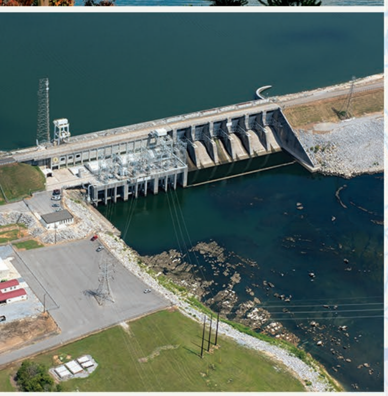
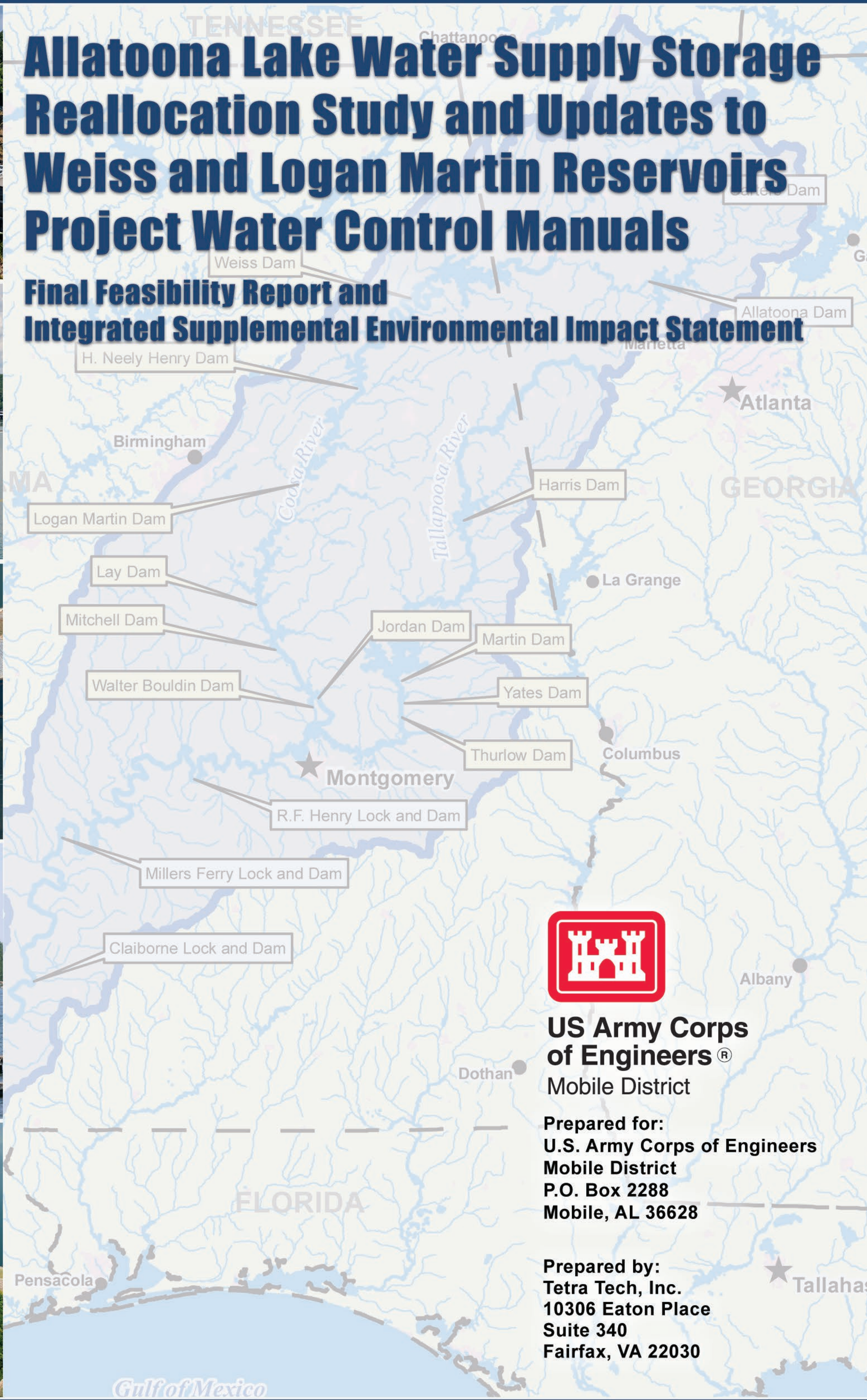
November 2020

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

Final Feasibility Report and Integrated Supplemental Environmental Impact Statement





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COVER SHEET *

FINAL FEASIBILITY REPORT AND INTEGRATED SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Allatoona Lake Water Supply Storage Reallocation Study and Updates to Weiss and Logan Martin Reservoirs Project Water Control Manuals, Alabama and Georgia (or Allatoona-Coosa Reallocation Study)

Lead Agency: Department of the Army, U.S. Army Corps of Engineers (USACE), Mobile District

Abstract:

In October 2014, USACE published the Final Environmental Impact Statement (EIS) addressing updates to the Master Water Control Manual (Master Manual) and individual project Water Control Manuals (WCMs) for USACE reservoir projects in the Alabama-Coosa-Tallapoosa (ACT) River Basin and Alabama Power Company (APC) reservoir projects in the basin with specific federally authorized project purposes for flood risk management and flow augmentation to support navigation in the Alabama River. The WCM updates included a basinwide drought management plan, specific criteria for flow augmentation to support commercial navigation, improved guidelines for minimum flows downstream of the Carters Reregulation Dam, revised guide curve and operational action zones at Allatoona Lake, and establishment of operational action zones at Carters Lake. USACE approved the updated Master Manual and project WCMs and signed a Record of Decision on the Final EIS in May 2015. USACE deferred consideration of two specific actions requiring further detailed study in the ACT River Basin WCM update process: (1) a pending request from the State of Georgia for USACE to reallocate multipurpose reservoir storage in Allatoona Lake to water supply to meet future demands in the region and to modify its reservoir storage accounting procedures; and (2) a request from APC to modify currently approved flood operations at their Weiss and Logan Martin reservoir projects, including a proposed increase in the winter guide curve elevation and a proposed decrease in the top of the flood storage pool elevation at both projects. This Final Feasibility Report and Integrated Supplemental Environmental Impact Statement (FR/SEIS) addresses these two deferred actions.

USACE Mobile District evaluated multiple alternatives in considering Georgia's water supply request and APC's request to modify current flood operations at the Weiss and Logan Martin projects, both individually and in combination. Based upon legal, policy, economic, and environmental considerations, this Final FR/SEIS identifies the plan known as Alternative 11 as the Recommended Plan. That plan would address both Georgia's water supply request at Allatoona Lake and APC's request to modify flood operations at Weiss and Logan Martin lakes with no adverse impacts to federally authorized project purposes and only minor impacts on the natural and human environment, as described in detail in this Final FR/SEIS.

Send your comments by:
(December 21, 2020)

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* Denotes sections required for National Environmental Policy Act compliance (40 CFR 1502.10)

FIGURES

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
aad-mgd	average annual day-million gallons per day
ac	acre(s)
ac-ft	acre-foot, acre-feet
ac-ft/yr	acre-feet per year
ACF	Apalachicola-Chattahoochee-Flint (River Basin)
ACR	Allatoona-Coosa Reallocation Study
ACT	Alabama-Coosa-Tallapoosa (River Basin)
ADAPT	Alabama Drought Assessment and Planning Team
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
AL	Alabama
ALOWR	Alabama Office of Water Resources
APC	Alabama Power Company
AQCR	Air Quality Control Region
AWAWG	Alabama Water Agencies Working Group
AWRC	Alabama Water Resources Commission
BA	biological assessment
BAC	Basin Advisory Council
BOD	biochemical oxygen demand
CAA	Clean Air Act
CCMWA	Cobb County-Marietta Water Authority
CCWS	Cobb County Water System
CDC	Centers for Disease Control and Prevention
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
cm	centimeter(s)

CNG	Coosa-North Georgia
CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
DA	Department of the Army
dB	decibel(s)
dBA	a-weighted decibel(s)
DIL	drought intensity level
DMR	Discharge Monitoring Report
DNL	Day-Night Sound Level
DO	dissolved oxygen
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EOPs	Environmental Operating Principles
ER	Engineer Regulation
ESA	Endangered Species Act
FAV	floating aquatic vegetation
FERC	Federal Energy Regulatory Commission
FPC	Federal Power Commission
FR	Federal Register
FR/SEIS	Feasibility Report and Integrated Supplemental Environmental Impact Statement
ft	feet, foot
ft/mi	foot or feet per mile
FWOP	Future without Project
FY	fiscal year
GA	Georgia
GADNR	Georgia Department of Natural Resources
GAEPD	Georgia Environmental Protection Division
GCM	global climate model
GEFA	Georgia Environmental Finance Authority

GHG	greenhouse gas
gpd	gallons per day
gpm	gallons per minute
HAC	Hydropower Analysis Center
H.D.	House Document
HEC	Hydrologic Engineering Center
HEC-5Q	Hydrologic Engineering Center (Water Quality) model)
HEC-FIA	Hydrologic Engineering Center-Flood Impact Analysis (model)
HEC-RAS	Hydrologic Engineering Center-River Analysis System (model)
HEC-ResSim	Hydrologic Engineering Center-Reservoir System Simulation (model)
HEMP	Hydrologic Engineering Management Plan
HUC	hydrologic unit code
I-	interstate
IIL	Initial Impact Level
in	inch(es)
in/yr	inches per year
IPCC	Intergovernmental Panel on Climate Change
JBT	Jordan-Bouldin-Thurlow (projects)
L&D	lock and dam
L_{eq}	Equivalent Sound Level
µg/L	micrograms per liter
M&I	municipal and industrial
m	meter(s)
Master Manual	Master Water Control Manual
MFO	Modified Flood Operation (alternative)
mg/L	milligrams per liter
mgd	million gallons per day
mi	mile/miles
MIG	Monitoring and Impact Group
MMT	million metric tons
MNGWPD	Metropolitan North Georgia Water Planning District

MOA	Memorandum of Agreement
MS4	municipal separate storm sewer system
MSC	Major Subordinate Command
MW	megawatt
MWh	megawatt-hour
N_2O	nitrous oxide
NAA	No Action Alternative
NAAQS	National Ambient Air Quality Standards
NASS	National Agricultural Statistics Service
NED	National Economic Development
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O&M	operation and maintenance
O_3	ozone
P.L.	Public Law
PA	Programmatic Agreement
PCB	polychlorinated biphenyl
PDT	project delivery team
PFC	perfluorinated compound
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PMO	Project Management Office
RCP	representative concentration pathway

RDC	regional developmental center
RHA	River and Harbor Act
RIL	Recreation Impact Level
RM	river mile
ROD	Record of Decision
ROI	Region of Influence
RONA	Record of Non-Applicability
RP	Recommended Plan
RR&R	repair, rehabilitation, and replacement
RV	recreational vehicle
RWP	Regional Water Plan
SAD	South Atlantic Division
SAV	submerged aquatic vegetation
SEIS	Supplemental Environmental Impact Statement
SEPA	Southeastern Power Administration
SERC	Southeastern Electrical Reliability Corporation
SHPO	State Historic Preservation Office
SMART	Specific, Measurable, Achievable, Risk Informed and Timely
SO_2	sulfur dioxide
sq mi	square miles
SR	state route
STADJ	statistical adjustment (program)
SVI	Social Vulnerability Index
SWP	Statewide Water Plan (Georgia)
T&E	threatened and endangered
TCC	Technical Coordinating Committee
TMDL	Total Maximum Daily Load
TN	total nitrogen
TP	total phosphorus
TSP	Tentatively Selected Plan
U.S. (adjective)	United States

U.S. (with highway #)	U.S. Highway
U.S.C.	United States Code
UEP	Universal Electric Power, Inc.
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VIC	Variable Infiltration Capacity
WAL	Water Access Limited
WCIP	Water Conservation Implementation Plan (Georgia)
WCM	Water Control Manual
WMA	wildlife management area
WRDA	Water Resources Development Act
WRF	water reclamation facility
WRRDA 2014	Water Resources Reform and Development Act of 2014
WS*n*	Water Supply*n* (where *n* = number of alternative)
WSA	Water Supply Act
WSP	water supply providers
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY *

Allatoona Lake Water Supply Storage Reallocation Study and Updates to Weiss and Logan Martin Reservoirs Project Water Control Manuals – Final Feasibility Study and Integrated Supplemental Environmental Impact Statement

(Allatoona-Coosa Reallocation Study)

Study Description. In May 2015, the U.S. Army Corps of Engineers (USACE) completed an update of the Alabama-Coosa-Tallapoosa (ACT) River Basin Master Water Control Manual (Master Manual) and individual project Water Control Manuals (WCMs), supported by an Environmental Impact Statement (EIS). During that WCM update process, USACE deferred consideration of two specific requests pending completion of further detailed studies and analyses: (1) a January 2013 updated request from the State of Georgia to reallocate additional reservoir storage in Allatoona Lake to municipal and industrial (M&I) water supply and (2) an Alabama Power Company (APC) request to modify federally authorized flood operations at the APC Weiss and Logan Martin projects.

The overall study area for this Final Feasibility Report and Integrated Supplemental Environmental Impact Statement (FR/SEIS) is the ACT River Basin. The ACT River Basin comprises the Alabama, Coosa, and Tallapoosa rivers and all areas within the basin boundaries. It stretches from the headwaters of the Coosa and Tallapoosa rivers downstream to the mouth of the Alabama River, where that river joins the Tombigbee River to form the Mobile River. At the ACT River Basin's confluence with the Tombigbee River, it has a drainage area of 22,739 square miles and covers portions of the states of Alabama, Georgia, and Tennessee. Figure ES-1 shows the ACT River Basin.

USACE operates reservoir projects in the ACT River Basin for various federally authorized purposes. Federal legislation authorizing project purposes in the ACT Basin has occurred over time. Section 2 of the River and Harbor Act of 1945 (P.L. 79-14) authorized the plan for flood control (now referred to as flood risk management), hydropower, and navigation. Those purposes are often referred to as expressly authorized project purposes. Other operational objectives derive from authorities that generally apply to all USACE reservoirs, such as fish and wildlife conservation (Fish and Wildlife Coordination Act of 1958 [P.L. 85-624] and Endangered Species Act of 1973 [P.L. 93-205]), recreation (Flood Control Act of 1944 [P.L. 78-534]), water quality (Water Pollution Control Act Amendments of 1972 [P.L. 92-500]), and water supply (Water Supply Act of 1958 [P.L. 85-500]).

Listed from upstream to downstream, the five USACE multipurpose reservoir projects in the ACT River Basin are:

- Carters Dam and Lake and Carters Reregulation Dam, GA (Coosawattee River) (the two dams function as a single project)
- Allatoona Dam and Lake, GA (Etowah River)
- Robert F. Henry Lock and Dam (L&D) and R.E. "Bob" Woodruff Lake, AL (Alabama River)
- Millers Ferry L&D and William "Bill" Dannelly Lake, AL (Alabama River)
- Claiborne L&D and Lake, AL (Alabama River).

In addition, USACE is responsible for navigation channel maintenance for the portion of the Alabama River from river mile (RM) 0 to Claiborne L&D at RM 72 and within the three L&D pools upstream to the head of navigation at Montgomery, AL.

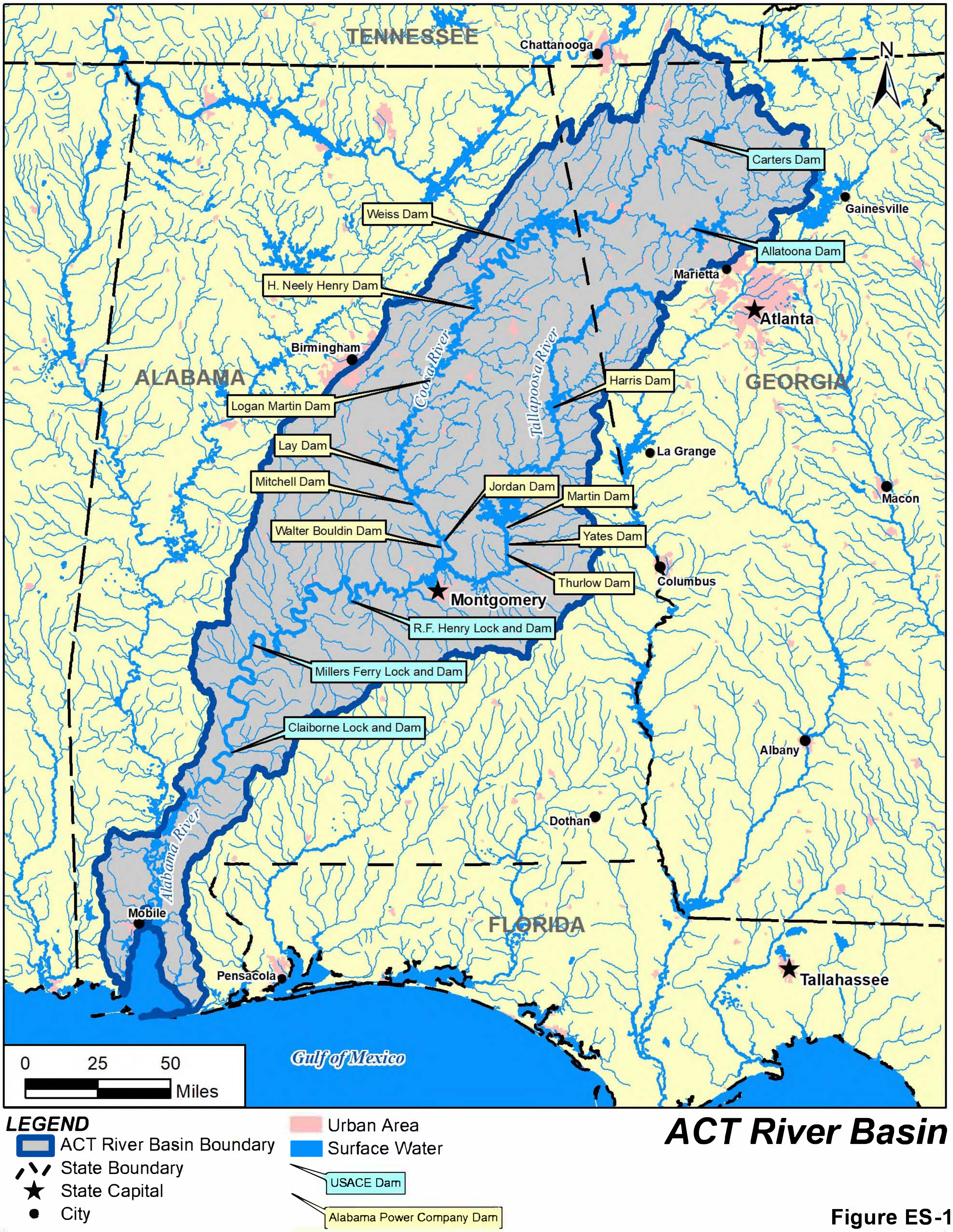

TENNESSEE
Chattanooga
Carters Dam
Gainesville
Weiss Dam
Allatoona Dam
Marietta
H. Neely Henry Dam
Atlanta
Birmingham
Coosa River
Tallapoosa River
ALABAMA
Harris Dam
GEORGIA
Logan Martin Dam
Lay Dam
La Grange
Mitchell Dam
Jordan Dam
Martin Dam
Macon
Walter Bouldin Dam
Yates Dam
Thurlow Dam
Columbus
Montgomery
R.F. Henry Lock and Dam
Millers Ferry Lock and Dam
Claiborne Lock and Dam
Albany
Dothan
Alabama River
Mobile
FLORIDA
Pensacola
Tallahassee
Gulf of Mexico
0 25 50
Miles
N
LEGEND
ACT River Basin Boundary
State Boundary
State Capital
City
Urban Area
Surface Water
USACE Dam
Alabama Power Company Dam
ACT River Basin

Figure ES-1

APC operates 11 reservoir projects in the ACT River Basin for the primary purpose of generating hydroelectric power (hydropower), although those projects provide other public benefits as well. Under Public Law (P.L.) 83-436 (June 28, 1954), USACE is responsible for operational oversight of flood risk management (formerly referred to as "flood control") and commercial navigation support for the following four APC reservoir projects in the ACT River Basin, listed from upstream to downstream in the basin:

- Weiss Dam and Lake, AL (Coosa River)
- H. Neely Henry Dam and Lake, AL (Coosa River)
- Logan Martin Dam and Lake, AL (Coosa River)
- R.L. Harris Dam and Lake, AL (Tallapoosa River).

Study Authority. The Final FR/SEIS addresses a reservoir storage reallocation request at Allatoona Lake from the State of Georgia, APC-proposed revisions to flood operations at Weiss Lake and Logan Martin Lake, and pertinent WCM updates to codify any revisions to reservoir operations that might result from this study process.

Reservoir storage reallocation involves the formal reassignment of existing storage capacity in a reservoir project from its initially authorized purpose to another purpose. Authority for USACE to reallocate existing storage space to M&I water supply is contained in Section 390 of the Water Supply Act of 1958, as amended (Title 43 of the *United States Code* § 390b).

As part of its responsibility for oversight of the operation of four APC reservoir projects in the ACT River Basin under P.L. 83-436, USACE has, in cooperation with APC, developed a WCM for each of those projects to define operations for flood risk management and navigation, complementary to APC hydropower operations and other collateral uses. Flood risk management and navigation operations at the APC projects are incorporated into the ACT River Basin Master Manual as well. The APC-proposed revisions to flood operations at Weiss Dam and Lake and Logan Martin Dam and Lake require USACE review and concurrence under P.L. 83-436. USACE concurrence would trigger pertinent updates to the Master Manual and WCMs for those projects.

The authority for USACE to prepare and update the Master Manual and individual project WCMs for the ACT River Basin projects is principally found in Section 7 of the 1944 Flood Control Act (P.L. 78-534) and Section 9 of Coosa Power Act (P.L. 83-436).

Study Purpose and Scope. The study for this Final FR/SEIS addresses the two actions that USACE deferred from consideration in the May 2015 update of the ACT River Basin Master Manual and individual WCMs for USACE and pertinent APC projects in the basin:

- The State of Georgia's January 24, 2013 request for additional water supply storage in Allatoona Lake occurred well into USACE's ACT River Basin Master Manual update process, which was initiated in 2008, and thus was deferred for separate future consideration.
- The WCM updates for APC's Weiss and Logan Martin projects were deferred from 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.

On January 9, 2018, the U.S. District Court for the Northern District of Georgia issued a judgment in *Georgia et al. v. U.S. Army Corps of Engineers,* Civil Action No. 1:14-cv-03593, holding that USACE had unreasonably delayed acting on Georgia's water supply request and directing USACE to take final action responding to that request by March 2021. The Georgia Environmental Protection Division (GAEPD), representing the State of Georgia, submitted an updated request to USACE on March 30, 2018, on behalf of the Cobb County-Marietta Water Authority (CCMWA) and the City of Cartersville, GA. GAEPD requested that USACE reallocate additional reservoir storage above the current water supply storage agreement at Allatoona Lake to meet a total projected average daily water supply demand of 94 million gallons per day (mgd) through the year 2050. Reallocation of an additional 33,872 acre-feet (ac-ft) of storage would be required to meet the projected demand, bringing the total storage allocation for M&I water supply at Allatoona Lake to 52,411 ac-ft.

The March 2018 water supply request was reduced from the state's 2013 request because of lowered population projections and reduced per capita water use values resulting from implementation of water conservation and efficiency measures within the Metropolitan North Georgia Water Planning District. Additionally, CCMWA's portion of the water supply request was further affected by the impending loss of most of Paulding County to the CCMWA service area upon completion of Paulding County's Richland Creek Reservoir by the end of 2019. In the 2018 updated water supply request, GAEPD also carried forward its January 2013 request that USACE consider revising its storage accounting practices to provide credit for "made inflows"—returns from two water reclamation facilities in Cobb County, GA, and releases by CCMWA from the Hickory Log Creek Reservoir to the Etowah River and, subsequently, into Allatoona Lake specifically for water supply withdrawal.

APC has requested that USACE consider changes to the established maximum surcharge levels and winter drawdown levels at Weiss Lake and Logan Martin Lake. For Weiss Lake, APC has proposed lowering the maximum surcharge elevation from 574 feet (ft) to 572 ft and raising the winter drawdown elevation from 558 ft to 561 ft. For Logan Martin Lake, APC has proposed lowering the maximum surcharge elevation from 477 ft to 473.5 ft and raising the winter drawdown elevation from 460 ft to 462 ft. APC does not currently own flowage easements for either project up to the maximum surcharge elevations established in the current WCMs. APC has proposed to modify flood operations at the Weiss and Logan Martin projects to keep reservoir pool levels at or below the proposed maximum surcharge elevations. Pursuant to the ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient data is available at the current time to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Weiss and Logan Martin dams. USACE received email correspondence from FERC on October 22, 2020. FERC stated that APC has acquired all necessary real estate interests for the proposed operation. FERC did not provide the requested supporting documentation. The proposed raising of the winter drawdown elevation at each project by APC is in response to requests by recreational users to reduce the severe constraints to recreational use that occur at the current winter drawdown level. These requests by recreational users were reaffirmed during the scoping process for this study. The study considered the flood risks and other impacts associated with APC's proposed operational changes at the Weiss and Logan Martin reservoirs.

Problems and Opportunities. The following problems and opportunities were identified by the project team, based upon specific requests from the State of Georgia and APC as well as substantial agency and public input during the National Environmental Policy Act (NEPA) scoping process undertaken at the beginning of the study:

- **M&I water supply needs for CCMWA and the City of Cartersville.** Based on the limits of current water supply storage agreements, there is a shortage of M&I water supply available for withdrawal to Allatoona Lake water users. As northern Georgia has continued to grow so have M&I water supply needs. As the two users of Allatoona Lake with current water supply storage agreements, CCMWA and the City of Cartersville have seen, and are projecting over the next several decades, increased population growth in their service areas. Both water supply users have exceeded existing storage agreements at Allatoona Lake on multiple occasions over the last 15 years. To address this situation, the State of Georgia has requested USACE to evaluate additional use of reservoir storage for M&I water supply that would provide a total equivalent yield of 94 mgd when combined with the equivalent yield available under existing water supply storage agreements with CCMWA and the City of Cartersville.

  The State of Georgia has also requested that USACE consider a revised operation of Hickory Log Creek Reservoir for water supply withdrawal at Allatoona Lake by CCMWA. The revised operation would involve making releases from Hickory Log Creek Reservoir into the Etowah River near Canton, GA, subsequently entering Allatoona Lake, and then withdrawing the water at its existing intake in the lake. Current USACE storage accounting practice does not recognize this operation, commonly known as "pass through conveyance." Additionally, the state requested that USACE provide credit for "made inflows" (e.g., treated wastewater returns). Current USACE storage accounting practice also does not recognize credit for made inflows.

- **Lack of flowage easements to accommodate flood operations at Weiss and Logan Martin dams.** APC does not currently have the level of flowage easements that were described in the original manuals. The maximum surcharge elevation (top of flood pool) at Weiss Lake is elevation 574 ft. Flowage easements are currently purchased to elevation 572 ft. The maximum surcharge elevation at Logan Martin Lake is elevation 477 ft. Flowage easements are currently purchased to elevation 473.5 ft. The absence of the necessary flowage easements at these projects has required APC to request temporary deviations, or variances, from USACE to conduct flood operations differently during flood events than as prescribed in the currently approved WCMs on multiple occasions since the projects were constructed.
- **Water quality at Weiss Dam and Lake.** Water quality at Weiss Dam was identified as a concern during the scoping period because of observed low dissolved oxygen (DO) levels below the dam. APC has invested approximately $50 million in infrastructure to address that issue. The water quality in the reservoir above Weiss Dam was also identified as a concern during the scoping process.
- **USACE/APC Memoranda of Agreement (MOAs) for operation of APC projects for federally authorized purposes.** Upon completion of construction of APC's Weiss, H. Neely Henry, Logan Martin, and R.L. Harris projects in the ACT River Basin in the 1960s, each having federally authorized flood risk management and navigation purposes, USACE and APC signed MOAs to ensure the APC projects would be operated to meet those federally authorized purposes. These federally authorized operations are reflected in USACE WCMs. No action has been taken since completion of the May 2015 ACT River Basin Master Manual update process to complete a new MOA. Completion of a USACE/APC MOA addressing operation of all four APC projects has been deferred until WCM updates have been completed for the Weiss and Logan Martin project WCMs**.**

Planning Objectives. According to the USACE *Planning Guidance Notebook* (Engineer Regulation [ER] 1105-2-100), the federal objective of water and related land resources project planning is to contribute to national economic development consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders (EOs), and other federal planning requirements.

USACE identified the following planning objectives for the study:

- Objective 1: Reduce the risk of not meeting the future water supply demand of 94 MGD of Lake Allatoona users.
- Objective 2: Alternatives will not alter the level of system flood risk within the ACT basin.

Plan Formulation and Evaluation of Alternatives. The planning process was conducted in accordance with applicable USACE planning guidance, consistent with the Specific, Measurable, Achievable, Risk Informed and Timely, or SMART, planning approach, to streamline and expedite civil works project planning. Based upon the identified planning objectives, the project team considered the requests from the State of Georgia and APC, as well as substantial input from the public scoping process, and developed a comprehensive list of management measures to address the identified problems and opportunities related to water supply at Allatoona Lake and flood operations at Weiss and Logan Martin lakes. Following a screening process for those management measures, the project team combined measures to formulate an array of alternatives for evaluation. Some alternatives were formulated to specifically address only the Allatoona Lake water supply request, including different proposed storage accounting methodologies. Other alternatives were formulated to specifically address only the proposed modified flood operations at the APC Weiss and Logan Martin lakes. The array also included several alternatives that combined measures to address both planning objectives.

Eleven alternatives were subjected to rigorous modeling and technical analysis with Hydrologic Engineering Center-Reservoir System Simulation (HEC-ResSim) model, Hydrologic Engineering Center (Water Quality) (HEC-5Q) model, Hydrologic Engineering Center-River Analysis (HEC-RAS) model, Hydrologic Engineering Center-Flood Impacts Analysis (HEC-FIA) model, and other tools. The evaluation process, described in detail in the Final FR/SEIS, fully considered the benefits and costs of the alternatives as well as the expected environmental effects. As a result of the plan formulation and evaluation process, the project team has identified Alternative 11 as the Recommended Plan (RP) in the Final FR/SEIS. At the Draft FR/SEIS stage in November 2019, Alternative 11 was identified as the Tentatively Selected Plan (TSP).

Recommended Plan. The components of the RP are as follows:

- **Allatoona Lake**. The RP would reallocate 33,872 ac-ft of storage in Allatoona Lake, 11,670 ac-ft from flood storage, and 22,202 ac-ft from conservation storage. The proposed reallocation for water supply storage would meet the full 2050 need requested by the State of Georgia, on behalf of the CCMWA and City of Cartersville, GA (94 mgd). Combined with existing storage in Allatoona Lake already allocated to water supply, the total storage allocated to water supply would be 52,411 ac-ft, or approximately 18.6 percent of the conservation storage. The remaining 81.4 percent of conservation storage, 281,917 ac-ft, would be available for all other authorized project purposes. The flood pool reallocation of storage would require a 1-ft increase in Allatoona Lake's summer guide curve elevation (from 840 ft to 841 ft) and a 1.5-ft increase in the winter guide curve elevation (from 823 ft to 824.5 ft). The RP would also continue to use the current USACE South Atlantic Division (SAD) storage accounting methodology.
- **Weiss Lake**. The RP would adopt APC-requested modifications to flood operations at Weiss Dam. The maximum surcharge elevation in the reservoir would be reduced from 574 ft to 572 ft. The winter drawdown level in the lake would be increased by 3 ft from elevation 558 ft to 561 ft. The summer pool level of elevation 564 ft would be extended from the current date of August 31 until September 30 to begin the winter drawdown period. With those modifications, the dedicated flood storage (surcharge storage) would be revised to 301,300 ac-ft and seasonal flood storage (below elevation 564 ft) would be revised to 82,013 ac-ft. To be able to conduct flood operations at Weiss Dam in a manner that would not exceed the revised maximum surcharge elevation of 572 ft, APC would make releases in accordance with a revised flood regulation schedule.
- **Logan Martin Lake**. The RP would adopt APC-requested modifications to flood operations at Logan Martin Dam. The maximum surcharge elevation in the reservoir would be reduced by 3.5 ft from elevation 477 ft to 473.5 ft. The winter drawdown level in the lake would be increased by 2 ft from elevation 460 ft to 462 ft. With those modifications, the dedicated flood storage would be revised to 160,000 ac-ft and seasonal flood storage would be revised to 41,610 ac-ft. To be able to conduct flood operations at Logan Martin Dam in a manner that would not exceed the revised maximum surcharge elevation of 473.5 ft, APC would make releases in accordance with a revised flood regulation schedule.

The RP addresses the stated problems and opportunities identified for the ACR Study as described below:

- The RP would meet the updated 2018 water supply request from the State of Georgia, submitted on behalf of the CCMWA and the City of Cartersville. The request would meet the stated needs for M&I water supply through year 2050.
- The RP incorporates an APC plan to modify flood operations at Weiss and Logan Martin dams on the Coosa River, such that (1) the maximum surcharge elevations at those projects would not exceed existing APC flowage easement elevations on the lakes and (2) adequate APC flowage easements to accommodate the modified flood releases downstream of these dams have been acquired.
- Water quality modeling documented that the proposed actions addressed in the ACR study would result in negligible changes to water quality conditions in Weiss Lake. APC has already addressed concerns

identified during the ACR study scoping process about low DO concentrations downstream of Weiss Dam as a result of its major investment in air injection features at the project.

- Upon approval of the RP, all necessary conditions will be met to update the USACE/APC MOA guiding operation of four APC projects in the ACT River Basin (Weiss, H. Neely Henry, Logan Martin, and R.L. Harris) for federally authorized purposes.

Environmental Consequences. The Final FR/SEIS considered the environmental consequences associated with the eleven alternatives that were subjected to rigorous hydrologic and water quality modeling. The No Action Alternative (NAA), the RP (Alternative 11), Alternative 10 and Alternative 3 were selected for a more in-depth analysis and comparison of environmental consequences. Alternative 10 features include: Allatoona Lake storage reallocation to enable withdrawals up to 94 mgd from conservation storage only, using USACE current storage accounting methodology, and modified flood operations at APC Weiss and Logan Martin projects. Alternative 3 features include: Allatoona storage reallocation to enable withdrawals up to 94 mgd from conservation storage only, using Georgia's proposed storage accounting methodology, and no modified flood operations at APC projects. The effects of the RP on the natural and human environment compared to the NAA are generally negligible to minor. This section summarizes those effects. Of the action alternatives that would address both planning objectives, the RP would be the environmentally preferred alternative.

- **Water quantity**. Using the HEC-ResSim model, USACE conducted simulations of ACT River Basin reservoir operations over a 73-year hydrologic period of record (1939–2011) for the NAA and multiple alternatives, including the RP. The analysis of model outputs focused on the extent of physical change in water resource parameters in the ACT River Basin that would likely result from implementing the alternatives. The changes in hydrologic parameters provide a principal basis for assessment of other natural and socioeconomic resource impacts:
    - *Lake levels and reservoir storage conditions*–Under the RP, median pool levels in Allatoona Lake would be between about 1–1.5 ft higher than the NAA from January through July and from 0–1 ft higher from August through December. Over the modeled period of record, the lowest water surface elevation the lake would be expected to reach would be elevation 817.3 ft, about 1.1 ft lower than the NAA and about 5.7 ft below the current winter guide curve level of 823 ft. The RP would result in substantial improvement in conservation storage conditions compared to the NAA, increasing the operational flexibility of the project to address authorized project purposes. Under the RP, the pool level in Allatoona Lake would reside in Action Zone 1 about 73 percent of the time, compared to 41 percent of the time for the NAA. A higher percentage of time in Action Zone 1 (compared to Zones 2, 3, or 4) generally indicates higher pool levels, more effective conservation of storage in the lake, and greater operational flexibility in meeting project purposes.

      Under the RP, median pool levels in Weiss Lake would range from a few inches to approximately 3 ft higher than the NAA from September through February and would be the same level as the NAA from March through August. Over the modeled period of record, the lowest water surface elevation the lake would be expected to reach would be 556 ft, about the same minimum level as the NAA and 2 ft below the current winter guide curve level. The Weiss Lake surface area at the proposed winter guide curve level (561 ft) under the RP would be 24,693 acres (ac) compared to 19,603 ac at the current winter guide curve level under the NAA (558 ft).

      Compared to the NAA, the RP would have a negligible effect on lake level conditions at H. Neely Henry Lake.

      Under the RP, median pool levels in Logan Martin Lake would range from a few inches up to about 2 ft higher than the NAA from mid-October through the first week of May, the same level as the NAA from the second week of May through August, and up to 0.5 ft lower than the NAA in September through mid-October. Over the modeled period of record, the lowest water surface elevation the lake would be expected to reach would be 458 ft, which would be the same minimum level as the NAA and 2 ft below the current winter guide curve level. Under the RP, the Logan Martin Lake surface area at the proposed winter guide curve level (462 ft) would be 13,157 ac compared to 11,894 ac at the current winter guide curve level under the NAA (460 ft).

The RP would have a negligible incremental effect on lake levels of run-of-river projects Lay, Mitchell, and Jordan lakes compared to current operations under the NAA, even with the inclusion of modified flood operations at Weiss and Logan Martin dams. Compared to the NAA, the upstream end of Lay Lake may experience slight and short-term increases in pool levels during flood events when modified flood operations at Logan Martin Dam would be activated.

The RP would have no discernable effects on pool levels at R.E. “Bob” Woodruff Lake. The physical effects of the proposed actions at Allatoona, Weiss, and Logan Martin lakes included in the RP would not extend downstream of the mouth of the Coosa River.

- *Streamflow conditions*–Based upon HEC-ResSim modeling, the effects of the RP on stream flow conditions compared to the NAA was examined at four locations in the Coosa River basin: (1) Etowah River downstream of Allatoona Dam; (2) Coosa River near Rome, GA; (3) Coosa River downstream of Logan Martin Dam; and (4) Alabama River near Montgomery, AL. The RP would likely result in minor changes to flow conditions in the Etowah River below Allatoona Dam compared to the NAA. Releases from Allatoona Dam would closely align with those under the NAA at the median, and 90 percent exceedance levels, but would be marginally lower, mostly in the November through March period. Little change in releases from Allatoona Dam between the NAA and RP would be expected in the late spring and summer months.

  In the Coosa River near Rome, the RP would be expected to result in negligible changes to flow conditions compared to the NAA. The changes at that location resulting from the proposed storage reallocation at Allatoona Lake are effectively nondiscernable in the model results.

  The RP would likely result in minor changes to flow conditions in the Coosa River downstream of Logan Martin Dam compared to the NAA. Median flows in the Coosa River throughout the year would closely align with those for the NAA but would be slightly lower in November and December as releases from Logan Martin Dam would decrease to maintain a higher winter pool level in the lake. Releases from the dam would be slightly higher than the NAA during January through April in response to modified flood operations that would increase releases during flood events.

  In the Alabama River at the confluence of the Coosa and Tallapoosa rivers, median flows throughout the year for the RP over the modeled period of record would closely align with those for the NAA. However, because of the residual downstream effects of proposed modifications to flood operations at the APC Weiss and Logan Martin projects, flows at that location would be marginally lower than for the NAA in October through December, resulting from water management actions to maintain higher winter pool levels in Weiss and Logan Martin lakes. Median flows under the RP would be marginally higher from January through March associated with modified flood operations at the Logan Martin and Weiss projects. The differences between the NAA and RP in the Alabama River near Montgomery would be measurable but, overall, the differences would be negligible.

- *Drought operations*–The ACT River Basin Master Manual update completed in May 2015 included a drought operation plan for the basin, prepared in collaboration with APC, that was incorporated into the Master Manual and individual project manuals. The plan basically specifies more conservative reservoir operations in the system with the onset and persistence of drought conditions in the basin based on three established triggers, or thresholds, for critical indicators of drought conditions (GA/AL state line flow, basin inflow, and composite conservation storage in APC reservoirs). The severity of drought conditions (Level 1, 2, or 3) is determined by the number of drought triggers that are activated simultaneously under the drought operation plan. Based on the HEC-ResSim model simulations, the

RP would be expected to trigger drought operations slightly more often than the NAA (140 occurrences versus 127 occurrences, respectively, over the period of record). The RP would likely result in slightly higher percentage time in drought operations than the NAA (19.9 percent versus 18.0 percent, respectively). Most of the increased time in drought operations under the RP would be at Level 1, the least constrained drought operation level. The RP would activate the state line flow drought trigger slightly more often than would the NAA (13.1 percent of the time versus 12.7 percent, respectively). These differences are primarily attributable to the APC-proposed modified flood operations component of the RP. Overall, the RP would be expected to have a minor effect on implementing the approved drought operations plan for the ACT River Basin compared to the NAA.

