely Henry Project are quoted below for guidance and reference purposes.

"**Article 8.** The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe."

"**Article 11.** Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United states, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act."

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission my prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned."

<u>Article 13.</u> On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters."

"**<u>Article 15.</u>** The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing."

<u>"Article 16.</u> Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license."

"**<u>Article 18.</u>** So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

"Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing."

"Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality."

"Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities."

"Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army."

"Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States."

"Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating."

"**Article 28.** The Licensee shall interpose no objection to, and shall in no way prevent, the use by the agency of the United States having jurisdiction over the lands of the United States affected, or by persons or corporations occupying lands of the United States under permit, of water for fire suppression from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license, or the use by said parties of water for sanitary and domestic purposes from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license.

EXHIBIT F

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

US Army Corps of Engineers ®

South Atlantic Division

Mobile District

March 2015

DROUGHT CONTINGENCY PLAN
FOR THE
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

I – INTRODUCTION

1-01. <u>Purpose of Document</u>. 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 manual within the respective project appendix to the ACT Basin Master Water Control Manual.

II – AUTHORITIES

2-01. <u>Authorities</u>. 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 02 Feb 2018. 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 30 Sep 2018. 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 30 May 2016. 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 10 Oct 2017. 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 Full Pool (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	5.9
Carters Reregulation Dam	Corps/GA/1974	17,500	16,000	0.1
Etowah River				
Allatoona Dam and Lake	Corps/GA/1949	349,922	281,916	10.8
Hickory Log Creek Dam	CCMWA/Canton/2007	17,702	NA	NA
Coosa River				
Weiss Dam and Lake	APC/AL/1961	306,655	263,417	10.0
H. Neely Henry Dam and Lake	APC/AL/1966	120,853	118,210	4.5
Logan Martin Dam and Lake	APC/AL/1964	273,467	144,383	5.5
Lay Dam and Lake	APC/AL/1914	262,887	92,352	3.5
Mitchell Dam and Lake	APC/AL/1923	170,783	51,577	1.9
Jordan Dam and Lake	APC/AL/1928	236,130	19,057	0.7
Walter Bouldin Dam	APC/AL/1967	236,130	NA	--
Tallapoosa River				
Harris Dam and Lake	APC/AL/1982	425,721	207,317	7.9
Martin Dam and Lake	APC/AL/1926	1,628,303	1,202,340	45.7
Yates Dam and Lake	APC/AL/1928	53,908	6,928	0.3
Thurlow Dam and Lake	APC/AL/1930	17,976	NA	--
Alabama River				
Robert F. Henry Lock and Dam/ R.E. “Bob” Woodruff Lake	Corps/AL/1972	247,210	36,450	1.4
Millers Ferry Lock and Dam/ William “Bill” Dannelly Lake	Corps/AL/1969	346,254	46,704	1.8
Claiborne Lock and Dam and Lake	Corps/AL/1969	102,480	NA	--

III – DROUGHT IDENTIFICATION

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

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

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

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

Various products are used to detect and monitor the extent and severity of basin drought conditions. One key indicator is the U.S. Drought Monitor available through the U.S. Drought Portal, www.drought.gov. The National Weather Service (NWS) Climate Prediction Center (CPC) also develops short-term (6- to 10-day and 8- to 14-day) and long-term (1-month and 3-month) precipitation and temperature outlooks and a U.S. Seasonal Drought Outlook, which are useful products for monitoring dry conditions. The Palmer Drought Severity Index is also used as a drought reference. The Palmer index assesses total moisture by using temperature and precipitation to compute water supply and demand and soil moisture. It is considered most relevant for non-irrigated cropland and primarily reflects long-term drought. However, the index requires detailed data and cannot reflect an operation of a reservoir system. The Alabama Office of the State Climatologist also produces a Lawn and Garden Moisture Index for Alabama, Florida, Georgia, and South Carolina, 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 conditions, 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 22,739 square miles: 17,254 square miles in Alabama; 5,385 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 4 – Watershed 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.

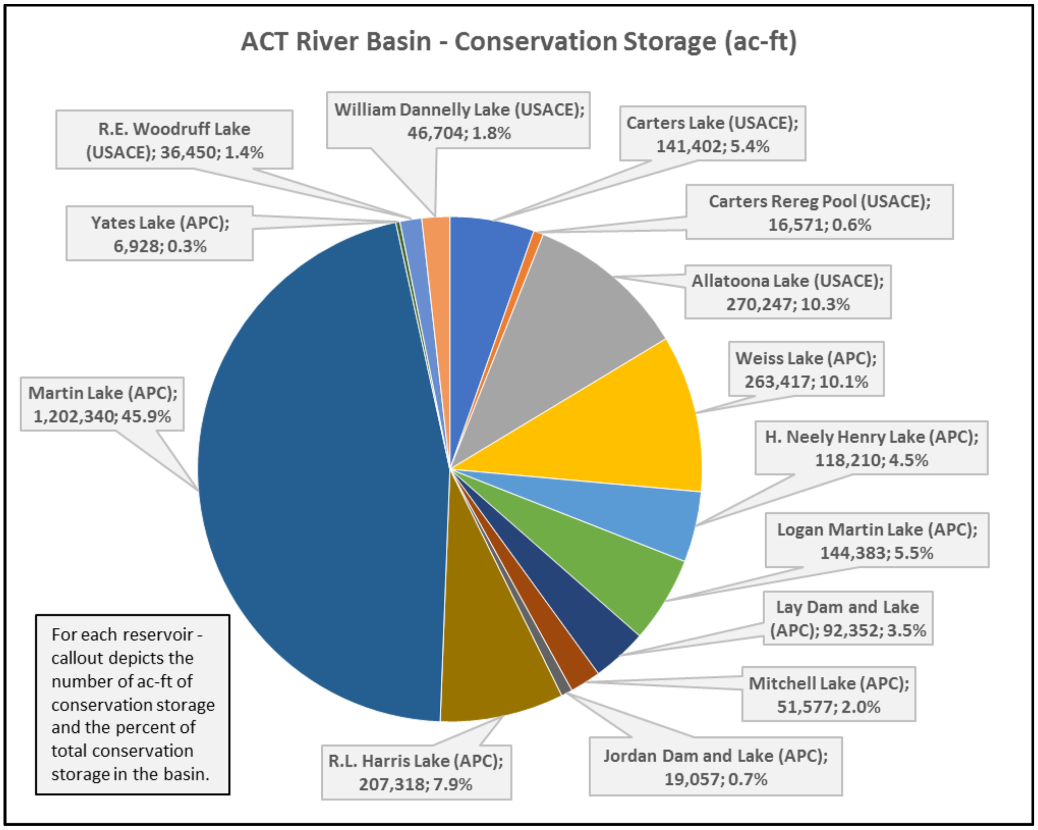


Figure 1. ACT Basin Reservoir Conservation Storage

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 45.9 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 80 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 approximately 20 percent. The two most upstream Corps reservoirs, Allatoona Lake and Carters Lake, account for 15.7 percent of the total basin conservation storage.

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

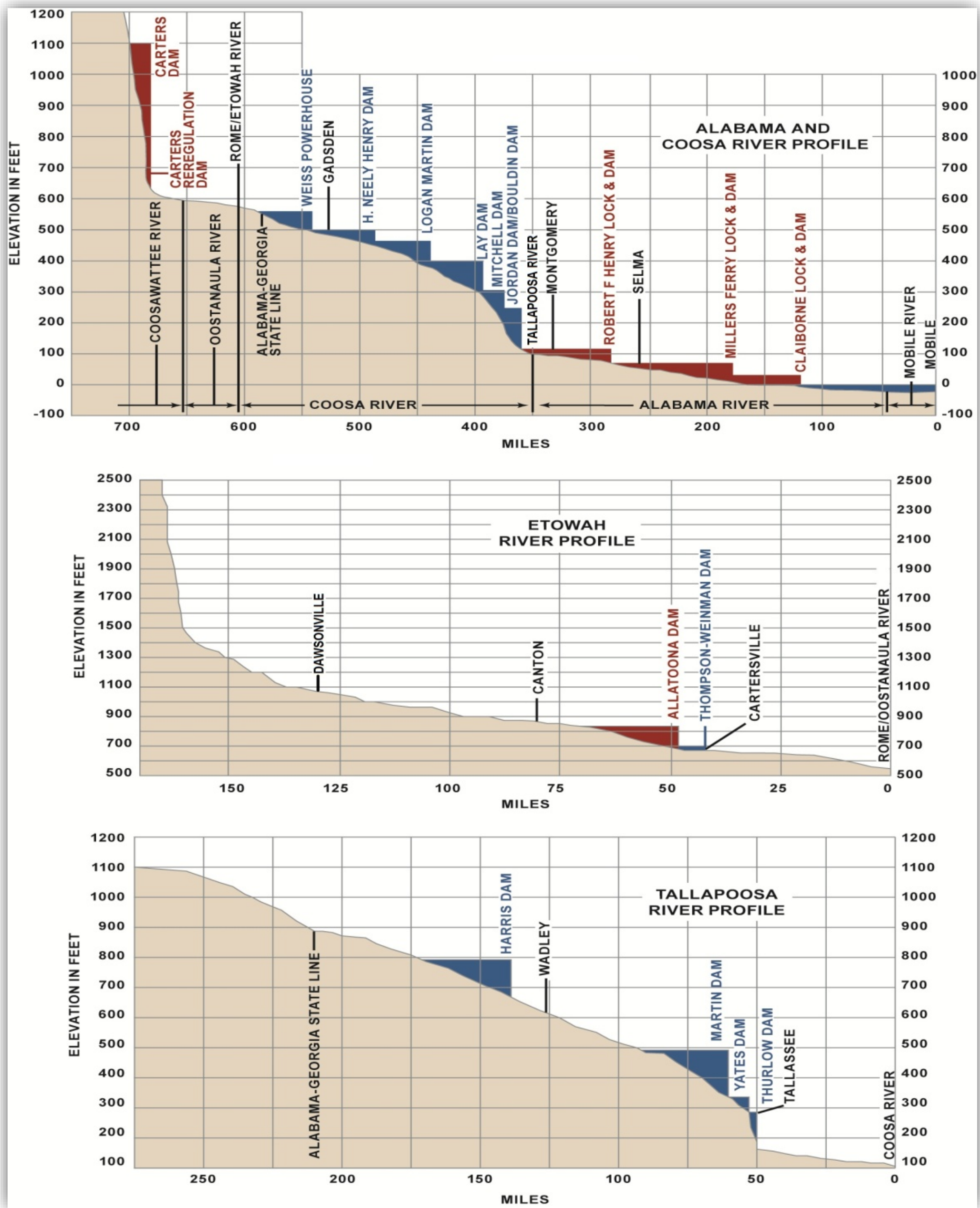


Figure 3. Alabama-Coosa-Tallapoosa River Basin Profile Map

B. **Allatoona Dam and Lake**. The Corps' Allatoona Dam on the Etowah River creates the 11,422 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 841 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 824.5 feet NGVD29 (1-15 January); and refills back to elevation 841 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.

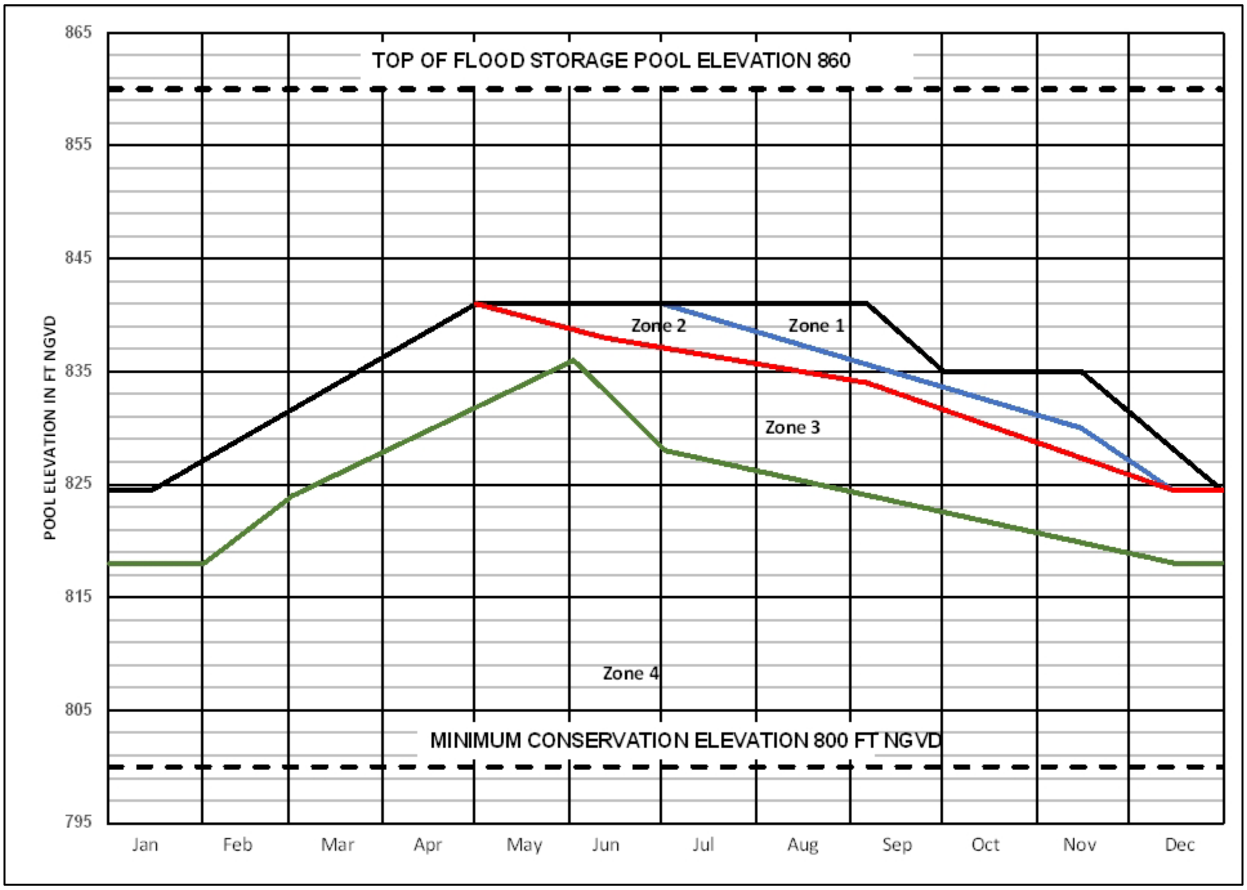


Figure 4. Allatoona Lake Guide Curve and Action Zones

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 1,074 feet NGVD29 from 1 May to 1 November; transitioning to elevation 1,072 feet NGVD29 between 1 November and 1 December; remains at elevation 1,072 feet NGVD 29 from 1 December to April; then transitioning back to 1,074 feet NGVD29 between 1 April and 1 May. This is 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 conservation. 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.

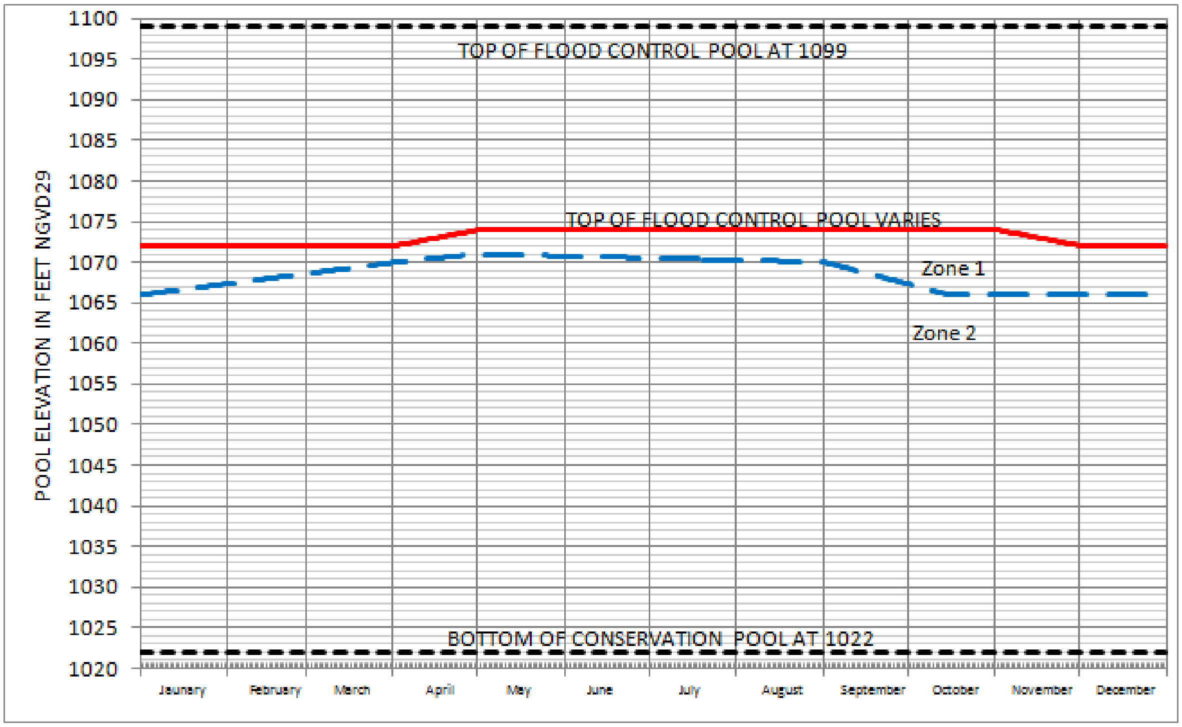


Figure 5. Carters Lake Guide Curve and Action Zones

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 three 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 understanding between the Corps and APC (Exhibit B of the *Master Water Control Manual, Alabama-Coosa-Tallapoosa (ACT) River Basin, Alabama, Georgia*), 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 30,027 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 15,269-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.

