US Army Corps of Engineers ®

Mobile District

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN WATER CONTROL MANUAL

Final

APPENDIX C

LOGAN MARTIN DAM AND LAKE

(Alabama Power Company)

COOSA RIVER ALABAMA

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

OCTOBER 1964
ADMINISTRATIVE UPDATE JUNE 2004
REVISED APRIL 2022

WATER CONTROL MANUAL

APPENDIX C
LOGAN MARTIN DAM AND LAKE
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

ALABAMA POWER COMPANY

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

October 1964
Administrative Update June 2004
Revised April 2022

Distribution authorized to U.S. Government agencies only due to the sensitivity of reservoir regulation plan, 5 December 2012. Non-U.S. Government agency requests shall be referred to the U.S. Army Corps of Engineers, Mobile District/South Atlantic Division, Chief of Water Management, P.O. Box 2288, Mobile, Alabama 36628.

FOR OFFICIAL USE ONLY

Logan Martin Dam and Lake

NOTICE TO USERS OF THIS MANUAL

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

Regulations specify that this Water Control Manual be published in digital form in the central repository located at the following link:

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It is not unexpected that USACE Corporate Information may move the central repository link to a new location. This information will be shared with all offices if a situation occurs by the HQUSACE.

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 Logan Martin Powerhouse personnel can be reached at (205) 472-0481 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 will be included in this manual as Exhibit C.

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

April 2022

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

TABLE OF CONTENTS (cont'd)

LIST OF FIGURES

Figure No. Figure Page No.

TABLE OF CONTENTS (Cont'd)

LIST OF EXHIBITS

TABLE OF CONTENTS (Cont'd)

LIST OF PLATES

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, navigation, flood risk management, water supply and recreation
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 2021) in Cubic Feet per Second (cfs)

Average for Period of Record	13,927
Maximum daily discharge (Mar. 1951)	143,000
Minimum daily discharge (Apr 1975)	378
Maximum annual discharge (1949 water year)	23,650
Minimum annual discharge (1941 water year)	6,625

FLOW AT DAMSITE
(1 Jan 1965 – 31 Dec 2021) (cfs)

Average for Period of Record	11,945
Maximum daily discharge (Apr 1979)	114,130
Minimum daily discharge (Several dates)	0
Maximum annual discharge (1979 calendar year)	18,115
Minimum annual discharge (2007 calendar year)	3,458
Bankfull capacity below dam	34,000
Prime flow	3,560

RESERVOIR

Maximum pool, spillway design flood (initial pool 465), feet (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-ft	141,897
Inactive Storage, below elevation 452.5 ft NGVD29	131,570
Seasonal storage, elevation 462 to 465 ft NGVD 29 (0.16 in runoff), acre-ft	42,574
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), cfs	464,100

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

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 trash bay gates (21'x 17.5', fixed wheel)	1
Elevation, top of gate, closed-feet NGVD 29	473
Elevation, spillway and trash bay crest	452
Maximum discharge capacity (spillway and trash bay) (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 (70,000 cfs), feet NGVD 29	413
Full gate turbine discharge (100% Load Factor), 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

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 kilovolt (kV) generator rated at 47,500 kilovolt-ampere (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 U.S. Army Corps of Engineers' (herein referred to as USACE or 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 (APC) 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, and municipal and industrial (M&I) 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 Alabama-Coosa-Tallapoosa (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 APC, under provisions of licensing through the Federal Energy Regulatory Commission (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, the FERC and the APC. A Memorandum of Understanding (MOU, see Exhibit C) 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 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 (NOAA). 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, mean sea level [MSL]), the current NSRS, and/or hydraulic/tidal datums, have been established per the requirements of ER 1110-2-8160 and in accordance with the standards and procedures as outlined in EM 1110-2-6056. A datum conversion survey has not been performed at this location. The National Geodetic Survey (NGS) Coordinate Conversion and Transformation Tool (NCAT) program shows that +0.07 can be used to convert NGVD29 to NAVD88 at Logan Martin Dam.

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 7,743 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 multipurpose 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 APC 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, and M&I 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 15,269 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 with a gross length about 330 feet (net length of 240 feet) 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 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 six radial gates, 38 feet high by 40 feet wide, and overflow crest at elevation 432 and a trash bay with one fixed-wheel gate, 21 feet high by 17.5 feet wide, with overflow crest at elevation 452. The piers between the spillway gate support a roadway bridge across the top of the dam at elevation 487. The top of the six 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 on Plates 2-5 and 2-6. The spillway has a discharge capacity of 244,000 cubic feet per second (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 2-7. Spillway rating curves, with and without the trash bay discharge, are included on Plates 2-8 through 2-10. 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 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 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 top of summer conservation, elevation 465, is 273,467 acre-feet; and, at top of winter conservation, elevation 462, the capacity is 230,893 acre-feet. Water surface areas at top of conservation summer and winter 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 three 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 2-10, and performance curves for the turbines are shown on Plate 2-11. Immediately upstream from the powerhouse, running from the trash bay 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. It is APC's responsibility to ensure all appropriate real estate requirements are existing or obtained. FERC may have the authority to require said easements in a license; however, the content and requirements of a FERC license under the Coosa Power Act are within FERC's discretion. Plate 2-12 and Figure 2-3 illustrate easement profiles for Logan Martin Dam and Lake. Table 2-1 describes APC's Logan Martin Lake and Coosa River easement and fee lands.

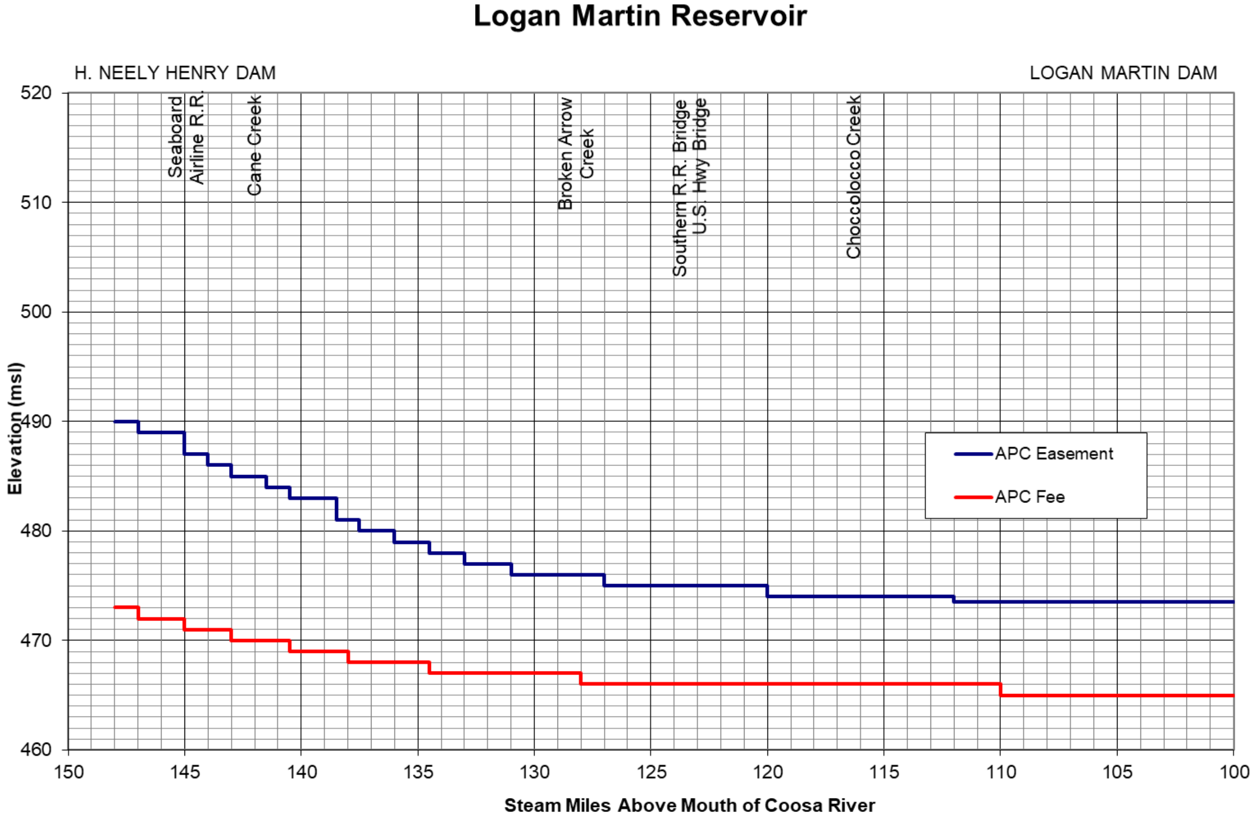

Figure 2-3 Logan Martin Lake, APC Easements Profile

Table 2-1 Coosa River, APC Easements and Fee Lands

LOGAN MARTIN LAKE AND COOSA RIVER			
APC EASEMENT		APC FEE	
RIVER MILE (mile)	ELEVATION (feet)	RIVER MILE (mile)	ELEVATION (feet)
148.00	490	148	473.00
147.00	490.00	147.00	473.00
147.00	489.00	147.00	472.00
145.00	489.00	145.00	472.00
145.00	487.00	145.00	471.00
144.00	487.00	144.33	471.00
144.00	486.00	143.67	471.00
143.00	486.00	143.00	471.00
143.00	485.00	143.00	470.00
141.50	485.00	142.17	470.00
141.50	484.00	141.33	470.00
140.50	484.00	140.50	470.00
140.50	483.00	140.50	469.00
138.50	483.00	139.67	469.00

LOGAN MARTIN LAKE AND COOSA RIVER			
APC EASEMENT		APC FEE	
RIVER MILE (mile)	ELEVATION (feet)	RIVER MILE (mile)	ELEVATION (feet)
138.50	481.00	138.83	469.00
138.00	481.00	138.00	469.00
138.00	481.00	138.00	468.00
137.50	481.00	137.30	468.00
137.50	480.00	136.60	468.00
136.00	480.00	135.90	468.00
136.00	479.00	135.20	468.00
134.50	479.00	134.50	468.00
134.50	478.00	134.50	467.00
133.00	478.00	133.20	467.00
133.00	477.00	131.90	467.00
131.00	477.00	130.60	467.00
131.00	476.00	129.30	467.00
128.00	476.00	128.00	467.00
128.00	476.00	128.00	466.00
127.00	476.00	125.43	466.00
127.00	475.00	122.86	466.00
120.00	475.00	120.29	466.00
120.00	474.00	117.71	466.00
112.00	474.00	115.14	466.00
112.00	473.50	112.57	466.00
110.00	473.50	110.00	466.00
110.00	473.50	110.00	465.00
100.00	473.50	100.00	465.00

2-06. Public Facilities. In July 2005, APC submitted to the 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.

Intentionally left blank.

3 - GENERAL HISTORY OF PROJECT

3-01. Authorization for Project. In 1934, the Corps, under the provisions of House Document No. 308, 69th Congress, first session, developed a general plan for the overall 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 four 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, to permit development by private interests under a license to be issued by the Federal Power Commission (FPC). The law stipulates that the license shall require 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.

3-02. Planning and Design. 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 APC made a study of the storage possibilities of the Coosa River above their existing Lay Dam with a view to the development of five additional power dams. In 1928, the APC prepared a report on complete canalization of the Coosa River. That report included a study of a site, Radcliff Island, which was only three miles below the site of Logan Martin Dam.

On 2 December 1955, the APC applied to the FPC for a license for development of the Coosa River in accordance with the provisions of Public Law 436. The development proposed by the APC, 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 three dams is essentially the same as the Corps' earlier plans for dams at Howell Mill Shoals, Patlay, and Leesburg sites. The ultimate Corps' plan eliminated the Patlay Dam and substituted a higher dam at Howell Mill Shoals.

The FPC issued a license to the APC 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 commences within three years from 4 September 1957 and be completed within seven 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 started in July 1960 and the dam and spillway were completed in July 1964. Filling of the reservoir commenced in early July 1964, reaching an operating level of 460 on 22 July 1964. All three 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 located in Alabama on the Coosa and Tallapoosa Rivers and operated mainly for the production of hydropower. USACE has flood risk management authority over four 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 on the Alabama River downstream. The Corps and APC reservoirs are operated as a system to accomplish the authorized purposes of the projects. The sites are shown on Plate 2-2.

3-05. Dam Safety History/Issues. Dam safety oversight of the APC projects is covered under the 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. In January 1975, a modification to flood control operation was implemented. The revision consists of changing chart No 12, "Flood Control Regulation Schedule for Logan Martin Reservoir Rule 5," with the addition to column headed, "OPERATION." At the request of APC and with the concurrence of the District Commander, when the pool recedes to within one foot of the top-of-power-pool, this operation may be modified to discharge turbine capacity or the inflow whichever is greater until the pool recedes to top-of-power-pool elevation.

Record pool elevations occurred during flooding in spring of 1977 and 1979 when Logan Martin went above APC's reservoir easement. APC was sued but was found to have followed the Corps plan and therefore not liable for damages. APC has worked with Mobile District Operations to obtain deviations, primarily at the beginning of flood events at Logan Martin to release more water earlier during large events, since the early 1980s. APC has been able to efficiently manage flood events while lowering the peak pool elevations due largely to these timely deviations. Additionally, in the past, APC has requested deviations to cut back releases during smaller flood events to store more water and further alleviate flooding issues downstream.

Mobile District completed a reevaluation of the flood control operations at APC projects on the Coosa and Tallapoosa Rivers in 1986. The purpose of this study was to examine the effect of reservoir operations on the flood flows throughout the Coosa-Tallapoosa-Alabama River system. The reservoirs considered in the study are owned by APC and operated for flood risk management in accordance with plans developed with USACE. The study concluded that any substantial changes to the current flood risk management plans at APC projects were not justified based on the analysis because the plan seems to maximize reductions for the unpredictable flood events. In addition, changes to the operating plan at Logan Martin, where additional releases are made early in the storm event, may actually be a beneficial operation in general.

Prior to the update of Water Control Manuals 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 feet to elevation 462 feet and to reduce the maximum surcharge elevation (top of flood pool) from elevation 477 feet to elevation 473.5 feet. The request was to bring the maximum surcharge elevation, which was 3.5 feet higher than the APC flowage easement elevation of 473.5 feet for Logan Martin Lake, in line with the flowage easement elevation. USACE did not include updates to the Water Control Manuals for the APC Weiss and Logan Martin reservoir projects in the 2015 ACT River Basin Master Manual update 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 was fully evaluated.

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 feet for Logan Martin Lake. In conjunction with these elevation changes, APC modified the Flood Regulation Schedule for Logan Martin Dam to operate with no appreciable increase in flood risk. The modified schedule is discussed in detail in 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 west 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.

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 riverbed. The total fall of the river is 450 feet in 286 miles, giving an average fall of about 1.6 feet per mile. The entire ACT Basin with the Coosa River Basin highlighted, and some of the other ACT projects are shown on Plate 2-2. The river mile and size of the drainage area above selected sites in the ACT Basin are shown on Table 4-1.

c. Coosa Basin above Logan Martin Dam. The basin above Logan Martin drains 7,743 square miles and has a fall of approximately 1.0 ft per mile. 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 4,148 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 1,860 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.

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. It occurs as a roughly northeast trending rectangular area in central and east-central Alabama and continues northeast into Georgia and Tennessee. This region is comprised of sandstone ridges and fertile limestone valleys. The Valley and Ridge borders the Cumberland Plateau section to the north and west, the Piedmont Upland section to the southeast, and the East Gulf Coastal Plain section to the southwest. The landscape developed on tightly folded and thrust-faulted rock layers and thus consists of numerous uniquely zigzagging ridges separated by deep steep-sided valleys.

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	1,860	
672	Coosawattee	Carters Dam	374	Corps
645.2	Oostanaula	Mouth	2,150	
638.1	Coosa	Mayo's 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
305	Coosa	Mouth	10,156	
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

4-03. Geology and Soils. 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.

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.

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.

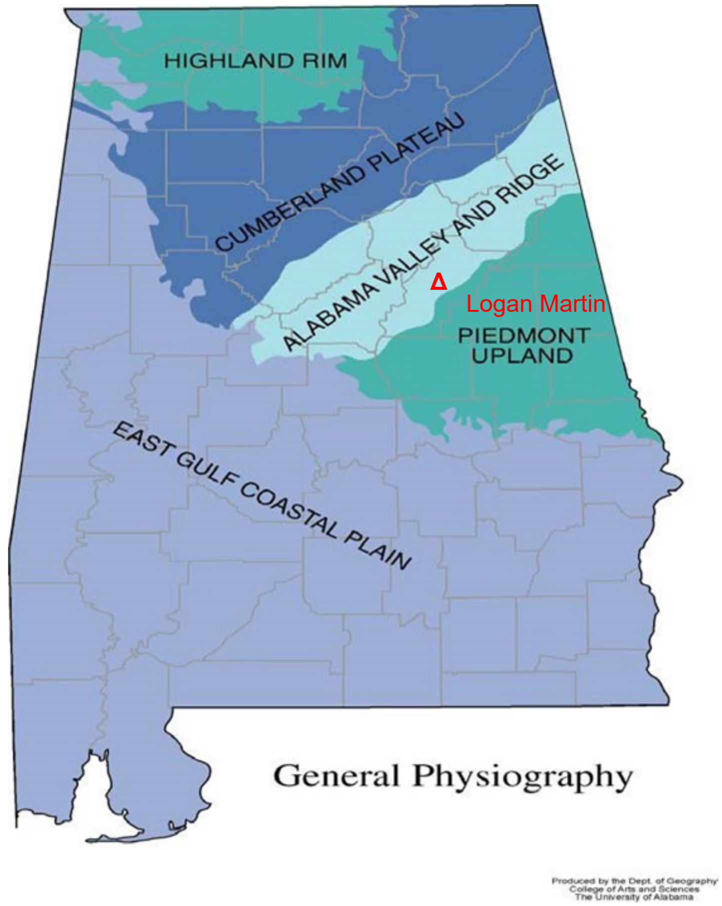

Figure 4-1 Topographic Regions in Alabama

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 NOAA National Centers for Environmental Information (https://www.ncdc.noaa.gov/cdo-web/datatools/normals) and the Southeast Regional Climate Center 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 National Climatic Data Center (NCDC) has standard methods available to them to adjust the dataset for any inhomogeneities or missing data before computing normal values. Extreme temperatures recorded in the mid-ACT Basin range from 109 degrees Fahrenheit (ºF) to -10 ºF. A map showing the location of the temperature and precipitation stations is found on Plate 4-1.

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

NORMAL MONTHLY TEMPERATURE (˚F) FOR MIDDLE ACT BASIN (MAX, MIN, & AVG), 1991–2020														
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
ALEXANDER CITY, AL USC00010160	MAX	55.8	59.9	67.9	75.1	82.1	87.9	91	90	85.5	76.6	66.2	58.2	74.7
	MIN	32.1	35.2	41.5	48.4	57.8	66.1	69.7	68.6	62.6	50.8	40.3	34.9	50.7
	AVG	44	47.5	54.7	61.7	69.9	77	80.4	79.3	74.1	63.7	53.3	46.5	62.7
GADSDEN, AL USC00013154	MAX	52.8	57.2	66.1	74.9	81.8	87.7	90.6	90.2	85.2	75.5	64	55.6	73.5
	MIN	33	36.4	43.5	50.9	59.6	68	71.3	70.4	64.5	52.8	41.6	35.6	52.3
	AVG	42.9	46.8	54.8	62.9	70.7	77.9	81	80.3	74.9	64.2	52.8	45.6	62.9
ROCK MILLS, AL USC00017025	MAX	54.5	59.1	67.7	75.7	82	87.6	89.7	88.7	84.2	75.3	65	57.1	73.9
	MIN	32.2	35.2	42	48.3	56.7	64.7	67.8	68.1	61.5	50.2	38.3	35.1	50
	AVG	43.4	47.1	54.8	62	69.3	76.2	78.8	78.4	72.9	62.7	51.7	46.1	62
LAFAYETTE 2W, AL USC00014502	MAX	55.5	60.1	67.7	75	82	87.4	90.1	89.7	84.6	75.4	66.2	57.3	74.3
	MIN	30.5	34	39.7	46.2	55.9	63.8	67.6	66.7	60.8	49.1	37.8	32.9	48.8
	AVG	43	47	53.7	60.6	69	75.6	78.9	78.2	72.7	62.3	52	45.1	61.5
HEFLIN, AL USC00013775	MAX	53.2	56.7	65.3	73.2	79.4	85.3	88.2	87.7	82.8	74	63.7	55.7	72.1
	MIN	29.7	32.3	38.6	45.6	55.1	63	66.7	66	59.9	48.3	37.2	33	47.9
	AVG	41.4	44.5	52	59.4	67.2	74.1	77.5	76.8	71.4	61.2	50.5	44.3	60
TALLADEGA, AL USC00018024	MAX	54.4	58.6	66.9	74.9	82.2	88	90.9	90.3	85.8	76.1	65.1	57.1	74.2
	MIN	30.4	33.2	39.4	46.2	56	64.4	68.2	67.2	60.9	48.3	38.3	33.2	48.8
	AVG	42.4	45.9	53.2	60.6	69.1	76.2	79.5	78.8	73.3	62.2	51.7	45.1	61.5
BASIN AVG	MAX	54.4	58.6	66.9	74.8	81.6	87.3	90.1	89.4	84.7	75.5	65.0	56.8	73.8
BASIN AVG	MIN	31.3	34.4	40.8	47.6	56.9	65.0	68.6	67.8	61.7	49.9	38.9	34.1	49.8
BASIN AVG	AVG	42.9	46.5	53.9	61.2	69.2	76.2	79.4	78.6	73.2	62.7	52.0	45.5	61.8

Source: NOAA High Plains Regional Climate Center

Table 4-3 shows the extreme temperatures for six stations within the middle ACT Basin. The maximum and minimum recorded temperatures for each month are shown. These stations are Alexander City, Gadsden, Rocky Mills, Lafayette 2W, Heflin, and Talladega in Alabama. All the middle Coosa Basin temperature stations are shown on Plate 4-1.

Table 4-3 Extreme Temperatures within the ACT

EXTREME TEMPERATURES (˚F) WITHIN MIDDLE ACT BASIN												
Month	**ALEXANDER CITY, AL USC00010160**		**GADSDEN, AL USC00013154**		**ROCK MILLS, AL USC00017025**		**LAFAYETTE 2W, AL USC00014502**		**HEFLIN, AL USC00013775**		**TALLADEGA, AL USC00018024**	
	High	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**
Period	**1969 To 2021**		**1953 To 2021**		**1953 To 2021**		**1944 To 2021**		**1956 To 2021**		**1888 To 2021**	
January	80	-6	76	-6	79	0	84	-7	78	-4	82	-5
February	82	5	82	1	83	6	86	3	83	1	84	-10
March	89	12	88	11	88	13	89	8	87	8	90	6
April	92	25	91	22	92	24	93	25	90	22	98	21
May	96	35	99	33	98	31	98	34	98	30	98	32

EXTREME TEMPERATURES (˚F) WITHIN MIDDLE ACT BASIN												
Month	**ALEXANDER CITY, AL USC00010160**		**GADSDEN, AL USC00013154**		**ROCK MILLS, AL USC00017025**		**LAFAYETTE 2W, AL USC00014502**		**HEFLIN, AL USC00013775**		**TALLADEGA, AL USC00018024**	
	High	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**
Period	**1969 To 2021**		**1953 To 2021**		**1953 To 2021**		**1944 To 2021**		**1956 To 2021**		**1888 To 2021**	
June	102	42	106	42	105	42	103	42	106	38	109	39
July	104	55	105	52	105	51	107	53	107	47	109	48
August	105	53	105	52	103	47	105	50	105	49	107	46
September	101	38	102	33	100	32	100	37	100	29	109	35
October	100	26	99	23	99	21	99	21	96	21	100	23
November	94	14	87	14	86	11	87	6	87	10	89	5
December	81	-1	78	1	80	-1	81	-1	78	-10	80	0

Source: NOAA, National Weather Service, NOWData – NOAA Online Weather Data

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 arithmetic mean of the normal values at six stations. These stations are the same as the temperature stations and are shown on Plate 4-1. About 39 percent of the normal annual precipitation occurs from December through March, while only about 20 percent occurs during the dry period September through November. The average annual snowfall is less than two 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 – 1991 Through 2021

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
ALEXANDER CITY, AL USC00010160	6.22	5.49	5.64	4.64	4.46	4.76	5.21	4.70	3.64	2.86	4.40	5.67	57.69
GADSDEN, AL USC00013154	5.70	5.28	5.40	5.07	4.79	4.56	4.71	4.49	4.50	3.51	4.25	5.58	57.84
ROCK MILLS, AL USC00017025	5.27	5.34	5.23	4.37	4.11	4.85	4.47	4.02	3.39	2.78	4.12	5.08	53.03
LAFAYETTE 2W, AL USC00014502	5.70	5.33	5.70	4.80	4.40	4.48	4.80	4.23	3.53	3.63	4.31	5.61	56.52
HEFLIN, AL USC00013775	5.98	5.59	6.10	4.83	4.67	4.58	5.39	4.36	3.33	3.36	4.51	5.55	58.25
TALLADEGA, AL USC00018024	5.57	6.02	6.39	4.77	4.65	4.67	4.69	3.90	3.49	3.41	4.69	5.20	57.45
BASIN AVE	5.74	5.51	5.74	4.75	4.51	4.65	4.88	4.28	3.65	3.26	4.38	5.45	56.80

Source: NOAA, National Weather Service, NOWData – NOAA Online Weather Data

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

EXTREME RAINFALL EVENTS (INCHES) WITHIN MIDDLE ACT BASIN																		
	ALEXANDER CITY, AL USC00010160			GADSDEN, AL USC00013154			ROCK MILLS, AL USC00017025			LAFAYETTE 2W, AL USC00014502			HEFLIN, AL USC00013775			TALLADEGA, AL USC00018024		
Period of Record	1969 to 2021			1953 to 2021			1938 to 2021			1944 to 2021			1956 to 2021			1888 to 2021		
	Monthly			Monthly			Monthly			Monthly			Monthly			Monthly		
	Max	Min	1-Day Max	Max	Min	1-Day Max	Max	Min	1-Day Max	Max	Min	1-Day Max	Max	Min	1-Day Max	Max	Min	1-Day Max
Jan	12.13	1.01	3.57	10.14	0.80	5.20	12.79	1.80	4.23	11.34	1.16	6.75	12.54	1.61	4.05	15.59	0.60	4.52
Feb	14.20	1.70	3.50	14.24	0.62	4.75	17.64	1.18	7.04	19.09	1.48	5.75	17.53	1.36	5.40	17.15	0.77	4.56
Mar	14.77	1.24	4.16	17.41	1.45	4.98	12.47	1.15	5.32	15.36	1.09	5.70	15.86	1.83	5.75	18.24	0.40	9.15
Apr	11.65	0.37	7.12	12.65	0.57	4.60	12.52	1.34	4.55	16.40	0.66	7.38	16.30	0.74	6.05	18.27	0.61	5.72
May	12.45	0.32	3.36	11.11	0.48	3.50	7.79	0.37	6.30	12.88	0.26	4.02	15.14	0.65	6.43	16.80	0.00	6.67
Jun	14.67	0.49	3.91	10.30	0.13	3.10	11.49	0.48	5.79	14.83	0.77	4.69	10.88	0.13	4.94	11.97	0.32	4.60
Jul	12.05	0.73	5.02	14.73	1.01	3.80	13.99	0.32	4.91	11.68	0.87	4.0	14.21	0.94	4.70	17.82	0.72	4.90
Aug	7.87	1.02	3.40	10.93	0.10	6.21	7.85	0.63	4.16	12.96	0.90	6.38	10.87	0.21	6.50	11.44	0.15	5.30
Sep	9.61	0.52	4.73	10.45	0.02	5.10	12.08	0.20	5.00	11.24	0.12	7.11	11.48	0.10	3.84	10.79	0.00	5.60
Oct	13.72	0.00	3.20	9.00	0.00	4.98	10.44	0.00	4.75	10.62	0.00	6.30	10.10	0.00	5.30	11.01	0.00	5.51
Nov	11.70	0.69	3.02	14.38	0.28	5.60	16.86	0.02	4.69	15.08	0.33	5.0	10.39	1.10	4.88	15.81	0.19	4.35
Dec	12.50	1.04	4.17	13.05	0.43	5.85	15.99	0.89	4.24	20.34	1.43	4.93	12.92	0.91	4.30	15.35	0.98	5.05

Source: NOAA, National Weather Service, NOWData – NOAA Online Weather Data

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

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 thunderstorms are typically non-frontal convective type events that are normally short and intense, and usually cover small areas. In addition, during the summer and fall, tropical weather systems occasionally pass through the area and can produce major rainfall events over a period of several days.

Records at the U.S. Geological Survey (USGS) gage 02407000 at Childersburg, Alabama, 13 miles downstream of the dam, are available from October 1913 through the present. This gage is jointly operated with the APC.

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

Inflow, discharge and pool elevation records for Logan Martin Dam and Lake from July 1964 through December 2019 are shown on Plates 4-2 through 4-12.

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 Mayo's Bar near Rome, Georgia is shown on Plate 4-13. Rating curves for the Etowah River at Allatoona Dam, at GA 1 Loop near Rome, Georgia, at Kingston, Georgia, at Resaca, Georgia, and at Oostanaula River near Rome, Georgia are shown on Plates 4-14 through 4-17 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. The Alabama Department of Environmental Management's (ADEM) 2020 Integrated Water Quality Monitoring and Assessment Report, Water Quality in Alabama 2018–2020 (AL 303[d], 2020) lists Logan Martin Lake as not supporting its designated uses of fish and wildlife, public water supply, and swimming due to impairment by priority organics (polychlorinated biphenyls [PCBs]) contaminated sediments. The lake is ranked as Category 5, which are waters in which a pollutant has caused or is suspected of causing impairment. The water should be placed in Category 5 if an identified pollutant causes impairment. It is assumed the PCB contamination is due to upstream industrial activity.

There is currently no Total Maximum Daily Load (TMDL) addressing PCB contamination in Logan Martin Lake.

The final TMDLs for Neely Henry Lake Nutrients, Organic Enrichment (OE)/Dissolved Oxygen (DO) and pH, Logan Martin Lake Nutrients and OE/DO, Lay Lake Nutrients and OE/DO and Mitchell Lake Nutrients was published by ADEM in 2008. A lake nutrient standard was not developed for Logan Martin Lake; however, a total TMDL of 3,593.86 pounds per day of total phosphorus was finalized for Logan Martin Lake. This TMDL was developed with a target of 17 micrograms per liter (µg/L) of chlorophyll a as an algae indicator in the upper reservoir and dam forebay. This target was set with the goal of meeting the state water quality standard of 5.0 mg/L for DO, as set forth by ADEM Administrative Code 335-6-10-.09.

The ability of Logan Martin Lake to assimilate point source pollutant loads from the Lincoln South Wastewater Treatment Plant AL0054356 and Pell City Dye Creek Wastewater Treatment Plant AL0045993 were considered in the 2008 TMDL development. As part of the TMDL process, allocations of nutrients were given to the wastewater treatment facilities to support achieving the TMDL chlorophyll *a* standard. Point source pollutant load management, TMDL targets, and APC oxygenation systems (discussed later in this section) are assumed to have positively influenced nutrient and OE/DO levels because the AL 303(d), 2020 did not identify these as causes of impairment in Logan Martin.

Additionally, Logan Martin is subject to ADEM Administrative Code 335-6-10-.06:

335-6-10-.06 Minimum Conditions Applicable to All State Waters. The following minimum conditions are applicable to all State waters, at all places and at all times, regardless of their uses:

(a) State waters shall be free from substances attributable to sewage, industrial wastes, or other wastes that settle in forming bottom deposits which are unsightly, putrescent or interfere directly or indirectly with any classified water use.

(b) State waters shall be free from floating debris, oil, scum, and other floating materials attributable to sewage, industrial wastes, or other wastes in amounts sufficient to be unsightly, or which interfere directly or indirectly with any classified water use.

(c) State waters shall be free from substances attributable to sewage, industrial wastes, or other wastes in concentrations or combinations, which are toxic or harmful to human, animal, or aquatic life to the extent commensurate with the designated usage of such waters.

AL 303(d), 2020 identifies Logan Martin Lake as eutrophic. Eutrophic lakes are nutrient rich and capable of supporting large plant populations that reduce DO as they decompose. The lake's trophic state index score indicated regulatory action for protection and restoration was not appropriate at the time of the report.

APC provides aeration at Logan Martin Dam using a forced air system and a forebay diffuser system. The forced air portion of the system is delivered from two centrifugal blowers installed on a concrete pad located approximately 200 feet southwest of the powerhouse. Each blower, driven by a 2,250-horsepower electrical motor, can produce airflow up to 24,000 standard cubic feet per minute. Discharge air from the blower passes through a heat exchanger to reduce the compressed air temperature to ambient. Both blowers are connected to a common header at the blower pad which is routed through the plant and down to the draft tube access level. The header splits into three independently controlled branches with each branch connecting to a peripheral aerating ring embedded under the runner in the draft tube wall. Air is introduced into the ring through two electrically operated valves. Air from the embedded aerating ring enters the draft tube, mixing with turbine discharge through a series of holes in the draft tube wall. The peripheral aerating ring is flush with the draft tube wall so there are no protrusions into the draft tube.

The aeration system is automatically controlled by a Programmable Logic Controller (PLC) using real time data from a DO monitor in the tailrace. The PLC is manually programmed with a range of set points. The blowers automatically turn on when the DO drops to the low set point and run continuously until the high set point is reached. The system piping is designed so that each blower can serve any of the three generating units. However, only one blower will operate for one-unit generation. A second blower will operate simultaneously with the first blower only if a second or third unit is generating. Blowers are in a lead-lag configuration to equalize runtimes. The Logan Martin blowers are in automatic operation from 1 May through 30 November.

The forebay diffuser system consists of an oxygen storage and control facility located on the west bank of the Logan Martin Dam forebay about 500 feet northeast of the dam's axis. The facility includes two 15,000-gallon liquid oxygen (LOX) tanks, vaporizers, PLC building, and control valves that deliver oxygen to the forebay diffuser lines. The diffuser lines in the forebay divide into seven branches with a total length of approximately 22,500 feet. Flow of gaseous oxygen into each branch is controlled manually using the Human Machine Interface screen on the PLC. The forebay diffuser system is a secondary system used to support the DO base in the forebay. It allows the blower system to cycle rather than run continuously. The Logan Martin forebay diffuser system is used as needed from 1 May through 30 November.

From 1 December to approximately 23 April, the blowers are placed in manual operation mode. Cooling water piping and the heat exchangers are drained to prevent freezing during the winter months. The motors on the blowers are bumped once a week to keep bearings lubricated and to prevent shaft sag. Air is discharged to the atmosphere when the motors are bumped. Oil is changed in the blower bearing housings and the cooling water system, including the heat exchangers, are watered up during the first week of April. The system is tested to ensure that every component is ready to be placed into automatic operation on May 1.

The forebay diffuser system is changed from continuous mode to blowoff gas mode (BOG) from 1 December to 30 April. A minimal amount of LOX is maintained in the storage tanks during this period to keep the system pressurized and to prevent a “hot-fill” procedure in the spring if the tanks were allowed to run dry. While in BOG mode, LOX inside the storage tanks slowly vaporizes and builds pressure. The excess pressure is vented into the reservoir diffuser lines rather than the atmosphere. Approximately one week before 1 May, the diffuser system is tested for operation in continuous mode.

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

a. General. 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. Four multipurpose dams are located upstream: APC’s H. Neely Henry and Weiss, and USACE’s Allatoona and Carters. The bankfull capacity of the Coosa River below Logan Martin Dam is 34,000 cfs.

Downstream of Logan Martin Dam along the Coosa River to Lay Lake is a mix of land uses, with agricultural land, forested land, industrial operations (an oil refinery, plastics manufacturing plant, power plant, pulp and paper mill, steel fabricator, and water treatment plant), low-density residential, and recreational use (golf course). Nearby communities include Childersburg, Fayetteville, Harpersville, Talladega Springs, Vincent, and Wilsonville, Alabama.

The approximate 13-mile channel below Logan Martin to Childersburg is low gradient with an average slope of 0.00012 (0.012 percent), the typical bank height ranges from 15 to 30 feet, bank heights decrease moving downstream in the wider floodplain area of Childersburg. The normal travel time from Logan Martin to the Childersburg gage is three hours.

Tailwater degradation was evaluated using low-flow tailwater stage and discharge data from 2000 to 2018. All flows of 2,500 +/- 25 cfs were plotted and compared for changes in tailwater elevation over time (Figure 4-2). The frequent variation in elevation between 396 feet and 399 feet within the same year indicates that it is likely that management of the pool above Lay Dam influences the Logan Martin Dam tailwater and obscures any trends in channel erosion or deposition. The nearly level trendline, however, supports a stable channel with little or no erosion or deposition in the tailwater area.

One of the changes in the flood control procedures involves modifying the induced surcharge operations at Logan Martin, with specific higher starting discharges. This increase at Logan Martin (from 50,000 cfs up to 70,000 cfs) prompts the need of additional flood easement. Routings of the Coosa River from Logan Martin Dam downstream to Lay Dam have been performed for 50,000 cfs up to 70,000 cfs to ascertain impacts to elevations above previous flood easements. These routings determined that additional flood easement was needed for a six mile stretch of the Coosa River on Lay Reservoir just downstream of Logan Martin Dam (Figure 4-3).

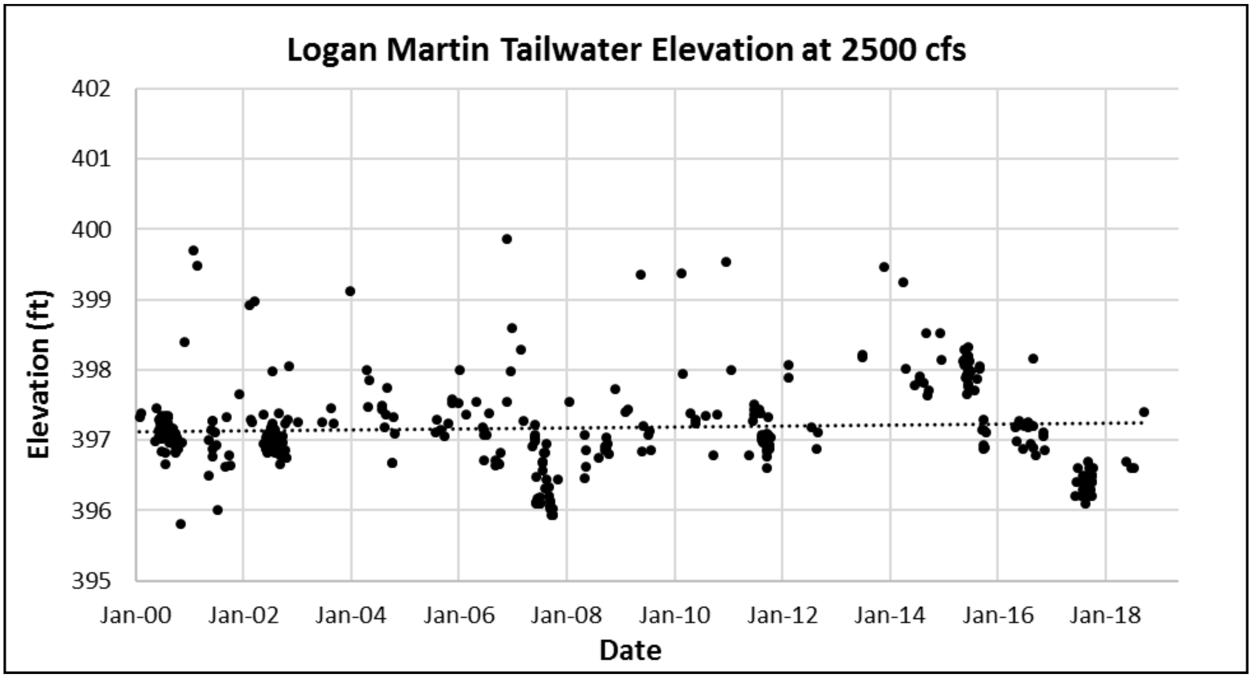

Figure 4-2 Low-Flow Elevation Trend of the Logan Martin Dam Tailwater

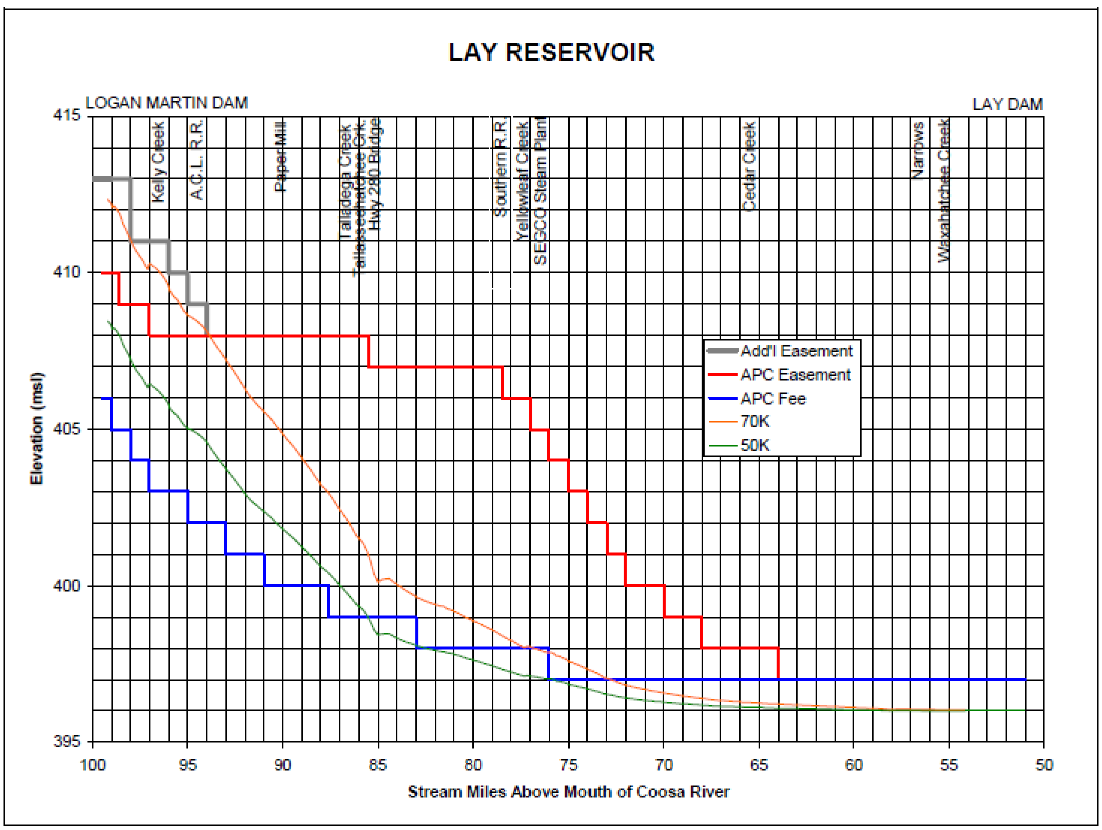

Figure 4-3 APC Flood Easements, Logan Martin Dam to Lay Dam

APC has obtained flowage easement in the Childersburg area to elevation 408 feet MSL (NGVD29).