- *Releases to support commercial navigation*–The May 2015 ACT River Basin Master Manual update included a navigation plan with specific protocols for upstream reservoir releases to support commercial navigation in the Alabama River when sufficient basin inflow is available and for specific reductions in upstream reservoir releases when basin inflows are insufficient to support navigation. That navigation plan was incorporated into the ACT River Basin Master Manual and individual project manuals and provides for greater reliability and predictability in meeting the needs of commercial navigation on the Alabama River. Under the RP, the percent of time adequate flows would be available in the Alabama River to sustain 7.5-ft and 9-ft channel depths would be nearly the same as under the NAA. During the months of September through December, the percent of time adequate flows would be available (for both channel depths) would be 1–3 percent lower than those for the NAA. Those slight decreases during those months would have a negligible effect on navigation.

- **Water quality**. Potential changes in water quality conditions between the NAA and the RP were evaluated using the HEC-5Q model. The model simulations revealed that the RP would generally have negligible effects on concentrations of modeled water quality parameters compared to the NAA. Further, based on the model results, instances in which reservoirs would not be expected to meet state standards or U.S. Environmental Protection Agency (USEPA) acceptable ranges would be limited and would occur under both the NAA and the RP with negligible differences in the values. Median values modeled in HEC-5Q meet all state water quality standards along the Etowah and Coosa rivers and their reservoirs except for the total phosphorous (TP) concentration in Weiss Lake. Modeled values at the 95 percent occurrence level would not meet state standards in all lakes for chlorophyll *a* or in Weiss Lake for TP. DO standards are met in every reservoir for every occurrence level except in Allatoona Lake and Logan Martin Lake at the 5 percent occurrence level. Model results at the 50 percent and 95 percent occurrence levels would not meet the USEPA acceptable ranges for TP in all reservoirs or at the 5 percent occurrence level in Weiss Lake and H. Neely Henry Lake. USEPA acceptable ranges for total nitrogen (TN) would be met in all reservoirs for all occurrence levels. A summary of model results for each modeled water quality parameter follows:

  - *Temperature*–Along the Etowah River, there is no discernible difference between the RP and NAA water temperatures. In the Coosa River, the simulated temperatures for the RP deviate only slightly from the NAA between H. Neely Henry and Weiss lakes and downstream of Weiss Lake, none of which are above 1.5 °F

  - *DO*–The RP would not be expected to have a detectable effect on DO concentrations upstream of Allatoona Lake or on the Etowah River between Allatoona Dam and Rome, GA, compared to the NAA. For the Coosa River, the RP would have a minimal effect on DO concentrations. The RP model results show a minor decrease in DO from the NAA of 0.16 milligrams per liter (mg/L) downstream of Weiss Lake at the 95 percent occurrence; however, that change is not expected to have a significant impact on water quality.

  - *TP*–Downstream of Canton, GA, the model predicts a peak difference in TP at the 95 percent occurrence between the RP and the NAA of approximately 0.01 mg/L (10 micrograms per liter [μg/L]). There are no other discernible changes in TP concentrations on the Etowah River. The difference in TP near Canton is expected to amplify during a dry year to approximately 0.02 mg/L (20 μg/L). The

Coosa River responds to the RP with a negligible change in TP from the NAA. A peak increase of less than 0.01 mg/L (10 µg/L) was modeled at the 95 percent occurrence level near Weiss Lake, but no other significant changes were discerned.

- *TN*–For the Etowah River, modeled results show no discernible change in TN between the RP and the NAA. HEC-5Q model simulations show a potential increase in TN concentrations of 0.03 mg/L immediately downstream of Weiss Lake at the 50 percent occurrence level for the RP but a decrease in TN concentrations of approximately 0.14 mg/L at the 95 percent occurrence level upstream of Weiss Lake. Other less significant decreases in TN concentration can be noted farther downstream where concentrations are modeled about 0.04 mg/L lower at the 95 percent occurrence level between Weiss Lake and H. Neely Henry Lake and by about 0.03 mg/L at the 95 percent occurrence level upstream of Mitchell Lake.
- *Chlorophyll a*–Model results demonstrate that the RP would not be expected to have an incremental effect on chlorophyll *a* concentration in Allatoona Lake compared to the NAA. Some temporary exceedances of standards at equivalent concentrations for both the NAA and the RP would likely occur. For the Coosa River, the RP would have no discernible incremental effect on chlorophyll *a* concentration compared to the NAA.

- **Geology and soils**. Compared to the NAA, the RP would have negligible effects on prime farmlands. The RP would be expected to result in a negligible increase in shoreline erosion and sedimentation conditions in Allatoona Lake and no change in shoreline erosion and sedimentation conditions in Weiss Lake, Logan Martin Lake, and other ACT River Basin lakes. It would not be expected to appreciably affect tailwater degradation downstream of any ACT River Basin dams.
- **Climate conditions**. Compared to the NAA, the RP would have no direct effects and only minor indirect effects on greenhouse gas emissions and climate conditions. Overall, those indirect effects would be negligible.

Land use. The RP would be expected to have long-term minor beneficial effects on Allatoona, Weiss, and Logan Martin lakes and no effects on the other ACT River Basin lakes. Those minor benefits are primarily related to the increased utility of lands adjacent to Allatoona Lake as a result of the slightly higher pool elevation year-round compared to current operations and the increased utility of lands adjacent to Weiss and Logan Martin lakes as a result of higher winter pool levels and lower induced surcharge elevations compared to current project operations. Purchase of flowage easements downstream of Weiss and Logan Martin dams would not be expected to appreciably affect the current land use in the affected areas but may include some specific restrictions on future land use options for those lands. USACE has conducted additional analysis of impacts to private property both upstream and downstream of Weiss and Logan Martin dams. Pursuant to the ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient data is available at the current time to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Weiss and Logan Martin dams. USACE received email correspondence from FERC on October 22, 2020. FERC stated that APC has acquired all necessary real estate interests for the proposed operation. FERC did not provide the requested supporting documentation.

- **Biological resources**. Overall, the effects of the RP on vegetation resources, wildlife resources, fish and aquatic resources, protected species, and fish and wildlife management facilities would be expected to be negligible to minor compared to the NAA. The effects of changes to project operations under the RP would be limited to the Etowah River, Coosa River, and the USACE and APC dams and lakes along those rivers. Effects include changes to pool elevations and stream flow and slight-to-negligible changes in nutrients, water temperature, and DO.
  - *Vegetation resources*–Minor changes in flow are expected to have a negligible effect on vegetation resources in the Etowah River below Allatoona Lake because the vegetation community currently withstands an altered hydrology based on water control operations at Allatoona Dam and does not depend

on natural stream hydrology. Slight seasonal changes in flow should continue to support the current vegetation community. Likewise, minor changes in pool elevations and flow in the Coosa River are not expected to have a notable influence on vegetation communities, including wetlands. Slightly increased pool levels in Allatoona Lake year-round and increased winter pool levels in Weiss and Logan Martin lakes under the RP would be slightly beneficial to wetlands around the reservoirs.

  - *Wildlife resources*–The effects of the RP on terrestrial and avian wildlife resources would be negligible.
  - *Fish and aquatic resources*–The slight alterations of flow that would result from changes in reservoir operations under the RP compared to the NAA are not expected to create notable changes in the presence or abundance of specific habitat types (e.g., riffle habitat with moderate flow) and are not expected to have notable effects on population dynamics of aquatic species. Slight changes in water temperature and DO are expected to have a negligible effect on aquatic resources. Slightly increased pool levels in Allatoona Lake year-round and increased winter pool levels in Weiss and Logan Martin lakes under the RP would be slightly beneficial to the reservoir fisheries.
  - *Protected species*– While there are several species of federally listed mammals, birds, reptiles, amphibians, and plants in the ACT River Basin, none are expected to be adversely affected by the RP. Changes to flow and water quality conditions under the RP would be minimal and would not be expected to adversely affect protected aquatic species or adversely modify or destroy critical habitat for those species. There are 12 federally protected fish species within the Coosa River and Etowah River basins. Three of those species inhabit the main stems of the Coosa and Etowah rivers and their associated lakes: the blue shiner, which occurs in the Coosa River near Weiss Lake, and the Cherokee and Etowah darters, which inhabit the Etowah River and Allatoona Lake. Thirteen federally protected mussel species are present within the Coosa River and Etowah River basins. Ten of those species inhabit the main stem of the rivers and their associated reservoirs: the Alabama moccasinshell, Coosa moccasinshell, finelined pocketbook, Georgia pigtoe, ovate clubshell, southern acornshell, triangular kidneyshell, and upland combshell inhabit parts of the Coosa River. The southern clubshell and southern pigtoe inhabit parts of both the Coosa River and the Etowah River. Seven federally protected snail species are found within the Coosa River and Etowah River basins. Four of those species inhabit the main stem of the rivers and their associated reservoirs: the interrupted rocksnail, painted rocksnail, rough hornsnail, and tulotoma snail. Critical habitat for several species is designated in the main stem of the Coosa River downstream of Weiss and Jordan dams and in several tributary streams to the Coosa River. The USFWS concurred with USACE determination of "no effect" and "may affect, not likely to adversely affect" to protected species and/or designated critical habitat. Therefore, informal consultation with the USFWS, pursuant to Section 7 of the ESA of 1973, as amended, is complete.

- **Socioeconomic resources**.
  - *M&I water supply*–Compared to the NAA, the RP is expected to provide substantial beneficial effects relative to future M&I water supply needs. Projected long-term water supply needs (2020–2050) for CCMWA and the City of Cartersville, GA, would be met.
  - *Flood risk management*–The RP would lower the maximum surcharge elevations on Weiss and Logan Martin lakes to levels consistent with current flowage easements currently held by APC, reducing the risk of occasional flooding of lands around those lakes exceeding those flowage easement elevations. The incremental effects of modified flood operations at Weiss and Logan Martin dams on flood risks downstream of those projects would be minor. USACE has conducted additional analysis of impacts to private property both upstream and downstream of Weiss and Logan Martin dams. The additional analysis is detailed in Appendix C and Appendix D.
  - *Recreation resources*–Beneficial effects on recreation resources are expected at Allatoona, Weiss, and Logan Martin lakes. Slightly beneficial effects on recreational use at Allatoona Lake would be expected because of slightly higher pool levels year-round (1–1.5 ft) compared to current operations. Beneficial

effects on recreational use at Weiss and Logan Martin lakes would be expected because of higher winter pool levels compared to current operations at those projects.

- *Other socioeconomic resources*–The RP would be expected to have negligible impacts on navigation, hydropower production, and agricultural water supply.
- *Environmental justice/protection of children*–Compared to the NAA, the RP would not be expected to have disproportionate adverse effects on minority and low-income populations nor impose any increased environmental health and safety risks to children in the ACT River Basin in accordance with EO 12898 and EO 13045.

- **Aesthetic resources**. Compared to the NAA, the RP would have slightly beneficial aesthetic effects at Allatoona, Weiss, and Logan Martin lakes. Allatoona Lake would typically be operated at 1–1.5 ft higher than under current operations, thus slightly improving the aesthetic appearance of the lake by reducing the amount of exposed shoreline and lake bottom year-round. Similarly, the increase in the winter guide curve elevations at Weiss and Logan Martin lakes would improve aesthetic conditions by reducing the amount of exposed shoreline and lake bottom during the winter and early spring months.
- **Cultural resources**. Compared to the NAA, the RP is generally expected to have a negligible effect on cultural resources in Allatoona, Weiss, and Logan Martin lakes. However, because there would be a degree of uncertainty regarding potential impacts to cultural resources within the pools of the reservoirs because of changing pool level fluctuations under RP operations, the Mobile District is entering into Programmatic Agreements with the Georgia and Alabama State Historic Preservation Officers to evaluate the potential effects and take appropriate mitigation actions if adverse effects are documented.
- **Other resources**. Compared to the NAA, the RP would be expected to have negligible effects on air quality, noise conditions, and traffic and transportation resources. The RP would not be expected to result in an increased risk of release of hazardous and toxic materials or waste into the ACT River Basin environment.

Environmental Compliance. This Final FR/SEIS has been prepared in accordance with NEPA (42 U.S.C. §§4321-4335), the 1978 Council on Environmental Quality regulations for implementing NEPA (Title 40 of the *Code of Federal Regulations* Parts 1500-1508) (85 FR 43340, July 16, 2020), and USACE NEPA regulations (ER 200-2-2). In addition, the Final FR/SEIS has been developed in compliance with other pertinent environmental laws, EOs, and policies. The coordination and consultation required by multiple federal laws are being completed by way of coordination of the Final FR/SEIS and, in some cases, have been completed by separate processes. Full compliance with pertinent laws and regulations will be completed prior to signing the Record of Decision (ROD).

Public Coordination. A Notice of Intent (NOI) announcing the Allatoona Lake Water Supply Storage Reallocation Study and Updates to the Weiss and Logan Martin Reservoirs Project WCMs was posted April 30, 2018 (83 FR 18829, April 30, 2018). The initial NOI provided background on the study, as summarized in Section 1.1. USACE announced the time and location of five public scoping meetings through the *Federal Register* in a supplement to the NOI on July 13, 2018 (83 FR 32641, July 13, 2018). In addition, USACE Mobile District sent letters to 26 federally recognized American Indian tribes on July 20, 2018, notifying them of the study and the opportunity to attend one or more of the public scoping meetings.

USACE Mobile District held an interagency web conference on July 12, 2018, prior to the public scoping meetings. An invitation was distributed to individuals representing pertinent state and federal agencies. Two agencies participated in the meeting in person and six agencies participated by phone. Participants in the web meeting also were invited to attend the public scoping meetings. Several of the participants attended the public scoping meetings, and some of them attended more than one of the public meetings.

USACE Mobile District conducted public scoping meetings from July 30 through August 3, 2018, to initiate preparation of the Allatoona-Coosa Reallocation Study (ACR). The objectives of the scoping meetings were (1) to inform agencies and the public about the project scope; schedule; and project planning, NEPA, and reservoir water management processes; and (2) to seek input on key concerns and issues and relevant sources of data and information related to the project for USACE to consider during the project planning process and SEIS preparation. Cumulatively, 407 people attended the five public meetings, including representatives from local U.S. congressional offices, state and local agencies, elected officials, APC, and local news media. Most attendees were members of organizations representing lake users and landowners at Allatoona, Weiss, and Logan Martin lakes; environmental and business interests (primarily recreation and tourism); and members of the public.

USACE organized scoping comments by issue area and summarized them in a scoping report. The scoping comments provided substantial information on agency and public concerns and the potential impacts on the human and natural environment resulting from proposed actions considered in the ACR Draft FR/SEIS.

USACE filed the Draft FR/SEIS with USEPA on November 7, 2019. The USEPA published a Notice of Availability (NOA) of the Draft FR/EIS in the *Federal Register* on November 15, 2019, The Draft FR/SEIS was made available for public and agency review through December 30, 2019. USACE, Mobile District, held public meetings at multiple locations within the ACT River Basin to answer questions and receive comments on the Draft FR/SEIS. The public meeting details were announced in a Mobile District press release, in five local newspapers, in newsletters sent to persons on the ACR project mailing list, and on the ACR project website. Based on specific requests from federal and state agencies, as well as several interest groups, the public comment period was extended to January 29, 2020. The comment period extension was announced via a Mobile District press release, emails to members of the ACR project mailing list, and an amended USEPA NOA, published in the *Federal Register* on December 27, 2019.

Agencies and members of the public made a total of 583 individual inquiries and/or comments submittals on the Draft FR/SEIS. USACE received submittals by email, U.S. mail, written comment forms at the public meetings, verbal comments provided to court reporters at the public meetings. Several agencies and organizations made inquiries to (1) formally request the comment period be extended beyond December 29, 2019, and/or (2) request USACE to provide copies of the HEC-ResSim and HEC-5Q model outputs for their review. The sources (and associated number) of inquiries and comment submittals were as follows: Native American tribes (3); congressional staff member (1); federal agencies (4); state agencies (5); local government agencies, boards, and authorities (17); non-government organizations (13); businesses (8); and interested individuals (532).

Commenting federal agencies generally had limited concerns with the TSP (now the RP) that focused on water conservation and efficiency, water quality, and potential impacts to federal hydropower operations. State agencies, as well as local government, non-government organization (NGO), and business stakeholders expressed comments both for and against reallocation of Allatoona Lake storage for water supply and the use of USACE storage accounting practices at Allatoona Lake versus Georgia's proposed storage accounting methodology. These interests also expressed concerns about potential adverse impacts on flow and water quality conditions downstream of Allatoona Dam and potential adverse impacts on federal and non-federal hydropower production. Some state and NGO interests expressed concerns that USACE had not used the correct baseline condition for its NEPA analysis. Numerous commenters expressed strong public support for raising the winter guide curve levels at Weiss and Logan Martin lakes. However, some commenters also expressed concerns that lowering the maximum surcharge elevation and raising the winter guide curve levels at Weiss and Logan Martin lakes could increase flooding downstream of those projects.

USACE has considered all comments provided by the public and agencies on the Draft FR/SEIS. The Final FR/SEIS addresses comments received during the public and agency review period and incorporates appropriate revisions based on agency and public comments on the Draft FR/SEIS. The Final FR/SEIS is undergoing state and federal agency review prior to a final decision on the proposed action that will be reflected in a ROD, expected in March 2021.

Findings and Conclusions. The ACR Final FR/SEIS recommends approval and implementation of the RP. The formulation and evaluation of alternatives leading to the RP recommendation was performed using a risk-based approach that fully considered a broad range of risk and uncertainty factors, which are documented in the Draft FR/SEIS. Major findings and conclusions of the Draft FR/SEIS are as follows:

- **Dam safety considerations**. The USACE Mobile District Dam Safety Officer reviewed the dam safety analysis for Allatoona Dam and concluded that the RP would not present any dam safety issues for Allatoona Dam and Lake. APC will be required to ensure that any proposed changes will meet the dam safety requirements set by FERC.

- **Climate change considerations**. The RP was subjected to an evaluation of the potential effects of climate change in accordance with applicable USACE guidance. The analysis indicated the potential for slightly wetter conditions in the upper portion of the ACT River Basin in the 2044-2093 period of analysis. Project operations under the RP are expected to be sufficiently flexible and resilient to manage these potential changes without an appreciable increase in environmental and socioeconomic impacts.

- **Project cost and cost allocation**. Based on the analysis, the Final FR/SEIS includes a recommendation that 33,872 ac-ft of usable storage be reallocated to water supply. Of that total of storage, 11,670 ac-ft would be reallocated from the current flood pool with the balance reallocated from the conservation pool. This alternative is the most cost-effective and timely response to satisfy a portion of the projected water demands in the State of Georgia for current Allatoona Lake users, CCMWA, and the City of Cartersville. The first cost to the user is $20,242,000. An estimate of the user's share of annual operation and maintenance cost is $56,000. The annual payment will also include the user's share of repair, rehabilitation, and replacement (RR&R) cost. The estimated annual payment is $873,000. Additional costs to modify recreation features and address any potential shoreline erosion have an estimated first cost of $17,400,000. There are no comparable cost and cost allocation issues associated with the modified flood operations at Weiss and Logan Martin dams.

- **Plan implementation**. Water supply storage agreements are approved by the Assistant Secretary of the Army for Civil Works. The agreements detail the amount and costs of storage, period of repayment, and other stipulations. Draft water supply storage agreements are included as an attachment to Appendix B. USACE and the State of Georgia cannot enter into agreements until the ROD is signed.

  The revised WCMs for the APC projects would require an MOA signed by the USACE SAD Commander and the appropriate APC representative. USACE anticipates the MOA and newly approved WCMs will be incorporated into APC's FERC license. All necessary real estate interests will be reviewed prior to the final signing of the new MOA and manuals. APC will provide any necessary real estate documentation prior to final plan approval.

- **Areas of concern or controversy**. Other than long-standing issues between the States of Alabama and Georgia over water use and water allocations in the ACT River Basin, the only significant area of disagreement relative to this proposed action is the State of Georgia's disagreement with the USACE storage accounting methodology for tracking the use of water supply storage in USACE Mobile District reservoirs.

1.0 PURPOSE AND AUTHORITY

1.1 Study Area and Scope

The overall study area for this Final Feasibility Report and Integrated Supplemental Environmental Impact Statement (FR/SEIS) is the Alabama-Coosa-Tallapoosa (ACT) River Basin. The ACT River Basin comprises the Alabama, Coosa, and Tallapoosa rivers and all areas within the basin boundaries. It stretches from the headwaters of the Coosa and Tallapoosa rivers downstream to the mouth of the Alabama River, where that river joins the Tombigbee River to form the Mobile River. At the ACT River Basin's confluence with the Tombigbee River, it has a drainage area of 22,739 square miles (sq mi) and covers portions of the states of Alabama, Georgia, and Tennessee. Figure 1-1 shows the ACT River Basin.

USACE operates reservoir projects in the ACT River Basin for various purposes. Federal legislation authorizing project purposes in the ACT Basin has occurred over time. Section 2 of the River and Harbor Act of 1945 (P.L. 79-14) authorized the plan for flood control (now referred to as flood risk management), hydropower, and navigation. Those purposes are often referred to as expressly authorized project purposes. Other operational objectives derive from authorities that generally apply to all USACE reservoirs, such as fish and wildlife conservation (Fish and Wildlife Coordination Act of 1958 [P.L. 85-624] and Endangered Species Act of 1973 [P.L. 93-205]), recreation (Flood Control Act of 1944 [P.L. 78-534]), water quality (Water Pollution Control Act Amendments of 1972 [P.L. 92-500]), and water supply (Water Supply Act of 1958 [P.L. 85-500]).

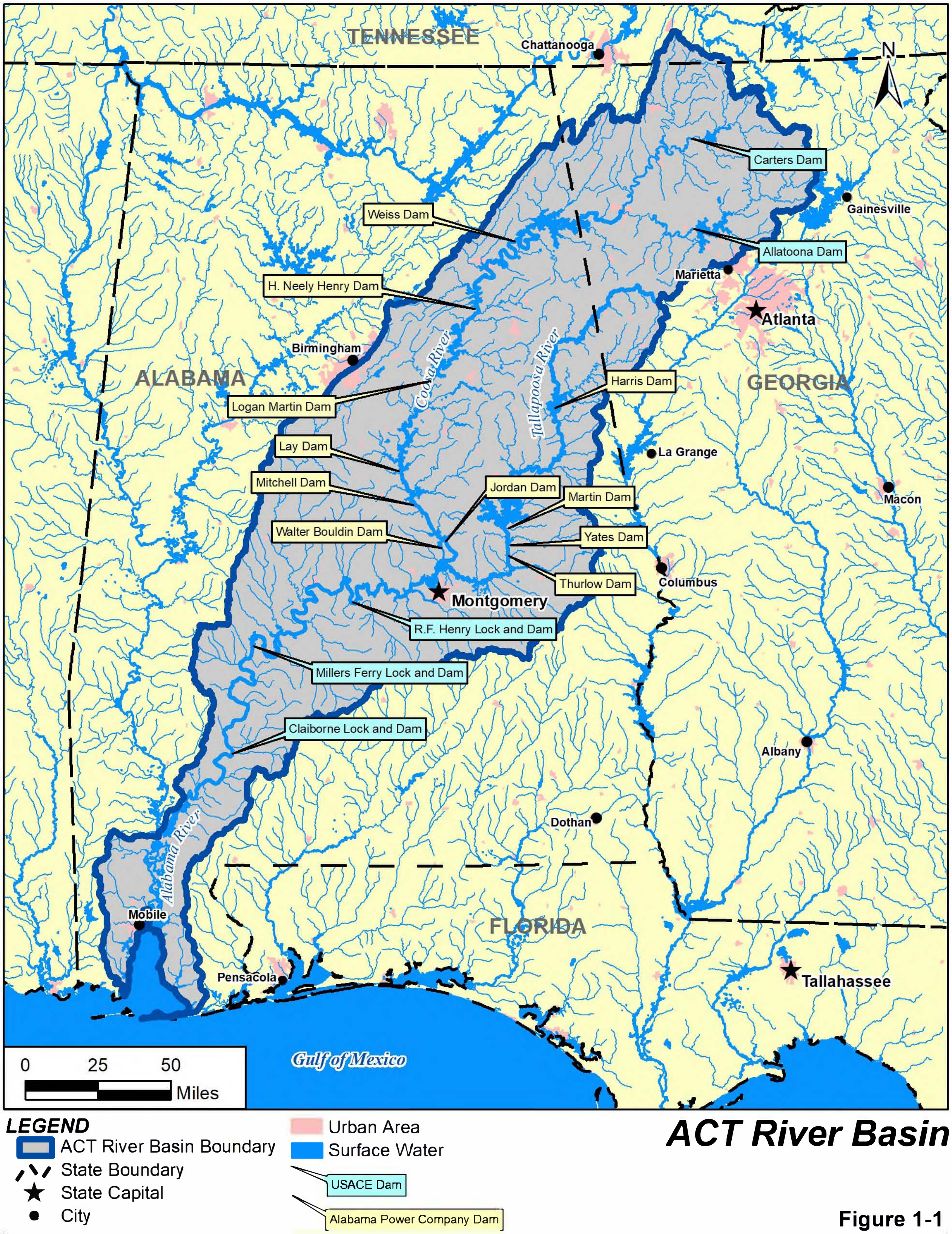
Listed from upstream to downstream, the five USACE multipurpose reservoir projects in the ACT River Basin are:

- Carters Dam and Lake/Carters Reregulation Dam, GA (Coosawattee River) (function as a single project).
- Allatoona Dam and Lake, GA (Etowah River)
- Robert F. Henry Lock and Dam (L&D) and R.E. "Bob" Woodruff Lake, AL (Alabama River)
- Millers Ferry L&D and William "Bill" Dannelly Lake, AL (Alabama River)
- Claiborne L&D and Lake, AL (Alabama River).

In addition, USACE is responsible for navigation channel maintenance for the portion of the Alabama River from river mile (RM) 0 to Claiborne L&D at RM 72 and within the three L&D pools upstream to the head of navigation at Montgomery, AL.

The Alabama Power Company (APC) operates 11 reservoir projects in the ACT River Basin for the primary purpose of generating hydroelectric power (hydropower), although those projects provide other public benefits as well. Under the Coosa Power Act (P.L. 83-436) (June 28, 1954), USACE is responsible for operational oversight of flood risk management (formerly referred to as flood control) and commercial navigation support for four of the APC reservoir projects in the ACT River Basin:

- Weiss Dam and Lake, AL (Coosa River)
- H. Neely Henry Dam and Lake, AL (Coosa River)
- Logan Martin Dam and Lake, AL (Coosa River)
- R.L. Harris Dam and Lake, AL (Tallapoosa River).



ACT River Basin

Figure 1-1

Figure 1-1 depicts the USACE and APC projects in the ACT River Basin. The USACE Master Water Control Manual for the ACT River Basin (Master Manual) and individual project Water Control Manuals (WCMs) guide operations at the five USACE reservoir projects and the four APC reservoir projects with flood risk management and navigation support provisions.

An update of the ACT River Basin Master Manual and individual project WCMs, supported by an Environmental Impact Statement (EIS), was completed in May 2015. During that WCM update process, USACE deferred consideration of two specific requests pending completion of further detailed studies and analyses: (1) a January 2013 updated request from the State of Georgia to reallocate additional reservoir storage in Allatoona Lake to municipal and industrial (M&I) water supply and (2) an APC request to change flood operations at the APC Weiss and Logan Martin projects (including associated updates to the WCMs for those projects).

This Final FR/SEIS addresses the proposed actions USACE deferred during the 2015 ACT River Basin Master Manual update process. This report also presents the benefits, costs, and environmental effects associated with a Recommended Plan (RP) and alternatives to address those deferred actions.

While this report describes the entire ACT River Basin as the overall study area, consistent with the previous WCM update process, the predominant effects of the proposed actions would occur in the immediate vicinity of the USACE Allatoona project and the APC Weiss and Logan Martin projects. The effects of proposed operational changes at those projects, however, are likely to extend for some distance downstream of the projects and could be discernable over the entire extent of the lower Etowah River and Coosa River, and potentially in the upper Alabama River. Therefore, this Final FR/SEIS maintains an ACT River Basin-wide focus in considering the environmental effects of the proposed action.

1.2 Purpose and Need *

In May 2015, USACE completed a long-term effort to update the Master Manual for the ACT River Basin, including updating WCMs for all five USACE projects described in Section 1.1 and two of the four APC projects with navigation support and flood risk management purposes (H. Neely Henry Dam and Lake, and R.L. Harris Dam and Lake). WCMs for the other two APC projects, Logan Martin Dam and Lake (or Reservoir) and Weiss Dam and Lake (or Reservoir), were not updated at that time. Also not included within the scope of the 2015 WCM update and EIS was a pending January 24, 2013, request from the State of Georgia for additional water supply storage in Allatoona Lake (83 FR 18829, April 30, 2018).

On January 9, 2018, the U.S. District Court for the Northern District of Georgia issued a judgment in *Georgia et al. v. U.S. Army Corps of Engineers,* Civil Action No. 1:14-cv-03593, holding that USACE had unreasonably delayed taking action on Georgia's water supply request, and directing USACE to take final action responding to that request by March 2021. The Georgia Environmental Protection Division (GAEPD), representing the State of Georgia, submitted an updated request to USACE on March 30, 2018, on behalf of the Cobb County-Marietta Water Authority (CCMWA) and the City of Cartersville, GA. GAEPD requested that USACE reallocate additional reservoir storage, above the current water supply storage agreements at Allatoona Lake, to meet a total projected average daily water supply withdrawal demand of 94 million gallons per day (mgd) through the year 2050. Further, GAEPD maintained its request from January 2013 that USACE consider revising its storage accounting practices to provide credit for "made inflows"—returns from two water reclamation facilities in Cobb County, GA, and releases by CCMWA from the Hickory Log Creek Reservoir to the Etowah River and, subsequently, into Allatoona Lake for water supply withdrawal. This Final FR/SEIS considers and evaluates actions necessary to respond to Georgia's request, including reasonable alternatives (83FR 18829, April 30, 2018).

USACE did not include updates to the WCMs for the APC Weiss and Logan Martin dams and lakes in the 2015 ACT River Basin Master Manual update project because changes to flood operations proposed by APC required further detailed study of flood risk at both projects. This Final FR/SEIS evaluates the flood risk and other impacts associated with APC's proposal to raise the winter pool level for recreation and lower the maximum induced surcharge elevation at both the Weiss and Logan Martin projects (83FR 18829, April 30, 2018). The results of this evaluation will provide the basis for appropriate updates to the WCMs for the APC Weiss and Logan Martin projects.

USACE has prepared documentation in compliance with the National Environmental Policy Act (NEPA) (Title 42 of the *United States Code* [U.S.C.] § 4321 *et seq.*); the 1978 Council on Environmental Quality (CEQ) regulations for implementing NEPA (Title 40 of the *Code of Federal Regulations* [CFR] Parts 1500–1508) (85 FR 43340, July 16, 2020); and USACE Engineer Regulation (ER) 200-2-2, *Procedures for Implementing NEPA*, to address the environmental effects associated with the proposed actions described above. Because USACE is concurrently considering proposals to modify operations and update WCMs at three different ACT River Basin projects, USACE has evaluated the effects of those proposals through a single Supplemental EIS to the Final EIS for the ACT River Basin Master Manual update completed in May 2015. As part of this analysis, USACE considered the effects of the proposed changes on operations of the ACT River Basin system of projects for federally authorized purposes and has revised the ACT River Basin Master Manual to incorporate the updated Allatoona Dam and Lake, Weiss Dam and Lake, and Logan Martin Dam and Lake WCMs and to reflect changes in overall system operations. Appendix A includes the updated ACT River Basin Master Manual and the three revised project WCMs.

1.3 Relevant Authorities

This Final FR/SEIS addresses the two separate federal actions related to three reservoirs within the ACT River Basin: (1) the proposed reallocation of multipurpose reservoir storage in Allatoona Lake to water supply storage to meet identified local water supply needs, and (2) proposed modifications to federally authorized flood operations at two APC projects on the Coosa River, Weiss Dam and Lake and Logan Martin Dam and Lake. Any changes to project operations resulting from implementing these proposed actions will require updates or revisions to the USACE ACT River Basin Master Manual and WCMs for the affected projects.

1.3.1 Reservoir Storage Reallocation for Water Supply

Reallocating reservoir storage is the formal reassignment of the use of existing storage capacity in a reservoir project from one authorized purpose to another authorized purpose. Authority for USACE to reallocate existing storage space to M&I water supply is contained in the Water Supply Act of 1958 (WSA), as amended (43 U.S.C. § 390b). Section 390b(b) of the WSA states that:

> It is hereby provided that storage may be included in any reservoir project surveyed, planned, constructed or to be surveyed, planned, and/or constructed… to impound water for present or anticipated future demand or need for municipal and industrial water supply.

The WSA specifically limits the extent to which reservoir storage reallocation can be undertaken through administrative action to accommodate M&I water supply. Section 390b(e) of the Act states that:

> Modifications of a reservoir project theretofore [before July 3, 1958] authorized, surveyed, planned, or constructed to include storage as provided in subsection (b), which would seriously affect the purposes for which the project was authorized, surveyed, planned, or constructed, or which would involve major structural or operational changes, will be made only upon the approval of Congress as now [on July 3, 1958] provided by law.

Any reallocation of additional multipurpose reservoir storage in Allatoona Lake to water supply storage and/or change in storage accounting practices at the project as requested by the State of Georgia would require a corresponding update or revision to the USACE ACT River Basin Master Manual and the Allatoona Dam and Lake WCM.

1.3.2 Revisions to Federally Authorized Flood Operations

Pursuant to the Coosa Power Act (P.L. 83-436), USACE has oversight of four APC projects in the ACT River Basin for the use of reservoir storage for the federally authorized project purposes of flood risk management and navigation: Weiss Dam and Lake; Logan Martin Dam and Lake; and H. Neely Henry Dam and Lake on the Coosa River, and R.L. Harris Dam and Lake on the Tallapoosa River. Accordingly, USACE, in cooperation with APC, has developed a WCM for each of those projects to define operations for flood risk management and navigation, complementary to APC hydropower operations and other collateral uses. Operations for flood risk management and navigation at the APC projects are also incorporated into the Master Manual for the ACT River Basin.

The APC-proposed revisions to flood operations at Weiss Dam and Lake and Logan Martin Dam and Lake require USACE review and concurrence. USACE concurrence would necessitate appropriate revisions to the WCMs for those projects. USACE concurrence with the proposed modifications to flood operations at the Weiss and Logan Martin projects would also enable the Federal Energy Regulatory Commission (FERC) to make the pertinent revisions/updates to the FERC license for the Coosa River Hydroelectric Project (Project No. 2146-111).

1.3.3 Water Control Manual Updates and Revisions

The authority and guidance for USACE to prepare and update the ACT River Basin Master Manual and individual project WCMs are principally found in Section 7 of the 1944 Flood Control Act (P.L. 78-534); Section 9 of P.L. 83-436; NEPA; USACE ER 1110-2-240, *Water Control Management*, and ER 1110-2-8156, *Engineering and Design Preparation of Water Control Manuals*; and other pertinent environmental laws and regulations. WCMs are guidance documents that assist federal water managers in operating individual and multiple interdependent federal reservoirs on the same river system. The manuals provide technical, historic, hydrologic, geographic, demographic, policy, and other information as well as operating criteria and guidelines for managing water storage and release of water from USACE reservoirs under all conditions. The manuals also include drought plans and action zones to help federal water managers know when to reduce or increase reservoir releases and how to ensure the safety of dams during extreme conditions (83FR 18829, April 30, 2018). Demographic, hydrologic, environmental, and technological changes within the project area that are relevant to reservoir project operations account for periodic WCM updates and revisions. The Water Resources Development Act (WRDA) of 1988 (P.L. 100-676) and WRDA 1990 (P.L. 101-640) provide for public involvement of interested stakeholders during the development of new or revised WCMs to incorporate the views and current interests of agencies and the public within the basin.

The evaluation of the proposed water supply storage reallocation at Allatoona Lake and proposed changes to flood operations at the APC Weiss and Logan Martin projects may require updates to the currently approved ACT River Basin Master Manual and individual WCMs for the Allatoona, Weiss, and/or Logan Martin projects.

This Final FR/SEIS includes updates to the ACT River Basin Master Manual and the individual Allatoona, Weiss, and Logan Martin project WCMs to reflect the proposed operational changes that are currently under consideration. Updated WCMs have been prepared in accordance with the authorities and specific guidance.

1.4 Report Organization

This study was prepared using aspects of the provisions of Section 1001 of the Water Resources Reform and Development Act of 2014 (WRRDA 2014), which codifies the congressional mandate to streamline and modernize civil works feasibility planning processes, a mandate commonly known as SMART planning (Specific, Measurable, Attainable, Risk-informed, and Timely). The study was conducted in accordance the requirements of ER 1105-2-100 (the USACE Planning Guidance Notebook) and consistent with USACE SMART planning guidance.

This integrated SEIS fulfills the requirements of NEPA. The CEQ regulations for implementing NEPA (40 CFR Parts 1500–1508) require that all EISs address a list of specific topics for a complete, consistent, and clear presentation of information to meet the intent of the NEPA process. Table 1-1 contains a list of the required topics and identifies where they are addressed in this Final FR/SEIS. In addition, the Table of Contents and body of this Final FR/SEIS include asterisks (*) to denote those specific sections or topics required for NEPA documents per CEQ regulations.

Table 1-1. EIS Required Sections or Topics per CEQ NEPA Regulations

Required by:	EIS Section or Topic	ACR FR/SEIS Section
40 CFR 1502.11	Cover Sheet	Abstract
40 CFR 1502.12	Summary	Executive Summary
40 CFR 1502.13	Purpose of and need for action	Section 1.2
40 CFR 1502.14	Alternatives, including the proposed action	Sections 4.2 – 4.4
40 CFR 1502.15	Affected environment	Section 3.0
40 CFR 1502.16	Environmental consequences	Section 5.0 / Section 7.3
40 CFR 1502.17	List of Preparers	Section 9.0
40 CFR 1502.10	List of agencies, organizations, and persons to whom copies of the statement are sent	Section 11.0
40 CFR 1502.10	Index	Section 13.0
40 CFR 1502.18	Appendix	Appendices A - G

In addition, a list of acronyms and abbreviations commonly used in this report immediately follows the Table of Contents, and Section 12 contains a glossary of terms commonly used in the report.

2.0 PROJECT BACKGROUND

2.1 ACT River Basin Overview

The ACT River Basin extends approximately 330 miles (mi) from northwest Georgia and southeast Tennessee to the mouth of the Alabama River, where it joins the Tombigbee River to form the Mobile River. The total drainage area of the ACT River Basin is approximately 22,739 sq mi (Figure 1-1). The three main rivers in the ACT River Basin are the Alabama, Coosa, and Tallapoosa rivers. The Coosa and Tallapoosa rivers join to form the Alabama River near Montgomery, AL. The basin is primarily rural, and the topography ranges from the southern Appalachian Mountains in northwest Georgia and southeast Tennessee, to the Piedmont region in northeast Alabama, to the coastal plain in south Alabama. Over 70 percent of the land in the basin is forested and agricultural land. Two large metropolitan areas, Atlanta, GA, and Birmingham, AL, are partially located in the basin, and they use water resources of the basin for M&I water supply. Montgomery, AL, is located on the Alabama River a short distance downstream of the confluence of the Coosa and Tallapoosa rivers. The smaller cities of Rome, GA, and Gadsden, AL, are located on the Coosa River, and numerous other small towns and communities are located in the basins near the primary rivers of the basin. Appendix E contains a detailed overview of the ACT River Basin.

Section 2 of the River and Harbor Act (RHA) of 1945 (P.L. 79-14) authorized a comprehensive plan to develop the Alabama and Coosa rivers for navigation from the confluence of the Alabama and Tombigbee rivers upstream to Rome, GA; flood risk management; hydropower generation; and other purposes, as presented in House Document (H.D.) 414, 77th Congress, 1st Session.