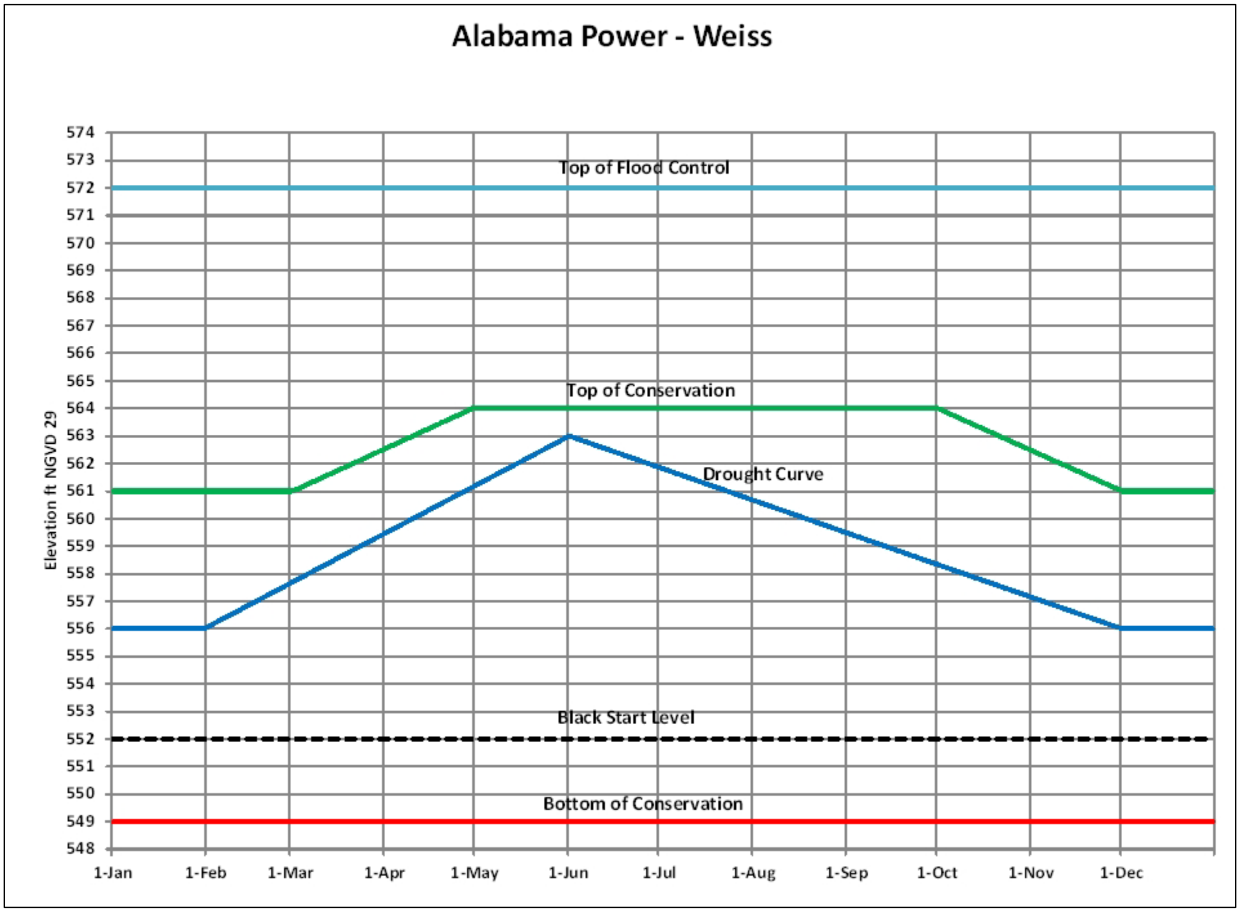


Figure 6. Weiss Lake Guide Curve

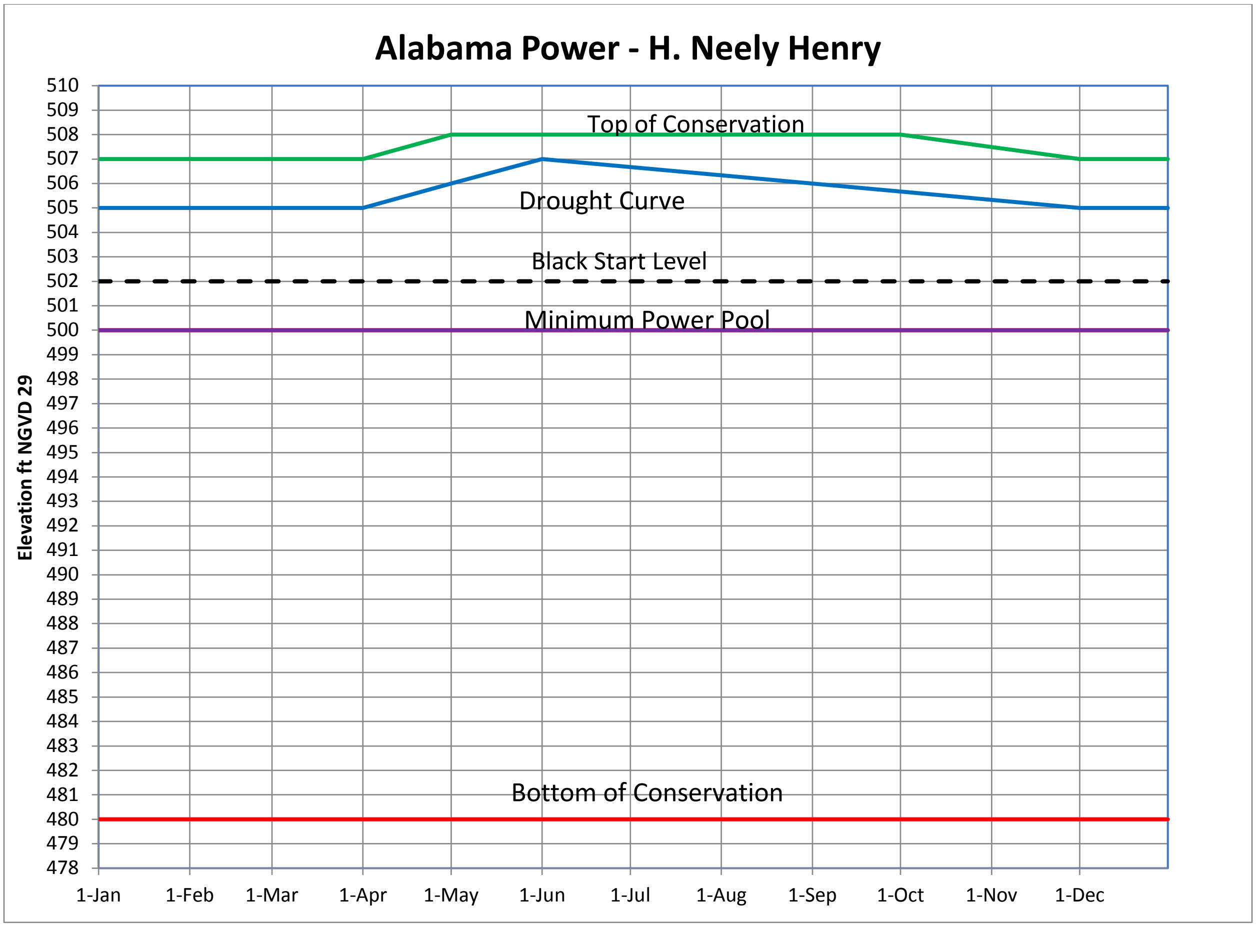


Figure 7. H. Neely Henry Lake Guide Curve

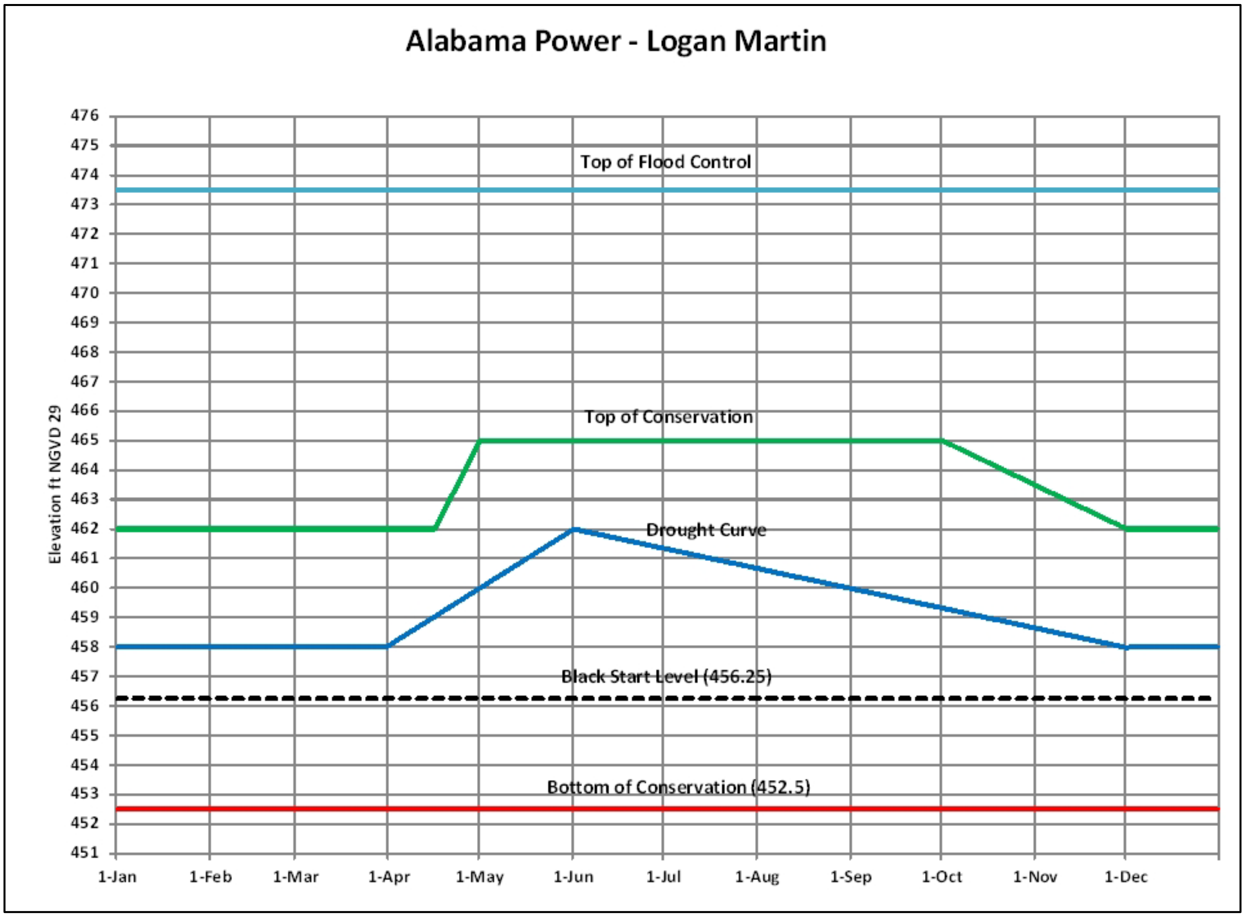
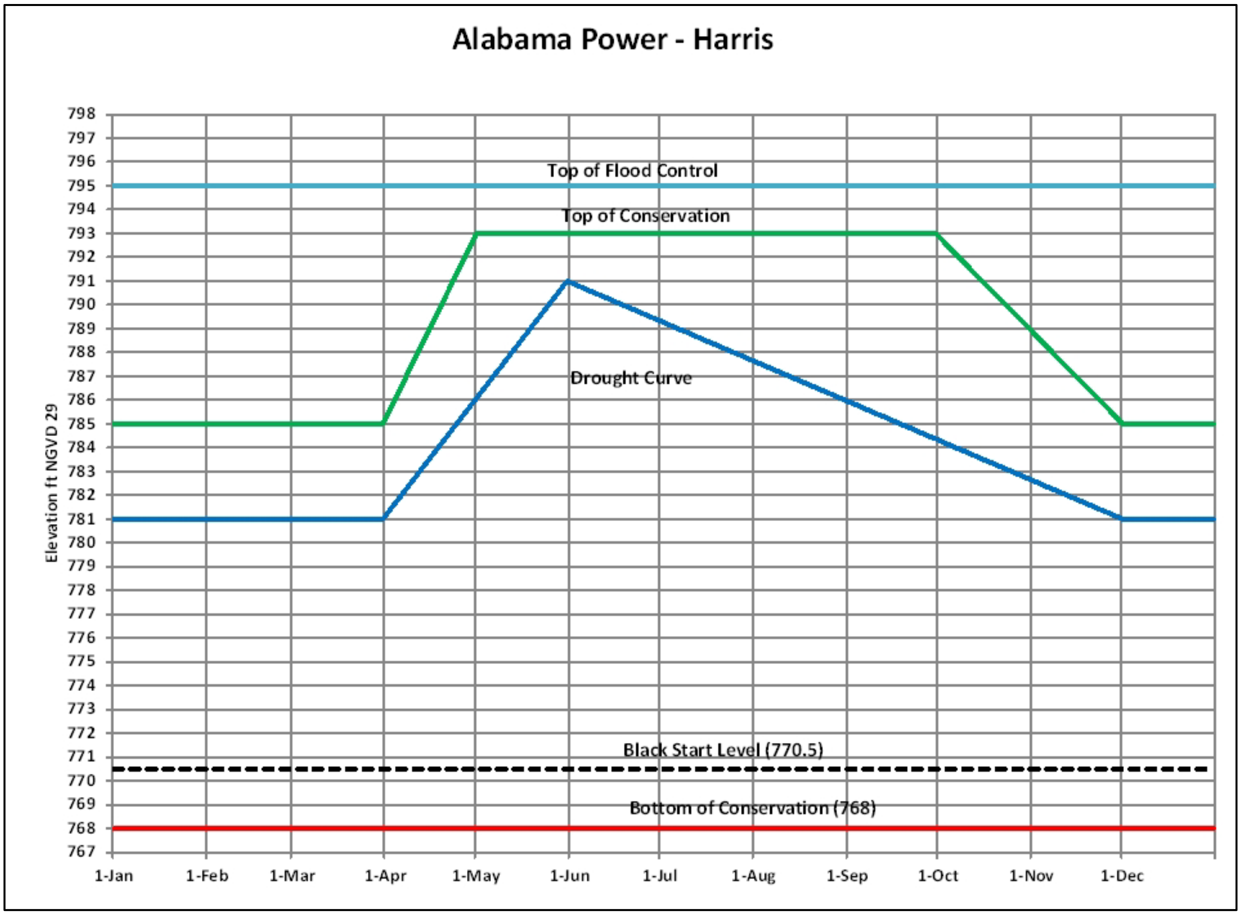


Figure 8. Logan Martin Lake Guide Curve

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 a memorandum of understanding between the Corps and APC, individual water control manuals for the APC projects, and this DCP.

1


2 **Figure 9. Robert L. Harris Lake Guide Curve**

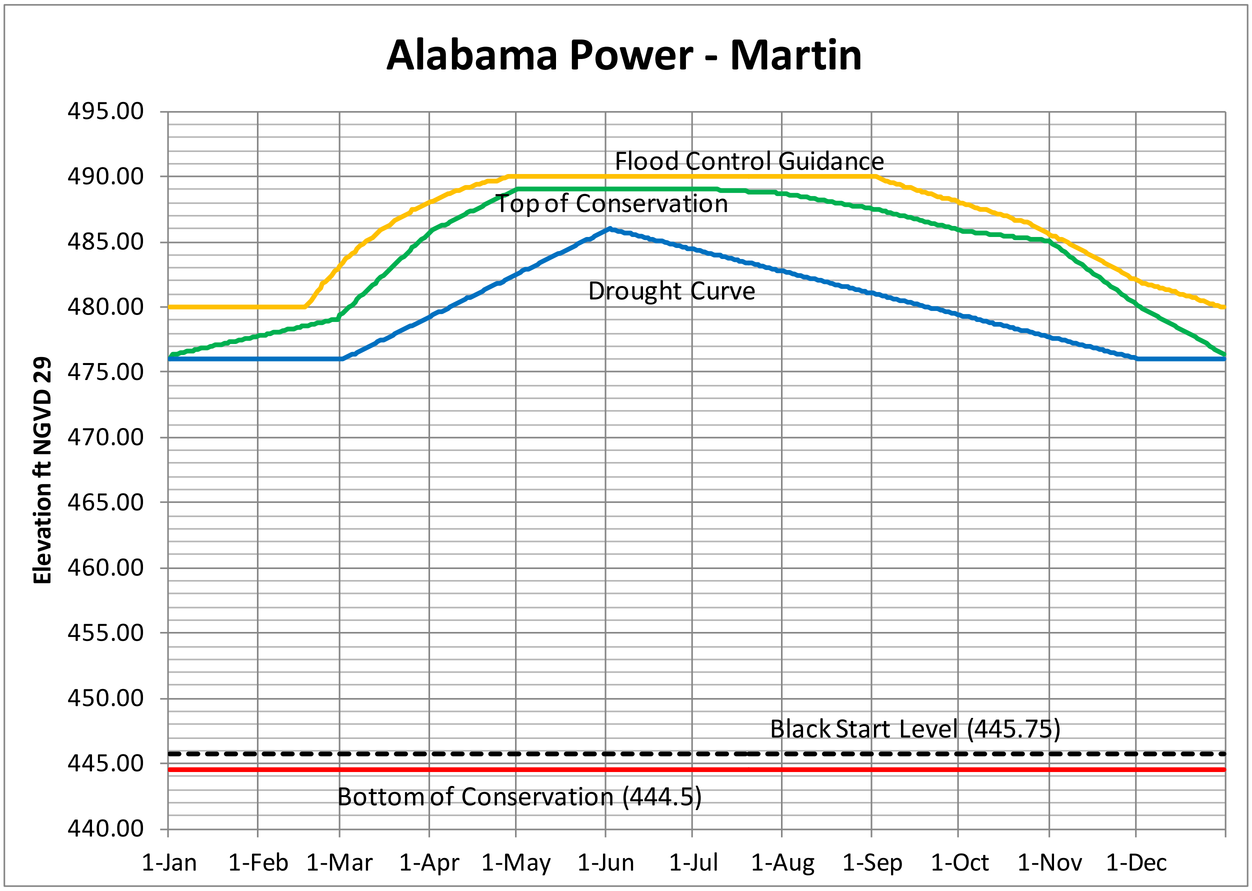


Figure 10. Martin Lake Guide Curve

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) <u>Robert F. Henry</u>. 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, 78 feet NGVD29 to 80.8 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 Sprngs	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 WW Commission	105-1405-01	Murray	Holly Creek	1.100	1.000
Coosa	Chatsworth WW Commission	105-1405-02	Murray	Eton Springs	1.800	1.800
Coosa	Chatsworth WW 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

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	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
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

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	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
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
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

VI. – CONSTRAINTS

6-01. <u>General.</u> The availability of water resources in the ACT Basin is constrained by existing water supply storage contracts, Corps water control manuals, minimum flow requirements from Allatoona and Carters Dams, APC FERC licenses, Corps-APC Memorandum of Understanding, and industrial water quality flow needs. Existing water supply storage contracts do not include the use of the inactive storage pool and would require developing and implementing an emergency storage contract in order to access this water resource. Each Corps project has a water control manual that specifies operational requirements for varying basin conditions and requires a deviation approval to operate outside the parameters established by the manual. The Allatoona Project has a minimum flow release requirement of 240 cfs for downstream purposes. The Carters Project has a seasonally varying minimum flow release requirement that ranges from 250 – 865 cfs during normal conditions and a minimum of 240 cfs during low flow conditions. The APC projects are operated under FERC licenses which define specific operational requirements for each project and require approval from FERC and possibly the Corps and State agencies before any revised operations could be implemented. The Corps and APC projects are also operated under the rules and regulations found in the Corps-APC Memorandum of Understanding, which describes operational requirements for flood conditions and navigation within the ACT Basin. Some industrial NPDES permits within the ACT Basin have water quality discharge limitations which are impacted by the volume of water flow in the river.

VII – DROUGHT MANAGEMENT PLAN

7-01. <u>General</u>. 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 manual 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 one to three. The DIL is determined on the basis of three basin drought criteria (or triggers). 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 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 is the sum of the total filling volume plus 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 first and third Tuesday 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">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 1,600 to 2,000 +/-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 1,600 to 2,000 +/-cfs</td></tr>
<tr><td colspan="3">Jordan 1,600 +/-cfs</td><td colspan="4">Jordan 1,600 to 2,000 +/-cfs</td><td colspan="3">Jordan 2,000 +/-cfs</td><td colspan="2">Jordan 1,600 to 2,000 +/-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 4,640 cfs flow</td></tr>
<tr><td colspan="4">4,200 cfs (10% Cut) - Montgomery</td><td colspan="6">4,640 cfs - Montgomery</td><td colspan="3">Reduce: Full – 4,200 cfs</td></tr>
<tr><td colspan="5">3,700 cfs (20% Cut) - Montgomery</td><td colspan="5">4,200 cfs (10% 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% 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	Minimum JBT Target Flow	Required Basin Inflow
Jan	628	0	628	4,640	5,268
Feb	626	1,968	2,594	4,640	7,234
Mar	603	2,900	3,503	4,640	8,143
Apr	1,683	2,585	4,269	4,640	8,909
May	248	0	248	4,640	4,888
Jun			0	4,640	4,640
Jul			0	4,640	4,640
Aug			0	4,640	4,640
Sep	–612	–1,304	–1,916	4,640	2,724
Oct	–1,371	–2,132	–3,503	4,640	1,137
Nov	–920	–2,748	–3,667	4,640	973
Dec	–821	–1,126	–1,946	4,640	2,694

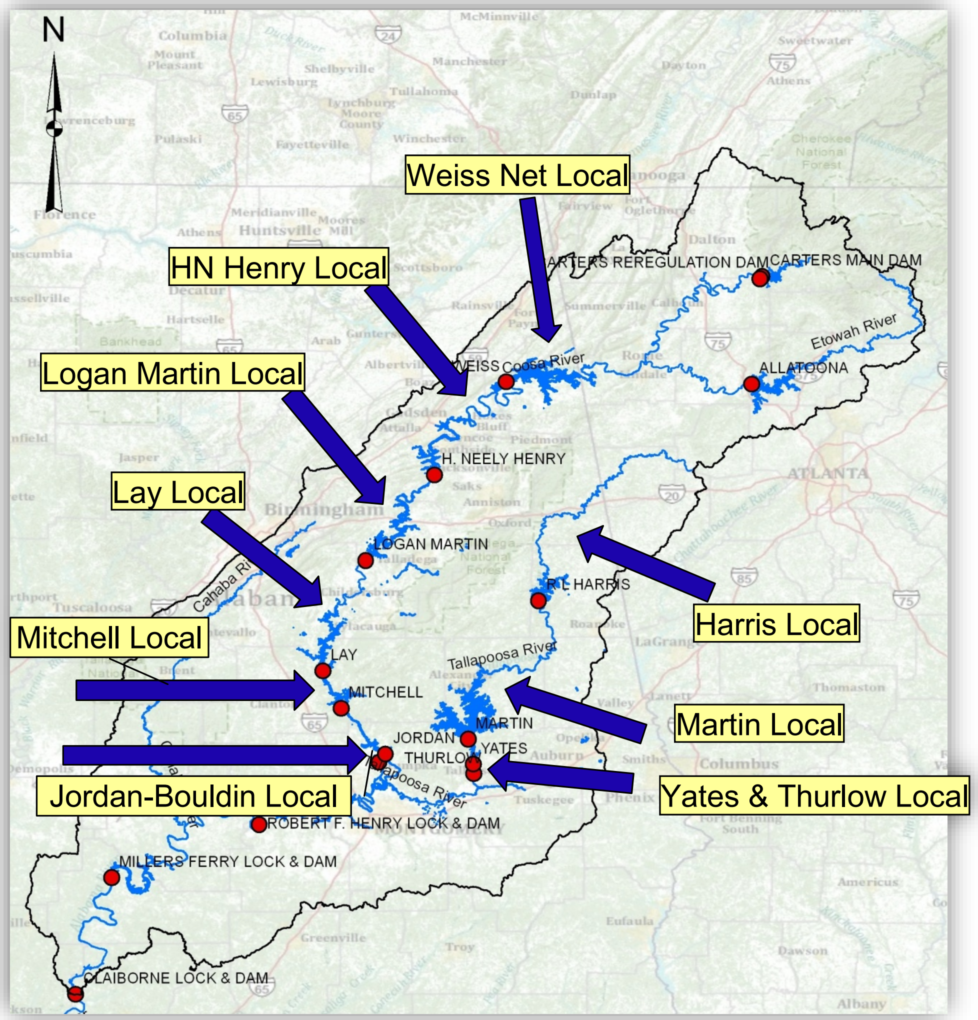
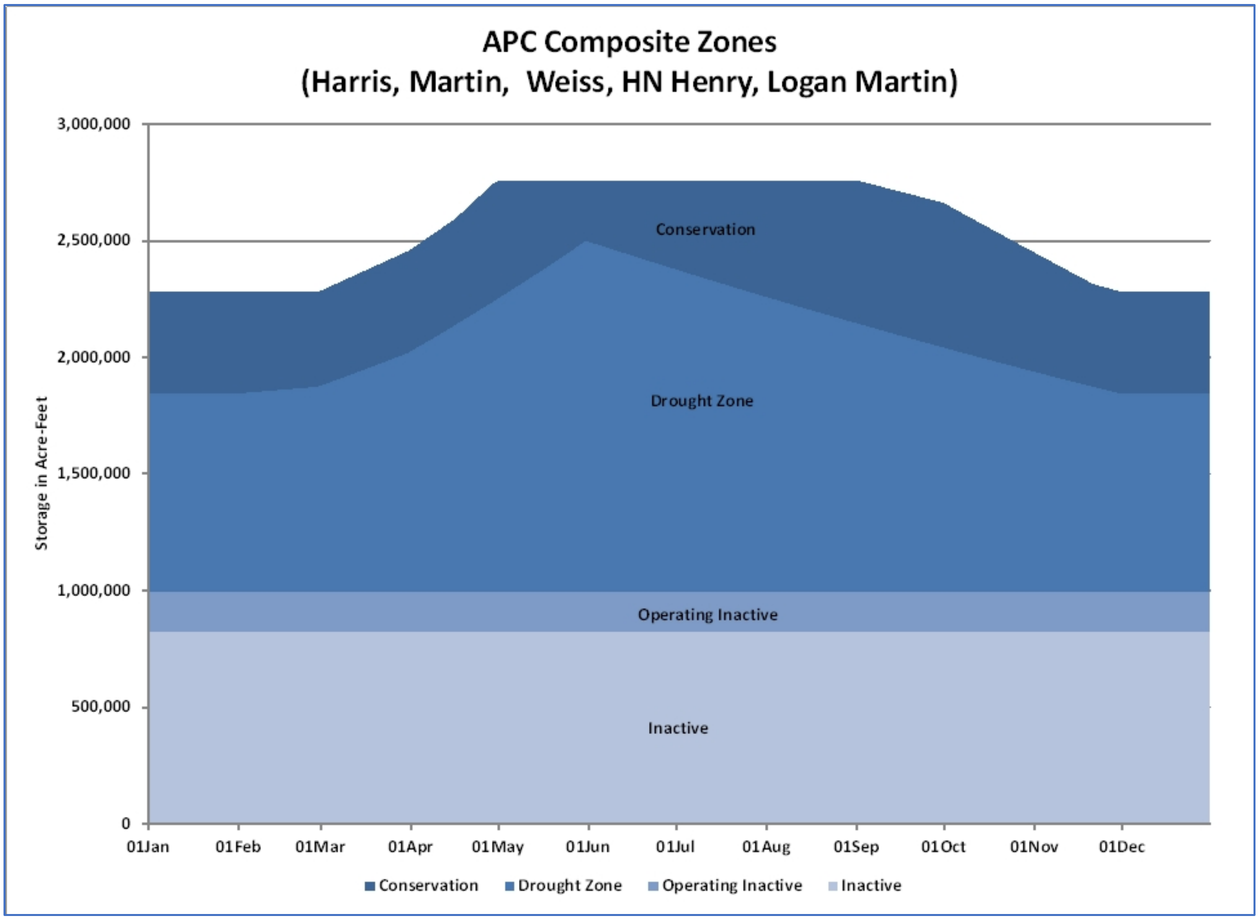


Figure 11. ACT Basin Inflows

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 first and third Tuesday of each month, and is considered along with the low state line flow trigger and basin inflow trigger.