The locations of the USGS stream gages in the Coosa River basin are shown on Plate 5-1. Coosa River at Childersburg, Alabama is only streamflow gage downstream of Logan Martin and the next project Lay Dam. Real-time stage and discharge data from the Childersburg gage are critical to the project operation (Table 4-6 and Table 4-7). The gage is in the pool of Lay Dam and subject to backwater effects. Childersburg is an index velocity site, consequently no standard rating curve is available. Computing discharge using the index velocity method differs from the traditional stage-discharge method by separating velocity and area into two ratings—the index velocity rating and the stage-area rating. The outputs from each of these ratings, mean channel velocity (V) and cross-sectional area (A), are then multiplied together to compute a discharge.

Table 4-6 Flood Impacts at Childersburg, Alabama – Coosa River

Downstream of Logan Martin Dam (USGS# 02407000)	
Stage (feet)	**Impacts**
412	Widespread residential flooding occurs. Evacuations needed.
410	Residential and street flooding becomes widespread. Extensive flooding of farmlands also occurs.
407	Flooding of some homes in the area begins.
402	Flooding of low lying areas begins. At 404 feet flooding of some low low-lying roads in the area begins. The yards of some homes near the river become flooded.

Table 4-7 Historical Crests for Coosa River at Childersburg, Alabama

(USGS #02407000) Gage Datum 382.45 ft NAVD88
(1) 412.86 ft on 02/23/1961
(2) 412.55 ft on 03/30/1951
(3) 412.48 ft on 04/09/1938
(4) 411.44 ft on 04/14/1979
(5) 410.95 ft on 02/05/1936
(6) 410.75 ft on 11/30/1948
(7) 409.40 ft on 01/21/1947
(8) 407.44 ft on 05/09/2003
(9) 407.07 ft on 03/17/1990
(10) 405.62 ft on 12/19/1962
(11) 405.49 ft on 12/26/2015 (P)
(12) 405.37 ft on 03/21/1980
(13) 404.91 ft on 02/03/1996
(14) 404.27 ft on 12/06/1983
(15) 403.98 ft on 06/22/1989
(16) 403.80 ft on 03/11/2011 (P)
(17) 403.80 ft on 03/11/2010
(18) 403.77 ft on 03/08/1996
(19) 403.72 ft on 05/21/1983
(20) 403.65 ft on 03/22/1942
(21) 403.19 ft on 04/08/2014 (P)
(22) 402.97 ft on 04/08/2014 (P)
(23) 402.79 ft on 12/29/2018 (P)
(24) 402.37 ft on 05/19/2013 (P)
(25) 402.16 ft on 03/03/1997
(26) 402.00 ft on 02/25/2016 (P)
(27) 400.20 ft on 04/06/2017
(28) 398.86 ft on 03/12/2012
(P): Preliminary values subject to further review
Low Water Records
(1) 390.00 ft on 04/20/1975

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 on the Alabama River. 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. The general economics of the region are represented by the three counties in Table 4-8. The watershed includes both developed urban and residential land uses, and more rural land uses within the watershed.

a. Population. The 2020 population for the three counties composing the Logan Martin project watershed and basin below was 289,693 persons. Table 4-8 shows the 2020 population and the per capita income in the past 12 months (in 2020 dollars), from 2016-2020. The most recent data available are provided.

Table 4-8 Population and Per Capita Income

County	Population	Per Capita Income (Average)	Persons Living in Poverty (Average)
Calhoun	116,441	$50,128	14.5%
St. Clair	91,103	$27,941	10.5%
Talladega	82,149	$24,244	16.9%
	289,693	$34,104	13.9%

Source: US Census Bureau, 2020

b. Agriculture. The watershed and basin consist of approximately 1,699 farms averaging 133 acres per farm. In 2017, the area produced $185.4 million in farm products sold and total farm earnings of more than $ 46.1 million. Agriculture in the Logan Martin Project watershed and basin consists primarily of livestock, which accounts for a little less than 82 percent of the value of farm products sold. Livestock production consists primarily of poultry operations in the counties in the immediate vicinity of the project. The principal crops consist of grains, cotton, hay, corn, soybeans, fruits, vegetables, and nuts. Agricultural production information and farm earnings for each of the counties in the Logan Martin Project watershed and basin are shown in Table 4-9.

Table 4-9 Farm Earnings and Agricultural Production

County	Farm Earnings ($1,000)	Number of Farms	Total Farm Acres	Average Acres Per Farm	Value of Farm Products Sold ($1,000)	Percent Crops	Percent From Livestock
Calhoun	20,414	643	89,010	138	86,807	15	85
St. Clair	15,300	490	58,975	120	58,250	13	87
Talladega	10,411	566	79,500	140	40,383	29	71

*U.S. Department of Agriculture, Census of Agriculture, 2017 State and County Profile

c. Industry. The leading industrial sectors that provide non-farm employment are manufacturing, health care and social assistance, and retail trade. In 2017, the Logan Martin Dam project area counties contained 265 manufacturing establishments that provided 19,505 jobs with total earnings of just over $1 billion. Table 4-10 contains information on the manufacturing activity for each of the counties in the Logan Martin Dam Project Watershed and Basin.

Table 4-10 Manufacturing Activity

	Number of Manufacturing Establishments	Total Manufacturing Employees	Total Earnings ($1,000)
Calhoun	106	6,265	310,560
St. Clair	72	4,006	181,861
Talladega	87	9,234	597,854

*U.S. Census - County Business Patterns by Legal Form of Organization and Employment Size Class for U.S., States, and Selected Geographies, 2017

d. Flood Damages. Not available for APC projects.

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. 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 Logan Martin Project, and the data collected by the Corps supplement those being collected by the APC and are of value to them in planning their project operations. It is important that each agency furnish the other with hydrologic and operating data as may be needed or found beneficial in its operational decision making. This requires that communications facilities be available between the Mobile District Office of the Corps 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 Logan Martin 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 the operation of the Logan Martin 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, GA
	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. 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 (sq mi)
Etowah River Basin Below Allatoona Dam			
Etowah River	Allatoona	47.00	1110
Etowah River	Cartersville (Nr)	38.22	1330
Etowah River	Cartersville (Nr)	38.22	1330
Etowah River	Kingston (Nr)	21.51	1630
Etowah River	Rome (So RR)	1.80	1810
Etowah River	Rome (2nd Ave)	0.90	1816
Oostanaula River Basin			
Talking Rock Creek	Talking Rock		119
Coosawattee River	Ellijay	1.00	90
Coosawattee River	Carters	26.60	376
Coosawattee River	Carters	24.91	531
Coosawattee River	Pine Chapel	6.60	856
Conasauga River	Eton	42.67	252
Conasauga River	Tilton	12.14	682
Oostanaula River	Resaca	43.16	1610
Oostanaula River	Calhoun	36.37	1624
Oostanaula River	Rome	4.50	2120
Oostanaula River	ROME (5th Ave.)	0.35	2150
Coosa River Basin Above Weiss Powerhouse			
Coosa Basin	Mayo's Bar	278.8	4040
Chattooga River	Summerville	(3)	193
Chattooga River	Gaylesville	7.31	368
Little River	Blue Pond	2.24	194
Terrapin Creek	Ellisville	8.15	258
Coosa River Basin Weiss Powerhouse to H. Neely Henry			
Coosa River	Gadsden	174.6	5800
Coosa River	Gadsden SP	174.6	5800
Big Wills Creek	Crudup	171.23	182
Big Canoe Creek	Ashville	154.26	141
Coosa River	Henry Dam	146.82	6596
Coosa River Basin H. Neely Henry Powerhouse to Logan Martin			
Choccolocco Creek	Jackson Shoals	113.83	481
Coosa River	Logan Martin Dam	98.47	7743

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 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.

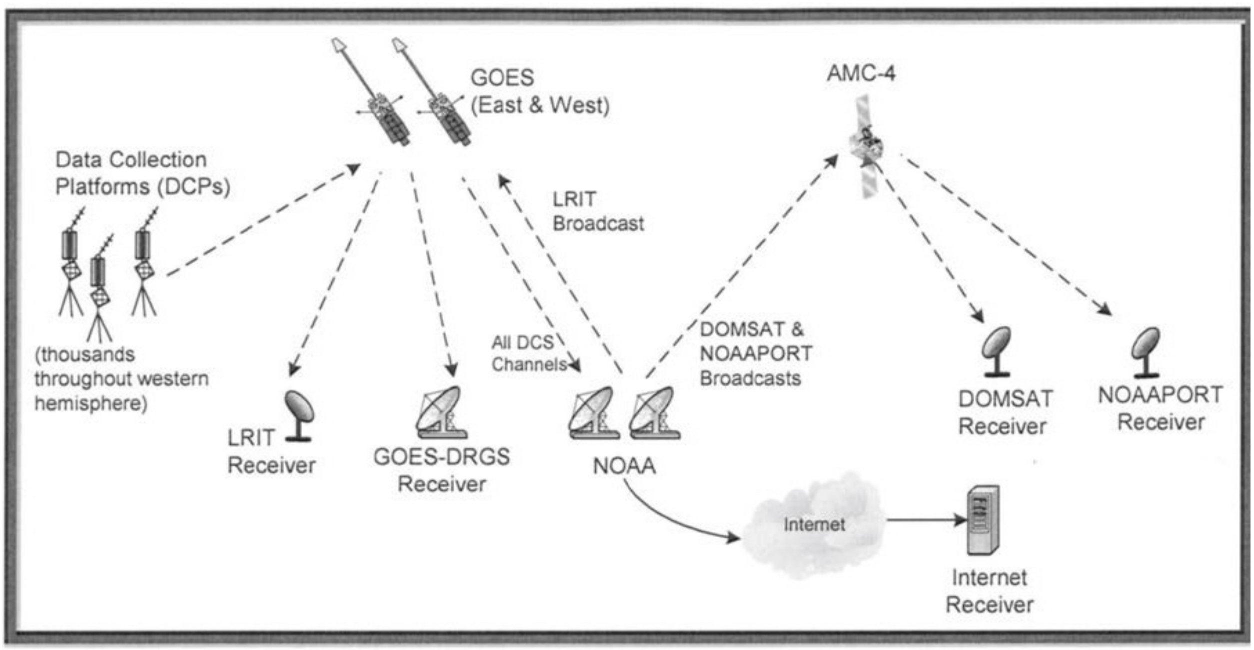

Figure 5-3 Typical Configuration of the GOES System

<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 APC'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:

APC – Alabama, P.O. Box 2641, Birmingham, Alabama 35291,
Phone: (205) 257-2599 Web: https://apcshorelines.com

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: https://www.weather.gov/srh/

USACE, 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 29 USGS gaging stations within the ACT Basin. The data for these stations can be obtained from the USGS yearly publication, Water Resources Data Alabama, and Water Resources Data Georgia.

Table 5-3 USGS Water Quality Stations, ACT Basin

Station Number	Station name
03130004 Lower Chattahoochee	
023432415	CHATTAHOOCHEE R .36 MI DS WFG DAM NR FT GAINES, GA
03150101 Conasauga	
02385800	HOLLY CREEK NEAR CHATSWORTH, GA
03150102 Coosawattee	
02382500	COOSAWATTEE RIVER AT CARTERS, GA
03150104 Etowah	
02388975	ETOWAH RIVER AT GA 136, NEAR LANDDRUM, GA
02388985	RUSSELL CRK 0.3 MI DS HEAD LAKE NR DAWSONVILLE, GA
02389150	ETOWAH RIVER AT GA 9, NEAR DAWSONVILLE, GA
02394000	ETOWAH RIVER AT ALLATOONA DAM, ABV CARTERSVILLE, GA
02394682	RICHLAND CREEK AT OLD DALLAS RD, NEAR DALLAS, GA
03150105 Upper Coosa	
02397000	COOSA RIVER (M'YO'S BAR) NEAR ROME, GA
02397530	COOSA RIVER AT STATE LINE, AL/GA
03150108 Upper Tallapoosa	
02413210	LITTLE TALLAPOOSA R AT GA 100, NEAR BOWDON, GA
03150105 Upper Coosa	
02397530	COOSA RIVER AT STATE LINE, AL/GA
02400100	TERRAPIN CREEK AT ELLISVILLE AL
03150106 Middle Coosa	
02405500	KELLY CREEK NEAR VINCENT AL
03150107 Lower Coosa	

Station Number	Station name
02407514	YELLOWLEAF CREEK NEAR WESTOVER, AL
02408540	HATCHET CREEK BELOW ROCKFORD AL
03150109 Middle Tallapoosa	
02414715	TALLAPOOSA RIVER NR NEW SITE, AL (HORSESHOE BEND)
03150110 Lower Tallapoosa	
02419890	TALLAPOOSA RIVER NEAR MONT.-MONT. WATER WORKS
03150201 Upper Alabama	
02423110	CAHABA RIVER NEAR TRUSSVILLE, ALA
03150202 Cahaba	
02423130	CAHABA RIVER AT TRUSSVILLE, AL.
02423160	CAHABA RIVER NEAR WHITES CHAPEL AL
02423380	CAHABA RIVER NEAR MOUNTAIN BROOK AL
02423397	LITTLE CAHABA RIVER BELOW LEEDS, AL.
02423496	CAHABA RIVER NEAR HOOVER, AL
0242354650	CAHABA VALLEY CR AT INDIAN TRAIL RD NR INDIAN SPRS
02423555	CAHABA RIVER NEAR HELENA AL
02423571	SHADES CREEK AT ELDER ST NEAR SPRINGDALE AL
02423586	SHADES CREEK NR HOMEWOOD, ALA
02423647	CAHABA RIVER NEAR WEST BLOCTON AL

5-03. Sediment Stations. APC has made provision for such surveys, if required in the future, by identifying five 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 PLCs. The PLC receives data from various inputs from the dam; then a server located at the APC'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 APC dams and reservoirs are located. The majority of these gages are owned and operated by APC. Where physically practical, APC pulls data from adjacent USGS rain and stage gages to enhance the viability of the overall HDAS. All data collected in the field are transmitted either via APC's dedicated network connections, where available, or the SouthernLINC Wireless radio network. Data are stored on servers located at the APC facilities.

Data collected from the various sources are then rendered into web and desktop applications to monitor operations and activities at the APC 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, Next Generation Weather Radar (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 are 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 SouthernLINC Wireless radios and dedicated network connections that interfaces with its Alabama Control Center Hydro Desk located in Birmingham, Alabama. Data are stored on servers located at the APC 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 Logan Martin 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 Advanced Weather Interactive Processing System (AWIPS) 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 Logan Martin 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 Logan Martin Lake is also provided by the APC at https://apcshorelines.com/our-lakes/.

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.

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 website.

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, are 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 Logan Martin Project, notifications to designated county emergency agency warning points (e.g., local law enforcement, E-911 operations centers, and county emergency management agencies), as well as NWS and the statewide Alabama Emergency Management Agency, will be made in accordance with APC's Emergency Action Plan for Logan Martin Dam.

6 - HYDROLOGIC FORECASTS

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

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

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

2) Maintains records of rainfall and river stages for the Coosa River Basin, and records of pool level, inflow, and outflow at Logan Martin Dam and other impoundments in the basin.

3) Monitors operation of the power plant and spillway at Logan Martin Dam for compliance with the regulation schedule for flood risk management operation.

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

5) Evaluate special water control deviation requests submitted by APC Reservoir Management and transmit the approval or disapproval of the Division Commander or their delegated representative.

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

b. Role of APC. The flood risk management 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.

c. Role of Other Agencies. The NWS is responsible for preparing and publicly disseminating forecasts relating to precipitation, temperatures, and other meteorological elements related to weather and weather-related forecasting in the ACT Basin. For the Coosa River Basin, forecasts are prepared by the NWS's SERFC located in Peachtree City, Georgia, and are issued through their office in Birmingham, Alabama. The Water Management Section uses the NWS as a key source of information for weather forecasts. The meteorological forecasting provided by the NWS is considered critical to the Corps' water resources management mission.

The 24- and 48-hour Quantitative Precipitation Forecasts (QPFs) are invaluable in providing guidance for basin release determinations during normal operations. Using precipitation forecasts and subsequent runoff directly relates to project release decisions.

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

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

6-02. Flood Condition Forecasts. During flood conditions, 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 deviations 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				
River/Creek	**Station**	**Station ID**	**Action Stage**	**Flood Stage**
Alabama	Montgomery	MGMA1	26	35
Alabama	R. F. Henry TW	TYLA1	122	122
Alabama	Millers Ferry TW	MRFA1	61	66
Alabama	Claiborne TW	CLBA1	35	42
Daily 24-hour Inflow in 1000 CFS Forecast				
Reservoir		**Station ID**		
R. F. Henry		TYLA1		
Millers Ferry		MRFA1		
Additional Stage Forecasts Only for Significant Rises				
River/Creek	**Station**	**Station ID**	**Action Stage**	**Flood Stage**
Coosa	Weiss Dam	CREA1	564.5	567
Coosa	Gadsden	GAPA1	511	511
Coosa	Logan Martin Dam	CCSA1	465.5	467
Coosa	Childersburg	CHLA1	402	402
Coosa	Wetumpka	WETA1	35	45
Tallapoosa	Wadley	WDLA1	13	13
Tallapoosa	Milstead	MILA1	15	40
Tallapoosa	Tallapoosa Wt Plt	MGYA1	15	25
Catoma Creek	Montgomery	CATA1	17	20
Alabama	Selma	SELA1	30	45
Cahaba	Cahaba Heights	CHGA1	14	14
Cahaba	Centreville	CKLA1	23	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 hydropower generation will also augment the flow of the river downstream down to the black start level shown in Figure 8 of the Drought Contingency Plan. Storage within the range of power-pool drawdown between elevations 465.0 and 462.0, amounting to 42,574 acre-feet (0.16 inches), will 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 Logan Martin 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 after approval by the South Atlantic Division (SAD) Commander or delegated authority in accordance with Section 7-15. Under normal and/or flood operation deviations will follow the process described in Section 7-15; however, the process will be driven by the urgency of conditions. Deviations during normal operations will be coordinated with APC Reservoir Management. Any departure from the regulation schedule will require approval by the Division Commander or delegated authority which is coordinated by the Water Management Section Chief.

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 APC 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 but above 460.0 feet and Weiss above elevation 564.0 feet and inflow into Logan Martin and Weiss at plant capacity and increasing	70,000 cfs	Pull Logan Martin to elevation 460.0 feet by discharging 70,000 cfs. Once at elevation 460.0 feet, 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-conservation 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, Plate 7-2, 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.

c. Reduce to 50% of Surcharge Schedule. The Logan Martin Rule #5 to cut surcharge releases operates to minimize impacts downstream of the dam by limiting the surcharge when the stage at Childersburg is rising over the easement of 408 feet MSL (NGVD29) due to a combination of discharges from Logan Martin and local inflow. When the rating curve at Childersburg indicates that a combination of local inflow and surcharge values from Logan Martin will cause the stage at Childersburg to rise over elevation 408 feet MSL, surcharge releases can be cut up to 50 percent to provide time for the local inflows to recede. The total volume of the cutback cannot exceed 11,000 cfs-days (21,810 acre-feet) per event. The total cutback volume does not have to be used consecutively but can be implemented as multiple cutback periods during an event. Once this volume has been utilized, the project will return to the normal surcharge release schedule. The cutback volume will be tracked and reported to Mobile District Water Management Section during each implementation. This option is suspended at elevation 472.5 feet.

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 three-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 feet 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 feet 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 schedule shown on Plate 7-2. Every three 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. At Weiss Dam, a moderate flood can be expected to have a 50 percent (1/2) to 33 percent (1/3) annual chance exceedance (ACE, chance of occurring in any given year) (natural peak flow of 50,000 cfs to 60,000 cfs). At Logan Martin, a 50 percent to 33 percent ACE event is expected to have a natural peak flow of 90,000 cfs to 100,000 cfs according to the Coosa River Basin Flood Frequency Analysis (2004). A major flood has a 10 percent ACE (1/10 chance of occurring in any given year). During the real-time operation of the project, a major storm event will be characterized by firm forecasted surcharge release exceeding 70,000 cfs.

Normally flood risk management operation will be in accordance with the regulation plan described above. However, in the event of a major storm over the Coosa River basin, APC and the District Commander, USACE Mobile District will collaborate in the prompt analysis of all available information and in the formation of special operating procedures appropriate to the circumstances as they relate to the most effective utilization of flood risk management capacities. 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 Division Commander or their delegated authority and is coordinated by the Water Management Section Chief as outlined in Section 7-15. Details of the forecasting procedures, which will be developed by APC with the concurrence of the District Commander, 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 Section 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 ensure compliance with statuary requirements. During late summer, DO 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 DO levels above 4 mg/L. DO levels in the releases from the dam can result in tailwater DO levels that are at times less than State DO criteria.

APC provides aeration at Logan Martin Dam using a forced air system and a forebay diffuser system. The forced air portion of the system is delivered from two centrifugal blowers installed on a concrete pad located approximately 200 feet southwest of the powerhouse. Each blower, driven by a 2,250-horsepower electrical motor, can produce airflow up to 24,000 standard cubic feet per minute. Discharge air from the blower passes through a heat exchanger to reduce the compressed air temperature to ambient. Both blowers are connected to a common header at the blower pad which is routed through the plant and down to the draft tube access level. The header splits into three independently controlled branches with each branch connecting to a peripheral aerating ring embedded under the runner in the draft tube wall. Air is introduced into the ring through two electrically operated valves. Air from the embedded aerating ring enters the draft tube, mixing with turbine discharge through a series of holes in the draft tube wall. The peripheral aerating ring is flush with the draft tube wall so there are no protrusions into the draft tube.

The aeration system is automatically controlled by a PLC using real time data from a DO monitor in the tailrace. The PLC is manually programmed with a range of set points. The blowers automatically turn on when the DO drops to the low set point and run continuously until the high set point is reached. The system piping is designed so that each blower can serve any of the three generating units. However, only one blower will operate for one-unit generation. A second blower will operate simultaneously with the first blower only if a second or third unit is generating. Blowers are in a lead-lag configuration to equalize runtimes. The Logan Martin blowers are in automatic operation from 1 May through 30 November.

The forebay diffuser system consists of an oxygen storage and control facility located on the west bank of the Logan Martin Dam forebay about 500 feet northeast of the dam's axis. The facility includes two 15,000-gallon LOX tanks, vaporizers, and PLC building and control valves that deliver oxygen to the forebay diffuser lines. The diffuser lines in the forebay divide into seven branches with a total length of approximately 22,500 feet. Flow of gaseous oxygen into each branch is controlled manually using the Human Machine Interface screen on the PLC. The forebay diffuser system is a secondary system used to support the DO base in the forebay. It allows the blower system to cycle rather than run continuously. The Logan Martin forebay diffuser system is used as needed from 1 May through 30 November.

From 1 December to approximately 23 April, the blowers are placed in manual operation mode. Cooling water piping and the heat exchangers are drained to prevent freezing during the winter months. The motors on the blowers are bumped once a week to keep bearings lubricated and to prevent shaft sag. Air is discharged to the atmosphere when the motors are bumped. Oil will be changed in the blower bearing housings and the cooling water system, including the heat exchangers, will be watered up during the first week of April. The system will be tested to ensure that every component is ready to be placed into automatic operation on May 1.

The forebay diffuser system is changed from continuous mode to BOG from 1 December to 30 April. A minimal amount of LOX is maintained in the storage tanks during this period to keep the system pressurized and to prevent a "hot-fill" procedure in the Spring if the tanks were allowed to run dry. While in BOG mode, LOX inside the storage tanks will slowly vaporize and build up pressure. The excess pressure is vented into the reservoir diffuser lines rather than the atmosphere. Approximately one week before 1 May, the diffuser system is tested for operation in continuous mode.

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. In its FERC licenses, APC has management responsibilities for project lands and waters, including water withdrawals from its FERC-licensed reservoirs. Consistent with these license responsibilities, APC has developed a water withdrawal policy to manage water withdrawals from its reservoirs. The policy encourages responsible management and resource planning by water withdrawers. A party interested in withdrawing water from APC's reservoirs may do so only after applying for and receiving permission from APC. All water withdrawals from APC reservoirs require APC approval after some level of consultation with certain state and federal agencies. Through the Standard Land Use article in the FERC licenses, APC has the delegated authority from FERC to permit water withdrawals up to 1 million gallons per day (mgd) without prior FERC authorization. Before granting permission for withdrawals in excess of 1 mgd, APC must obtain approval from FERC for the prospective withdrawer's joint use of project lands and waters.

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-conservation-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-conservation), 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.

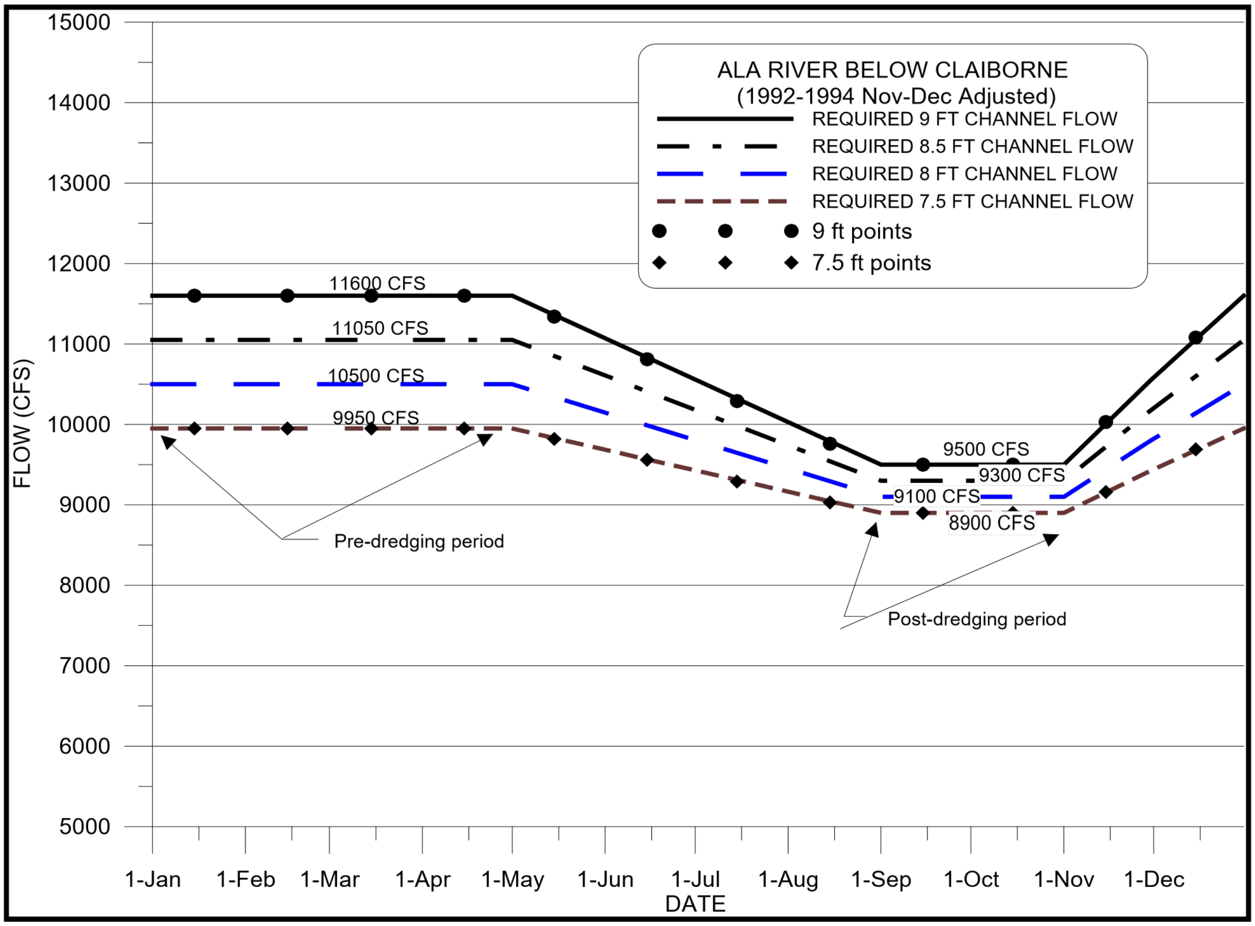

Figure 7-1 Flow-Depth Pattern (Navigation Template) Using 2004–2010 Survey Data

A 9.0-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 (9.0-foot channel) will probably not be attainable in the low water season, the three Alabama

River projects are operated to provide flows for a reduced project channel depth as determined by surveys of the river. APC operates its reservoirs on the Coosa and Tallapoosa Rivers (specifically flows from their Jordan, Bouldin, and Thurlow (JBT) Projects) to provide a minimum navigation flow target in the Alabama River at Montgomery, Alabama. The monthly minimum navigation flow targets are shown in Table 7-2.

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 lowest flow over a 7-day period that would occur once in 10 years (7Q10) 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)
January	11,600	9,280	9,950	7,960
February	11,600	9,280	9,950	7,960
March	11,600	9,280	9,950	7,960
April	11,600	9,280	9,950	7,960
May	11,340	9,072	9,820	7,856
June	10,810	8,648	9,560	7,648
July	10,290	8,232	9,290	7,432
August	9,760	7,808	9,030	7,224
September	9,500	7,600	8,900	7,120
October	9,500	7,600	8,900	7,120
November	10,030	8,024	9,160	7,328
December	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 Historical Storage Usage (cfs)	Required Basin Inflow (cfs)
January	9,280	–994	10,274
February	9,280	–1,894	11,174
March	9,280	–3,028	12,308
April	9,280	–3,786	13,066
May	9,072	–499	9,571
June	8,648	412	8,236
July	8,232	749	7,483
August	7,808	1,441	6,367
September	7,600	1,025	6,575
October	7,600	2,118	5,482
November	8,024	2,263	5,761
December	8,864	1,789	7,075

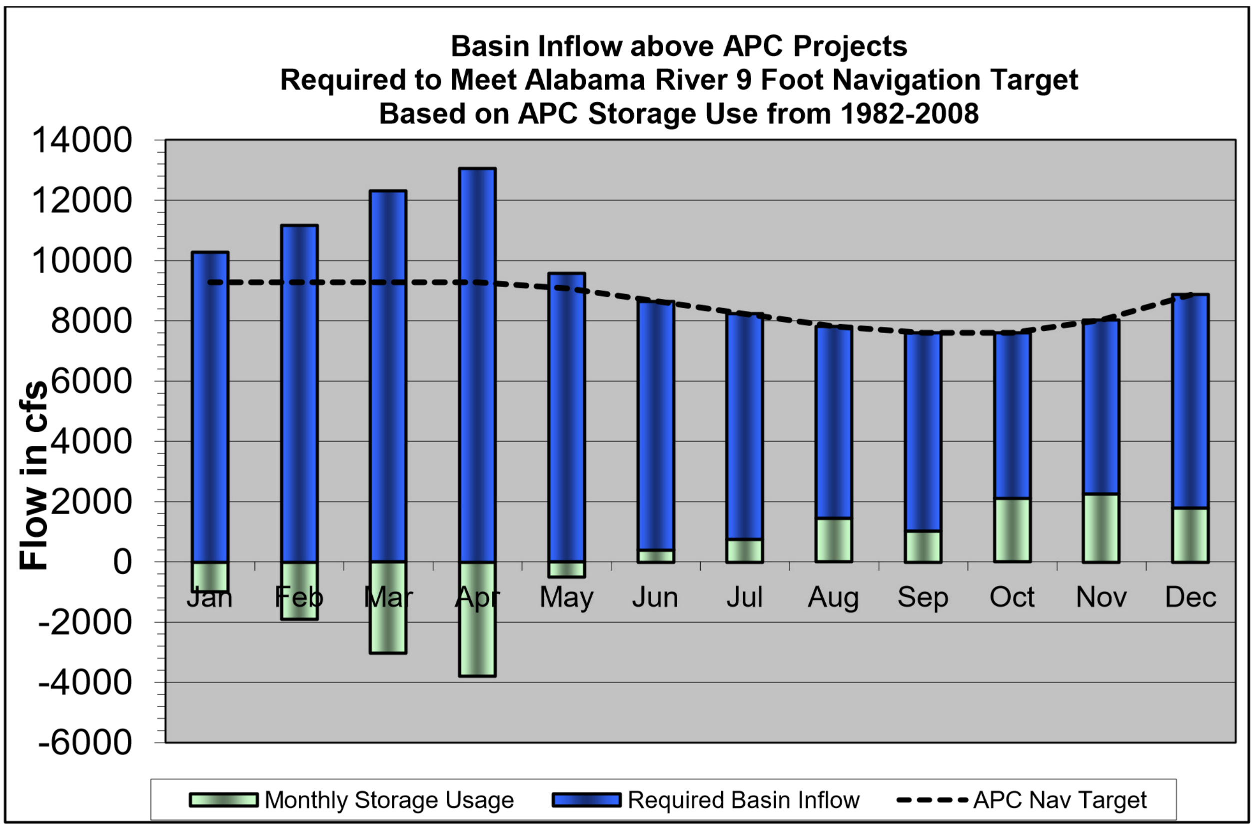

Figure 7-2 Flow Requirements from Rainfall (or Natural Sources) and Reservoir Storage to Achieve the JBT Goal for Navigation Flows for a 9-foot Channel

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

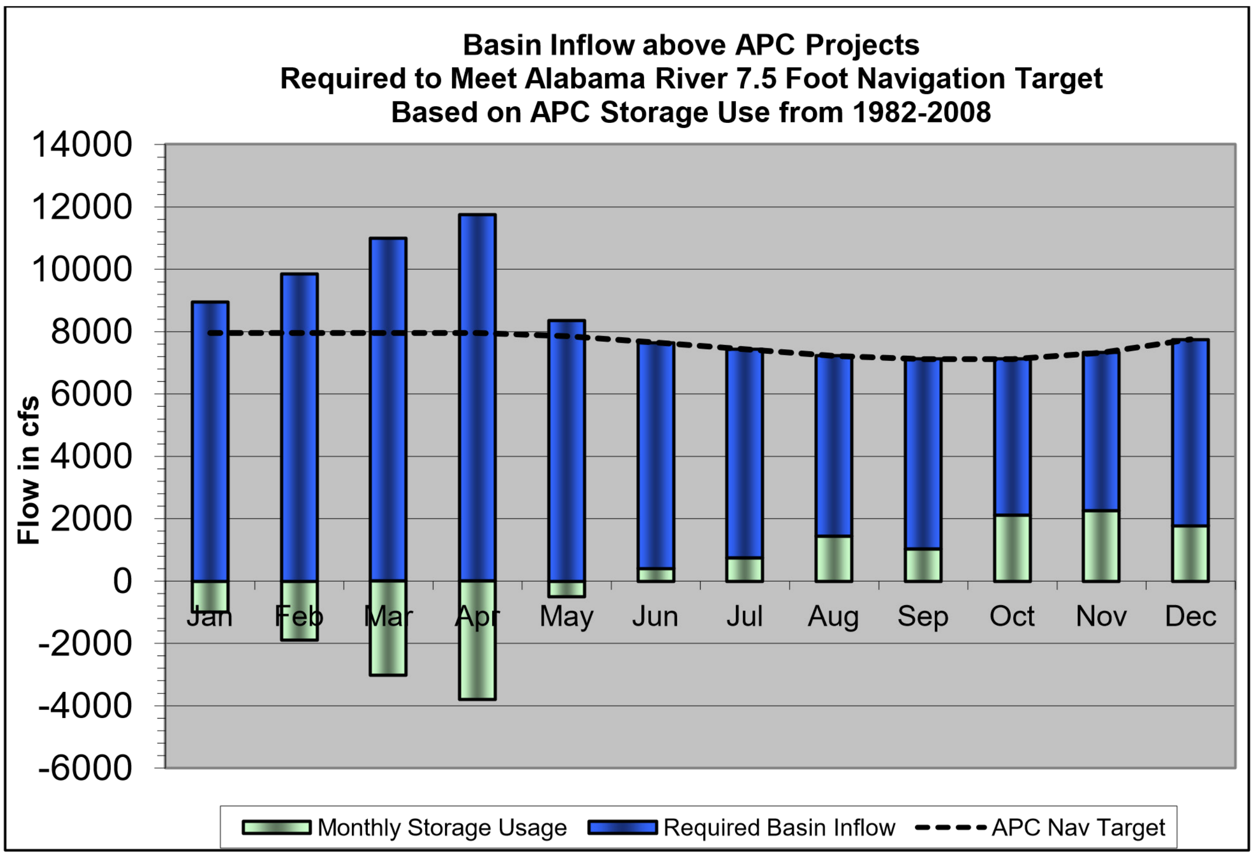

Figure 7-3 Flow Requirements from Rainfall (or Natural Sources) and Reservoir Storage to Achieve the JBT Goal for Navigation Flows for a 7.5-foot Channel

During low-flow periods, it is not always possible to provide the authorized 9.0-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. Due to the low river levels, navigation was not available for a significant period of time during those years.

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 found in Exhibit F.

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 9.0-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 has a 33 percent ACE (1/3 chance of occurring in any given year) and the freeboard will be one-foot on the guide and lock walls.

In the event that the Mobile District Water Management Section determines upcoming reductions in water releases may impact the available navigation channel depth, they shall contact the Black Warrior/Tombigbee – Alabama/Coosa Project Office, and the Mobile District Navigation Section, to coordinate the impact. The Water Management Section 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 the Water Management Section 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 Logan Martin 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.

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 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 Commander 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.

Table 7-6 ACT Drought Management Plan

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

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.

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.

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, 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.

The impacts of the *ACT Master Water Control Manual* and its Appendices, including this water control manual have been fully evaluated the ACR FR SEIS that was published in November 2020. A Record of Decision (ROD) for the action was signed in August 2021. During the preparation of the ACR FR/SEIS, a review of all direct, secondary, and cumulative impacts was made. As detailed in the ACR FR/SEIS, 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 FR/SEIS 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 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.

<u>a. Spillway Design Flood.</u> Regulation of the spillway design flood is shown on Plate 8-1. The initial pool for the spillway design flood was assumed to be maximum summer-level power pool, elevation 465.0 NGVD29.

<u>b. Other Floods.</u> The effects of reservoir regulation on three floods of record, March–April 1944, November–December 1948, and March–April 1951, are shown on Plates 8-2 to 8-4. 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 top of summer conservation pool, elevation 465.0 NGVD29.