In 1954, the Coosa Power Act (P.L. 83-436) amended RHA 1945 to suspend the authorization of federal hydropower development on the Coosa River and to authorize nonfederal interests to construct a series of dams to generate hydropower. The nonfederal dams were subject to licensing requirements under the Federal Power Act administered by the Federal Power Commission (FPC) (today's FERC). P.L. 83-436 stipulated that, under the hydropower license, flood storage had to be provided and the projects would be operated for flood risk management and navigation in accordance with reasonable rules and regulations established by the Secretary of the Army. Section 4 of P.L. 83-436 contemplated future navigation on the Coosa River, providing that "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." Section 5 required that nonfederal development of the Coosa River meet the following standards:

- The project(s) shall provide the maximum flood control that is economically feasible;
- The flood control storage may not be less than the displaced valley storage; and
- The flood control storage may not be less in quantity and effectiveness that the amount of flood control storage provided by the Howell Mill Shoals project. Howell Mill Shoals was the originally authorized federal project for construction on the Coosa River to be replaced by the nonfederal hydropower development.

APC subsequently constructed Weiss Dam and Lake, H. Neely Henry Dam and Lake, and Logan Martin Dam and Lake on the Coosa River in accordance with the above provisions.

RHA 1966 (P.L. 89-789) further amended RHA 1945 to suspend federal hydropower development of a reach of the Tallapoosa River not more than 15 mi downstream of the confluence of the Tallapoosa and Little Tallapoosa rivers. That change made the Crooked Creek site on the Tallapoosa River in Randolph County, AL, available for development for hydropower by nonfederal interests under a license to be issued by the FPC. The hydropower license for the nonfederal project on the Crooked Creek site also required provision of flood risk management storage and project operations for flood risk management and navigation support in accordance with Army rules and regulations. APC subsequently constructed R.L. Harris Dam and Lake on the Tallapoosa River in accordance with those provisions.

From the 1960s through the early 1970s, USACE constructed three navigation L&D projects and training works on the Alabama River for commercial navigation upstream to Montgomery, AL. Section 813 of WRDA 1986 (P.L. 99-662) further modified the comprehensive plan for developing water resources of the Alabama and Coosa rivers and tributaries as authorized by RHA 1945 and modified by Coosa Power Act. Section 813 authorized the Secretary of the Army to carry out planning, engineering, and design of a project to provide for navigation between Montgomery, AL, and Gadsden, AL, in accordance with a May 1982 report titled *Montgomery to Gadsden, Coosa River Channel, Alabama, Design Memorandum No. 1, General Design* (USACE Mobile District, 1982). The plan involved construction of navigation locks at the APC dams on the Coosa River. Following the 1986 authorization, no funding was provided to carry out planning, engineering, or design for facilities to accommodate commercial navigation between Montgomery and Gadsden. This authorized project element was subsequently included in an interim deauthorization list published in the *Federal Register* on October 7, 2015 pursuant to Section 6001(d) of WRRDA 2014 (P.L. 113-121). The final deauthorization report, completed by the Office of the Secretary of the Army for Civil Works (OASA(CW)) in February 2016 (OASA(CW), 2016) and made available to the public via *Federal Register* notice on March 25, 2016, included the Coosa River, Montgomery to Gadsden navigation project.

USACE currently operates five reservoir projects in the ACT River Basin to support multiple federally authorized purposes: Allatoona Dam and Lake, Carters Dam and Lake/Carters Reregulation Dam, Robert F. Henry L&D/R.E. “Bob” Woodruff Lake, Millers Ferry L&D/William “Bill” Dannelly Lake, and Claiborne L&D and Lake. Weiss Dam and Lake, H. Neely Henry Dam and Lake, and Logan Martin Dam and Lake on the Coosa River and R.L. Harris Dam and Lake on the Tallapoosa River are the four APC reservoir projects with federal flood risk management and navigation support authorizations. APC also operates seven other dams (six reservoirs) in the ACT River Basin that have no federal authorization for flood risk management or navigation support: Lay, Mitchell, Jordan, and Bouldin dams on the Coosa River (Jordan and Bouldin dams share a single reservoir) and the Martin, Yates, and Thurlow dams on the Tallapoosa River. All of these projects except for Bouldin Dam were constructed prior to the RHA 1945. All the APC projects in the ACT River Basin operate under licenses granted by FERC. Figure 1-1 shows a map of the ACT River Basin and locations of the USACE and APC projects. Table 2-1 summarizes important details on the USACE and APC reservoir projects. All elevation data for project structures, reservoir water surface elevations, and other pertinent elevation information in Table 2-1 and subsequently presented in this report are referenced to the National Geodetic Vertical Datum of 1929 (NGVD29). Table 2-2 depicts the federally authorized purposes for the USACE and pertinent APC reservoir projects in the ACT River Basin. Appendix A, Section A.1, provides a more detailed description of each reservoir in the basin and their general operations.

The USACE and APC reservoirs on the mainstem rivers of the ACT River Basin cumulatively have about 2.61 million acre-feet (ac-ft) of conservation storage. APC projects control 80 percent of the available conservation storage in the ACT River Basin, and four federal projects (Allatoona Lake, Carters Lake, R.E. “Bob” Woodruff Lake, and William “Bill” Dannelly Lake) control about 20 percent of the conservation storage. Martin Lake on the Tallapoosa River controls about 46 percent of the total available conservation storage in the basin. The next largest conservation storage volumes, in decreasing order, are in Allatoona Lake, Weiss Lake, R.L. Harris Lake, Carters Lake/Reregulation Pool, and Logan Martin Lake. These five reservoirs hold a combined total of about 39 percent of the conservation storage in the basin. The two USACE reservoirs that are furthest upstream, the Allatoona project and Carters project (including the reregulation pool), control about 16 percent of the basin conservation storage.

The USACE and APC reservoirs on the mainstem rivers of the ACT River Basin cumulatively have about 1.04 million ac-ft of dedicated flood storage above the normal summer pool level at two USACE and three APC projects in the basin: Allatoona Lake, Carters Lake, Logan Martin Lake, R.L. Harris Lake, and Weiss Lake. About 89 percent of the dedicated flood storage capacity is in three reservoirs: Weiss Lake, Allatoona Lake, and Logan Martin Lake. Lowering the pool levels at these projects as well as Carters Lake and at H. Neely Henry Lake during the winter months provides additional flood storage capacity during that period.

Table 2-1. Project Data for USACE and APC Reservoirs in the ACT River Basin

Basin/river/ project name	Owner/state/ year initially completed	Drainage area (sq mi) [a]	Normal (summer) lake elev (ft) [b]	Reservoir size at normal (summer) pool (ac) [i]	Total storage at normal (summer) pool (ac-ft) [i]	Conservation storage (ac-ft)	Top of flood pool elev (ft) [c]	Total storage at top of flood pool (ac-ft) [i]	Dedicated Flood storage (ac-ft) [i]	Power capacity (megawatt [MW])
Coosawattee River		*862*								
Carters Dam and Lake	USACE/GA/1974	374	1,074	3,275	383,564	141,402 [j]	1099	472,757	89,192	600 [d]
Carters Reregulation Dam	USACE/GA/1974	520	698	990	17,380	16,571 [i]	*NA*	NA	0	None
Etowah River		*1,861*								
Allatoona Dam and Lake	USACE/GA/1949	1,122	840	11,164	338,253	270,247 [i]	860	626,860	288,606	82.2 [d]
Coosa River		*10,156*								
Weiss Dam and Lake	APC/AL/1961	5,270	564	30,027	306,655	263,417 [i]	574	704,414	397,759 [i]	87.75 [e]
H. Neely Henry Dam and Lake	APC/AL/1966	6,596	508	11,235	120,853	118,210 [i]	NA	NA	0	72.9 [e]
Logan Martin Dam and Lake	APC/AL/1964	7,743	465	15,269	273,467	141,897 [i]	477	519,110	245,673 [i]	128.25 [e]
Lay Dam and Lake	APC/AL/1914	9,053	396	11,795	262,887	92,352 [b]	NA	NA	0	177 [e]
Mitchell Dam and Lake	APC/AL/1923	9,778	312	5,855	170,783	51,577 [b]	NA	NA	0	170 [e]
Jordan Dam and Lake [f]	APC/AL/1929	10,102	252	5,890	210,198	19,057 [f]	NA	NA	0	100 [e]
Bouldin Dam [f]	APC/AL/1967	10,102	252	734	---- [f]	---- [f]	NA	NA	0	225 [e]
Tallapoosa River		*4,687*								
R.L. Harris Dam and Lake	APC/AL/1982	1,454	793	10,660	425,721	207,318 [i]	795	447,501	21,780	135 [b]
Martin Dam and Lake	APC/AL/1927	2,984	491 [g]	39,807	1,628,303	1,202,340 [b]	NA	NA	0	182.5 [b]
Yates Dam and Lake	APC/AL/1928	3,293	345 [g]	2,004	53,908	6,928 [b]	NA	NA	0	44.25 [b]
Thurlow Dam and Lake	APC/AL/1930	3,308	289 [g]	570	17,976	NA	NA	NA	0	81.35 [b]
Alabama River		*22,739*								
R F. Henry L&D/ R.E. “Bob” Woodruff Lake	USACE/AL/1972	16,233	126 [h]	13,500	247,210	36,450 [j]	NA	NA	0	82 [d]
Millers Ferry L&D/ William “Bill” Dannelly Lake	USACE/AL/1969	20,637	80.8 [h]	18,528	346,254	46,704 [j]	NA	NA	0	90 [d]
Claiborne Lock, Dam, and Lake	USACE/AL/1969	21,473	36 [h]	6,290	102,480	None	NA	NA	0	None

ac = acre; ac-ft = acre-feet
a. Source: USGS HUC Units and stream gage data (Subregion 0315)
b. Source: USACE projects – verified by USACE (June 2014); APC projects – values verified by USACE coordination with APC via email (June 2014)
c. Source: USACE email (April 2019), placemat and WCM
d. Declared Power Capacity. The value may vary slightly from week to week depending on factors such as head and cooling capabilities; values shown are the nominal values reported
e. Source: (FERC, 2009)
f. Jordan and Bouldin Dams both impound the same reservoir and share the same reservoir storage.
g. Subtract one (1) ft to convert from ft NGVD29 to Martin datum. Source: Martin Dam FERC FEIS April 2015 (page 13)
h. Represents the upper limit elevation of the normal operating range
i. All projects – verified by USACE ResSim Input (April 2019)
j. Source: USACE Water Control Manuals

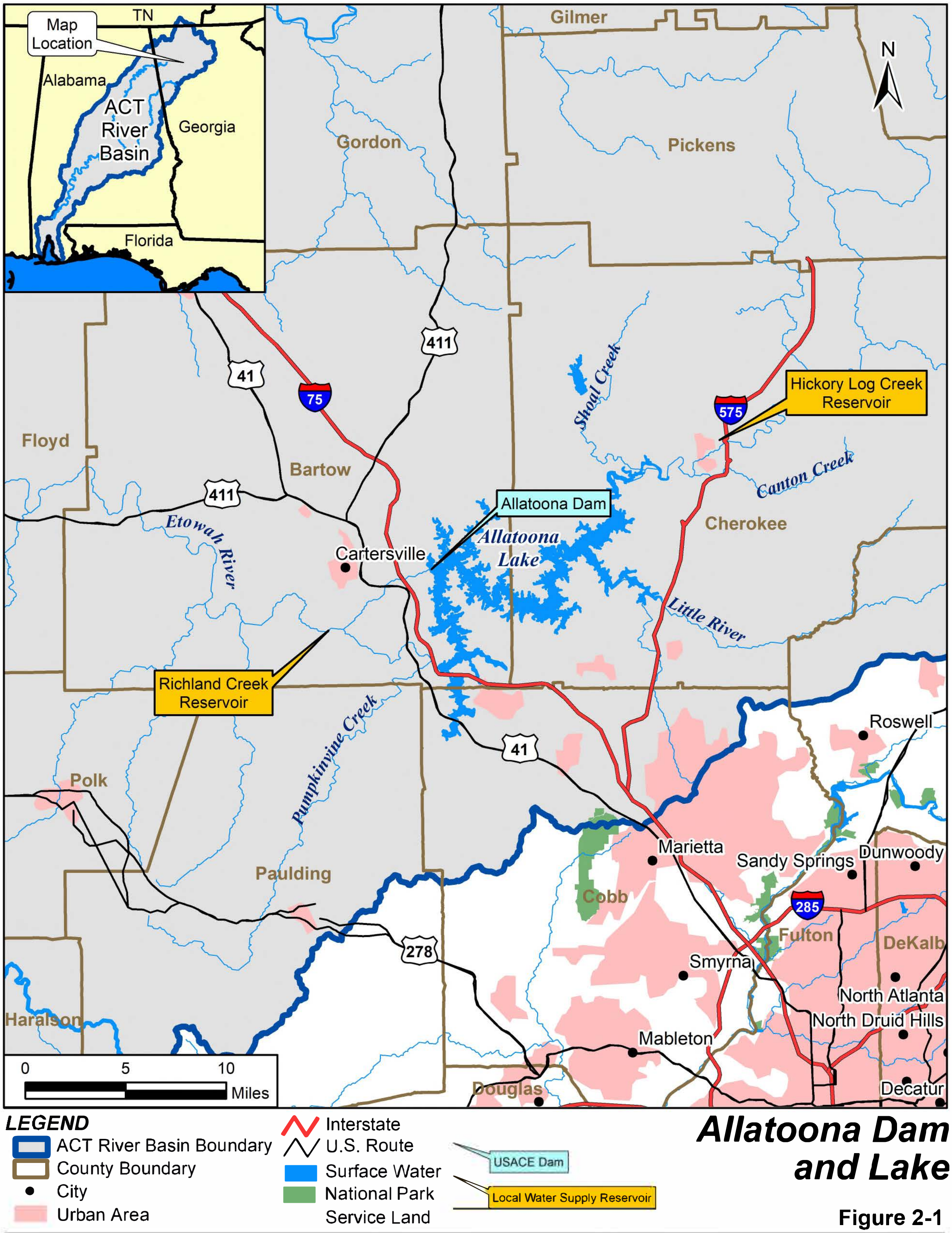
Table 2-2. Federally Authorized Purposes for USACE and APC Projects in the ACT River Basin

Federally authorized purposes	Flood risk management	Hydropower	Navigation	Recreation	Water supply	Water quality	Fish & wildlife
USACE projects (listed from upstream to downstream in the basin)							
Carters Dam and Lake	●	●	●	●	●	●	●
Allatoona Dam and Lake	●	●	●	●	●	●	●
Robert F. Henry L&D / R.E. "Bob" Woodruff Lake		●	●	●		●	●
Millers Ferry L&D / William "Bill" Dannelly Lake		●	●	●		●	●
Claiborne L&D and Lake			●	●		●	●
APC projects (listed from upstream to downstream in the basin)							
Weiss Dam and Lake	●		●				
H. Neely Henry Dam and Lake	●		●				
Logan Martin Dam and Lake	●		●				
R.L. Harris Dam and Lake	●		●				

The WCMs for APC's Weiss, H. Neely Henry, and Logan Martin projects on the Coosa River and R.L. Harris project on the Tallapoosa River specifically guide the operation of these projects for flood risk management in the basin and flow augmentation to support navigation in the Alabama River. The WCMs for the H. Neely Henry and R.L. Harris projects were updated and approved as part of the 2015 ACT River Basin Master Manual update process. This Final FR/SEIS focuses on the proposed changes at APC's Weiss, and Logan Martin projects and the USACE Allatoona project as well as the associated WCM updates that would be required for all three projects.

2.1.1 Allatoona Dam and Lake

Allatoona Dam and Lake, which was authorized by the Flood Control Act of 1941 (P.L. 77-228, 55 Stat 638), is a USACE multipurpose reservoir project on the Etowah River in northwest Georgia. Figure 2-1 shows the general location of the project and Table 2-1 and Table 2-2 present detailed information on the project. The project consists of a gravity-type concrete dam 1,250 feet (ft) long with a top elevation of 880 ft. Its power installation consists of two 40-megawatt (MW) generators and a 2.2-MW service unit (declared values). The lake has a surface area of 11,164 acres (ac) at normal pool elevation of 840 ft, a flood storage capacity of 288,606 ac-ft, and conservation storage capacity of 270,247 ac-ft. The current storage allocation at Allatoona Lake is depicted on Figure 2-2. A minimum flow of approximately 240 cubic feet per second (cfs) is continuously released through a small service unit, which generates power while providing a constant flow to the Etowah River downstream for water quality purposes. The major flood risk management areas downstream of Allatoona Dam are Cartersville, Kingston, and Rome, GA.



Allatoona Dam and Lake

Figure 2-1

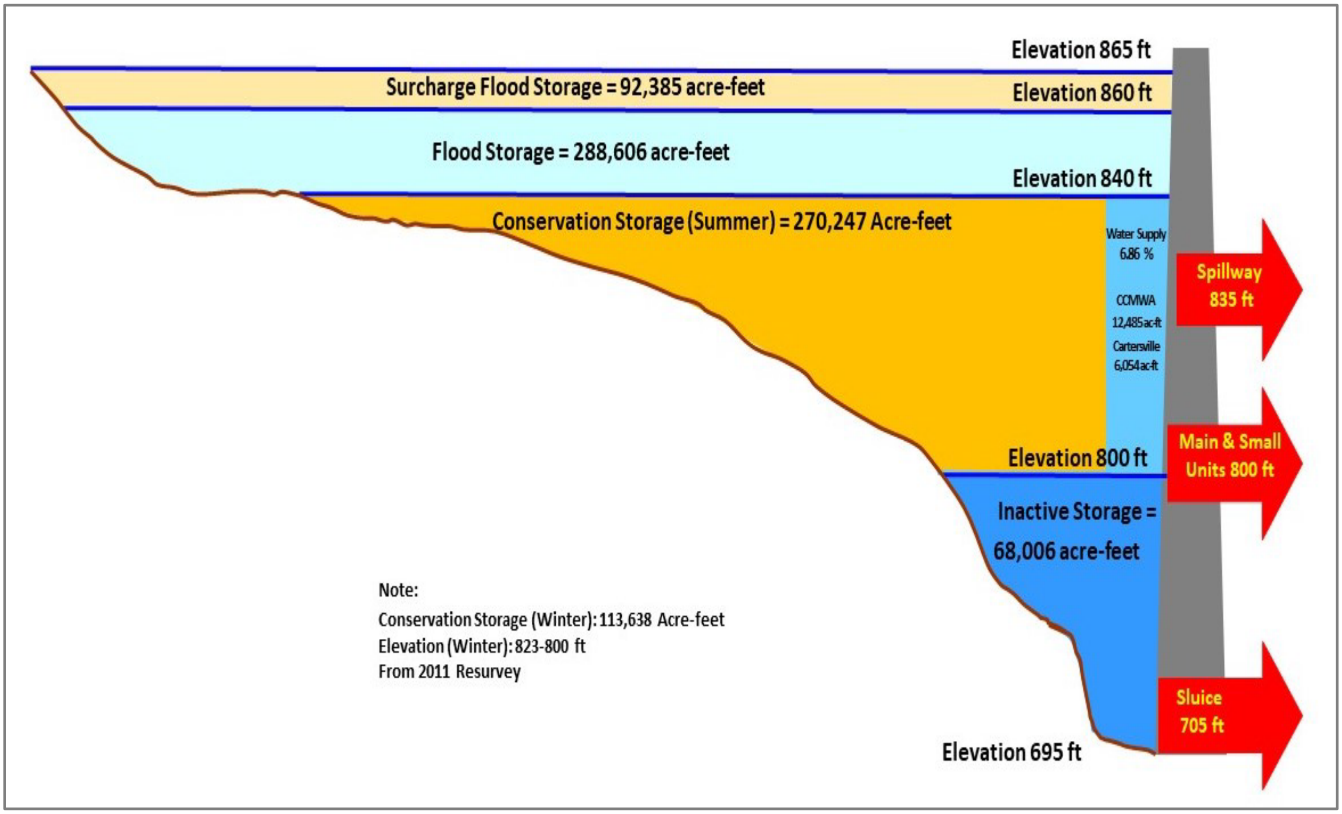
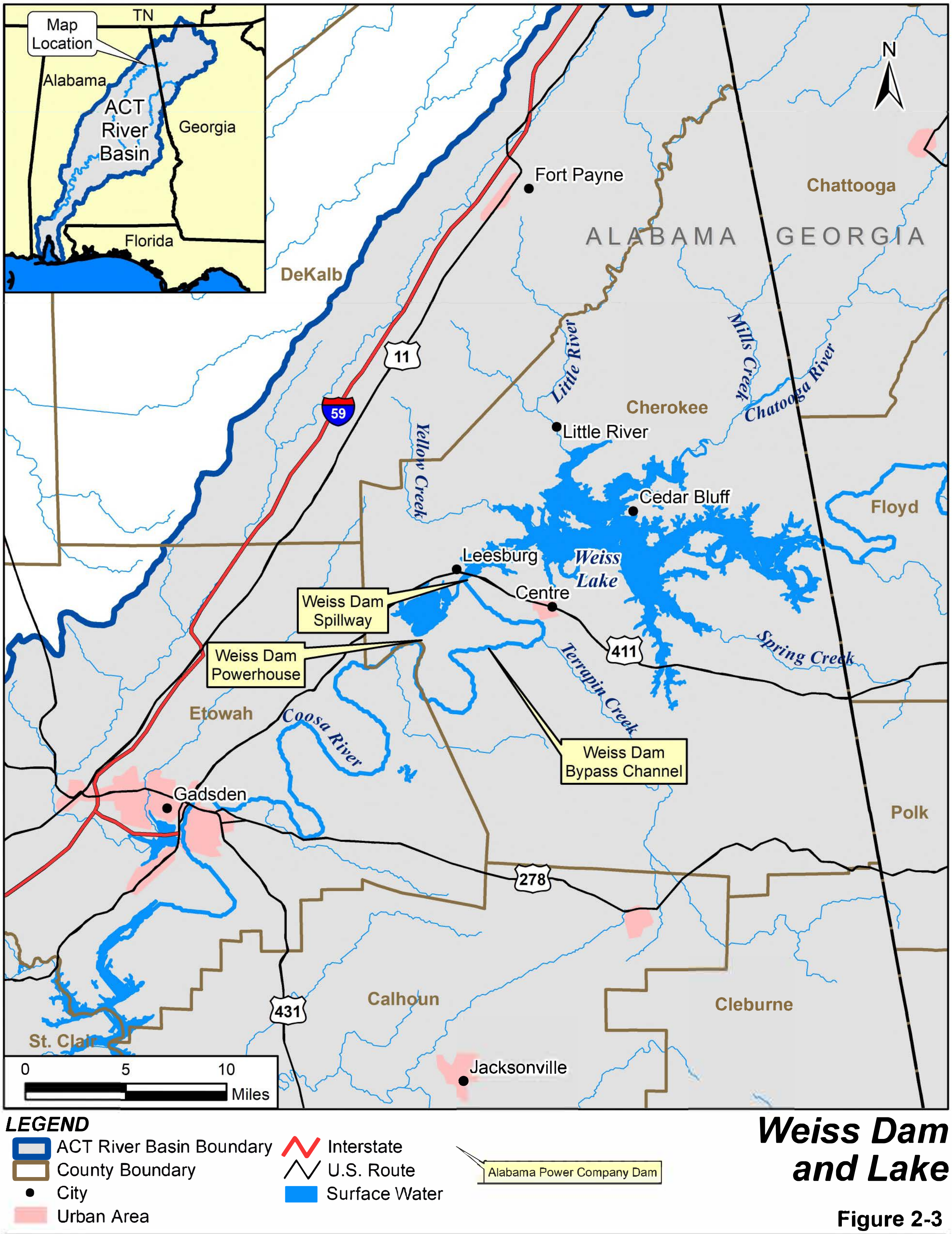


Figure 2-2. Allatoona Lake—Current Storage Allocation

The top of the conservation pool at Allatoona Lake is at elevation 840 ft during the late spring and summer months (May through August); transitions to elevation 835 ft in the fall (October through mid-November); transitions to a winter drawdown to elevation 823 ft (January 1-15); and refills back to elevation 840 ft during the winter and spring wet season. 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. The project also has four action zones within the conservation storage that provide water control regulation guidance to meet water conservation while balancing the use of available storage to meet the project purposes. 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 the four action zones. A more detailed description of Allatoona Dam and its operations, including the action zone criteria, are further described in Appendix A.

2.1.2 Weiss Dam and Lake

The Weiss Dam and Lake project is on the Coosa River at RM 225.7, about 50 mi upstream of Gadsden, AL, and about 1 mi southeast of the town of Leesburg, AL. The reservoir, extending from the dam about 52 mi upstream to Mayo's Bar, GA, is in Cherokee County, AL, and Floyd County, GA. Figure 2-3 shows the general location of the project and Table 2-1 and Table 2-2 present detailed information on the project. Weiss Dam and Lake is a multiple-purpose project and is the furthest upstream of APC's seven reservoirs on the Coosa River. APC built it principally for hydropower production and federally authorized flood risk management and navigation purposes. The generating capacity of the Weiss powerhouse is 87.75 MW. The project also incidentally serves as a source of water supply for domestic, agricultural, and M&I uses, and the lake provides a large surface area of 30,027 ac for water-based recreation, with opportunities for fishing, boating, and other water-based activities. The reservoir has 447 mi of shoreline and a maximum depth of 62 ft and a relatively shallow average depth of about 10 ft at the normal summer pool elevation of 564 ft.



Weiss Dam and Lake

Figure 2-3

The Weiss project has a diversion dam with a gated spillway located on the Coosa River channel. A canal about 7,000 ft long carries water from the main reservoir at the spillway to the forebay of the powerhouse. Discharges through the Weiss Lake powerhouse flow into a 1,300-ft-long, man-made tailrace canal which reenters the Coosa River at the downstream end of a 20-mi bypass reach of the Coosa River channel between the diversion dam spillway and the juncture of the powerhouse tailrace canal with the Coosa River (FERC, 2009). The spillway maintains a minimum flow in the bypassed river channel and is primarily used to pass basin inflows during flood events that exceed the discharge capacity of the powerhouse. Figure 2-3 shows the locations of the spillway, powerhouse, and bypass reach of the Coosa River. Appendix A contains more detailed information on the Weiss Dam and Lake project, including the minimum flow requirements for the bypass channel.

From May through the end of August, the reservoir is normally operated near full-pool elevation of 564 ft during normal inflows and average system-generating requirements. A drawdown of the reservoir begins in September and continues to the end of December, when the level is lowered to elevation 558 ft. The reservoir begins refilling on January 1 and continues to refill until April 30, when full pool is normally reached. Available conservation storage is 263,417 ac-ft (USACE Mobile District, 2014b). Conservation storage is used for hydropower generation, releases for navigation and minimum flows, and seasonally for added flood risk management capacity for small flood events associated with the winter pool drawdown period. The dedicated flood storage capacity for Weiss Lake is 397,759 ac-ft, located between elevations 564 ft and 574 ft (FERC, 2009). The current storage allocation at Weiss Lake is depicted on Figure 2-4.

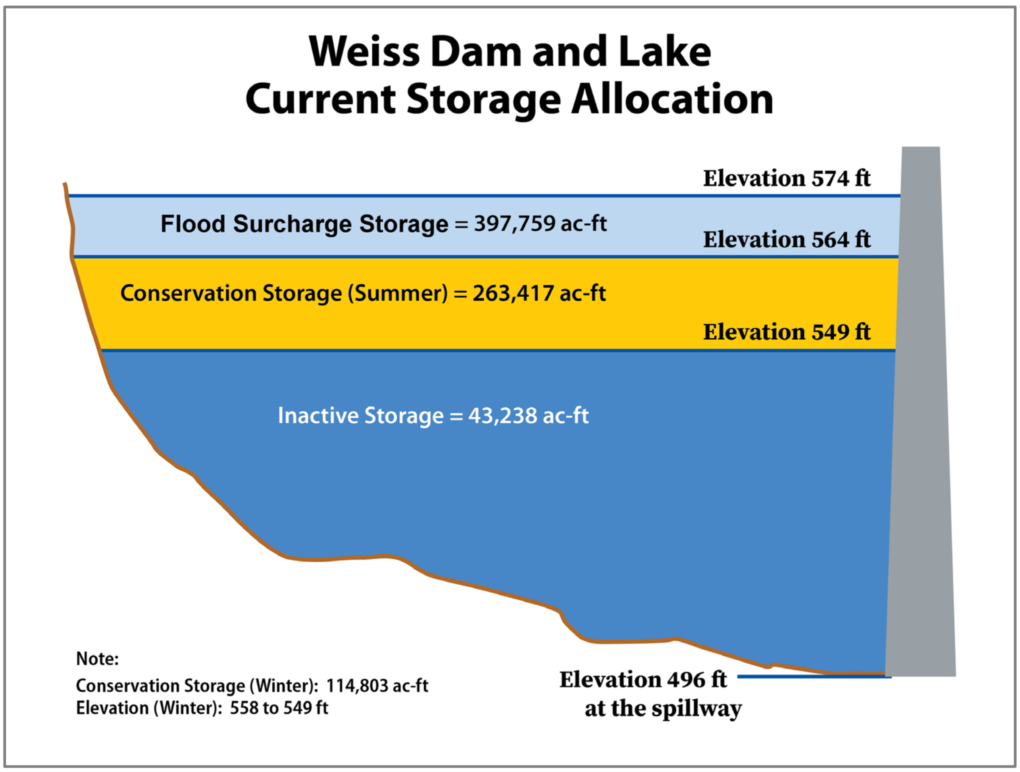


Figure 2-4. Weiss Lake—Current Storage Allocation

2.1.3 Logan Martin Dam and Lake

Logan Martin Dam and Lake is a multipurpose project on the Coosa River at RM 99.5, about 13 mi upstream from Childersburg, AL. The lake, extending upstream 48.5 mi to H. Neely Henry Dam, is in Calhoun, St. Clair, and Talladega counties, AL. Figure 2-5 shows the general location of the project and Table 2-1 and Table 2-2 present detailed information on the project. The lake has 275 mi of shoreline and a maximum depth of 69 ft at the dam (FERC, 2009). It has a surface area of 15,269 ac and a total storage capacity of 273,467 ac-ft at the top of the conservation pool (465 ft). Available conservation storage is 141,897 ac-ft (USACE Mobile District, 2014b). APC built Logan Martin Dam and Lake principally for hydropower production and for federally authorized flood risk management and navigation purposes. The reservoir incidentally provides water supply for domestic, agricultural, and M&I uses and a large surface area for water-based recreation, including fishing, boating, and other water sports. The dedicated flood storage capacity for Logan Martin Lake is 245,673 ac-ft, located between elevations 465 ft and 477 ft (FERC, 2009). The current storage allocation for Logan Martin Lake is shown on Figure 2-6. APC coordinates the operation of Logan Martin Lake with other projects on the Coosa River to minimize flooding. When basin inflow to the project exceeds the power plant's capacity (32,700 cfs), the excess is released through the spillway. Appendix A contains more detailed information on the Logan Martin Dam and Lake project.

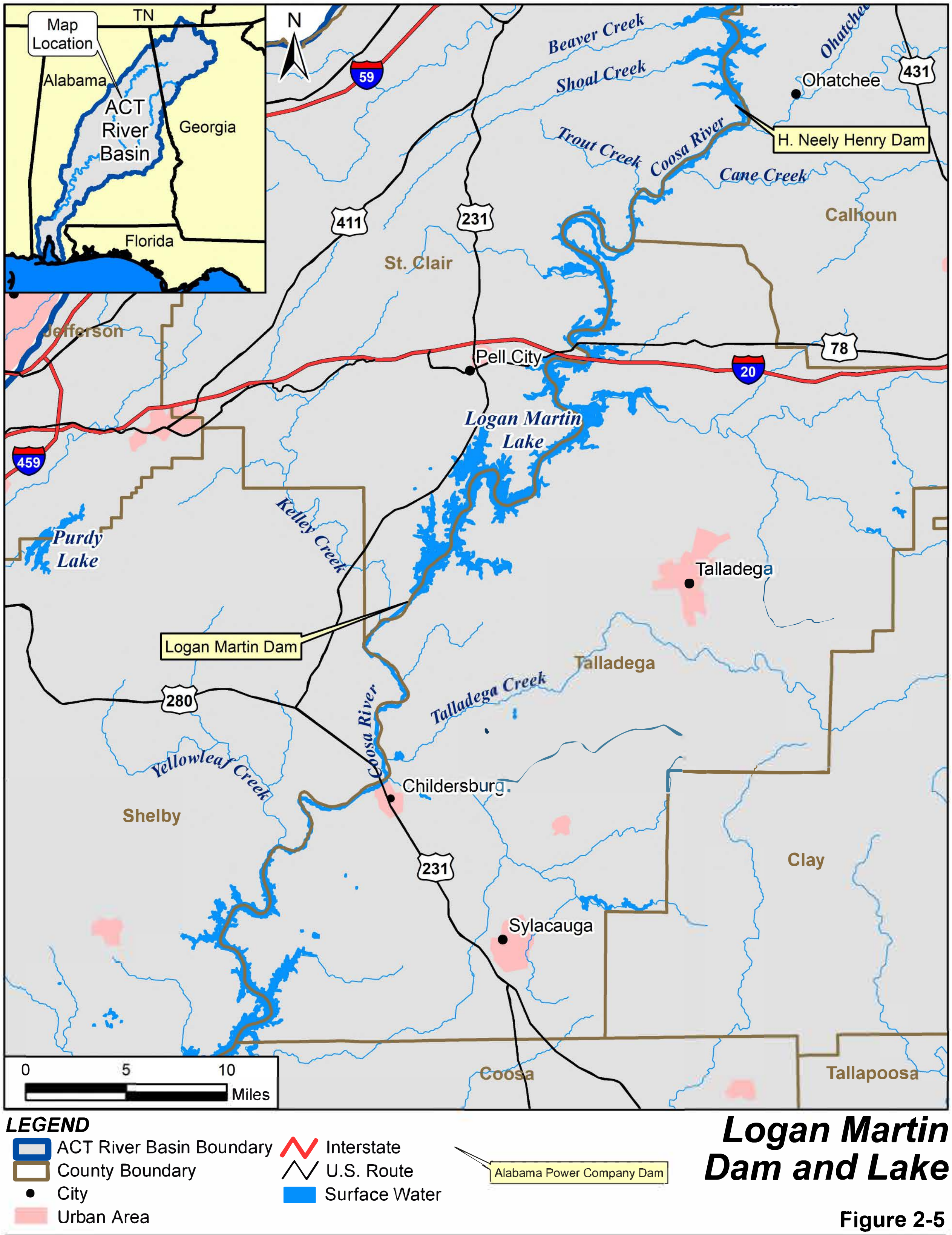
APC normally operates Logan Martin Lake in a peaking mode for several hours each weekday, depending on electrical power demand. Discharges from the Logan Martin Lake powerhouse enter the upper reaches of Lay Lake immediately downstream from Logan Martin Lake. The generating capacity of the project is 128.25 MW.

From May 8 through the end of September, Logan Martin Lake is operated from the full-pool elevation of 465 ft during normal inflows and system-generating requirements. Beginning on October 1, the guide curve decreases to elevation 463 ft at the end of the month. Between November 1 and December 31, the water level drops to elevation 460 ft where it remains until March 30. On April 1, the water level begins rising toward the normal full-pool elevation of 465 ft on May 8 (FERC, 2009).

2.2 Litigation Background Related to the Proposed Actions

In 1981, CCMWA requested USACE to reallocate additional storage in Allatoona Lake for M&I water supply. USACE completed its review of CCMWA's request in 1989 and proposed to reallocate 34,864 ac-ft of storage in Allatoona Lake for use by CCMWA and others for water supply. The USACE recommendation was based on the findings of its study report and its determination that no significant environmental impacts would result. The State of Alabama sued USACE in 1990 to block finalization of the storage reallocation recommendation for Allatoona Lake and a similar storage reallocation proposal at Carters Lake for the City of Chatsworth, GA. That lawsuit has resulted in years of litigation, further studies, and negotiations. USACE action on the CCMWA-requested storage reallocation at Allatoona Lake was not finalized.

On January 3, 1992 the governors of Alabama, Florida, and Georgia and the Assistant Secretary of the Army for Civil Works signed a Memorandum of Agreement (MOA) to address water resource issues of concern in the Apalachicola-Chattahoochee-Flint (ACF) River Basin and the ACT River Basin by conducting a comprehensive study of the basins, in partnership among the states and USACE, to develop the needed water resources data and to investigate the feasibility of implementing an interstate coordination mechanism (compact) for resolving water resources issues in the ACF and ACT basins. Studies continued over several years as subsequent supplemental MOAs extended the term of those agreements. The comprehensive study partners recommended river basin compacts among the states as the mechanism for negotiating water allocation formulas and managing the basins. Interstate River Basin Compacts for each basin, were signed into law by the President in November 1997; the MOAs were allowed to expire in September 1998 (USACE Mobile District, 2014b).



Logan Martin Dam and Lake

Figure 2-5

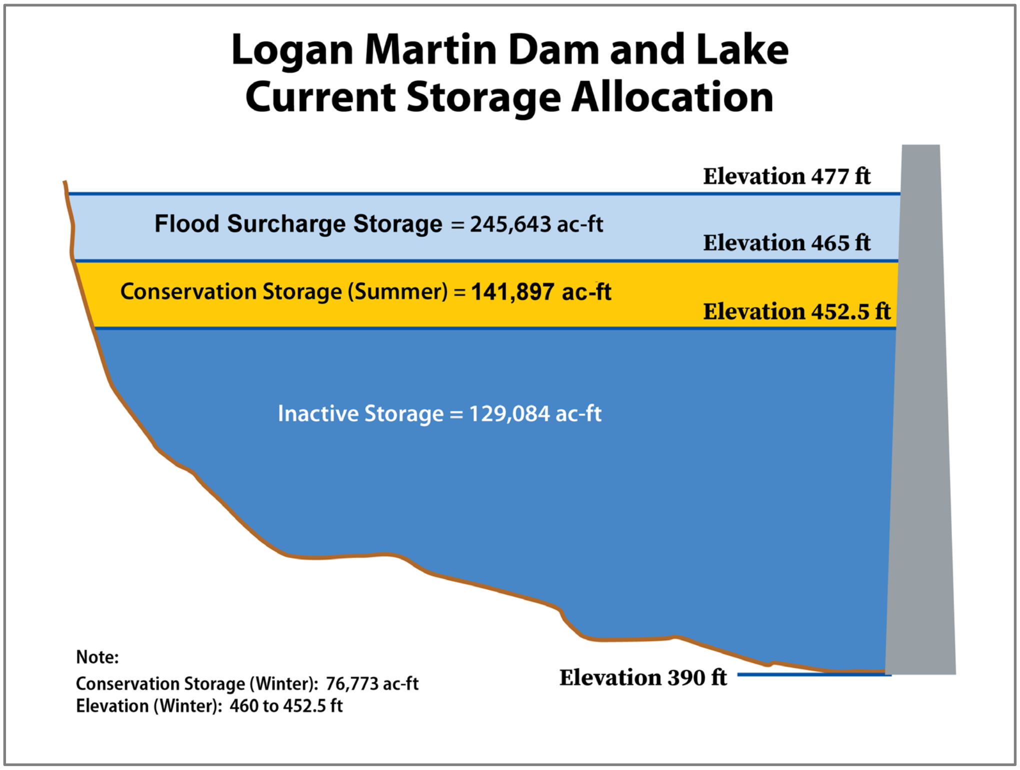


Figure 2-6. Logan Martin Lake—Current Storage Allocation

Compact negotiations began in early 1998, with a December 31, 1998, deadline for reaching agreement on the water allocation formulas. By mutual agreement and in accordance with the provisions of the compacts, the states extended the deadline numerous times. Nevertheless, the state commissioners (governors of each state) were unable to reach an agreement on an equitable apportionment of the waters in either basin, and the compacts were allowed to expire in August 2003 (ACF River Basin) and in July 2004 (ACT River Basin) (USACE Mobile District, 2014b).

Subsequent to the expiration of the ACT River basin compact, USACE recognized that the population and demand for water resources in the ACT River Basin had changed substantially in the years since the federal reservoirs were authorized and constructed and initiated a process in 2008 to update the Master Manual for the ACT River Basin to address changes resulting from years of growth and development. As the ACT River Basin Master Manual update process was underway, the State of Alabama's claims in the ACT River Basin were ultimately dismissed by the courts in 2012. Additionally, the State of Georgia submitted a revised request for water supply storage reallocation at Allatoona Lake on January 24, 2013, in a letter from Governor Nathan Deal to the Assistant Secretary of the Army for Civil Works (the "2013 Request"). As the USACE ACT River Basin Master Manual update process was well underway when the request was received, USACE deferred action on the state's request. Accordingly, the ACT River Basin Master Manual update was completed and approved in May 2015 without addressing the state's request for additional water supply storage in Allatoona Lake. USACE acknowledged the need for a future separate action on the state's water supply request.