1


2 **Figure 12. APC Composite Zones**

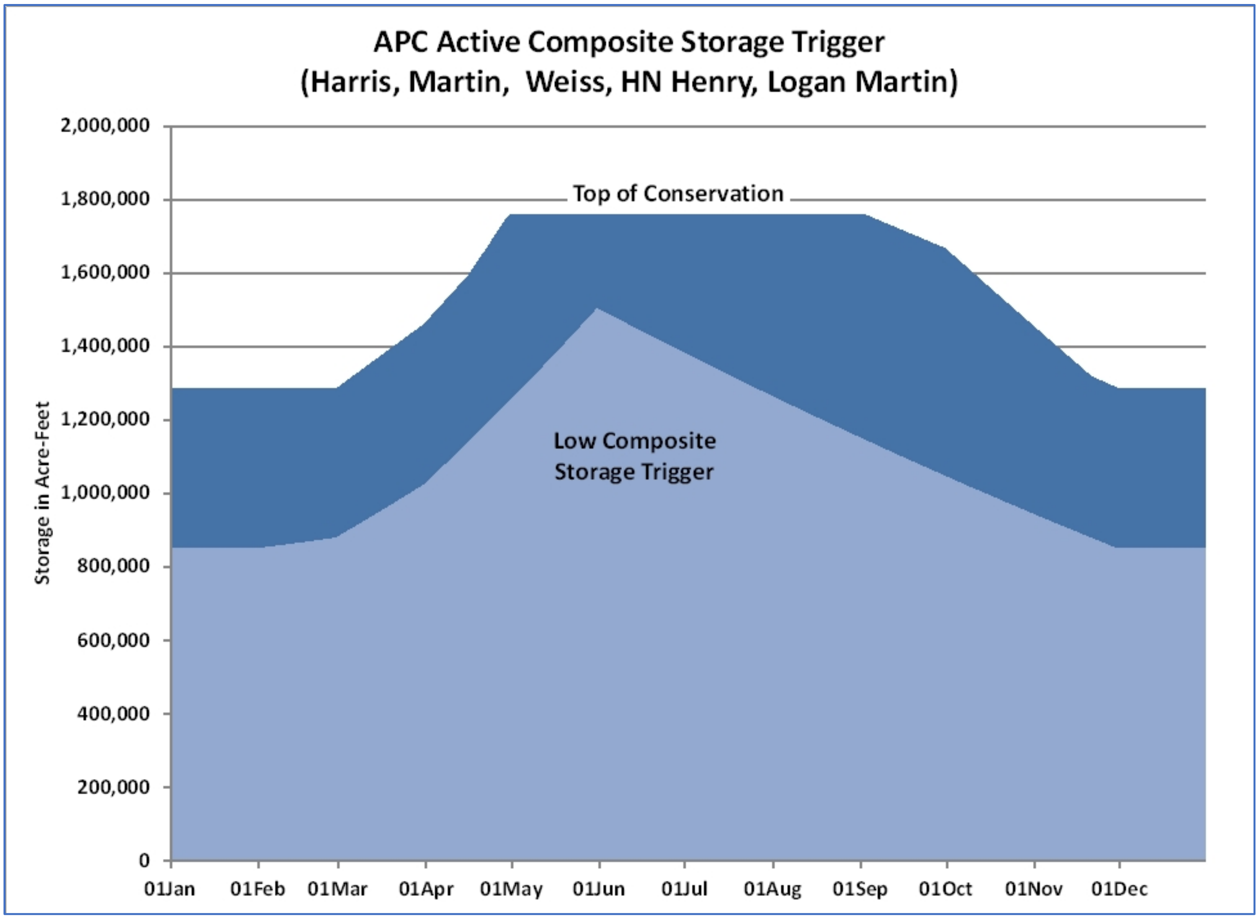


Figure 13. APC Low Composite Conservation Storage Drought Trigger

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 (determined from observed flows from 1949 – 2006). The lowest 7-day average flow over the past 14 days is computed and checked at the first and third Tuesday 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 first and third Tuesday 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 normal operating conditions.

For normal operations, 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 or 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 1,600 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. Under normal operations, the APC projects are operated to meet the needed navigation flow target or 4,640 cfs flow as defined in the navigation measure section. Once drought operations begin, 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.

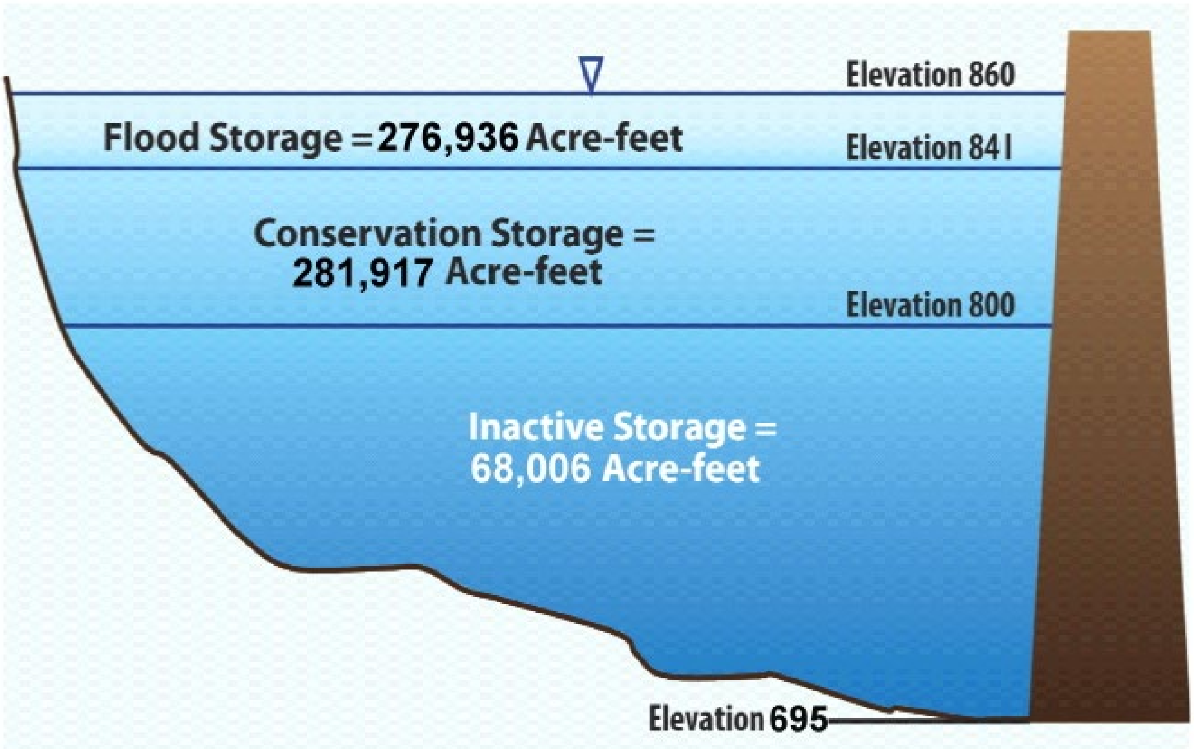


Figure 14. Storage in Allatoona Lake

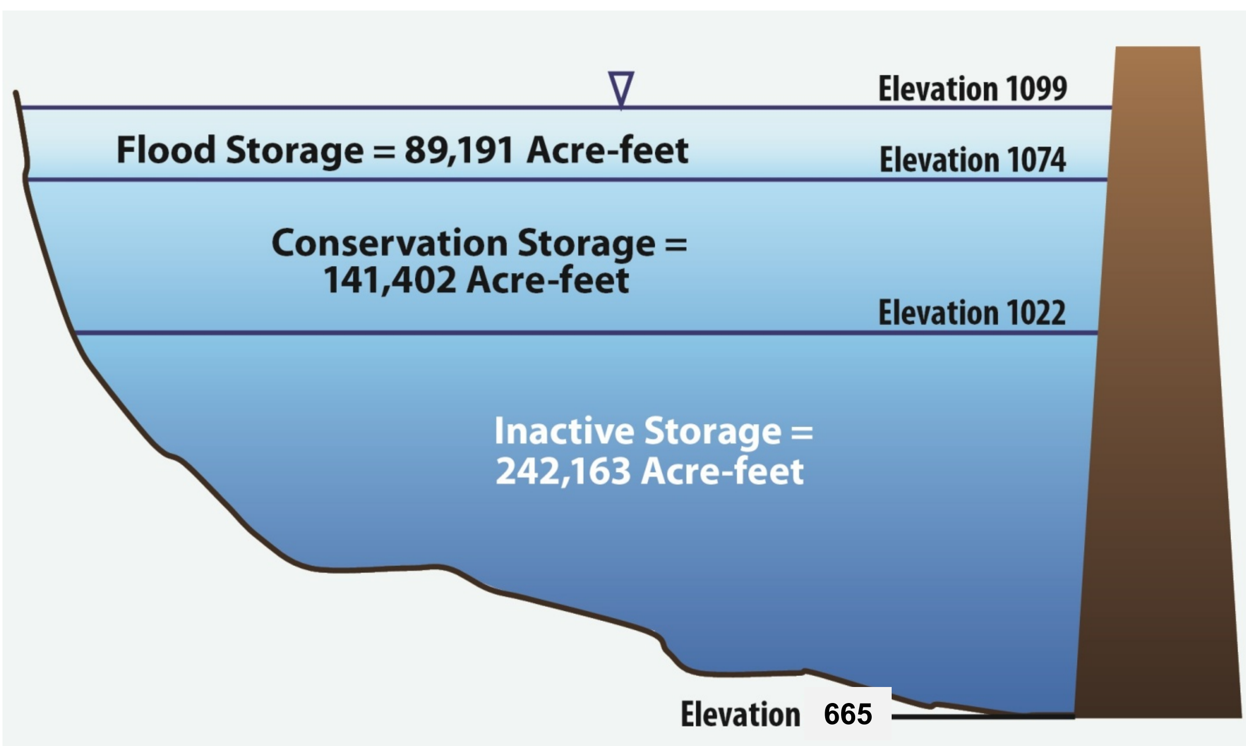


Figure 15. Storage in Carters Lake (excluding reregulation pool)

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 https://www.sam.usace.army.mil/Missions/Civil-Works/Water-Management/. 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.

EXHIBIT G

EMERGENCY CONTACT INFORMATION

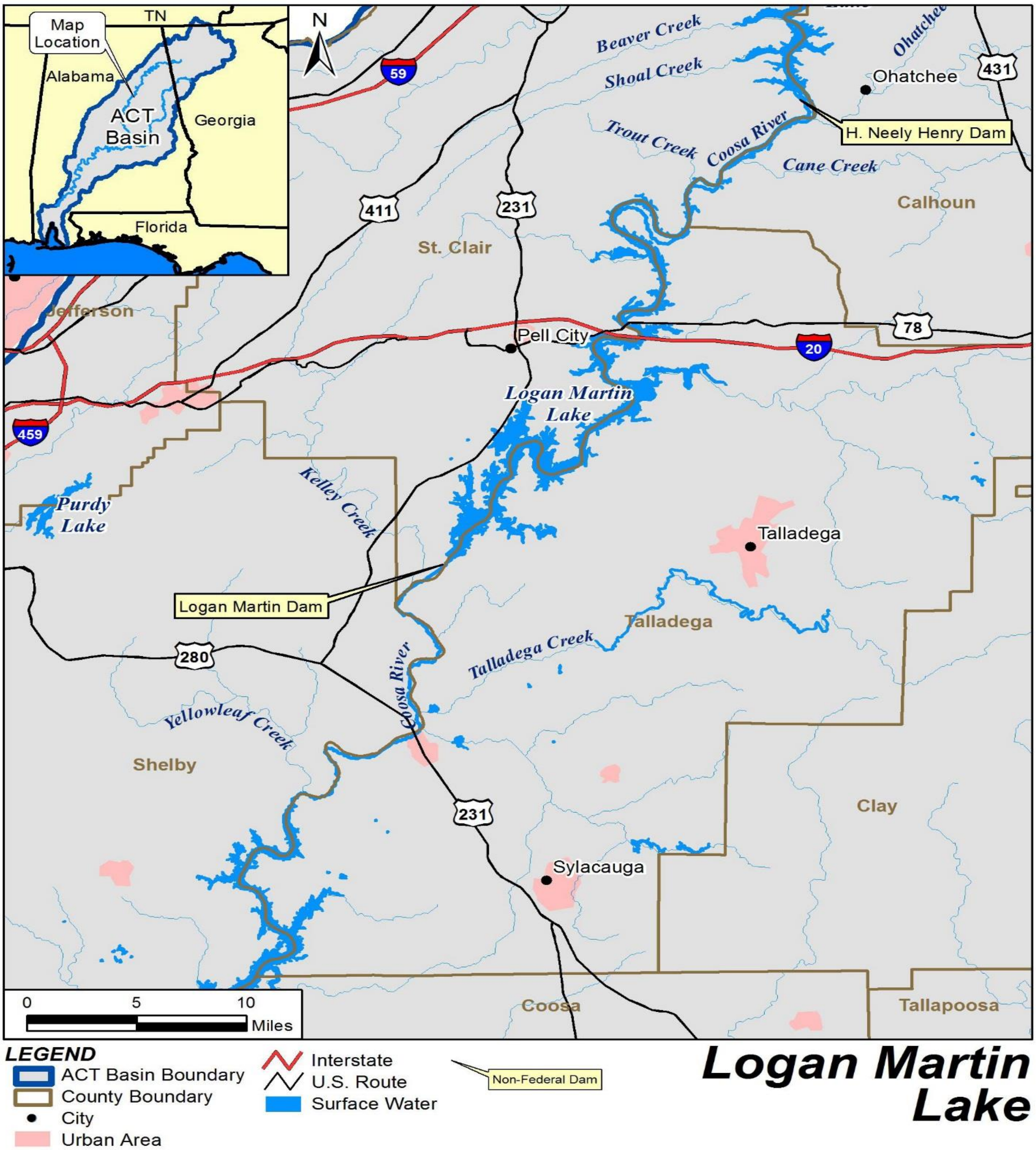
Alabama Power Company:

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

US Army Corps of Engineers:

Water Management Section	(251) 690-2737
Chief of Water Management	(251) 690-2730 or (251) 509-5368

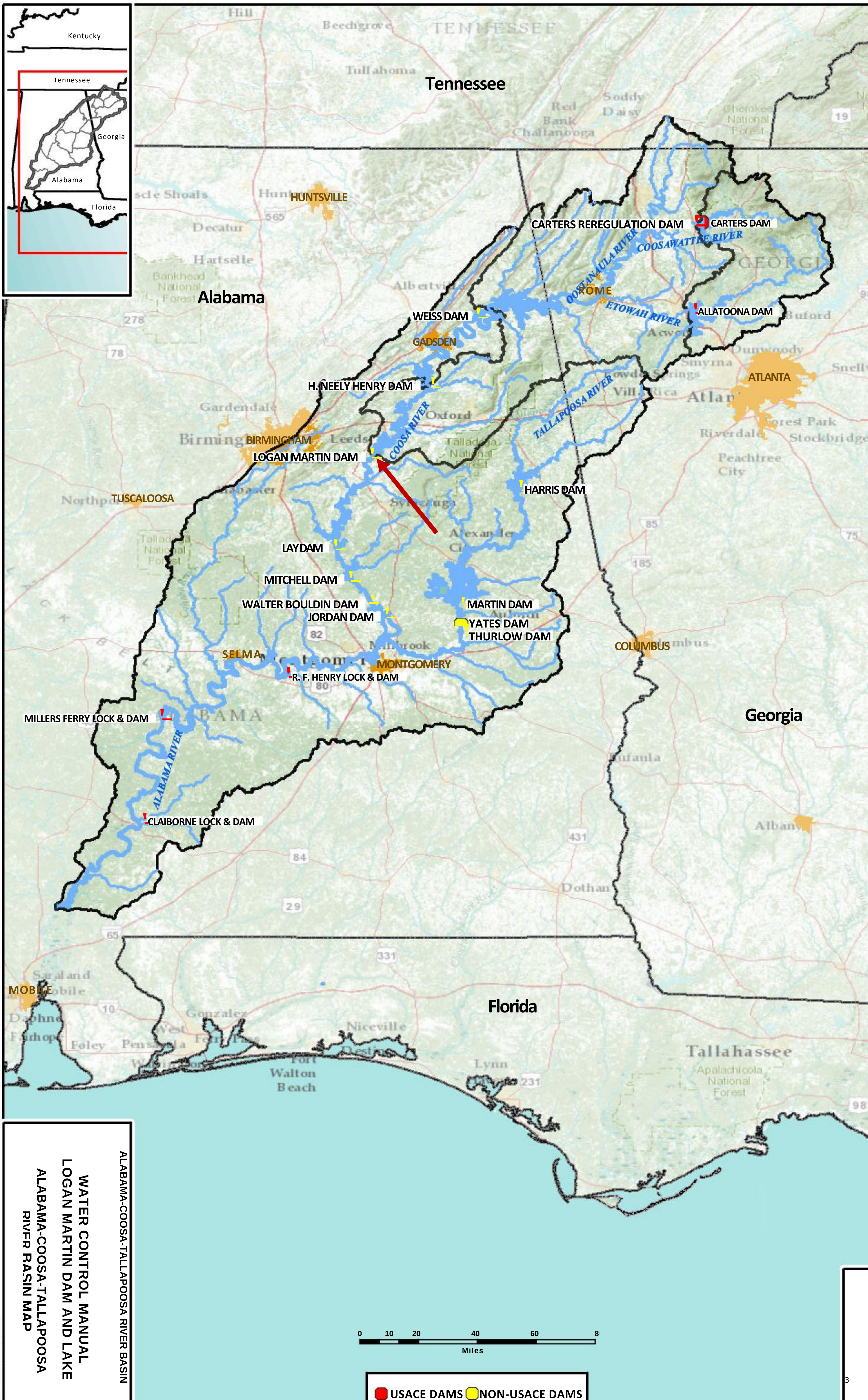
PLATES



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

PROJECT MAP



CORPS OF ENGINEERS

U.S. ARMY

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
ALABAMA-COOSA-TALLAPOOSA
RIVER BASIN MAP