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	-	-	8,390
99.50	Logan Martin Dam	-	-	7,743
148.00	Henry Dam	-	-	6,620
174.76	USGS gage, Gadsden, AL	-	-	5,800
206.25	Weiss Powerhouse	-	-	5,610
220.20	Below junction, Terrapin Creek	Terrapin Creek	289	5,571
-	(USGS gage at Ellisville, AL)	Terrapin Creek	258	-
225.65	Weiss Dam	-	-	5,270
232.98	Below junction, Chattooga River	Chattooga River	675	5,208
-	(USGS gage above Gaylesville, AL)	Chattooga River	368	-
278.65	Mayo's Bar	-	-	4,040
285.78	Confluence Etowah & Oostanaula, Rome, GA	-	-	4,010

ETOWAH RIVER		
River Miles above Mouth	Point on River	Drainage Area in square miles
0.00	Junction, Oostanaula River, Rome, GA	1,860
47.86	Allatoona Dam	1,122

OOSTANAULA RIVER		
River Miles above Mouth	Point on River	Drainage Area in square miles
0.00	Junction, Etowah River, Rome, GA	2,150
0.35	USGS gage, Hwy 27, Rome, GA	2,149
43.16	USGS gage, Resaca, GA	1,602
46.95	Confluence Conasauga & Coosawattee Rivers	1,596

COOSAWATEE RIVER		
River Miles above Mouth	Point on River	Drainage Area in square miles
0.00	Junction, Conasauga River	859
24.90	USGS gage 02382500, (Hwy 411) Carters, GA	531
26.80	Carters Dam	376

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 top of summer conservation pool elevation at 465NGVD 29 to top of winter conservation pool at elevation 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, DO 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 Logan Martin 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. In its FERC licenses, APC has management responsibilities for project lands and waters, including water withdrawals from its FERC-licensed reservoirs. Consistent with these license responsibilities, APC has developed a water withdrawal policy to manage water withdrawals from its reservoirs. The policy encourages responsible management and resource planning by water withdrawers. A party interested in withdrawing water from APC's reservoirs may do so only after applying for and receiving permission from APC. All water withdrawals from APC reservoirs require APC approval after some level of consultation with certain state and federal agencies. Through the Standard Land Use article in the FERC licenses, APC has the delegated authority from FERC to permit water withdrawals up to 1 mgd without prior FERC authorization. Before granting permission for withdrawals in excess of 1 mgd, APC must obtain approval from FERC for the prospective withdrawer's joint use of project lands and waters.

8-07. Hydroelectric Power. The Logan Martin Dam Project, along with 13 other hydroelectric facilities throughout the State of Alabama, provides approximately 6 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 weekday (not generally on weekends). The project generates an estimated 400,200 megawatt hours of energy annually.

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 Logan Martin Project in 1964. 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-1980s, 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 Logan Martin 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 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.

8-11. Frequencies.

a. Discharge Frequency. The discharge frequency curve at the dam site for the period 1964–2019 is shown on Plate 8-5.

b. Pool Elevation and Discharge Duration. The Annual Pool Elevation Duration curve is shown on Plate 8-6. The Annual Discharge Duration curve is shown on Plate 8-7.

8-12. Other Studies.

a. Examples of Regulation. Pool elevation, inflow, and outflow for the period of record are plotted on Plates 4-2 through 4-12. This demonstrates the actual reservoir regulation activity for the full period of record.

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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 Commander, USACE Mobile District who will monitor the operation of the Logan Martin 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 Logan Martin 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 Logan Martin Dam and other impoundments in the basin.

c. Monitor operations of the power plant and spillway at Logan Martin Dam for compliance with the regulation schedule for flood risk management operation.

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 Logan Martin 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 Section 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). ADEM's 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. APC. As stated in Public Law 436, 83rd Congress, and in FPC's license for the construction, operation, and maintenance of Project No. 2146, it is the responsibility of the APC to operate and maintain the Logan Martin 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 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, M&I water users, navigation interests, environmental organizations, and other basin-wide interest 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 Logan Martin 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. NWS. NWS is the federal agency in NOAA that is responsible for weather and weather forecasts. The NWS along with its River Forecast Center maintains a network of reporting stations throughout the nation. It continuously provides current weather conditions and forecasts. It prepares river forecasts for many locations including the ACT Basin. Often, it prepares predictions on the basis of what if scenarios. Those include rainfall that is possible but has not occurred. In addition, the NWS provides information on hurricane tracts and other severe weather conditions. It monitors drought conditions and provides drought information through the Internet, the news, and the Mobile District's direct access.

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

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

9-03. Interagency Agreements. Refer to the Section 9-03. Interagency Agreements and Exhibit C of the Master Water Control Manual of the ACT River Basin for discussion of interagency agreements for the ACT basin projects.

9-04. Commissions, River Authorities, Compacts, and Committees. Refer to Section 9-04. Commissions, River Authorities, Compacts, and Committees of the Master Water Control Manual of the ACT River Basin for discussion of these subjects.

9-05. Non-Federal Hydropower. Refer to Section 9-05. Non-Federal Hydropower of the Master Water Control of the ACT River Basin Manual for discussion of non-federal hydropower in the ACT basin.

9-06. Reports.

a. As early as possible every day (preferably between 4:00 and 6:00 a.m.), and at other times upon request, the Project Operator operating agency shall provide to the Mobile District Water Management Section the Operational Data Requirements. Data shall be distributed via automatic electronic transmittal. The operational data may include midnight pool elevation, 24-hour average inflow and discharge, 4-hour (midnight to 4:00 a.m.) inflow and discharge, 4:00 a.m. pool elevation, gross and estimated generation.

b. An After-Action Report will be generated after each flood event. These reports will be archived, utilized to provide narrative for annual flood damage reports, and made available upon request to SAD.

c. Automated reports are generated daily/weekly/monthly and made available through the Corps server; ACT Basin Daily Report, ACT 10-day Forecast, River Bulletin, ACT-ACT Report Summary, Lake Level 4-Week Forecast and Average Daily Inflow to Lakes by Month.

d. The District River System Status – Weekly summary of activities on the Mobile District river systems is updated weekly and published to the webpage.

e. The hourly power generation schedule is generated and posted to by 4:00 p.m. CT. Available for viewing are tomorrow's schedule, plus the previous 5 days.

f. Any Corps-requested information, such as monthly charts, short-term hydrologic reports, emergency regulation reports, graphical and tabular summaries, and flood situation reports, shall be provided in a timely manner.

9-07. Framework for Water Management Changes. Special interest groups often request modifications of the basin water control plan or project specific water control plan. The Logan Martin Project and other ACT Basin projects were constructed to meet specific, authorized purposes, and major changes in the water control plans would require modifying, either the project itself or the purposes for which the projects were built. However, continued increases in the use of water resources demand constant monitoring and evaluating reservoir regulations and reservoir systems to ensure their most efficient use. Within the constraints of Congressional authorizations and engineering regulations, the water control plan and operating techniques are often reviewed to see if improvements are possible without violating authorized project functions. When deemed appropriate, temporary deviations to the water control plan approved by SAD can be implemented to provide the most efficient regulation while balancing the multiple purposes of the ACT Basin-wide System.

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EXHIBIT A

SUPPLEMENTARY PERTINENT DATA

GENERAL INFORMATION

FERC License Number	2146
License Issued	4 Sep 1957
License Expiration Date	31 July 2007
Licensed Capacity, kilowatt (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-fil
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

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

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	131,570
Usable Storage Capacity (between 465 and 452.5 NGVD29), acre-feet	141,897
Surface Area (at 465 NGVD29), acres	15,269
Miles Shoreline (including tributaries) at 465 NGVD29	275
Water Residence Time, days	13
Existing Classification	PWS/F&W/S

POWERHOUSE

Length (Superstructure), feet	295
Width (Superstructure), feet	168.5
Height, feet	65
Construction Type (Superstructure)	Concrete gravity
Draft Tube Invert Elevation, feet NGVD29	358.9
Operating Floor Elevation, feet NGVD29	448.0
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	401.5
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, kW-h	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 gallons	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

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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."

Article 13. 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."

"**Article 15.** 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."

"Article 16. 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."

"**Article 18.** 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

April 2022

DROUGHT CONTINGENCY PLAN

FOR THE

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

I – INTRODUCTION

3-01. **Purpose of Document**. The purpose of this Drought Contingency Plan (DCP) is to provide a basic reference for water management decisions and responses to water shortage in the Alabama-Coosa-Tallapoosa (ACT) River Basin induced by climatological droughts. As a water management document, it is limited to those drought concerns relating to water control management actions for Federal U.S. Army Corps of Engineers (Corps) and Alabama Power Company (APC) dams. This DCP does not prescribe all possible actions that might be taken in a drought situation due to the long-term nature of droughts and unique issues that may arise. The primary value of this DCP is in documenting the overall ACT Basin Drought Management Plan for the system of Corps and APC projects; in documenting the data needed to support water management decisions related to drought regulation; and in defining the coordination needed to manage the ACT project's water resources to ensure that they are used in a manner consistent with the needs which develop during a drought. This DCP addresses the water control regulation of the five Corps impoundments and the APC Coosa and Tallapoosa projects (Table 1) in regard to water control regulation during droughts. Details of the drought management plan as it relates to each project and its water control regulation during droughts are provided in the water control manual within the respective project appendix to the ACT Basin Master Water Control Manual.

II – AUTHORITIES

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

A. ER 1110-2-1941, "Drought Contingency Plans", dated 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	17,380	16,000	0.1
Etowah River				
Allatoona Dam and Lake	Corps/GA/1949	338,253	270,247	10.3
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	141,897	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% 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% 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 is 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 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 reservoir conservation storage and 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.

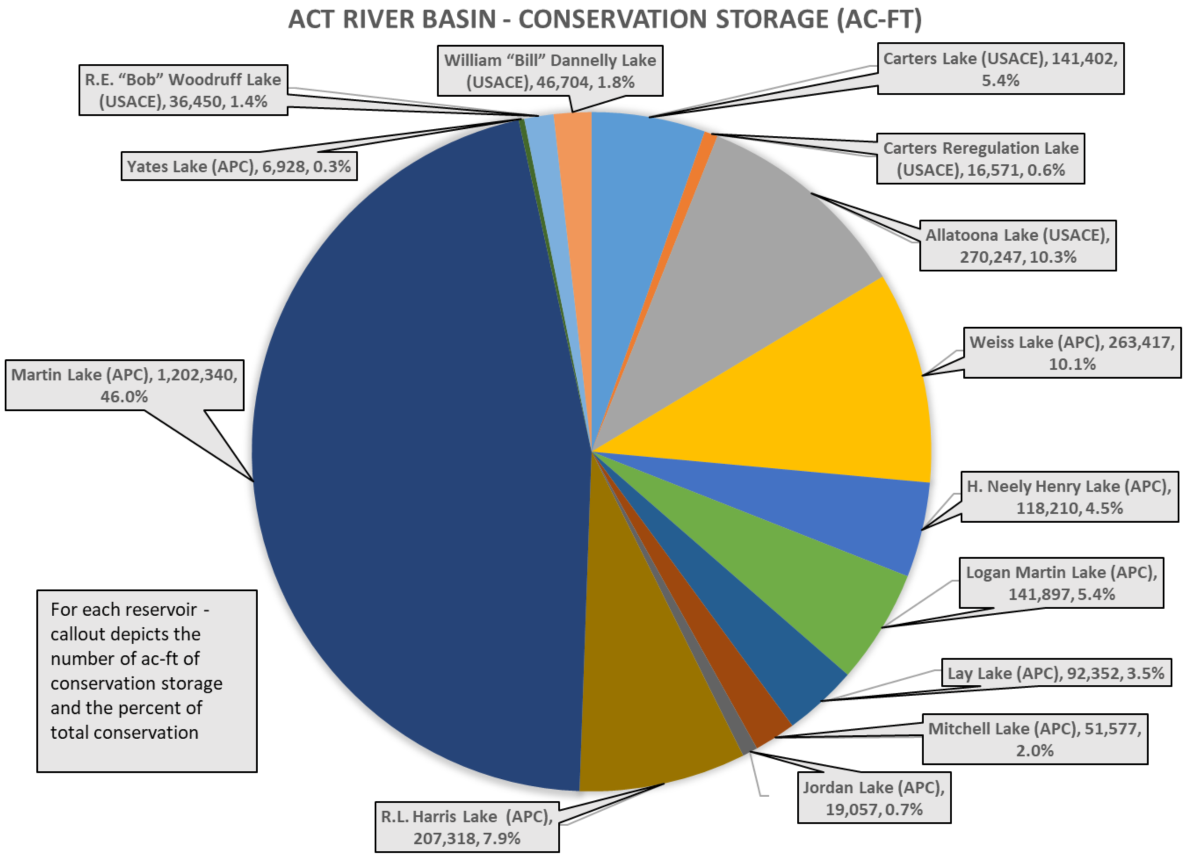

Figure 1. ACT Basin Reservoir Conservation Storage

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% 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% 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%. The two most upstream Corps reservoirs, Allatoona Lake and Carters Lake, account for 15.7% of the total basin conservation storage.

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

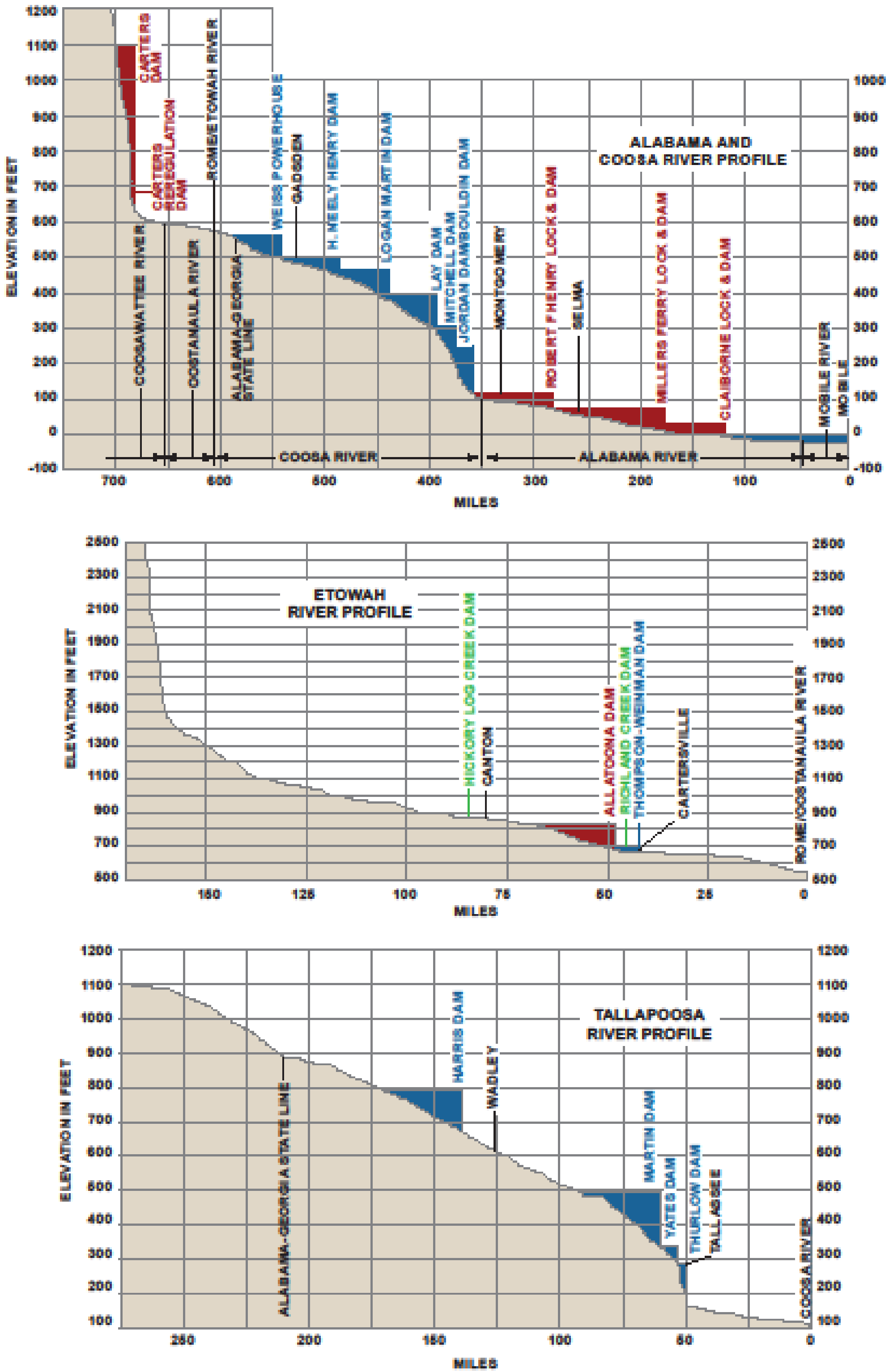

Figure 3. Alabama-Coosa-Tallapoosa River Basin Profile Map

B. **Allatoona Dam and Lake**. The Corps' Allatoona Dam on the Etowah River creates the 11,164 acres Allatoona Lake. The project's authorization, general features, and purposes are described in the Allatoona Dam and Lake Water Control Manual. The Allatoona Lake top of conservation pool is elevation 840 feet NGVD29 during the late spring and summer months (May through August); transitions to elevation 835 feet NGVD29 in the fall (October through mid-November); transitions to a winter drawdown to elevation 823 feet NGVD29 (1-15 January); and refills back to elevation 840 feet NGVD29 during the winter and spring wet season as shown in the water control plan guide curve (Figure 4). However, the lake level may fluctuate significantly from the guide curve over time, dependent primarily upon basin inflows but also influenced by project operations, evaporation, withdrawals, and return flows. A minimum flow of about 240 cfs is continuously released through a small unit, which generates power while providing a constant flow to the Etowah River downstream. Under drier conditions when basin inflows are reduced, project operations are adjusted to conserve storage in Allatoona Lake while continuing to meet project purposes in accordance with four action zones as shown on Figure 4.

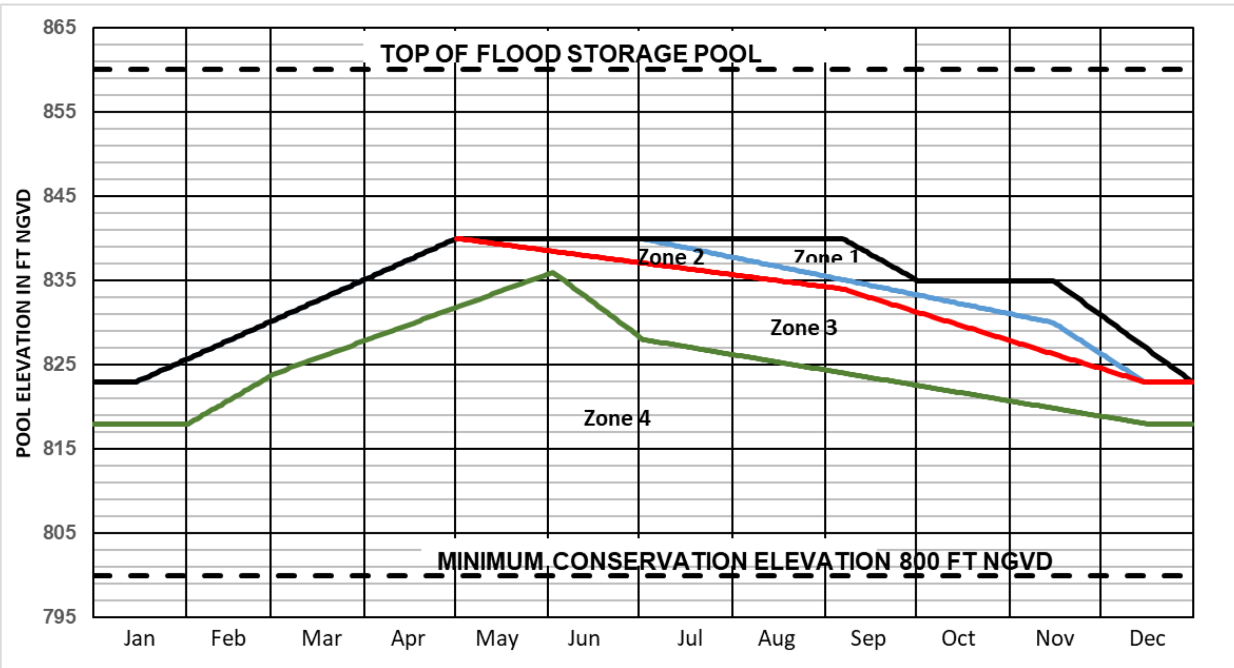

Figure 4. Allatoona Lake Guide Curve and Action Zones

C. **Carters Dam and Lake and Reregulation Dam**. Carters Lake is formed by Carters Dam, a Corps' reservoir on the Coosawattee River in northwest Georgia upstream of Rome, Georgia. The Carters project is a pumped-storage peaking facility that utilizes a Reregulation Dam and storage pool in conjunction with the main dam and lake. The project's authorization, general features, and purposes are described in the Carters Dam and Lake and Regulation Dam water control manual. The Carters Lake top of conservation pool is elevation 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.

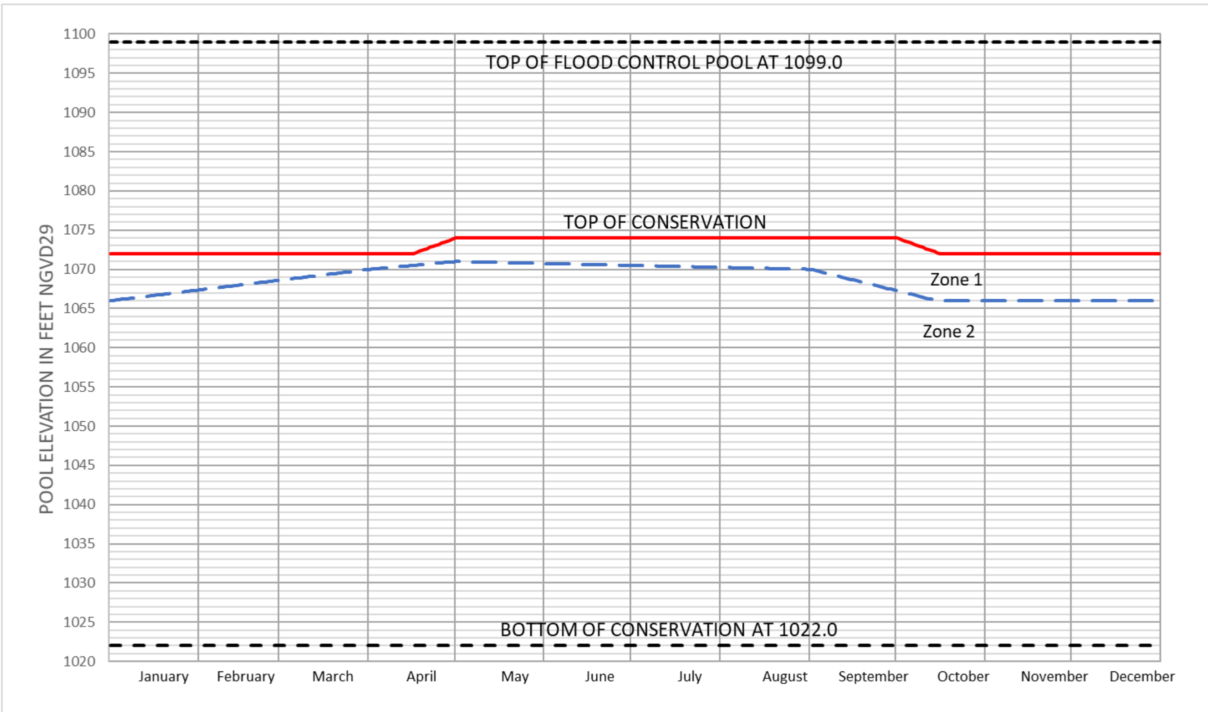

Figure 5. Carters Lake Guide Curve and Action Zones

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.

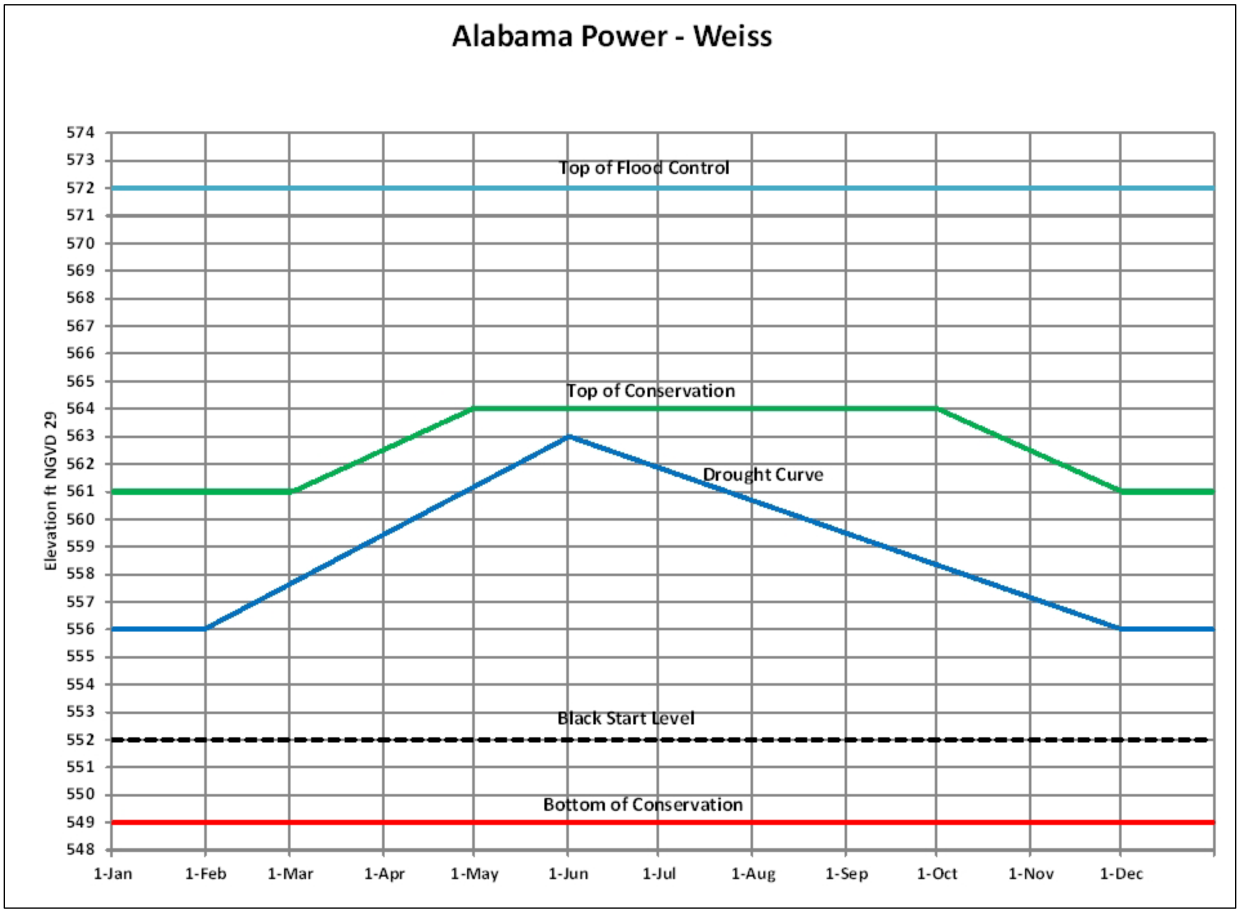

Figure 6. Weiss Lake Guide Curve

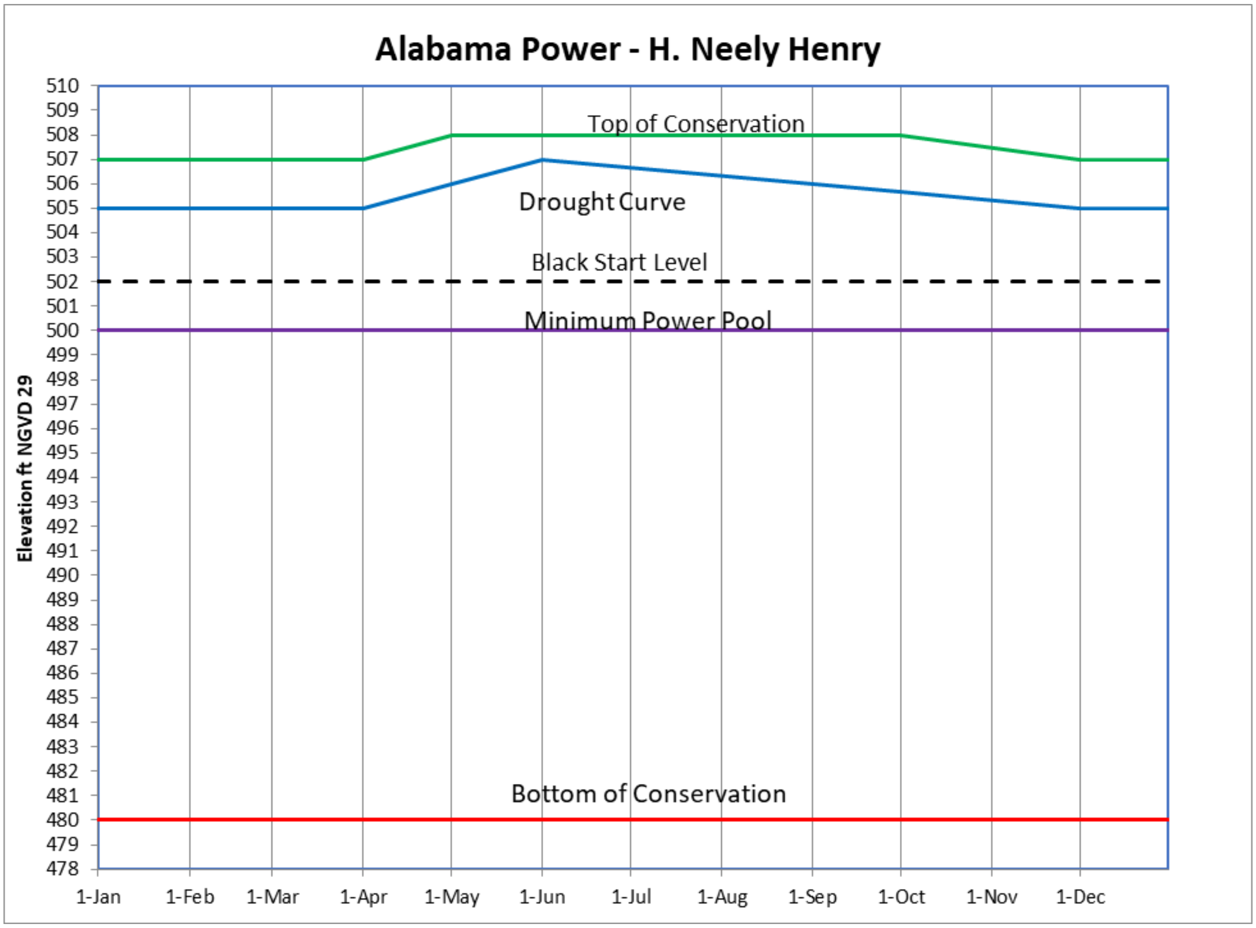

Figure 7. H. Neely Henry Lake Guide Curve

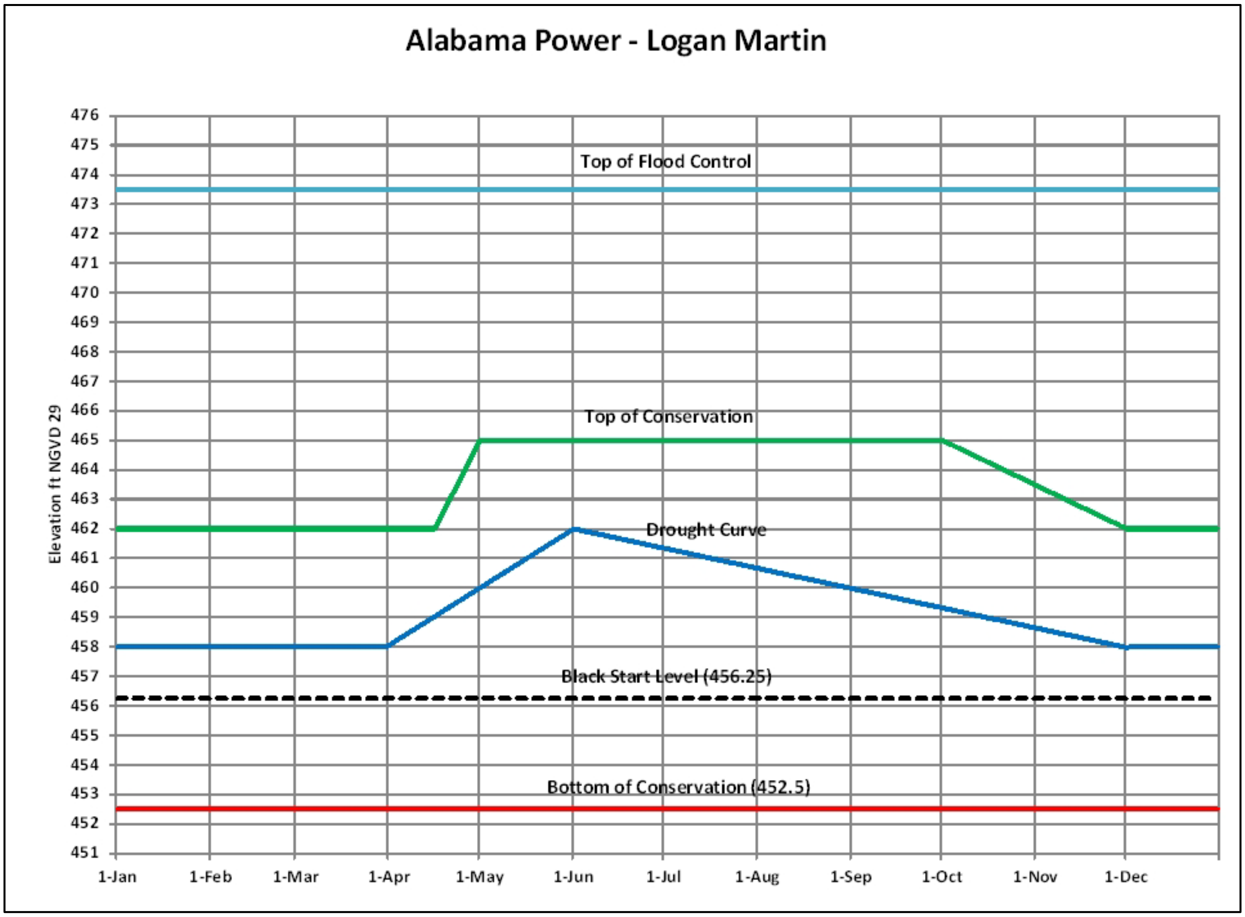

Figure 8. Logan Martin Lake Guide Curve

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.

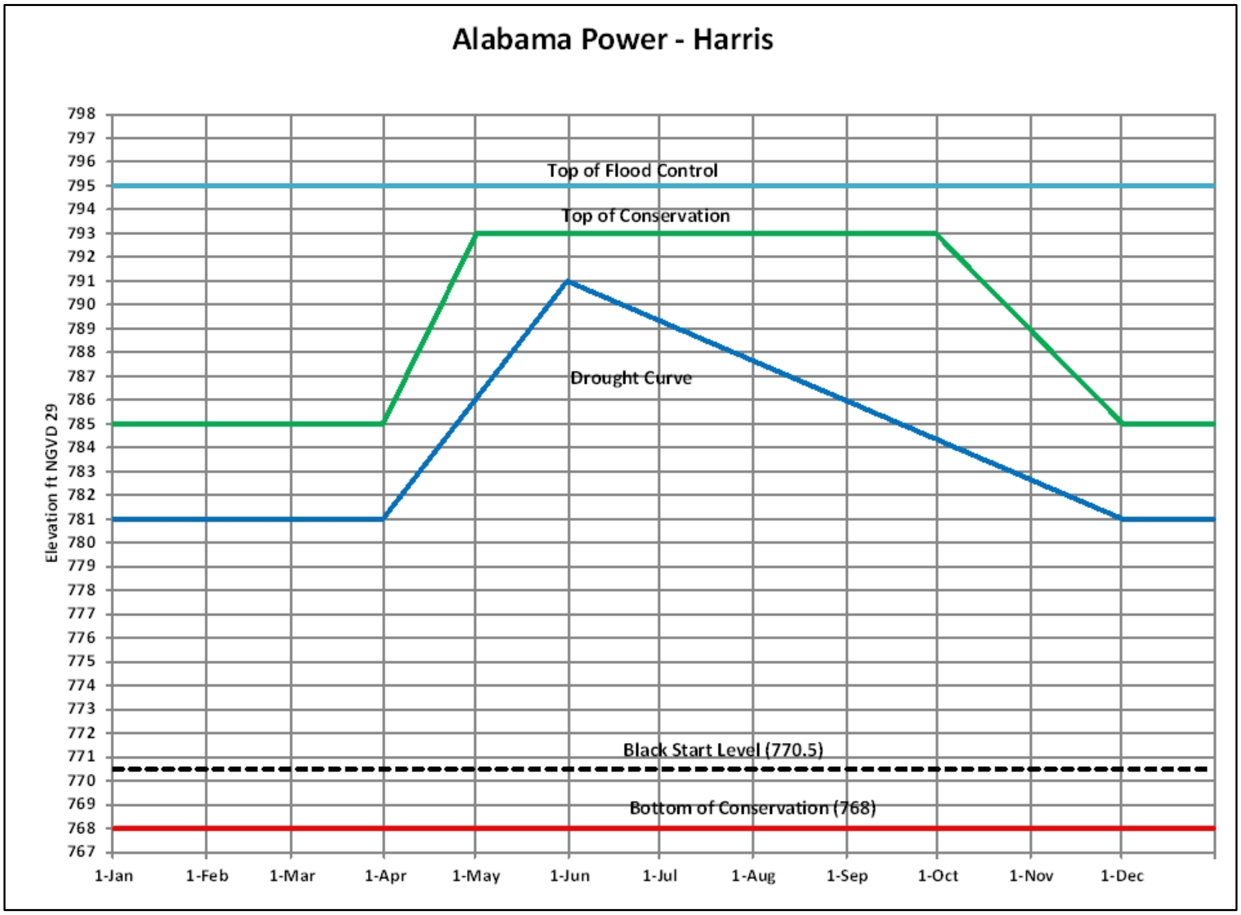

Figure 9. Robert L. Harris Lake Guide Curve

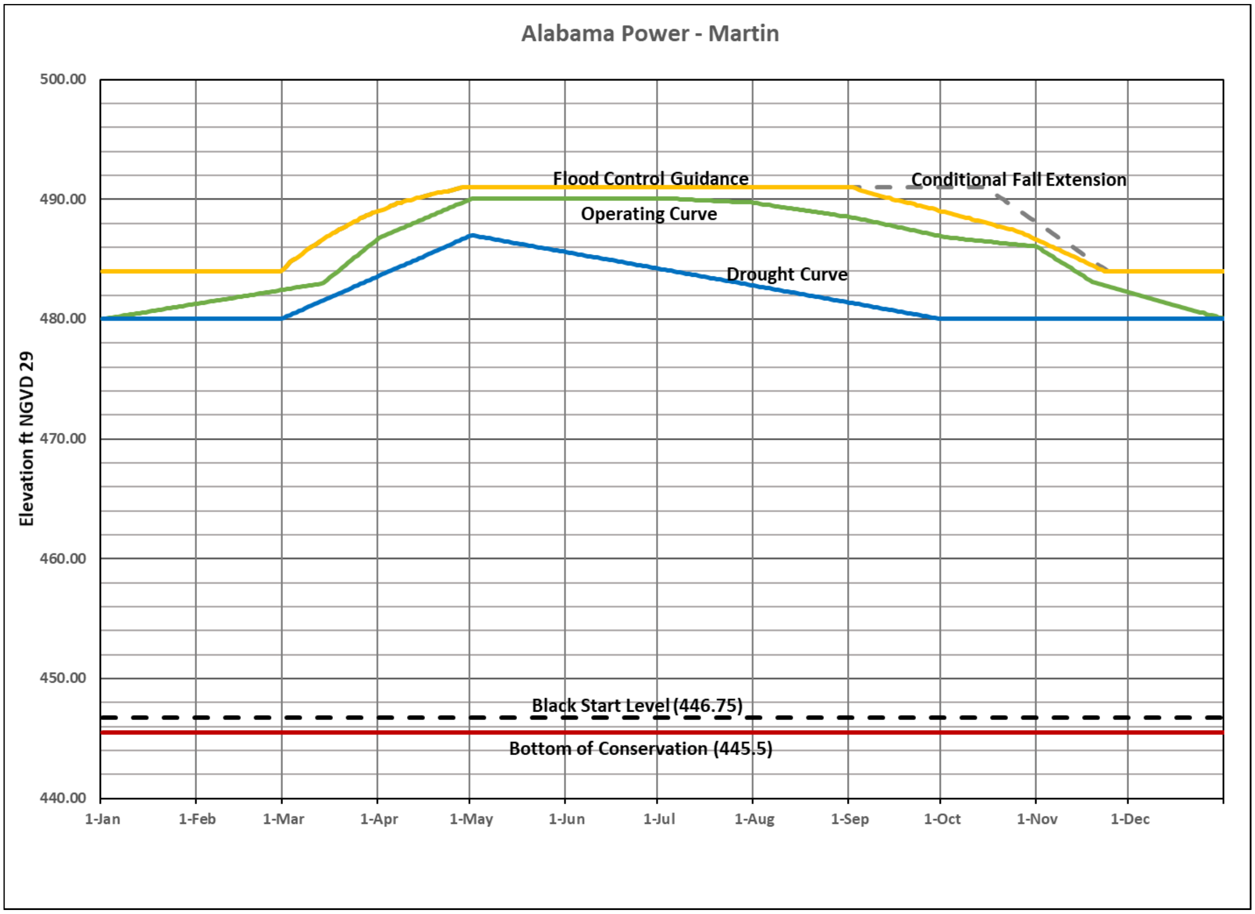

Figure 10. Martin Lake Guide Curve

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

(1) Robert F. Henry. The R.E. “Bob” Woodruff Lake is created by the Robert F. Henry Lock and Dam on the Alabama River at river mile 236.3. R.E. “Bob” Woodruff Lake extends from the Robert F. Henry Lock and Dam upstream to the Walter Bouldin Dam. In addition to hydropower and navigation, R.E. “Bob” Woodruff Lake provides recreation and fish and wildlife conservation. R.E. “Bob” Woodruff Lake is 77 miles long and averages 1,300 feet wide. It has a surface area of 12,510 acres and a storage capacity of 234,200 acre-feet at a normal pool elevation of 125 feet NGVD29. Lake levels are typically fairly stable with minimal fluctuation between the operating pool elevation limits, 123 feet NGVD29 to 126 feet NGVD29. The emergency drawdown pool elevation is 122 feet NGVD29. An authorized 9-foot-deep by 200-foot-wide navigation channel exists over the entire length of the lake. The Jones Bluff hydropower plant generating capacity is 82 MW (declared value). The lake is a popular recreation destination, receiving up to two million visitors annually.