In the intervening years, CCMWA and its retail customers invested in projects designed to reduce water supply needs through conservation and to increase the amount of water CCMWA could store in Allatoona Lake. Those projects were intended to minimize environmental impacts and maximize the use of existing infrastructure by augmenting the amount of water flowing into the existing storage space in the reservoir, including (1) the return of about 17 million gallons of highly treated, reclaimed water per day to Allatoona Lake for reuse and (2) the construction of the Hickory Log Creek Reservoir upstream of Allatoona Lake to release water for withdrawal by CCMWA to supplement its Allatoona Lake supplies.

In November 2014, the State of Georgia, the Atlanta Regional Commission, and CCMWA filed suit in federal court in Georgia to compel USACE to act on the pending water supply request for Allatoona Lake (*State of Georgia v. U.S. Army Corps of Engineers*, Civil Action No. 1:14-cv-03593 [N.D. Ga. filed November 7, 2014]). Following oral arguments in August 2017, the United States District Court for the Northern District of Georgia ruled in the Georgia Parties' favor on September 29, 2017, finding that USACE unreasonably delayed responding to the Georgia Parties' water supply requests at Allatoona Lake. On January 9, 2018, the Court issued a judgment holding that USACE had unreasonably delayed action on Georgia's 2013 water supply request and directed USACE to take final action responding to that request by March 2021. As part of the judgment, the State and CCMWA agreed that USACE could fulfill its duty to answer the pending requests by responding to and addressing the issues raised by the State of Georgia's 2013 request, as updated. On March 30, 2018, GAEPD submitted a further updated water supply request to USACE that reflected reduced future water supply demand projections in response to water conservation and the efficiency measures undertaken by the water providers in recent years.

In February 2017, the CCMWA filed a separate suit against USACE (*Cobb County-Marietta Water Authority v. U.S. Army Corps of Engineers*, Civil Action No. 1:17-cv-400 [N.D. Ga.]), challenging the "storage accounting system" USACE uses to determine the amount of water available to CCMWA from its storage space in Allatoona Lake. CCMWA alleged that the USACE storage accounting system illegally interferes with CCMWA's water rights and allocates less water to CCMWA than it should. Based on its current storage accounting practices, USACE has concluded that CCMWA at times withdraws more water than its storage agreement allows. This suit is currently stayed.

Separately, the State of Alabama and APC filed suit against USACE in federal court in Washington, DC, to challenge the 2015 Master Manual update and Final EIS. Those suits challenged USACE compliance with NEPA as well as the operational rules adopted by USACE. The consolidated case is *Alabama et al. v. U.S. Army Corps of Engineers*, Civil Action No. 1:15-cv-696 (D.D.C. filed May 7, 2015). The cities of Montgomery and Mobile, AL, also intervened in this case. In the suit, the plaintiffs brought challenges to the 2015 ACT River Basin Master Manual under the Administrative Procedures Act (5 U.S.C. § 551 *et seq*.) alleging that USACE violated NEPA, the Clean Water Act (CWA), and its own regulations. The State of Alabama and APC case is still pending.

Independent of USACE actions in the ACT River Basin to complete the ACT WCM update process and subsequently initiate this ACR Study, FERC issued a new license to APC in 2013 for its Coosa River projects to guide dam and reservoir operations for the next 30 years. FERC was subsequently petitioned to revisit the license based on an insufficient environmental assessment to support the issuance of the license. In July 2018, after an appeal, the U.S. Court of Appeals overturned the license for failing to adequately account for the negative effects of the prescribed operations on Coosa River flora and fauna. The FERC license was subsequently vacated, and the dams are currently operating under the previous license while both FERC and APC work to address the environmental concerns. It is expected that the new FERC license, when issued, would incorporate pertinent changes to flood operations at the APC Weiss and Logan Martin projects that may be approved as a result of this ACR Study.

2.3 Current Water Supply Storage Agreements at Allatoona Lake

USACE currently has water supply agreements at Allatoona Lake with two local water providers, CCMWA and the City of Cartersville, GA. The Final EIS for the 2015 ACT River Basin WCM update stated that the agreements, when executed, contemplated the use of the following amounts of reservoir storage: 6,371 ac-ft for the City of Cartersville and 13,140 ac-ft for CCMWA. The amounts of storage stated in those agreements were estimated at the time the agreements were executed to yield 16.76 mgd and 34.5 mgd, respectively, during the critical drought (i.e., the worst drought on record at the time the agreements were executed) (USACE Mobile District, 2014b).

The severity and frequency of droughts change over time, however, and more recent storage-yield analyses by USACE have indicated that the estimated yield of ACT River Basin reservoir storage has decreased. Area-capacity curves for

Allatoona Lake have been updated using hydrography and topography data collected in 2009. The previous area-capacity curves for Allatoona Lake were published in the revised August 1962 Reservoir Regulation Manual for the project (USACE Mobile District, 1962) and subsequently in the December 1993 WCM for the project (USACE Mobile District, 1993). The updated area-capacity curves indicate that sedimentation has caused about a 5-percent reduction in reservoir storage capacity since the previous area-capacity curves were developed (Tetra Tech, Inc., 2012a). Accordingly, the reservoir storage allocated to water supply per the existing agreements has likewise been proportionately reduced to 6,054 ac-ft for the City of Cartersville and to 12,485 ac-ft for CCMWA. The 2006–2008 drought has been established as the critical drought period for the more recent storage-yield analyses by USACE. Based upon the revised water supply storage values, the estimated yield from the current agreements with the City of Cartersville and CCMWA have been reduced to 12.2 mgd and 24.9 mgd, respectively (USACE Mobile District, 2018). Figure 2-2 shows the current water supply storage as a share of the conservation storage in Allatoona Lake.

To manage storage in Allatoona Lake and other USACE reservoirs, the USACE Mobile District has employed a storage accounting methodology that tracks multiple storage accounts, applying to each account a proportion of inflows and losses, as well as direct withdrawals by specific users. Storage limitations indicated by storage accounting are not intended to identify maximum amounts that can be withdrawn on a daily basis or on an average daily basis under the respective water supply agreements.[1] Nor do these figures represent any guarantee by USACE that these amounts will be available for withdrawal at all times.[2] Rather, these figures reflect the estimated maximum water supply demand that can reasonably be expected to exist, based on past use and the extent to which existing water supply storage would support those withdrawals. The actual amount of water withdrawn is ultimately dependent on the amount of water available in storage, which will naturally change over time.

USACE recognizes that, according to its present method of accounting for storage use at Allatoona Lake, the current and projected future water supply needs of the City of Cartersville and CCMWA exceed the average daily withdrawals contemplated under the original agreements and the amount of storage currently allocated to water supply under those agreements.

2.4 Proposed Changes to Water Supply Storage at Allatoona Lake

In its revised water supply request to USACE on March 30, 2018, GAEPD requested that USACE enter into a storage agreement providing enough storage in Allatoona Lake to enable Georgia users to sustain annual average withdrawals from the reservoir of 94 mgd through year 2050. That amount is substantially lower than the range of 124–148 mgd through year 2040 presented in the state's 2013 water supply request. This change was based on revised population estimates and dramatically lower per capita water-use values directly associated with implementing multiple water conservation and efficiency measures within the Metropolitan North Georgia Water

[1] The water supply storage agreement for the City of Cartersville expressly recognizes that during periods of normal or greater streamflow, the storage space will yield greater quantities than the amount that was expected to be available throughout the drought of record. See Agreement No. DACW01-9-91-120 (October 18, 1991) (City of Cartersville), Article 1.b(1) and Exhibit B at 1. The CCMWA agreement does not contain those express statements, but Exhibit 1, providing the basis for the storage calculation, references an average daily amount of 34.5 mgd (equivalent to the yield during the critical drought), as well as a maximum daily requirement of 58 mgd (which would not be available on a daily basis during the critical drought). See Agreement No. DA-01-076-CIVENG-64-116 (October 31, 1963) (Cobb County-Marietta Water Authority), Exhibit 1 at 1.

[2] The water supply storage agreement for the City of Cartersville expressly states that the agreement provides storage space only and that USACE "makes no representations with respect to the . . . availability of water." See Agreement No. DACW01-9-91-120 (October 18, 1991), Art. 1.d; and Agreement No. DACW01-9-91-481 (November 15, 1991), Article 1.d. Those agreements also expressly recognize that less water would be available for withdrawal during more severe drought periods. See Agreement No. DACW01-9-91-120 (October 18, 1991), Art. 1.b(1) and Ex. B at 1; Agreement No. DACW01-9-91-481 (Nov. 15, 1991), Art. 1.b(1) & Ex. B at 1. The CCMWA agreement does not contain those express statements, but it does make clear that CCMWA's ability to withdraw water is dependent on the availability of water in storage. See Agreement No. DA-01-076-CIVENG-64-116 (Oct. 31, 1963), art. 1.

Planning District (MNGWPD) since 2010. GAEPD also requested that USACE specify how much storage it can reallocate and explain in detail its reasoning, if it determines not to grant the entire storage capacity requested to support the stated water supply demand.

The State of Georgia recognized that the storage capacity required to support average annual withdrawals of 94 mgd will depend upon the assumptions USACE makes about the relationship between storage capacity and yield. They include assumptions about the total natural inflow to Allatoona Lake; the extent to which natural inflows are augmented by made inflows (consisting of releases from the Hickory Log Creek Reservoir and return flows to Allatoona Lake); the manner in which made inflows are allocated to users; the rule used to determine when storage space allocated to water supply users is full; and the rule used to determine each user's share of conservation storage for purposes of allocating natural inflows to the project. USACE's assumptions, which the state's request separated into two categories—made inflows and other storage accounting issues—are reflected in the storage accounting practices USACE applies at Allatoona Lake and other reservoir projects. The state disagrees with those assumptions and has requested that USACE review and revise its storage accounting practices consistent with the state's position.

The state's January 2013 request sought changes to the USACE storage accounting practice and included a specific request to credit the made inflows from the Hickory Log Creek Reservoir and return flows to Allatoona Lake. Subsequent to the State of Georgia's 2013 request, the Georgia Department of Natural Resources (GADNR) promulgated rules clarifying GAEPD's authority and procedures for allocating made inflows to specific users (Georgia Compiled Rules and Regulations [Ga. Comp. R. & Regs.] 391-3-6-.07(2)(o) and (16)(a)). Pursuant to that authority, the State of Georgia has allocated certain made inflows to CCMWA, which is reflected in GAEPD Permit No. 008-1491-05 (modified Nov. 7, 2014) ("CCMWA's permit"). The State of Georgia requested that USACE honor CCMWA's permit (and any subsequent renewal), which grants CCMWA the exclusive right to impound water released from Hickory Log Creek Reservoir and certain return flows in CCMWA's existing storage space in Allatoona Lake, subject to available space in CCMWA's storage. Further, the state requested that USACE credit made inflows in accordance with any future allocations by the GAEPD.

In addition, CCMWA and the state also have other outstanding issues with USACE storage accounting practices at Allatoona Lake that are the subject of ongoing litigation between CCMWA and USACE (*Cobb County-Marietta Water Authority v. U.S. Army Corps of Engineers,* Civil Action No. 1:17-cv-400-RWS [N.D. Ga.]) (the "Storage Accounting Litigation"). The State of Georgia has requested that USACE determine that water supply storage accounts in Allatoona Lake must be full whenever conservation storage, as defined by the project's guide curve, is full. The state asserts that USACE's current storage accounting practices improperly allocate natural inflows (all inflows that are not *made inflows*) using a fixed percentage of conservation storage, even though CCMWA's *pro rata* share of conservation storage increases in the winter when the volume of conservation storage is reduced. The State has requested USACE to allocate natural inflows to users in proportion to the percentage of conservation storage held by a user at the time the inflow occurs, as defined by the top-of-conservation guide curve.

The reallocation of reservoir storage for water supply purposes could come from the conservation storage only, from a combination of conservation storage and flood storage, or from flood storage only. Reallocation from a combination of conservation storage and flood storage, or from flood storage only, would require raising the project guide curve to a pool elevation throughout the year that would encompass the volume of flood storage being reallocated. The storage reallocation options are discussed in more detail in Section 4.0, which summarizes the plan formulation and evaluation process for Georgia's reallocation request, and in Appendix B (Plan Formulation).

2.5 Current Flood Operations at APC Weiss and Logan Martin Projects

The sections that follow this introduction describe current flood operations at Weiss and Logan Martin dams, as specified in the currently approved WCMs for those projects. At both projects, flood operations are conducted using flood storage that is available when the spillway gates (also called tainter gates) on the dam are closed and induced surcharge storage features. The left half of Figure 2-7 depicts the limited flood storage that would be available prior to opening the spillway gates. Runoff from a rainfall event would be temporarily stored in that area while it is safely passed through the downstream channel system, generally through hydropower releases. In a larger rainfall event, that storage capacity may be exceeded, requiring that the spillway gates be opened to begin releasing flood waters through the spillway gates and concurrently providing additional temporary "induced surcharge storage" (as shown in the right half of Figure 2-7). Depending on the magnitude of the flood event, induced surcharge operations may continue up to a maximum surcharge elevation defined for each project. Induced surcharge operations would be maintained until the magnitude of the flood event recedes to a level where the operators can once again close the spillway gates and evacuate the remaining water in flood storage by maximizing hydropower releases.

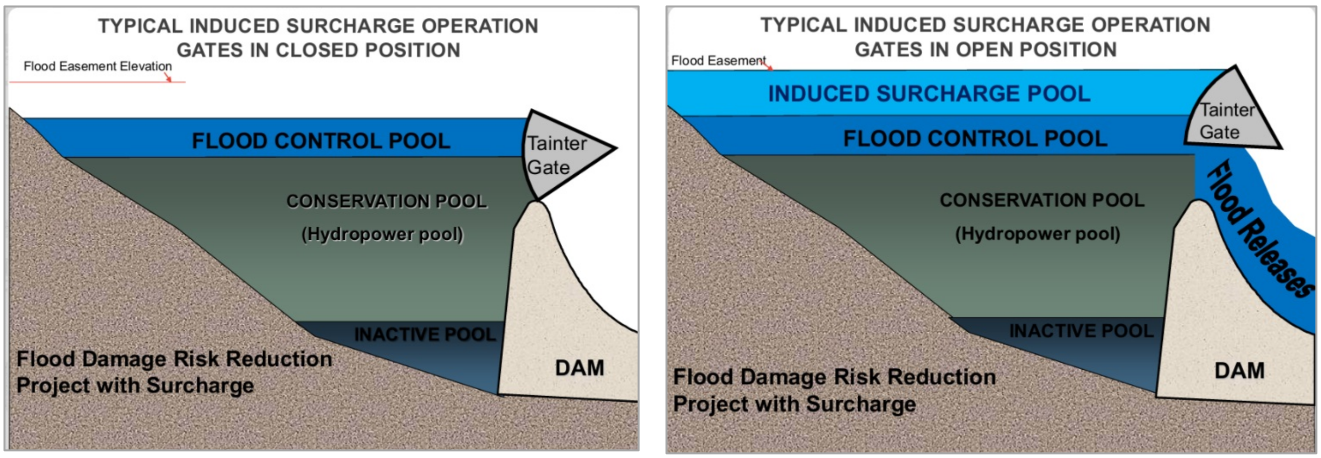


Figure 2-7. General Schematic of Flood Operations with Induced Surcharge Storage

2.5.1 Weiss Dam and Lake

This section summarizes current flood operations at the APC Weiss Dam, as described in the currently approved WCM for the project (USACE Mobile District, 2004a). The drainage area above Weiss Dam is 5,270 sq mi. Within that area, the USACE Allatoona Dam project controls the runoff from 1,122 sq mi of the upper Etowah River basin, and the Carters Dam project controls the runoff from 374 square miles of the upper Coosawattee River basin. There are 3,774 sq mi of drainage area above Weiss Dam not controlled by Allatoona and Carters dams. The Weiss Dam and Lake project provides storage for flood operations between elevations 564 ft and 574 ft (397,759 ac-ft) and additional storage for flood operations between elevations 558 ft and 564 ft (up to 148,400 ac-ft) during the winter/spring reservoir drawdown period. Assuming normal inflows and average system-generating requirements, the reservoir project is operated near full-pool elevation of 564 ft from May through the end of August. Beginning in September, the reservoir guide curve and corresponding pool level gradually decreases to elevation 558 ft by the end of December. Reservoir refilling begins around January 1 and continues until the end of April, when the guide curve returns to the normal full-pool level (elevation 564 ft) (see Figure 2-8). The guide curve delineates the boundary between conservation storage and flood storage in the reservoir and represents the top of conservation storage through the year. The maximum surcharge elevation represents the top of flood storage in the reservoir.

To the maximum extent possible, APC maintains the reservoir level on the project guide curve within the limits of the discharge capacity of the power plant (24,650 cfs). When the inflow causes the reservoir to rise above the project guide curve with the power plant operating at full capacity, the plant will operate continuously at full capacity until the reservoir recedes to the level designated by the project guide curve (USACE Mobile District, 2004a).

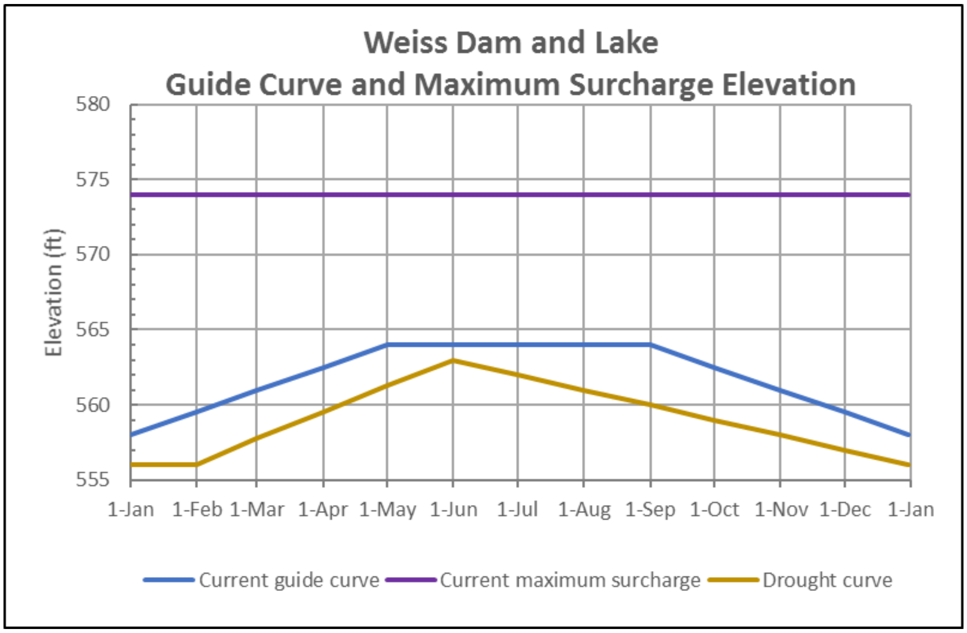


Figure 2-8. Weiss Dam and Lake—Current Guide Curve and Maximum Surcharge Elevation.

When the reservoir level is at elevation 564 ft, all inflow is passed through the power plant until its discharge capacity is exceeded. Thereafter, the excess is passed through the spillway with gate positions adjusted at the end of each 6-hour period as required to maintain the reservoir at elevation 564 ft, until the total release rate (spillway plus powerhouse) reaches 40,000 cfs. Thereafter, as long as the inflow continues to equal or exceed 40,000 cfs, APC limits the release rate to 40,000 cfs until the reservoir rises and/or the inflow increases to a point at which a higher release rate is dictated by the induced surcharge curve for the project. Every 6 hours thereafter, the release rate is adjusted to conform to the induced surcharge schedule. At all times, when release rates higher than 51,000 cfs are scheduled, the excess must be discharged continually through the gated overflow section adjacent to the powerhouse to its capacity until the rate of reservoir release decreases to 51,000 cfs. During that time, the powerhouse overflow section operates as a control works to improve flow conditions in the river reach between the dam and the powerhouse (USACE Mobile District, 2004a).

When the rate of inflow equals the reservoir release rate, the positions of the spillway gates at that time are maintained during the evacuation of flood storage above elevation 564 ft until the reservoir level recedes to elevation 564 ft. In the event a second flood enters the reservoir before evacuation to elevation 564 ft is complete, the rate of reservoir release will be as dictated by the induced surcharge schedule. When the reservoir level has receded to elevation 564 ft, APC operates the power plant at capacity until the reservoir pool elevation coincides with the project guide curve, after which the power plant is operated as required to maintain the reservoir on or below the project guide curve. The current Weiss Dam Flood Regulation Schedule rules are presented in Table 2-3 (USACE Mobile District, 2004a).

The currently approved regulation plan substantially improves downstream flow conditions associated with high-to-moderate frequency floods compared to pre-dam conditions. The amount of reservoir storage allocated to flood operations is limited and generally will not provide an appreciable reduction in major flood peaks. Consequently, special consideration is given to operating the reservoir during a major flood event. When firm forecasts indicate that a major flood is occurring in the Coosa River basin, APC and the USACE, Mobile District Commander, will collaborate in promptly analyzing all available information and developing special operating procedures appropriate to the circumstances to maintain hydropower output and most effectively use flood control capacities, including whether deviating from the induced surcharge schedule will improve flood operations. Any departure from the regulation schedule requires approval of the USACE, South Atlantic Division Commander.

Table 2-3. Weiss Dam—Current Flood Regulation Schedule

Rule	Condition	Outflow	Operation
1	Below project guide curve	Ranging up to full discharge capacity of power plant	Operate power plant as required to satisfy normal system load requirements.
2	At project guide curve and below elevation 564.0 ft	Ranging up to full discharge capacity of power plant	Releases shall be made through power plant at rates up to continuous operation at plant capacity (3 units at full gate) as required to keep reservoir stage at or below project guide curve as long as this level is below elevation 564.0 ft.
3	Above project guide curve and below elevation 564.0 ft	Full discharge capacity of power plant	Releases shall be made through power plant operating continuously at plant capacity (3 units at full gate) until reservoir stage: • Recedes to project guide curve, after which rule 2 applies, or • Reaches elevation 564.0 ft, after which rule 4 applies.
4	At elevation 564.0 ft	Ranging up to 40,000 cfs	Maintain reservoir stage at elevation 564.0 ft by passing the inflow up to 40,000 cfs. Releases will be made through the power plant operating continuously at plant capacity (3 units at full gate) supplemented by spillway discharge as required.
5	Rising above elevation 564.0 ft	40,000 cfs unless higher rate is specified by induced surcharge schedule	Maintain total discharge of 40,000 cfs by discharging through the power plant operating continuously at plant capacity (3 units at full gate) supplemented by spillway discharge as required. Continue this operation until: • Reservoir stage recedes to elevation 564.0 ft, after which rule 4 applies, or • Reservoir stage and rate of inflow are such that a higher rate of outflow is required by induced surcharge schedule, in which case rule 6 applies.
6	Rising above elevation 564.0 ft with releases above 40,000 cfs specified by induced surcharge schedule	As specified by induced surcharge schedule	Operate according to induced surcharge schedule, passing the required outflow through the power plant and spillway. Special Note: Whenever the schedule specifies an outflow higher than 51,000 cfs, the excess shall be discharged through the gated overflow section adjacent to the powerhouse to its capacity until the reservoir outflow decreases to 51,000 cfs.
7	Above elevation 564.0 ft and falling	As specified by induced surcharge schedule	When the reservoir level begins to fall, maintain the gate openings in effect at the time of peak reservoir stage and continue power plant discharge in effect at that time until the reservoir level recedes to elevation 564.0 ft. When the pool recedes to elevation 564.0 ft, rule 4 applies.

In the event of a localized storm centered over one of the downstream reservoirs in the basin, APC could modify operations at the Weiss project to temporarily reduce releases to the maximum extent feasible to help alleviate downstream flooding conditions. USACE and APC have arranged for regular and rapid exchange of data to permit the fullest coordination of their operations.

2.5.2 Logan Martin Dam and Lake

This section summarizes current flood operations at the APC Logan Martin Dam, as described in the currently approved WCM for the project (USACE Mobile District, 2004b). Approximately 68 percent of the 7,743 sq mi drainage area above Logan Martin Dam is located above Weiss Dam. The Logan Martin Dam and Lake project provides storage for flood operations between elevations 465 ft and 477 ft (245,673 ac-ft) and additional storage for flood operations between elevations 460 ft and 465 ft (66,700 ac-ft) during the winter/spring reservoir drawdown period. Assuming normal inflows and system-generating requirements, APC operates the reservoir project near the full-pool elevation of 465 ft from May 8 through the end of September. Beginning on October 1, the guide curve and corresponding pool level decrease to elevation 463 ft by the end of October. Between November 1 and December 31, the guide curve and corresponding pool level further decrease to elevation 460 ft, where it remains until March 30. Between April 1 and May 8, the guide curve and corresponding water level return to the normal full-pool elevation of 465 ft (see Figure 2-9) (FERC, 2009).

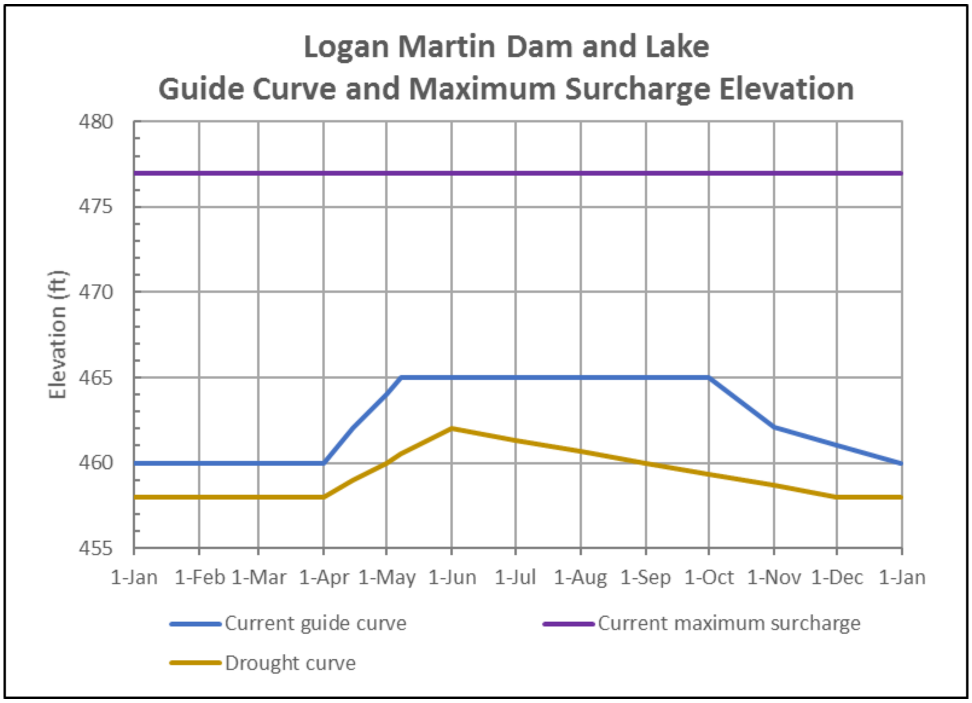


Figure 2-9. Logan Martin Dam and Lake—Current Guide Curve and Maximum Surcharge Elevation.

When the reservoir level is equal to the guide curve elevation, the basin inflow is passed up to 50,000 cfs. Normally, the inflow is discharged through the power plant until its discharge capacity (33,000 cfs) is exceeded, after which the excess is discharged through the spillway, with gate positions adjusted at the end of each 6-hour period as necessary to maintain the reservoir at the guide curve elevation. If, for any reason, the power plant is inoperative, the total required discharge is passed through the spillway. As long as the basin inflow equals or exceeds 50,000 cfs, the release rate is limited to 50,000 cfs until the water level rises and/or the basin inflow increases to a point at which a higher release rate is dictated by the project's induced surcharge curve. Every 6 hours thereafter, the release rate is adjusted to conform to the induced surcharge schedule (USACE Mobile District, 2004b).

When the rate of reservoir inflow equals the reservoir release rate, the positions of the spillway gates in effect at that time are maintained during the evacuation of flood storage until the reservoir level recedes to the applicable guide curve elevation at that time. In the event a second flood enters the reservoir before evacuation to the guide curve elevation is complete, the position of the spillway gates will not be changed unless a higher release rate is dictated by the induced surcharge schedule. When the reservoir level has receded to the guide curve elevation, APC operates the power plant and spillway gates as necessary to maintain the reservoir at or below the guide curve elevation. The current Logan Martin Dam Flood Regulation Schedule rules are presented in Table 2-4 (USACE Mobile District, 2004b).

Table 2-4. Logan Martin Dam—Current Flood Regulation Schedule

Rule	Condition	Outflow	Operation
1	Below project guide curve	Up to plant capacity	Operate power plant as required to satisfy normal system load requirements.
2	At the project guide curve elevation	Ranging up to 50,000 cfs	Maintain reservoir stage at guide curve elevation by passing the inflow up to 50,000 cfs.
3	Above project guide curve and rising	50,000 cfs unless higher rate specified by the induced surcharge schedule	Maintain total discharge of 50,000 cfs until: • Reservoir stage recedes to guide curve elevation, after which rule 2 applies, or • Reservoir stage and rate of inflow are such that a higher rate of outflow is required by the induced surcharge schedule, in which case rule 4 applies.
4	Above project guide curve elevation with release above 50,000 cfs specified by induced surcharge schedule	As specified by the induced surcharge schedule	Operate according to the induced surcharge schedule, passing the required outflow through the power plant and spillway.
5	Above 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.

The currently approved regulation plan substantially improves downstream flow conditions associated with high-to-moderate frequency floods compared to pre-dam conditions. The amount of reservoir storage allocated to flood operations is limited and generally will not provide an appreciable reduction in major flood peaks. Consequently, special consideration is given to operating the reservoir during a major flood event. When firm forecasts indicate that a major flood is occurring in the Coosa River basin, APC and the USACE, Mobile District Commander, will collaborate in promptly analyzing all available information and developing special operating procedures appropriate to the circumstances to maintain hydropower output and most effectively use flood control capacities, including whether deviating from the induced surcharge schedule will improve flood operations (USACE Mobile District, 2004b). Any departure from the regulation schedule requires approval of the USACE, South Atlantic Division Commander.

In the event of a localized storm centered over one of the downstream reservoirs in the basin, APC could modify operations at the Logan Martin Dam and other upstream reservoir projects to temporarily reduce releases to the maximum extent feasible to help alleviate downstream flooding conditions. USACE and APC have arranged for regular and rapid exchange of data to permit the fullest coordination of their operations (USACE Mobile District, 2004b).

2.6 Proposed Changes to Flood Operations at APC Weiss and Logan Martin Projects

APC proposes revisions to flood operation plans for the Weiss and Logan Martin projects, which include raising the winter guide curve elevation at each project, lowering the upper limit of the induced surcharge operation at each reservoir, and making some adjustments to the operating rules during flood events. Current water control plans for the Weiss and Logan Martin projects include induced surcharge curves with elevations higher than the flowage easements acquired by APC at each project. APC variance requests, evaluated and approved by USACE, have been necessary to avoid/minimize exceedances of APC flowage easements on these reservoirs during major flood events. In 2006, APC began purchasing additional flowage easements downstream of Logan Martin Dam to accommodate increased releases during flood events consistent with APC variance requests. These increased releases are described in more detail in Section 2.6.2. Therefore, the increased releases are considered "non-damaging." The APC-proposed modified flood operations would be conducted in a manner similar to flood operations under previous APC variance requests approved by USACE. USACE evaluation of, and concurrence with, the APC-proposed modifications to the Weiss and Logan Martin flood operation plans would generally preclude the need for such variance requests in the future.

In May 2018, USACE and APC established a Hydrologic Engineering Management Plan (HEMP) to address the long-standing issues related to flood operations at the APC Weiss and Logan Martin projects. The HEMP outlines historic events used to evaluate the effects higher winter pools and revised surcharge curves using the USACE Hydrologic Engineering Center Reservoir System Simulation (HEC-ResSim) model (APC, 2019b). APC provided their analysis of the proposed modified flood operations to USACE, and USACE subsequently conducted a detailed review of the APC flood analysis as part of this ACR study, included in Appendix C, Attachment 5.

2.6.1 Weiss Dam and Lake

APC proposes to increase the project guide curve level during the winter months (December–February) at Weiss Dam and Lake from elevation 558 ft to elevation 561 ft and to reduce the maximum surcharge elevation (top of flood pool) from elevation 574 ft to elevation 572 ft. In addition, APC has proposed to extend the summer guide curve elevation of 564 ft from September 1 to October 1. Current APC reservoir easements at Weiss Dam and Lake are below the required maximum surcharge elevations as described in the original WCM. The current maximum surcharge elevation is 2 ft higher than the APC flowage easement elevation of 572 ft for Weiss Lake. APC has proposed to modify flood operations by releasing more water during flood events to keep reservoir pool levels within the newly proposed maximum surcharge elevation. USACE has conducted additional analysis of potential impacts to private property both upstream and downstream of Weiss Dam. The results of this analysis are detailed in Appendix C and Appendix D. The correspondence received from FERC on October 22, 2020, stated that APC has acquired all necessary real estate for the proposed operation. Pursuant to ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient data is available to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Weiss Dam. It is the responsibility of APC to acquire all necessary real estate interests prior to implementation.

The proposed raising of the winter drawdown elevation by APC is in response to requests by recreational users of the lake to reduce substantial constraints to recreational use that occur at the current winter drawdown level. These requests by recreational users were reaffirmed during the scoping process for this study. The proposed changes would result in a 30-percent reduction in flood storage during the winter months and a 24-percent reduction in flood storage in the summer months. Figure 2-10 shows the storage allocations in Weiss Lake with proposed changes requested by APC. In conjunction with these elevation changes, APC proposes to modify the current Flood Regulation Schedule for Weiss Dam in order to operate with no appreciable increase in flood risk. Figure 2-11 depicts the proposed changes to the project guide curve and maximum surcharge elevation, and Table 2-5 summarizes the proposed changes to flood operations (APC, 2019b).

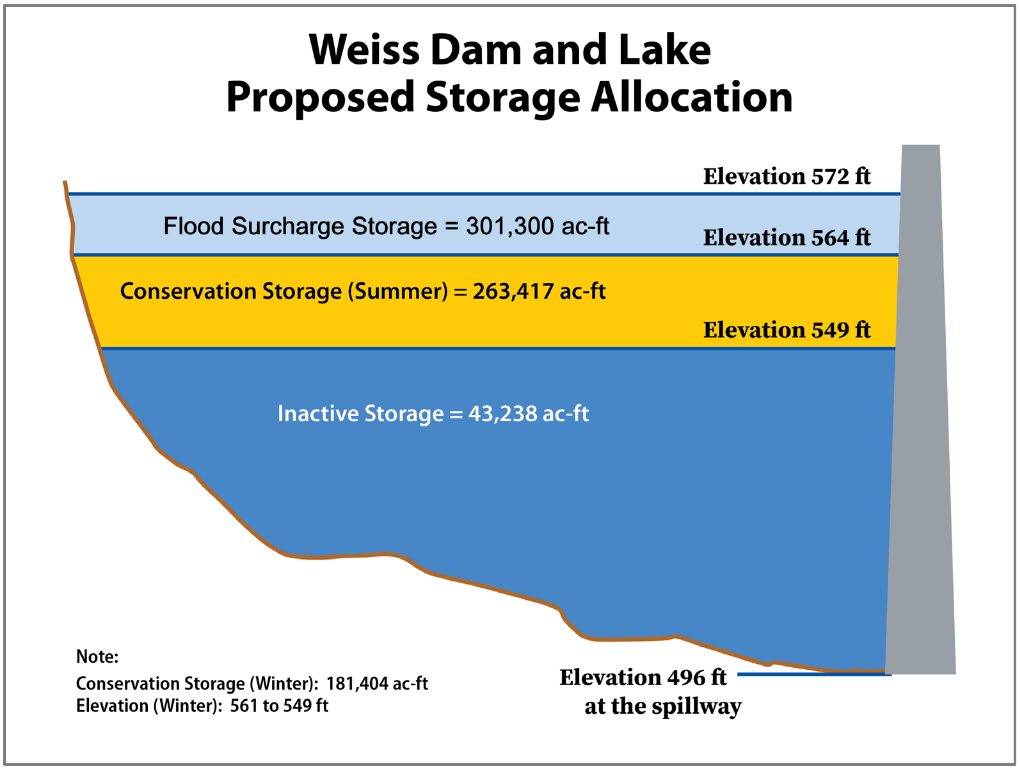


Figure 2-10. Weiss Lake—Storage Allocation with APC-Proposed Changes

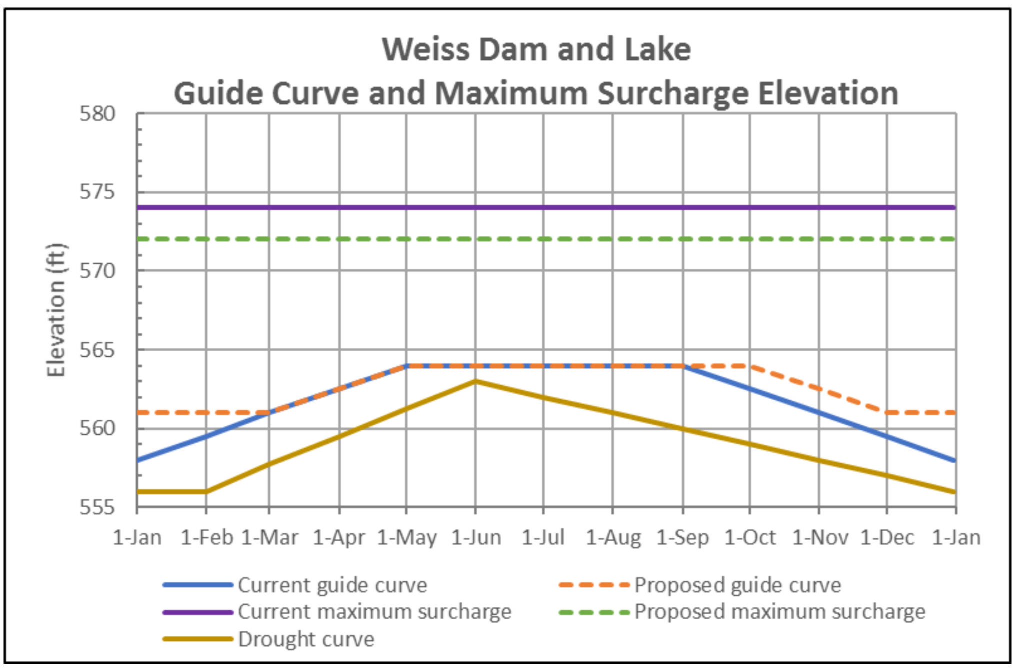


Figure 2-11. Weiss Dam and Lake—Proposed Changes to Guide Curve and Maximum Surcharge Elevation.