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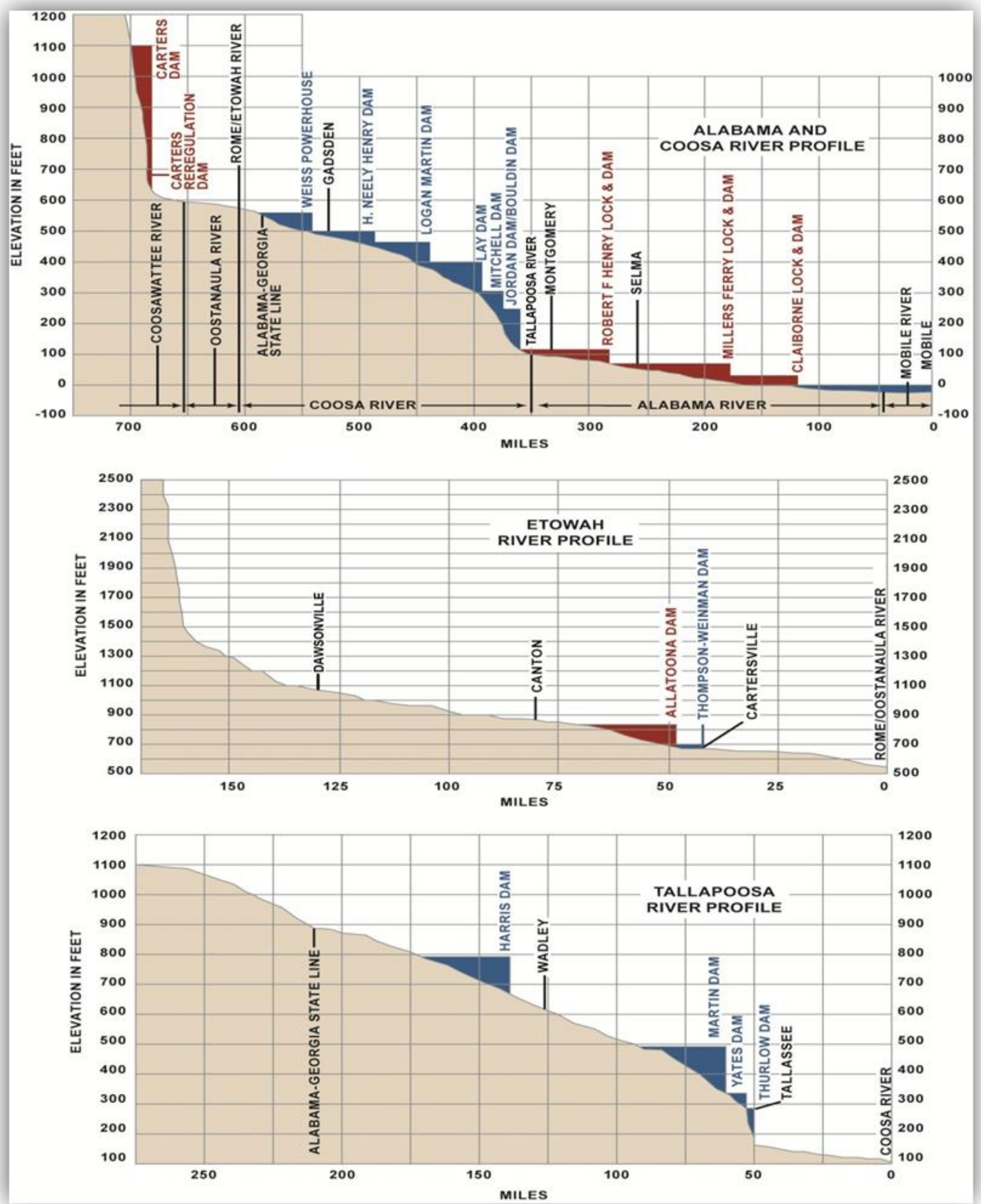
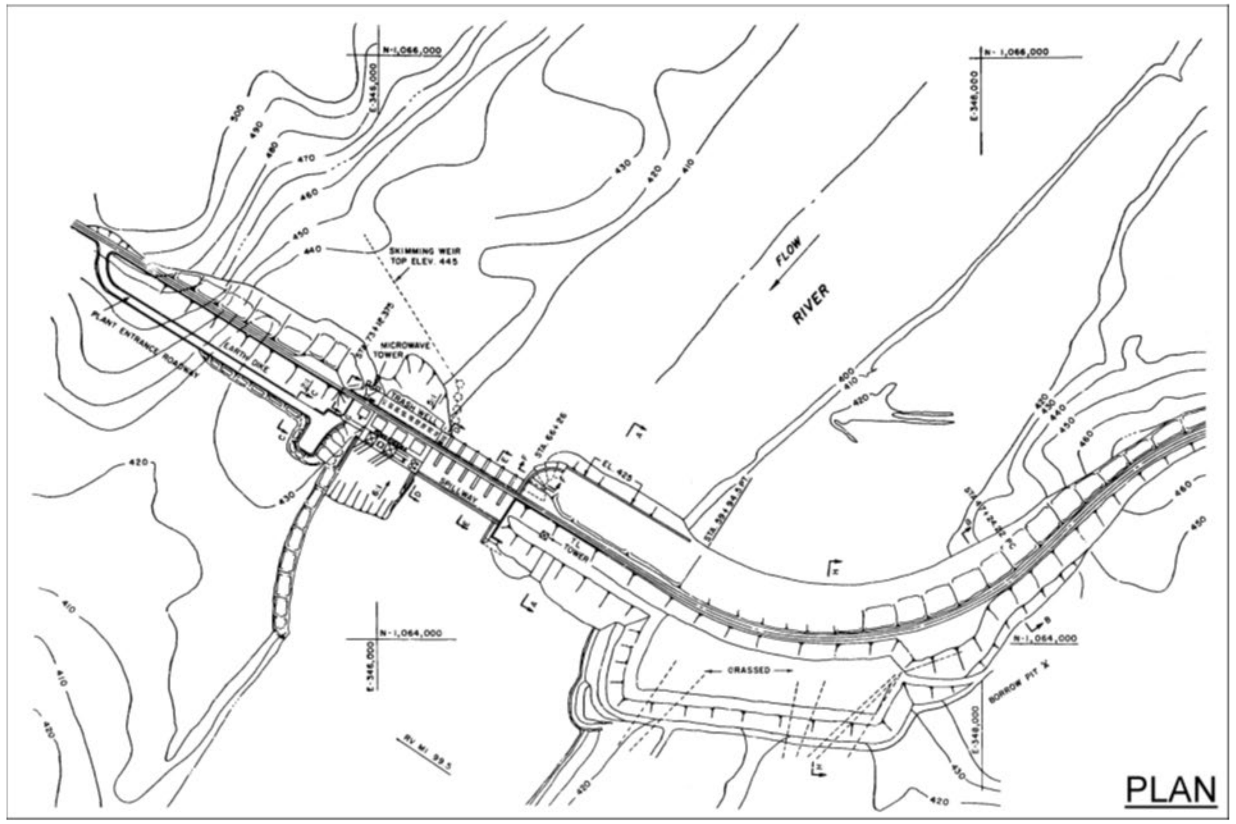
APPENDIX C PLATE 2-2

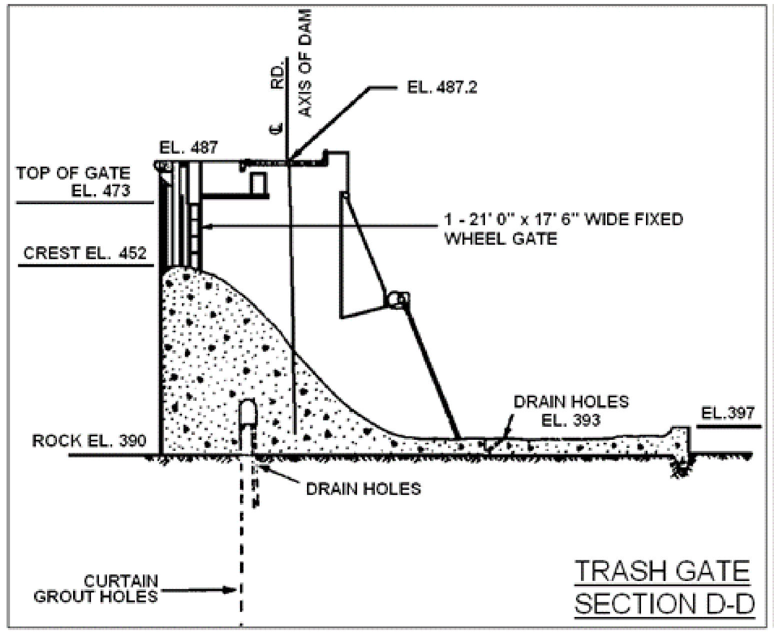


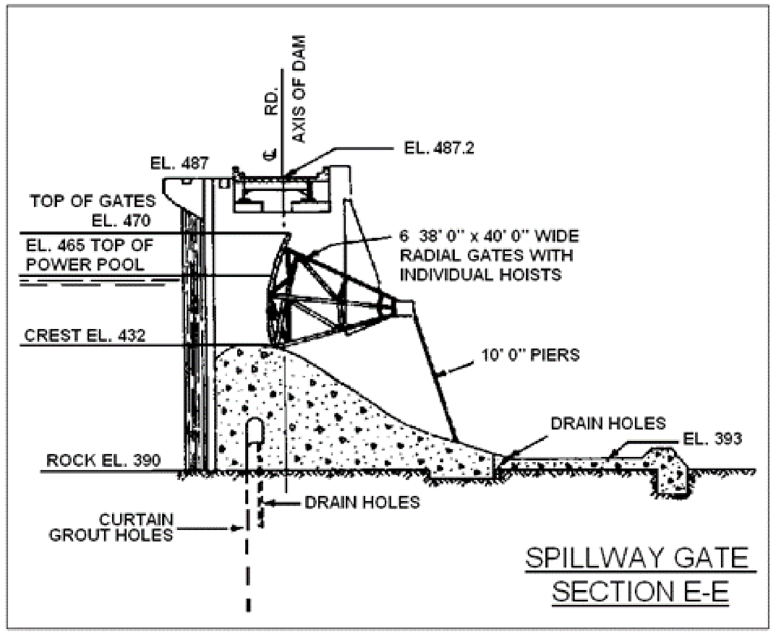
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN PROFILE







ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

POWERHOUSE PLAN
ELEVATION AND SECTION

SPILLWAY RATING TABLE

El	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	533	550	550	567	567	583	583	600	600	617	617	633	633	0	0	0	0
10	1067	1083	1100	1117	1133	1167	1183	1200	1217	1233	1250	1267	1283	0	0	0	0
15	1600	1633	1650	1683	1717	1733	1767	1783	1817	1850	1867	1900	1917	0	0	0	0
20	2133	2167	2200	2250	2283	2317	2350	2383	2417	2450	2500	2533	2550	2583	2617	0	0
25	2667	2717	2750	2800	2850	2900	2950	2983	3033	3067	3117	3150	3200	3233	3283	0	0
30	3183	3250	3300	3367	3417	3483	3533	3583	3633	3683	3733	3783	3833	3883	3933	0	0
35	3717	3783	3850	3917	3983	4050	4117	4183	4250	4300	4367	4417	4483	4533	4600	0	0
40	4250	4317	4400	4483	4550	4633	4700	4783	4850	4917	4983	5050	5133	5183	5250	5317	5383
45	4767	4850	4950	5033	5117	5200	5283	5367	5450	5533	5617	5683	5767	5833	5917	5983	6067
50	5283	5383	5483	5583	5683	5783	5867	5967	6050	6150	6233	6317	6400	6483	6567	6650	6733
55	5800	5917	6033	6133	6250	6350	6450	6550	6650	6750	6850	6950	7050	7133	7233	7317	7417
60	6317	6450	6567	6683	6800	6917	7033	7150	7250	7367	7467	7583	7683	7783	7883	7983	8083
65	6833	6967	7100	7233	7350	7483	7600	7733	7850	7967	8083	8200	8317	8433	8533	8650	8750
70	7333	7483	7633	7767	7917	8050	8183	8317	8450	8567	8700	8817	8950	9050	9183	9300	9417
75	7833	8000	8150	8317	8450	8600	8750	8900	9033	9167	9317	9450	9583	9700	9833	9967	10083
80	8333	8517	8683	8850	9000	9167	9317	9467	9617	9767	9917	10067	10200	10350	10483	10617	10750
85	8833	9017	9200	9383	9550	9717	9883	10050	10217	10367	10533	10683	10833	10983	11133	11267	11417
90	9333	9533	9717	9900	10083	10267	10450	10617	10783	10967	11133	11300	11450	11617	11767	11933	12083
95	9817	10017	10233	10433	10617	10817	11000	11183	11367	11550	11733	11900	12067	12233	12417	12567	12733
100	10300	10517	10733	10950	11150	11350	11550	11750	11950	12133	12317	12517	12683	12867	13050	13217	13400
105	10783	11000	11233	11467	11683	11900	12100	12317	12517	12717	12917	13117	13300	13483	13683	13867	14050
110	11250	11500	11733	11967	12200	12433	12650	12867	13083	13300	13500	13700	13917	14117	14300	14500	14700
115	11717	11967	12233	12467	12717	12950	13183	13417	13650	13867	14083	14300	14517	14717	14933	15133	15333
120	12183	12450	12717	12967	13233	13483	13733	13967	14200	14433	14667	14900	15117	15333	15550	15767	15983
125	12633	12917	13200	13467	13733	14000	14250	14500	14767	15000	15250	15483	15717	15950	16167	16400	16617
130	13083	13383	13667	13950	14233	14517	14783	15050	15300	15567	15817	16067	16300	16550	16783	17017	17250
135	13533	13833	14150	14433	14733	15017	15300	15583	15850	16117	16383	16633	16900	17150	17400	17633	17883
140	13967	14283	14600	14917	15233	15517	15817	16100	16383	16667	16950	17217	17483	17733	18000	18250	18500
145	14400	14733	15067	15383	15717	16017	16333	16633	16933	17217	17500	17783	18050	18333	18600	18867	19117
150	14817	15167	15517	15850	16183	16517	16833	17150	17450	17750	18050	18350	18633	18917	19200	19467	19733
155	15233	15600	15967	16317	16667	17000	17333	17650	17983	18283	18600	18900	19200	19500	19783	20067	20350
160	15650	16033	16400	16767	17133	17483	17833	18167	18500	18817	19133	19450	19767	20067	20367	20667	20950
165	16050	16450	16850	17217	17600	17950	18317	18667	19000	19350	19683	20000	20317	20633	20950	21250	21567
170	16450	16867	17267	17667	18050	18417	18800	19150	19517	19867	20200	20550	20883	21200	21533	21850	22150
175	16850	17267	17700	18100	18500	18883	19267	19650	20017	20383	20733	21083	21433	21767	22100	22433	22750
180	17233	17667	18100	18533	18950	19350	19750	20133	20517	20883	21250	21617	21967	22317	22667	23000	23333
185	17600	18067	18517	18950	19383	19800	20200	20600	21000	21383	21767	22133	22500	22867	23233	23567	23917
190	17983	18450	18917	19367	19817	20233	20667	21083	21483	21883	22283	22667	23050	23417	23783	24133	24500
195	18333	18817	19317	19767	20233	20667	21117	21533	21967	22367	22783	23167	23567	23950	24333	24700	25067
200	18683	19183	19683	20167	20650	21100	21550	22000	22433	22850	23267	23683	24083	24467	24867	25250	25633
205	19033	19550	20067	20567	21050	21517	21983	22450	22900	23333	23767	24183	24600	25000	25400	25800	26183
210	19383	19917	20450	20950	21467	21950	22433	22883	23350	23800	24250	24683	25100	25517	25933	26350	26750
215	19717	20267	20817	21333	21850	22350	22850	23333	23800	24267	24717	25167	25617	26033	26467	26883	27300
220	20033	20600	21167	21700	22250	22750	23267	23767	24250	24733	25200	25650	26117	26550	26983	27417	27833
225	20350	20933	21517	22067	22633	23150	23683	24183	24700	25183	25667	26133	26600	27050	27500	27933	28383
230	20667	21267	21867	22433	23000	23550	24083	24600	25133	25617	26133	26600	27083	27550	28017	28467	28917
235	20967	21583	22200	22783	23367	23933	24483	25017	25550	26067	26583	27067	27567	28033	28517	28983	29433
240	21250	21883	22533	23133	23733	24300	24883	25433	25967	26500	27017	27533	28033	28517	29017	29483	29950
245	0	22200	22850	23467	24083	24667	25267	25817	26383	26933	27467	27983	28500	29000	29500	29983	30467
250	0	22200	22850	23467	24083	24667	25267	25817	26383	26933	27467	27983	28500	29000	29500	29983	30467

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

SPILLWAY RATING TABLE

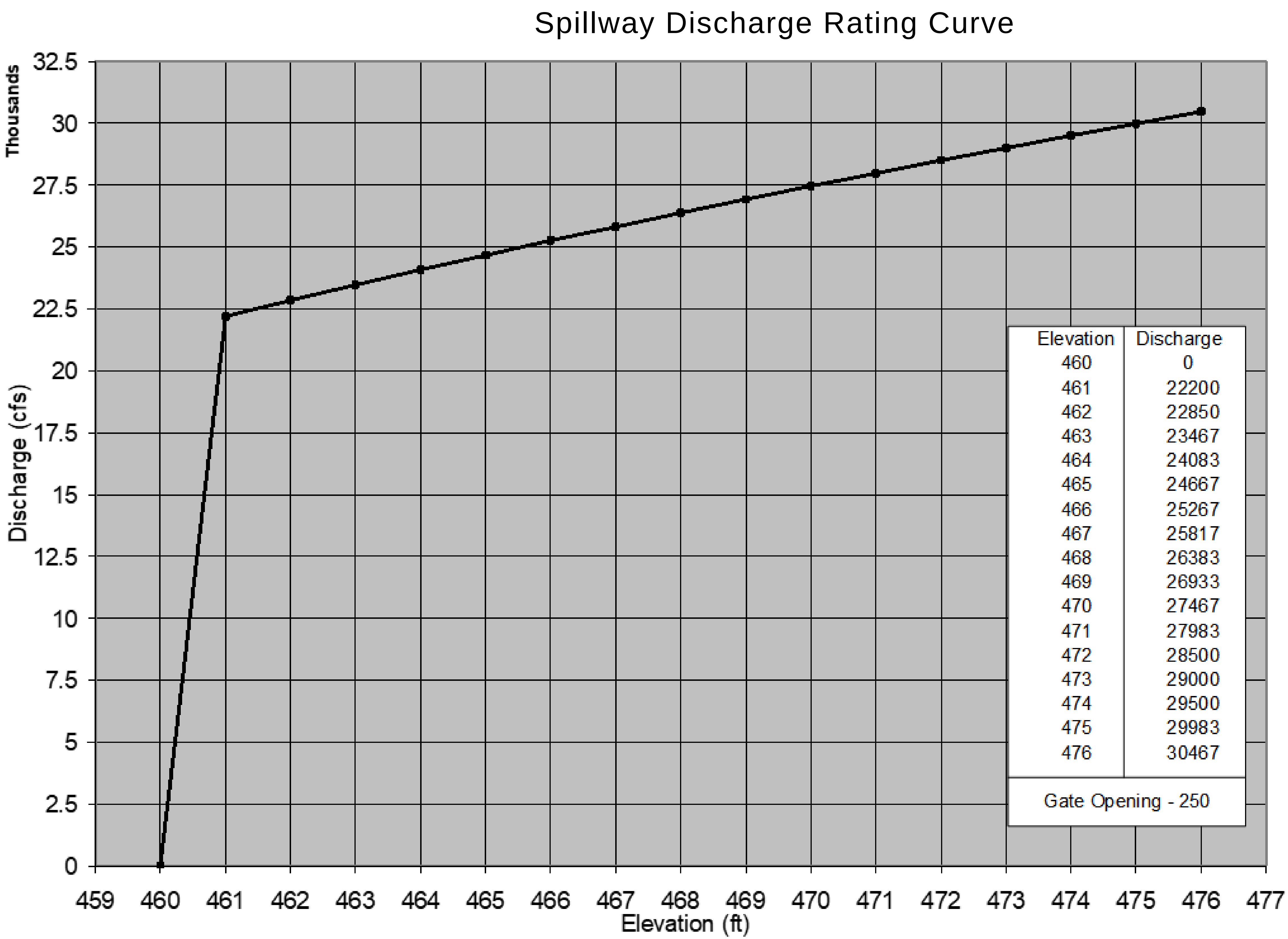
Trashbay Discharge Rating, cfs
(Full Gate)

ELEVATION FEET MSL	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
459	965	990	1010	1035	1060	1080	1105	1130	1150	1175
460	1200	1225	1250	1275	1300	1325	1350	1375	1400	1425
461	1450	1475	1500	1530	1555	1585	1610	1635	1665	1690
462	1720	1750	1775	1805	1830	1860	1890	1920	1945	1975
463	2005	2035	2065	2095	2125	2155	2185	2215	2245	2280
464	2310	2340	2370	2405	2440	2470	2500	2535	2565	2600
465	2630	2665	2700	2730	2765	2800	2830	2865	2900	2930
466	2965	3000	3035	3070	3105	3145	3180	3215	3250	3285
467	3320	3360	3395	3430	3470	3505	3545	3580	3615	3655
468	3690	3730	3770	3810	3845	3885	3925	3965	4000	4040
469	4080	4120	4160	4200	4240	4280	4320	4360	4400	4445
470	4485	4525	4565	4605	4650	4690	4730	4775	4815	4855
471	4895	4940	4985	5025	5070	5115	5155	5200	5245	5285
472	5330	5375	5420	5465	5510	5550	5595	5640	5685	5730
473	5775	5820	5865	5910	5955	6005	6050	6095	6140	6185
474	6230	6280	6325	6375	6420	6470	6515	6565	6610	6660
475	6705	6755	6805	6860	6910	6960	7010	7060	7110	7160
476	7215	7265	7315	7370	7420	7475	7525	7580	7630	7680

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

TRASHBAY DISCHARGE RATING

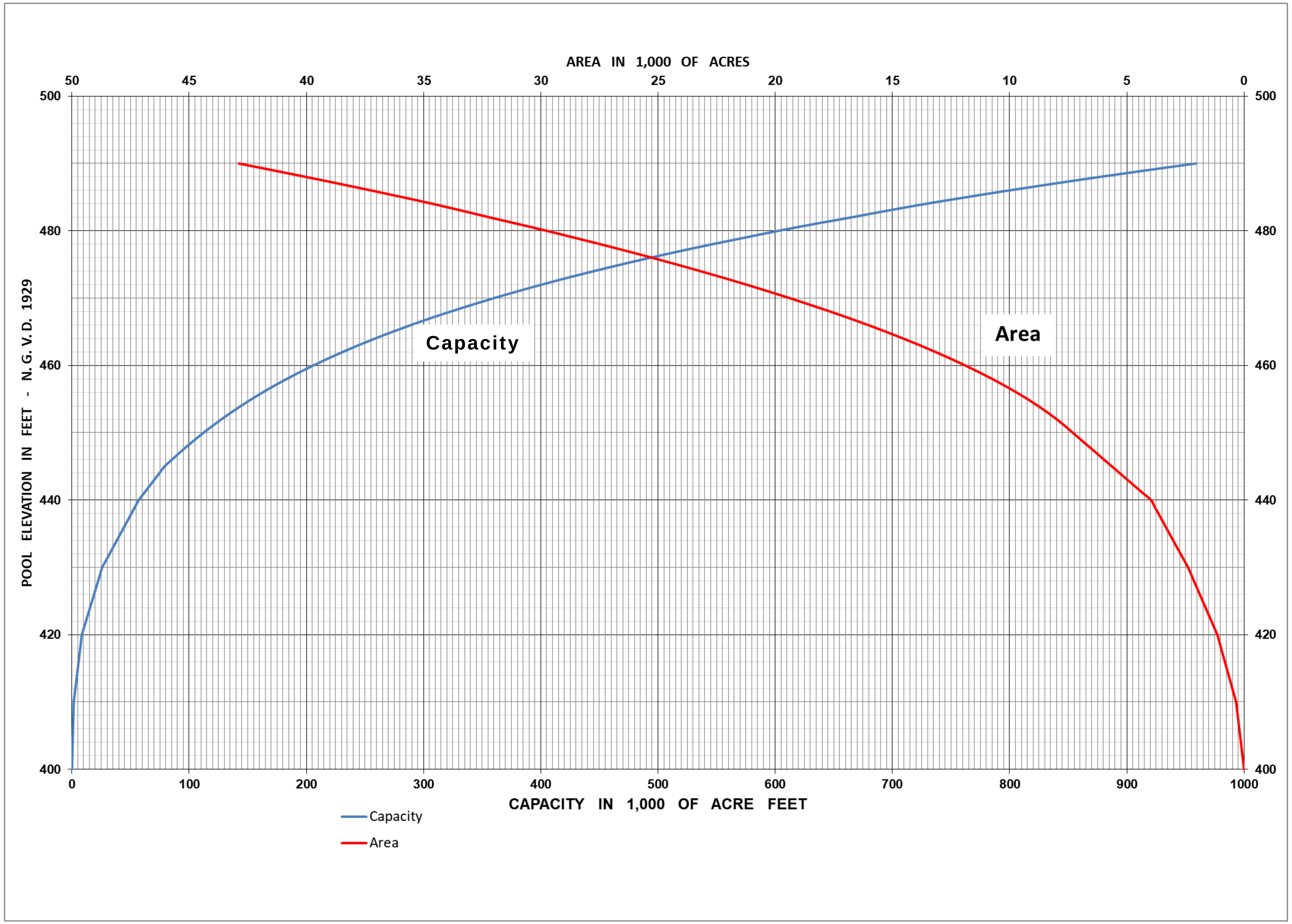


Elevation	Discharge
460	0
461	22200
462	22850
463	23467
464	24083
465	24667
466	25267
467	25817
468	26383
469	26933
470	27467
471	27983
472	28500
473	29000
474	29500
475	29983
476	30467
Gate Opening - 250	