(2) Millers Ferry. The William “Bill” Dannelly Lake is created by the Millers Ferry Lock and Dam on the Alabama River at river mile 133. William “Bill” Dannelly Lake is 103 miles long and averages almost 1,400 feet wide. The reservoir has a surface area of 18,528 acres and a storage capacity of 346,254 acre-feet at the upper level of the operating range of the normal full pool elevation of 80.8 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 2015)

Water use category	Quantity (mgd)	% of total
Total Use	2,231	100%
Public Supply	839.9	38
Domestic and Commercial	3.21	0
Industrial and Mining	286.7	13
Irrigation	174.4	7
Livestock	87.9	4
Thermoelectric Power Generation	839.8	38

Source: U.S. Department of the Interior, U.S. Geological Survey, Estimated Use of Water in Georgia for 2015 and Water-Use Trends, 1985-2015, Open-File Report 2019-1086

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

River basin	Permit holder	Permit number	County	Source water	Permit limit max day (mgd)	Permit limit monthly average (mgd)
Coosa River Basin (Georgia)—upstream counties to downstream counties						
Coosa	Dalton Utilities, Conasauga R	155-1404-01	Whitfield	Conasauga River	49.400	40.300
Coosa	Dalton Utilities, Mill Creek	155-1404-02	Whitfield	Mill Creek	13.200	7.500
Coosa	Dalton Utilities, Coahulla Cr	155-1404-03	Whitfield	Coahulla Creek	6.000	5.000
Coosa	Dalton Utilities, Freeman Springs	155-1404-04	Whitfield	Freeman Springs	2.000	1.500
Coosa	Dalton Utilities - River Road	155-1404-05	Whitfield	Conasauga River	35.000	18.000
Coosa	Chatsworth 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

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

River basin	Permit holder	Permit number	County	Source water	Permit limit max day (mgd)	Permit limit monthly average (mgd)
Coosa	Calhoun, City of	064-1492-02	Gordon	Oostanaula River	6.200	3.000
Coosa	Calhoun, City of	064-1493-01	Gordon	Coosawattee River	18.000	16.000
Coosa	Jasper, City of	112-1417-02	Pickens	Long Swamp Creek	1.000	1.000
Coosa	Bent Tree Community, Inc.	112-1417-03	Pickens	Chestnut Cove Creek and unnamed creek	0.250	0.230
Coosa	Bent Tree Community, Inc.	112-1417-04	Pickens	Lake Tamarack	0.250	0.230
Coosa	Big Canoe Utilities Company, Inc.	112-1417-05	Pickens	Lake Petit	1.000	1.000
Coosa	Big Canoe Utilities Company, Inc.	112-1417-06	Pickens	Blackwell Creek	2.650	2.650
Coosa	Etowah Water & Sewer Authority	042-1415-01	Dawson	Etowah River	5.500	4.400
Coosa	Cherokee County Water & Sewerage Auth	028-1416-01	Cherokee	Etowah River	43.200	36.000
Coosa	Gold Kist, Inc	028-1491-03	Cherokee	Etowah River	5.000	4.500
Coosa	Canton, City of	028-1491-04	Cherokee	Etowah River	23.000	18.700
Coosa	Canton, City of (Hickory Log Creek)	028-1491-05	Cherokee	Etowah River	39.000	39.000
Coosa	Bartow County Water Department	008-1411-02	Bartow	Bolivar Springs	0.800	0.800
Coosa	Adairsville, City of	008-1412-02	Bartow	Lewis Spring	5.100	4.100
Coosa	New Riverside Ochre Company, Inc.	008-1421-01	Bartow	Etowah River	5.000	5.000
Coosa	New Riverside Ochre Company, Inc.	008-1421-02	Bartow	Etowah River	6.000	6.000
Coosa	Emerson, City of	008-1422-02	Bartow	Moss Springs	0.630	0.500
Coosa	Gerdau AmeriSteel US, Inc. – Cartersville Steel Mill	008-1423-01	Bartow	Pettit Creek	2.000	1.500
Coosa	Baroid Drilling Fluids, Inc.	008-1423-02	Bartow	Etowah River	3.400	2.500
Coosa	Cartersville, City of	008-1423-04	Bartow	Etowah River	26.420	23.000
Coosa	Georgia Power Co. - Plant Bowen	008-1491-01	Bartow	Etowah River	520.000	85.000
Coosa	CCMWA	008-1491-05	Bartow	Allatoona Lake	86.000	78.000
Coosa	Cartersville, City of	008-1491-06	Bartow	Allatoona Lake	21.420	18.000
Coosa	La Fayette, City of Dry Creek	146-1401-01	Walker	Dry Creek	1.000	0.900
Coosa	La Fayette, City of Big Spring	146-1401-02	Walker	Big Spring	1.650	1.310
Coosa	Mount Vernon Mills - Riegel Apparel Div.	027-1401-03	Chattooga	Trion Spring	9.900	6.600
Coosa	Summerville, City of	027-1402-02	Chattooga	Raccoon Creek	3.000	2.500
Coosa	Summerville, City of	027-1402-04	Chattooga	Lowe Spring	0.750	0.500
Coosa	Mohawk Industries, Inc.	027-1402-05	Chattooga	Chattooga R./ Raccoon Cr.	4.500	4.000
Coosa	Oglethorpe Power Corp.	057-1402-03	Floyd	Heath Creek	3,838.000	3,030.000
Coosa	Floyd County - Brighton Plant	057-1414-02	Floyd	Woodward Creek	0.800	0.700

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

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

Source: GAEPD 2009a

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

Basin (subbasin)	Withdrawal by	County	Withdrawal (mgd)
Coosa River Basin (Georgia)			
Coosa (Conasauga)	Dalton Utilities	Whitfield	35.38
Coosa (Conasauga)	City of Chatsworth	Murray	1.26
Coosa (Coosawattee)	Ellijay-Gilmer County Water System	Gilmer	3.12
Coosa (Coosawattee)	City of Fairmount	Gordon	0.06
Coosa (Oostanaula)	City of Calhoun	Gordon	9.10
Coosa (Etowah)	Big Canoe Corporation	Pickens	0.48
Coosa (Etowah)	City of Jasper	Pickens	1.00
Coosa (Etowah)	Bent Tree Community	Pickens	0.07
Coosa (Etowah)	Lexington Components Inc (Rubber)	Pickens	0.01
Coosa (Etowah)	Etowah Water and Sewer Authority	Dawson	1.50
Coosa (Etowah)	Town of Dawsonville	Dawson	0.10
Coosa (Etowah)	City of Canton	Cherokee	2.83
Coosa (Etowah)	Cherokee County Water System	Cherokee	15.81
Coosa (Etowah)a	Gold Kist, Inc.	Cherokee	1.94
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. **General.** 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. **General**. The Drought Contingency Plan (DCP) for the ACT Basin implements drought conservation actions on the basis of composite system storage, state line flows, and basin inflow as triggers to drive drought response actions. The DCP also recognizes that a basin-wide drought plan must incorporate variable hydropower generation requirements from its headwater projects in Georgia (Allatoona Dam and Carters Dam), a reduction in the level of navigation service provided on the Alabama River as storage across the basin declines, and that environmental flow requirements must still be met to the maximum extent practicable. The ACT basin-wide drought plan is composed of three components — Headwater regulation at Allatoona Lake and Carters Lake in Georgia; Regulation at APC projects on the Coosa and Tallapoosa Rivers; and Downstream Alabama River regulation at Corps projects downstream of Montgomery, Alabama.

A. **Headwater Regulation for Drought at Allatoona Lake and Carters Lake**. Drought regulation at Allatoona Lake and Carters Lake consists of progressively reduced hydropower generation as pool levels decline in accordance with the conservation storage action zones established in the projects' water control plans. For instance, when Allatoona Lake is operating in normal conditions (Conservation storage Zone 1); hydropower generation typically ranges from 0 to 4 hours per day. However, as the pool drops to lower action zones during drought conditions, generation could be reduced to 0 to 2 hours per day. As Carters Lake pool level might drop into a conservation storage Zone 2, seasonal varying minimum target flows would be reduced to 240 cfs. The water control 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 Deviations: As Needed; FERC Deviation for Lake Martin</td></tr>
<tr><td colspan="13">Corps Deviations: As Needed; FERC Deviation for Lake Martin</td></tr>
<tr><td colspan="13">Corps Deviations: As Needed; FERC Deviation 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	0	0	0	4,640	4640
Feb	0	120	120	4,640	4760
Mar	643	2900	3543	4,640	8183
Apr	1606	2585	4191	4,640	8831
May	5	0	5	4,640	4645
Jun	0	0	0	4,640	4640
Jul	0	0	0	4,640	4640
Aug	0	0	0	4,640	4640
Sep	0	-1304	-1304	4,640	3336
Oct	-1167	-2132	-3299	4,640	1341
Nov	-1067	-2186	-3253	4,640	1387
Dec	-3	0	-3	4,640	4637

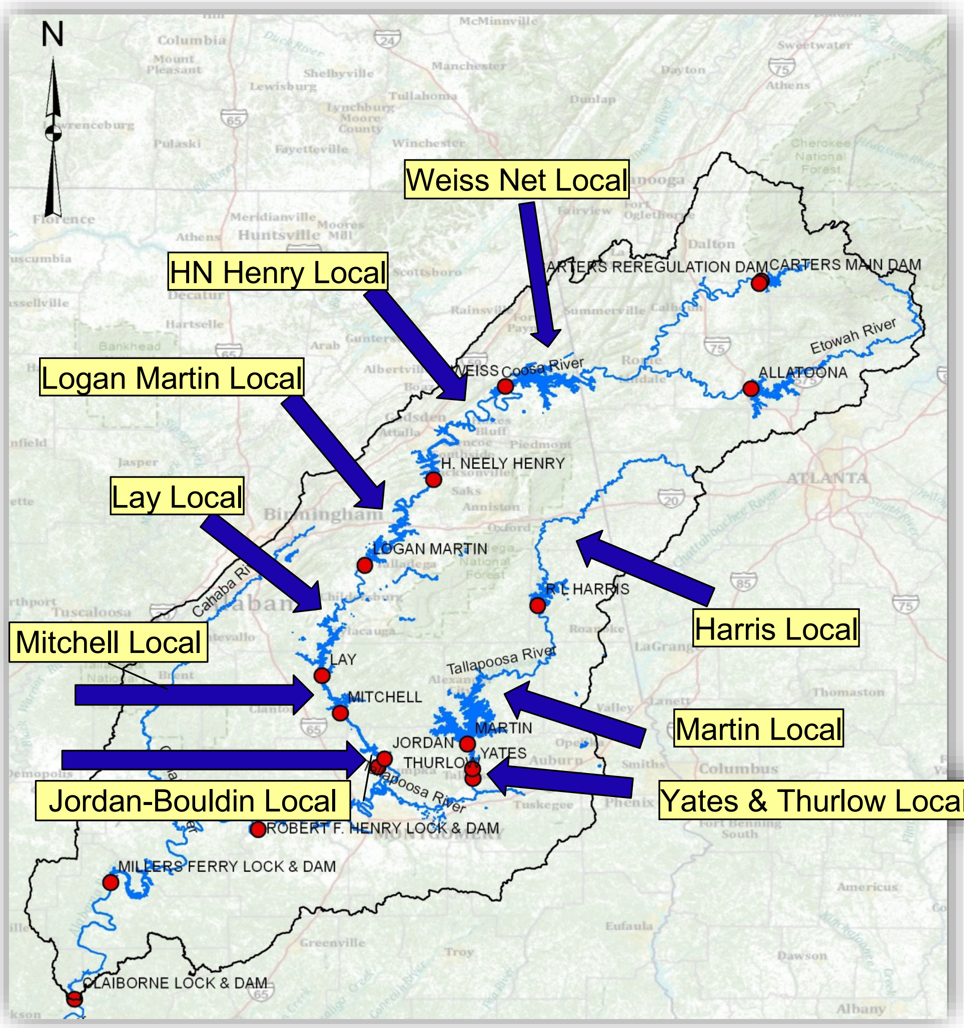

Figure 11. ACT Basin Inflows

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.

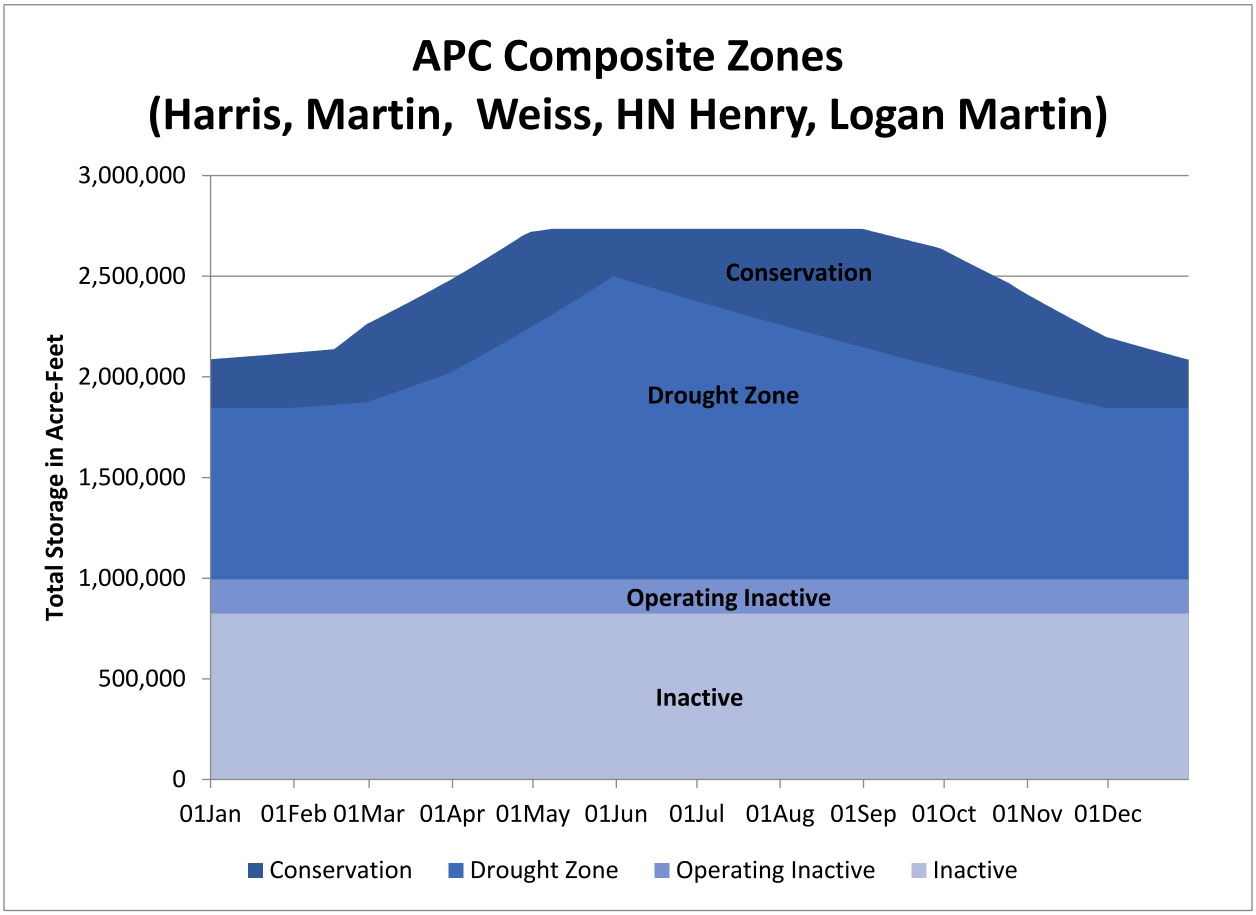

Figure 12. APC Composite Zones

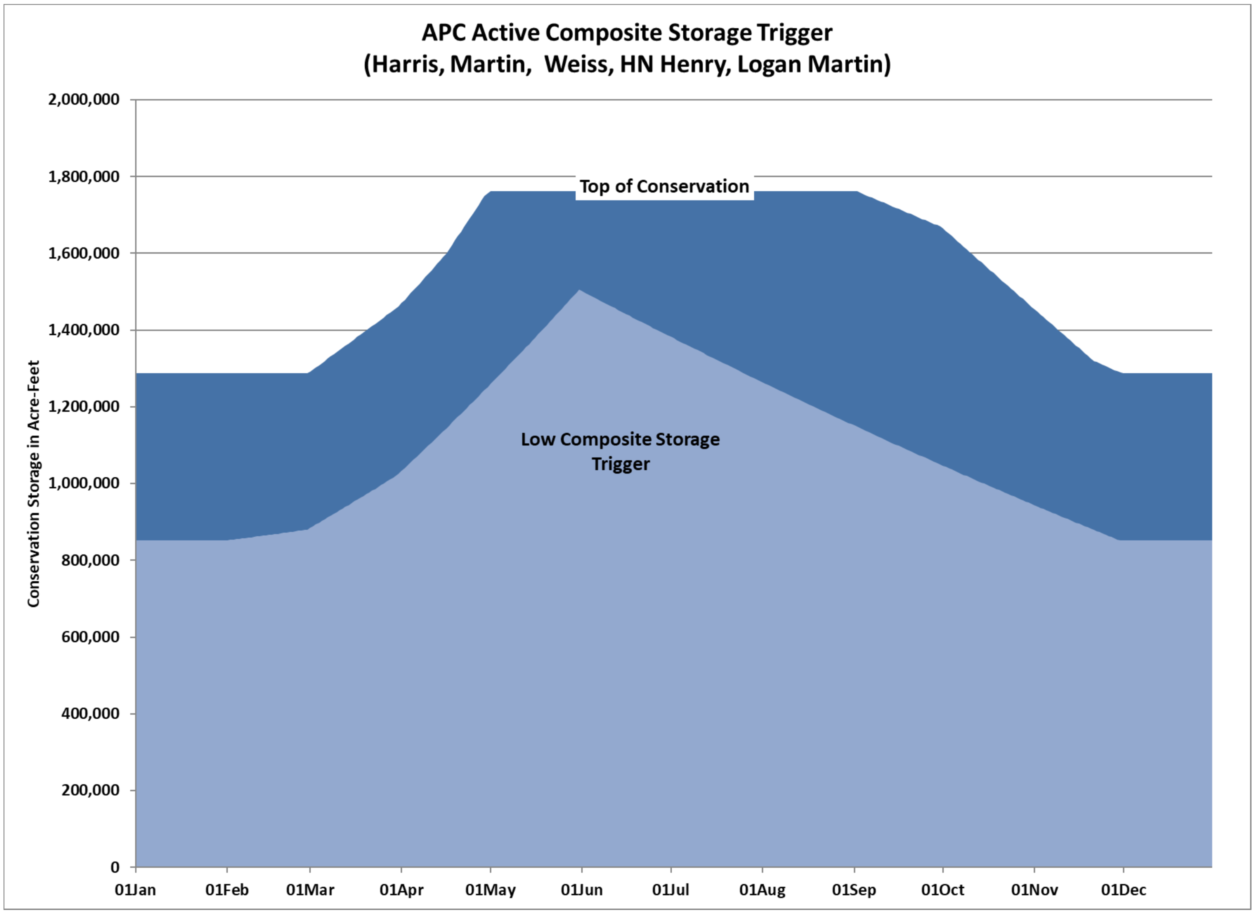

Figure 13. APC Low Composite Conservation Storage Drought Trigger

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 through 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.

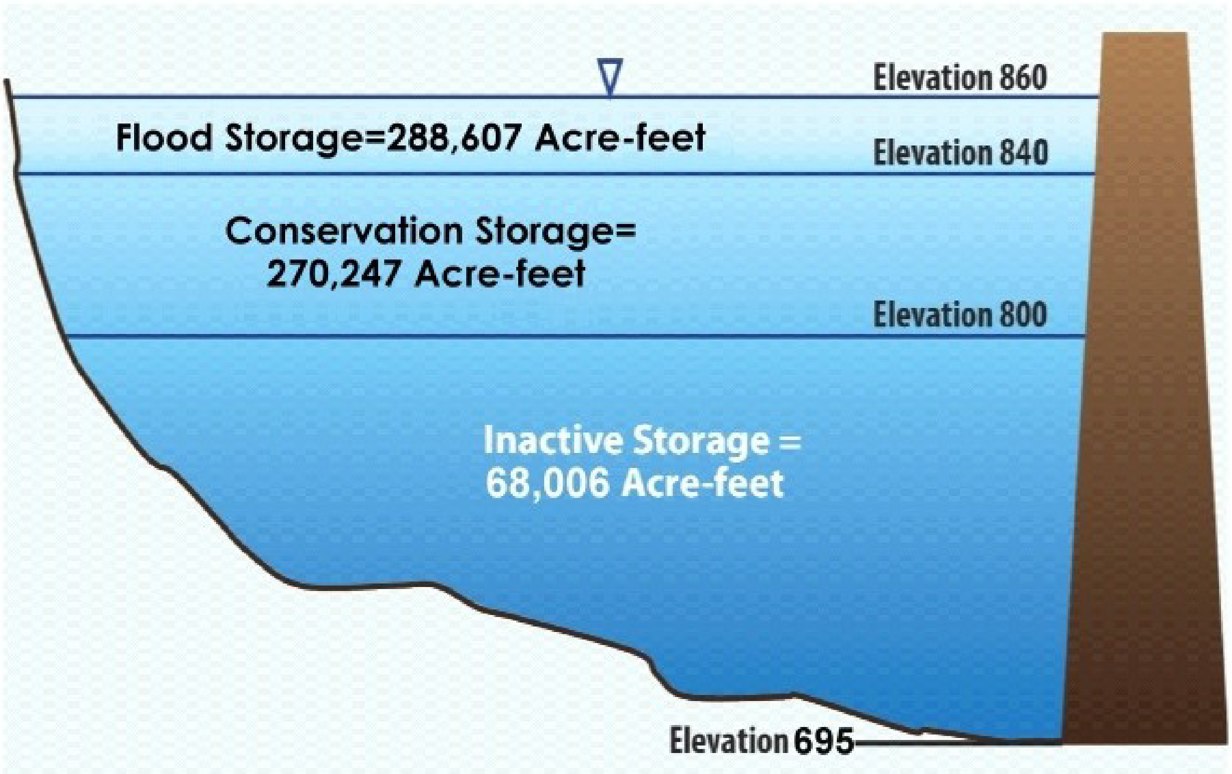

Figure 14. Storage in Allatoona Lake

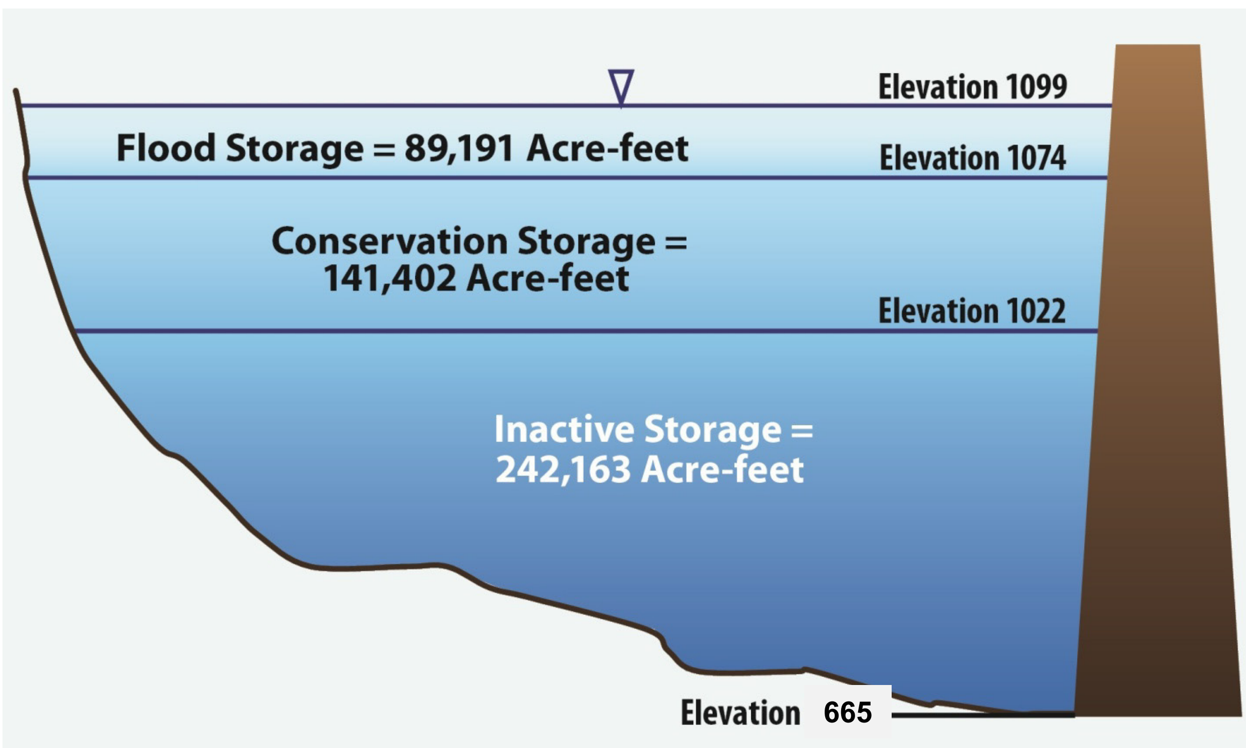

Figure 15. Storage in Carters Lake (excluding reregulation pool)

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.

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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	(205) 472-0481

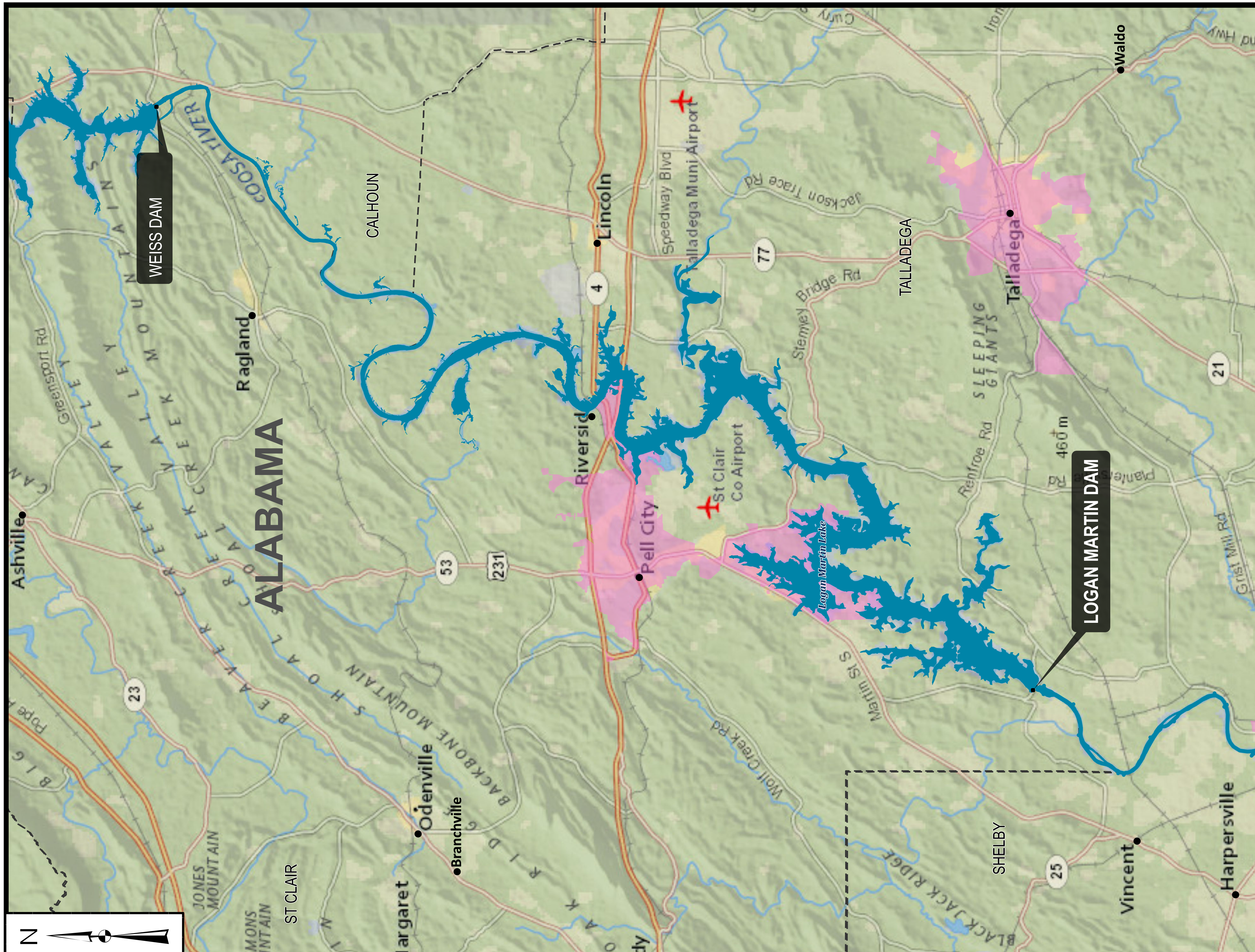
US Army Corps of Engineers:

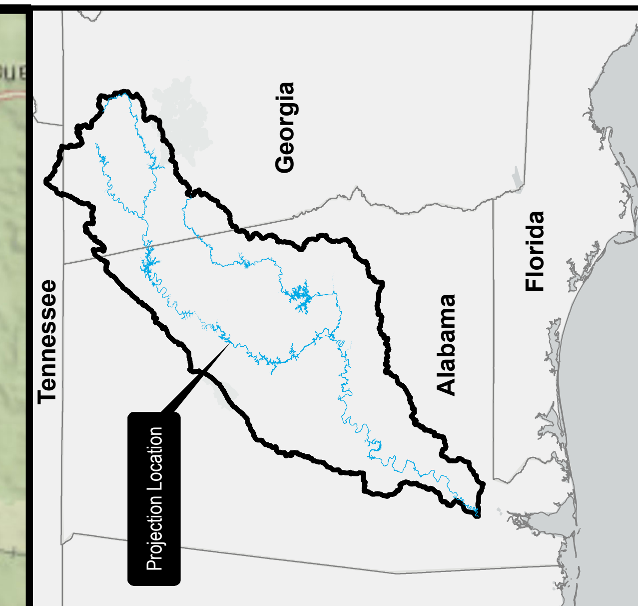
Water Management Section	(251) 690-2737
Chief of Water Management	(251) 690-2730 or (251) 509-5368

PLATES

CORPS OF ENGINEERS

U.S. ARMY





ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

PROJECT MAP

0 1 2 4 6 Miles

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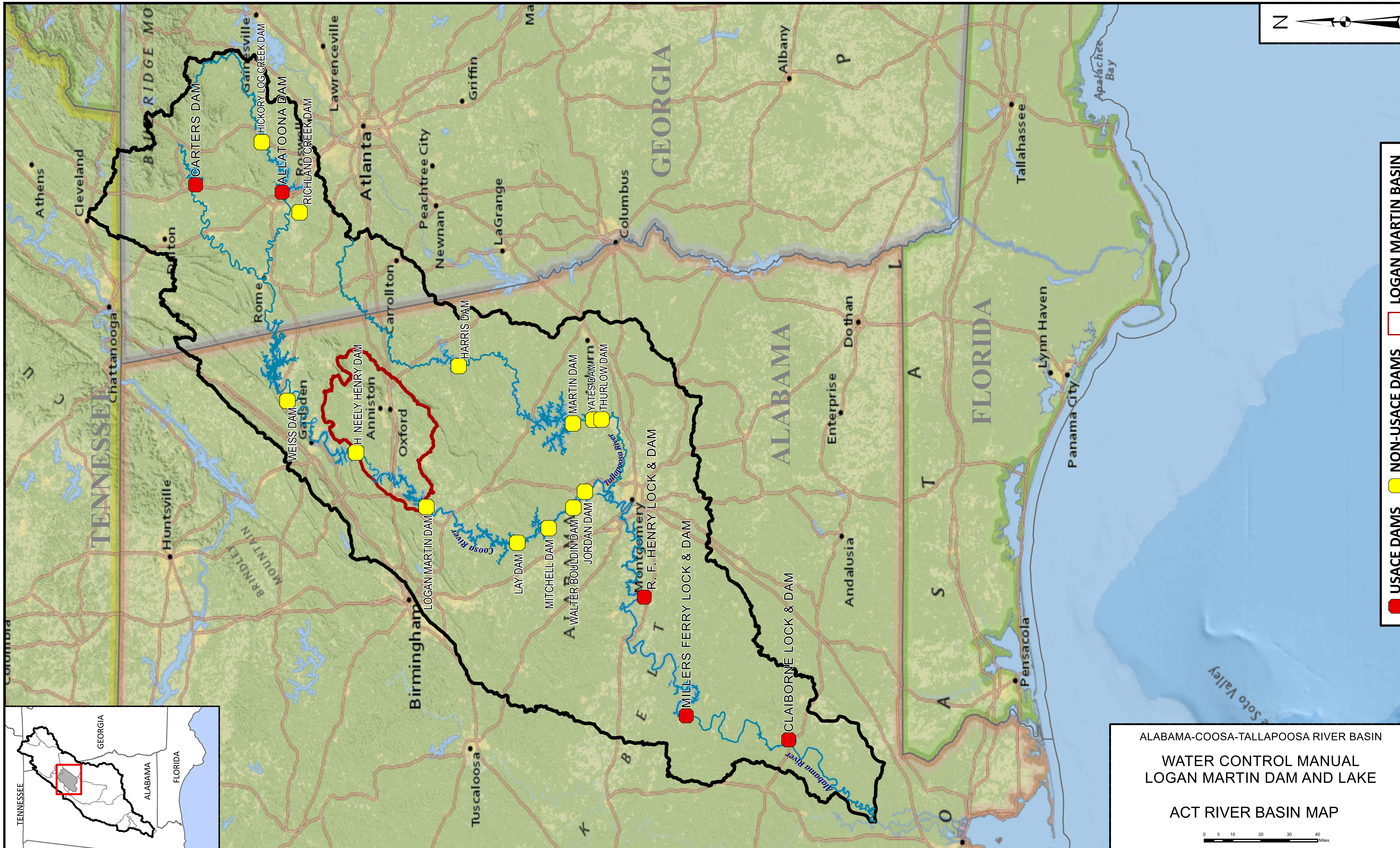
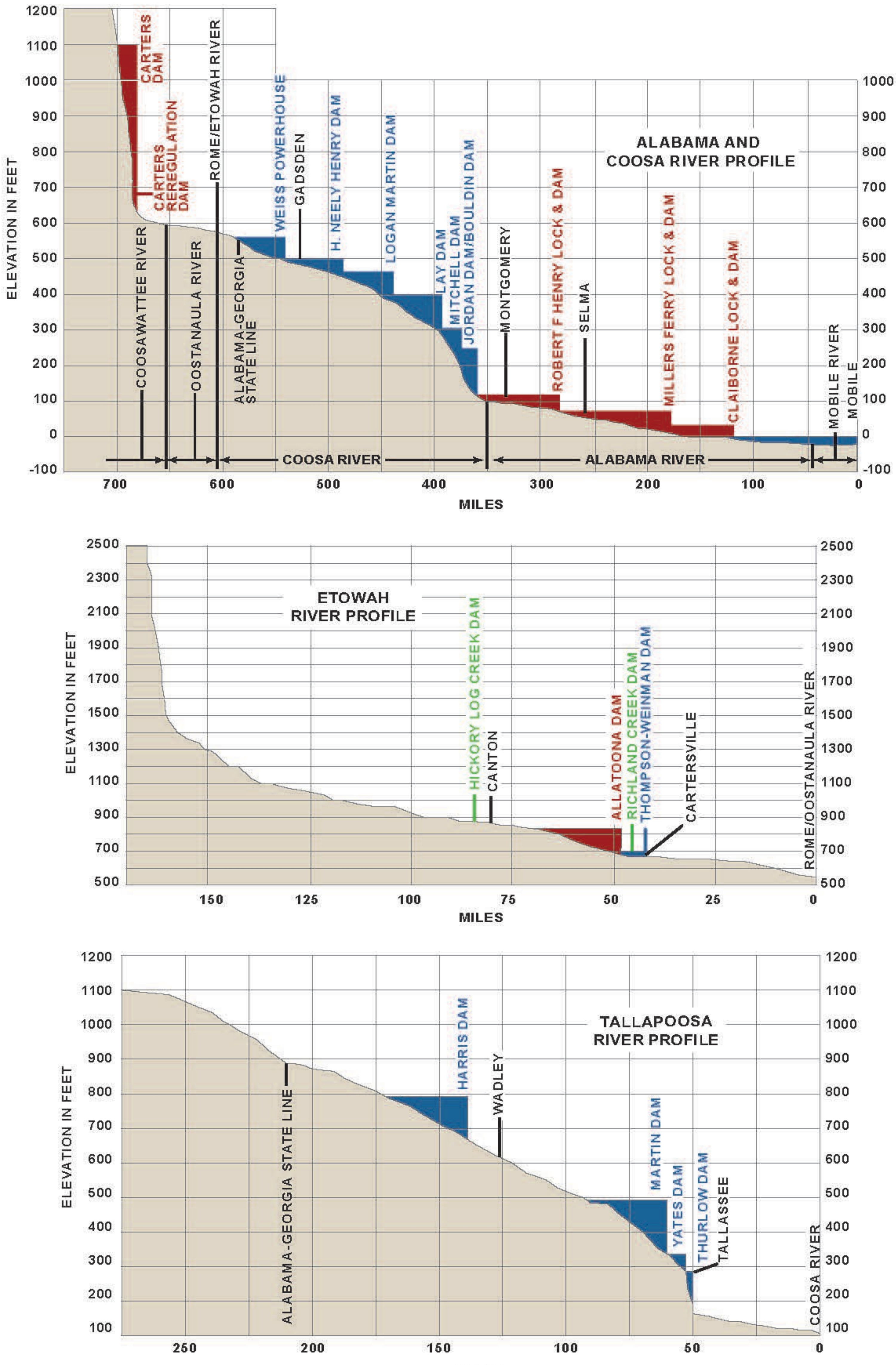
APPENDIX C PLATE 2-1