Table 2-5. Weiss Dam—Proposed Flood Regulation Schedule

Rule	Condition	Outflow	Operation	Proposed change
1	Below project guide curve	Ranging up to full discharge capacity of power plant	Operate power plant as required to satisfy normal system load requirements.	None
2	At project guide curve and below elevation 564.0 ft	Ranging up to full discharge capacity of power plant	Releases shall be made through power plant at rates up to continuous operation at plant capacity (3 units at full gate) as required to keep reservoir stage at or below the project guide curve as long as the pool level is below elevation 564.0 ft.	None
3	Above project guide curve and below elevation 564.0 ft	Full discharge capacity of power plant	Releases shall be made through the power plant operating continuously at plant capacity (3 units at full gate) until reservoir stage: • Recedes to project guide curve, after which rule 2 applies, or • Reaches elevation 564.0 ft, after which rule 4 applies.	None
4	At elevation 564.0 ft	Ranging up to 40,000 cfs	Maintain reservoir stage at elevation 564.0 ft by passing the inflow up to 40,000 cfs. Releases will be made through the power plant operating continuously at plant capacity (3 units at full gate) supplemented by spillway discharge as required.	None
5	Rising above elevation 564.0 ft	40,000 cfs unless higher rate is specified by induced surcharge schedule	Maintain total discharge of 40,000 cfs by discharging through the power plant operating continuously at plant capacity (3 units at full gate) supplemented by spillway discharge as required. Continue this operation until: • Reservoir stage recedes to elevation 564.0 ft, after which rule 4 applies, or • Reservoir stage and rate of inflow are such that a higher rate of outflow is required by induced surcharge schedule, in which case rule 6 applies.	None
6	Rising above elevation 564.0 ft with releases above 40,000 cfs as specified by induced surcharge schedule	As specified by induced surcharge schedule	Operate according to induced surcharge schedule, passing the required outflow through the power plant and spillway.	New surcharge curves
7	Stages downstream of Weiss exceed or are expected to exceed flood stage due to local inflows	Reduce up to 50% of surcharge schedule	Temporarily reduce the release prescribed by the plan, provided that the release will not be reduced below 50% of the amount required by the surcharge schedule and that the total addition of floodwaters stored in Weiss Lake will not exceed a volume of 22,500 cfs-days.	Entirely new rule

Rule	Condition	Outflow	Operation	Proposed change
8	Above elevation 564.0 ft and falling	As specified by induced surcharge schedule	When the reservoir level begins to fall, maintain the gate openings in effect at the time of peak reservoir stage and continue power plant discharge in effect at that time until the reservoir level recedes to elevation 564.0 ft. When the pool recedes to elevation 564.0 ft, rule 4 applies.	None

2.6.2 Logan Martin Dam and Lake

APC proposes to increase the project guide curve level during the winter months (December–March) at Logan Martin Dam and Lake from elevation 460 ft to elevation 462 ft and to reduce the maximum surcharge elevation (top of flood pool) from elevation 477 ft to elevation 473.5 ft. Current APC reservoir easements at Logan Martin Dam and Lake are below the required maximum surcharge elevations as described in the original WCM. The current maximum surcharge elevation is 3.5 ft higher than the APC flowage easement elevation of 473.5 ft for Logan Martin Lake. APC has proposed to modify flood operations by releasing more water during flood events to keep reservoir pool levels within the newly proposed maximum surcharge elevation and has acquired flowage easements downstream to accommodate increased non-damaging releases from 50,000 cfs to 70,000 cfs. USACE has conducted additional analysis of potential impacts to private property both upstream and downstream of Logan Martin Dam. The results of this analysis are detailed in Appendix C and Appendix D. The correspondence received from FERC on October 22, 2020, stated that APC has acquired all necessary real estate for the proposed operation. Pursuant to ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient data is available to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Logan Martin Dam. It is the responsibility of APC to acquire all necessary real estate interests prior to implementation.

The proposed raising of the winter drawdown elevation is in response to requests by recreational users to reduce substantial constraints to recreational use that occur at the current winter drawdown level. These requests by recreational users were reaffirmed during the scoping process for this study. The proposed changes would result in a 35-percent reduction in flood storage during the winter months and a 35-percent reduction in flood storage in the summer months. Figure 2-12 shows the storage allocations in Logan Martin Lake with proposed changes requested by APC. In conjunction with the elevation changes, APC proposes to modify the current Flood Regulation Schedule for Logan Martin Dam in order to operate with no appreciable increase in flood risk. Figure 2-13 depicts the proposed changes to the project guide curve and maximum surcharge elevation, and Table 2-6 summarizes the proposed changes to flood operations (APC, 2019b).

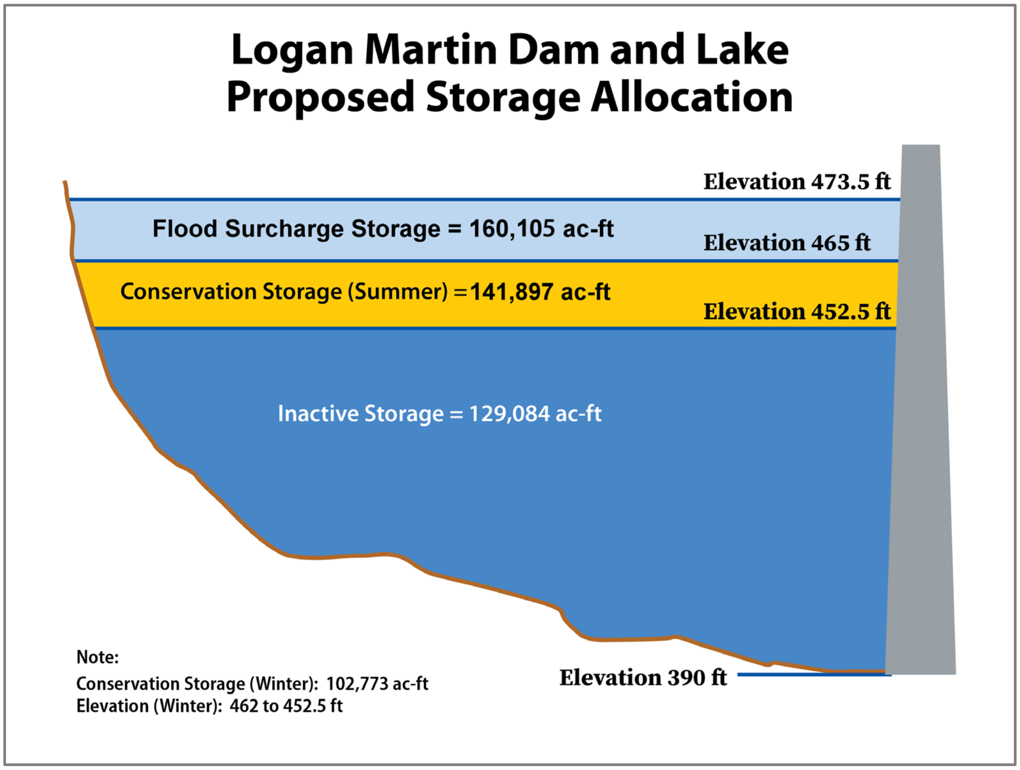


Figure 2-12. Logan Martin Lake—Storage Allocation with APC-Proposed Changes

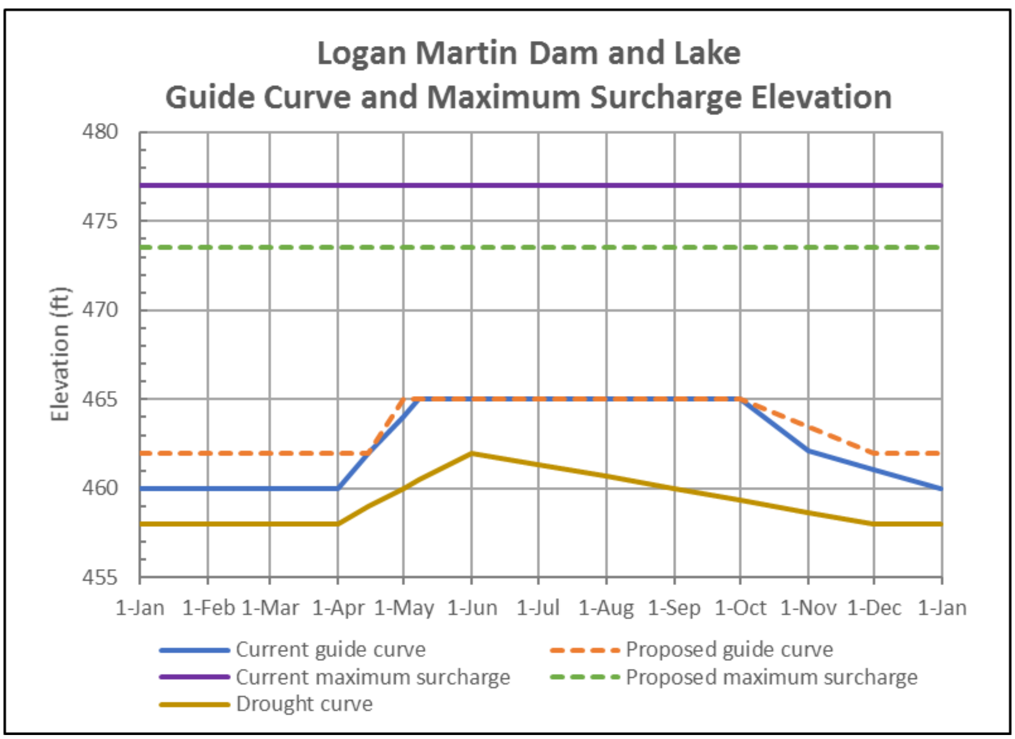


Figure 2-13. Logan Martin Dam and Lake—Proposed Changes to Guide Curve and Maximum Surcharge Elevation.

Table 2-6. Logan Martin Dam–Proposed Flood Regulation Schedule

Rule	Condition	Outflow	Operation	Proposed change
1	Below project guide curve	Up to plant capacity.	Operate power plant as required to satisfy normal system load requirements.	None
2	Below project guide curve, Weiss Lake above elevation 564.0 ft, and inflow into Logan Martin and Weiss lakes at plant capacity and increasing	70,000 cfs	Pull Logan Martin Lake to elevation 460.0 ft by discharging 70,000 cfs. Once it is at elevation 460.0 ft, hold the elevation by passing the hourly inflow.	Entirely new rule
3	At the project guide curve elevation	Ranging up to 70,000 cfs	Maintain reservoir stage at top-of-power pool elevation by passing the inflow up to 70,000 cfs.	Maximum release increased from 50,000 to 70,000 cfs
4	Above the project guide curve elevation and rising	Rate specified by induced surcharge schedule	Operate according to induced surcharge schedule passing the required outflow through the power plant and spillway.	New surcharge curves
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.	Entirely new rule
6	Above the project guide curve elevation and falling		When the reservoir level begins to fall, maintain the gate openings in effect at the time of peak reservoir stage and continue power plant discharge in effect at that time until the reservoir level recedes to project guide curve elevation.	None

2.6.3 Downstream Flooding Considerations

During the review of the Draft FR/SEIS, a number of commenters expressed concerns that the reductions in flood storage at Weiss and Logan Martin dams as proposed in APC's modified flood operations plan could be expected to result in increased flood damages downstream of those projects compared to operations specified in the currently approved WCMs for those projects. APC's flood analysis and the USACE review of that analysis do not support that conclusion.

At the Weiss project, the surcharge releases would be lower than those for current operations when pool elevations are less than 569 ft, which is the first 5 ft of the surcharge flood storage pool (564 ft to 569 ft). Lower releases during moderate events would result in slightly higher pool elevations in Weiss Lake compared to current operations. Greater releases than those under current operations would not occur until the upper 3 ft of the surcharge flood storage (as proposed by APC) is reached (elevation 569 ft to 572 ft). Moderate flood events that occur on the average of 2 to 3 years can be effectively managed using this approach, and the effects would be consistent with current operations.

Under the APC-proposed plan at the Logan Martin project, the downstream channel capacity would be increased from 50,000 to 70,000 cfs. This operational change would, in effect, represent a transfer of storage from the reservoir to the downstream channel, equivalent to 39,670 ac-ft, or about 3 ft of storage in Logan Martin Lake (460 ft to 463 ft). Lay Lake, downstream of Logan Martin Dam, would be lowered by 1 ft to elevation 395 ft during a flood event. This operation would lower the forebay elevation over a 12-hour period whenever the Logan Martin discharge reaches 70,000 cfs. This flexibility already exists in the current operations and may prove helpful in preventing water from backing up to Childersburg, AL, by implementing a higher discharge at Lay Dam before the Logan Martin releases reach Lay Dam. When the Logan Martin releases drop back below 70,000 cfs, the Lay Reservoir pool would return to elevation 396 ft. Logan Martin Lake would retain provisions for an additional 2-ft drawdown below the guide curve, as needed, during the period each year when floods are most likely (December through March). This measure would retain approximately 25,000 ac-ft of flood storage during these months. Considering that these operational factors can result in lower starting elevations at the beginning of a flood event, essentially no overall loss in flood storage would result from raising the winter pool at the Logan Martin project.

The limited amount of flood storage under current operations will generally not provide any significant reduction in major flood peaks. The major objective under proposed operations would be to utilize available flood storage in the basin such that major flood peaks would not be greater than would occur under current operations.

Results of APC's flood analysis and the USACE review of that analysis is presented in more detail in Section 4 as well as in Appendix C (Attachment 5), and Appendix D.

3.0 AFFECTED ENVIRONMENT *

This section describes the "affected environment," which represents the physical, biological, and socioeconomic conditions of the geographic area in which the impacts of the proposed action and alternatives are expected to occur. The affected environment serves as a baseline from which potential environmental and socioeconomic effects of proposed actions can be compared. The proposed action and alternatives will be evaluated against this affected environment baseline condition.

The ACT River Basin comprises the Alabama, Coosa, and Tallapoosa rivers and all areas within the basin boundaries. It stretches from the headwaters of the Coosa and Tallapoosa rivers downstream to the mouth of the Alabama River, where that river joins the Tombigbee River to form the Mobile River. The ACT River Basin, which measures 22,739 sq mi, drains approximately the same size area as the Tombigbee River Basin (20,200 sq mi). Thus, flows from the ACT River Basin are roughly half of the total flow in the Mobile River downstream of the juncture of the Alabama and Tombigbee rivers.

This document is intended to supplement the October 2014 Final EIS for the ACT River Basin WCM update and addresses specific proposed federal actions that were deferred in the previous update process. This section presents an abbreviated overview of the environmental and socioeconomic resources of the entire ACT River Basin that has been updated with any new available information on pertinent resources. The balance of detailed information provided on the entire ACT River Basin is incorporated by reference into the Final EIS for the ACT River Basin WCM update in accordance with CEQ regulations, which direct agencies to incorporate relevant material by reference into an EIS to reduce the size of the document and avoid duplicative effort (40 CFR §1502.21).

HEC-ResSim and Hydrologic Engineering Center water quality model (HEC-5Q) simulation results were used to determine that the specific federal actions considered in this Final FR/SEIS will affect only a portion of the overall ACT River Basin. HEC-ResSim is a state-of-the-art tool for simulating flow operations in managed systems (i.e., a reservoir or system of reservoirs). HEC-5Q is a compatible model with HEC-ResSim that analyzes water quality conditions in managed systems. These models are described in more detail in Appendix C. HEC-ResSim and HEC-5Q model simulation results summarized in Sections 4.0 and 5.0 demonstrate that the effects of the proposed actions would be limited to a Region of Influence (ROI) defined as the Etowah River at its confluence with Hickory Log Creek at Canton, GA, downstream to its confluence with the Oostanaula River at Rome, GA, including Allatoona Dam and Lake; and the Coosa River at Rome downstream to its confluence with the Tallapoosa River near Montgomery, AL (including Weiss Dam and Lake, Logan Martin Dam and Lake, and other APC reservoirs). Appendix E presents and evaluates the model simulation results in detail.

The proposed federal actions evaluated in this Final FR/SEIS would affect neither the Oostanaula River Basin nor the Tallapoosa River Basin. Accordingly, this section focuses on the narrowed ROI, which is the area most likely to be affected by the proposed actions. The HEC-ResSim and HEC-5Q models also demonstrated that the proposed federal actions would have no discernable effect on hydrologic conditions, including water quality, in the Alabama River downstream of the confluence of the Coosa and Tallapoosa rivers and further downstream into the Mobile River and Bay. Accordingly, other environmental resources of interest in this portion of the ACT River Basin would not be affected by the proposed federal actions.

Along the river and lake segments in the ROI, the lateral extent of expected effects would generally include the extent of fee or easement interest in adjacent lands by USACE and APC or the base floodplain along the rivers where no fee or easement interests exist. Any exceptions to the lateral extent of potential effects on specific resources will be noted in the pertinent resource area affected environment summaries. The resource areas addressed in this section are water quantity and quality, geology and soils, climate conditions, land use, biological resources (including protected species), socioeconomics, aesthetics, air quality, noise, traffic and transportation, cultural resources, and hazardous and toxic materials. Water supply, commercial navigation, hydropower, recreation, agricultural water supply, environmental justice, and protection of children are addressed in the socioeconomics discussion.

3.1 Existing Conditions

3.1.1 Water Resources—Water Quantity

This section describes the complex interrelationships among surface water, groundwater, and the numerous competing demands on water resources in the ACT River Basin by characterizing precipitation, streamflow conditions, reservoir water levels, groundwater quantities, water use, and water planning and management activities. Water quantity conditions in the basin are directly affected by human activities, including M&I use; agricultural use for irrigation; operation of thermoelectric power plants; and water management activities associated with the 17 major dams on the mainstem rivers in the basin. The USACE and APC reservoirs in the ACT River Basin attenuate high river flows during wet periods and augment low flows during dry periods to meet congressionally authorized purposes throughout the year. Reservoir water management is a complex process that requires consideration of many competing demands for water in the basin.

3.1.1.1 Precipitation

Average yearly precipitation in the ACT River Basin ranges from 49 inches to 65 inches per year (in/yr), and precipitation typically falls during every month. Rainfall amounts in the basin can be highly variable from year to year. Precipitation amounts are highest in the mountain ecoregions and the Southeastern Plains ecoregion because of orographic effects and tropical moist air, respectively. Periods of heavy rainfall can be caused by El Niño events, which bring heavy winter rain to the southeast, and by active hurricane seasons, which can bring heavy rainfall in the late summer and fall. Droughts are loosely associated with La Niña events but are more likely caused by atmosphere-ocean climate variability and by internal atmosphere variability (Seager, Tzanova, & Nakamura, 2009). Over half of the water that falls as precipitation in the ACT River Basin is returned to the atmosphere via evapotranspiration (direct evaporation plus transpiration by plants). Evapotranspiration can range from 30 to 42 inches (in) annually and increases from north to south (USACE Mobile District, 1998b).

Rome, GA, is located at the confluence of the Etowah and Oostanaula rivers where they become the Coosa River. The mean annual rainfall at the Rome station is 52.99 in; the maximum annual rainfall of 77.65 in at this station occurred in 1932, and the minimum annual rainfall of 28.71 in occurred in 2007 (SERCC, 2019b). The Gadsden Steam Plant station is located on the Coosa River between the H. Neely Henry Dam and Weiss Dam. The mean annual rainfall is 54.30 in at the Gadsden Steam Plant station; the maximum annual rainfall of 74.89 in at this station occurred in 2009, and the minimum annual rainfall of 36.56 in occurred in 1954 (SERCC, 2019a).

With normal runoff conditions, intense and general rainfall of 5–6 in are required to produce widespread flooding. Since 1900, major flooding events occurred in the ACT River Basin in July 1916, December 1919, March 1929, February 1961, March 1990, July 1994, May 2003, and September 2009. The ACT River Basin Master Manual in Appendix A briefly describes each of these flood events.

Between 1920 and 1980, the region experienced severe droughts from 1929 to 1932, 1938 to 1945, and 1950 to 1957. Since 1980, several severe drought periods have occurred in the ACT River Basin. Two droughts occurred in Alabama and Georgia in the 1980s, the second of which lasted from 1984 to 1989 and caused water shortages in both states; the drought had a magnitude of 50- to 100-year recurrence interval in north Georgia, causing over one-third of the private wells across the state to run dry (USGS, 2000). A multiyear drought affected the basin between 1998 and early 2003, severely affecting water use and operation of USACE reservoirs. The 2006–2008 drought was the most devastating drought event encountered in Alabama and western Georgia, reaching an exceptional drought intensity level throughout the summer of 2007. Reservoirs in the ACT River Basin dropped to record low levels, and rainfall in north Georgia for the entire year was as low as 20 in (USACE Mobile District, 2010). In spring of 2016, drought conditions intensified in northern Alabama and Georgia and expanded during the summer. By late October, severe-to-exceptional drought conditions covered much of the two states. Flows on the Coosa River at Rome, GA, experienced new record lows between July and November 2016 (USGS, 2017) (USGS, 2018). Appendix E describes these drought events in more detail.

3.1.1.2 Surface Water—Rivers

The three main rivers in the ACT River Basin are the Alabama, Coosa, and Tallapoosa. The Coosa and Tallapoosa, which join to form the Alabama River near Montgomery, AL, have numerous smaller tributary rivers (Figure 1-1). The basin includes both natural (unregulated) and regulated rivers. Natural rivers exhibit a more consistent pattern, responding to precipitation and drought periods as expected with short periods of high flows and prolonged periods of low flows, respectively. Regulated streams exhibit a variable pattern, with daily variations caused by hydropower operations (most prominent below peaking projects) and lower flood peaks and higher sustained minimum flows through dry periods as the upstream reservoirs augment low flows. The highest monthly average flows for those rivers occur in the later winter/early spring months of February–April. Through late spring and summer, low precipitation and high evapotranspiration combine to reduce river flows. The lowest average monthly flow typically occurs in late September and October.

3.1.1.2.1 Coosa River

The Coosa River Basin begins in southeast Tennessee with the Conasauga River. The Conasauga River drains an area of 727 sq mi, about 20 percent of which is in Tennessee and 80 percent of which is in Georgia (Figure 1-1). It has a slope of about 35.5 feet per mile (ft/mi) for the upper 41 mi in the mountains, then falls at a gentler slope of 3 ft/mi for the remaining 47 mi to its mouth. The Conasauga River joins the Coosawattee River (with a drainage area of 862 sq mi) to form the Oostanaula River. The Coosawattee River initially falls at a steep rate of about 29 ft/mi for 19 mi, then falls at a gentler slope of about 2 ft/mi for the remaining 27 mi to its mouth. Carters Dam and Lake and Carters Reregulation Dam project, located on the Coosawattee River about 27 mi upstream of its confluence with the Conasauga River, is a peaking hydropower facility with pumpback capabilities (USACE Mobile District, 1997).

The Oostanaula River, downstream of the confluence of the Conasauga and Coosawattee rivers near Resaca, GA, flows south for 47 mi to join the Etowah River at Rome, GA, where they combine to form the Coosa River (Figure 1-1). The Oostanaula River has a drainage area of 2,150 sq mi and a relatively flat slope, with a fall averaging 1 ft/mi (USACE Mobile District, 1997).

The Etowah River begins in the Blue Ridge Mountains near Dahlonega, GA, and flows about 150 mi southwest to its confluence with the Oostanaula River at Rome, GA (Figure 1-1). The Etowah River Basin drains an area of 1,861 sq mi in Georgia and has a steep slope initially, falling at a rate of 45 ft/mi. Thereafter, the river's slope flattens significantly, averaging about 4.5 ft/mi for 93 mi to Allatoona Dam and Lake near Cartersville, GA (USACE Mobile District, 1997). Below Allatoona Dam, the slope of the Etowah River is about 3.2 ft/mi for about 48 mi downstream to its mouth at Rome. A low-head dam (the Thompson-Weinman Dam) is located about 3.5 mi downstream of Allatoona Dam at Cartersville. Dating to the early 1900s, this dam provided Cartersville's first electricity and served as a power supply to local industry until the late 1900s. The abandoned structure no longer serves a useful purpose.

The Coosa River, which begins at the confluence of the Oostanaula and Etowah rivers at Rome, GA, flows 286 mi downstream to Wetumpka, AL, just north of Montgomery, AL, where it joins the Tallapoosa River to form the Alabama River. The Coosa River Basin drains an area of 10,156 sq mi. The river falls approximately 420 ft in 267 mi, or 1.6 ft/mi, in a series of six successive APC reservoirs, from its source downstream to Jordan and Walter Bouldin (or Bouldin) dams, which share the same reservoir. The APC dams form a series of continuous impoundments over almost the entire length of the Coosa River (USACE Mobile District, 1997). APC operates its upper three projects on the Coosa River—Weiss, H. Neely Henry, and Logan Martin dams and lakes—as hydropower peaking facilities. The lower four projects—Lay, Mitchell, and Jordan dams and lakes and Bouldin Dam—generally operate as run-of-river projects for hydropower production and to maintain stable flows from Jordan Dam over weekends, when the upstream peaking facilities do not operate. Weiss Dam is 60 mi downstream of Rome, and the Jordan Dam is 19 mi above the Coosa River's confluence with the Tallapoosa River near Montgomery.

3.1.1.2.2 Tallapoosa River

The Tallapoosa River begins in northwest Georgia, 40 mi west of Atlanta, GA, at an elevation of 1,145 ft. The river flows 235 mi into Alabama to join the Coosa River north of Montgomery, AL. The basin drains a total area of 4,687 sq mi, 15 percent of which is in Georgia and 85 percent of which is in Alabama. From its source, the river falls at a rate of 12 ft/mi for the first 15 mi, then descends at a more gradual rate of 3.4 ft/mi. In the lower reach from Thurlow Dam to its mouth, the river falls at a rate of 1.6 ft/mi (USACE Mobile District, 1997). APC constructed and operates four dams on the Tallapoosa River. The upper two projects—R.L. Harris and Martin dams and lakes—are hydropower peaking facilities. The two downstream projects—Yates and Thurlow dams and lakes—operate as run-of-river facilities, slightly reregulating peak releases and maintaining downstream minimum flows over weekends, when the upstream projects do not operate.

3.1.1.2.3 Alabama River

The confluence of the Coosa and Tallapoosa rivers forms the Alabama River near Wetumpka, AL, north of Montgomery, AL. Excluding the Coosa River and Tallapoosa River tributary areas, the Alabama River drains an area of 7,896 sq mi, all of which is in Alabama. Montgomery, the largest city on the stream, is about 14 mi downstream from the source of the Alabama River. The river meanders generally in a westerly direction for 100 mi to Selma, AL, and then southwesterly 210 mi to join the Tombigbee River. The Alabama and Tombigbee rivers merge to form the Mobile River near Calvert, AL. The Alabama River has a relatively flat slope, averaging 0.3 ft/mi. The channel varies in width from 400 to 600 ft with banks 10 ft high (USACE Mobile District, 1997). The Cahaba River, a major tributary of the Alabama River, originates northeast of Birmingham, AL; drains an 1,825-sq mi area; flows southwesterly and southerly for 196 mi; and joins the Alabama River about 17 mi downstream from Selma. USACE constructed and operates three multipurpose L&Ds on the Alabama River—Robert F. Henry L&D, 30 mi above Selma and 245 mi above the mouth of the river; Millers Ferry L&D, 73 mi downstream of Selma and 142 mi above the mouth; and Claiborne L&D, 82 mi above the mouth.

3.1.1.3 Surface Water—Reservoirs

Modern dam construction in the ACT River Basin dates from the middle to the latter part of the 1800s. Navigation locks and small dams provided sufficient depths for slack-water river traffic on the Coosa River in the early 1900s. Those L&Ds are either gone or their remnants are no longer serviceable. By 1930, two dams on the Coosa River and three on the Tallapoosa River were built to take advantage of the natural stream gradients for power production. During the middle 1900s, large reservoirs were built throughout the basin to provide storage for multiple project purposes, including hydropower, navigation, recreation, and water supply (USACE Mobile District, 1997). The last major dam in the basin (R.L. Harris Dam on the Tallapoosa River) was completed in 1983. Currently, there are 17 major dams on the mainstem rivers in the ACT River Basin (Jordan Dam and Bouldin Dam on the Coosa River share a common reservoir). Six dams are federally owned projects (USACE) and 11 are privately owned projects (APC). Pertinent USACE and APC project data are presented in Table 2-1. More detail on each of these USACE and APC reservoirs is provided in Section 2.1 and Appendices A and E.

Multipurpose storage reservoirs are typically subdivided into separate storage levels. The lowest level is "inactive storage," which is not generally considered useable storage. Reservoir releases are not typically made from inactive storage. The next level is "conservation storage," which is available to meet multiple authorized project purposes (e.g., hydropower, water supply, and recreation). USACE Mobile District has further partitioned the conservation storage into multiple action zones, which each can trigger specific operating criteria designed to increasingly limit reservoir releases to conserve storage when available storage is depleted under drought conditions. Some reservoirs are designed to include "flood storage," providing storage capacity above conservation storage to temporarily store runoff from a storm event when it cannot be safely passed through the downstream channel system. Reservoirs with flood storage also may have "surcharge storage" to temporarily accommodate water above the top of the flood storage with either a gated or emergency spillway.

Hydropower generation is a project purpose of all the dams on the mainstem rivers in the ACT River Basin, except for Claiborne L&D. Much of the hydropower generation is "peaking power" (i.e., generators are operated to help meet a peak demand for power). Peaking hydropower projects generate power during the peak electrical demand hours on weekdays and typically do not generate on the weekend. In contrast, "run-of-river" hydropower projects typically generate power by passing the available basin inflows and releases from upstream reservoir projects during peak demand periods, by normally operating for a portion of each day, resulting in daily variations in tailrace elevations and flows. Unlike storage projects, however, run-of-river projects with hydropower facilities generally maintain a stable pool elevation and do not redistribute flows seasonally.

USACE Mobile District conducted a survey of existing impoundments in the ACT River Basin in 2002. The survey identified approximately 280 impoundments other than USACE or APC projects that were 20 ac or more (USACE Mobile District, 2014b). Those impoundments serve a variety of purposes, including water supply for livestock and irrigation; M&I water supply; fish and wildlife conservation; recreation; and other localized uses. Hundreds of other ponds and impoundments smaller than 20 ac are scattered across the basin. One noteworthy large water supply reservoir in the basin is Purdy Lake, a 990-ac reservoir in the headwaters of the Cahaba River, southeast of Birmingham, AL, in Shelby and Jefferson counties. The reservoir, owned and operated by the Birmingham Water Works Board, was completed in 1964.

USACE issues Department of the Army (DA) permits for non-USACE reservoir projects in accordance with Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899 (as applicable). Since 1988, eight water supply reservoirs have been proposed in the ACT River Basin in northwest Georgia that have either received DA permits or have DA permits pending. Five reservoirs have been completed and are in operation, Richland Creek Reservoir (Paulding County) is under construction, Russell Creek Reservoir (Dawson County) is permitted (construction pending), and the permits for the Indian Creek Reservoir (Carroll County) are pending. Appendix E provides more detail on these water supply reservoirs in the basin, including specific focus on three projects in the Etowah River Basin with operations that would be interrelated to the proposed actions addressed in this Final FR/SEIS: Hickory Log Creek Reservoir (Cherokee County), Richland Creek Reservoir, and Russell Creek Reservoir. No similar local or regional water supply reservoir projects have recently been pursued in portions of the ACT River Basin in Alabama (Turney, 2019).

3.1.1.4 Groundwater

The major aquifer formations in the ACT River Basin include the solution-conduit aquifers, crystalline rock aquifers, and sand and gravel aquifers. Groundwater in the ACT River Basin generally flows from northwest to southeast, with some variation in local flow. Near major stream channels and in areas of major water withdrawals, the flow is vertically upward and downward, but is mainly perpendicular to the stream channel, which demonstrates good hydraulic connection between groundwater and surface water. Rivers and streams in the southern half of the basin are deeply incised into the underlying aquifers and can receive substantial amounts of groundwater. The aquifers located in the principal ROI of the proposed actions considered in this Final FR/SEIS are the Valley and Ridge aquifers, the Blue Ridge and Piedmont aquifers, and a small portion of the Southeastern Coastal Plain aquifer system. Appendix E describes these aquifers in more detail.

3.1.1.5 Water Withdrawals, Consumptive Use, and Return Flows in the ACT River Basin

This section summarizes current water use practices in the basin. Appendix E provides a historical perspective on water use and water use trends in the ACT River Basin from the 1940s to the present.

Since 1980, the ACT River Basin has experienced rapid population growth, particularly in the northwest quadrant of Metro Atlanta. Irrigated agriculture has increased in the basin, although not to the scale experienced in the adjacent Apalachicola-Chattahoochee-Flint (ACF) River Basin. These factors indicate a continued upward trend in both surface water and groundwater withdrawal and use. However, several technological and economic factors have, in part, offset increased water demands in the basin, including water conservation/water efficiency technologies and programs instituted by the states and public water supply providers, particularly in northwest Georgia; reduced water demands in the commercial-industrial water use category as the industrial sector of the economy has declined with the shift to a more service-based economy; improved cooling water technologies for thermoelectric power plants; and increased agricultural irrigation efficiencies.

3.1.1.5.1 Surface Water Withdrawals

The U.S. Geological Survey (USGS) completed comprehensive inventories of surface water use for Georgia for the years 2005 (Fanning & Trent, 2009), 2010 (Lawrence, 2016), and 2015 (Painter, 2019). The 2015 report stated that "the quantity of water estimated to meet the personal, commercial, and recreational needs of the 10.2 million people residing in Georgia for 2015 is the smallest quantity since the compilation of water-use data began in 1980 … even though the total population of Georgia continues to increase and the 2015 population is 71 percent greater than the population was in 1985" (Painter, 2019). Surface water use in the Georgia portion of the ACT River Basin for 2005, 2010, and 2015, summarized by water-use category, is presented in Table 3-1. Cumulative surface water withdrawals in the Georgia portion of the ACT River Basin in 2015 totaled 466.30 mgd. The most significant surface water use in 2015 was thermoelectric power generation (about 52.5 percent), followed by public supply and domestic/commercial uses (cumulatively about 33.4 percent). Domestic/commercial uses in the USGS analysis generally include those that are self-supplied instead of purchasing water supplies from a local M&I water provider. Industrial and mining uses combined totaled about 8.1 percent of total water use. About 6 percent of surface water withdrawals in the Georgia portion of the ACT River Basin was used for agricultural purposes (irrigation and livestock) (Painter, 2019).

Table 3-1. Surface Water Use—ACT River Basin (Georgia) for 2005, 2010, and 2015

Water use category	2005 water withdrawals		2010 water withdrawals		2015 water withdrawals	
	mgd	% of total	mgd	% of total	mgd	% of total
Total Use	788.98		697.60		466.30	
Public Supply	154.78	19.6%	147.00	21.1%	145.20	31.1%
Domestic and Commercial	0.30	0.0%	6.28	0.9%	10.61	2.3%
Industrial and Mining	32.49	4.1%	40.24	5.8%	37.89	8.1%
Irrigation	11.31	1.4%	14.91	2.1%	10.14	2.2%
Livestock	16.18	2.1%	9.05	1.3%	17.60	3.8%
Thermoelectric Power Generation	573.92	72.8%	480.10	68.8%	244.90	52.5%

Sources: (Fanning & Trent, 2009); (Lawrence, 2016); and (Painter, 2019).

Overall, total surface water use in the Georgia portion of the ACT River Basin experienced a substantial decline between 2005 and 2015. Compared to the 2005 data, total surface water withdrawals in the Georgia portion of the ACT River Basin in 2015 declined by about 41 percent. The largest contributor to the decline was thermoelectric power generation, which experienced about a 57-percent decline in withdrawals. On July 16, 2019, the Georgia Public Service Commission approved a plan proposed by the Georgia Power Company to close Plant Hammond (a coal-fired power plant on the Coosa River in Floyd County near Rome, GA) (Proctor, 2019). Closure of Plant Hammond further reduces future thermoelectric power generation withdrawals in the Georgia portion of the ACT River Basin to those occurring at Plant Bowen in Bartow County near Cartersville, GA, which would be about 34 mgd (Painter, 2019). Cumulatively, public supply and domestic/commercial combined withdrawals declined slightly (by about 6 percent) from 2005 to 2015, despite notable population growth that continued to occur in that portion of the basin between those years (see Table 3-11). Industrial and mining withdrawals remained relatively steady over that 10-year period. Likewise, combined irrigation and livestock withdrawals were about the same in 2005 and 2015, even though a slightly lower withdrawal level occurred in 2010.

Comprehensive inventories of surface water use in Alabama were conducted for 2005 (Hutson, Littlepage, Harper, & Tinney, 2009), 2010 (Harper & Turner, 2015), and 2015 (Harper, Littlepage, Johnston, Jr., & Atkins, 2019). Table 3-2 provides a summary of surface water use by water use category. Estimated surface water use in the ACT River Basin in Alabama in 2015 totaled 949.33 mgd. Overall, the most significant water use within the Alabama portion of the ACT River Basin was thermoelectric power generation (about 61 percent). Public water supply and industrial/mining uses in 2015 represented about 15 and 19 percent of surface water withdrawals, respectively. Agricultural water use (irrigation, livestock, and aquaculture combined) represented about 6 percent of surface water use in the Alabama portion of the ACT River Basin in 2015.

Table 3-2. Surface Water Use—ACT River Basin (Alabama) for 2005, 2010, and 2015

Water use category	2005 water withdrawals		2010 water withdrawals		2015 water withdrawals	
	mgd	% of total	mgd	% of total	mgd	% of total
Total Use	1,337.11		1,148.05		949.33	
Public Supply and Residential	167.83	12.6%	143.72	12.5%	138.42	14.6%
Industrial and Mining	175.23	13.1%	166.39	14.5%	176.56	18.6%
Irrigation	30.70	2.3%	47.43	4.2%	44.01	4.6%
Livestock	4.21	0.3%	3.77	0.3%	4.16	0.4%
Aquaculture	--	--	--	--	6.58[a]	0.7%
Thermoelectric Power Generation	959.14	71.7%	786.74	68.5%	579.60	61.1%

a. Aquaculture was not included as a specific water use in the 2005 and 2010 water use reports.
Sources: (Hutson, Littlepage, Harper, & Tinney, 2009); (Harper & Turner, 2015); and (Harper, Littlepage, Johnston, Jr., & Atkins, 2019).

Compared to the 2005 water-use data, total surface water withdrawals in the Alabama portion of the ACT River Basin in 2015 declined by 29 percent. Thermoelectric power generation had the largest decrease in withdrawals from 2005 to 2015, dropping about 40 percent. Public supply and residential withdrawals in the basin decreased slightly from 2005 to 2015 (about 18 percent), but the percentage share of the total withdrawals slightly increased from 2005 to 2015. Industrial and mining withdrawals remained about the same from 2005 to 2015. Cumulatively, irrigation and livestock withdrawals increased by 43.8 percent from 2005 to 2010, but they remained at about the same level from 2010 to 2015 (about 5 percent of total surface water withdrawals).

3.1.1.5.2 Groundwater Withdrawals

Estimates of groundwater withdrawals for 2005 (Fanning & Trent, 2009), 2010 (Lawrence, 2016), and 2015 (Painter, 2019) in the 19 Georgia counties that lie entirely or partly within the ACT River Basin are presented in Table 3-3. Those estimates indicate that about 44.8 mgd were withdrawn in 2015 for various beneficial uses, which was essentially unchanged from the 2010 groundwater withdrawals in the basin. In 2015, public supply and domestic/commercial uses composed about 70 percent of the groundwater use in the Georgia portion of the ACT River Basin, while industrial/mining, irrigation, and livestock uses made up the remaining 30 percent. Groundwater withdrawals represented about 9 percent of total water withdrawals in the Georgia portion of the ACT River Basin in 2015. Compared to 2005 values, groundwater withdrawals for all uses in the Georgia portion of the ACT River Basin in 2010 decreased by about 30 percent. The most sizeable portion of that decline is attributable to a reduction in groundwater withdrawals for industrial and mining uses.

Table 3-3. Groundwater Use—ACT River Basin (Georgia) for 2005, 2010, and 2015

Water use category	2005 water withdrawals		2010 water withdrawals		2015 water withdrawals	
	mgd	% of total	mgd	% of total	mgd	% of total
Total Use	64.0		44.7		44.8	
Public Supply	21.0	33%	15.4	34%	16.3	36%
Domestic and Commercial	20.3	31%	18.0	40%	15.1	34%
Industrial and Mining	20.5	31%	6.6	15%	8.4	19%
Irrigation	2.3	4%	3.9	9%	2.4	5%
Livestock	0.7	1%	0.8	2%	2.6	6%
Thermoelectric Power Generation	0.0	0%	0.0	0%	0.0	0%

Sources: (Fanning & Trent, 2009), (Lawrence, 2016), and (Painter, 2019).

Groundwater withdrawals within the ACT River Basin in Alabama in 2005 (Hutson, Littlepage, Harper, & Tinney, 2009), 2010 (Harper & Turner, 2015), and 2015 (Harper, Littlepage, Johnston, Jr., & Atkins, 2019) are summarized in Table 3-4. In 2015, total groundwater withdrawals in the Alabama portion of the basin were estimated at 169.4 mgd. About 70 percent were for public water supply, about 20 percent for agricultural irrigation and livestock uses, and 10 percent for industrial uses. About 72 percent of the groundwater withdrawals in the Alabama portion of the basin occur in three specific subbasins: Middle Coosa (25 percent), Upper Alabama (29 percent), and Cahaba River (17 percent). Groundwater withdrawals represent about 15 percent of total water withdrawals in the Alabama portion of the ACT River Basin. Total groundwater withdrawals in 2015 were about 25 percent higher than estimated in 2010, primarily attributable to notable increases in industrial and agricultural (irrigation and livestock) withdrawals. Groundwater withdrawals by water-use category and subbasin within the ACT River Basin in Alabama had shown a slight decrease (about 6 percent) from 2005 to 2010.