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

SPILLWAY DISCHARGE
RATING CURVE



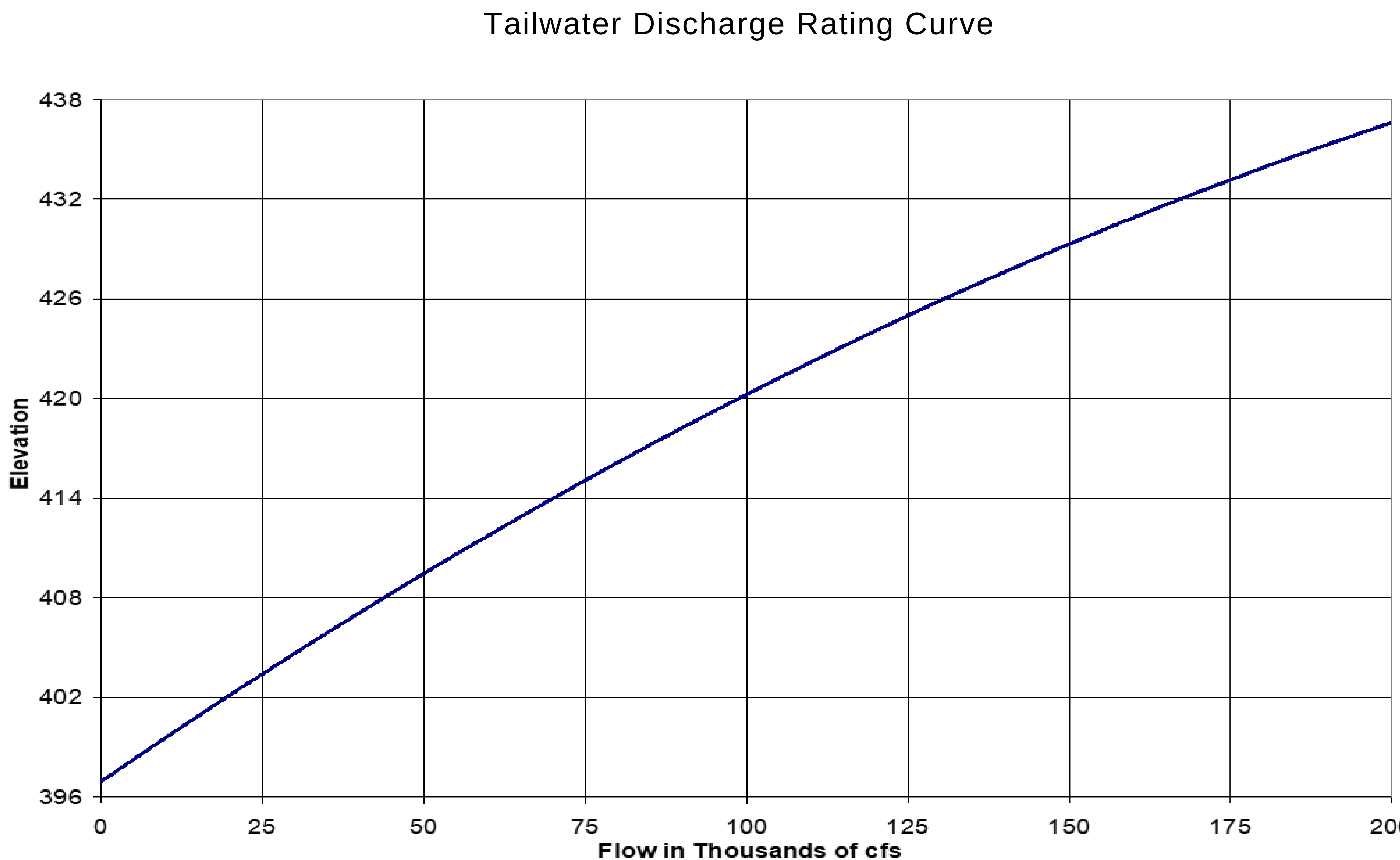
AREA CAPACITY TABLE					
Pool Elevation	Total Area (Acres)	Total Storage (Acre-Feet)	Pool Elevation (Feet)	Total Area (Acres)	Total Storage (Acre-Feet)
400	0	0	446	5970	85199
401	34	153	447	6303	91582
402	68	306	448	6636	98191
403	102	459	449	6970	105056
404	136	612	450	7303	112209
405	170	765	451	7632	119672
406	204	918	452	7989	127480
407	238	1071	[3]452.5	8182	131570
408	272	1224	453	8375	135659
409	306	1377	454	8790	144238
410	340	1530	455	9234	153247
411	420	2224	456	9707	162714
412	500	2918	457	10209	172670
413	580	3612	458	10742	183248
414	660	4306	459	11303	194270
415	740	5000	460	11894	205865
416	820	5694	461	12508	218064
417	900	6388	462	13157	230893
418	980	7082	463	13831	244385
419	1060	7776	464	14535	258567
420	1140	8470	[2]465	15269	273467
421	1265	10205	466	16029	289115
422	1390	11940	467	16822	305540
423	1515	13675	468	17646	322946
424	1640	15410	469	18498	341017
425	1765	17145	[5]470	19377	359954
426	1890	18880	471	20283	379783
427	2015	20615	472	21219	400532
428	2140	22350	473	22183	422232
429	2265	24085	[1]473.5	22680	433572
430	2390	25820	474	23177	444911
431	2548	28932	475	24200	468598
[4]432	2706	32044	476	25249	493320
433	2864	35156	477	26330	519110
434	3022	38268	478	27445	545994
435	3180	41380	479	28589	574289
436	3338	44492	480	29743	602567
437	3496	47604	481	30954	632885
438	3654	50716	482	32180	664812
439	3812	53828	483	33371	695822
440	3970	56940	484	34590	728025
441	4303.3	61355	485	35900	763143
442	4636.6	65770	486	37239	799571
443	4969.9	70185	487	38608	837338
444	5303.2	74600	488	40005	876473
445	5636.5	79015	489	41431	917004
			490	42882	958777

(1) Top of flood control
(2) Top of conservation
(3) Minimum conservation
(4) Spillway crest elevation
(5) Top of gates – closed position

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

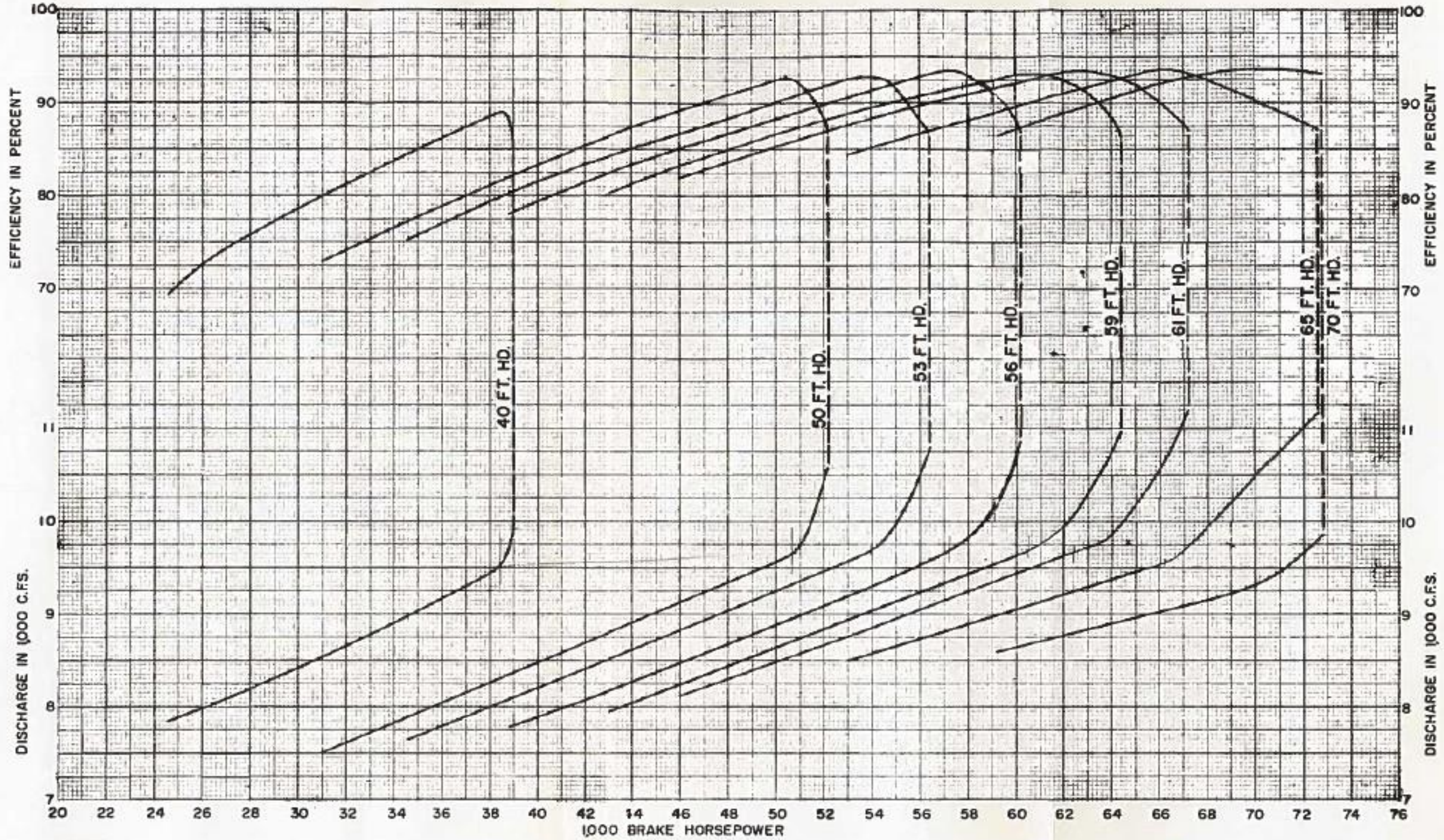
AREA AND CAPACITY



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

TAILWATER DISCHARGE RATING

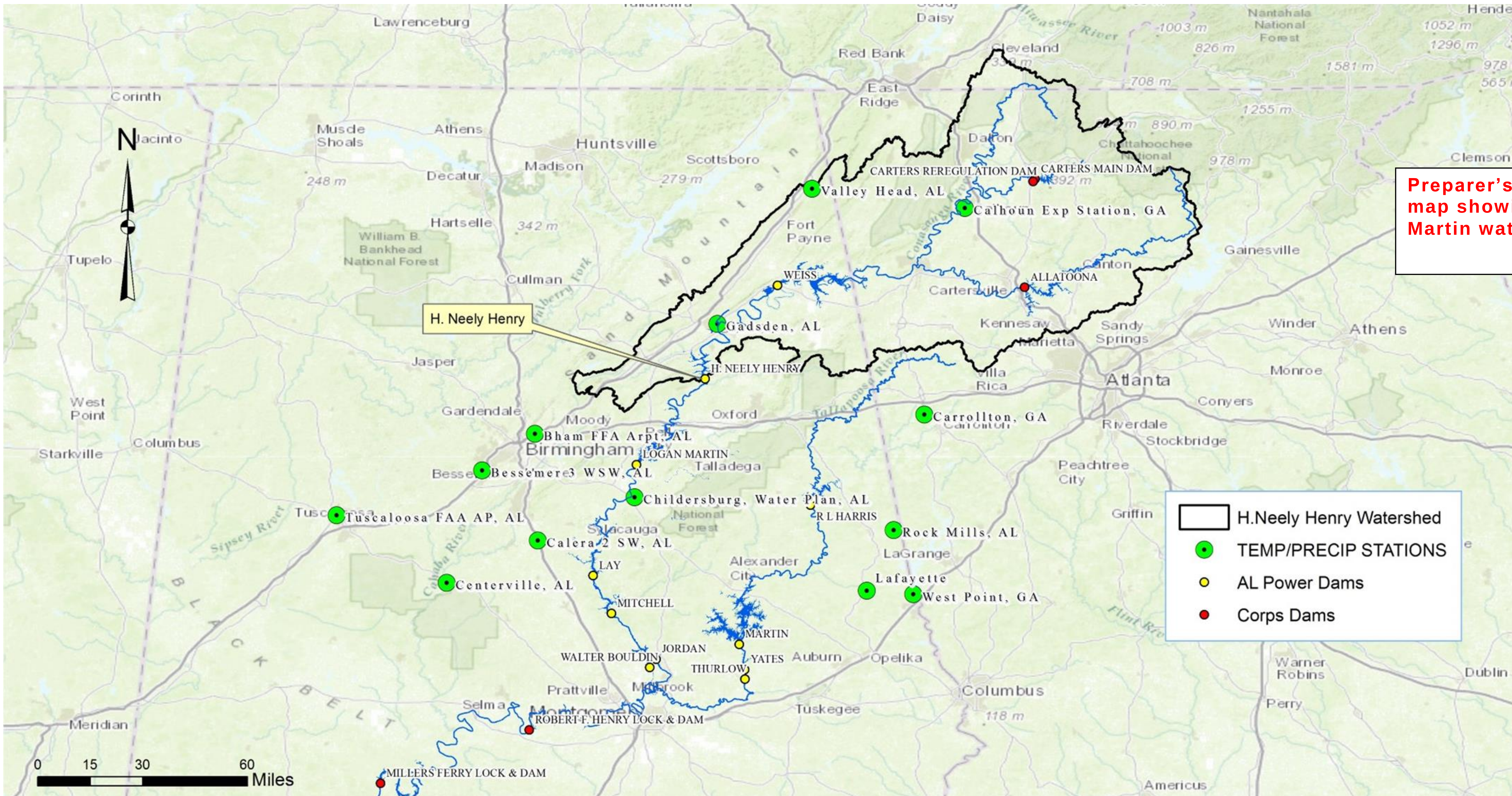


NOTE:

Expected performance curves for a vertical fixed-blade propeller turbine rated at 59,000 horsepower, at 56 ft. head, at 90 r.p.m.

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
PERFORMANCE CURVES – TURBOGENERATOR UNIT



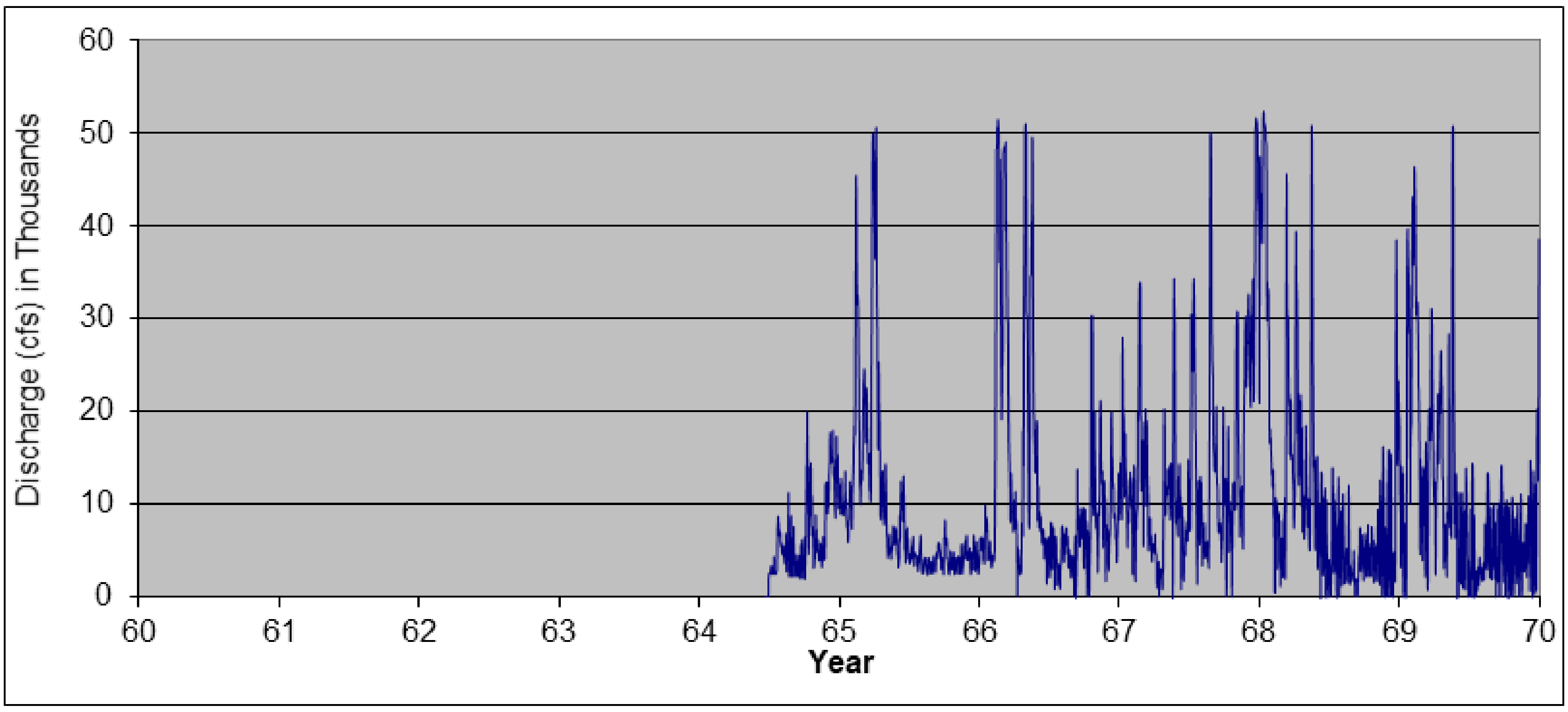
Preparer's Note: Need map showing Logan Martin watershed.

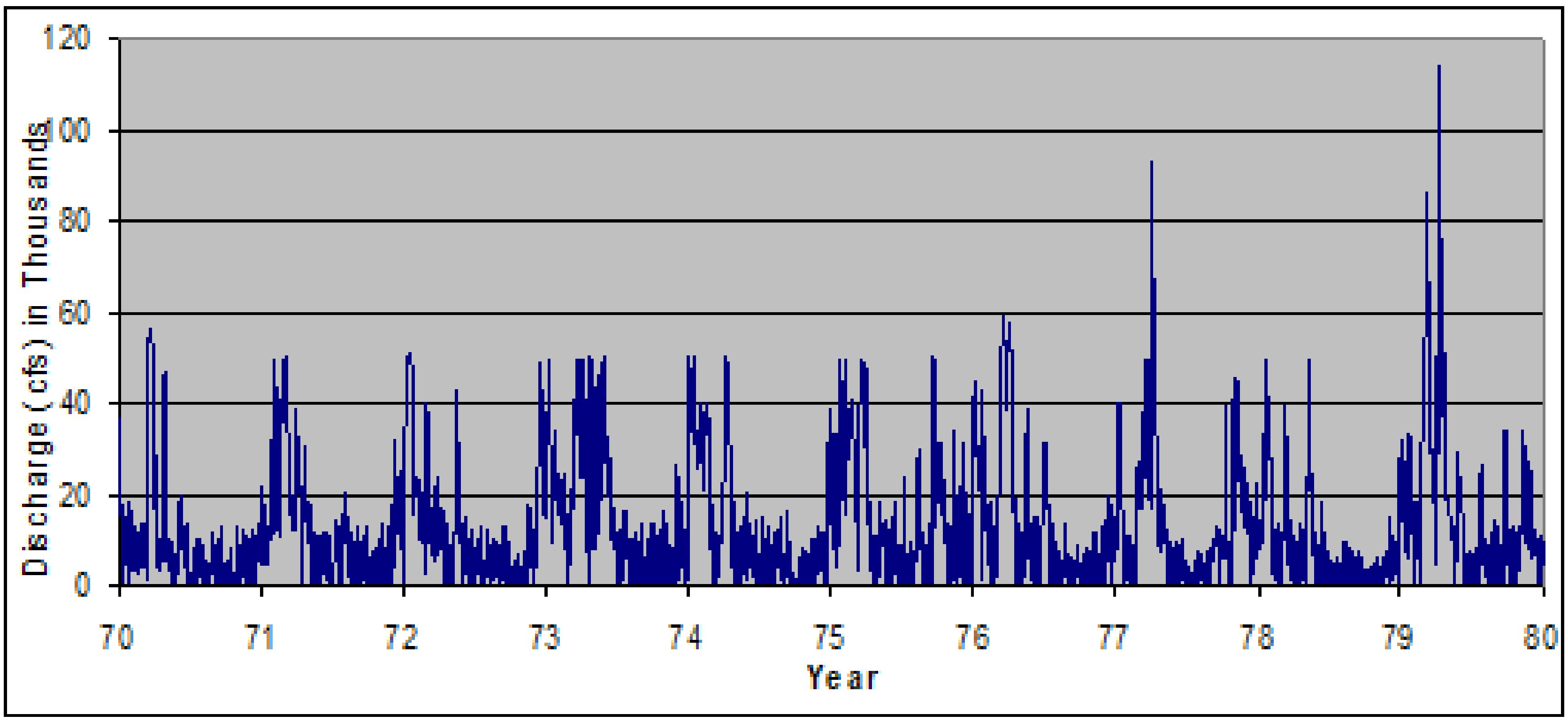
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