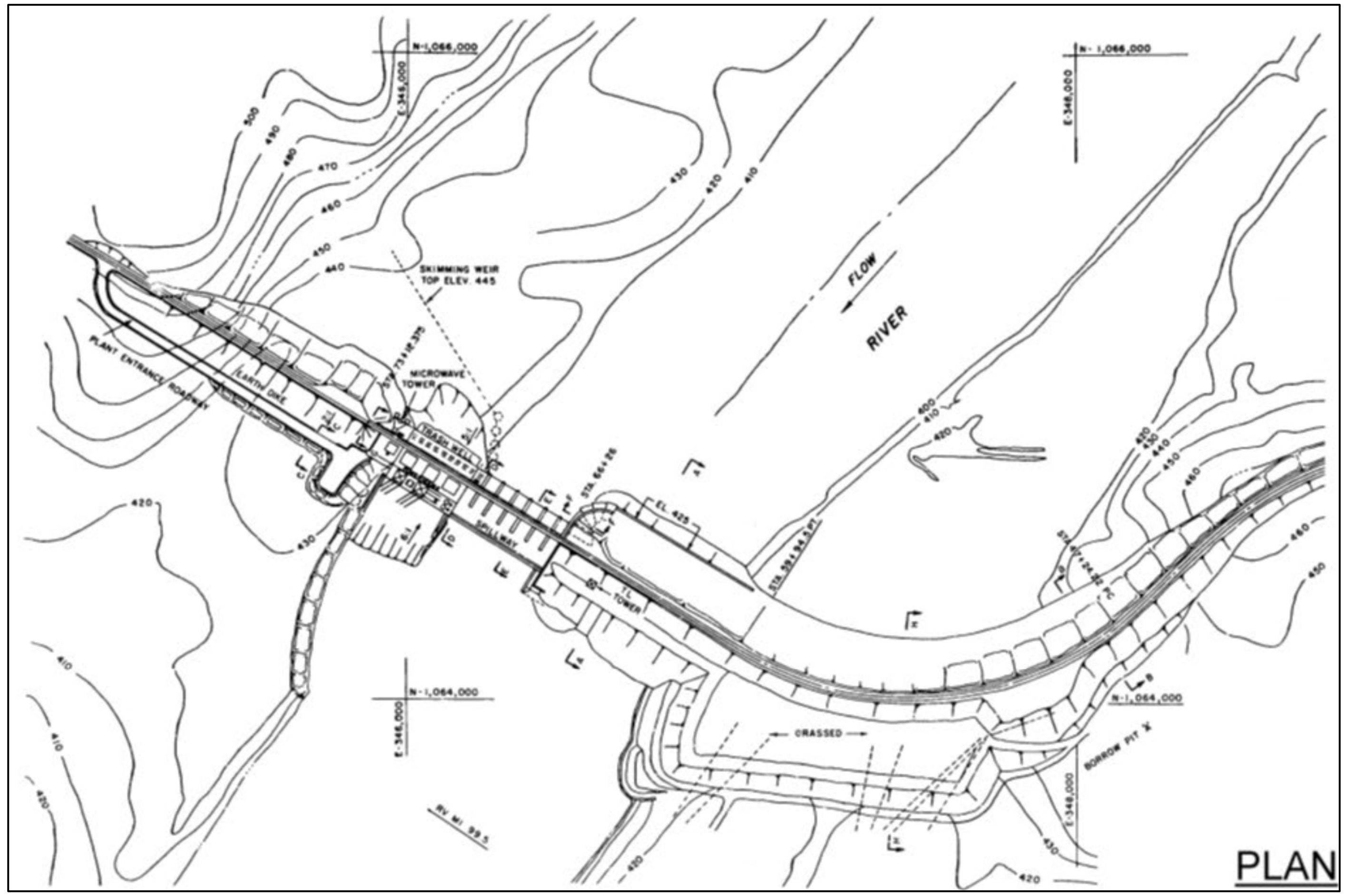

USACE DAMS
NON-USACE DAMS
LOGAN MARTIN BASIN
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN
WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
ACT RIVER BASIN MAP
CARTERS DAM
HICKORY LOG CREEK DAM
ALLATOONA DAM
RICHLAND CREEK DAM
WEISS DAM
H. NEELY HENRY DAM
LOGAN MARTIN DAM
HARRIS DAM
MARTIN DAM
YATES DAM
THURLOW DAM
LAY DAM
MITCHELL DAM
WALTER BOULDIN DAM
JORDAN DAM
R. F. HENRY LOCK & DAM
MILLERS FERRY LOCK & DAM
CLAIBORNE LOCK & DAM
Coosa River
Tallapoosa River
Alabama River
GEORGIA
ALABAMA
FLORIDA
TENNESSEE
Atlanta
Birmingham
Montgomery
Columbus
Chattanooga
Huntsville
Tuscaloosa
Tallahassee
Pensacola
Panama City
Dothan
Rome
Gadsden
Anniston
Oxford
Carrollton
Newnan
LaGrange
Griffin
Peachtree City
Lawrenceville
Gainesville
Albany
Dalton
Cleveland
Athens
Enterprise
Andalusia
Lynn Haven
Apalachee Bay
R005_19MAY11_BASIN_MAP_11X17.MXD

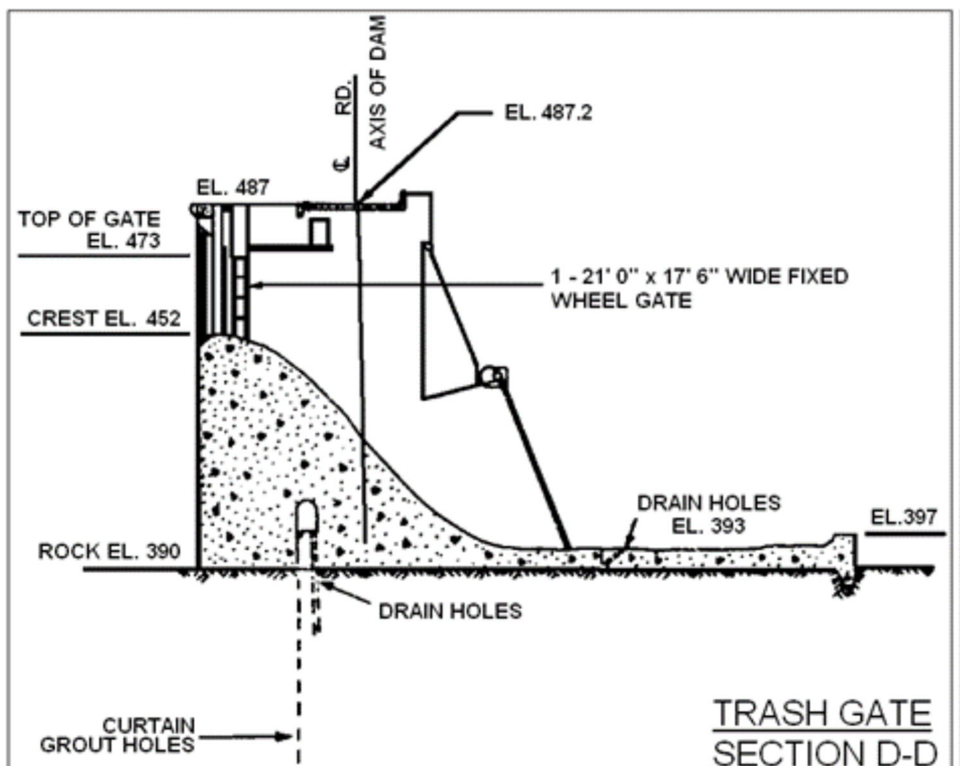


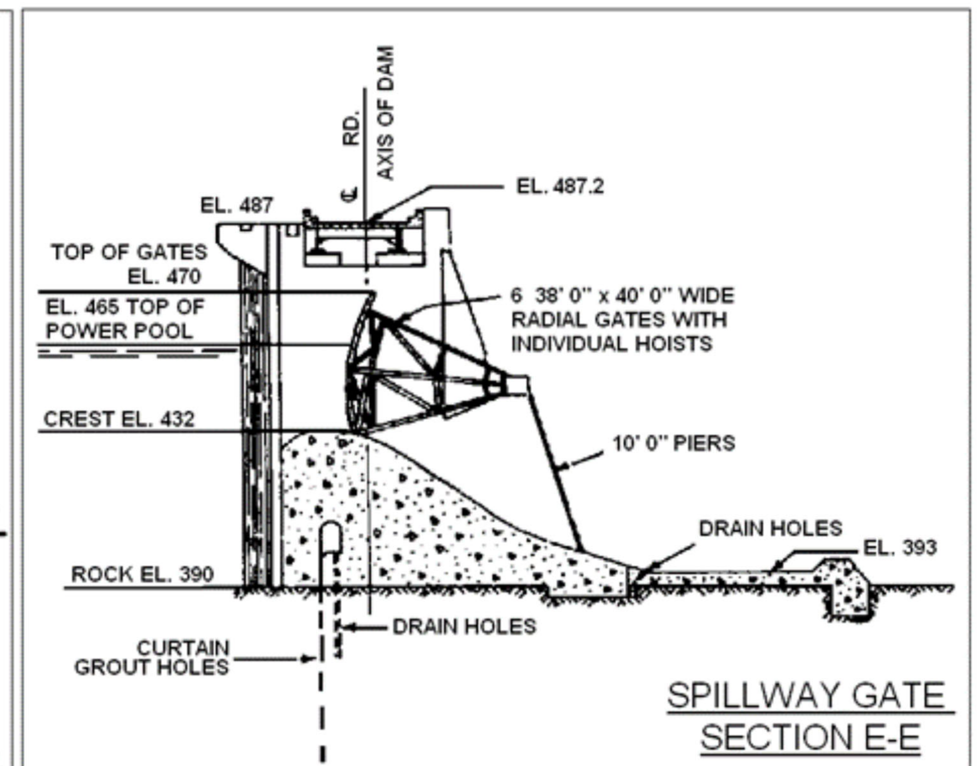
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

ALABAMA-COOSA-TALLAPOOSA
RIVER PROFILES







ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

POWERHOUSE PLAN ELEVATION AND SECTION

Gate Step No.	Headwater Elevation (feet-msl)																
	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476
0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.00	533	550	550	567	567	583	583	600	600	617	617	633	633	0	0	0	0
10.00	1067	1083	1100	1117	1133	1167	1183	1200	1217	1233	1250	1267	1283	0	0	0	0
15.00	1600	1633	1650	1683	1717	1733	1767	1783	1817	1850	1867	1900	1917	0	0	0	0
20.00	2133	2167	2200	2250	2283	2317	2350	2383	2417	2450	2500	2533	2550	2583	2617	0	0
25.00	2667	2717	2750	2800	2850	2900	2950	2983	3033	3067	3117	3150	3200	3233	3283	0	0
30.00	3183	3250	3300	3367	3417	3483	3533	3583	3633	3683	3733	3783	3833	3883	3933	0	0
35.00	3717	3783	3850	3917	3983	4050	4117	4183	4250	4300	4367	4417	4483	4533	4600	0	0
40.00	4250	4317	4400	4483	4550	4633	4700	4783	4850	4917	4983	5050	5133	5183	5250	5317	5383
45.00	4767	4850	4950	5033	5117	5200	5283	5367	5450	5533	5617	5683	5767	5833	5917	5983	6067
50.00	5283	5383	5483	5583	5683	5783	5867	5967	6050	6150	6233	6317	6400	6483	6567	6650	6733
55.00	5800	5917	6033	6133	6250	6350	6450	6550	6650	6750	6850	6950	7050	7133	7233	7317	7417
60.00	6317	6450	6567	6683	6800	6917	7033	7150	7250	7367	7467	7583	7683	7783	7883	7983	8083
65.00	6833	6967	7100	7233	7350	7483	7600	7733	7850	7967	8083	8200	8317	8433	8533	8650	8750
70.00	7333	7483	7633	7767	7917	8050	8183	8317	8450	8567	8700	8817	8950	9050	9183	9300	9417
75.00	7833	8000	8150	8317	8450	8600	8750	8900	9033	9167	9317	9450	9583	9700	9833	9967	10083
80.00	8333	8517	8683	8850	9000	9167	9317	9467	9617	9767	9917	10067	10200	10350	10483	10617	10750
85.00	8833	9017	9200	9383	9550	9717	9883	10050	10217	10367	10533	10683	10833	10983	11133	11267	11417
90.00	9333	9533	9717	9900	10083	10267	10450	10617	10783	10967	11133	11300	11450	11617	11767	11933	12083
95.00	9817	10017	10233	10433	10617	10817	11000	11183	11367	11550	11733	11900	12067	12233	12417	12567	12733
100.00	10300	10517	10733	10950	11150	11350	11550	11750	11950	12133	12317	12517	12683	12867	13050	13217	13400
105.00	10783	11000	11233	11467	11683	11900	12100	12317	12517	12717	12917	13117	13300	13483	13683	13867	14050
110.00	11250	11500	11733	11967	12200	12433	12650	12867	13083	13300	13500	13700	13917	14117	14300	14500	14700
115.00	11717	11967	12233	12467	12717	12950	13183	13417	13650	13867	14083	14300	14517	14717	14933	15133	15333
120.00	12183	12450	12717	12967	13233	13483	13733	13967	14200	14433	14667	14900	15117	15333	15550	15767	15983

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

SPILLWAY RATING TABLE

Gate Step No.	Headwater Elevation (feet-msl)																
	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476
125.00	12633	12917	13200	13467	13733	14000	14250	14500	14767	15000	15250	15483	15717	15950	16167	16400	16617
130.00	13083	13383	13667	13950	14233	14517	14783	15050	15300	15567	15817	16067	16300	16550	16783	17017	17250
135.00	13533	13833	14150	14433	14733	15017	15300	15583	15850	16117	16383	16633	16900	17150	17400	17633	17883
140.00	13967	14283	14600	14917	15233	15517	15817	16100	16383	16667	16950	17217	17483	17733	18000	18250	18500
145.00	14400	14733	15067	15383	15717	16017	16333	16633	16933	17217	17500	17783	18050	18333	18600	18867	19117
150.00	14817	15167	15517	15850	16183	16517	16833	17150	17450	17750	18050	18350	18633	18917	19200	19467	19733
155.00	15233	15600	15967	16317	16667	17000	17333	17650	17983	18283	18600	18900	19200	19500	19783	20067	20350
160.00	15650	16033	16400	16767	17133	17483	17833	18167	18500	18817	19133	19450	19767	20067	20367	20667	20950
165.00	16050	16450	16850	17217	17600	17950	18317	18667	19000	19350	19683	20000	20317	20633	20950	21250	21567
170.00	16450	16867	17267	17667	18050	18417	18800	19150	19517	19867	20200	20550	20883	21200	21533	21850	22150
175.00	16850	17267	17700	18100	18500	18883	19267	19650	20017	20383	20733	21083	21433	21767	22100	22433	22750
180.00	17233	17667	18100	18533	18950	19350	19750	20133	20517	20883	21250	21617	21967	22317	22667	23000	23333
185.00	17600	18067	18517	18950	19383	19800	20200	20600	21000	21383	21767	22133	22500	22867	23233	23567	23917
190.00	17983	18450	18917	19367	19817	20233	20667	21083	21483	21883	22283	22667	23050	23417	23783	24133	24500
195.00	18333	18817	19317	19767	20233	20667	21117	21533	21967	22367	22783	23167	23567	23950	24333	24700	25067
200.00	18683	19183	19683	20167	20650	21100	21550	22000	22433	22850	23267	23683	24083	24467	24867	25250	25633
205.00	19033	19550	20067	20567	21050	21517	21983	22450	22900	23333	23767	24183	24600	25000	25400	25800	26183
210.00	19383	19917	20450	20950	21467	21950	22433	22883	23350	23800	24250	24683	25100	25517	25933	26350	26750
215.00	19717	20267	20817	21333	21850	22350	22850	23333	23800	24267	24717	25167	25617	26033	26467	26883	27300
220.00	20033	20600	21167	21700	22250	22750	23267	23767	24250	24733	25200	25650	26117	26550	26983	27417	27833
225.00	20350	20933	21517	22067	22633	23150	23683	24183	24700	25183	25667	26133	26600	27050	27500	27933	28383
230.00	20667	21267	21867	22433	23000	23550	24083	24600	25133	25617	26133	26600	27083	27550	28017	28467	28917
235.00	20967	21583	22200	22783	23367	23933	24483	25017	25550	26067	26583	27067	27567	28033	28517	28983	29433
240.00	21250	21883	22533	23133	23733	24300	24883	25433	25967	26500	27017	27533	28033	28517	29017	29483	29950
245.00	0	22200	22850	23467	24083	24667	25267	25817	26383	26933	27467	27983	28500	29000	29500	29983	30467
250.00	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)

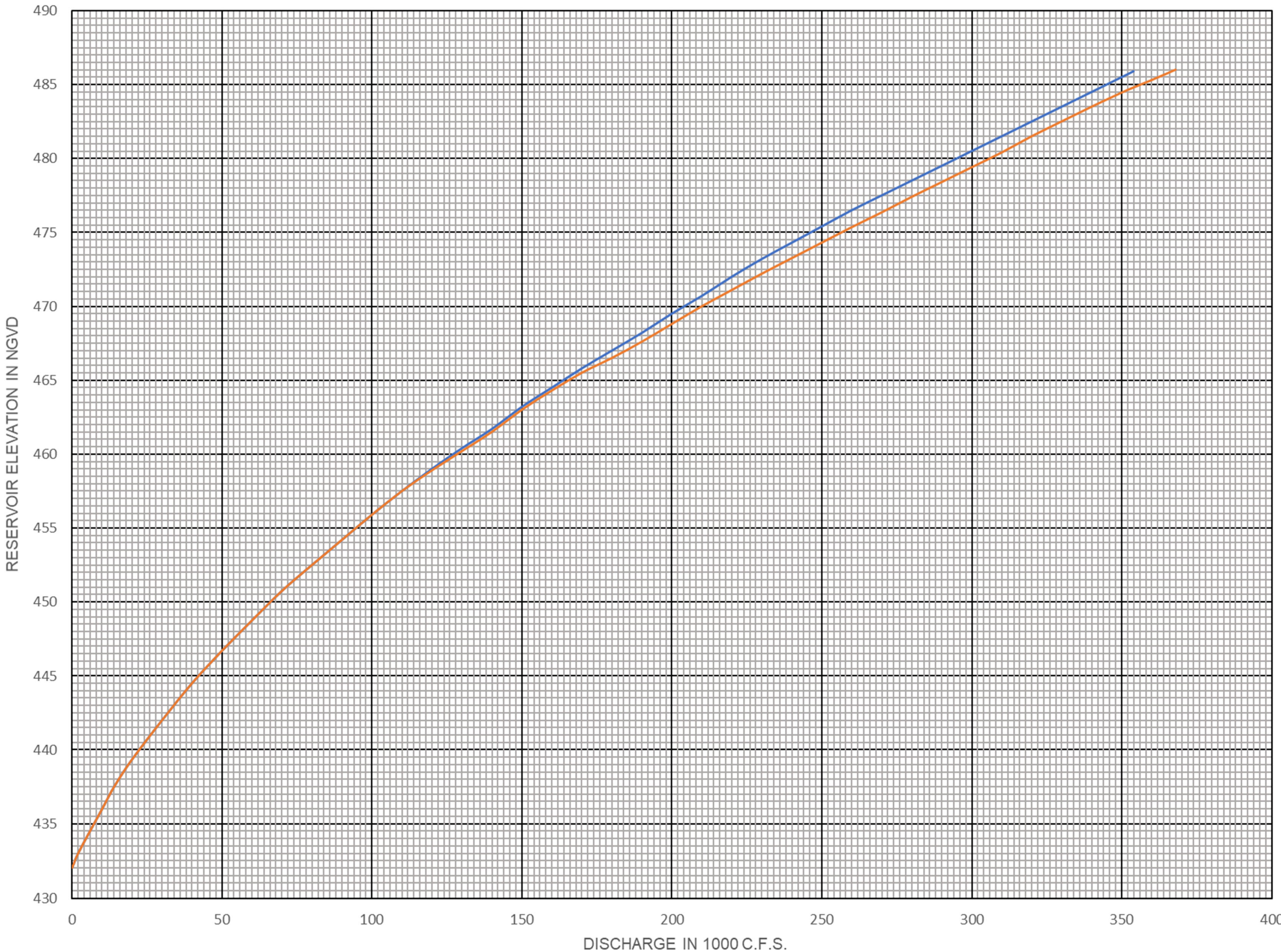
HEADWATER ELEVATION FEET MSL	0.0*	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
459	965	990	1010	1035	1060	1080	1105	1130	1150	1175
460	1200	1225	1250	1275	1300	1325	1350	1375	1400	1425
461	1450	1475	1500	1530	1555	1585	1610	1635	1665	1690
462	1720	1750	1775	1805	1830	186o	1890	1920	1945	1915
463	2005	2035	2065	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	3300	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
412	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

*These values represent the pool or forebay elevation in 0.1 foot increments and the flow associated with the elevation.

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

TRASHBAY DISCHARGE RATING



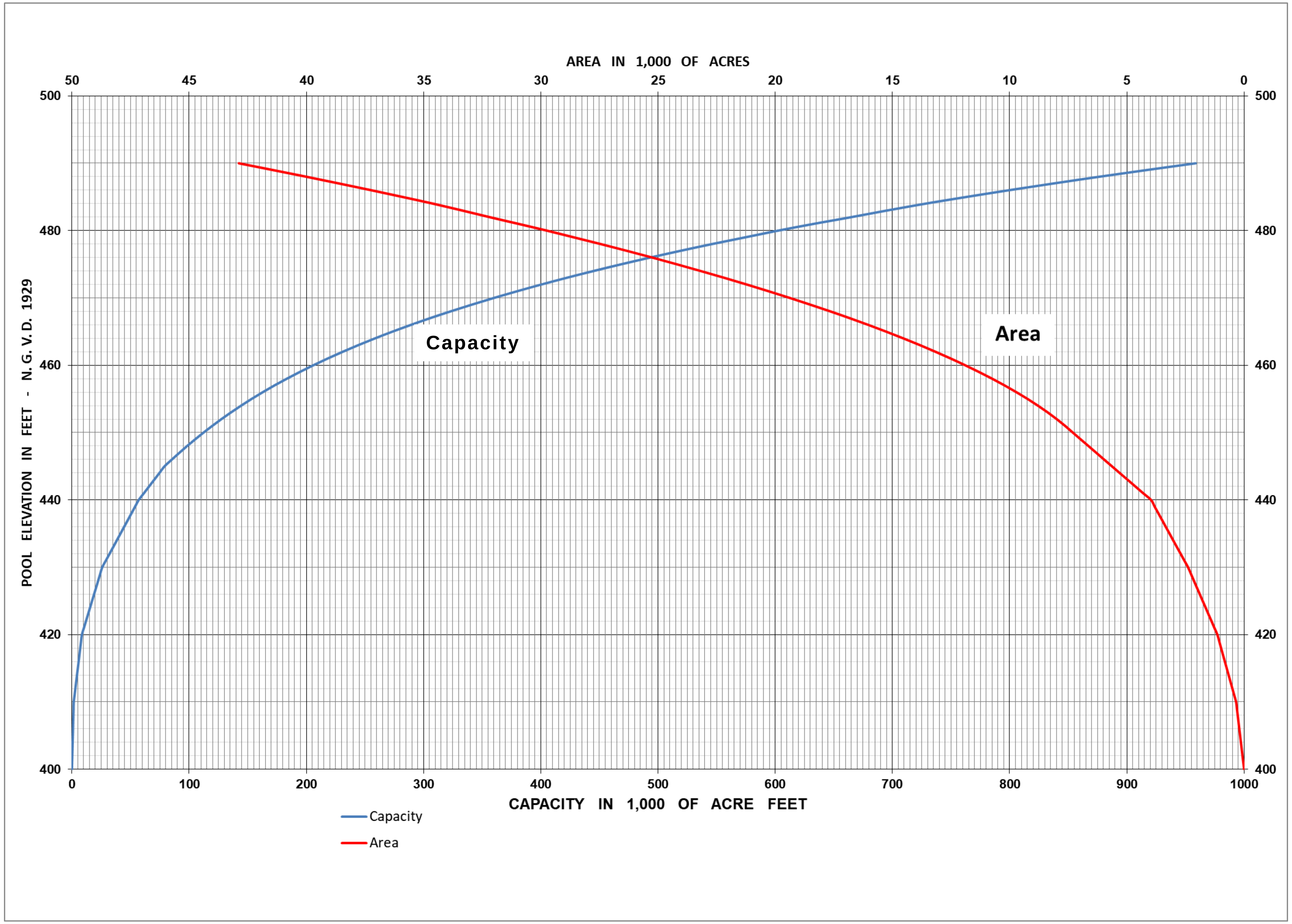
POOL ELEVATION- DISCHARGE TABLE

Pool Elevation (Feet M.S.L.)	Curve 1 (1000 C.F.S)	Curve 2 (1000 C.F.S.)	Pool Elevation (Feet M.S.L.)	Curve 1 (1000 C.F.S)	Curve 1 (1000 C.F.S)
432	0.00	0.00	460.00	127.14	128.46
433	2.00	2.00	461.00	134.62	136.15
434	4.67	4.67	462.00	142.00	143.33
435	7.33	7.33	463.00	148.67	150.00
436	10.00	10.00	464.00	156.15	157.69
437	12.38	12.67	465.00	163.85	165.83
438	15.62	15.62	466.00	171.67	175.00
439	18.68	18.86	467.00	180.00	184.55
440	22.45	22.45	468.00	188.33	193.33
441	26.23	26.23	469.00	196.15	201.67
442	30.00	30.00	470.00	204.17	210.00
443	34.00	34.00	471.00	212.31	219.09
444	38.00	38.00	472.00	220.00	228.18
445	42.27	42.27	473.00	228.33	237.62
446	46.82	46.82	474.00	237.27	247.14
447	51.46	51.46	475.00	246.36	256.67
448	56.34	56.34	476.00	255.45	266.50
449	61.25	61.25	477.00	265.00	276.19
450	66.25	66.25	478.00	275.00	286.00
451	71.43	71.43	479.00	285.00	296.00
452	77.14	77.14	480.00	295.00	306.00
453	82.94	82.94	481.00	305.00	315.45
454	88.82	88.82	482.00	315.00	325.00
455	94.71	94.71	483.00	325.00	335.00
456	100.63	100.63	484.00	335.00	345.26
457	106.88	106.88	485.00	345.00	356.40
458	113.33	113.57	486.00	355.00	368.00
459	120.00	120.77	486.00	355.00	368.00

LEGEND

Curve 1	6-40' Bays, Crest Elevation 432' M.S.L.
Curve 2	6-40' Bays, Crest Elevation 432' M.S.L.; Plus 1-17.5' Trashbay, Crest Elevation 452' M.S.L.

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN
WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
SPILLWAY DISCHARGE RATING CURVES

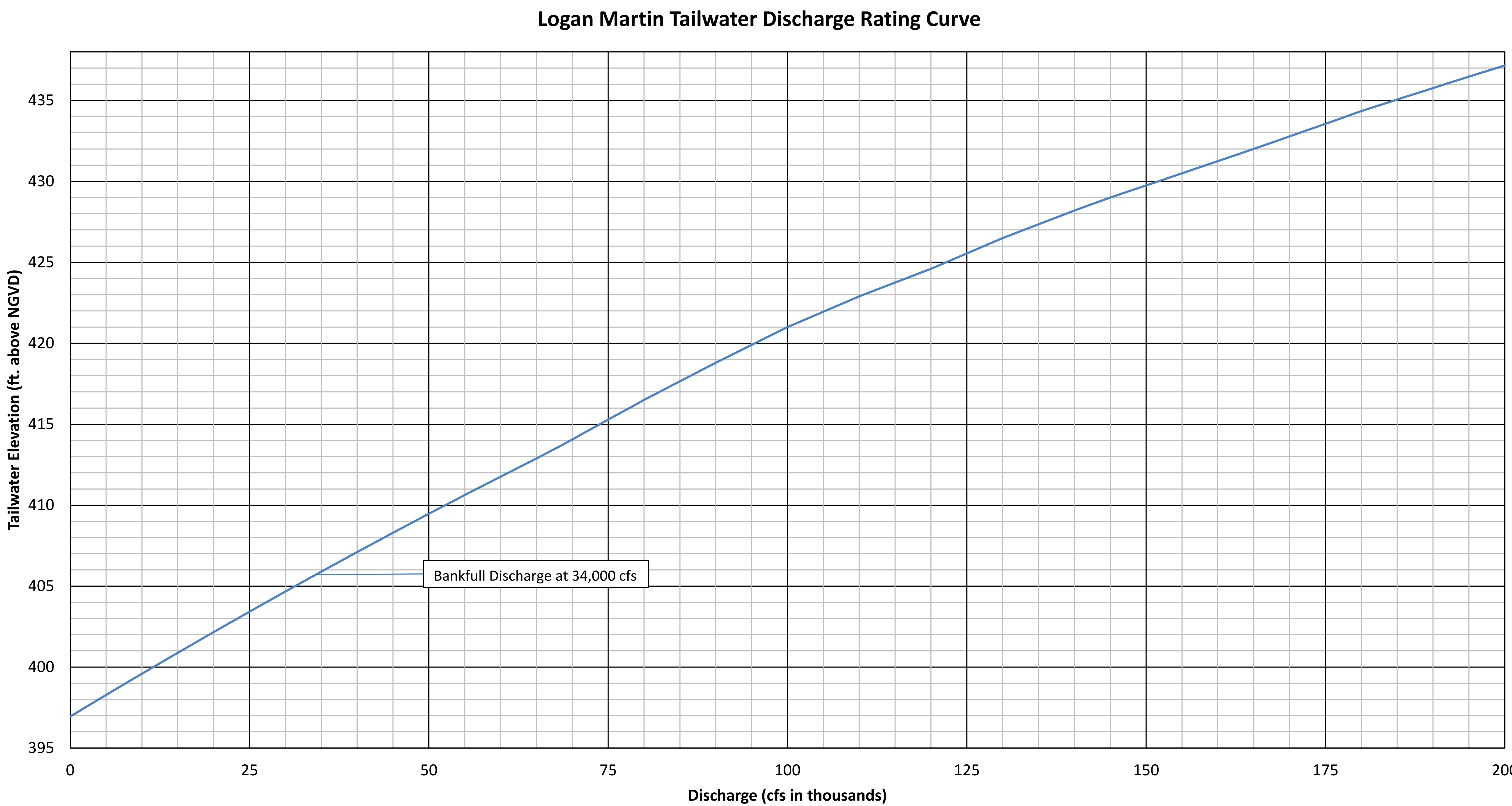


AREA CAPACITY TABLE					
Pool Elevation	Total Area (Acres)	Total Storage (Acre-Feet)	Pool Elevation (Feet)	Total Area (Acres)	Total Storage (Acre-Feet)
400	0	0	446	5970	85199
401	34	153	447	6303	91582
402	68	306	448	6636	98191
403	102	459	449	6970	105056
404	136	612	450	7303	112209
405	170	765	451	7632	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

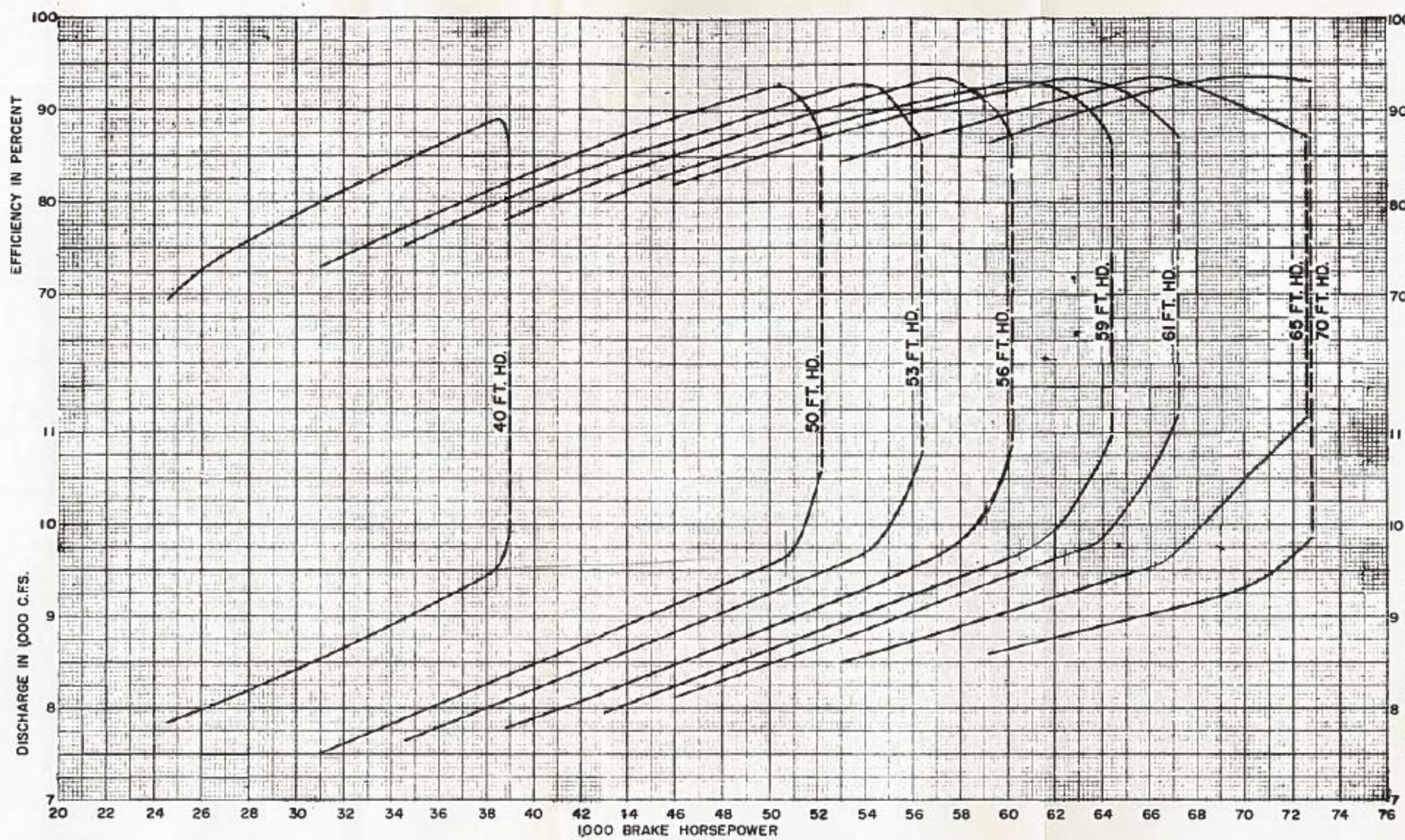
WATER CONTROL MANUAL LOGAN MARTIN DAM AND LAKE AREA AND CAPACITY CURVES AND TABLE



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

TAILWATER DISCHARGE
RATING CURVE



NOTE:

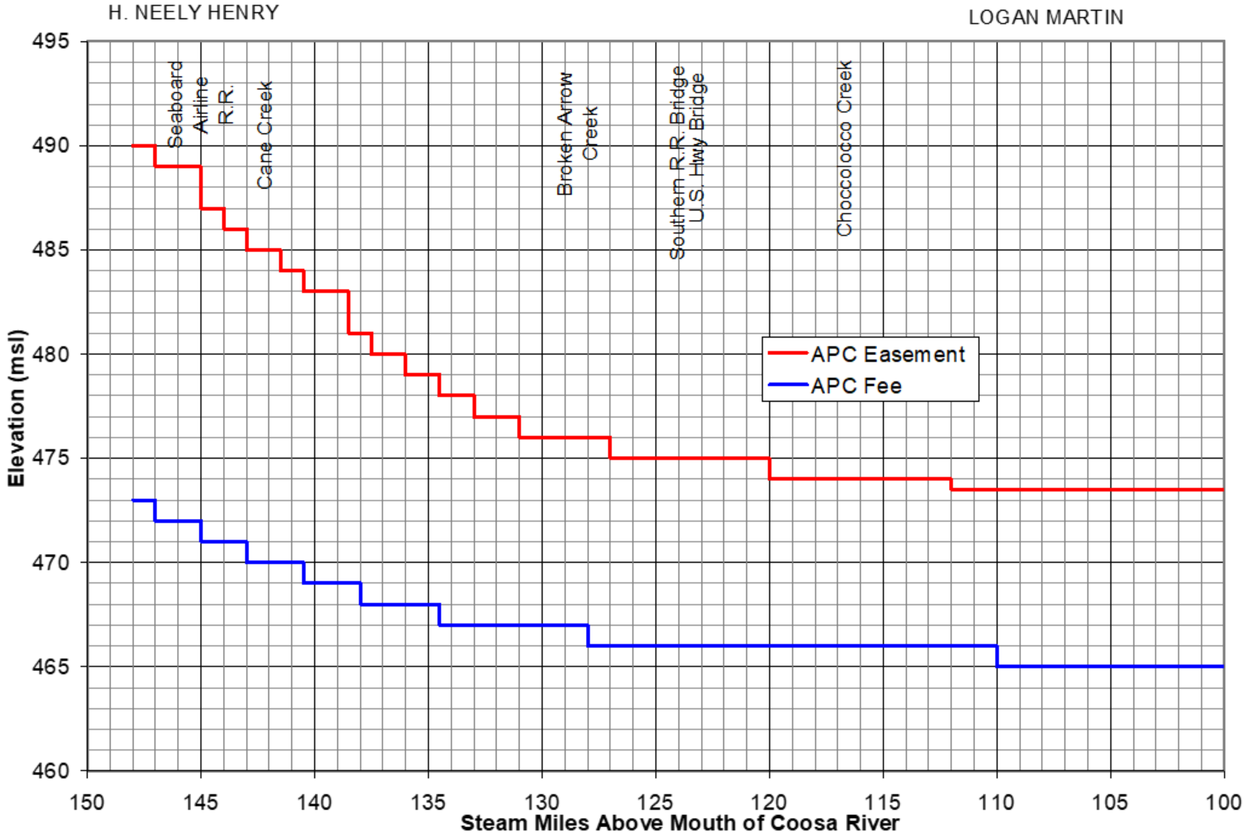
Expected performance curves for a vertical fixed-blade propeller turbine rated at 59,000 horsepower, at 56 ft. head, at 90 r.p.m.