Table 3-4. Groundwater Use—ACT River Basin (Alabama) for 2005, 2010, and 2015

Water use category	2005 water withdrawals		2010 water withdrawals		2015 water withdrawals	
	mgd	% of total	mgd	% of total	mgd	% of total
Total Use	144.7		135.9		169.4	
Public Supply	120.2	83%	114.3	84%	118.2	70%
Industrial	6.2	4%	4.6	3%	17.9	10%
Irrigation	15.2	11%	14.3	10%	33.4[a]	20%
Livestock	3.1	2%	2.8	2%		
Thermoelectric Power Generation	0.0	0%	0.0	0%	0	0%

a. In the 2015 water use report, irrigation and livestock uses were combined and reported as "agriculture."
Sources: (Hutson, Littlepage, Harper, & Tinney, 2009), (Harper & Turner, 2015), and (Harper, Littlepage, Johnston, Jr., & Atkins, 2019).

3.1.1.5.3 Consumptive Water Use and Return Flows

The USGS 2005 water use report for Georgia (Fanning & Trent, 2009) summarized how much water is consumptively used for the various water use categories (called "consumptive-use coefficients"). Consumptive use occurs when a user withdraws water from the basin and returns only a portion, or none, of the water to the basin. For domestic water use, consumptive use is estimated at about 18 percent of the total use. For industrial and mining use, consumptive-use coefficients were determined by industry type and type of mining activity. For example, the consumptive-use coefficient for the pulp and paper industry was estimated at 7 percent and 13 percent for the textile industry in 2005. Irrigation and livestock water uses are considered 100 percent consumptive. Irrigation in the region uses sprinkler and micro-irrigation methods, which do not use the large nonconsumptive amounts of water that flood irrigation methods use. Consumptive use is negligible for in-stream hydropower generation (Fanning & Trent, 2009).

For thermoelectric power generation, consumptive water use is primarily determined by the type of cooling system used at each plant. "Once-through cooling" refers to systems in which water is withdrawn, circulated through heat exchangers, and returned to a surface waterbody. "Recirculating cooling" refers to systems in which water is withdrawn, circulated through heat exchangers, cooled, and then recycled, periodically requiring additional withdrawals to supplement water lost in the cooling process. Consumptive use from once-through cooling ranged from zero to nearly 7 percent; consumptive use from recirculating cooling, ranged from 30 to 65 percent (Hutson et al. 2009). Three thermoelectric power plants in the ACT River Basin use once-through cooling systems: Hammond (Georgia Power, Floyd County); Gadsden (APC, Etowah County); and Gaston (APC, Shelby County). Two plants use closed cycle cooling systems: Bowen (Georgia Power, Bartow County) and Harris (Southern Power Company, Autauga County). Note that the Georgia Public Service Commission approved the Georgia Power Company plan to close Plant Hammond on July 16, 2019 (Proctor, 2019).

In 2005, total consumptive use across Georgia was estimated to be about 24 percent of total withdrawals (Fanning & Trent, 2009). For counties in northwest Georgia that lie entirely or partially within the ACT River Basin, consumptive use was estimated by applying the consumptive use coefficients to be approximately 117 mgd, or about 15 percent of total withdrawals. Surface water that is not consumed when used will generally be returned, with appropriate treatment, to the surface water system, typically at or near the point of withdrawal.

Current withdrawals from Allatoona Lake and associated returns of treated wastewater to the ACT River Basin are of specific interest in considering the proposed reallocation of storage at Allatoona Lake. In 2018, the CCMWA averaged withdrawals of 41.2 mgd and the Cobb County Water System (CCWS) averaged 17.8 mgd of treated wastewater returns to Allatoona Lake. About 43 percent of CCMWA's 2018 withdrawals from Allatoona Lake were returned by the CCWS to the lake as treated wastewater. This relatively low rate of return to Allatoona Lake is attributable, in part, to CCMWA's principal customer, the CCWS, which has a large service area overlaying both the Chattahoochee and Etowah river basins. Consequently, a share of the water withdrawn from Allatoona Lake is used, treated, and discharged to the Chattahoochee River. Another factor contributing to the relatively low overall return rate is that a portion of CCMWA withdrawals from Allatoona Lake is sold to other local water providers, including the City of Woodstock, Douglas County, and Paulding County. Treated wastewater associated with these customers is generally returned to the ACT River Basin but not directly to Allatoona Lake. The City of Cartersville averaged withdrawals of 11.3 mgd from Allatoona Lake in 2018 (Hathorn J. , 2019). Treated wastewater resulting from City of Cartersville withdrawals are discharged to the Etowah River via the Cartersville Water Pollution Control Plant, downstream of Allatoona Dam.

Overall, CCMWA and Cartersville withdrew 52.5 mgd from Allatoona Lake in 2018. CCWS returned 17.8 mgd of treated wastewater directly to the lake; the City of Cartersville made no returns directly to the lake. The net withdrawal from Allatoona Lake in 2018 was about 34.7 mgd.

3.1.1.5.4 Interbasin Transfers

Interbasin transfer is commonly described as a withdrawal of water from one river basin, followed by use and/or return of some, or all, of that water to a second river basin. Most of the interbasin transfers (both in numbers and volume) occur within the 15-county MNGWPD. The water and wastewater systems within the MNGWPD operate as an interconnected service network, and transfers among basins are particularly common within counties that straddle two or more basins. An MNGWPD analysis based on 2013 data estimated that interbasin transfers resulted in a net transfer of about 9 mgd from the Coosa River Basin (MNGWPD, 2017). A previous MNGWPD analysis based on 2006 data estimated a net transfer of 14 mgd from the Coosa River Basin (MNGWPD, 2009). Therefore, the net loss of water from the Coosa River Basin as a result of interbasin transfers in the MNGWPD was reduced by 5 mgd between 2006 and 2013.

The Tennessee Valley Authority identified several water supply utilities on or near the Tennessee River Basin boundary (TVA, 2007). In river basins adjacent to the Tennessee River (including the ACT River Basin), water may be transferred into or from the basin depending on water suppliers' local service areas. The net effect of water transferred from the ACT River Basin versus water transferred into the basin is minimal, resulting in a small net gain to water resources in the ACT River Basin (TVA, 2018).

3.1.1.5.5 Per Capita Use

USGS water use data for Georgia indicate that per capita use for public water supply averaged 185 gallons per day (gpd) in 2000 (Fanning J. L., 2003). USGS 2005 water use data indicate that per capita use in Georgia had declined to an average of 158 gpd (Fanning & Trent, 2009), and 2010 water use data show a further decline in per capita use to about 136 gpd (Lawrence, 2016). In Alabama, public water supply per capita use averaged 233 gpd in 2000, declining to about 199 gpd in 2005 (Hutson, Littlepage, Harper, & Tinney, 2009), and further declining to about 196 gpd in 2010 (Harper & Turner, 2015). While those are statewide averages, per capita use in the Georgia and Alabama portions of the ACT River Basin is likely to be similar.

Maddaus Water Management, Inc. and CH2M Hill summarized per capita water use in a report based upon a national survey of 41 metropolitan water agencies in 22 different states between 2005 and 2007 (Maddaus Water Management, Inc. and CH2M Hill, 2011). Agencies surveyed represented metropolitan areas geographically distributed across the United States. The surveyed communities had a total population of almost 46 million and total water use of over 7.7 billion gpd, yielding an average per capita water use of 174 gpd. MNGWPD was one of the 41 agencies surveyed in the Maddaus Water Management/CH2M Hill report. The per capita water use for MNGWPD in the survey was 128 gpd, which was the fourth lowest number of the 41 surveyed metropolitan water agencies (Maddaus Water Management, Inc. and CH2M Hill, 2011).

Since MNGWPD was created in 2001, the foundation of the District's water supply planning has been implementation of effective water conservation and efficiency practices and the associated decreases in per capita water use. The MNGWPD area includes Allatoona Dam and Lake and the service areas for the water supply providers presently requesting additional water supply storage from Allatoona Lake (CCMWA and city of Cartersville). The first MNGWPD water supply plan in 2003 introduced innovative water conservation strategies expanded upon in the 2009 plan update and subsequent 2010 amendments. The 2010 amendments were largely instituted in response to the Georgia Water Stewardship Act of 2010. Since 2001, MNGWPD has implemented activities and policies that have decreased per capita water use in the region by more than 30 percent (MNGWPD, 2017). The downward trend in per capita water use is expected to continue in the future as renovation and replacement of older residences and businesses in MNGWPD comply with the new water conservation and efficiency requirements (Zitsch, 2018b). Barring new major technological advances in water conservation and efficiency, the current rate of decrease in per capita water use is likely to slow over time as the existing conservation and efficiency measures are fully implemented across the MNGWPD area.

Water conservation and efficiency measures implemented by MNGWPD plus mandatory drought management measures implemented by the State of Georgia have reduced M&I water withdrawals. From 2006 to 2015, withdrawals decreased by as much as 20 percent. While the population in the MNGWPD area grew by about 60 percent between 1994 and 2015, water withdrawals in the area in 2015 were only about 25 percent higher than 1994 levels (Zitsch, 2018a).

3.1.1.6 Water Planning, Management, and Conservation Activities of State, Regional, and Local Interests in the ACT River Basin

The states of Georgia and Alabama have implemented a variety of water resource planning, management, and conservation programs and activities in their respective states. These programs and activities include regulation and/or monitoring of water withdrawals; drought management plans; water conservation plans; and water resource management plans. In addition, MNGWPD has developed and updated a robust regional water management plan for Metro Atlanta. Appendix E describes these programs and activities in more detail.

3.1.2 Water Resources—Water Quality

Local, state, and federal agencies continue to quantify water quality conditions from point and nonpoint sources along the Coosa River, Etowah River, and Oostanaula River and their tributaries to comply with the CWA as well as with other local and state laws to address water pollution. This section focuses on reservoir and riverine water quality conditions in the portion of the Coosa River Basin affected by the proposed actions addressed in this Final FR/SEIS.

3.1.2.1 Surface Water Quality

3.1.2.1.1 Reservoir Water Quality

The main body of a reservoir contains lower velocities and less suspended sediment than a reservoir's upper reaches and shallower tributary streams feeding it; therefore, better water quality conditions exist in the main body. Water in deep reservoirs like Allatoona Lake and Carters Lake is relatively clear and generally has a uniform density and temperature during the colder winter months. Wind action on the surface mixes the reservoir's water and provides high levels of dissolved oxygen (DO).

As the deeper reservoirs in the basin warm during the spring and summer months, the water stratifies into three distinct layers: the epilimnion on the surface, the metalimnion (or thermocline) in the middle, and the hypolimnion on the bottom. The thickness of the epilimnion varies from 15 to 30 ft, remains uniform in temperature, and maintains a high level of DO from wind action and photosynthesis. The hypolimnion becomes isolated with a colder temperature (45–55 degrees Fahrenheit [°F]) and no longer mixes with the warm, well-oxygenated epilimnion. By the end of the summer, the reservoir becomes strongly stratified with a hypolimnion characterized by cold water and low DO (less than 3 milligrams per liter [mg/L]).

In 2013, when FERC issued a new license for the APC's seven developments in the Coosa River Basin, the license contained a condition requiring APC to ensure that DO levels downstream of all seven developments remain above 4.0 mg/L. APC implemented a variety of methods to achieve the required DO levels, completing installation of the aeration systems by May 1, 2018.

3.1.2.1.2 Water Quality Standards

Under 33 U.S.C. § 1313(3)(A), states are required to adopt water quality standards after public review and U.S. Environmental Protection Agency (USEPA) approval. States designate uses for their waterbodies, establish numeric criteria, and establish antidegradation policies to protect their water resources. Water quality standards applicable to the proposed actions considered in this Final FR/SEIS are defined in Alabama Department of Environmental Management (ADEM) Administrative (Admin.) Code R. 335-6 and Ga. Comp. R. & Regs. 391-3-6-.03, *Water Use Classifications and Water Quality Standards*.

Relevant water quality numeric criteria are applied based on a waterbody's designated use(s). Appendix E presents water quality criteria for Alabama and Georgia and includes the water quality parameters E. coli/fecal coliform, DO, pH, and temperature. It also provides designated uses of the mainstem waterbodies in the ACT River Basin. More information relevant to water quality criteria for metals and other toxic substances is provided in ADEM Admin. Code R. 335-6 and Ga. Comp. R. & Regs. 391-3-6-.03. Changes to reservoir operations may be expected to affect DO, water temperature, and nutrients.

Both Alabama and Georgia have site-specific water quality criteria for nutrients, metals, and other toxic substances based on human use and consumption rates. Chlorophyll *a* standards are enforced at monitoring stations in the following APC reservoirs on the Coosa River: Weiss Lake; H. Neely Henry Lake; Logan Martin Lake; Lay Lake; Mitchell Lake; and Jordan Lake. The standards range from 14 to 20 µg/l for mean samples collected monthly from April to October. Appendix E presents site-specific water quality criteria applied to Allatoona Lake and Carters Lake in Georgia.

Water quality impairment of state waterbodies from nutrient overenrichment is addressed on a site-specific basis in Georgia. GAEPD designates the state's publicly owned lakes with additional lake-specific water quality standards to address impairments. Those site-specific standards have led to the implementation of nutrient control strategies and the management of point source discharges in watersheds draining to nutrient sensitive lakes. GAEPD continues to monitor water quality to improve standards and quantify the effects of nutrient overenrichment (GAEPD, 2015).

ADEM developed nutrient criteria for the state's reservoirs with the goal of protecting each lake's designated uses. Chlorophyll *a* concentration, an indicator of nutrient overenrichment, is affected by geographical region as well as reservoir characteristics, including reservoir depth, retention time, and power generation schedule. ADEM analyzed historical data, trends in trophic conditions, stability of reservoir conditions, and existing impairments from nutrient overenrichment to determine site-specific chlorophyll *a* limits for each reservoir (ADEM, 2016).

3.1.2.1.3 Monitoring and Other Studies

Water quality monitoring and study conditions in the ACT River Basin up to 2013 were documented in previous work (USACE Mobile District, 2014b). Water quality monitoring is performed by multiple federal, state, and local agencies as well as by industrial entities. USACE WCMs for the ACT River Basin projects describe monitoring conducted at those projects.

The U.S. Fish and Wildlife Service (USFWS) identified a need to monitor water quality—including temperature, pH, hardness, turbidity, oxygen content, and other chemical characteristics—in the ACT River Basin to ensure the normal behavior, growth, and viability of all life stages of mussels (USFWS, 2010). USGS also collects water quality data throughout the ACT River Basin. Local or state sponsors coordinate, and often pay for, those efforts. In Alabama and Georgia, 259 USGS water quality monitoring stations are in the ACT River Basin, 55 of which are located in the Coosa River Basin. Of the 259 stations, 10 have real-time reporting of DO, temperature, and specific conductivity. GAEPD has sponsored 119 monitoring stations in the ACT River Basin.

ADEM and GAEPD also monitor water quality in rivers and lakes. Alabama has several water quality sampling programs that focus on reservoir monitoring, trend monitoring, and specialty studies that address needs identified by ADEM for Total Maximum Daily Load (TMDL) development and wasteload allocations. Georgia has a similar water quality monitoring program and collected water quality data from 36 sampling points in the Coosa River Basin from 2018 to 2019.

Local agencies and commercial and industrial organizations also collect water quality samples to meet regulatory requirements for National Pollutant Discharge Elimination System (NPDES) permits and to support management decisions. For example, the Bartow County Water Department, near Allatoona Lake, routinely conducts water quality testing to ensure that their water supply meets the requirements of the National Primary Drinking Water Regulations established by USEPA. They include publishing and distributing annual water quality reports to serviced customers and the general public. In addition to releasing that report, since 2007, the City of Rome, GA, has also been a designated member of WaterFirst!, a program dedicated to improving and maintaining Georgia's water quality by exceeding standards required by law. Other cities monitor water for specific compounds to meet government regulations. In 2016, USEPA issued health advisories for perfluorooctanoic acid and perfluorooctanesulfonic acid and, subsequently, found the City of Gadsden water supply test results were above the health advisory limits. That finding led to the Gadsden Water Works and Sewer Board implementing weekly monitoring of perfluorinated compounds and releasing results to ensure the city was meeting USEPA regulations.

Nonprofit and volunteer organizations are very active in water quality monitoring throughout the ACT River Basin. Those efforts are supported by ADEM through the Clean Water Partnership and by GAEPD through the Adopt-a-Stream program. The Adopt-a-Stream group, Coosa River Basin Initiative, monitors seven sites on the Etowah River and the Coosa River downstream of Allatoona Lake, along with several other sites in the area. Other citizen organizations include Alabama Water Watch, Alabama Rivers Alliance, Coosa Riverkeeper, Georgia Water Coalition, Georgia River Network, and a variety of associations for residents of lake communities.

3.1.2.1.4 Impaired Waterbodies

ADEM and GAEPD monitor conditions in their respective states to ensure water quality standards are met. If standards are not achieved for a waterbody's designated use, the waterbody is identified as impaired. Each of the two state agencies submit to USEPA biennially a list of any waters identified as not meeting standards consistent with CWA Section 305(b). The goal of the program is to identify the cause of impairment to a waterbody, establish the load of that pollutant the waterbody can assimilate, establish the waterbody's assimilative capacity as a TMDL, and develop an implementation plan to ensure the waterbody achieves water quality standards in the future. There are 27 and 15 impaired waterbodies in Alabama and Georgia, respectively, that are within the ROI of the proposed actions addressed in this Final FR/SEIS–the Coosa River Basin, excluding the unaffected Oostanaula River and tributaries. Those impaired waterbodies are identified and described in more detail in Appendix E, Section E.1.2, Tables E-22 and E-23.

3.1.2.1.5 Total Maximum Daily Loads

TMDLs are developed for impaired waterbodies to identify the sources of impairment, the levels to which contaminants must be reduced, and the methods to be used to reduce contamination to an acceptable level. In the Coosa River Basin, Alabama has listed 37 established TMDLs and Georgia has listed 166, presented in Appendix E.

Various nonprofits; federal, state, and local agencies; and universities have conducted specialty studies that describe watershed conditions, including sources and stressors affecting water quality. GAEPD developed the *Coosa River Basin Management Plan* (GAEPD, 1998) in 1998 for the Coosa River Basin watersheds in Georgia. The Alabama Clean Water Partnership then developed the *Mid-Coosa River Basin Management Plan* (ACWP, 2003), the *Upper Coosa Basin Watershed Management Plan* (ACWP, 2004), and the *Lower Coosa River Basin Management Plan* (ACWP, 2005). These documents describe the watersheds and outline basin water quality improvement programs by identifying potential sources of pollution and strategies to reduce them.

3.1.2.1.6 Point Sources

The NPDES was created in 1972 under the CWA to prohibit nonpermitted point source pollutant discharges. Historically, point source permits applied only to M&I pipe discharges; however, in the late 1990s, USEPA began regulating stormwater discharges from municipal separate storm sewer systems (MS4s), construction activities, and industrial activities under the NPDES program.

MS4s are regulated as either Phase I for medium and large cities or counties with populations over 100,000, or Phase II for small urbanized areas and nontraditional MS4s, including public universities, departments of transportation, hospitals, and prisons. Construction activities that disturb over 1 ac of land require an NPDES permit and the implementation of best management practices to prevent erosion. Industrial and commercial wastewater discharges are regulated by NPDES limits based on the type of facility, activities, and pollutants produced. Those sources were identified as contributing to surface water impairment and decreased water quality; however, NPDES regulations attempt to mitigate the effects of point source discharges by decreasing the amount of pollutants entering storm sewers and surface waters.

Historical point sources including legacy pollutants like polychlorinated biphenyl (PCB) were believed to have been released by the General Electric manufacturing plant in Rome, GA, and the Solutia (Monsanto) facility in Anniston, AL. PCBs are preserved in contaminated soils that, if disturbed, could release the contaminants into the ecosystem and create a hazard to human health.

ADEM and GAEPD develop wasteload allocations to set NPDES limits that ensure instream water quality standards are met. The entities within Alabama and Georgia responsible for point sources are required to submit discharge monitoring reports to ADEM and GAEPD, respectively, to demonstrate that those discharges adhere to their NPDES limits. Appendix E identifies 30 NPDES permits in Alabama and 19 in Georgia within the Coosa River Basin (excluding the Oostanaula River and tributaries) for point sources discharging over 1 mgd of wastewater.

3.1.2.1.7 Nonpoint Sources

Nonpoint sources of pollution are associated with a watershed's land-use activities and include contaminants like fecal coliform bacteria, metals, nutrients (biochemical oxygen demand [BOD], nitrogen, and phosphorus), pesticides, and suspended solids from erosion. The sources include areas associated with agricultural, forested, and urban activities that the NPDES program does not regulate. The metal, mercury, for example, is a nonpoint source known to be released by atmospheric deposition that bioaccumulates in fish tissue. The Alabama Department of Public Health and the Georgia Environmental Protection Division have in the past issued fish consumption advisories for reaches of the ACT River Basin.

CWA Section 319 requires each state to develop a nonpoint source management program to reduce nonpoint source pollution in navigable waters. The programs must include goals and strategies to protect each state's natural resources, strengthen stakeholder relationships, and prioritize the restoration of impaired waters. In 2014, USEPA approved Alabama's Nonpoint Source Management Plan (ADEM, 2014), which details implementing the state's Nonpoint Source Management Program. Under the program, Alabama releases an annual report that documents monitoring and assessment results and provides updates to Alabama's nonpoint source pollution reductions. Georgia's Statewide Nonpoint Source Management Plan (GAEPD, 2019) was updated in 2019 by GAEPD and will be in effect through 2024.

3.1.2.2 Groundwater Quality

Groundwater quality is affected by dissolved minerals from rocks with which the water comes into contact, including bicarbonate, calcium, chloride, magnesium, potassium, sodium, and sulfate. The groundwater quality of a region depends on its geology and varies among aquifer systems.

3.1.3 Geology and Soils

3.1.3.1 Geologic Setting

The ACT River Basin spans five Level III ecoregions each of which represent similar physical, chemical, and biological environmental attributes. The ecoregions are used as the spatial framework for research and policy decisions, including the development of site-specific water quality standards and stream pollutant loads. Rivers of the ACT River Basin upstream of Montgomery, AL, flow through high-to-moderate relief ecoregions, including the Blue Ridge, Ridge and Valley, Southwestern Appalachians, and Piedmont with elevations from 3,500 ft in the Blue Ridge headwaters of the northeast to 400 ft in the southern Piedmont downstream of Logan Martin Dam. The main channel of the Coosa River flows through the Ridge and Valley ecoregion and is primarily underlain by sedimentary bedrock. Many of the tributaries and headwater streams originate in the Blue Ridge, Southwestern Appalachians, and Piedmont ecoregions where they are underlain by crystalline metamorphic and igneous bedrock.

The various bedrocks have weathered into primarily three soil types: "ultisols," which consist of a loamy surface horizon overlying a clayey subsurface horizon and are commonly called *red clay soil*; "inceptisols," which are characterized by minimal horizon development and are found on steep slopes; and "entisols," which are characterized as sandy, deep, infertile, well drained, and subject to active erosion.

Approximately 18 percent of the ACT River Basin has been designated as prime farmland. Prime farmland, as designated by the U.S. Department of Agriculture, has the best combination of physical and chemical characteristics for producing beneficial crops, and it is available for that use. Prime farmland is found throughout the Coosa Basin, but above Logan Martin Dam it is located primarily on the east side of the Coosa River and along the eastern tributaries.

The following subsections discuss erosion and sedimentation and tailwater degradation characteristics within the ROI for this Final FR/SEIS (the Coosa River Basin), with specific emphasis on the following reservoir projects: Allatoona Lake, Weiss Lake, H. Neely Henry Lake, and Logan Martin Lake. More detailed information addressing the general geologic setting, erosion and sedimentation, and tailwater degradation for this Final FR/SEIS is provided in Appendix E.

3.1.3.2 Erosion and Sedimentation

Cropland acreages obtained from the National Agricultural Statistics Service indicate that the number of acres under cultivation in the ACT River Basin dropped by 41 percent between 1970 and 2017. That reduction coupled with improved erosion control results in an estimated 62-percent reduction in soil erosion from agricultural lands over the period. The portion of the eroded soil transported overland to streams is transported to the lakes as sediment, along with sediment generated by urban land use and stream channel erosion.

Allatoona Lake, Weiss Lake, H. Neely Henry Lake, and Logan Martin Lake—are all affected by sedimentation and shoaling. The detailed 2011 sedimentation study of Allatoona Lake (USACE Mobile District, 2011) indicated that the most heavily affected regions were associated with the mouth of the Etowah River where it enters the lake and the bays associated with major tributaries. Because most of the sediment has settled in the tributary bays, the main body of the lake has experienced very mild sedimentation. In general, erosion of the lake shoreline occurred between the summer and winter pool elevations with sedimentation primarily below the winter pool elevation.

Detailed sedimentation studies were not completed for the other three projects. Because of the sizes of their drainage areas and locations along the Coosa River system, however, reasonable shoaling impacts can be inferred. Weiss Lake likely is heavily affected by shoaling along the main Coosa River channel where it enters the lake. Weiss Lake is also likely affected within the two major tributary bays to the north, Little River and Chattooga River, with the main lake body experiencing mild sedimentation.

The sediment load to H. Neely Henry Lake is buffered by Weiss Lake, which likely traps perhaps 90 percent of the sediment carried by the Coosa River. Thus, the primary sediment contributors to H. Neely Henry Lake are likely the three major tributaries, Terrapin Creek, Big Willis Creek, and Big Canoe Creek. The main lake body likely experiences very little sedimentation.

The sediment load to Logan Martin Lake is buffered by H. Neely Henry Lake and Weiss Lake, which likely trap nearly all the sediment generated upstream of Weiss Lake. Thus, the primary sediment contributors to Logan Martin Lake are likely the three major tributaries on the southeast side of the lake, Ohatchee Creek, Cane Creek, and Choccolocco Creek. The main lake body likely experiences very little sedimentation.

3.1.3.3 Tailwater Degradation

“Tailwater degradation” is the lowering of the river bed elevation immediately downstream of a dam. Three factors drive the occurrence and rate of tailwater degradation: a reduction in the supply of sediment from upstream, erodibility of the bed material, and sufficient flow energy to transport the bed material. After a dam’s construction, a large portion of the sediment (as much as 90 percent for large reservoirs) often becomes trapped in the lake above the dam. Flow downstream of the dam, having lost its sediment load to the lake, then has excess capacity to transport sediment.

An investigation of the tailwater degradation downstream of the ACT River Basin projects was conducted using available data from USGS and APC. The method entails comparing water surface elevations over time for similar discharges. Changes in water surface elevation for similar discharges are indicative of changes in the channel form, typically bed degradation or channel widening.

The Allatoona, Weiss, H. Neely Henry, and Logan Martin projects were in operation on or before 1966. The available data used in the investigation ranged from 1979 to 2017 for Allatoona Lake, and 2001 to 2018 for the three APC projects. None of the four analyses showed discernable channel degradation within their tailwaters. That does not mean, however, that degradation did not occur during the first several years after the projects were put into operation. Presently, the channels have either eroded to a stable state or are bounded by erosion-resistant bedrock or rock bed and banks.

3.1.4 Land Use

Land use data for the entire ACT River Basin was obtained from the USGS 2011 National Land Cover Database, which categorizes land use as water, developed (urban or built-up), barren land, forested land, shrubland, cultivated herbaceous or planted (i.e., agricultural), or wetlands. The dominant land use in the ACT River Basin is forested land, accounting for more than half (54 percent). The next largest land use is agriculture at 18 percent, followed by developed land at 9 percent. Water accounted for almost 4 percent of land cover in the basin. The USACE and APC projects generally are not in or adjacent to large developed areas in the basin (e.g., Atlanta, Birmingham, and Montgomery), but in more rural areas in which the nearby developed areas are small cities or towns or unincorporated communities. Land use around each of the projects is a mix of undeveloped forested land and developed land for residential, commercial, or recreational use. Development such as homes, boat docks, marinas, and parks are most common along the shorelines of the project lakes, whereas forested land, agricultural land, and low-density residential areas are most common just downstream of the dams along the rivers before reaching the main body of a project lake.

The land-use section in Appendix E (Section E.1.5) presents a summary of overall land use in the ACT River Basin as well as land use along the rivers and around the lakes in the basin. It focuses principally on the following projects, their shorelines, and the land around them and immediately downstream of the USACE Allatoona Dam and Lake and the APC reservoir projects on the Coosa River, including the Weiss, H. Neely Henry, Logan Martin, Lay, Mitchell, and Jordan/Bouldin projects.

This section summarizes land use around, and immediately downstream of, the three reservoir projects most directly affected by the proposed actions addressed in this Final FR/SEIS: Allatoona Dam and Lake; Weiss Dam and Lake; and Logan Martin Dam and Lake.

3.1.4.1 Allatoona Dam and Lake

USACE's Allatoona Dam and Lake project is in north Georgia on the Etowah River (a tributary of the Coosa River) about 30 mi north of Atlanta, GA (Figure 1-1). At normal summer lake elevation of 840 ft, the lake shoreline is 270 mi. The Allatoona project consists of 49,545 ac; at the normal summer pool level, there are 11,164 ac of water and 38,381 ac of land. The project land was acquired to a contour elevation of 863 ft to provide an area necessary for flood risk management. In some areas around the lake, blocks of land above the 863 ft contour were purchased to provide areas for recreation, natural resource protection, and public access. The land acquisition provides a continuous area of land around the reservoir above the flood pool to ensure public access along the shore and to accommodate project-related activities (USACE Mobile District, 1998a) (USACE Mobile District, 2014a).

Allatoona Dam and Lake is a long-established project; consequently, options for resource use are limited primarily to improvements within the existing pattern of land use and framework of land use controls and practices. Proposed future development on Allatoona Lake project lands includes updating and upgrading aging facilities, improving accessibility for persons with disabilities, and when needs arise develop additional day-use or camping facilities such as additional boat ramps, camp sites, comfort stations, fishing jetties, parking sites, picnic sites, and playing fields (USACE Mobile District, 2017).

The lands at the Allatoona project are a mix of residential, commercial, recreational, and undeveloped forested land. As Metro Atlanta has expanded, residential and commercial development on the southern side of Allatoona Lake has increased (USACE Mobile District, 1998a). Homes, boat docks, and marinas line the shoreline. In comparison, the northern side of the lake is much less populated, with the project land bordered primarily by forested land, with a few housing developments or individual homes.

USACE developed the *Allatoona Lake Shoreline Management Plan*, prepared in accordance with ER 1130-2-406, *Shoreline Management at Civil Works Projects*, to guide the effective management of the Allatoona Lake shoreline and adjacent public land and water. The plan allocates the lake's shoreline into four land use categories: prohibited access areas, protected shoreline areas, public recreation, and limited development for shoreline and lake access (USACE Mobile District, 1998a).

"Prohibited access areas" protect certain project operation areas for public safety reasons. No shoreline use permits or licenses are issued for those areas. Prohibited access land is in proximity to the dam and spillway. Of the 270 mi of shoreline at normal summer level, 1 percent is categorized as prohibited access land (USACE Mobile District, 1998a).

"Protected shoreline areas" are designated to protect or restore fish and wildlife habitat, aesthetics, cultural resources, or other environmental values. No shoreline use permits or licenses are issued for protected shoreline areas, but pedestrian access and boating are permitted in those areas provided aesthetic, environmental, historical, or natural resources are not damaged. Protected areas around the lake account for 40 percent of the shoreline. A nearly 7,000-ac wildlife management area (WMA) operated by the GADNR Game and Fish Division is on the north side of Allatoona Lake (USACE Mobile District, 2019a).

"Public recreation areas" are specifically designated for present or future recreational development such as campgrounds, day-use parks, hiking and biking trails, primitive or natural areas, and marine services. Public recreation, the largest shoreline allocation at Allatoona Lake, accounts for 45 percent of the shoreline. USACE operates day-use parks, boat ramps, camp sites, and picnic sites; additional recreational facilities are available in nine city and county parks, one state park (Red Top Mountain), and eight commercial marinas (USACE Mobile District, 2019a). USACE leases the land to city, county, or state governments; organizations; or private citizens to operate the facilities. Popular recreational activities around the lake are boating, camping, fishing, hiking, hunting, picnicking, sightseeing, swimming, and observing wildlife (USACE Mobile District, 2017).

"Limited development areas"—which account for 14 percent of the shoreline—allow for specific private uses of public lands along the lake shoreline. The Allatoona Lake Project Management Office (PMO) issues permits and licenses in limited development areas for docks, under brushing, grass mowing, shoreline protection, steps, walkways, and other limited shoreline uses (USACE Mobile District, 2019a). Permits are issued for floating facilities (e.g., docks) and vegetation modification (e.g., mowing); licenses are issued for land-based structures (e.g., walkways, handrails, water lines, and picnic shelters). The Allatoona Lake PMO has issued 680 shoreline use permits and licenses (Jackson, 2019).

Downstream of Allatoona Dam to Weiss Lake is a mix of developed, agricultural, and forested land uses along the Etowah and Coosa rivers. Developed areas are focused around the communities of Cartersville, Euharlee, Rome, and Coosa, GA. Between these communities is a mix of primarily agricultural and forested land, with some industrial development at Coosa.

3.1.4.2 Weiss Dam and Lake

APC's Weiss Dam and Lake is on the Coosa River in northeast Alabama, about 80 mi northeast of Birmingham, AL (Figure 1-1). The dam impounds a reservoir of approximately 30,000 ac with 447 mi of shoreline at the normal summer elevation of 564 ft (FERC, 2009). APC owns fee interest in lands up to the normal pool elevation and has a combination of fee and easement interests for flood storage above elevation 564 ft. The major shoreline land uses at Weiss Lake are residential, forest management, sensitive resources, and project operations. The shoreline of Weiss Lake is heavily developed by commercial and private entities (FERC, 2009). Residential, commercial, retail, and recreational land uses border the reservoir, with the highest density development around the Alabama communities of Cedar Bluff on the north shore of the lake; Leesburg on the western end of the lake; and Centre south of the lake. Recreational access to Weiss Lake is provided by APC and numerous other public and private entities through formal recreation areas with boat launches, marinas, boat slips, campgrounds, picnic areas, beaches, fishing piers, general piers, bank fishing, trails, and playgrounds (FERC, 2009).

Downstream of Weiss Dam along the Coosa River to H. Neely Henry Lake is a mix of mostly agricultural and forested land use, with a few small, low-density communities such as Owens and Turkeytown, AL, until reaching Hokes Bluff, AL, a suburb of Gadsden, AL. Gadsden is the largest city in the area and borders the northern end of H. Neely Henry Lake.

3.1.4.3 Logan Martin Dam and Lake

Downstream of H. Neely Henry Dam along the Coosa River to Logan Martin Lake is primarily forested and agricultural land use, with one mining operation within 1 mi of the Coosa River around Ragland, until reaching the city of Riverside, AL, on the western bank of the river, and the city of Lincoln, AL, on the eastern bank. Riverside and Lincoln have commercial, industrial, recreational, and residential development along and near the river, including the Honda Manufacturing of Alabama plant in Lincoln.

APC's Logan Martin Dam and Lake is in northeast Alabama on the Coosa River, about 40 mi east of Birmingham, AL (Figure 1-1). The dam impounds a reservoir of approximately 15,300 ac with 275 mi of shoreline at the normal summer elevation of 465 ft (FERC, 2009). APC owns fee interest in lands up to the full-pool elevation of 465 ft has a combination of fee and easement interests for flood storage above elevation 465 ft. The principal shoreline land uses at Logan Martin Lake are residential, sensitive resources, and forest management. A limited portion of the shoreline is more heavily developed by commercial and private entities (FERC, 2009). Besides Riverside and Lincoln, the largest cities near Logan Martin Lake are Pell City, AL, to the west and Talladega, AL, to the east. Recreational use of the lake includes watersports, boating, fishing, canoeing, and scenic viewing. The lake has private clubs, golf courses, and marinas and is heavily used by the public for recreation and private residences (FERC, 2009).

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 AL.

3.1.5 Biological Resources

3.1.5.1 Vegetation Resources

The ACT River Basin lies within portions of five Level III ecoregions (Griffith, et al., 2001), which are described in detail in the 2014 Final EIS for the ACT River Basin WCM update. The ROI is primarily within the Ridge and Valley ecoregion (ecoregion 67); however, the edges of Allatoona Lake lie within the Blue Ridge (ecoregion 66) and Piedmont (ecoregion 45) ecoregions.

The primary vegetative communities in the ROI include riverine and reservoir aquatic macrophyte communities and wetland communities.

3.1.5.1.1 Riverine and Reservoir Aquatic Macrophyte Communities

APC manages aquatic vegetation on its reservoirs to protect the ecology of the rivers and to comply with federal license requirements. Aquatic plant management activities include control and enhancement. During the FERC relicensing process, APC developed an Invasive Species Management Plan for each hydroelectric project with the assistance of stakeholders and federal and state agencies. The plans include aquatic plant management guidelines (APC, 2018).

3.1.5.1.2 Wetland Communities

The majority of wetlands in the ACT River Basin are forested palustrine wetlands in the floodplains of the rivers. Within the ROI, there are approximately 223,413 ac of wetlands and deepwater habitats in the Coosa River subbasin and approximately 39,162 ac of wetlands and deepwater habitats in the Etowah River subbasin. The majority of this acreage comprises deepwater habitats such as lakes and rivers. Most of the palustrine wetlands are found in the riparian, or river-associated, areas along the edges of streams and rivers, and they depend on natural flooding to maintain the water and habitat quality of the riverine ecosystems. Other palustrine wetlands in the ACT River Basin occur along and are influenced by reservoirs. Appendix E, Section E.1.6.1.2 provides a breakdown of the acreage of different wetland and deepwater types by subbasin.

3.1.5.2 Wildlife Resources

Wildlife resources in the ACT River Basin that could potentially be affected by updates to project WCMs include species known or likely to occur in riparian or wetland areas. Fish and aquatic resources are discussed in Section 3.1.6.3. The ROI is limited to aquatic, riparian, and wetland communities because of the current water control measures along the Coosa and Etowah rivers. Because flow in those rivers is controlled at the hydroelectric dams, the rivers and reservoirs are not expected to inundate upland areas beyond the river banks and managed reservoir pool elevations except in the case of catastrophic flooding.

Because riparian zones form the interface between aquatic and terrestrial components of the landscape, many important ecological connections are maintained by their protection and enhancement. Maintaining floodplain connectivity is critical not only to providing appropriate moisture regimes to vegetative communities in the surrounding landscape, but also to supporting the wildlife assemblages dependent on the vegetation for habitat and nutritional resources.

3.1.5.2.1 Birds

There are approximately 142 species of birds known to occur in, or potentially inhabit areas of, the ACT River Basin (USGS, 2003a) (AL-GAP, 2010). Riparian forests typically support a wide diversity of birds; however, the exact makeup of a bird assemblage depends on specific characteristics of the forest. Various raptors prefer living and hunting in riparian hardwood forests, including Mississippi and American swallow-tailed kites, bald eagles, and ospreys. Wood storks, purple gallinules, and moorhens rely on aquatic areas for habitat and for foraging zones; in addition, wood storks require tall cypress and hardwoods for nesting spots. Bottomland hardwood forests support a diverse bird assemblage, which can include numerous species of warblers.

3.1.5.2.2 Mammals

Approximately 68 species of mammals actually or potentially inhabit riparian and/or upland areas in the ACT River Basin (USGS, 2003a) (AL-GAP, 2010). In addition to the larger species such as black bear (*Ursus americana*), white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), wild pig (*Sus scrofa*), red fox (*Vulpes vulpes*), and American beaver (*Castor canadensis*), several species each of bats, squirrels, shrews and voles, otters, skunks, and mice are included. The extent to which each species uses riparian habitat differs depending on specific life history traits, especially requirements for food, cover, protection from natural enemies, and refuge from extreme weather events.

3.1.5.2.3 Reptiles

The diversity of reptile fauna in the ACT River Basin is reflected by approximately 81 species known or likely to occur (USGS, 2003a) (AL-GAP, 2010), including the American alligator (*Alligator mississippiensis*), common and alligator snapping turtles (*Chelydra serpentine* and *Macroclemys temmincki*, respectively), 24 other turtles and tortoises, 46 species of snakes, the green anole (*Anolis carolinensis*), six skinks, and five lizards. Many reptiles are associated with riparian areas because of their reliance on the moisture and/or on the location of food sources, whether they are predators or herbivores.