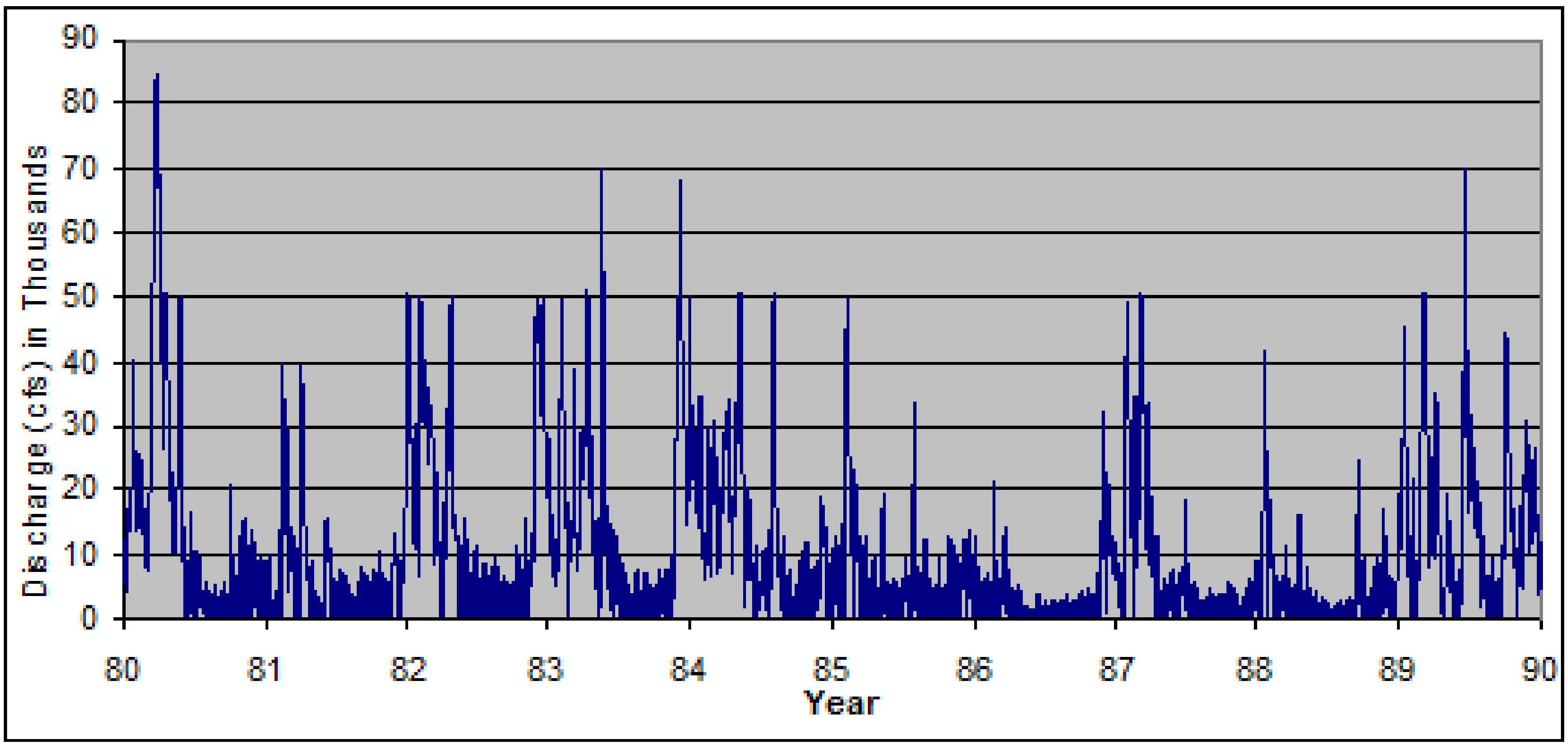
WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

TEMPERATURE AND PRECIPITATION STATIONS

Average Daily Discharge Hydrographs





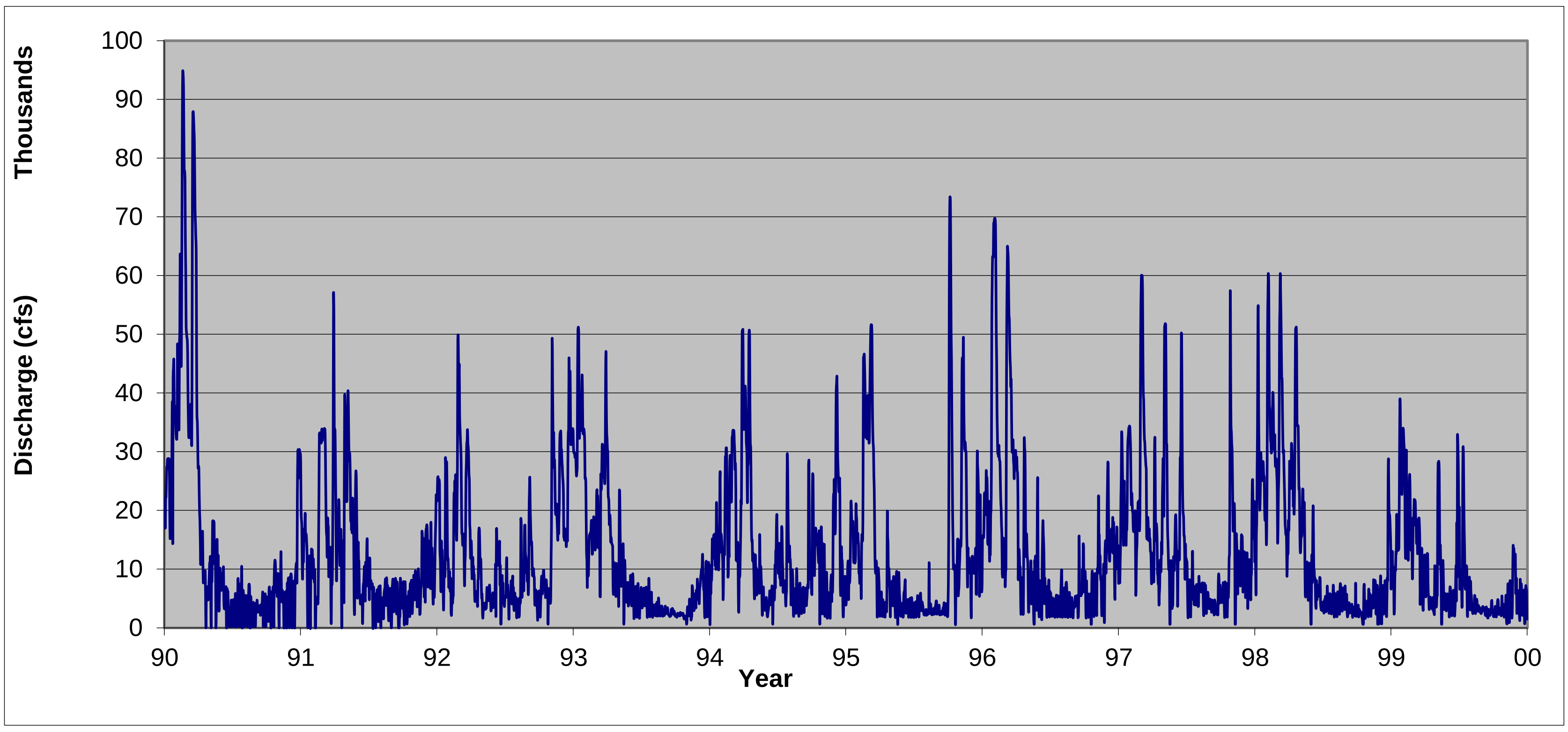


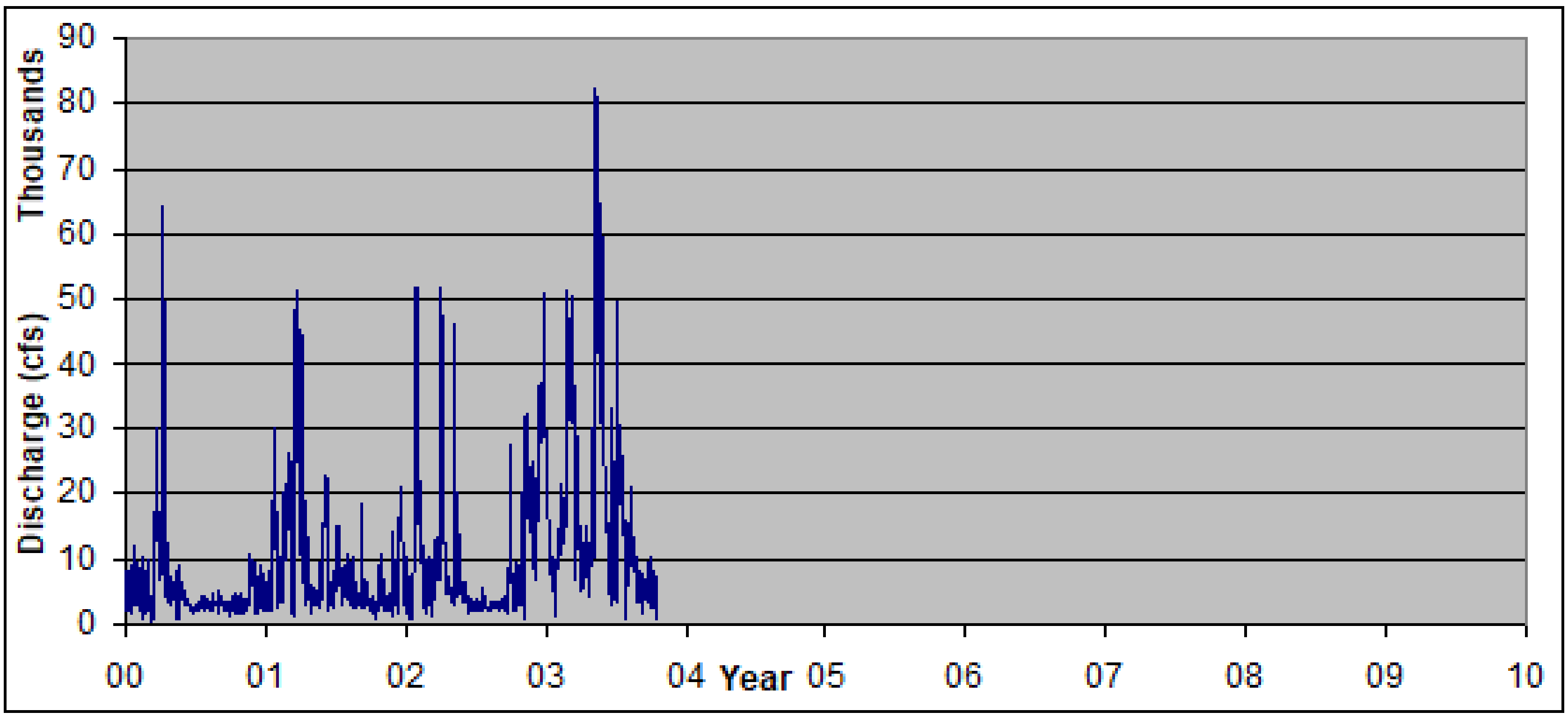
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