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

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

Profile of Coosa River

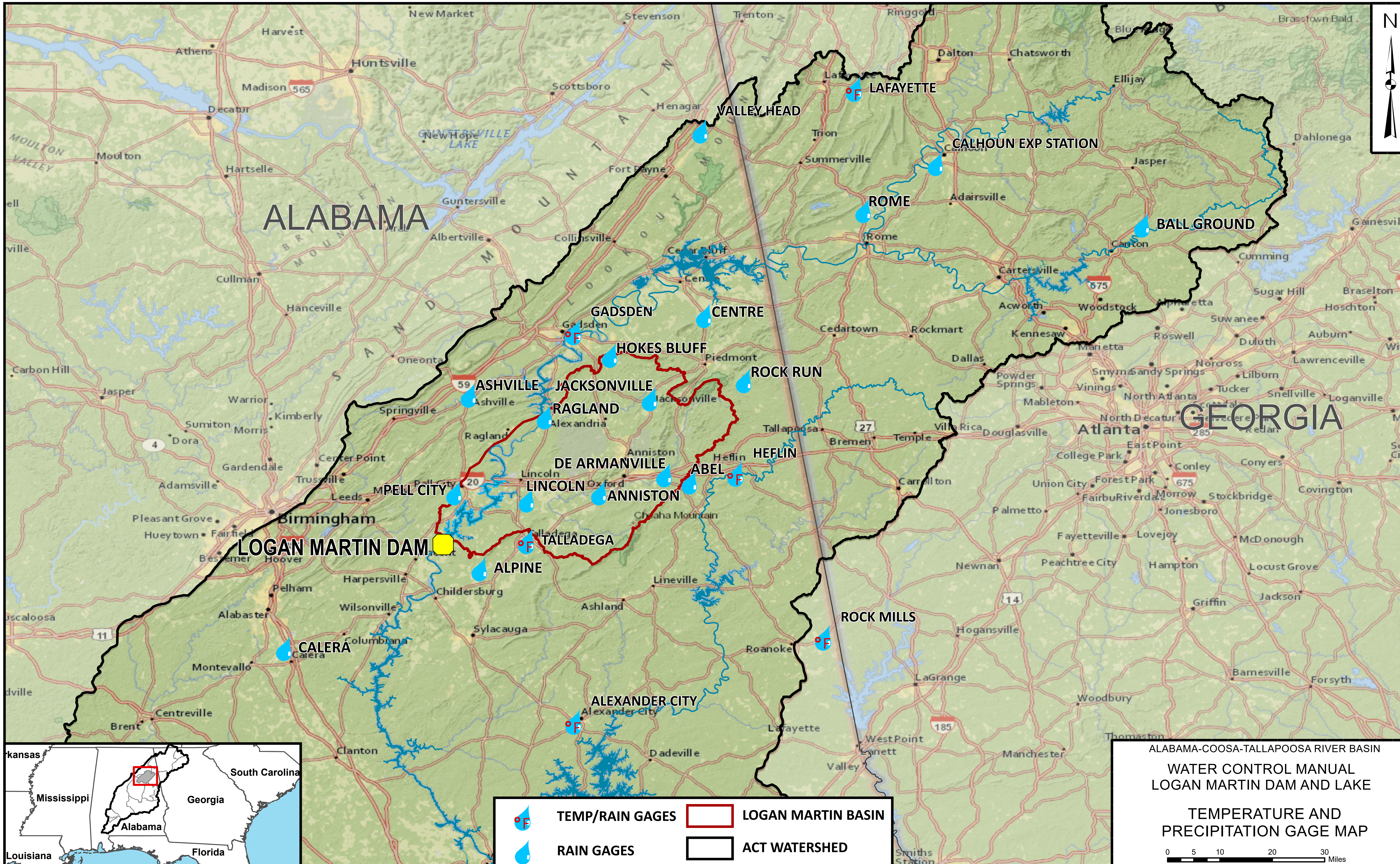
Showing Existing and Authorized Developments

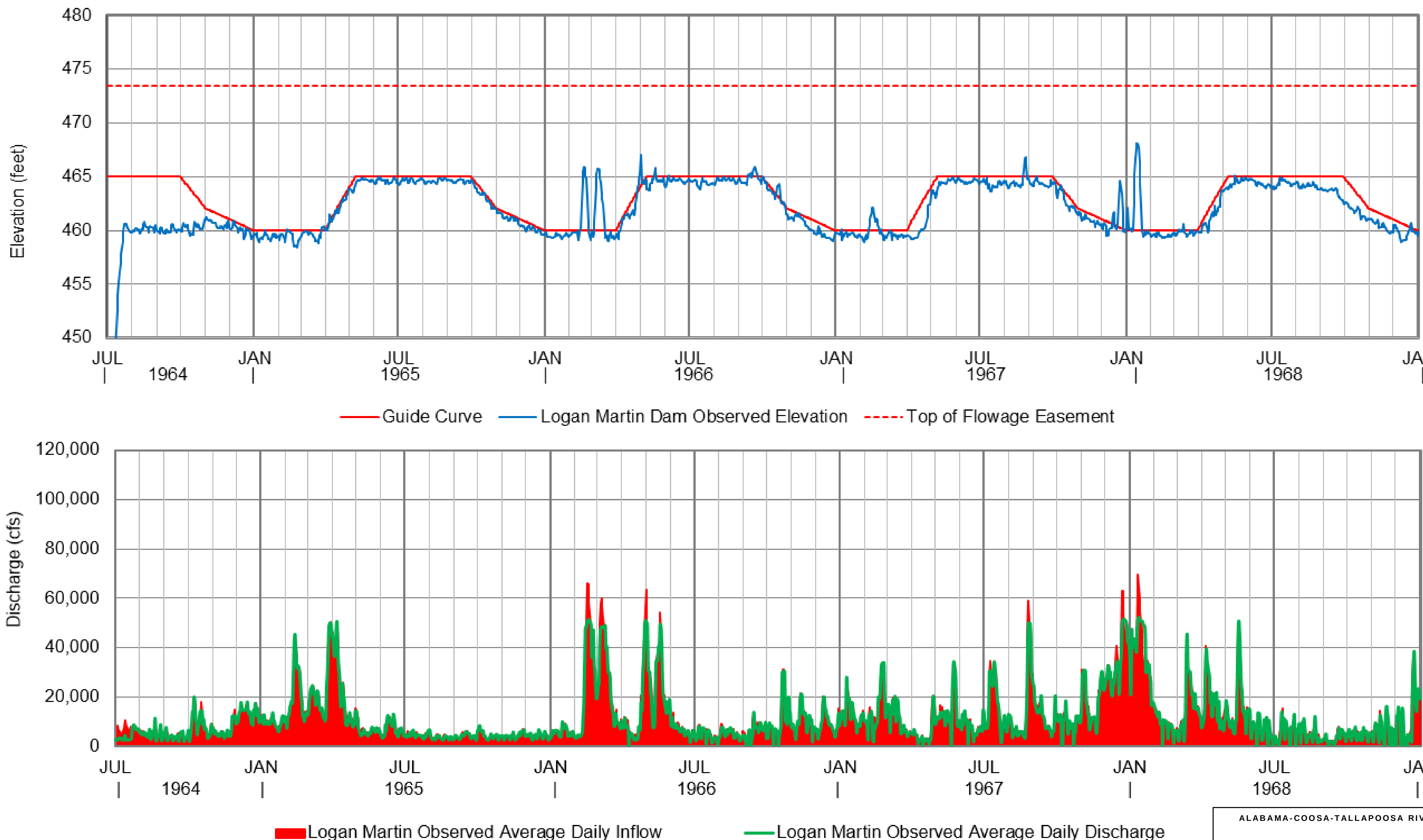


ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

COOSA RIVER EASEMENT PROFILE

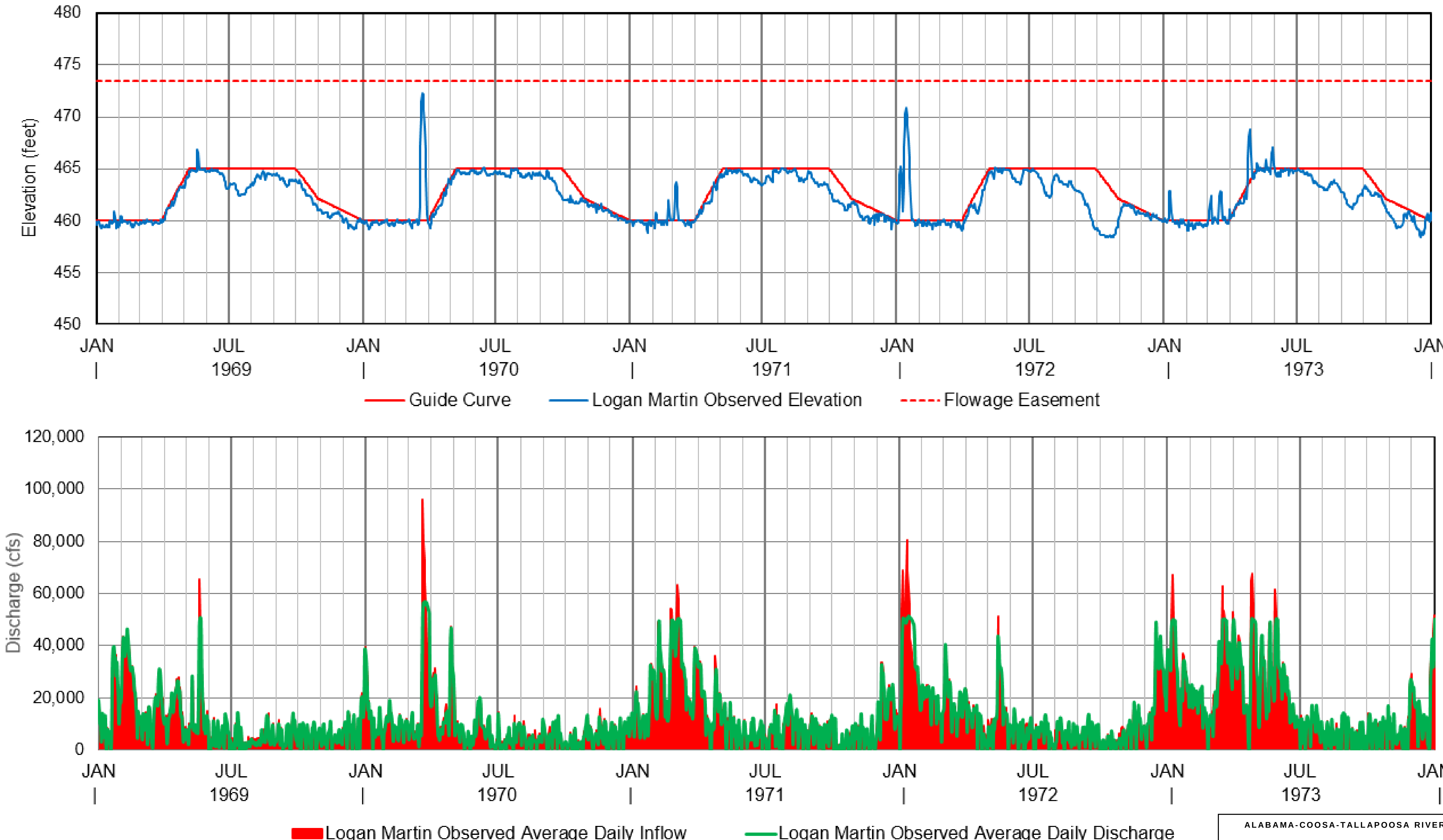

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN
WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
TEMPERATURE AND
PRECIPITATION GAGE MAP
0 5 10 20 30 Miles
TEMP/RAIN GAGES
RAIN GAGES
LOGAN MARTIN BASIN
ACT WATERSHED
ALABAMA
GEORGIA
LOGAN MARTIN DAM
LAFAYETTE
VALLEY HEAD
CALHOUN EXP STATION
ROME
BALL GROUND
GADSDEN
CENTRE
HOKES BLUFF
ROCK RUN
ASHVILLE
JACKSONVILLE
RAGLAND
DE ARMANVILLE
HEFLIN
ABEL
PELL CITY
LINCOLN
ANNISTON
TALLADEGA
ALPINE
ROCK MILLS
CALERA
ALEXANDER CITY
Birmingham
Atlanta
Mississippi
Alabama
Georgia
South Carolina
Florida
Louisiana
N