3.1.5.2.4 Amphibians

Amphibians are represented by approximately 57 species known or likely to occur in the ACT River Basin (USGS, 2003a) (AL-GAP, 2010). Salamanders and frogs are the most diverse groups of amphibians in the basin. There are 27 species of salamanders representing nine genera. The 21 frog species represent four genera. There also are three toad species, two siren species, two- and three-toed amphiuma, one newt species, the hellbender (*Cryptobranchus alleganiensis*), and the Alabama waterdog (*Necturus alabamensis*). Although some salamanders and frogs can be found in upland areas, most amphibians require nearly constant contact with moisture for most of their life cycle, if not for their entire life cycle.

3.1.5.3 Fish and Aquatic Resources

Fish and aquatic resources within the Coosa River and Etowah River basins have the potential to be affected by changes in ACT River Basin operations, including species that inhabit riverine and reservoir communities.

3.1.5.3.1 Riverine

Coosa River Subbasin. The mainstem of the Coosa River forms at the confluence of the Etowah and Oostanaula rivers in Georgia and runs 255 mi into and through Alabama. APC dams impound approximately 238 mi of the Coosa River before it meets the Tallapoosa River to form the Alabama River, effectively fragmenting the few remaining reaches of free-flowing riverine habitat found in the subbasin.

The subbasin contains approximately 147 fish species, including several that are unique to the Coosa River. It is home to approximately 91 species of aquatic snails, of which 82 are endemic to the Coosa River subbasin. Approximately 53 freshwater mussel species also have been documented in the subbasin, 11 of which are endemic (USACE Mobile District, 1998b) (ADCNR, 2008). Although the seven APC dams impound most of the river in six reservoirs (Jordan and Bouldin dams share a single reservoir), some significant reaches of free-flowing riverine habitat on the mainstem Coosa River remain (USACE Mobile District, 1998b): downstream of Rome, GA, to Weiss Lake headwaters; downstream of the spillway at Weiss Dam; and downstream of Jordan Dam. These reaches have some of the greatest diversity of aquatic species.

Etowah River Subbasin. The Etowah River originates as a high-gradient stream in the Blue Ridge province of the Southern Appalachian Mountains and flows approximately 69 mi westward through Piedmont upland to Allatoona Lake. The upper mainstem and tributaries of the Etowah River support the federally endangered amber darter (*Percina antesella*) and Etowah darter (*Etheostoma etowahae*), and the federally threatened Cherokee darter (*Etheostoma scotti*). Through 3 years of macroinvertebrate sampling and analysis (2005–07), approximately 43 percent of the stream channel miles in the upper Etowah River watershed were assessed (686 mi out of 1,613 mi) (Stribling, Hill, Davie, Jokay, & Miller, 2006) (Millard, Stribling, Jokay, Moiz, & Davie, 2007) (Millard, Stribling, Jokay, & Davie, 2008). Cumulatively, there have been 421 taxa (primarily, genera) of benthic macroinvertebrates collected, of which approximately 37 percent are considered stressor sensitive.

The lower Etowah River extends 48.6 mi from Allatoona Lake to its confluence with the Oostanaula River, forming the Coosa River in Rome, GA. Historically, the lower Etowah River contained more than 91 native fish species, including lake sturgeon and at least 51 mussel species.

3.1.5.3.2 Reservoirs

Coosa River Subbasin. Weiss Lake is fertile and shallow, making it very productive for fish. Known as the “crappie fishing capital of the world,” it offers outstanding fishing for largemouth bass and striped bass (ADCNR, 2018).

H. Neely Henry Lake is a popular area for recreational fishing. Fishing for largemouth bass and spotted bass is excellent. Locally renowned for its crappie fishing, H. Neely Henry Lake is receiving recognition for its striped bass fishing as well (ADCNR, 2018).

Logan Martin Lake is popular for its good Alabama spotted bass and largemouth bass fishing (ADCNR, 2018). Bass clubs in Alabama and neighboring states submit their tournament results to help ADCNR manage their resource. White, hybrid and striped bass make annual spring runs upriver and have established an important fishery resource at the headwaters (below Neely Henry dam). The striped bass fishery fluctuates depending upon 1) reproduction and migration of striped bass down the Coosa River from Weiss Lake and 2) stocking success into Logan Martin Lake. Striped bass and hybrid striped bass will continue to be stocked at three to five fish per acre each year (ADCNR, 2019a).

Etowah River Subbasin. Allatoona Dam impounds approximately 30 mi of the Etowah River and creates approximately 11,862 ac of reservoir habitat. Allatoona Lake is used for recreational fishing. GADNR develops a list each year of the best fishing prospects based on sampling efforts by its Wildlife Resources Division and knowledge of past fishing trends, fishing experiences, and discussions with anglers and marina owners. For 2018, the most likely fishing prospects at the project included striped bass, hybrid striped bass, white bass, and crappie (GADNR, 2018).

3.1.5.4 Protected Species (Federal and State)

The ACT River Basin is home to approximately 230 species protected by state and federal law according to the 1998 draft EIS and the 2003 Biological Assessment (BA) addressing project operations in the ACT River Basin (USACE Mobile District, 1998b) (USACE Mobile District, 2003). Additional review of protected species in the basin was conducted in conjunction with the ACT River Basin WCM update, which was approved in 2015 (USACE Mobile District, 2014b). This updated study focuses on the Coosa River and Etowah River basins, which includes the ROI. According to recent USFWS Official Species Lists, there are 57 federally protected species associated with these river basins, which have the greatest potential to be affected by changes in basin operations. These species are listed in Table 3-5, with their state status. Of the 57 potentially affected species, 20 are endemic to the ACT River Basin.

Table 3-5. Federally Protected Species Occurring in the Coosa and Etowah Subbasins on the ACT River Basin.

Scientific name	Common name	Endemic[a]	Federal status[b]	Alabama status[b]	Tennessee status[b]	Georgia status[b]
Mammals						
Myotis grisescens	Gray Bat	—	E	SP	—	E
Myotis sodalis	Indiana Bat	—	E	SP	—	E
Myotis septentrionalis	Northern Long-Eared Bat	—	T	SP	—	T
Birds						
Picoides borealis	Red-Cockaded Woodpecker	—	E	SP	—	—
Mycteria americana	Wood Stork	—	T	SP	—	—

Scientific name	Common name	Endemic[a]	Federal status[b]	Alabama status[b]	Tennessee status[b]	Georgia status[b]
Reptiles						
Clemmys muhlenbergii	Bog Turtle	—	SAT	—	—	E
Sternotherus depressus	Flattened Musk Turtle	Y	T	SP	—	—
Amphibians						
Necturus alabamensis	Black Warrior (Sipsey Fork) Waterdog	—	E	SP	—	—
Fish						
Percina antesella	Amber Darter	—	E	—	—	E
Cyprinella caerulea	Blue Shiner	Y	T	SP	—	E
Notropis cahabae	Cahaba Shiner	—	E	SP	—	—
Etheostoma scotti	Cherokee Darter	Y	T	—	—	T
Percina jenkinsi	Conasauga Logperch	Y	E	—	—	E
Etheostoma etowahae	Etowah Darter	Y	E	—	—	E
Percina aurolineata	Goldline Darter	Y	T	SP	—	E
Cottus paulus	Pygmy Sculpin	Y	T	SP	—	—
Etheostoma phytophilum	Rush Darter	—	E	SP	—	—
Percina tanasi	Snail Darter	—	T	*SP*	—	E
Etheostoma trisella	Trispot Darter	Y	T	*SP*	T	E
Etheostoma chermocki	Vermilion Darter	—	E	SP	—	—
Mussels (Clams)						
Medionidus acutissimus	Alabama Moccasinshell	—	T	SP	—	T
Medionidus parvulus	Coosa Moccasinshell	Y	E	SP	—	E
Villosa trabalis	Cumberland Bean	—	E	—	—	—
Pleurobema furvum	Dark Pigtoe	—	E	—	—	—
Lampsilis altilis	Finelined Pocketbook	—	T	—	—	—
Pleurobema hanleyianum	Georgia Pigtoe	Y	E	SP	—	E
Lampsilis perovalis	Orangenacre Mucket	—	T	—	—	—
Pleurobema perovatum	Ovate Clubshell	—	E	SP	—	—
Epioblasma othcaloogensis	Southern Acornshell	Y	E	SP	—	—
Pleurobema decisum	Southern Clubshell	—	E	SP	—	E
Pleurobema georgianum	Southern Pigtoe	Y	E	SP	—	E
Ptychobranchus greenii	Triangular Kidneyshell	—	E	SP	—	E
Epioblasma metastriata	Upland Combshell	—	E	SP	—	—

Scientific name	Common name	Endemic[a]	Federal status[b]	Alabama status[b]	Tennessee status[b]	Georgia status[b]
Snails						
Lioplax cyclostomaformis	Cylindrical Lioplax (snail)	Y	E	SP	—	—
Leptoxis foremani	Interrupted (Georgia) Rocksnail	Y	E	SP	—	E
Elimia crenatella	Lacy Elimia (snail)	Y	T	SP	—	—
Leptoxis taeniata	Painted Rocksnail	Y	T	SP	—	—
Leptoxis plicata	Plicate Rocksnail	—	E	SP	—	—
Pleurocera foremani	Rough Hornsnail	Y	E	SP	—	—
Tulotoma magnifica	Tulotoma Snail	Y	T	SP	—	—
Flowering Plants						
Sarracenia rubra ssp. alabamensis	Alabama Canebrake Pitcher-Plant	Y	E	—	—	—
Clematis socialis	Alabama Leather Flower	Y	E	—	—	E
Spigelia gentianoides	Gentian Pinkroot	—	E	—	—	—
Arabis georgiana	Georgia Rockcress	—	T	—	—	T
Sarracenia oreophila	Green Pitcher-Plant	—	E	—	—	E
Ptilimnium nodosum	Harperella	—	E	—	—	—
Sagittaria secundifolia	Kral's Water-Plantain	—	T	—	—	T
Scutellaria montana	Large-Flowered Skullcap	—	T	—	—	T
Rhus michauxii	Michaux's Sumac	—	E	—	—	E
Marshallia mohrii	Mohr's Barbara's Buttons	—	T	—	—	T
Isotria medeoloides	Small Whorled Pogonia	—	T	—	—	T
Helonias bullata	Swamp Pink	—	T	—	—	T
Pityopsis ruthii	Ruth's Golden Aster	—	E	—	—	—
Xyris tennesseensis	Tennessee Yellow-Eyed Grass	—	E	—	—	E
Spiraea virginiana	Virginia Spiraea	—	T	—	—	T
Platanthera integrilabia	White Fringeless Orchid	—	T	—	—	T
Helianthus verticillatus	Whorled Sunflower	—	E	—	—	E

Sources: (USFWS, 2019a) (USFWS, 2019b) (USFWS, 2019c) (USFWS, 2019d) (ANHP, 2017) (ADCNR, 2019b) (GADNR, 2019) (TWRA, 2019) (Tennessee Department of State, 2016)

Notes:

a. Y = endemic to ACT River Basin.

b. Status. E = listed as endangered; SAT = similarity of appearance, threatened; SP = state protected; T = threatened.

"Sensitive species" are unique plants and animals observed to be declining toward extinction. Using available scientific research, state, federal, and nongovernmental organizations have assigned conservation priority to many rare and declining species. The most significant protection for sensitive species is the Endangered Species Act (ESA) (16 U.S.C. § 1531 *et seq*.), passed in 1973 (with subsequent amendments in 1978, 1982, 1988, and 2004) to address concerns about declining populations. The law offers two classes of protection for rare species—threatened and endangered. "Threatened status" indicates the species is likely to become endangered within the foreseeable future. "Endangered status" indicates the species is in danger of extinction throughout all or a significant portion of its range. All federal agencies are required to protect threatened and endangered (T&E) species while carrying out projects and to preserve T&E species habitats on federal land (USFWS, 2001). Because it is unlawful to hunt or collect T&E species, habitat degradation is the primary reason for population declines in listed species (USFWS, 2001).

Critical habitat is defined in the ESA. Species listed as threatened or endangered under the ESA are afforded protection within specific areas of their geographic range that offer physical or biological features essential to their conservation and that might require special management considerations. Critical habitat units in the Coosa River and Etowah River basins are depicted in Figure 3-1 (USFWS, 2019f). Critical habitat for aquatic species in the Coosa River and Etowah River basins is summarized below. More detailed information is provided in Appendix E.

Critical habitat has been established in the Coosa River subbasin for several mussel, snail, fish, and plant species, including Alabama moccasinshell (*Medionidus acutissimus*), Coosa moccasinshell (*M. parvulus*), finelined pocketbook (*Lampsilis altilis*), Georgia pigtoe (*Pleurobema hanleyianum*), Georgia rockcress (*Arabis georgiana*), interrupted rocksnail (*Leptoxis foreman*), ovate clubshell (*Pleurobema perovatum*), rough hornsnail (*Pleurocera foremani*), southern acornshell (*Epioblasma othcaloogensis*), southern clubshell (*Pleurobema decisum*), southern pigtoe (*Pleurobema georgianum*), triangular kidneyshell (*Ptychobranchus greenii*), upland combshell (*E. metastriata*), trispot darter (*Etheostoma trisella*) (proposed), and whorled sunflower (*Helianthus verticillatus*).

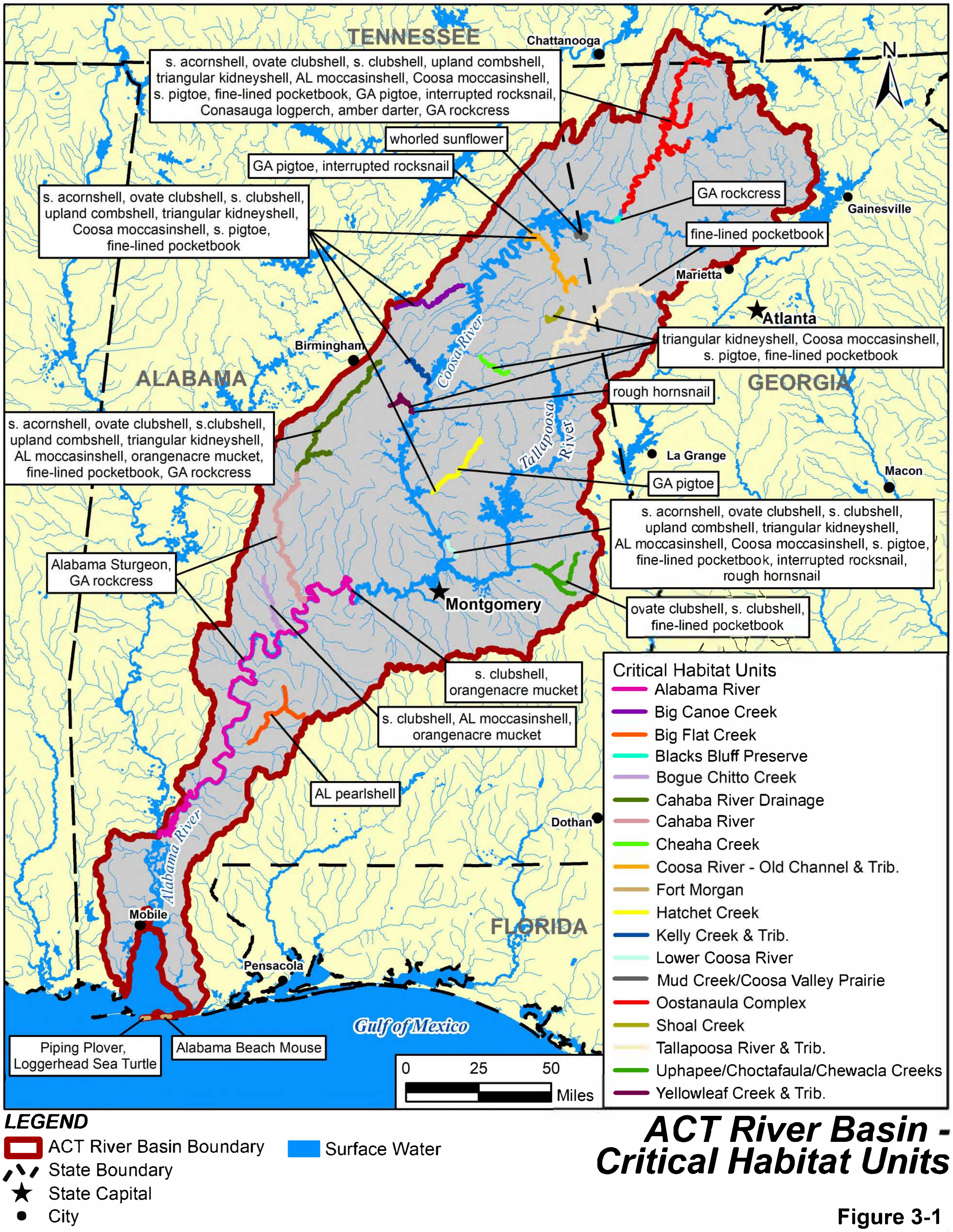
Critical habitat has been established in the Etowah River subasin for several fish, mussel, snail, and plant species, including amber darter, Conasauga logperch, finelined pocketbook, Georgia pigtoe, Georgia rockcress, interrupted rocksnail, southern acornshell, ovate clubshell, southern clubshell, upland combshell, triangular kidneyshell, Alabama moccasinshell, Coosa moccasinshell, southern pigtoe, trispot darter (proposed).

3.1.5.5 Fish and Wildlife Management Facilities

Fish and wildlife management facilities include all fish hatcheries, wildlife refuges, and fish and WMAs in the ACT River Basin. There are several state and federal facilities in the ACT River Basin that use surface water or groundwater in operations for fish and wildlife management, including fish hatcheries and a public fishing area, and are listed in the October 2014 Final EIS for the ACT River Basin WCM update. However, none of those facilities are within the identified ROI.

No National Wildlife Refuges or Alabama state parks are located within the local area of effect; however, two WMAs and one Georgia state park are within it. Coosa WMA is a 17,486-ac property that borders the Coosa River in Alabama and is managed by ADCNR in cooperation with the Forever Wild Land Trust and numerous private companies and landowners. The WMA offers hunting opportunities for large and small game including deer, turkey, dove, quail, rabbit, squirrel, crow, raccoon, opossum, fox, woodcock, snipe, waterfowl, and feral swine. WMA regulations allow the use of firearms, bow and arrow, and falconry, with restrictions.

Allatoona WMA is a federal property located in Cherokee and Bartow counties in Georgia that is owned by USACE and managed by GADNR. The 6,818-ac property on the northeastern end of Allatoona Lake offers hunting opportunities for deer, bear, turkey, small game, and waterfowl (USACE Mobile District, 2019b). Red Top Mountain State Park is a 1,776-ac park on Allatoona Lake that includes a marina with two boat docks, a swimming beach, hiking and biking trails, and fishing areas. GADNR manages the park and oversees wildlife management.



ACT River Basin - Critical Habitat Units

Figure 3-1

Source: USFWS GIS 2019.

3.1.6 Socioeconomic Resources

This section describes the affected environment for socioeconomic resources in the ACT River Basin. M&I water demands, navigation, power generation, agriculture, recreation, and flood risk management are discussed, as well as population, housing, income, employment, environmental justice, and protection of children. More details concerning these topics are provided in Appendix E, Section E.1.7.

3.1.6.1 Municipal and Industrial Water Demands

A critical function of the rivers in the ACT River Basin is water supply. This analysis represents the existing and projected future water supply demands for Allatoona Lake from 2020 through 2050.

3.1.6.1.1 Water Demand Methodology

The methodology and analysis for determining water demand were developed by MNGWPD and verified by the USACE Mobile District staff. Appendix B (Plan Formulation) describes the process in more detail, including information provided by the MNGWPD. M&I demands for Allatoona Lake include all water uses for jurisdictions that withdraw water from the lake. The projections incorporate the most recent information concerning regional population trends and projected population and employment growth rates, the effects of existing and projected water conservation measures, and economic activity (Zitsch, 2018b).

3.1.6.1.2 State-Collected Water Use Data

USACE Mobile District receives monthly M&I water use reports from the states of Alabama and Georgia, which are used to determine the state water use withdrawn from the reservoirs. Table 3-6 summarizes surface withdrawal data for the ACT River Basin in Alabama from Weiss Lake to Jordan Lake above the city of Montgomery for the period 2002 through 2012. Additional information regarding Georgia withdrawals can be found in Appendix D (Economics).

Table 3-6. M&I Water Use Data in the ACT River Basin, Alabama (2002–2012)

	Net withdrawals (mgd) by reservoir/reach						
Year	Coosa	Jordan	Mitchell	Lay	Logan Martin	H. Neely Henry	Weiss
2002	-37.08	0.00	0.65	352.11	-218.25	203.68	10.22
2003	-39.63	63.10	-26.75	167.99	-261.76	83.12	15.71
2004	-40.39	4.63	-0.16	57.26	-240.76	118.33	8.30
2005	-36.28	3.87	-3.44	145.59	-270.31	111.37	24.45
2006	-37.73	3.11	1.19	344.56	-252.65	163.77	19.73
2007	-33.24	69.91	6.41	245.13	-204.95	228.54	17.19
2008	-25.28	58.53	-15.41	5.23	-239.40	156.13	11.16
2009	-15.32	51.83	19.67	-417.62	98.95	84.15	13.54
2010	-12.85	51.28	-0.29	-351.52	28.48	148.02	17.74
2011	-20.98	51.38	1.86	-372.70	165.12	119.80	-16.50
2012	-18.08	0.00	0.33	22.69	-165.12	-1200.14	0.00

Source: USACE Mobile District

3.1.6.1.3 Future M&I Water Demand at Allatoona Lake

As part of its mission to prepare and periodically update comprehensive water resource management plans within their area of responsibility, the MNGWPD developed projected water supply demands for Allatoona Lake. The USACE team reviewed and vetted the analysis to ensure reliability and accuracy of the data, and then the data were used as the future demands in the planning process. The demand projections were developed using a Monte Carlo analysis, which included uncertainty factors for the data used, and were heavily based on (1) population and employment forecasts; (2) water billing, production, and withdrawal data; and (3) plumbing fixture and appliance stock. The 2050 demand for withdrawals from Allatoona Lake for CCMWA and the City of Cartersville/Bartow County is 94 mgd, as shown in Table 3-7. Year 2006 was used as a baseline year for comparison because more water was withdrawn in the ACT River Basin (including withdrawals from Allatoona Lake) in that year than in any other year recorded.

Table 3-7. Projected Water Demands from Allatoona Lake

Water provider	2006 level of use (mgd)	Projected 2050 demand (mgd)	Additional water to meet projected demand (mgd)
Cobb County-Marietta Water Authority	47.3	57	9.7
City of Cartersville/ Bartow County	13.9	37	23.1
Total Demand	**61.2**	**94**	**32.8**

Source: (Hazen and Sawyer, Inc., 2018).

3.1.6.2 Navigation

The federally authorized Alabama River navigation project in southwest Alabama stretches 289 mi from its confluence with the Mobile River upstream to Montgomery, AL. The authorization provides for a 9-ft deep by 200-ft wide navigation channel from its junction with the Mobile River upstream to Montgomery and includes three L&D projects: Claiborne, Millers Ferry, and Robert F. Henry. Table 3-8 highlights the ACT River Basin's use for navigation, especially noncommercial use and lockages.

Table 3-8. ACT River Basin Navigation—Cumulative Lockage Use Data (1999–2017)

Alabama River L&Ds (Claiborne, Millers Ferry, and Robert F. Henry)	No. of vessels	No. of lockages/cuts
Commercial Vessels	684	499
Noncommercial Vessels	391	368
Recreational Vessels	6,189	4,439
Total Vessels	7,264	5,306

Source: (USACE Institute for Water Resources, 2018b).

Table 3-9 presents waterborne commerce for 1999 through 2017 as reported by USACE Institute for Water Resources traffic statistics.

Table 3-9. Cumulative Waterborne Commerce for Alabama River (1999-2017)

Commodity	Total tons (1999-2017)
All Units (Ferried Autos, Passengers, Railway Cars)	0
All Crude Materials, Inedible, Except Fuels	957,055
All Primary Manufactured Goods	22
All Manufactured Equipment and Machinery	37,303
All Waste Material	1,100
All Unknown or Not Elsewhere Classified	600

Source: (USACE Institute for Water Resources, 2018a).

3.1.6.3 Hydropower Generation

The ACT River Basin was heavily developed for hydropower generation by private power companies, municipalities, and USACE. The power resources serve all sectors; however, some of the agricultural and industrial users are dependent upon economical power sources for continued operations of their enterprises.

3.1.6.3.1 ACT River Basin Bulk Power System Overview

A bulk power system is a large interconnected electrical system comprised of generation and transmission facilities and their control systems. The ACT River Basin is in the southeastern subregion of the Southeastern Electric Reliability Corporation (SERC). SERC's southeastern subregion comprises five smaller control areas, each of which is individually managed by PowerSouth (formerly Alabama Electric Cooperative), Oglethorpe Power Corporation, South Mississippi Electrical Power Association, the Southern Company, or Walton Electric Membership Corporation. APC is a division of the Southern Company and is the primary private operator in the ACT River Basin.

3.1.6.3.2 ACT River Basin Hydropower System

USACE operates four projects with hydropower capabilities in the ACT River Basin. Robert F. Henry L&D and Millers Ferry L&D are both on the Alabama River and work together with a combined generating capacity of 172 MW in support of hydropower generation while also serving other project purposes. Allatoona Dam, on the Etowah River in Georgia, is operated as a peaking plant with an installed generating capacity of 82.2 MW. Carters Dam/Reregulation Dam, on the Coosawattee River in Georgia, is operated as a pump storage project with a total generating capacity of 600 MW.

APC operates a total of 14 peaking hydropower projects in Alabama. Of that total number, 11 are on the Tallapoosa and Coosa rivers in the ACT River Basin system, with 1,403.5 MW of declared generating capacity. The 11 APC hydropower projects in the basin are identified in Section 2.1 and are shown on Figure 1-1. Table 3-10 displays generation from Fiscal Year 2008 through 2018 for USACE and APC projects in the ACT River Basin.

Table 3-10. ACT River Basin—USACE and APC Power Generation (MWh) by Fiscal Year

Project	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
APC Power Projects (11)	444,314	645,867	660,838	506,146	564,291*	564,291*	564,291*	564,291*	564,291*	564,291*	564,291*
Allatoona Dam	50,541	100,222	174,927	86,790	67,903	189,901	68,531	0	0	11,138	134,856
Carters Dam	535,959	577,565	610,566	544,692	490,110	473,761	479,980	490,758	492,970	415,831	439,700
Robert F. Henry L&D	195,711	306,682	313,766	210,441	235,152	396,013	296,922	311,444	196,113	315,481	300,549
Millers Ferry L&D	238,177	340,076	324,713	194,871	302,109	416,148	358,854	377,331	241,123	377,267	310,855

Note: MWh = megawatt hours
Source: USACE Mobile District
* Average APC project generation from 2008-2011

3.1.6.4 Flood Risk Management

Flood risk management has long been an important USACE focus for the reservoirs it operates. Allatoona Lake provides important flood storage, with spillway capacities sufficient to discharge floods with return intervals of 500 years. Downstream of the dam, the Etowah River extends through Bartow and Floyd counties, GA, and, with the confluence of the Oostanaula River, becomes the Coosa River at Rome, GA.

The majority of the floodplain structures that would be affected are in the cities of Cartersville, Euharlee, and Rome, GA. The Hydrologic Engineering Center-Flood Impact Analysis (HEC-FIA) model results indicate that a maximum of 511 structures would be affected under the base (existing) conditions in Georgia below Allatoona Dam, of which 360 are in Floyd County, GA. In Alabama, the majority of floodplain structures are in Etowah, St. Clair, and Talladega counties. Additional details on the HEC-FIA model results can be found in Appendix D.

The composition of residential structures within or in close proximity to the ACT River Basin floodplain from Allatoona Lake in Georgia to Montgomery, AL, is very diverse with a wide range of structure types from trailer parks and fishing cabins to mansions and large estates. Nonresidential structures are also diverse and include hospitals, shopping malls, marinas, and large industrial complexes such as power plants. In Georgia below Allatoona Dam, most of the structures at risk for flooding during flood events are largely concentrated in the city of Rome. In Alabama, the areas directly downstream of the APC projects receive most of the flooding and are mostly rural agricultural lands without large concentrations of development. The flood risk along the Coosa River is spread over a much larger area from Weiss Lake in Cherokee County, AL, to Jordan Lake in Elmore County, AL. St. Clair, Talladega, and Etowah counties in Alabama contain the largest number of structures within the floodplain of the Coosa River.

3.1.6.5 Recreation

The lakes, rivers, and streams of the ACT River Basin are heavily used for recreation. The lakes and rivers provide recreation opportunities for residents in northern Georgia and a majority of Alabama. This section summarizes the recreational activities and facilities in the Coosa River Basin, with an emphasis on the mainstem rivers and lakes potentially affected by the proposed actions addressed in this Final FR/SEIS. Northern Georgia and Alabama have several national forests, national and state parks, and resort communities that are favorite weekend and vacation destinations of state residents and visitors. In Georgia, the upper portion of the Coosa River Basin is in the Chattahoochee National Forest. The Coosa River runs through the Talladega National Forest, south of Birmingham and Anniston, AL. The developed sites provide a range of primitive to modern facilities. Dispersed activities include hunting, fishing, boating, hiking, and off-road vehicle riding. Little River Canyon National Preserve, a popular National Park Service (NPS) site, is on a tributary to the Coosa River that drains into Weiss Lake from the north. Sightseeing, picnicking, hiking, wading, advanced whitewater paddling, canoeing, mountain biking, horseback riding, and rock climbing are popular activities in that area. There are no federally designated Wild and Scenic Rivers within the ACT River Basin.

While all of the USACE and APC reservoirs in the ACT River Basin provide water-based recreational opportunities, the following sections focus on the reservoirs in the Coosa River portion of the basin that would be directly affected by the proposed actions addressed in this Final FR/SEIS: Allatoona Dam and Lake (USACE), Weiss Dam and Lake (APC), and Logan Martin Dam and Lake (APC). Allatoona Lake in Georgia is one of the most frequently visited USACE lakes in the nation, with nearly 7 million visitors per year (USACE Mobile District, 2019a). USACE, in conjunction with other public and private organizations, provides a wide spectrum of quality recreation opportunities that inject nearly $250 million into the regional economy each year (USACE Mobile District, 2019a). Recreational opportunities at Allatoona Lake include boat fishing, pleasure boating, water skiing, canoeing/kayaking, hiking, biking, swimming, picnicking, camping, and hunting. USACE has 14 day-use parks, 16 boat ramps, 589 camp sites, and 188 picnic sites at the lake, and additional recreational facilities are available in nine city and county parks, one state park (Red Top Mountain State Park), and eight commercial marinas (USACE Mobile District, 2019a). The marinas provide varying levels of service from boat slips (both covered and uncovered) and dry storage to fuel, boat repairs, rentals, supplies, and other services. USACE leases project land to city, county, and state governments; organizations; and private citizens to operate facilities that provide public access to the lake.

Weiss Lake provides opportunities and access for a variety of recreational activities, including fishing, hunting, boating, swimming, picnicking, walking, and scenic viewing. There are 44 formal recreational areas at Weiss Lake: 13 publicly owned sites and 31 privately owned areas that include boat launches, marinas, boat slips, campgrounds, picnic areas, beaches, fishing piers, general piers, bank fishing areas, trails, and playgrounds. APC owns and operates three of the areas—the Weiss Dam tailrace access area, the Weiss Dam spillway overlook area, and the Leesburg boat launch area. The Alabama Department of Conservation and Natural Resources (ADCNR) maintains two other facilities owned by APC—State Launch at Cobia Bridge and Bay Springs boat launch. The fishing pier and parking area at the Weiss Dam tailrace access area are on the eastern bank, upstream of the powerhouse discharge area. The Weiss Dam spillway area offers parking and trails to the water on the western shore near the spillway structure to accommodate individuals fishing from the banks near the spillway. The marinas generally provide launching facilities, fuel services, groceries/food services, boat rental or repair, marine supplies, bait and tackle, and piers. Several marinas also provide camping facilities and day-use areas. Camping facilities and resorts provide a variety of day and overnight use facilities, including boat launching facilities and picnic areas. The informal recreation sites provide access to the Weiss project for camping, bank fishing, and boating (FERC, 2009). Annual recreational use at Weiss Dam and Lake is about 1.5 million recreation days. About 84 percent of the total annual use at the project occurs during the spring and summer months. Boat fishing is by far the most popular recreational pursuit, followed in descending order by pleasure boating, picnicking, and swimming (FERC, 2009).

Logan Martin Lake provides a variety of different recreational opportunities at 38 designated recreational areas: eight publicly owned areas and 30 privately owned sites. APC owns and operates the Logan Martin Dam tailrace facility and owns the Stemley Bridge bank fishing site and Choccolocco Creek boat launch. The Logan Martin Dam tailrace area has a fishing pier and parking area located on the western shoreline (FERC, 2009). APC also operates the Logan Martin Dam Park, a day-use area located on the eastern edge of the embankment at the dam. The park includes a fishing pier, grills, pavilions, and picnic tables (APC, 2019a). APC leases property around the lake to various state and local entities and private interests that provide recreation facilities for the public. In addition to the formal access sites, APC has identified 24 informal access areas at the project that primarily provide shoreline fishing opportunities (FERC, 2009). The lake has numerous private clubs, golf courses, and marinas and is heavily used by the visiting public and those residing on the lake. The downstream portion of the lake, which is more heavily developed, provides a broad surface area and many coves for water sports, motorized boating, and other water-based recreational activities. The area downstream of the H. Neely Henry Dam tailrace is riverine, less developed, and offers fishing, canoeing, scenic viewing opportunities, and other water-based recreational opportunities (FERC, 2009). Annual recreational use at Logan Martin Dam and Lake is about 1.5 million recreation days. About 82 percent of the total annual use at the project occurs during the spring and summer months. Boat fishing is by far the most popular recreational pursuit, followed in descending order by pleasure boating, swimming, picnicking, and camping (FERC, 2009).

3.1.6.6 Agricultural Water Supply

Overall, agricultural water supply withdrawals from surface water and groundwater sources in the ACT River Basin for irrigation and livestock purposes represent a relatively small portion of the total water withdrawals for all uses in the basin. Agricultural withdrawals in the ACT River Basin are summarized along with water withdrawals for other uses in Section 3.1.1 and in more detail in Appendix E.

Agricultural water supply withdrawals in the Georgia portion of the ACT River Basin, most of which occur in the Etowah River subbasin, did not appreciably change from 2005 to 2015 levels. Surface water withdrawals for agriculture (irrigation and livestock) in the Georgia portion of the ACT River Basin totaled 27.74 mgd in 2015 (Painter, 2019), which represents about 6 percent of the total surface water withdrawals in that portion of the basin. Surface water withdrawals in 2005 totaled 27.49 mgd (Fanning & Trent, 2009). Total groundwater use for agricultural purposes in the Georgia portion of the ACT River Basin was 5.0 mgd in 2015 (Painter, 2019), which represents about 11 percent of the total 2015 groundwater withdrawals in that portion of the basin. Groundwater withdrawals in 2005 totaled 3.0 mgd. Overall, groundwater withdrawals for all uses in the Georgia portion of the ACT River Basin declined by about 30 percent from 2005 to 2015.

Surface water withdrawals for agriculture (irrigation, livestock, and aquaculture) in the Alabama portion of the ACT River Basin totaled 54.75 mgd in 2015 (Harper, Littlepage, Johnston, Jr., & Atkins, 2019), which equals about 5.8 percent of the total surface water withdrawals in that portion of the basin. Surface water withdrawals in 2005 totaled 34.91 mgd (Hutson, Littlepage, Harper, & Tinney, 2009). The 2015 surface water withdrawals for agriculture were about 57 percent higher than the 2005 levels. Groundwater use for agricultural purposes in the Alabama portion of the ACT River Basin totaled 33.4 mgd in 2015 (Harper, Littlepage, Johnston, Jr., & Atkins, 2019), which equals about 20 percent of the total 2015 groundwater withdrawals for all purposes. Groundwater withdrawals in 2005 totaled 18.3 mgd (Hutson, Littlepage, Harper, & Tinney, 2009). Groundwater withdrawals for agriculture in the Alabama portion of the ACT River Basin increased by 82 percent between 2005 and 2015. Collectively, surface water and groundwater withdrawals for agriculture in the Alabama portion of the ACT River Basin increased by 66 percent from 2005 to 2015. The growth trend in withdrawals for agricultural uses in the Alabama portion of the ACT River Basin is expected to continue. However, a substantial share of those agricultural water withdrawals occur downstream of Montgomery, AL, which is outside the primary area of focus for this Final FR/SEIS.

3.1.6.7 Population

The total population in the ACT River Basin in 2016 was 5,507,182. Table 3-11 presents the estimated total population within the basin for the decades from 1960 to 2016, including the number of people residing in the Alabama and Georgia portions of the basin. Population data for 2016 for the counties in the basin were collected from the Centers for Disease Control and Prevention’s (CDC’s) Social Vulnerability Index (SVI). The SVI is a compilation of the U.S. Census Bureau’s American Community Survey 2012–2016 estimates. About 60 percent of the population in the ACT River Basin resides in Alabama and about 40 percent resides in Georgia. The population in the basin sharply increased between 1960 and 2016. While the overall percentage of population is larger in Alabama, Georgia’s population has increased at a faster rate. Since 1960, Georgia’s ACT River Basin population has increased by about 355 percent, while Alabama’s ACT River Basin population has increased only about 42 percent (Centers for Disease Control and Prevention, 2019) (U.S. Census Bureau, 2019).

Table 3-11. ACT River Basin—Population Data between 1960 and 2016

	1960	1970	1980	1990	2000	2010	2016	Percent of basin population (2016)
ACT (AL)	2,330,066	2,379,925	2,688,651	2,766,512	3,042,112	3,255,514	3,307,059	60%
ACT (GA)	484,100	636,681	854,126	1,153,046	1,594,408	2,019,492	2,200,123	40%
ACT River Basin	2,814,166	3,016,606	3,542,777	3,919,558	4,636,520	5,275,006	5,507,182	100%

Sources: (Centers for Disease Control and Prevention, 2019) (U.S. Census Bureau, 2019).

3.1.6.8 Housing

Table 3-12 presents housing estimates for the entire ACT River Basin for the decades from 1960 to 2016, including the number of housing units in both the Alabama and the Georgia portions of the basin. In 2016, a total of 2,391,261 housing units existed in the ACT River Basin, of which 63% were in Alabama. Housing unit estimates, however, have increased much faster in the Georgia portion of the basin.

Table 3-12. ACT River Basin—Housing Units within the Basin between 1960 and 2016

	1960	1970	1980	1990	2000	2010	2016
ACT River Basin (AL)	691,644	773,949	1,010,899	1,141,341	1,336,384	1,530,108	1,510,687
ACT River Basin (GA)	144,153	204,074	318,845	471,315	627,987	819,161	880,574
ACT River Basin (Total)	835,797	978,023	1,329,744	1,612,656	1,964,371	2,349,269	2,391,261

Sources: (Centers for Disease Control and Prevention, 2019) (U.S. Census Bureau, 2019).

3.1.6.9 Income

Table 3-13 presents per capita income statistics for residents of the ACT River Basin at 10-year intervals between 1959 and 2016, including per capita incomes in both the Alabama and the Georgia portions of the basin. In 2016, the average per capita income within the ACT River Basin was $22,988 (Centers for Disease Control and Prevention, 2019).

Table 3-13. ACT River Basin—Per Capita Income Statistics

	1959	1969	1979	1989	1999	2009	2016
ACT(AL)	$3,824	$6,046	$8,514	$9,779	$15,738	$19,895	$21,125
ACT(GA)	$4,362	$7,234	$9,544	$11,709	$18,841	$22,174	$24,850
ACT Basin	$4,009	$6,455	$8,868	$10,444	$16,806	$20,679	$22,988

Source: (Centers for Disease Control and Prevention, 2019).

3.1.6.10 Employment

Table 3-14 provides details of employment statistics for the ACT River Basin. In 2016, an estimated 206,408 people were unemployed in the basin, 126,685 of whom were residents of Alabama. The average unemployment rate for the areas within Alabama was 10.36 percent, while the average unemployment rate for the Georgia portion of the basin was lower at 7.99 percent (Centers for Disease Control and Prevention, 2019).

Table 3-14. ACT River Basin—Employment Statistics

	Unemployed (2016)	Percent unemployed (2016)
ACT River Basin (AL)	126,685	10.36
ACT River Basin (GA)	79,723	7.99
ACT River Basin	206,408	9.13

Source: (Centers for Disease Control and Prevention, 2019).