DAILY DISCHARGE HYDROGRAPHS

Average Daily Discharge Hydrographs

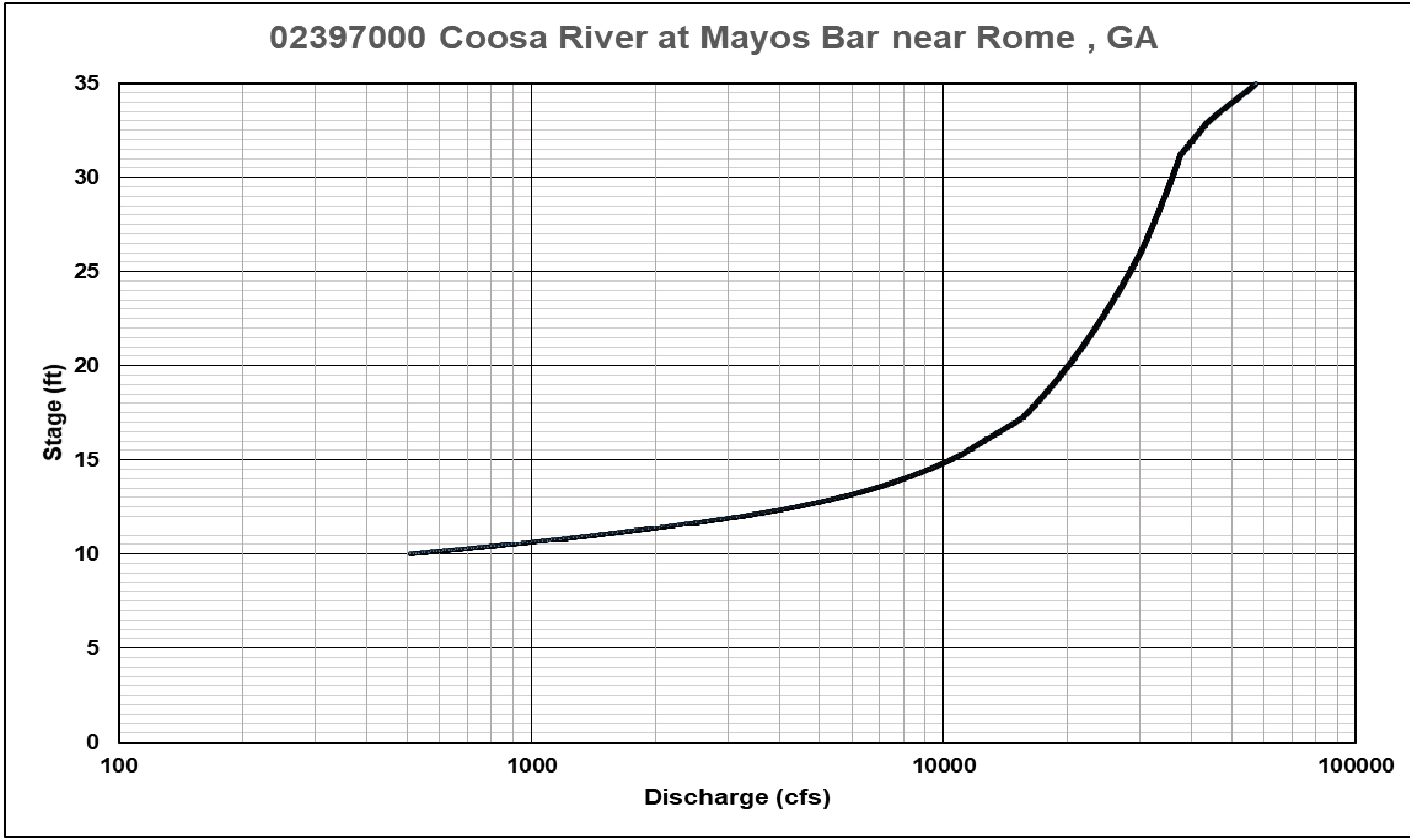




ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

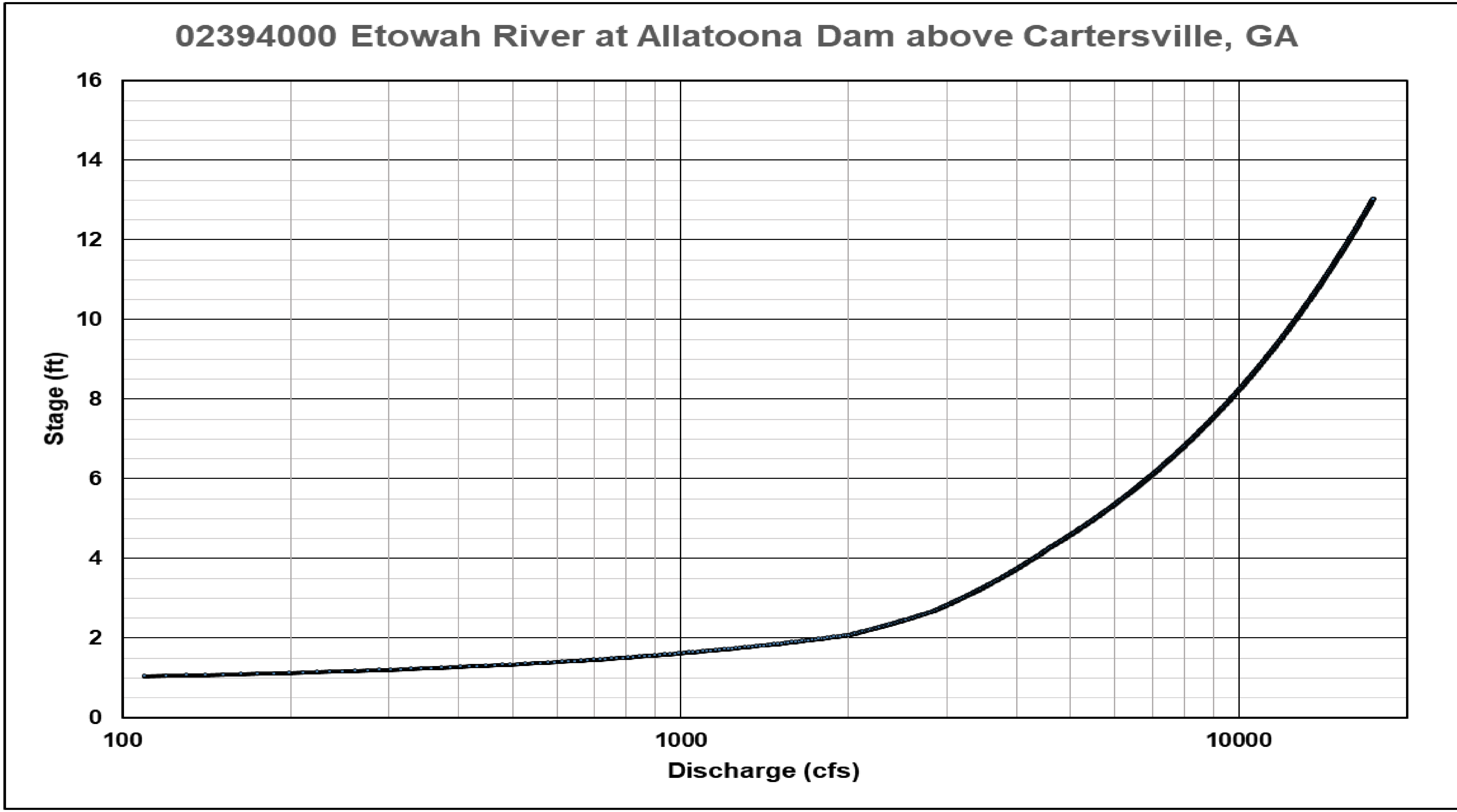
DAILY DISCHARGE
HYDROGRAPHS



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

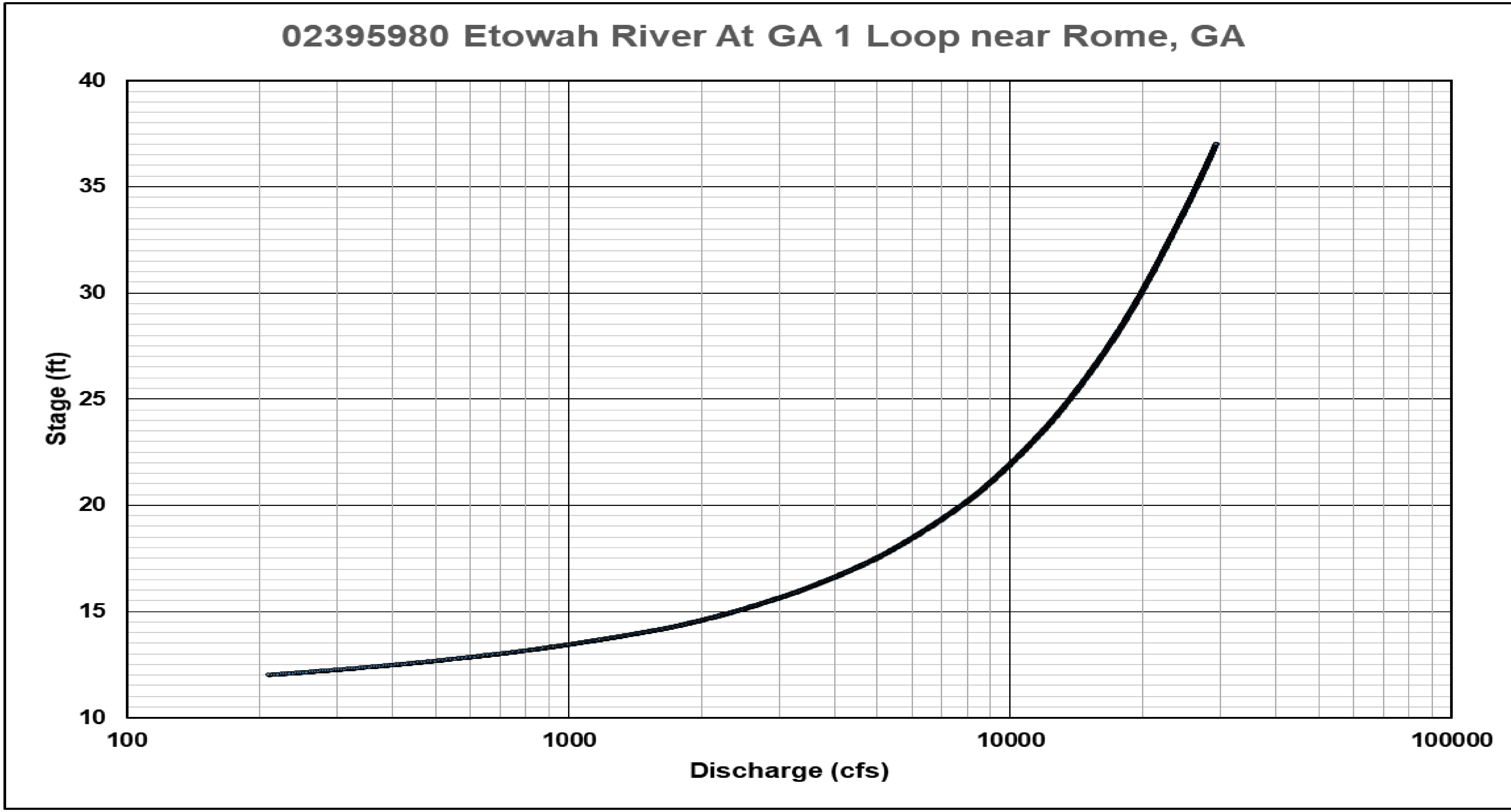
RATING CURVE



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN DAM AND LAKE

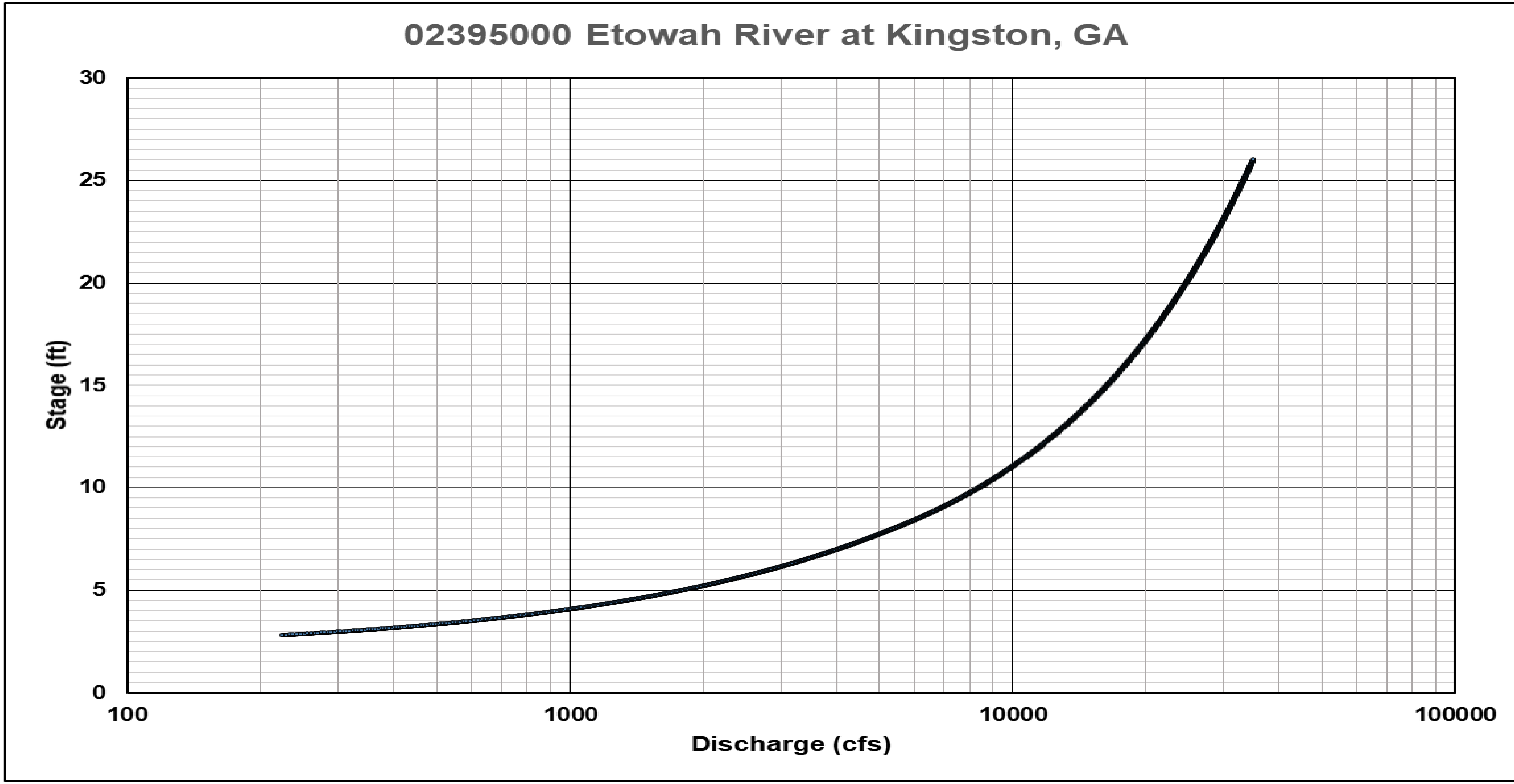
RATING CURVE



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

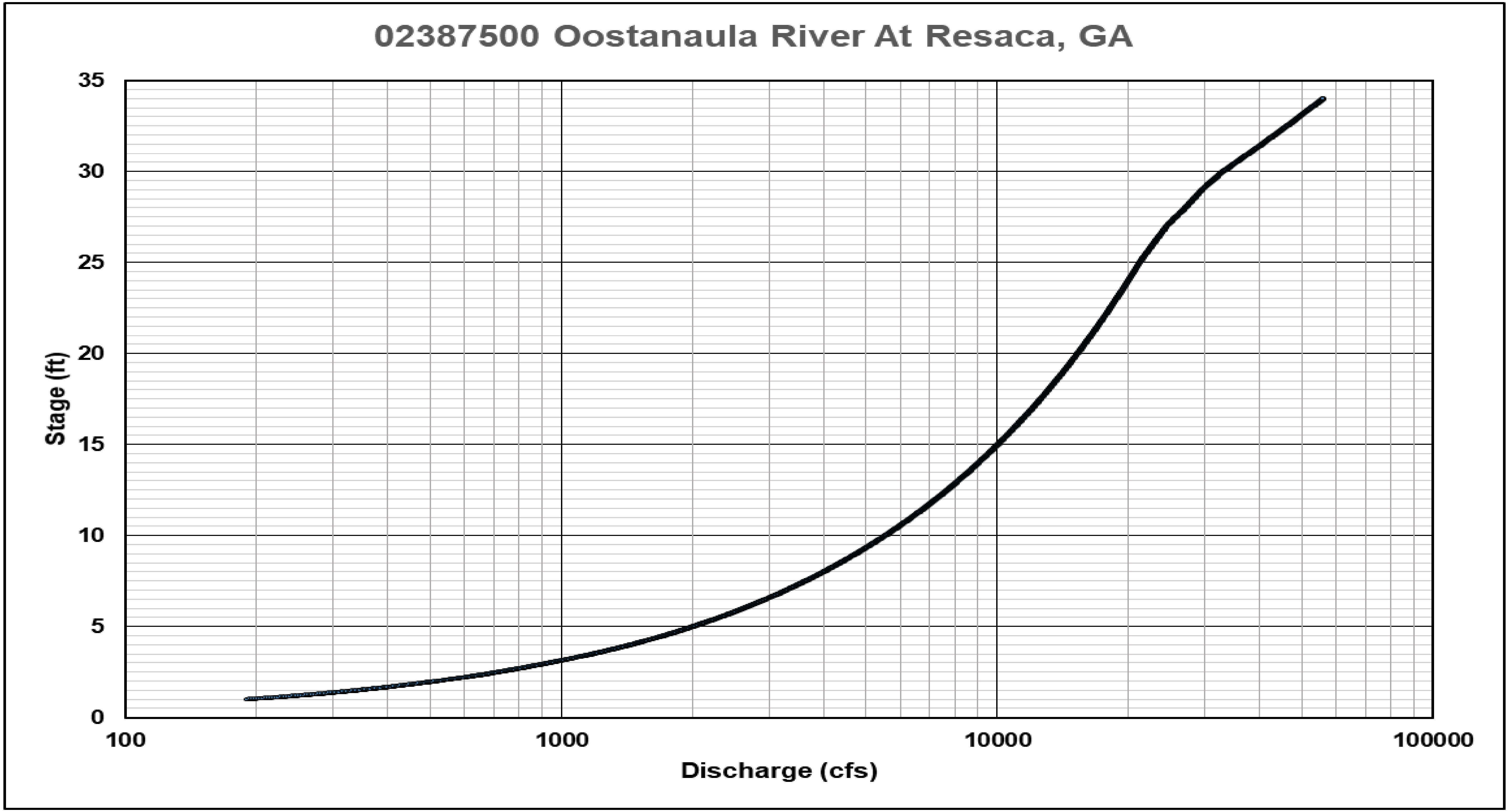
RATING CURVE



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

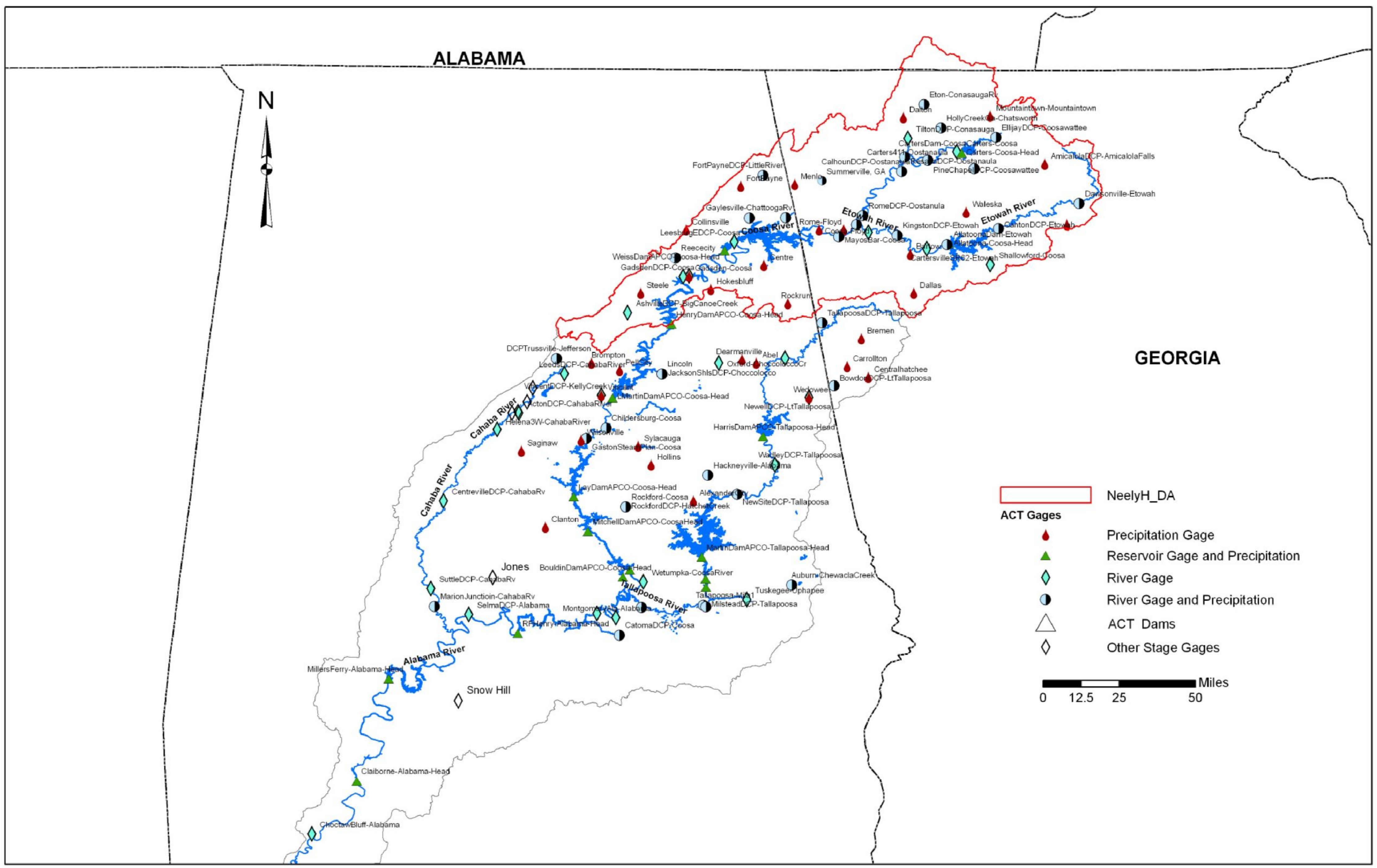
RATING CURVE



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

RATING CURVE

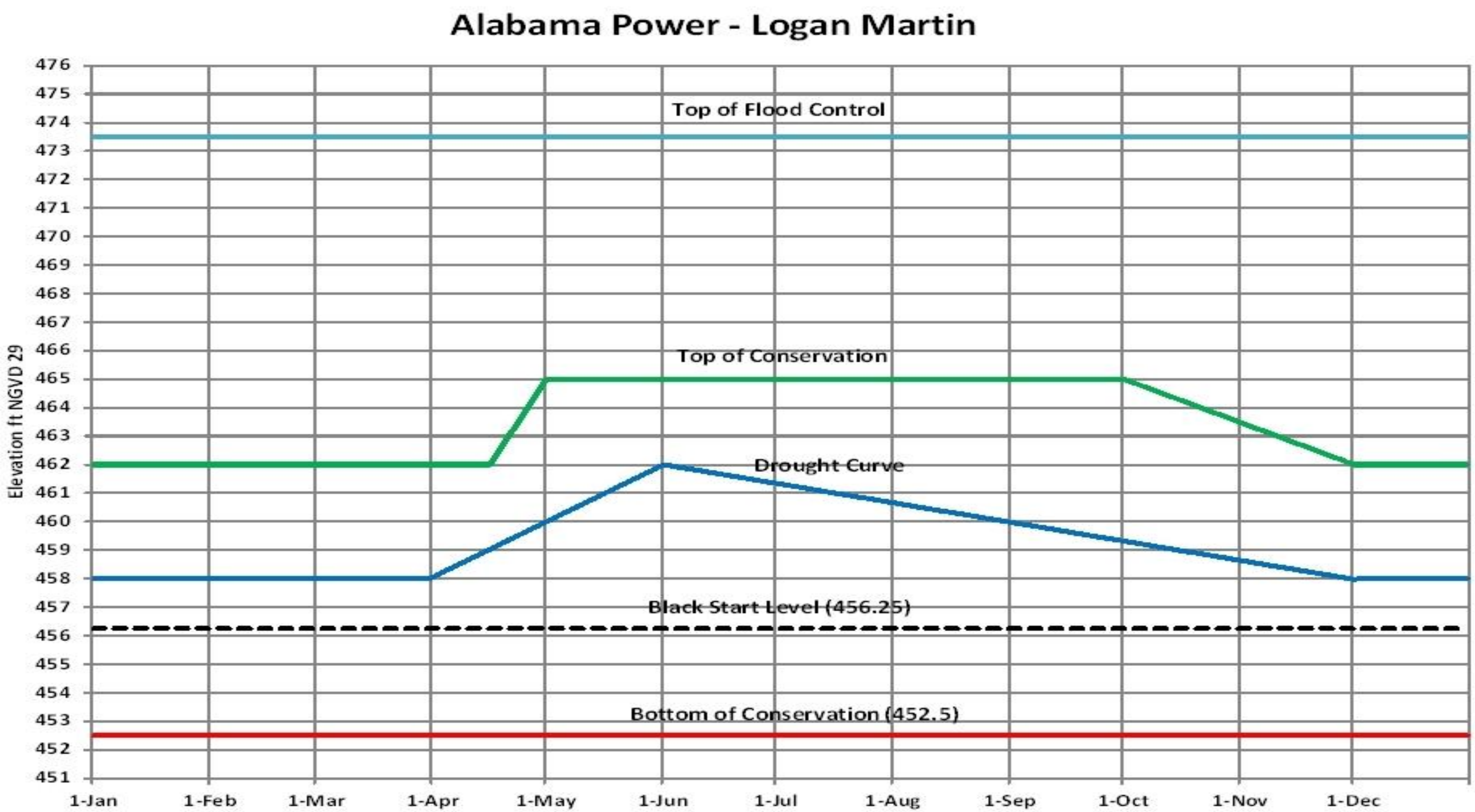


Preparer's Note: Need updated table to show Logan Martin Basin.

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

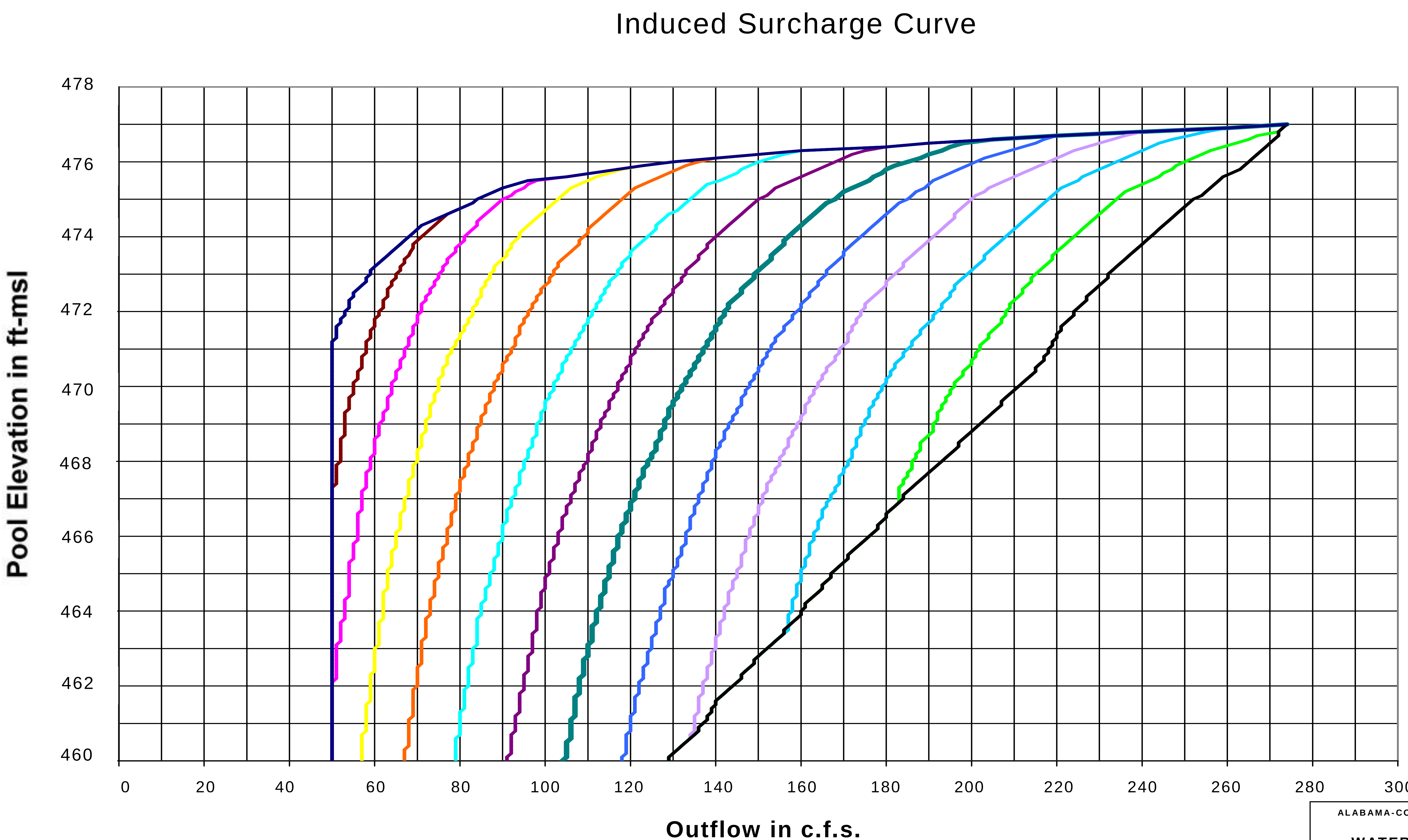
ACT REPORTING STATIONS



ALABAMA-COOSA-TALLAPOOSA BASIN

WATER CONTROL MANUAL
LOGAN MARTIN LAKE

GUIDE CURVES



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
INDUCED SURCHARGE CURVES

Discharge Percent Chance Exceedance Curve

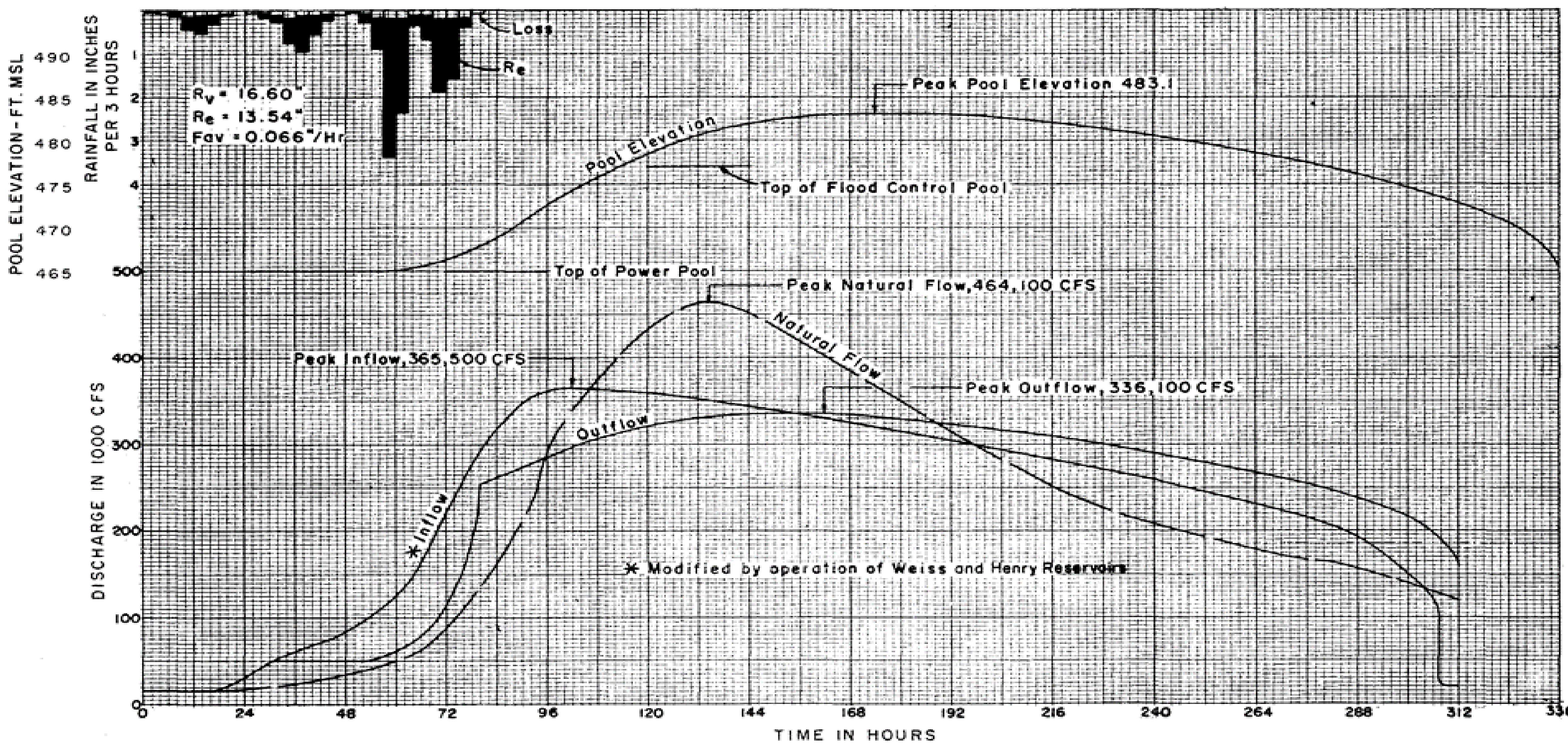
Preparer's Note: Awaiting curves from USACE