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

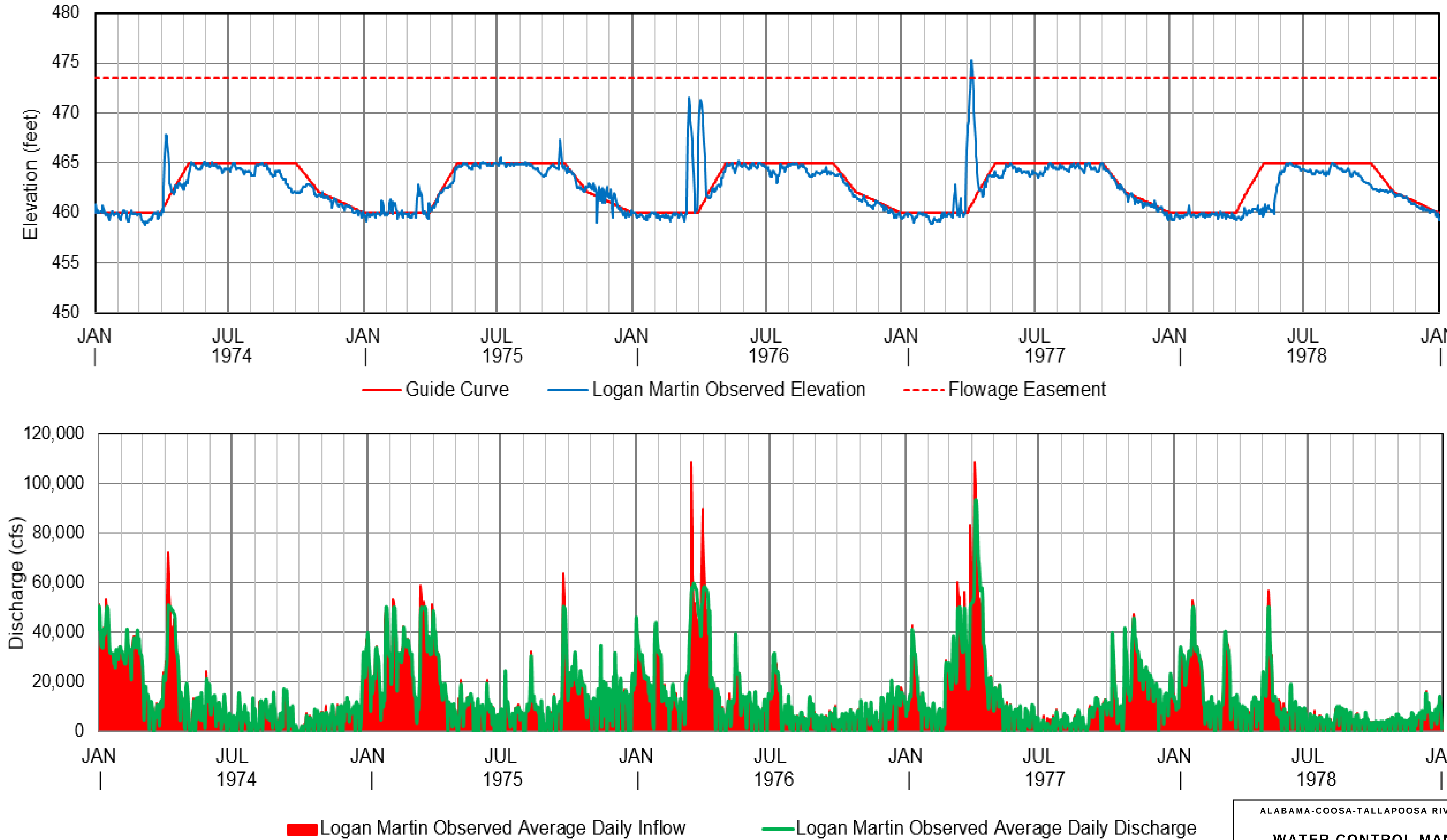
INFLOW-OUTFLOW-POOL



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

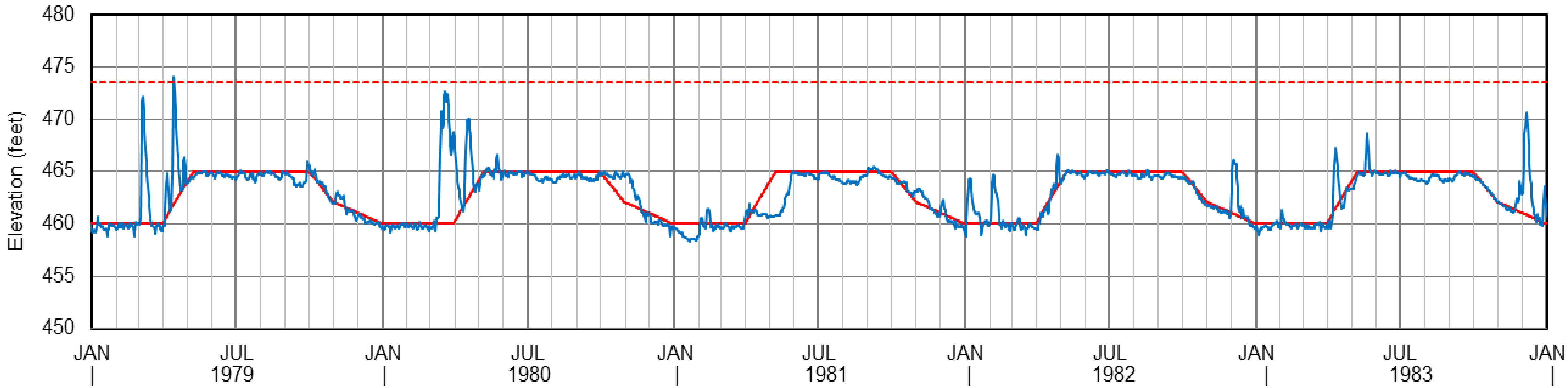
INFLOW-OUTFLOW-POOL

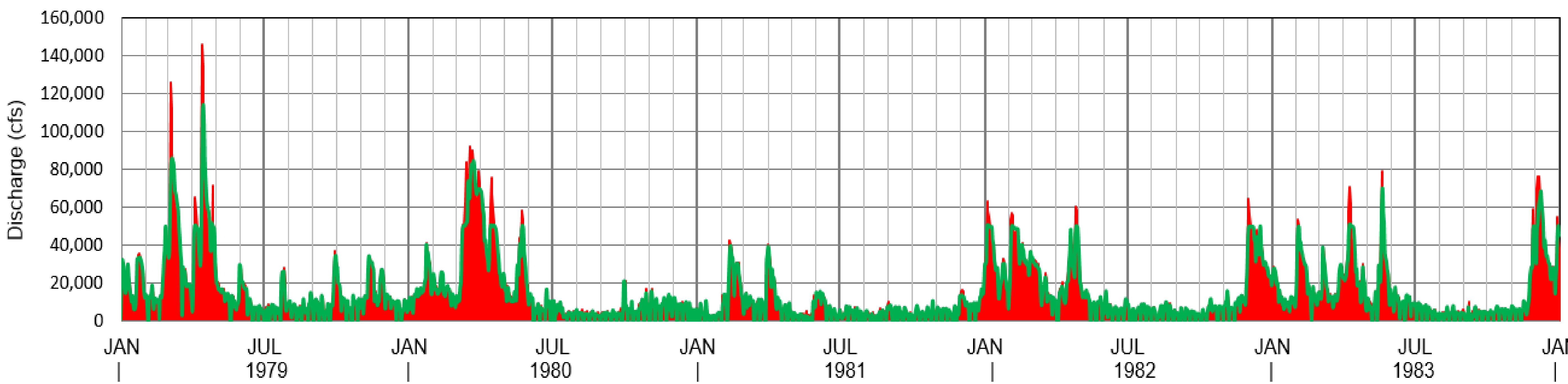


ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

INFLOW-OUTFLOW-POOL

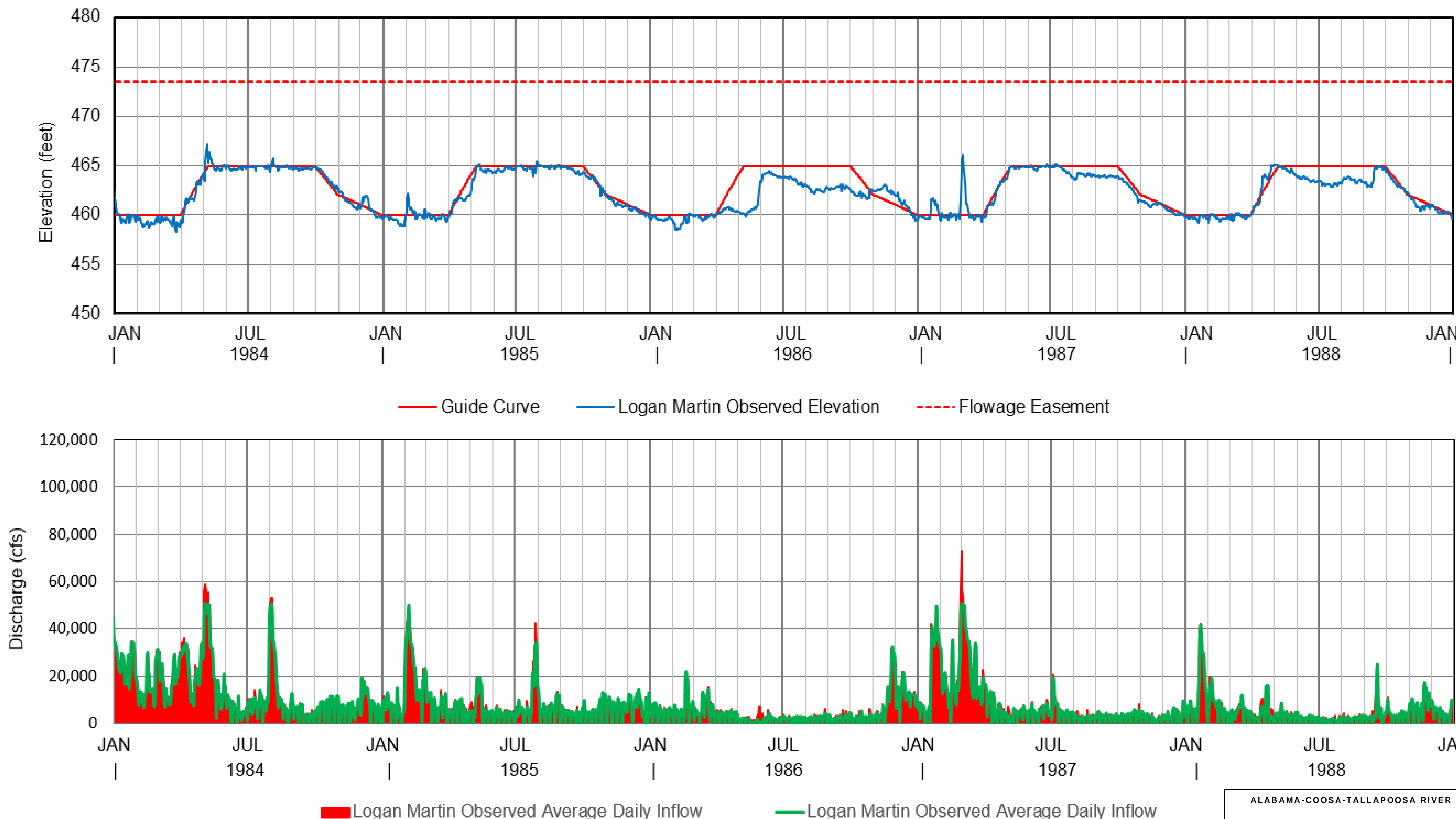




ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

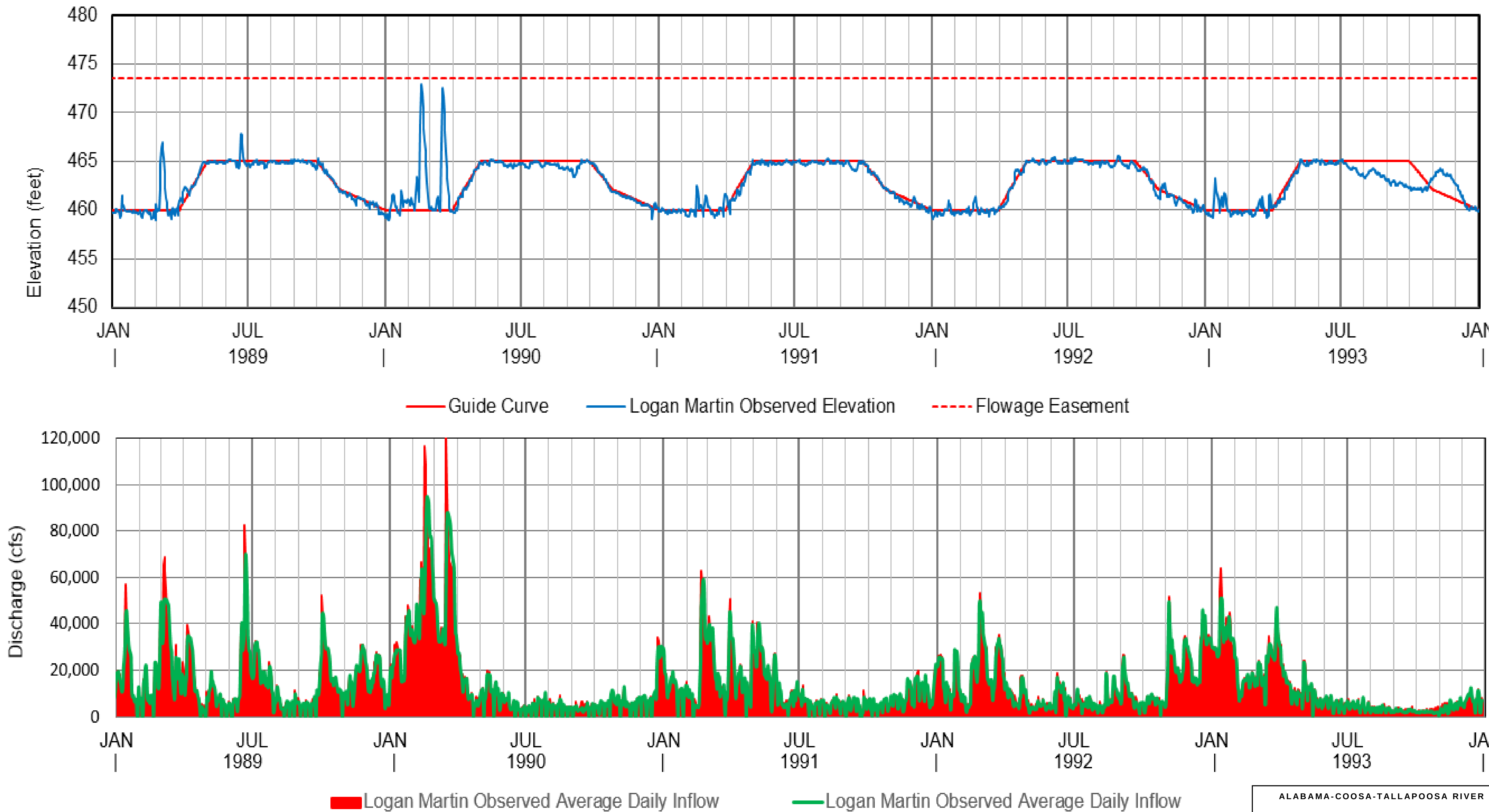
INFLOW-OUTFLOW-POOL



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

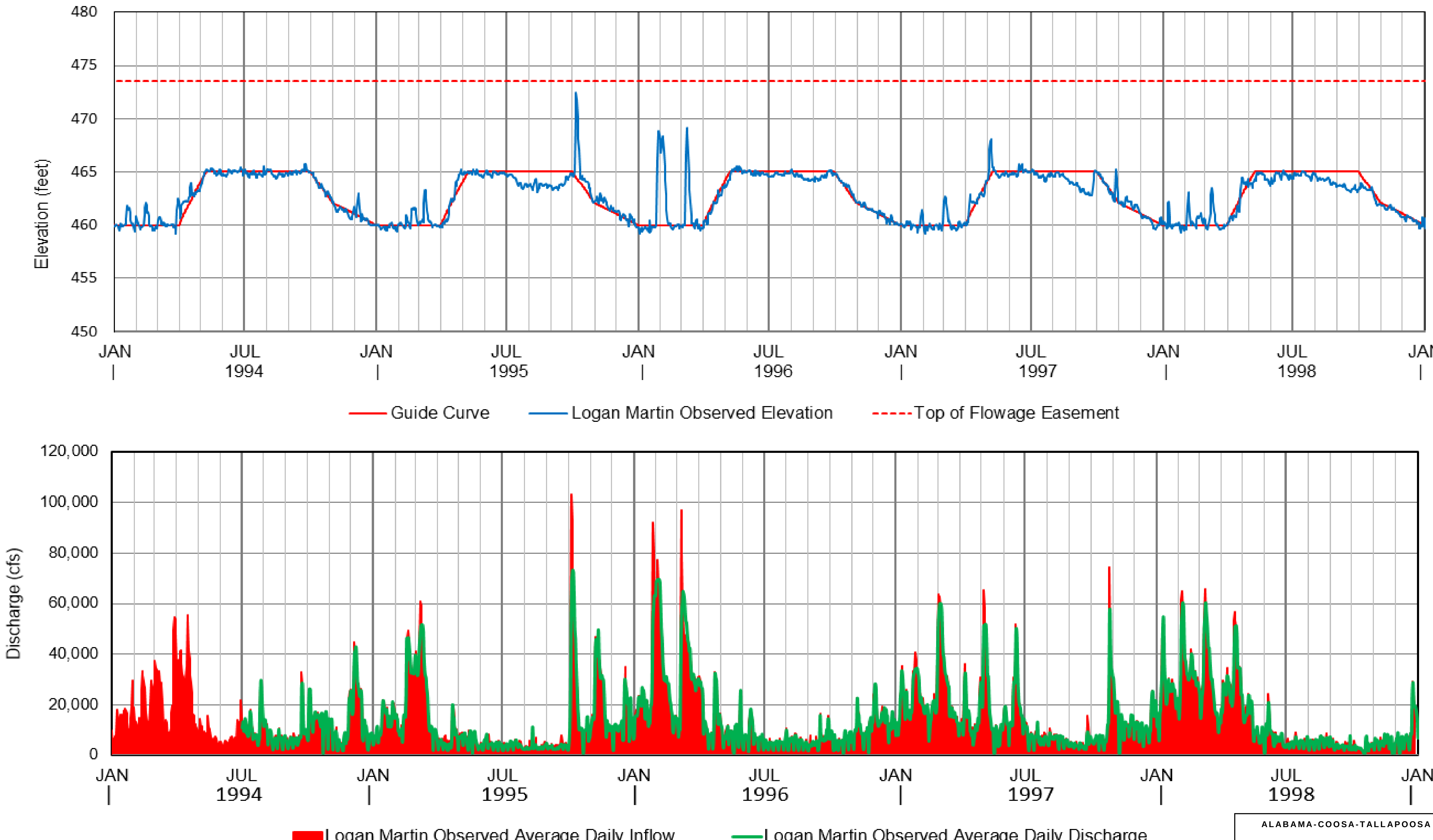
INFLOW-OUTFLOW-POOL



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

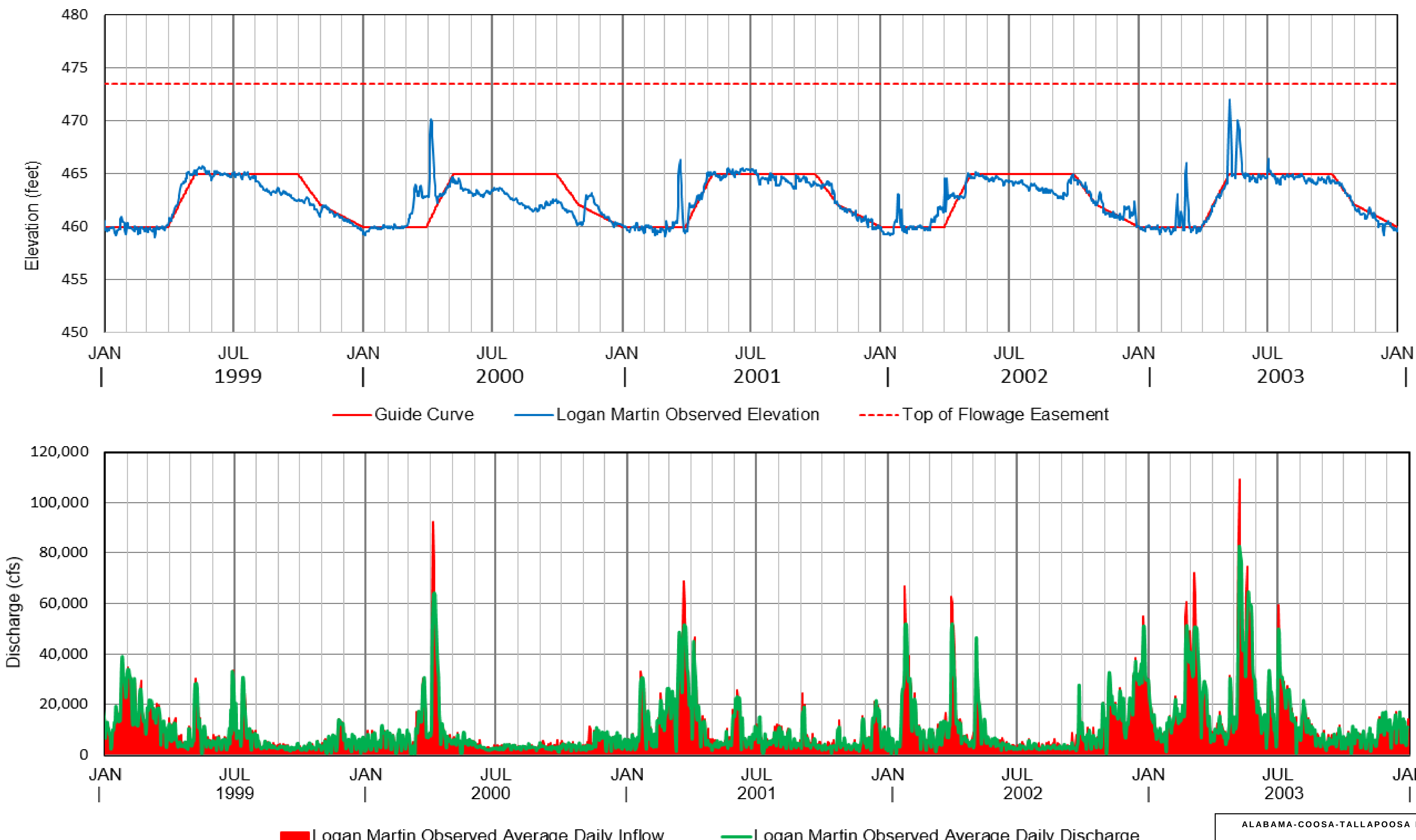
INFLOW-OUTFLOW-POOL



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

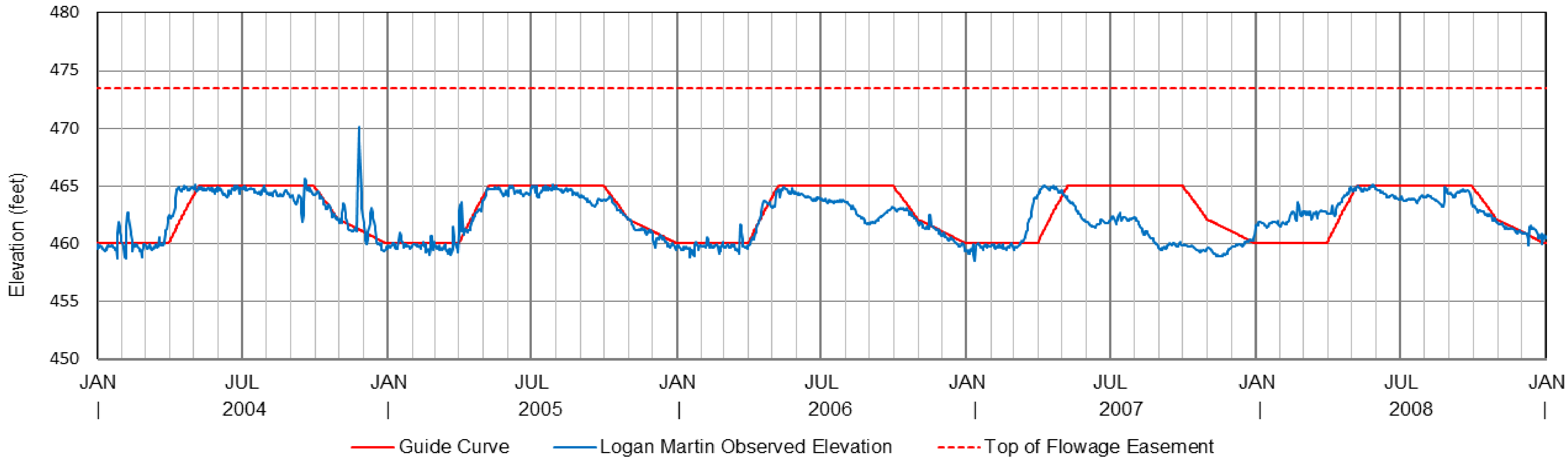
INFLOW-OUTFLOW-POOL

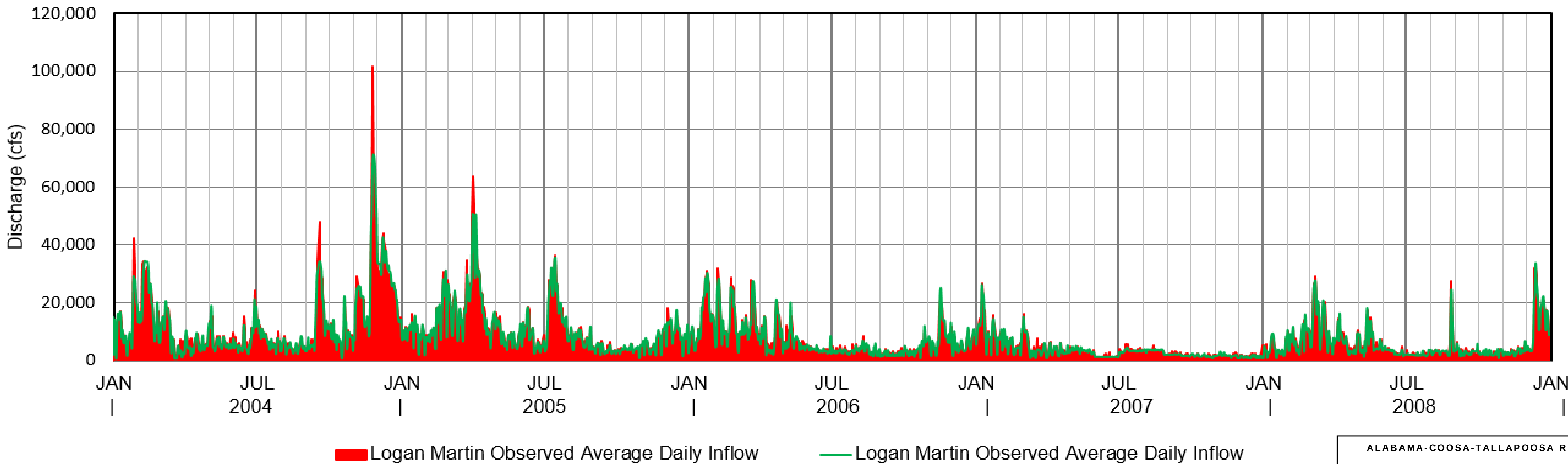


ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

INFLOW-OUTFLOW-POOL

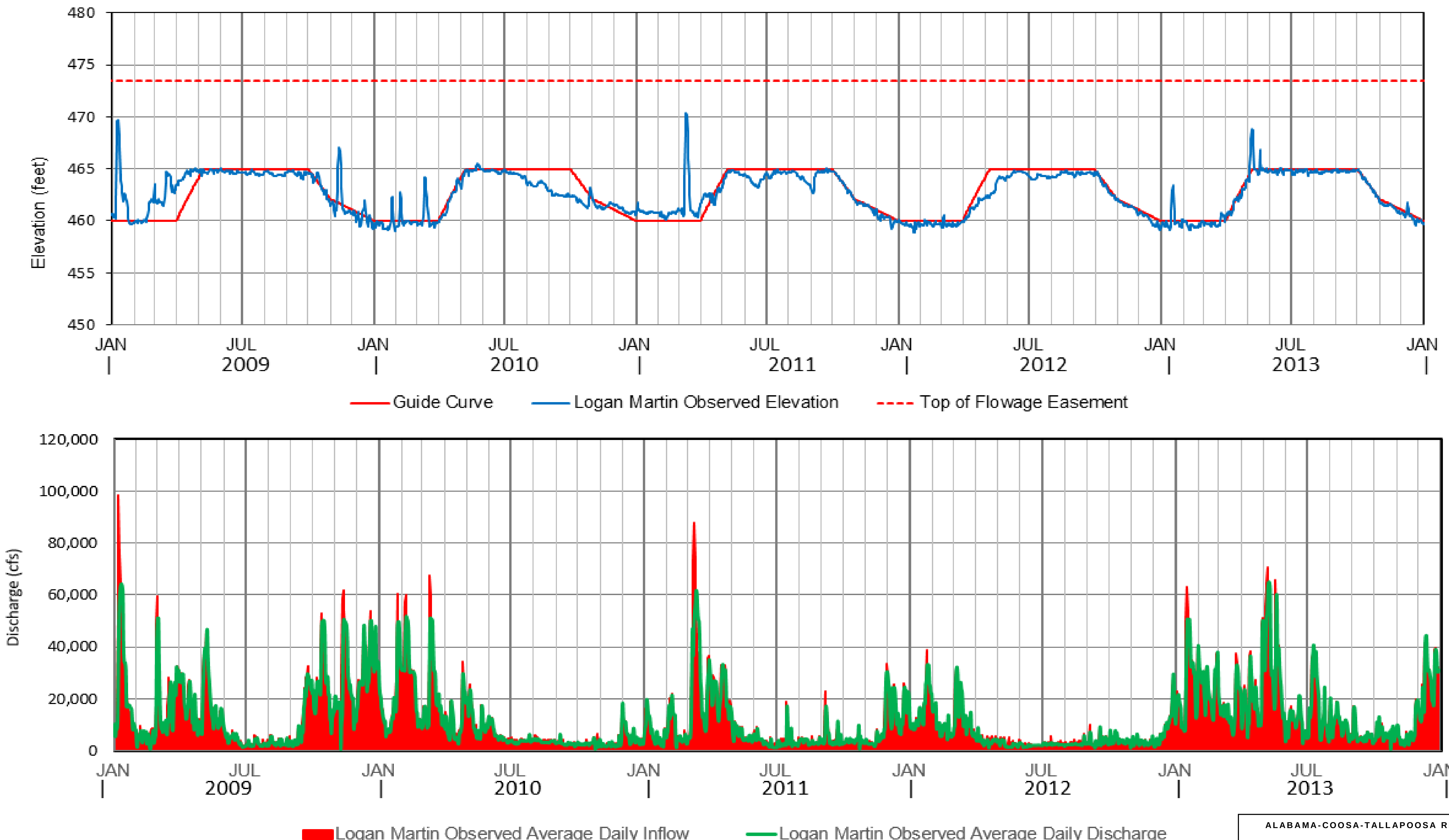




ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

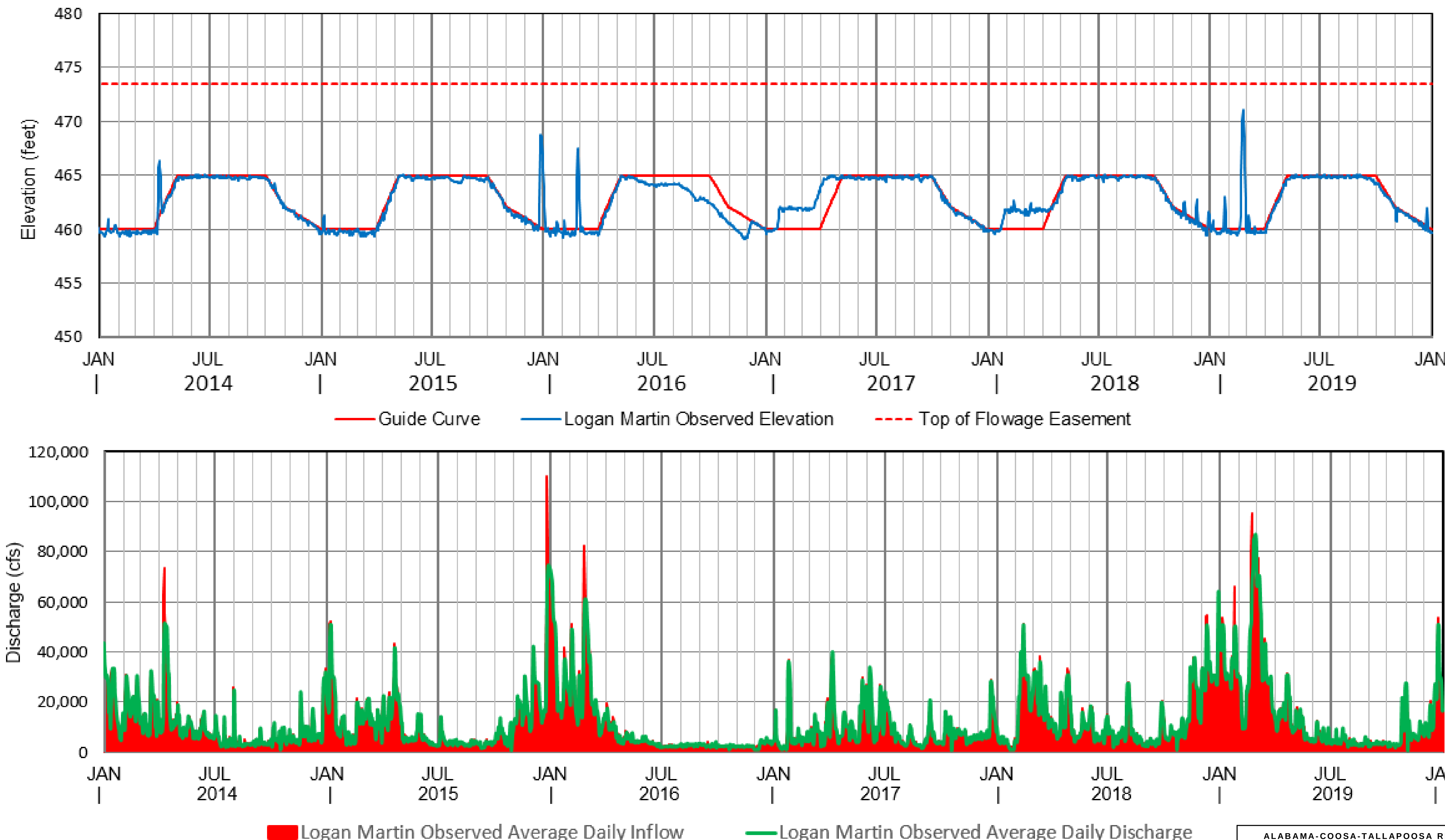
INFLOW-OUTFLOW-POOL



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

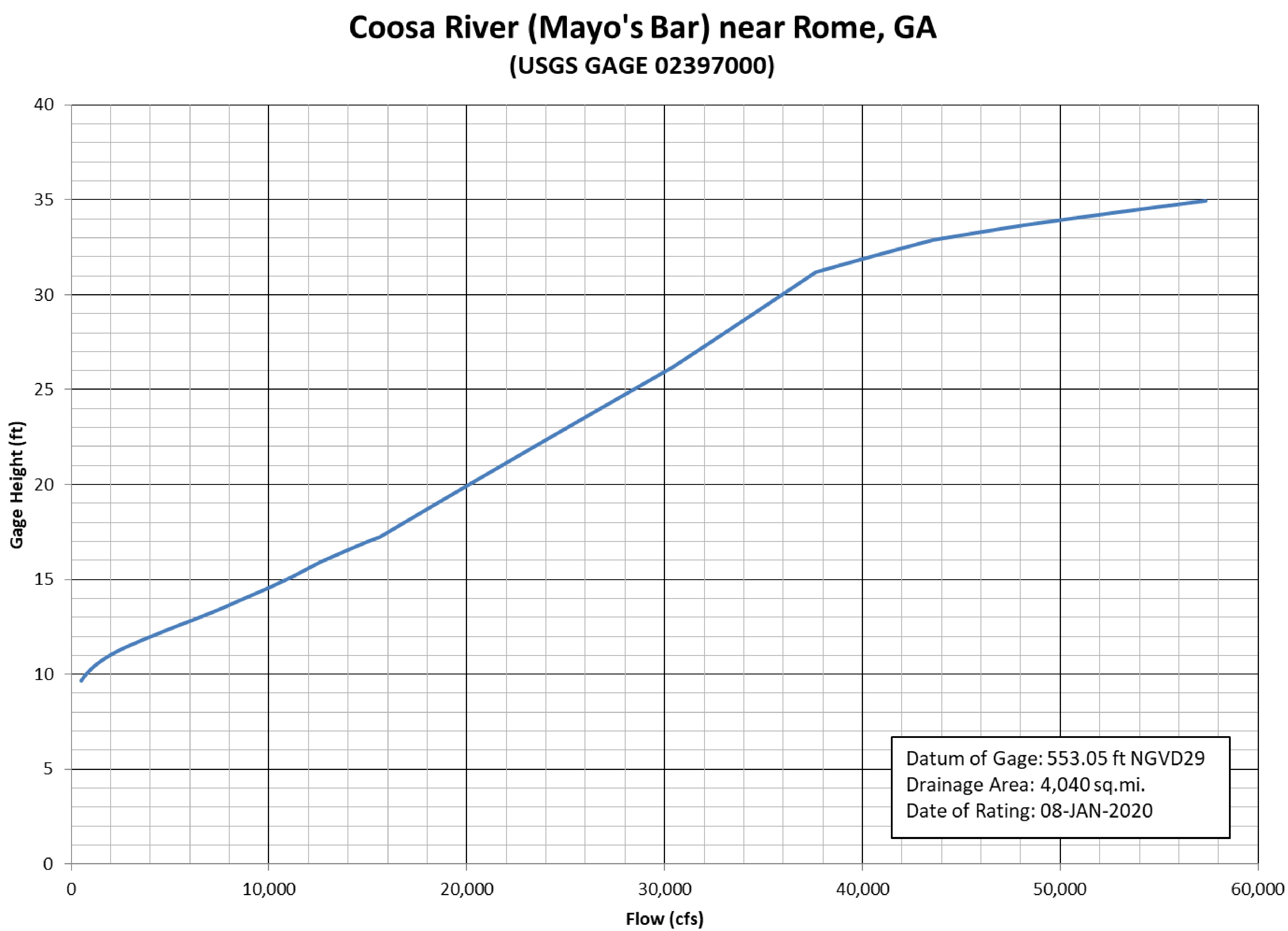
INFLOW-OUTFLOW-POOL



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

INFLOW-OUTFLOW-POOL

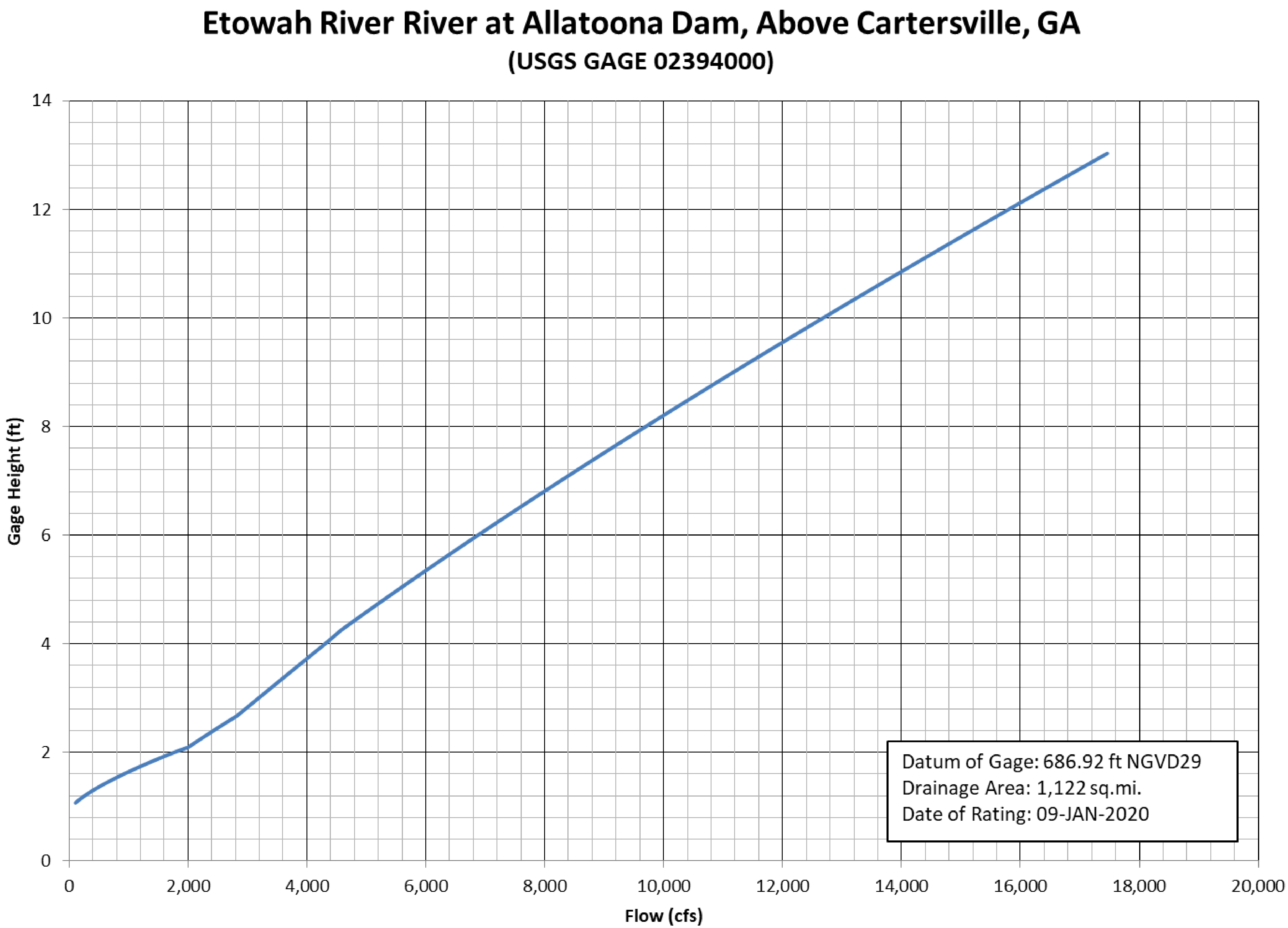


USGS GAGE
02397000

FLOW (cfs)	GAGE HT (ft)	FLOW (cfs)	GAGE HT (ft)
510	9.66	10890	15
602	9.8	12777	16
675	9.9	16846	18
754	10	20115	20
1031	10.3	23416	22
1253	10.5	26745	24
1507	10.7	30097	26
1956	11	31596	27
2495	11.3	33046	28
2909	11.5	34491	29
3360	11.7	35931	30
4051	12	40408	32
6479	13	50446	34
8755	14	57352	34.95

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
RATING CURVE, USGS GAGE 02397000

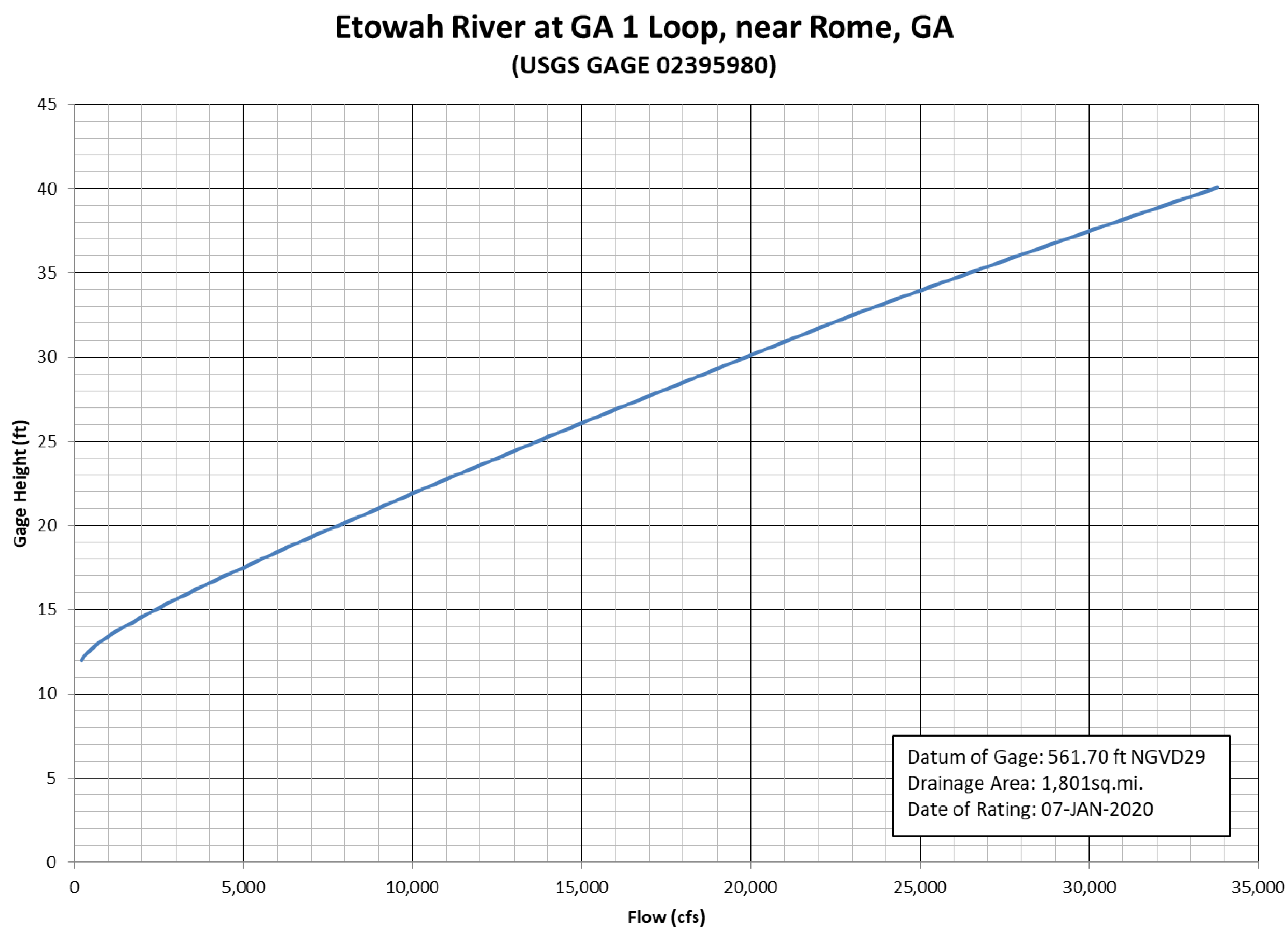


USGS GAGE 02394000

FLOW (cfs)	GAGE HT (ft)
110	1.07
735	1.5
1769	2
2572	2.5
3188	3
3746	3.5
4308	4
5540	5
6877	6
8265	7
9697	8
11170	9
12681	10
14227	11
15804	12
17411	13
17460	13.03

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
RATING CURVE, USGS GAGE 02394000

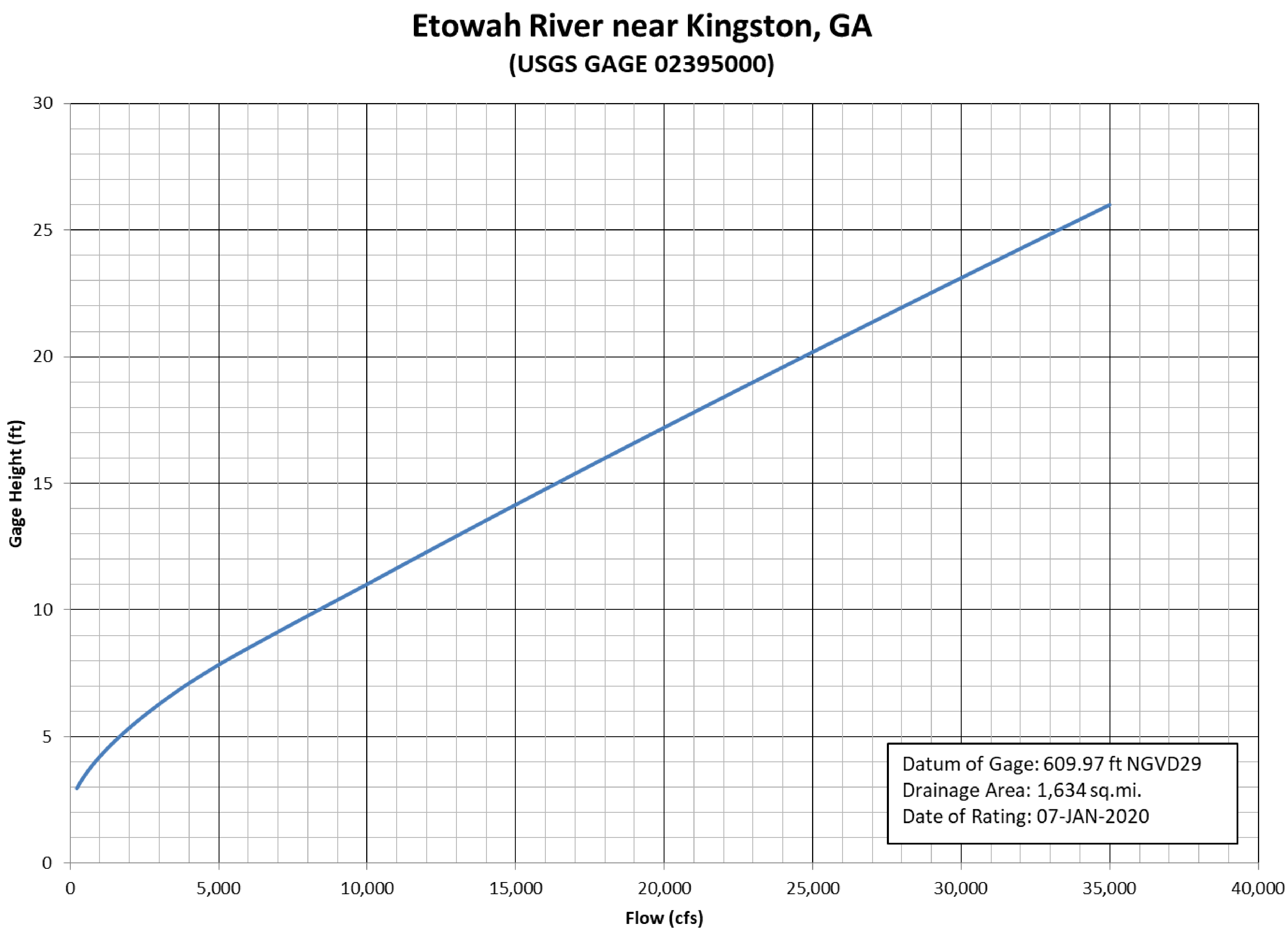


USGS GAGE
02395980

FLOW (cfs)	GAGE HT (ft)	FLOW (cfs)	GAGE HT (ft)
210	12	10108	22
325	12.3	12500	24
418	12.5	14892	26
523	12.7	16120	27
704	13	17369	28
910	13.3	18613	29
1057	13.5	19849	30
1217	13.7	22363	32
1480	14	25061	34
2400	15	27870	36
3390	16	30746	38
5528	18	33687	40
7796	20	33791	40.07

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
RATING CURVE, USGS GAGE 02395980

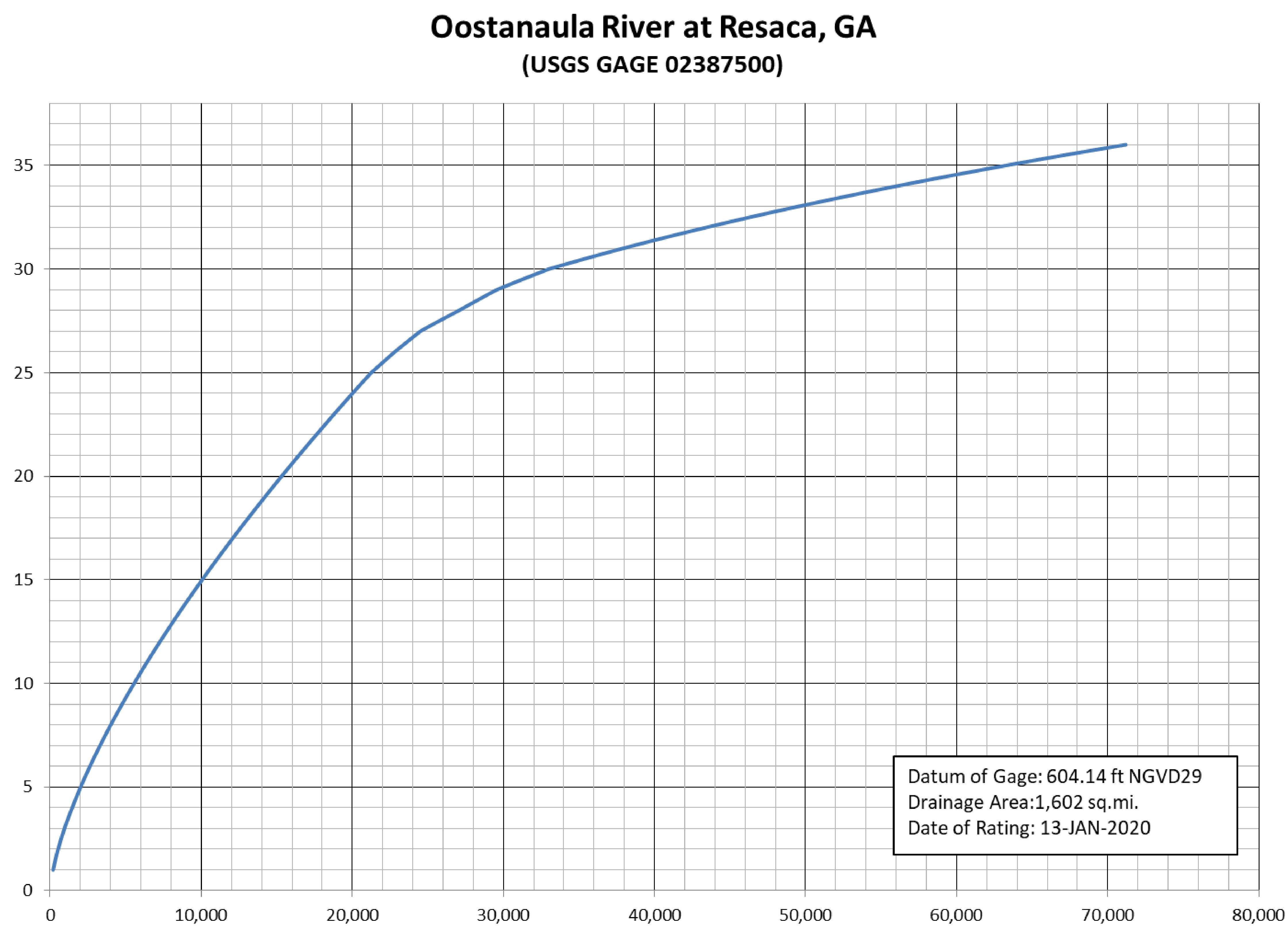


USGS GAGE 02395000

FLOW (cfs)	GAGE HT (ft)
224	2.95
247	3
512	3.5
842	4
1667	5
2680	6
3859	7
5241	8
6783	9
8365	10
11546	12
14746	14
18008	16
21324	18
24686	20
28088	22
31527	24
35000	26

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
RATING CURVE, USGS GAGE 02395000



USGS GAGE
02387500

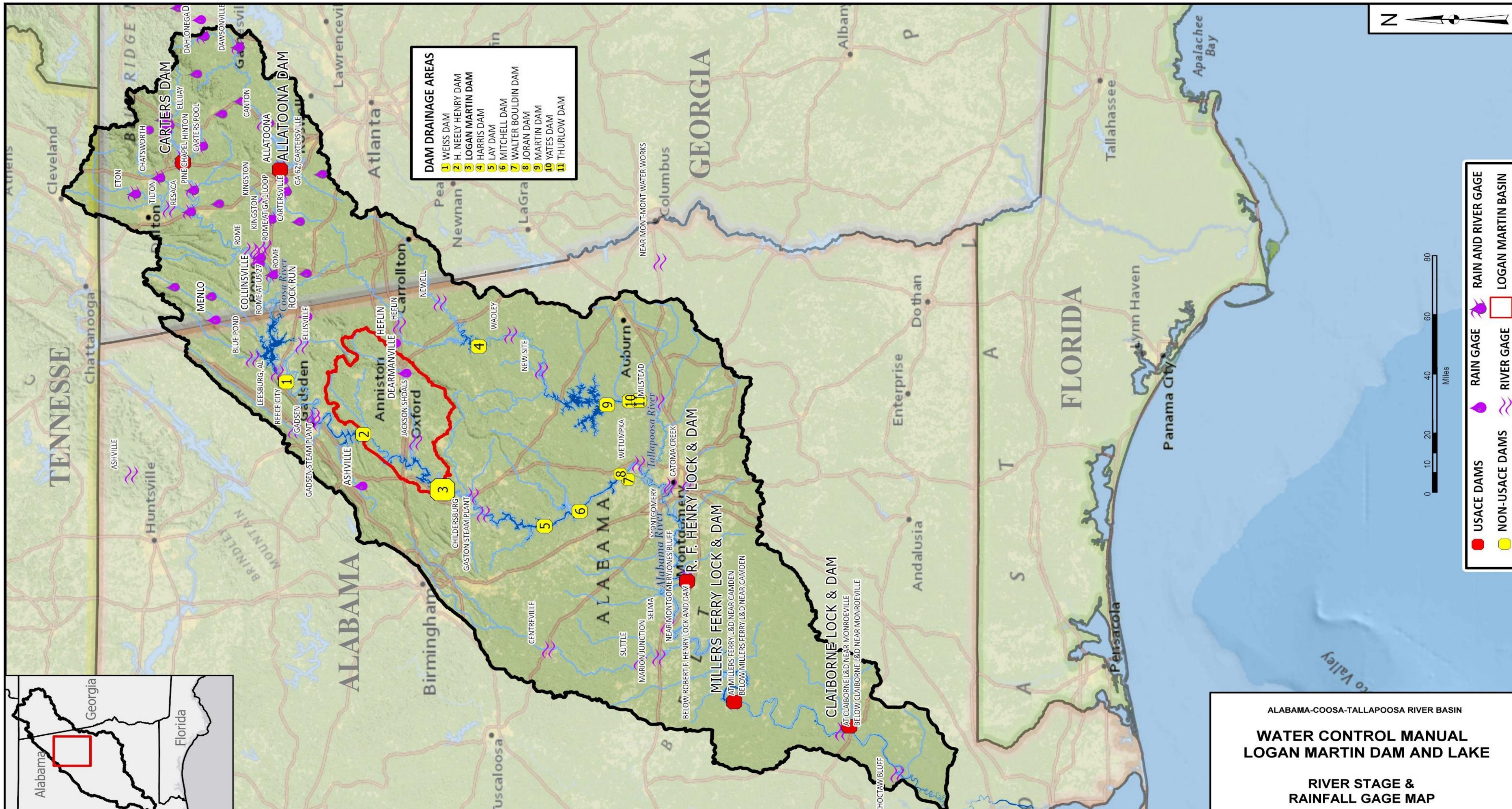
FLOW (cfs)	GAGE HT (ft)	FLOW (cfs)	GAGE HT (ft)
190	1	10048	15
218	1.1	12070	17
342	1.5	13123	18
520	2	14205	19
720	2.5	15313	20
940	3	17607	22
1450	4	20000	24
2010	5	21250	25
2626	6	22800	26
3291	7	27050	28
4002	8	29550	29
4755	9	33000	30
5549	10	43369	32
6380	11	49383	33
7247	12	56000	34
8148	13	63257	35
9082	14	71195	36

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE
RATING CURVE, USGS GAGE 02387500

CORPS OF ENGINEERS

U.S. ARMY

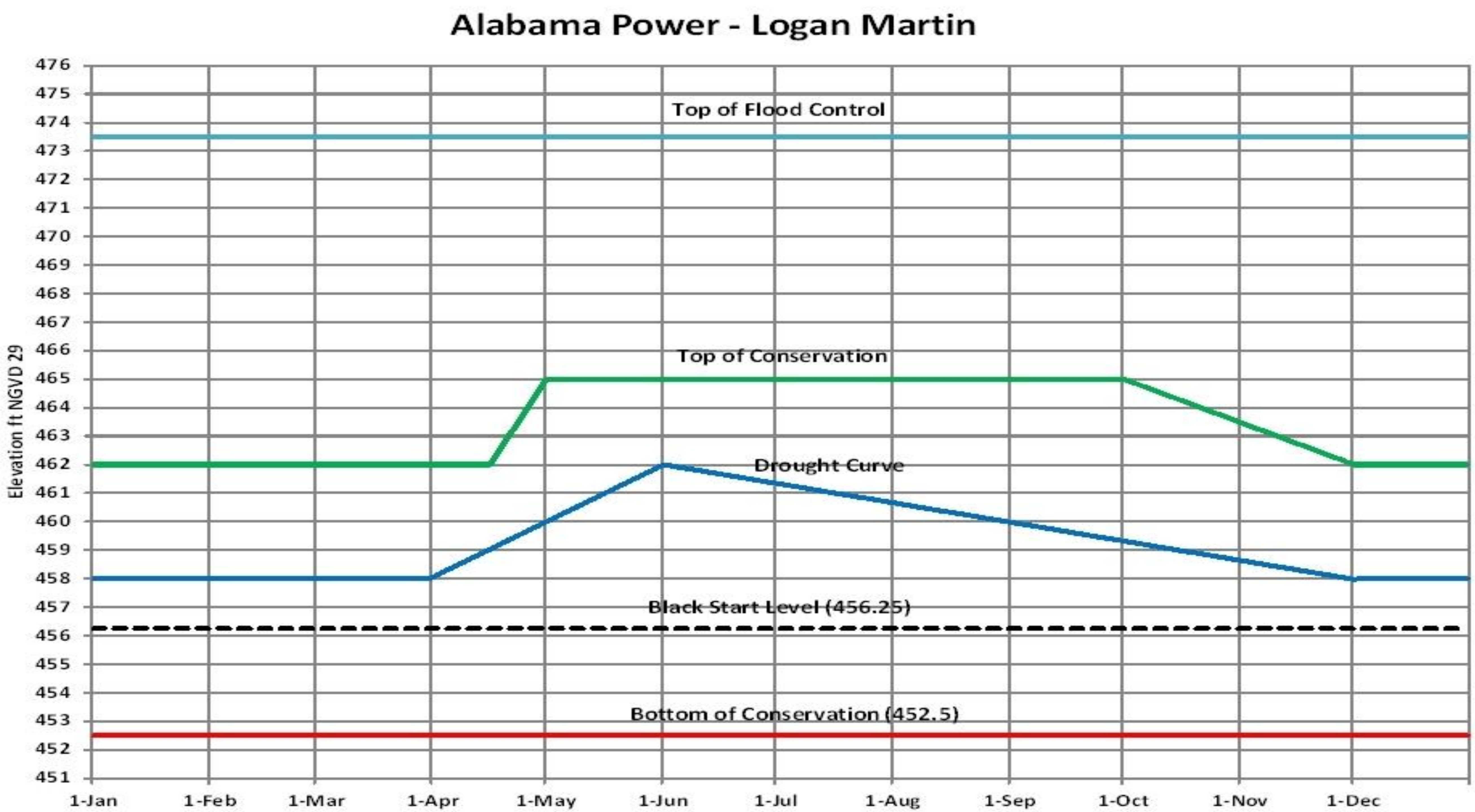


ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

RIVER STAGE &
RAINFALL GAGE MAP

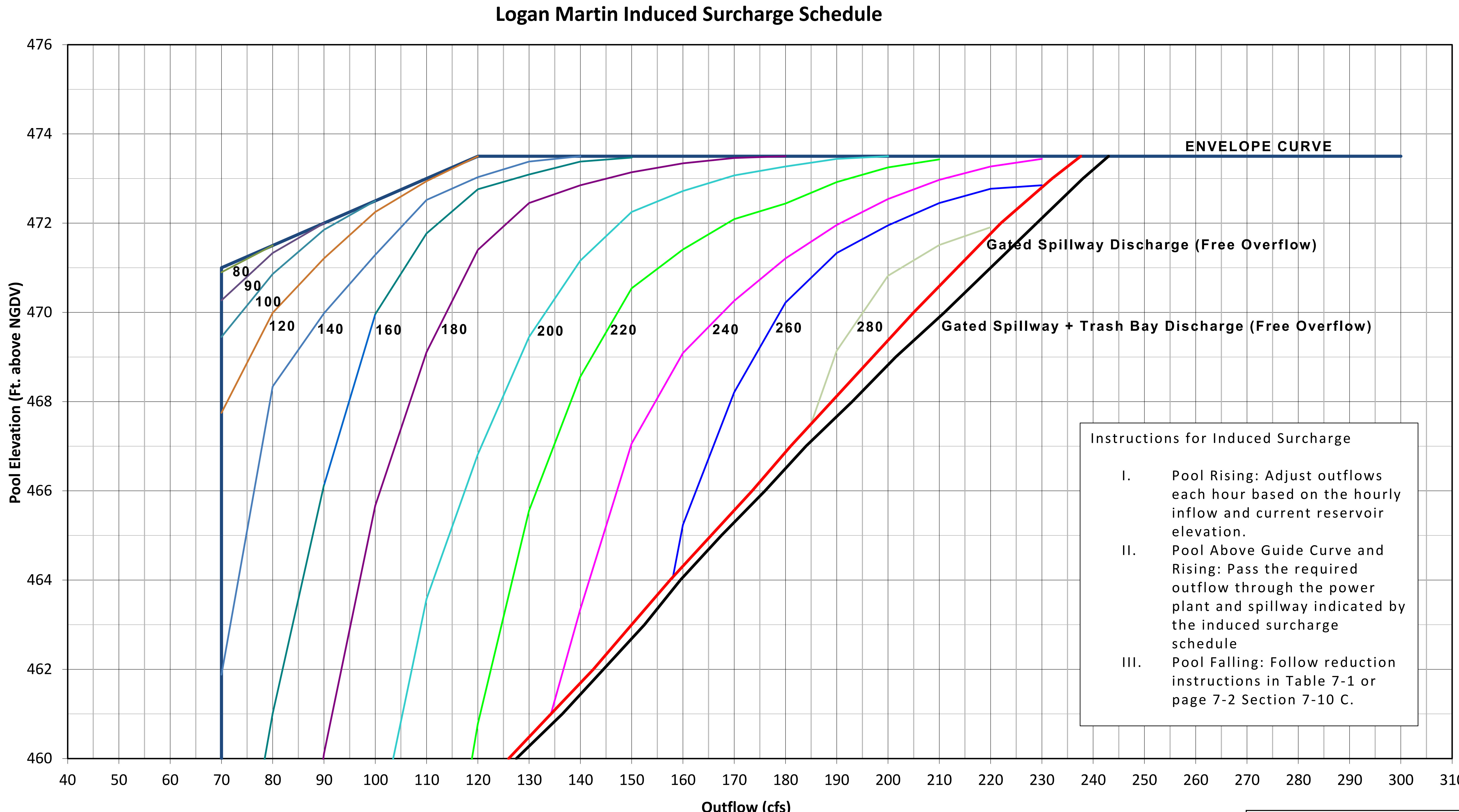
APPENDIX C PLATE 5-1



ALABAMA-COOSA-TALLAPOOSA BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

GUIDE CURVES



Notes:

IV. Each line represents the previous hourly average inflow to the project in thousands.

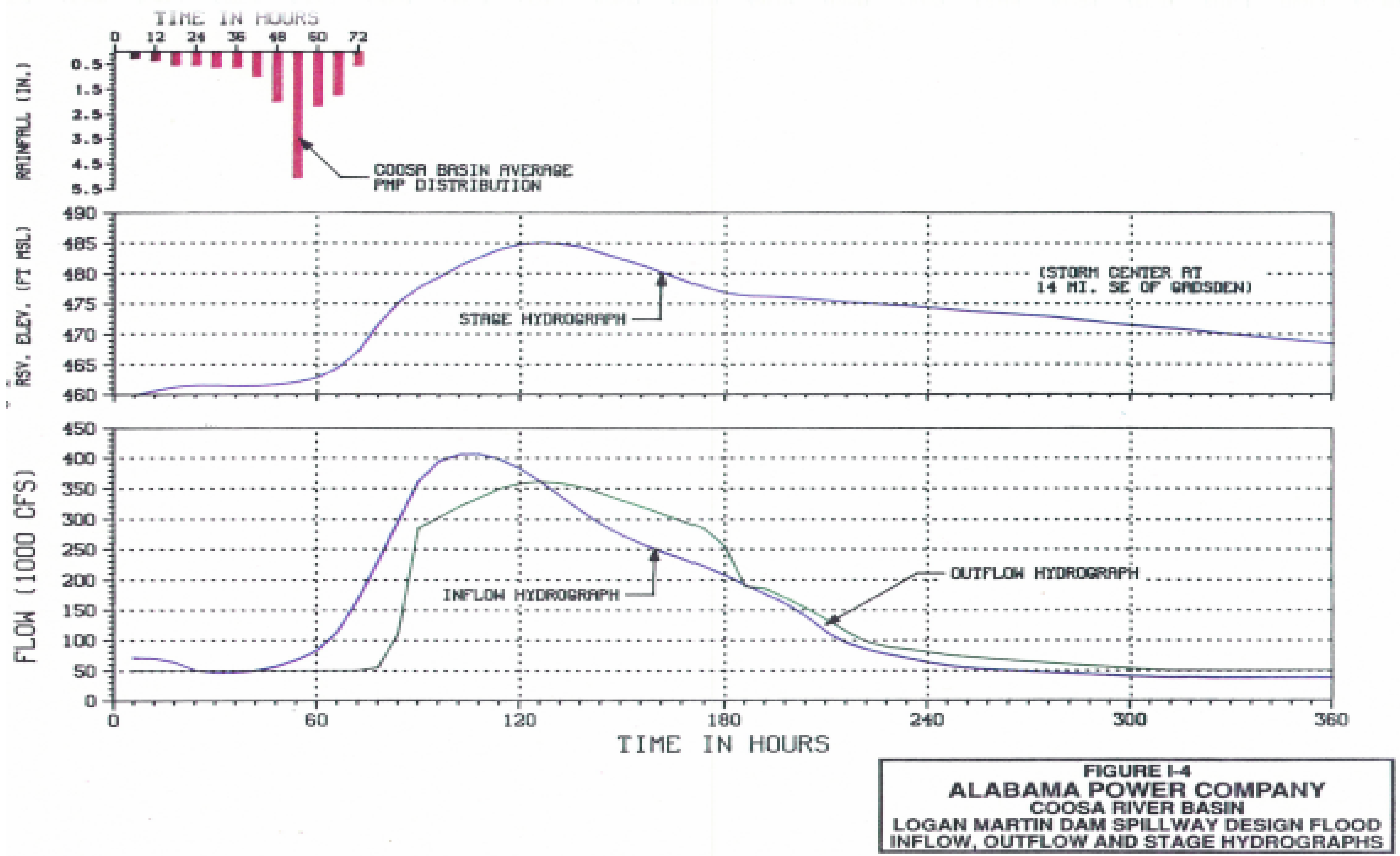
V. This induced surcharge schedule was revised in June 2005

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL LOGAN MARTIN DAM AND LAKE

INDUCED SURCHARGE SCHEDULE

Inflow – Outflow – Pool Stage Hydrographs
Spillway Design Flood



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

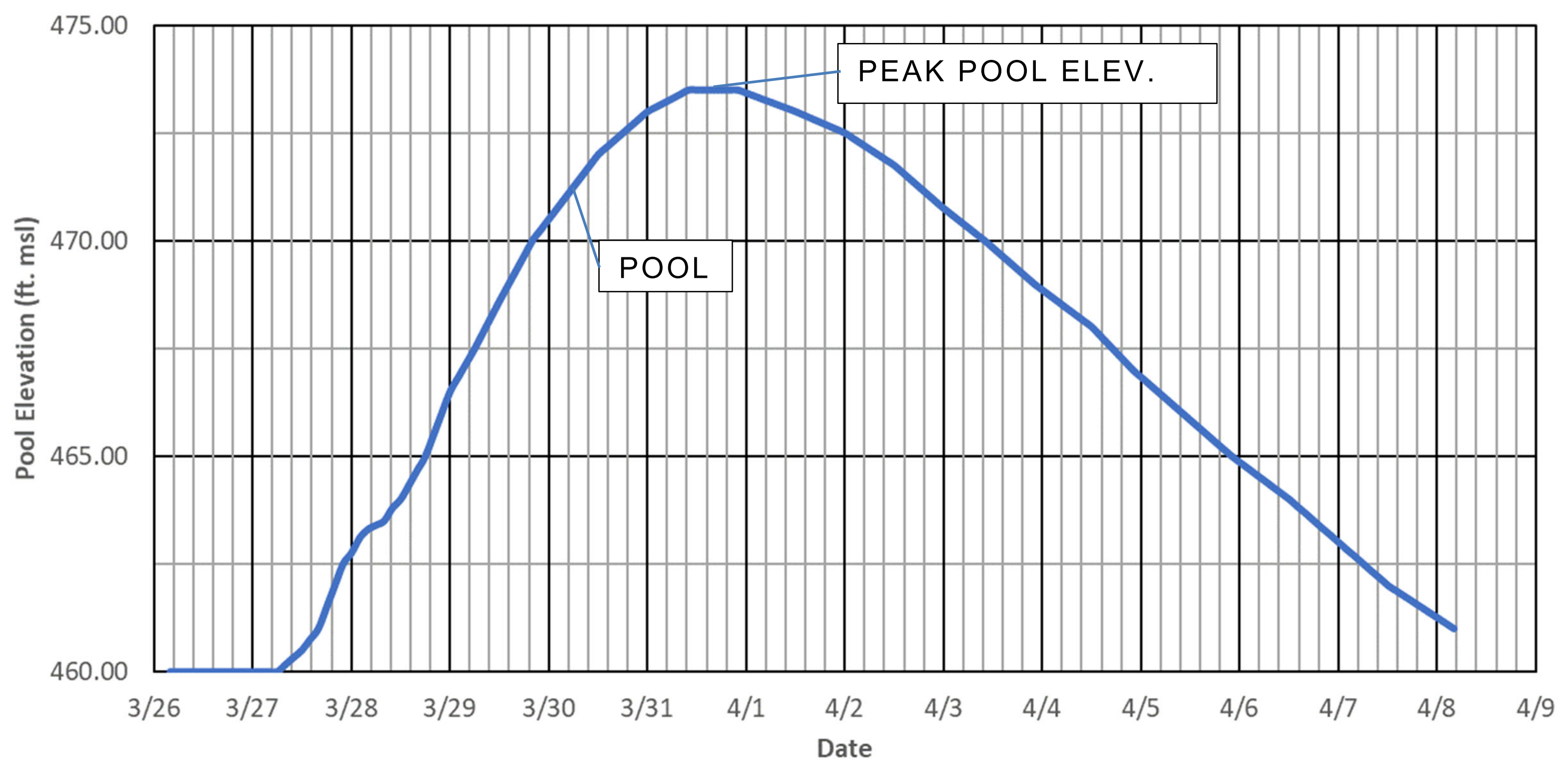
WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