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

DISCHARGE PERCENT CHANCE
EXCEEDANCE CURVE

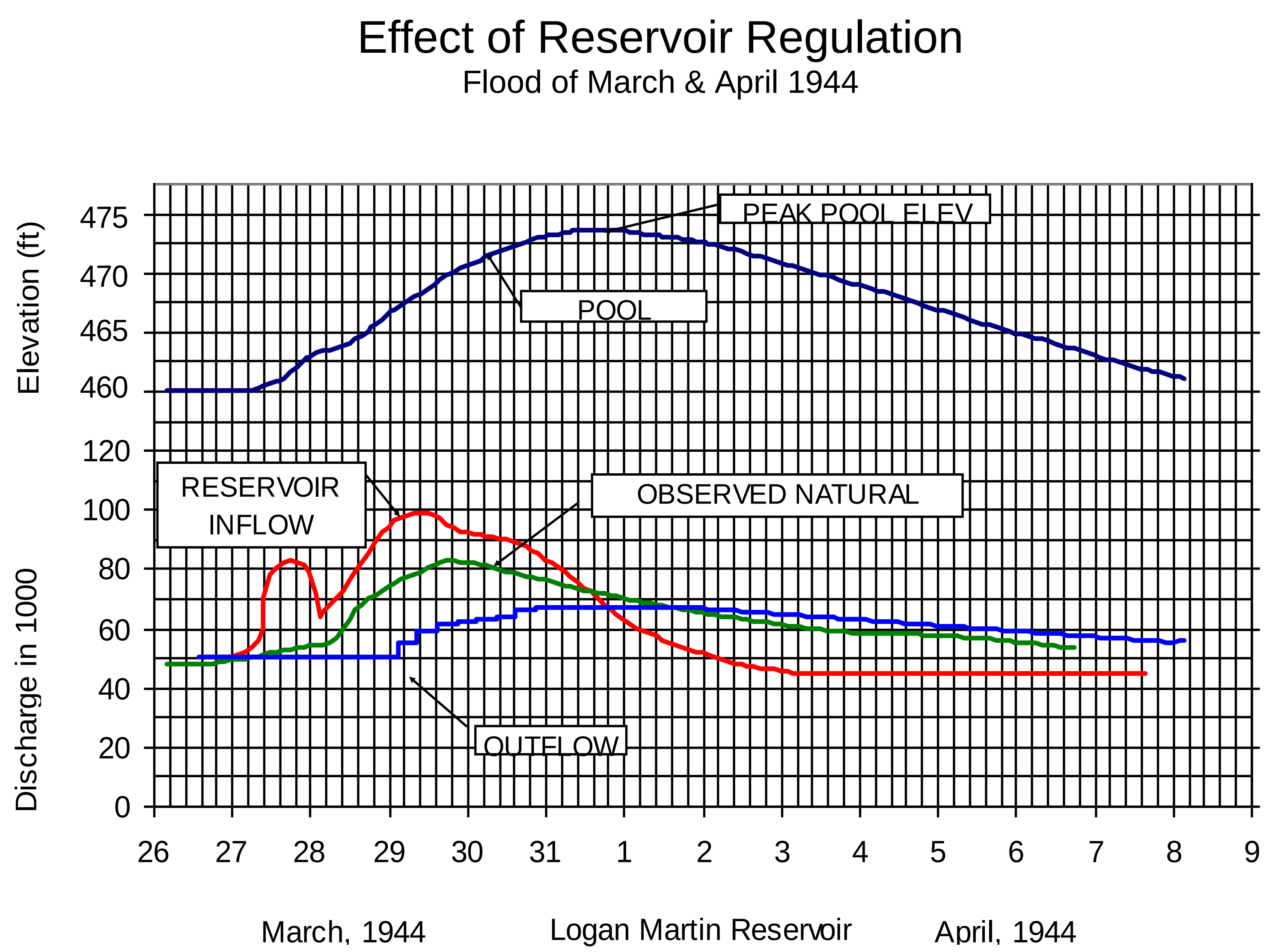
Inflow – Outflow – Pool Stage Hydrographs
Spillway Design Flood

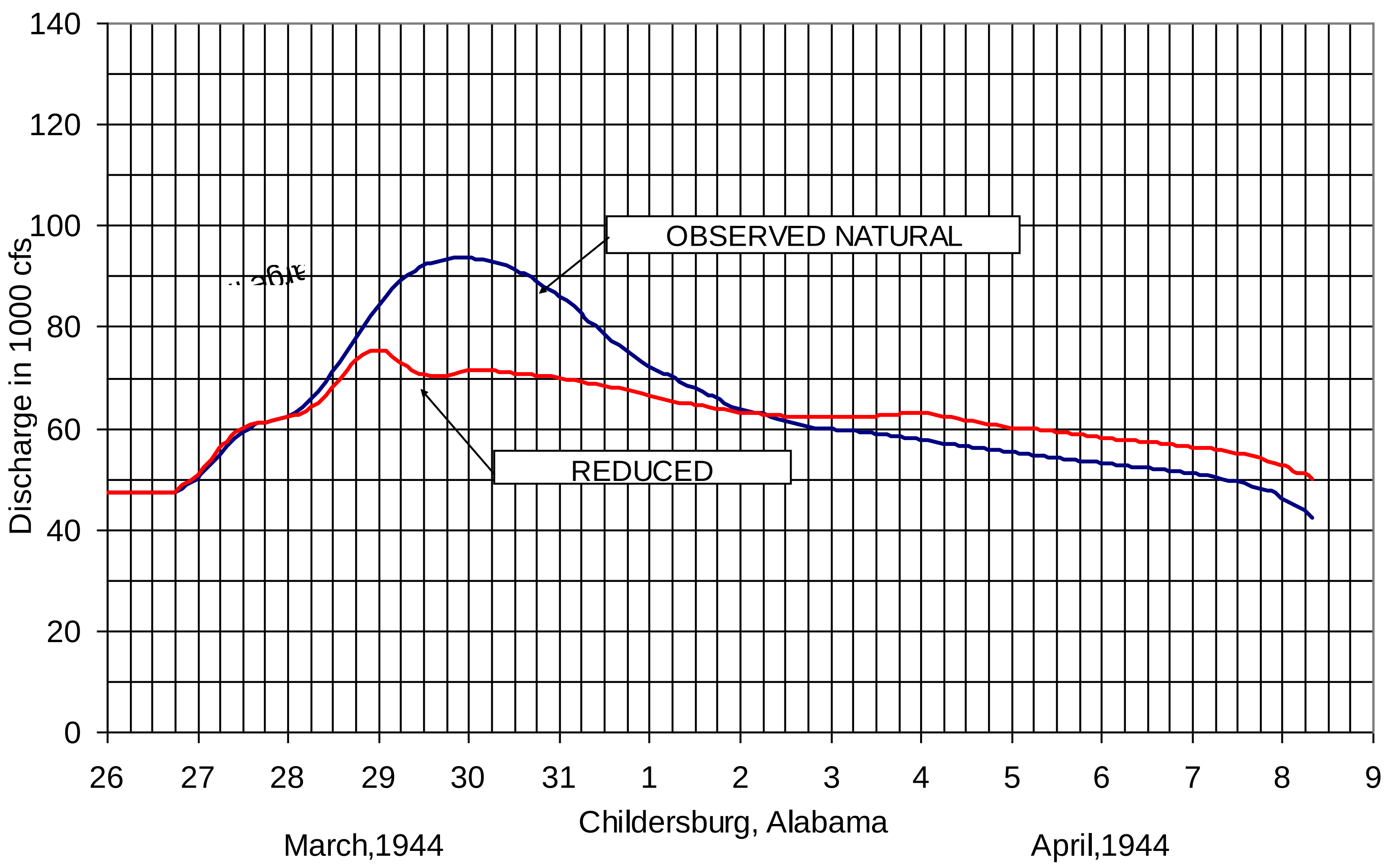


ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

SPILLWAY DESIGN FLOOD





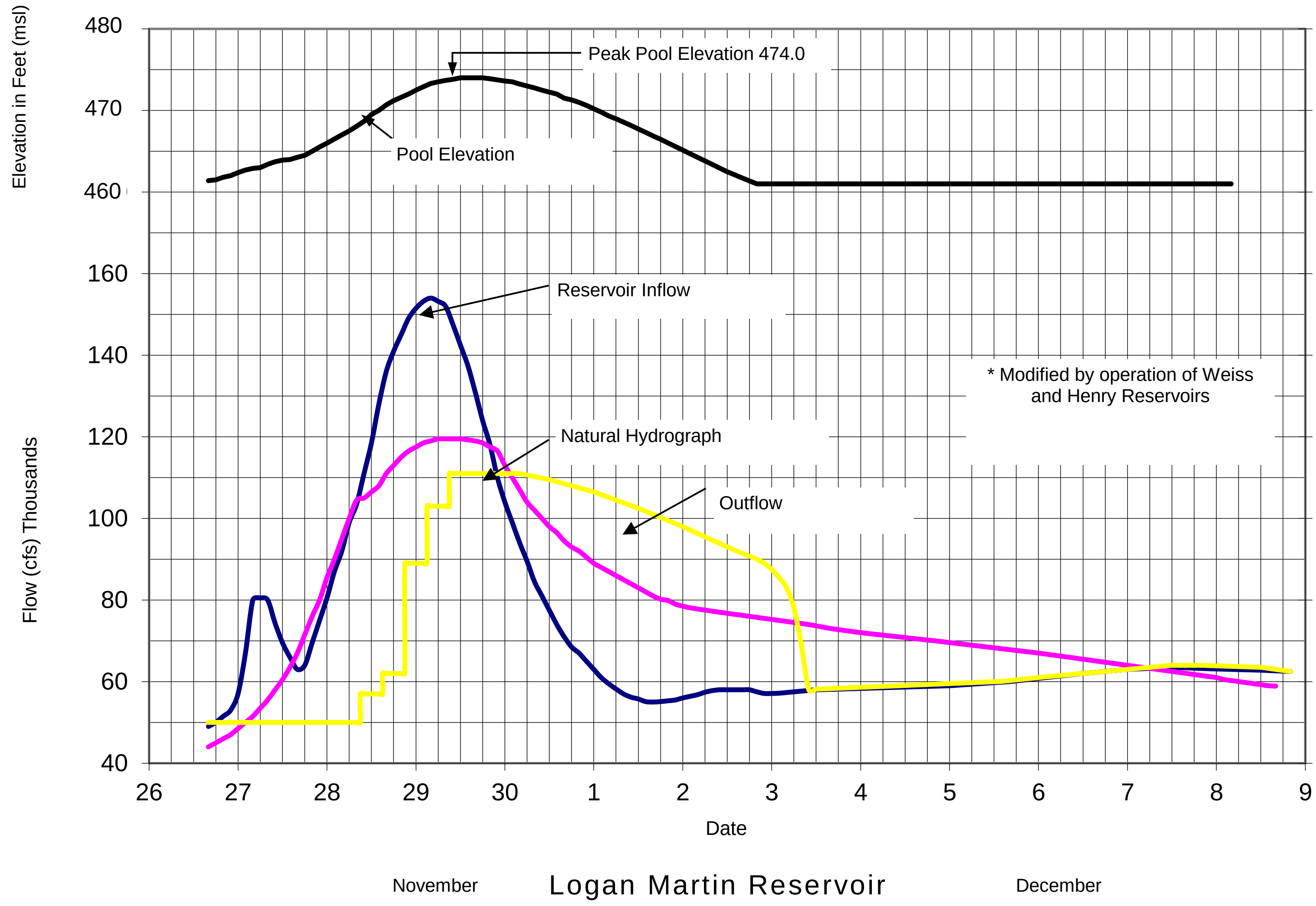
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

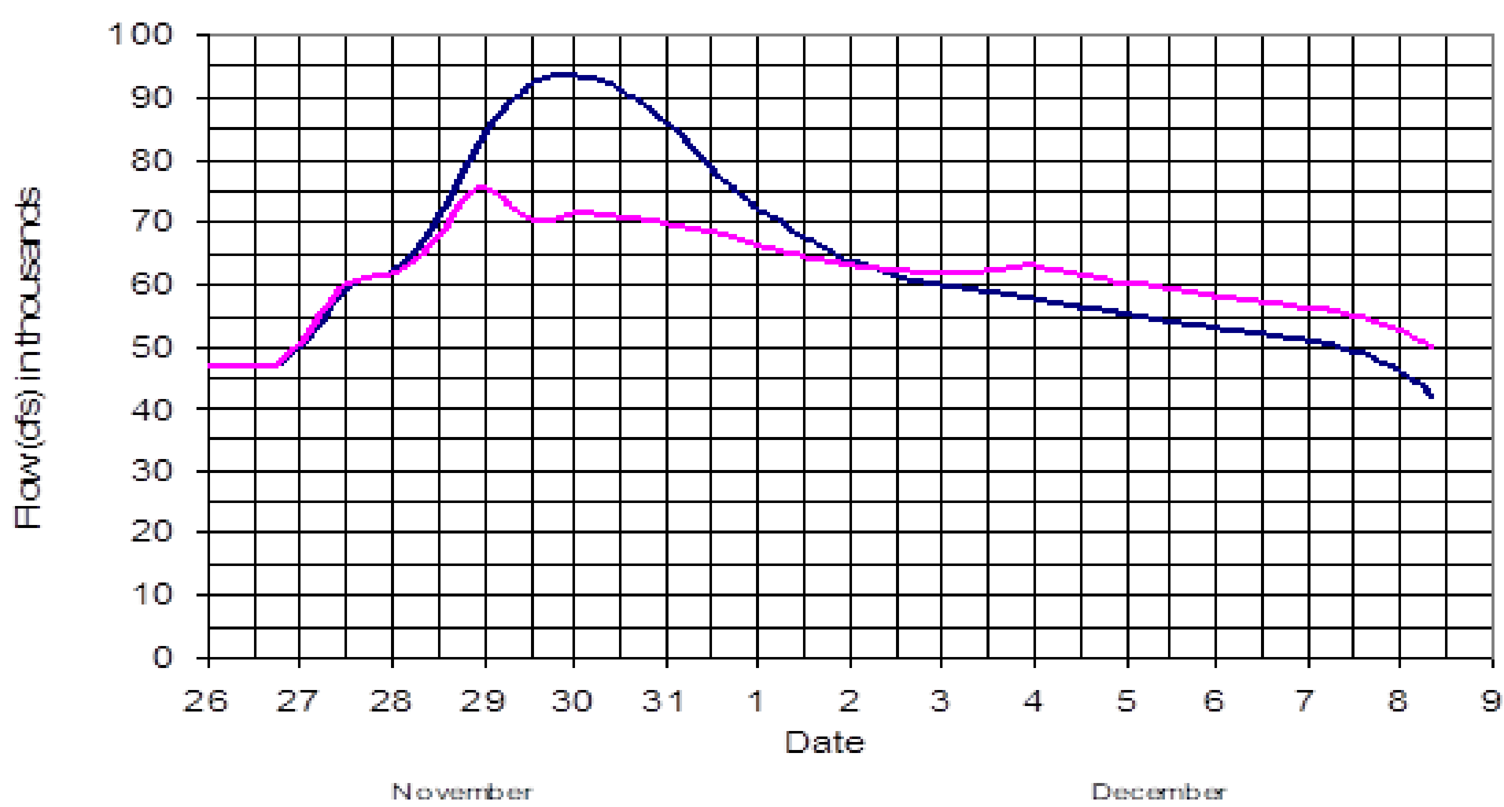
FLOOD OF MARCH & APRIL 1944

Effect of Reservoir Regulation

Flood of November & December, 1948



Logan Martin Reservoir



Childersburg, Alabama

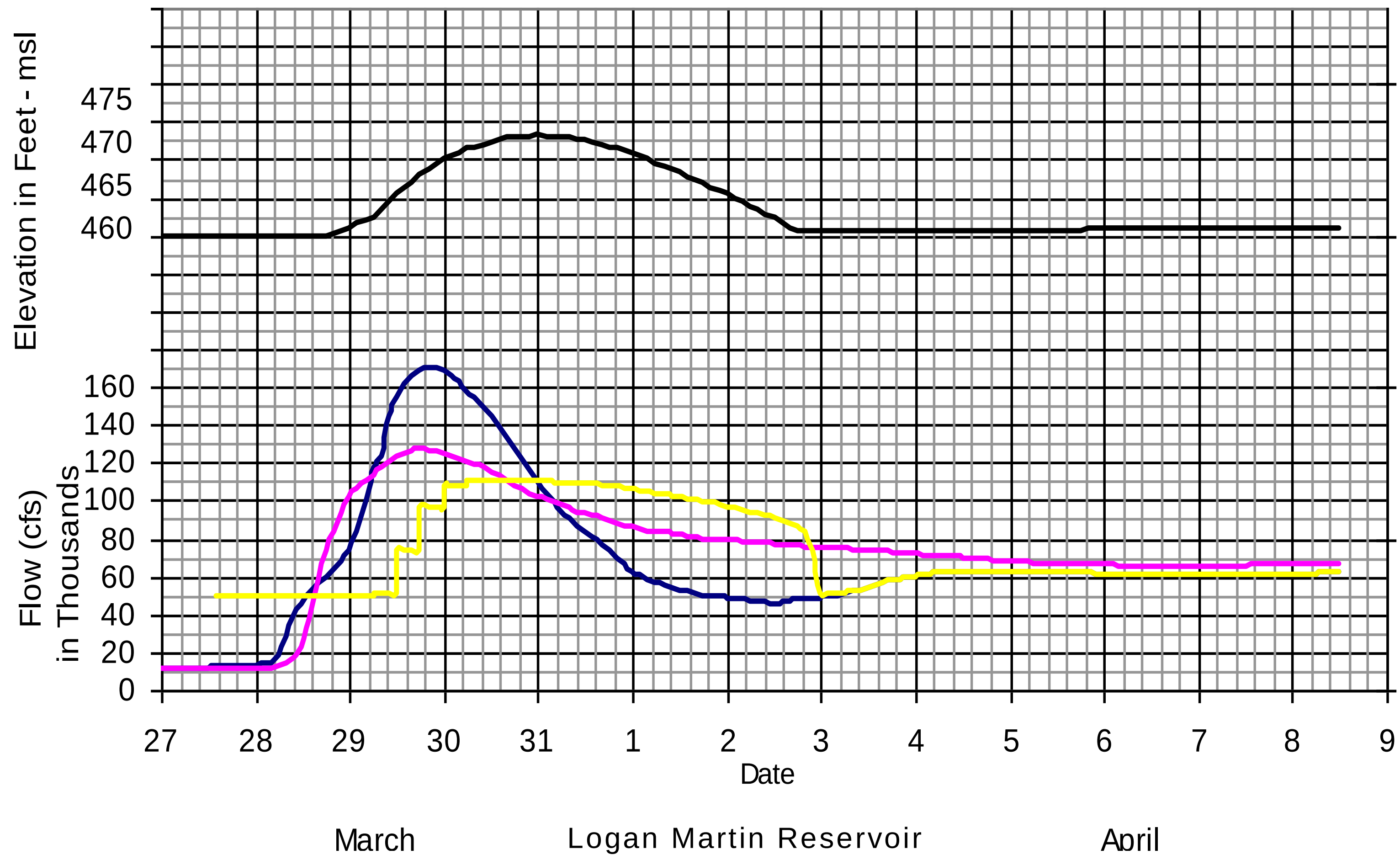
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

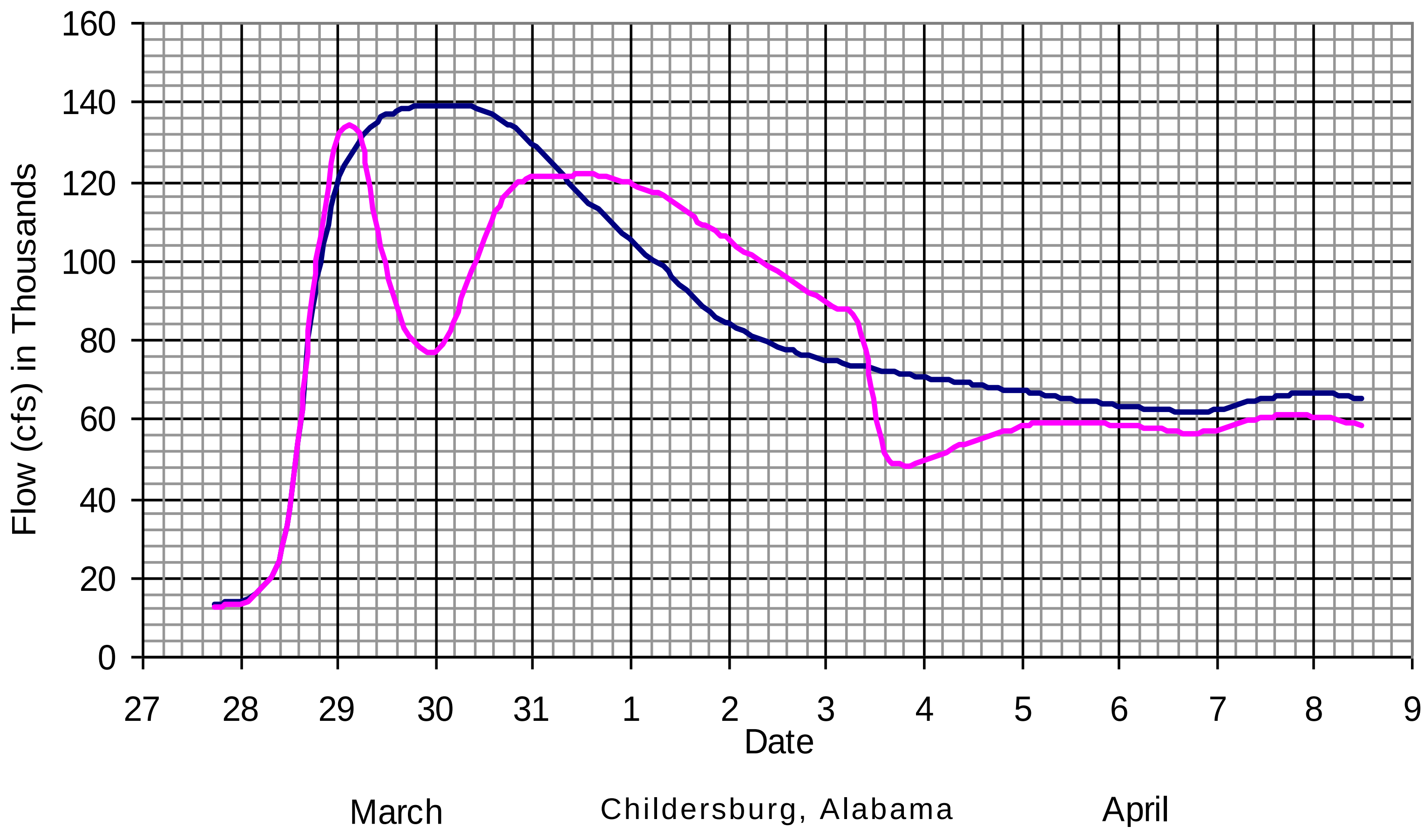
WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

FLOOD OF NOVEMBER & DECEMBER 1948

Effect of Reservoir Regulation

Flood of March & April, 1951





ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

FLOOD OF MARCH & APRIL 1951