SPILLWAY DESIGN FLOOD

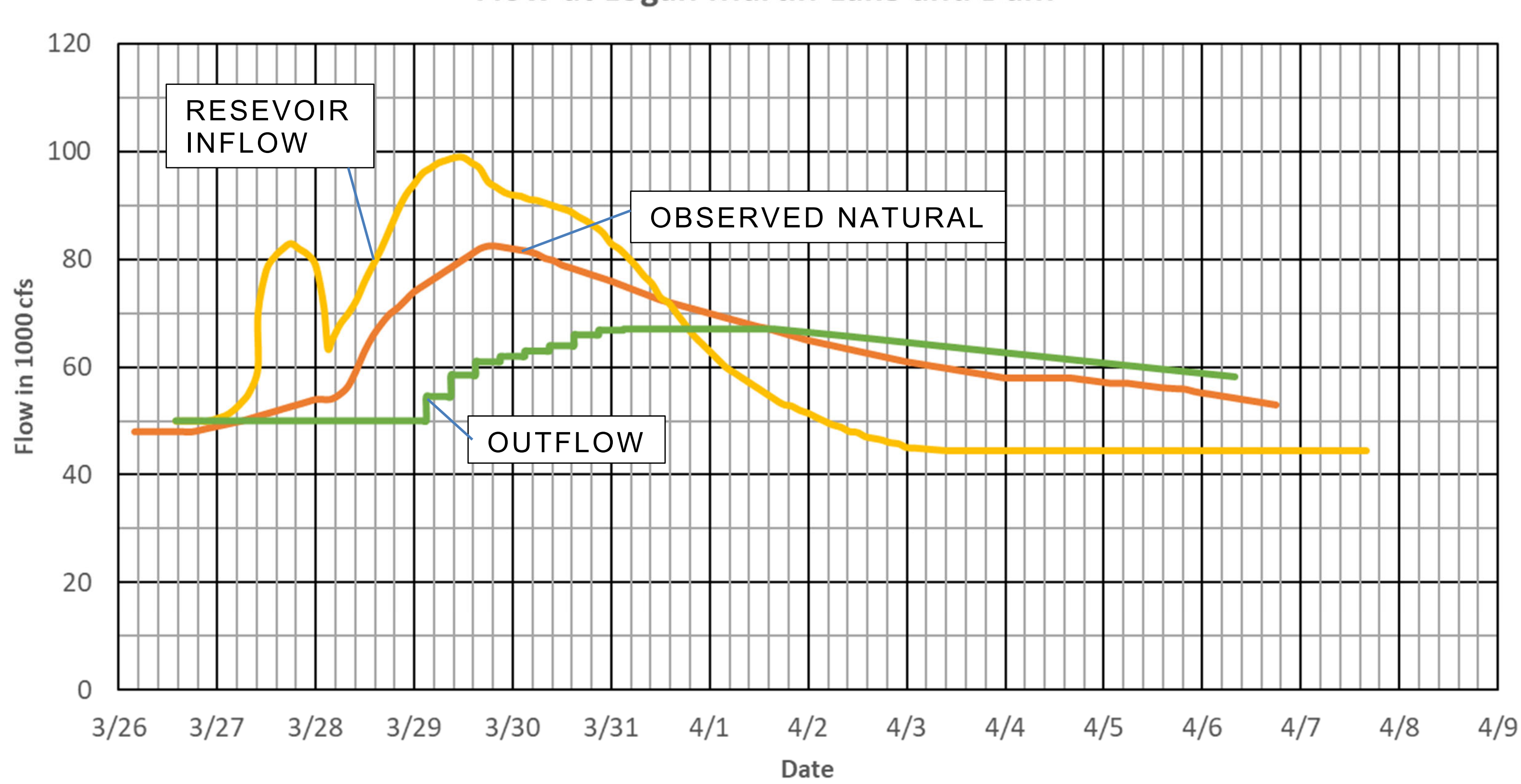
Effect of Reservoir Regulation

Flood of March & April 1944

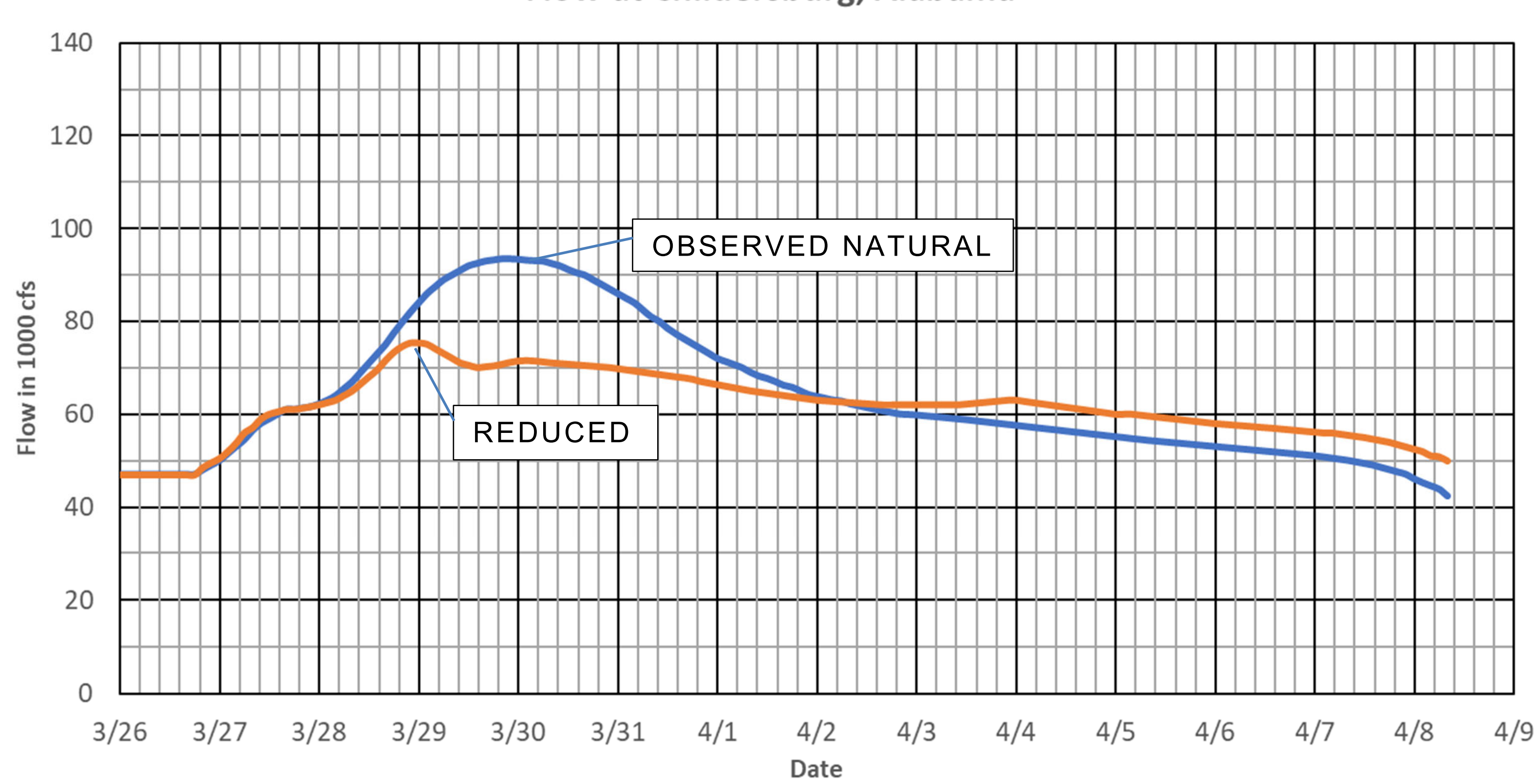
Pool Elevation at Logan Martin Lake and Dam



Flow at Logan Martin Lake and Dam



Flow at Childersburg, Alabama



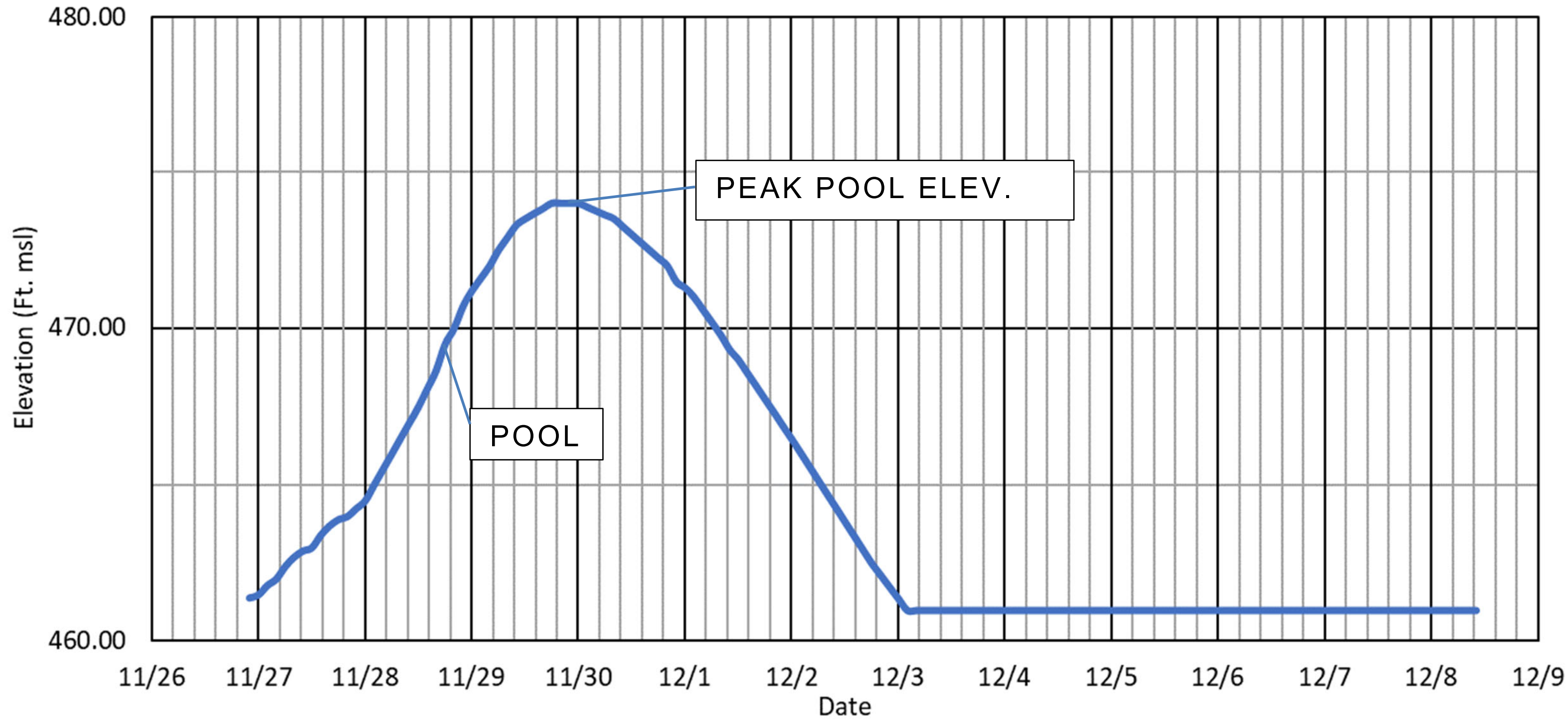
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN
WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

EFFECT OF RESERVOIR REGULATION-FLOOD OF MARCH & APRIL 1944

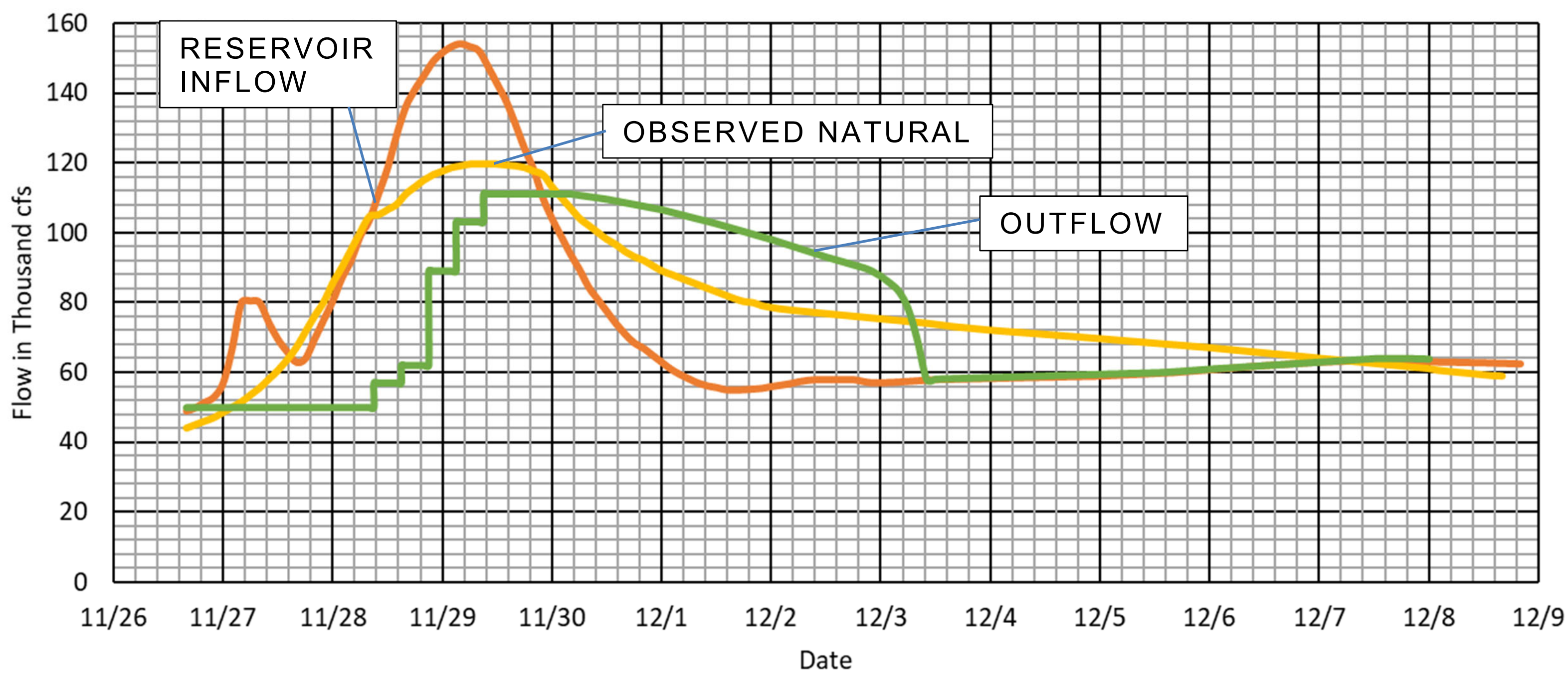
Effect of Reservoir Regulation

Flood of November & December 1948

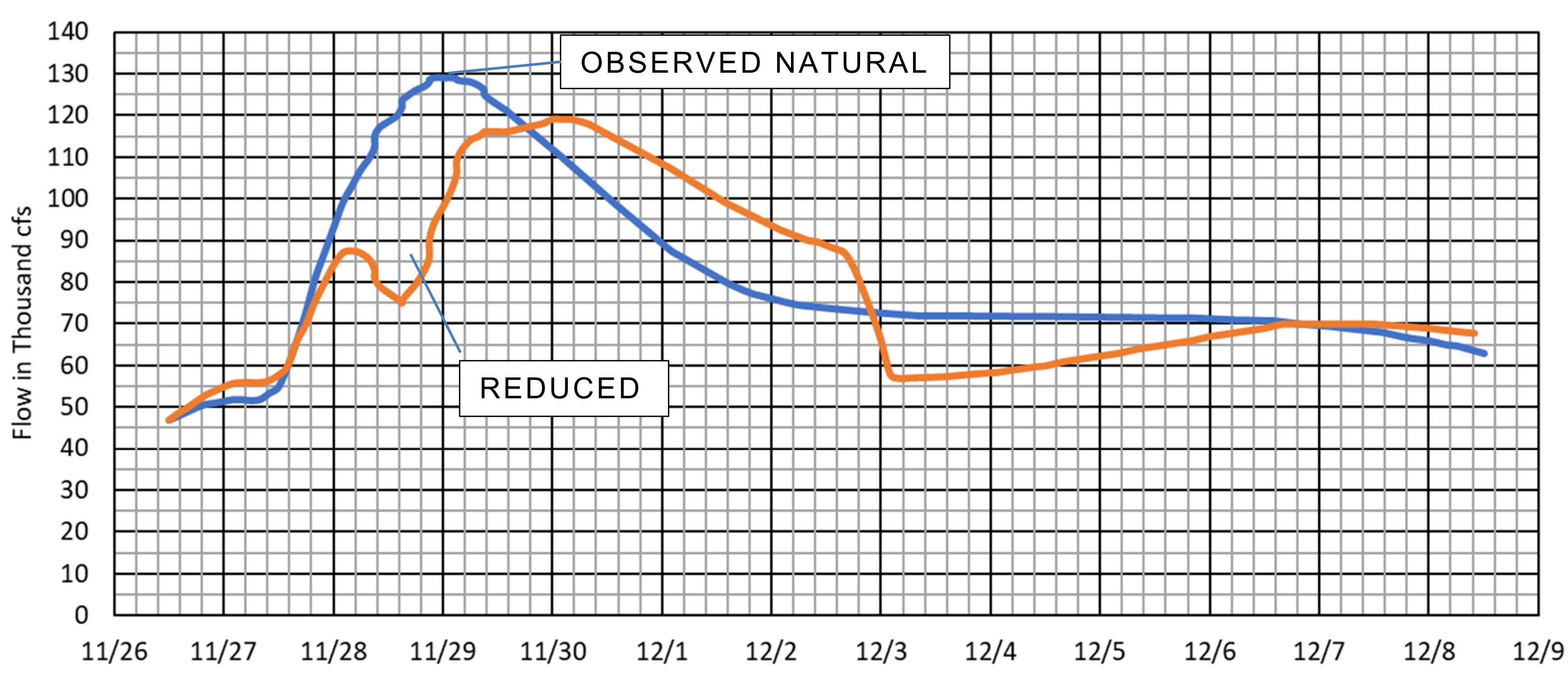
Pool Elevation at Logan Martin Lake and Dam



Flow at Logan Martin Lake and Dam



Flow at Childersburg, Alabama



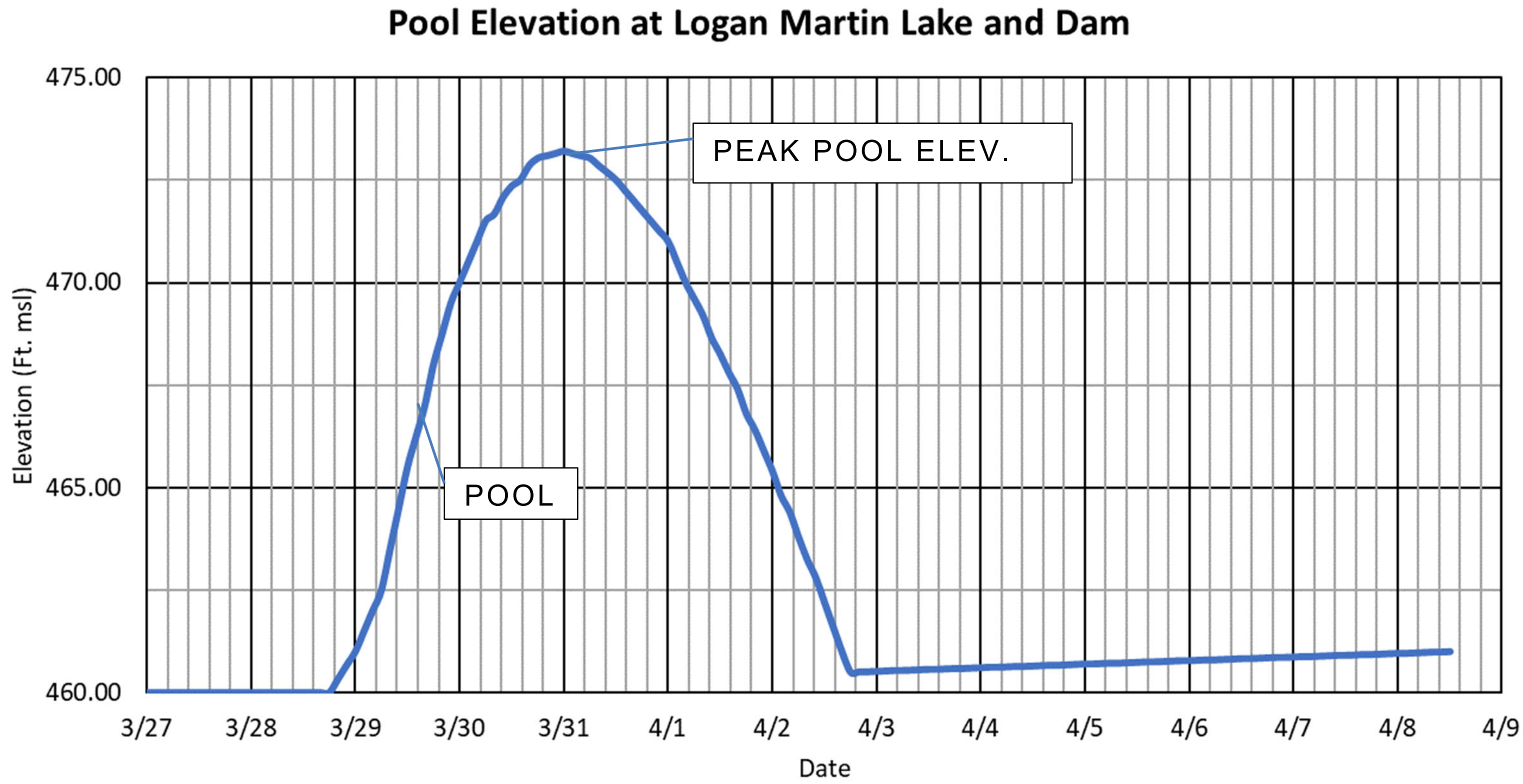
ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

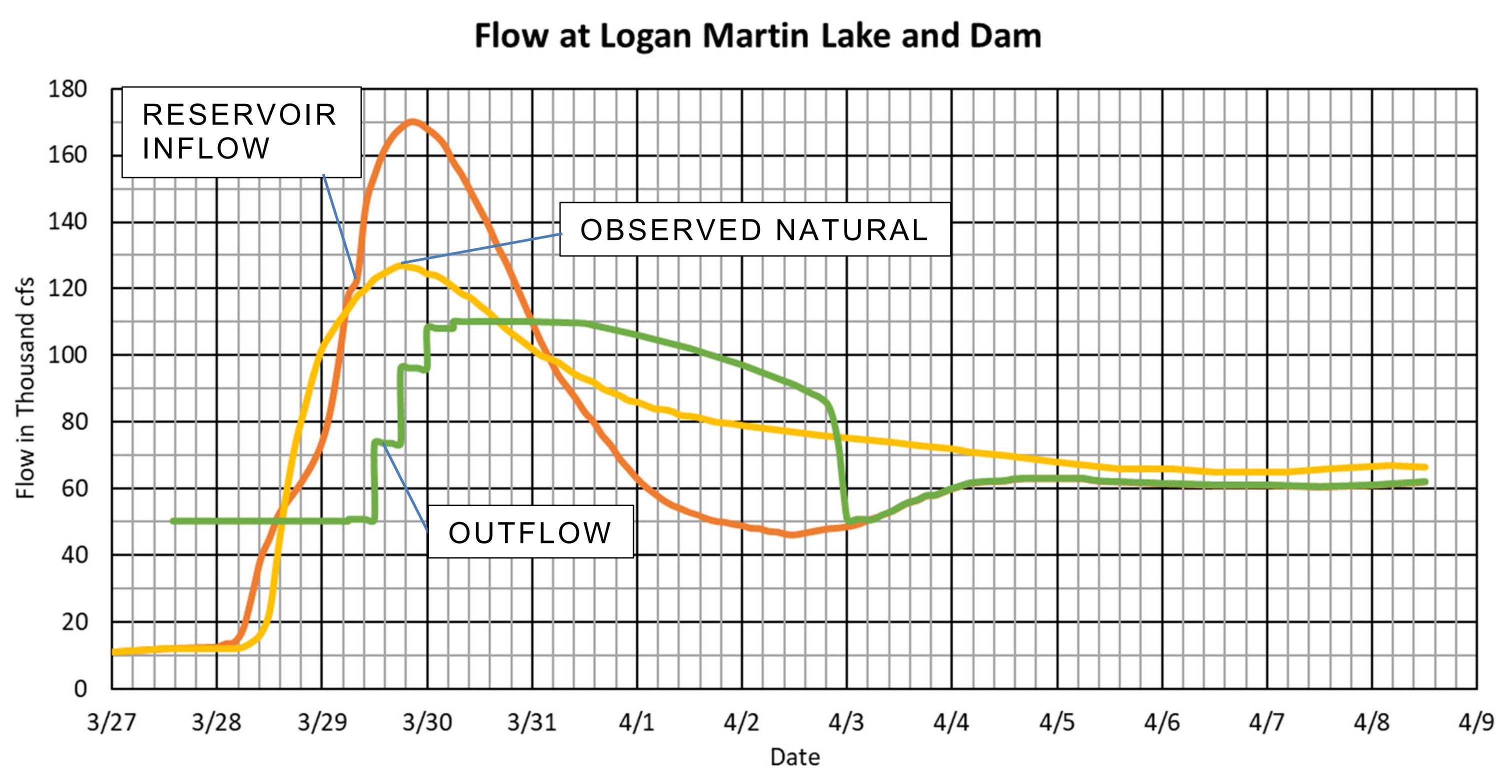
WATER CONTROL MANUAL LOGAN MARTIN DAM AND LAKE

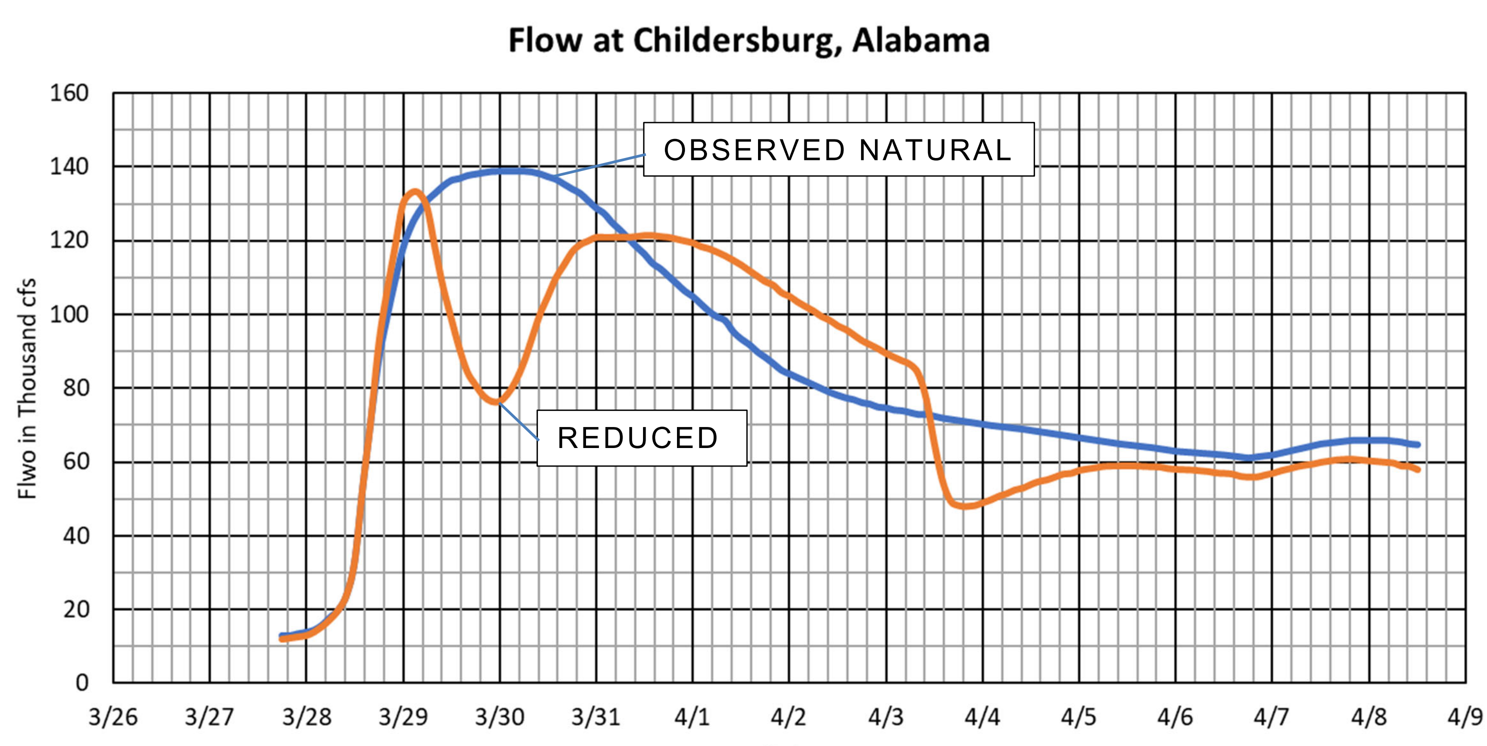
EFFECT OF RESERVOIR REGULATION-FLOOD OF NOVEMBER & DECEMBER 1948

Effect of Reservoir Regulation

Flood of March & April 1951

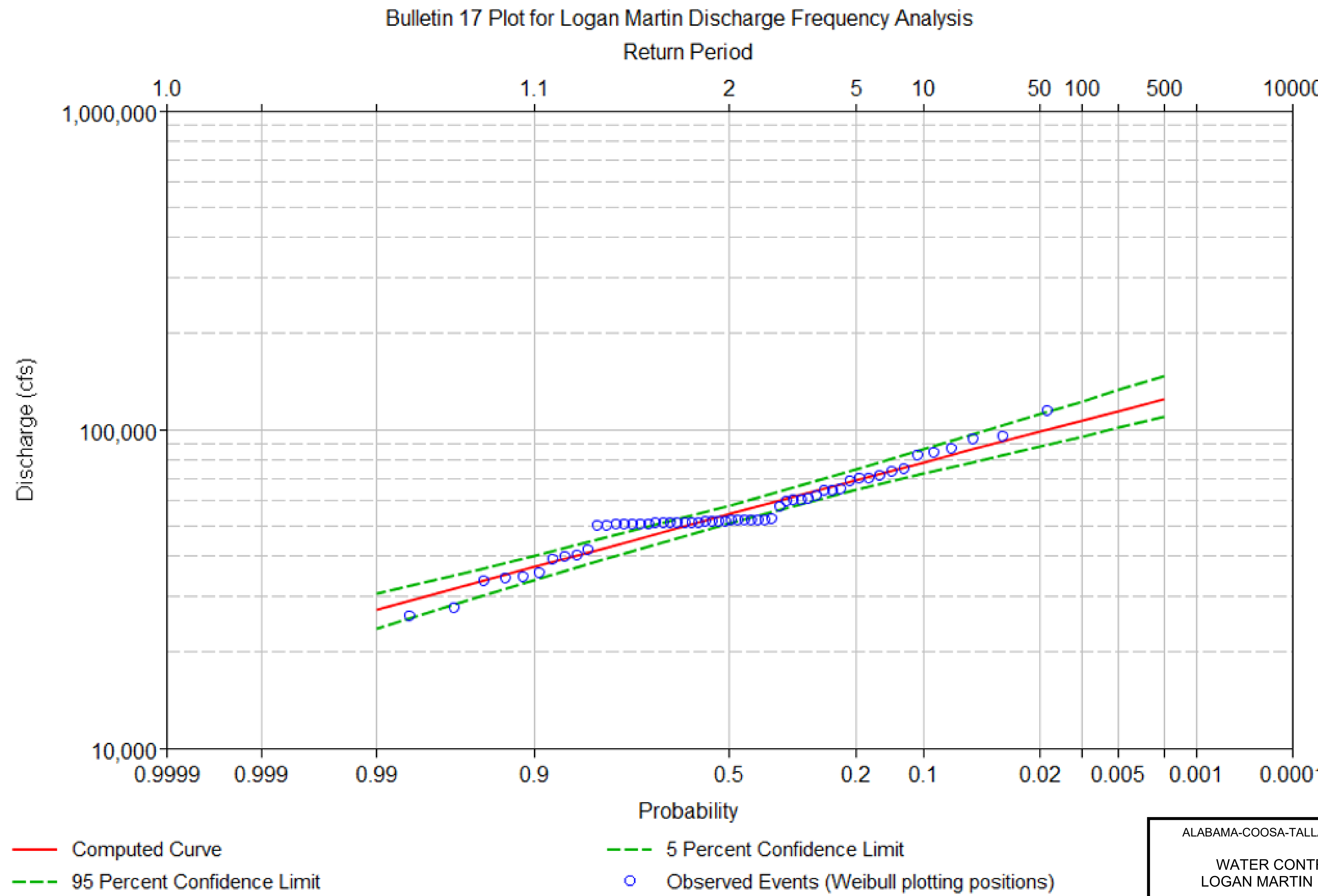






ALABAMA-COOSA-TALLAPOOSA RIVER BASIN
WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

EFFECT OF RESERVOIR REGULATION-FLOOD OF MARCH & APRIL 1951

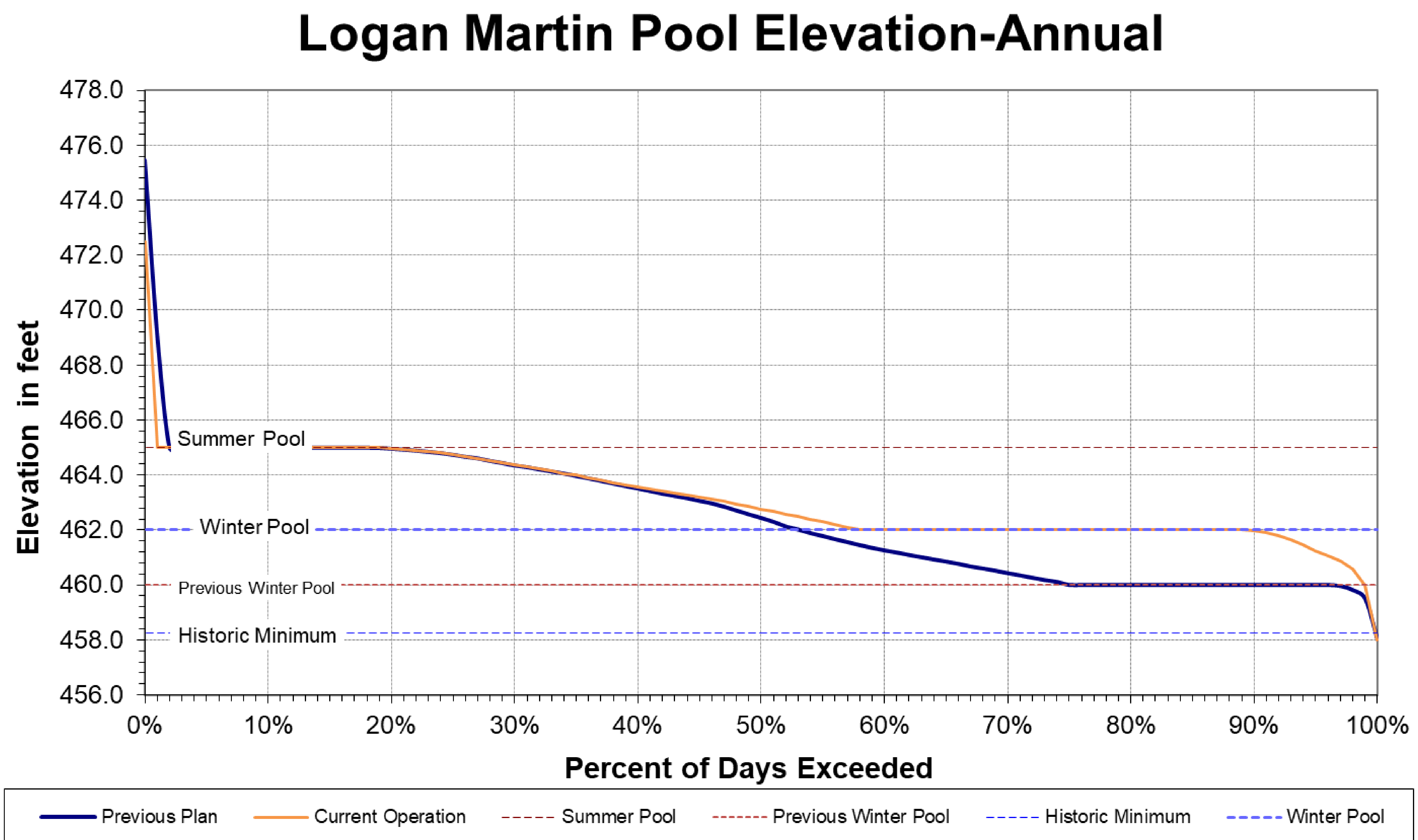


Note : Curve computed using HEC-SSP 2.2 with 1964 to 2019 period.

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

DISCHARGE FREQUENCY CURVE

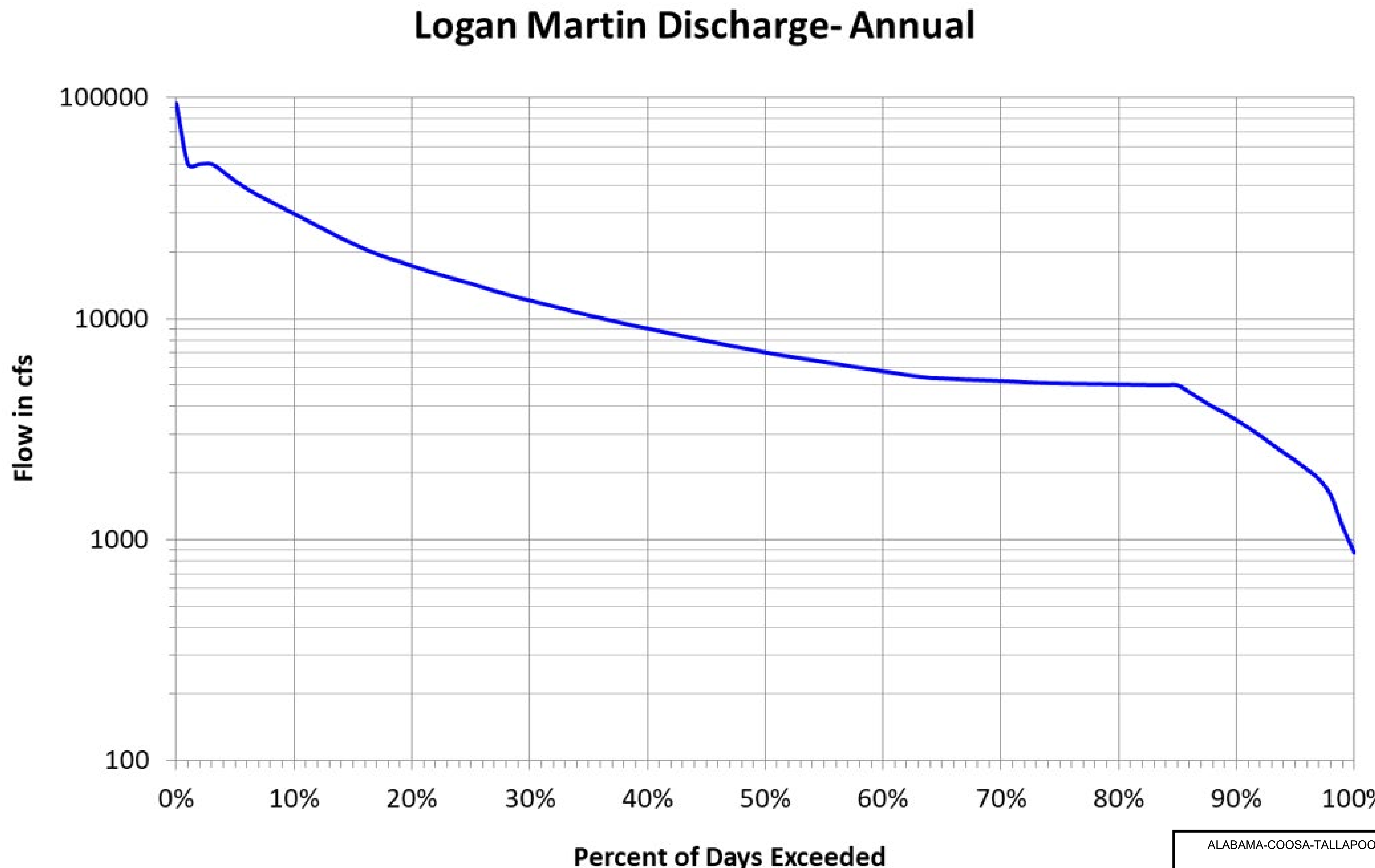


* Modeled Period of Record 1939 - 2011, used for this analysis

ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

ANNUAL POOL DURATION CURVE



ALABAMA-COOSA-TALLAPOOSA RIVER BASIN

WATER CONTROL MANUAL
LOGAN MARTIN DAM AND LAKE

ANNUAL DISCHARGE DURATION CURVE