3.1.6.11 Environmental Justice

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* requires that federal agencies identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations that might result from their programs, policies, and activities. Under the EO, USEPA was directed to ensure that agencies analyze environmental effects on minority and low-income communities, including human-health, social, and economic effects. Table 3-15 provides information on the demographic characteristics of the ACT River Basin with a specific focus on the minority, low-income, and disadvantaged communities.

Table 3-15. ACT River Basin—Demographics (2016)

	Minority (all except white, non-Hispanic)	Minority (all except white, non-Hispanic) (%)	Persons below poverty level	Persons below poverty level (%)	Single-parent household with children under 18	Single-parent households with children (%)	Persons age 17 and younger (%)
ACT River Basin (AL)	1,249,404	38.78	601,746	21.77	125,381	9.78	22.55
ACT River Basin (GA)	645,686	18.22	290,083	16.37	73,022	8.72	23.71
ACT River Basin	1,895,090	28.50	891,829	19.07	198,403	9.25	23.13

Source: (Centers for Disease Control and Prevention, 2019).

The majority of the communities along the rivers of the ACT River Basin are rural and range from developments of large estates to trailer parks and fishing cabins along the shores of the reservoirs and rivers. Many of the communities nearest to the water have been built along the shores of the reservoirs, and the residents express close ties to the water and the recreation and lifestyle the reservoirs provide. Minority and low-income residents in these communities and rural areas depend on the resources of these rivers and reservoirs as a source of income, food, and outdoor enjoyment.

3.1.6.12 Protection of Children

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, recognizes that a growing body of scientific knowledge demonstrates that children might suffer disproportionately from environmental health and safety risks and requires federal agencies, to the maximum extent permitted by law and mission, to identify and assess those environmental health and safety risks. Table 3-15 provides information on the number and general characteristics of children residing in the ACT River Basin.

Many children participate in a wide range of water-based recreation activities (swimming, boating, kayaking, skiing, fishing, etc.) while camping, attending summer camps, or visiting day-use parks at Allatoona, Weiss, and Logan Martin lakes. The principal health and safety risks to children while engaged in these activities are drownings, accidental injuries, and waterborne illnesses. USACE and APC actively promote water safety on their reservoir projects, supported by law enforcement agencies (GADNR and Alabama Department of Public Safety, Marine Patrol).

3.1.6.13 Executive Order 11988

EO 11988 "…is the policy of the Corps of Engineers to formulate projects which, to the extent possible, avoid or minimize adverse impacts associated with use of the base flood plain and avoid inducing development in the base [floodplain] unless there is no practicable alternative."

Economic activity within the floodplain mainly occurs in population centers such as Cartersville, GA; Rome, GA; Gadsden, AL; and Childersburg, AL. Transportation via the rivers has seen a steep decrease in activity over time and is not expected to increase. The communities within the base floodplain are largely agricultural and have developed over time with consideration to the existing nature of flooding.

3.1.7 Aesthetic Resources

Scenic views and vistas within the river and stream corridors of the ACT River Basin encompass a wide range of settings, including cascading streams rising from the upper reaches of the Coosa River watershed in the mountains and foothills of the Southern Appalachian highlands; rivers and streams in the Piedmont Province and along the fall line in the lower Coosa River and Tallapoosa River watersheds; the imposing Alabama River below Montgomery, AL, that meanders through the coastal plain toward the Mobile River delta and the Gulf of Mexico. Interspersed along the rivers and primary streams throughout the ACT River Basin are federal and nonfederal reservoirs. The streams, rivers, and lakes of the basin provide aesthetic resources, valued by the residents and tourists in the region, associated with a variety of the water-based recreational pursuits.

Water levels of the three reservoirs directly affected by the proposed actions under consideration in this Final FR/SEIS—Allatoona Dam and Lake, Weiss Dam and Lake, and Logan Martin Dam and Lake—are drawn down substantially during the winter months associated with their authorized purpose for flood risk management. The routine winter drawdown of the lakes temporarily exposes a substantial amount of shoreline and unvegetated lake bottoms at these projects, temporarily decreasing their aesthetic value during the drawdown period each year. Allatoona Lake is typically drawn down from a normal summer elevation of 840 ft to elevation 823 ft (17 ft) at the end of December. The reservoir size decreases from 11,164 ac at elevation 840 ft to 6,962 ac at elevation 823 ft, exposing up to 4,200 ac of lake bottom during the winter (Tetra Tech, Inc., 2012b). Similarly, the winter drawdown of 6 ft at Weiss Lake exposes up to 10,700 ac of lake bottom (USACE Mobile District, 2004a), and the 5-ft drawdown at Logan Martin Lake exposes up to 3,370 ac of lake bottom (USACE Mobile District, 2004b).

The aesthetic resources along the rivers, streams, and reservoirs of the ACT River Basin are institutionally recognized by federal, state, and local agencies and non-government organizations. Accordingly, there are many established public access points, public use areas, and national, state, and local parks along their shorelines. While there are no formally designated National Wild and Scenic Rivers within the basin, several river corridors such as for the Cartecay and Conasauga rivers in Georgia and the Little River in Alabama are publicly recognized within their states and the region as scenic and minimally affected by man's activities. The Alabama and Coosa rivers are an integral part of the blueway known as the Alabama Scenic River Trail (Alabama Scenic River Trail, 2019).

3.1.8 Air Quality and General Conformity

The Clean Air Act (CAA) (42 U.S.C. §§ 7401–7671q), as amended, gives USEPA the responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that set acceptable concentration levels for six criteria pollutants: particulate matter (less than 10 microns in diameter [PM_{10}] and less than 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide (SO_2), carbon monoxide (CO), nitrous oxides (NO_x), ozone (O_3), and lead. USEPA has established short-term NAAQS (for 1-, 8-, and 24-hour periods) for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects. Each state has the authority to adopt standards stricter than those established under the federal program; however, both Alabama and Georgia accept the federal standards.

Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as "nonattainment areas." Federal regulations designate AQCRs with levels below the NAAQS as "attainment areas." "Maintenance areas" are AQCRs previously designated as nonattainment and have been redesignated to attainment for a probationary period through implementation of maintenance plans. USEPA has designated eight out of the 64 counties in the ACT River Basin as nonattainment or maintenance areas for at least one criteria pollutant (Table 3-16).

Table 3-16. Counties in the ACT River Basin Designated as Nonattainment or Maintenance Areas

State	Counties	Nonattainment pollutant
Georgia	Cherokee, Forsyth, Paulding	O_3 (Maintenance)
	Bartow, Cobb, Fulton	O_3 (Nonattainment)
Alabama	Jefferson, Shelby	$PM_{2.5}$ (Maintenance)

Source: (USEPA, 2019c).

USEPA, ADEM, and GADNR have established general conformity rules specifically to ensure that the actions taken by federal agencies in nonattainment areas do not affect a region's ability to meet the NAAQS. The conformity regulations play an important role in helping states and tribal regions improve air quality in areas that do not meet the NAAQS and in implementing federally supported activities in the eight nonattainment and maintenance counties in the ACT River Basin.

3.1.9 Noise

"Noise" is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies according to the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities that are part of everyday life such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. The hertz is used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighing," described in a-weighted decibels (dBA), approximates that frequency response to express accurately the perception of sound by humans. The dBA noise metric describes steady noise levels. Because very few noises are, in fact, constant, a noise metric, Day-Night Sound Level (DNL), has been developed. DNL is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 p.m. to 7 a.m.). DNL is a useful descriptor for noise because it (1) averages ongoing, yet intermittent noise, and (2) measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level (L_{eq}), the average sound level in dB, is often used to describe the overall noise environment.

The Noise Control Act of 1972 (P.L. 92-574) directs federal agencies to comply with applicable federal, state, and local noise control regulations. In 1974, USEPA provided information suggesting that continuous and long-term noise levels exceeding DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals. Alabama and Georgia have not implemented noise regulations at the state level. Many counties in the basin maintain nuisance noise regulations. However, most do not outline specific, not-to-exceed noise levels. Most county and city noise ordinances exempt construction noise during the daytime hours.

Existing noise levels (L_{eq} and DNL) were estimated for the areas in the ACT River Basin, according to the techniques specified in the *American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound Part 3: Short-term measurements with an observer present*, and are provided in Table 3-17 (ANSI, 2013). Individuals residing in urban areas in the basin have outdoor DNL values ranging from 45 to 65 dBA. The levels shown in Table 3-17 are the lowest provided by the American National Standards Institute standard; noise levels in remote areas could be substantially less. Very rural and remote areas are estimated to have DNL values ranging from 20 to 45 dBA.

Table 3-17. Estimated Noise Levels for Varying Land Use Intensities

Example land use category	Average residential intensity (people per ac)	DNL (dBa)	L_{eq} (dBa)	
			Daytime	Nighttime
Noisy Urban Residential	80	65	64	57
Quiet Commercial, Industrial, and Normal Urban Residential	25	60	58	52
Quiet Urban Residential	8	55	53	47
Quiet Suburban Residential	3	50	48	42
Rural Residential	1	45	43	37

Source: (ANSI, 2013)

3.1.10 Traffic and Transportation

Major transportation facilities within the general vicinity of the mainstem rivers in the Coosa River Basin include interstate highways, U.S. highways, and railroad corridors. Interstate (I-) 59 and U.S. Highway (U.S.) 11 run along the west side of the Coosa River between Birmingham and Gadsden, AL. I-20 and U.S. 78 cross the Coosa River (at the upper end of Logan Martin Lake) near Pell City, AL. I-75 and U.S. 41 cross the Etowah River near Cartersville, GA, and the Oostanaula River near Calhoun, GA. U.S. 411 runs along the Etowah and Coosa rivers between Cartersville, GA, and Centre, AL (near Weiss Lake). Numerous railroad lines run along and cross the Coosa, Etowah, and Oostanaula rivers, connecting cities that include Childersburg, Birmingham, Anniston, and Gadsden, AL, and Rome, Cartersville, and Dalton, GA. Numerous state and county roads lie in the immediate vicinity of the USACE and APC lakes in the Coosa River Basin. These road systems support transportation needs around the reservoirs, including the operation and maintenance (O&M) of facilities managed by USACE and APC and vehicle access for residents and property owners around the lakes, lake users, and tourists. There are no major airport facilities in the Coosa River Basin, but numerous small airport facilities are found in small towns across the basin.

3.1.11 Cultural Resources

The project area, or Area of Potential Effects (APE), encompasses the Etowah River from Allatoona Dam extending 79 mi downstream to its confluence with the Oostanaula River at Rome, GA, including Allatoona Lake. The project area also includes a section of the Coosa River extending from Rome, GA, downstream to Weiss Reservoir, a section of the Coosa River extending from Weiss Dam to Hokes Bluff near Gadsden, AL, and a section of the Coosa River extending from Logan Martin Dam to Childersburg, AL. Historic properties situated along river banks in these downstream portions of the project area could potentially be affected by channel widening and increased erosion from proposed changes in release patterns from dams.

Within the Allatoona, Logan Martin, and Weiss reservoirs, the project area boundaries are defined by elevation contours where changes in winter and summer water levels will occur from the proposed reallocation and WCM updates. Within Allatoona Lake, the proposed project will raise summer conservation storage from the 840-ft to the 841-ft elevation contour and raise winter levels from 823 ft to 824.5 ft. Within Logan Martin Reservoir the proposed WCM update will lower the top of flood control level from 477 ft to 473.5 ft and raise winter water levels from 460 ft to 462 ft. Within Weiss Reservoir, winter levels will increase from 558 ft to 561 ft and the top of flood control level will be decreased from the 574-ft to the 572-ft elevation contour.

Prior to the construction of the Allatoona Dam and Lake in the 1950s, the now inundated corridors of the Etowah River and its tributaries were surveyed for cultural resources. This initial survey (Caldwell, 1957), along with subsequent survey's (Ledbetter, Wood, Wood, Ethridge, & Braley, 1987), identified over 1,000 archaeological sites within what is now Allatoona Lake. These include both sites that have been inundated by the lake and sites situated above the maximum gross pool of the reservoir. Rivers have always been focal points of human subsistence, travel, and settlement and given the large number of known archaeological sites within the land and waters of the Allatoona project, it is reasonable to assume that high frequencies of cultural resources exist throughout the ACT River Basin.

The *National Reservoir Inundation Study* (Lenihan, et al., 1981) also identified four impact categories of reservoir processes that adversely affect archaeological sites. These consist of mechanical, biochemical, human, and other miscellaneous categories. Mechanical impacts are erosion and the deposition sediments from wave action along vertically fluctuating shorelines, the saturation and slumping of sediments along the shoreline, and siltation from backshore runoff. Biochemical impacts include the increased degradation of archaeological artifacts, materials, and cultural deposit soils from periodic inundation. Human impacts consist of the consequence of reservoir construction, wave action from boat traffic, and problems stemming from increased access to previously inundated sites that could facilitate looting. Miscellaneous factors encompass a host of other impacts including changes in the composition of flora and fauna and loss of access to an impacted cultural resource's data (Lenihan, et al., 1981). The *National Reservoir Inundation Study* was followed by additional work, and in the late 1980s, USACE's Environmental Laboratory arranged an interdisciplinary workshop to better understand processes that contribute to the degradation of archaeological sites within reservoirs (Mathewson, 1989). This in turn led to another USACE study that was intended to develop a means of designing effective ways to protect archaeological resources by burying them (Mathewson, Gonzalez, & Eblen, 1992).

Although wave action is the primary driver of reservoir pool impacts, frequent wetting and drying cycles are also damaging to a wide range of materials that exist in archaeological sites and other cultural resources (Dunn, 1996) (Mathewson, 1989) (Mathewson, Gonzalez, & Eblen, 1992). Increased frequencies of wetting/drying cycles can cause materials such as bone, charcoal, and other plant remains to deteriorate at accelerated rates. Wetting and drying can also change the physical properties of such materials rendering them unsuitable for specialized analyses such as radiocarbon dating. Some of these components include animal bones, shell, plant remains, charcoal, chipped stone, pottery, and midden soils (Mathewson, 1989).

Although the project area is vast, a reasonable estimate of site types and probable project related effects can be illustrated from a subsample of previously recorded cultural resources. By the end of the 1980s, the Allatoona Lake portion of the project had been subjected to numerous archaeological inventory efforts resulting in the identification of over 1,000 cultural resource sites. Approximately 250 of these historic properties have been determined to be eligible, or potentially eligible, for the National Register of Historic Places (NRHP) (Ledbetter, Wood, Wood, Ethridge, & Braley, 1987). These include properties representing every Native American period of occupation in the region, from 12,000 years ago until European contact. Historic Period properties include sites related to the industrial production of iron and textiles and grist mills dating to the mid-1800s and early 1900s and more recent resources related to flood risk management, hydropower generation, and navigation projects enacted by congressional legislation.

Given the extent of the proposed project area, even preliminary inventory efforts to list Historic Properties within the overall APE would require an extensive records search, which is beyond the scope of the present document. As an alternative, the following discussion relies upon data on known resources within the land and waters of the USACE Allatoona project. It is assumed that sites similar to those within the land and waters of the Allatoona project will be present throughout the rest of the project area. It is also expected that sites within the Weiss and Logan Martin reservoirs will be affected by similar processes, as those within Allatoona Lake. Therefore, Allatoona Lake's historic properties represent an appropriate subsample from which current conditions can be described and expected affects from implementation of the proposed project can be determined.

Of the previously recorded sites within Allatoona Lake, 14 have components located within the normal operating range of pool elevations for the reservoir. Based on the location of these resources, each of the properties could be impacted through increased wetting and drying, increased exposure to wave action, and increased human access. Adverse effects to these sites from mechanical, biochemical, or miscellaneous impacts would depend upon their geomorphological characteristics, wind exposure, and the extent of surrounding development. Information on these 14 representative cultural properties has been compiled from site descriptions prepared during previous studies and site inspections conducted under Section 110 compliance. A more detailed characterization of these properties is provided in Appendix E.

3.1.12 Hazardous and Toxic Materials

Operating and maintaining the USACE Allatoona Dam and Lake and the APC Weiss and Logan Martin dams and lakes typically require the use of hazardous and toxic materials. The use of materials such as pesticides, paints, solvents, and petroleum products would be expected during the O&M of facilities, lake shoreline, vehicles, and equipment. The use of petroleum products would also be expected from the operation of marinas and from recreational vehicle use.

Immediately downstream of Weiss Dam is predominately agricultural and forested land with a few residences near the river. Overall, there is a low probability of hazardous and toxic materials in the flood plain immediately downstream of Weiss Dam. Downstream of Logan Martin Dam is predominately agricultural and forested land with some residential areas; however, industrial, commercial and recreational uses are more apparent in this area than along other reaches of the Coosa River. Situated between 7 to 10 mi downstream of the Logan Martin Dam, on the eastern side of the river, is Coosa Industrial Park, a golf course and a large industrial facility consisting of the Coosa Pines Mill and other facilities. The land area including Coosa Industrial Park, the Coosa Pines Mill and golf course was once part of the former Alabama Army Ammunition Plant. Site conditions at the former plant have been investigated by the Army with USEPA and ADEM oversight. Remedies to clean up soil and groundwater contamination have been taken or are ongoing (USEPA, 2018). Across from Coosa Pines Mill on the western bank of the river is a water treatment facility, and a short distance further downstream is the APC Gaston Power Plant. No potential inundation resulting from implementation of the proposed action would be expected beyond the power plant.

3.2 Future Without Project Conditions

Environmental conditions within the ROI for proposed actions addressed in this Final FR/SEIS are likely to change in the future, regardless of whether the proposed actions are implemented or not. These changes might, over time, compound the expected effects of the proposed actions, offset the effects, or result in no discernable differences between present and future environmental conditions. This section describes future environmental conditions without the proposed changes to USACE and APC reservoir project operations in comparison to existing conditions.

Table 3-18 presents the expected or likely future conditions of the environmental resources (by topic or area of concerns) presented in Section 3.1 over the period of analysis for the project (through 2050). The future conditions are presented as a comparison to existing conditions. The contents of the table are based on reasoned estimates of future conditions based on past changes, recent and current trends, and existing plans and projections for the future. For each environmental resource area, the table identifies the potential implications for water management activities on USACE and APC reservoir projects in the ACT River Basin.

Table 3-18. Future Without Project Condition for Allatoona-Coosa Reallocation Study

Environmental Resource Area or Issue	Current Conditions	Future Without Project Conditions Compared to Current Conditions
Water quantity	Section 3.1.1	Population growth and associated land development are expected to continue in the ACT River Basin, particularly in the upper portion of the basin (in the Etowah River, including the Allatoona Lake area) with the continued expansion of metro Atlanta to the northwest. Withdrawals for public water supply and other purposes are likely to increase, but the rate of increase is expected to slow as a result of water conservation and efficiency measures being implemented. Land use changes are likely to increase the amount of impervious surfaces and runoff during storm events and decrease base flows in streams. Climate change over time could affect precipitation, evapotranspiration, and streamflow conditions in the ACT River Basin. Those future changes could indirectly affect future water management activities on the ACT Basin reservoirs.
Water quality	Section 3.1.2	Population growth and associated land development are expected to continue in the ACT River Basin, particularly in the upper portion of the basin (in the Etowah River, including the Allatoona Lake area) with the continued expansion of metro Atlanta to the northwest. Associated land-use changes are likely to cause some water quality degradation, although the extent to which that might occur is unknown. Potential water quality degradation in USACE and APC reservoirs in the basin could have some indirect effects on future water management activities on the ACT Basin reservoirs.
Geology and soils	Section 3.1.3	As land-use change becomes more dramatic and land development continues to expand in the ACT River Basin, soil erosion in tributaries of USACE and APC reservoirs could increase sedimentation and further reduce available storage in those reservoirs. Specifically, Allatoona, Weiss, and Logan Martin lakes could be vulnerable to increased erosion driven by accelerated land-use change and development. Future management of the ACT River Basin reservoirs could potentially be affected by increased sedimentation over time.
Land use	Section 3.1.4	Land use in the ACT River Basin is likely to change dramatically in the future, particularly in the upper portion of the basin (in the Etowah River, including the Allatoona Lake area). Land use will transition over time from predominately forested and agriculture to urban/suburban. Compared to current conditions, those land-use changes are likely to increase the amount of impervious surfaces and runoff during storm events, decrease base flows in streams, degrade water quality; degrade or destroy fish and wildlife habitat, and pose further risk to imperiled aquatic species. Dependent on the extent to which land uses change in the basin, those changes could potentially have an indirect effect on future management of ACT River Basin reservoirs.

Environmental Resource Area or Issue	Current Conditions	Future Without Project Conditions Compared to Current Conditions
Biological resources	Section 3.1.5	Future land-use change in the ACT River Basin, particularly in the upper portion of the basin (in the Etowah River, including the Allatoona Lake area), could potentially decrease base flows in streams, degrade water quality; degrade or destroy fish and wildlife habitat, and increase the number of imperiled aquatic species. The extent of those impacts will depend on the level of water and related land resource planning, management, and regulation by AL and GA. Future conditions for biological resources in the basin, particularly aquatic resources, could potentially have a limited indirect effect on future management of ACT River Basin reservoirs.
Socioeconomic resources	Section 3.1.6	Specific socioeconomic resource areas are addressed individually below.
M&I water supply	Section 3.1.6.1	Population growth and associated development will increase demand for public water supply in the ACT River Basin. Water supply withdrawals are expected to increase, but the rate of increase in the basin is expected to slow appreciably as a result of water conservation and efficiency measures being implemented. Georgia's pending water supply request would specifically address expected water supply demands for the City of Cartersville and CCMWA through 2050 in a substantial portion of the lower Etowah River Basin, including Allatoona Lake.
Navigation	Section 3.1.6.2	Commercial navigation in the Alabama River is likely to remain the same or continue to decline as a mode of transportation for commodities. The navigation plan in the 2015 ACT River Basin Master Manual update will continue to provide flow support from upstream reservoirs to sustain adequate navigation channel depths in the Alabama River when adequate basin inflows are available. Those releases are collaterally beneficial for downstream water supply and water quality purposes. The future status of commercial navigation on the Alabama River might have limited effects on management of ACT River Basin reservoirs.
Hydropower	Section 3.1.6.3	Demand for hydropower as a sustainable, renewable source of energy is expected to remain high in the future. Construction of new hydropower projects in the future will likely be rare because of extensive environmental concerns at most dam sites. There is potential for nonfederal hydropower development at USACE's Claiborne L&D and Carters Reregulation Dam, and possibly at nonfederal dams. Continued hydropower generation at current or higher levels in the future would not affect implementation ongoing or expected future water management activities at USACE and APC reservoirs.
Flood risk management	Section 3.1.6.4	Over time, reduced flood risk provided by USACE and APC reservoir projects could inadvertently encourage development in flood-prone areas downstream of reservoirs, potentially increasing future flood damages. Development in those areas could be curtailed through proactive efforts by local officials to regulate and discourage it. The potential for development in the floodplain downstream of those reservoirs could have limited effects on future flood operations if property owners are at risk.

Environmental Resource Area or Issue	Current Conditions	Future Without Project Conditions Compared to Current Conditions
Recreation	Section 3.1.6.5	The demand for public access to water-based recreation facilities is likely to substantially increase in the future, especially in populated areas near USACE and APC reservoirs. Increased recreational use in the future could have a direct effect on routine water management activities at USACE and APC reservoirs in the basin.
Agricultural water supply	Section 3.1.6.6	Agricultural water supply demand in the ACT River Basin is likely to increase in the future, but that increase is likely to be modest compared to the increased demand for public water supply and other water uses and represents only a small share of total water use in the basin. Future agricultural water supply demand would not be expected to have a direct effect on management of ACT River Basin reservoirs.
Environmental justice	Section 3.1.6.11	The demographic composition of the ACT River Basin is not expected to change dramatically in the foreseeable future, including the relative share and general distribution of minority and economically disadvantaged residents. No new environmental justice issues are expected regarding the management of ACT River Basin reservoirs.
Protection of children	Section 3.1.6.12	River and reservoir management activities that currently may pose health and safety risks to children are expected to be the same in the future. Management activities at USACE and APC reservoir projects aimed at reducing those risks are expected to continue in the future and to be improved, where possible.
Aesthetic resources	Section 3.1.7	Continued population growth and associated development in the ACT River Basin will likely increase adverse effects on scenic areas in the basin, including along the primary rivers, streams and reservoirs. Those effects would likely create greater public pressure to preserve existing aesthetic values around USACE and APC lakes but would not be expected to have a direct effect on management of ACT River Basin reservoirs.
Air quality	Section 3.1.8	Despite the expected increases in population, air quality in the ACT River Basin is likely to improve over time. Transition from coal-fired to natural gas-fired power generation, increased use of renewable energy, increased electric vehicle use, and other changes will likely sustain or improve conditions. Future air quality conditions would not be expected to have a direct effect on management of ACT River Basin reservoirs.
Noise	Section 3.1.9	Continued population growth and associated development in the ACT River Basin will likely increase noise levels in more urbanized areas and on the lakes as a result of increased recreational use. Future changes would not be expected to have a direct effect on management of ACT River Basin reservoirs.
Traffic and transportation	Section 3.1.10	Continued population growth and associated development in the ACT River Basin will likely increase congestion and pressure to further develop and improve the ground transportation infrastructure, especially in populated areas in the basin, some which are close to USACE and APC reservoirs.

Environmental Resource Area or Issue	Current Conditions	Future Without Project Conditions Compared to Current Conditions
Cultural resources	Section 3.1.11	Mechanical, chemical, human induced, and other effects from current operations have impacted numerous historic properties within the APE and this will continue without implementation of the proposed project. Additional future changes in water management practices at Allatoona Lake are likely even without the proposed reallocation and could result in additional effects on cultural resources at the project.
Hazardous and toxic waste	Section 3.1.12	Continued population growth and associated development could increase the risk of accidental releases of hazardous and toxic materials or waste into rivers, streams, and reservoirs or poor waste management practices near waterbodies. Risks can be minimized through proactive planning, risk avoidance measures, and emergency response preparedness. The likelihood of such occurrences is considered low, any potential effects are likely to be localized, and the risks would not be expected to have a direct effect on water management activities for ACT River Basin reservoirs.

4.0 PLAN FORMULATION AND EVALUATION OF ALTERNATIVES

4.1 Planning Strategy

USACE maintains adherence to the six-step planning process as defined in the 1983 *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* and ER 1105-2-100 to:

1. Identify problems, opportunities, objectives, and constraints.
2. Inventory the study area and forecast conditions (future without project [FWOP]).
3. Formulate alternative plans.
4. Evaluate alternative plans.
5. Compare alternative plans.
6. Select a recommended plan.

This study effort also adopts aspects of the SMART planning approach codified in Section 1001 of WRRDA 2014.

4.1.1 Problems and Opportunities

4.1.1.1 Problems

4.1.1.1.1 Current and Future Allatoona Lake Users

Based on the limits of current water supply storage agreements, there is a shortage of M&I water supply available for withdrawal to current Allatoona Lake water users. As northern Georgia has continued to grow, so have its M&I water supply needs. Cartersville and CCMWA are the two users of Allatoona Lake that both have seen and are projecting increased population growth in their service areas over the next several decades.

Current water supply users have exceeded the yield found in their existing storage agreements at Allatoona Lake on multiple occasions over the last 15 years. To address that situation, USACE has received a request from the State of Georgia to evaluate additional use of storage that would provide an equivalent yield of 94 mgd.

The State of Georgia also requested that USACE adopt its proposed storage accounting methodology, including provision of credit for made inflows. Made inflows would include releases from Hickory Log Creek Reservoir into the Etowah River with subsequent water supply withdrawals at the current CCMWA intake in Allatoona Lake, commonly known as “flow through conveyance.” An additional element of Georgia’s proposed credit for made inflows would be credit for treated wastewater returns. Granting made inflow credits is not part of current USACE storage accounting practice.

4.1.1.1.2 Water Supply Demand Analysis Conducted to Identify Need

As part of the updated water supply storage request, the MNGWPD provided updated water supply demands for entities that withdraw water from and return water to Allatoona Lake and the Etowah River between Allatoona Dam and the Kingston gage downstream of the reservoir. The current projections are an update from the MNGWPD Water Resource Management Plan (June 2017). MNGWPD prepared county-level forecasts for the 15 counties within its boundaries, then isolated the portion of the demand that is assigned to CCMWA and the City of Cartersville.

Total 2050 demand for CCMWA is projected to be 103 mgd. The MNGWPD projects a 2050 need for CCMWA from Allatoona Lake of 57 mgd. Currently, there is a storage agreement for CCMWA at Allatoona Lake for 13,140 ac-ft, which provides an effective yield of 24.9 mgd. This assumes that CCMWA will be able to withdraw water to meet the remaining need from the ACF River Basin (Chattahoochee River), which was addressed in the 2017 ACF WCM update Record of Decision (ROD). That decision is currently being challenged in litigation. Paulding County currently purchases water from CCMWA. Richland Creek Reservoir is currently under construction and also will serve as a source for Paulding County. Once Richland Creek Reservoir is fully operational, Paulding County will not purchase water from CCMWA. This future condition was factored into the 2050 demand calculations.

Total 2050 demand for the City of Cartersville (Bartow County) ranged from 40.4 mgd to 52.0 mgd. Based on discussions with the City of Cartersville, 37 mgd of that need would be sourced from Allatoona Lake. There is an existing storage agreement with Cartersville for 6,371 ac-ft that currently provides an effective yield of 12.2 mgd.

4.1.1.1.2.1 USACE Review of Water Supply Demand Analysis

USACE conducted an independent review of the water supply demand analysis documentation. The project delivery team (PDT) focused review on key assumptions, including population growth forecasts, per-capita use, sector analysis, climate change, changes in weather patterns, and uncertainty.

Based on the review of the documentation, USACE concluded that the water supply demand analysis is valid for use in determining alternatives to meet the stated need in the 2018 water supply storage request.

Additional information related to the methodology is discussed in Appendix B.

4.1.1.1.3 Lack of Easements to Accommodate Flood Risk Management Operations at Logan Martin and Weiss Lakes

Current reservoir easements at Weiss and Logan Martin are below the required maximum surcharge elevations as described in the original WCMs. APC is responsible for obtaining sufficient easements to comply with the manuals and the Coosa Power Act as part of their FERC license. The flowage easements were not obtained prior to completion of the projects. The top of the flood storage at Weiss Dam is at elevation 574 ft. Easements are currently purchased to elevation 572 ft. The top of the flood storage at Logan Martin is at elevation 477 ft. Easements are currently purchased to elevation 473.5 ft. On multiple occasions since the Weiss and Logan Martin projects were constructed, the absence of the necessary flowage easements at these projects has required APC to request temporary deviations, or variances, from USACE to conduct flood operations differently during flood events than as prescribed in the currently approved WCMs.

4.1.1.1.4 Water Quality at Weiss Lake

Water quality in Weiss Lake was identified as a concern by lake users during the 2018 NEPA scoping period for this project. APC has invested substantial resources in infrastructure to improve DO conditions downstream of Weiss Dam, but lake users expressed concerns about general water quality conditions in the lake upstream of the dam, mostly associated with sedimentation and nutrient concerns. USACE assessed baseline conditions and any potential impacts to water quality in Weiss Lake that might be associated with the proposed storage reallocation at Allatoona Lake.

4.1.1.1.5 No Current Memorandum of Agreement for APC Projects

There is not a current signed MOA between USACE and APC addressing operation of APC projects in the basin to meet federally authorized purposes. USACE previously signed MOA with APC regarding project operations at the Weiss, H. Neely Henry, Logan Martin, and R.L. Harris projects in conjunction with completion of the original WCMs for those projects. While the WCMs for the H. Neely Henry and R.L. Harris projects were updated in 2015, completion of a new MOA is being deferred until updates of the WCMs for the Weiss and Logan Martin projects are completed. The MOA provides that APC accepts the operation described in each WCM. APC is required to follow the WCM as compliance with their FERC license. USACE intends to negotiate and sign an MOA with APC after the completion of this FR/SEIS process.

4.1.1.2 Opportunities

USACE identified opportunities to improve recreation at Allatoona Lake, Weiss Lake, and Logan Martin Lake. The public commented on recreation opportunities during the 2018 NEPA scoping process as a key issue of concern with many lake users. Recreation is an important economic driver in the local communities and is a top concern for many stakeholders.

USACE identified opportunities to meet future water supply needs for Bartow County and Cobb County through a period from 2025 to 2050.

4.1.2 Objectives and Constraints

4.1.2.1 Federal Objectives

According to ER 1105-2-100, the federal objective of water and related land resources project planning is to contribute to national economic development (NED) consistent with protecting the nation's environment pursuant to national environmental statutes, applicable EOs, and other federal planning requirements.

4.1.2.2 Study Objectives

USACE identified the following planning objectives for the ACR study:

- Objective 1: Reduce the risk of not meeting the future water supply demand of 94 MGD of Lake Allatoona users.
- Objective 2: Alternatives will not alter the level of system flood risk within the ACT basin.

4.1.2.3 Planning Constraints

The formulation of alternatives to address the study objective is limited by planning constraints. Constraints are statements of effects that the alternative plans should avoid. Constraints are designed to avoid undesirable changes between without and with-project future conditions.

Constraints might consist of limitations on the study associated with resource, legal, and/or policy considerations. The following constraints are applicable to this study:

- Minimize effects on federally listed threatened and endangered species. Within the ACT River Basin, there are several species of fish, freshwater mussels, and snails that are listed as well as several areas of critical habitat (see Section 3.1.5.4. During the impact analysis, the PDT will identify any key thresholds.
- Minimize impacts to cultural resources.
- Meet Congress's intent for flood control. The original federal project was authorized on the Upper Coosa River for flood control and other authorized purposes; however, P.L. 83-436 allowed a nonfederal entity to develop three reservoirs in place of the federal project with the condition that it supported navigation and the intended amount of flood control (see Section 2.1).

- Must meet authorized project purposes for the ACT River Basin. Under the WSA, if the recommended plan constitutes a major operational change to a federally authorized project purpose or causes a serious effect it would require additional Congressional authorization. Therefore, the recommended plan must be within the existing Congressional authorization.
- Avoid adverse impacts to the structural integrity of projects.
- Continue to maintain flow support to navigation on the Alabama River from APC projects.

4.2 Summary of Management Measures *

Management measures are formulated to address the problems and opportunities identified in Section 4.1.1. Management measures are also formulated to meet defined planning objectives and avoid planning constraints. The PDT identified measures to address both future water supply needs of the City of Cartersville and CCMWA as requested by the State of Georgia and the APC request for modifications to the winter guide curve, maximum surcharge level, and flood operations at Logan Martin and Weiss lakes. The measures, listed in Table 4-1, were then divided into two groups: water supply measures (Objective 1) and flood operations measures (Objective 2).

Table 4-1. Screening of Management Measures.

Measures	Objective 1	Objective 2	Screened or Carried Forward
Conservation	Yes		Carried Forward
Groundwater wells	Yes		Carried Forward
Desalination and pumping	Yes		Carried Forward
Other surface water sources	Yes		Carried Forward
Reallocation from the flood pool	Yes		Carried Forward
Reallocation from the inactive pool	Yes		Carried Forward
Reallocation from the conservation pool	Yes		Carried Forward
New water supply reservoir construction	Yes		Carried Forward
Raise winter pool levels		Yes	Carried Forward
Lower top of flood storage elevation		Yes	Carried Forward
Modified induced surcharge operation		Yes	Carried Forward
Acquire additional property interests downstream		Yes	Carried Forward
Acquire the reservoir flowage easements up to the maximum surcharge elevation		Yes	Carried forward

4.3 Summary of Screening *

As part of the planning process, the PDT screened the measures prior to combining them to formulate alternatives. Measures that met one or more of the study objectives were carried forward. Those measures that did not meet one or more of the study objectives were eliminated from further consideration. Based on the available information at the time of screening, the PDT carried forward all measures to use for formulating the initial array of alternatives.

4.3.1 Final Water Supply Measures

This section describes the final water supply measures.

- **Conservation**: Conservation is often the first step to reduce consumption and overall demand for water supply. Water providers within the MNGWPD, including the City of Cartersville and the CCMWA, have been implementing multiple conservation measures to reduce demand. Examples include conservation pricing, leak detection and repair, plumbing and toilet retrofit programs, education programs, multifamily submetering, and water recycling (e.g., car washes).
- **Groundwater wells**: Groundwater is an existing source for water in north Georgia. There is a limited supply of groundwater available in the area.
- **Desalination and pumping**: Desalination involves extracting ocean water (usually), desalinating it at a treatment facility, and then piping it to a service area.
- **Other existing surface water sources**: Nearby surface water sources include Lake Lanier, the Chattahoochee River, the Etowah River, Hickory Log Creek Reservoir, and Richland Creek Reservoir (currently under construction).
- **Reallocation from Allatoona Lake flood storage**: Reallocation would include an assignment of storage from the flood pool specifically to the water supply project purpose. This measure would involve raising the guide curve at Allatoona Lake.
- **Reallocation from Allatoona Lake inactive storage**: Reallocation would include an assignment of storage from the inactive pool specifically to the water supply project purpose. This measure would involve lowering the bottom of the conservation pool at Allatoona Lake.
- **Reallocation from Allatoona Lake conservation storage**: Reallocation would include an assignment of storage from the conservation pool specifically to the water supply project purpose.
- **New water supply reservoir construction**: This measure would include identifying any new locations for a reservoir impoundment that could be constructed by the nonfederal sponsor. USACE does not construct single-purpose water supply reservoirs.

4.3.2 Final Flood Operations Measures

This section describes the final flood operations measures.

- **Raise the winter conservation pool level**: APC requested to raise the winter pool level at Weiss Lake from 558 ft to 561 ft (see Section 2.6.1) and to raise the winter pool level at Logan Martin Lake from 460 ft to 462 ft (see Section 2.6.2).
- **Lower the maximum surcharge (or top of flood pool) elevations**: APC requested to reduce the maximum surcharge elevation at Weiss Lake from 574 ft to 572 ft (see Section 2.6.1) and to reduce the maximum surcharge elevation at Logan Martin Lake from 477 ft to 473.5 ft (see Section 2.6.2).
- **Modify induced surcharge operations**: APC requested to increase releases above those specified under current operations at Weiss and Logan Martin dams during flood events to ensure that the proposed reduced maximum surcharge levels on the lakes are not exceeded. More detailed descriptions of the proposed maximum surcharge operations at Weiss Dam and Logan Martin Dam are presented in Section 2.6.1 and Section 2.6.2, respectively.
- **Acquire additional property interests downstream of Weiss and Logan Martin**: This measure would include APC purchase of easements downstream to accommodate increased non-damaging releases from 50,000 cfs to 70,000 cfs as may be required. USACE has conducted additional analysis of potential impacts to private property both upstream and downstream of Weiss Dam. The results of this analysis are detailed in

Appendix C and Appendix D. The correspondence received from FERC on October 22, 2020, stated that APC has acquired all necessary real estate for the proposed operation. Pursuant to ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient data is available to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Weiss Dam. It is the responsibility of APC to acquire all necessary real estate interests prior to implementation.

- **Acquire the reservoir flowage easements up to the maximum surcharge elevation**: This measure is a requirement of the current WCMs.

4.4 Summary of Alternatives to Evaluate in Detail *

The PDT formulated alternatives based on the measures identified during the previous planning step as well as on additional input received from stakeholders during the 2018 public scoping process. Alternative formulation occurred in two phases. First, the PDT formulated an initial array of alternatives. The PDT then evaluated the initial array based on a set of screening criteria. The PDT then screened the initial array to identify the final array of alternatives that were carried forward for more detailed evaluation.

4.4.1 Initial Array of Alternatives

The PDT formulated alternatives that focused on measures to satisfy the water supply objective, the flood risk objective or a combination of measures that satisfied both objectives. Each of the alternatives is generally characterized in Sections 4.4.1.1 through 4.4.1.13. Table 4-2 displays the specific components of those alternatives. The flood risk measures at the Weiss and Logan Martin projects were evaluated as a single alternative. Based on discussions with APC, these measures are dependent on each other and, therefore, were considered as one component. Water supply alternatives, other than those that included reallocation, were documented in a report prepared for the State of Georgia and provided to USACE for review and consideration (Hazen and Sawyer, Inc., 2018). These nonfederal alternatives are specifically discussed in Section 4.4.2 and are presented in more detail in Appendix B.

4.4.1.1 No Action Alternative

The No Action Alternative (NAA) represents a set of assumptions and conditions that would occur absent any additional action by USACE. Assumptions and conditions will be identified at each of the three reservoirs where changes in the future are considered. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM update. The NAA uses 2006 water demands in the HEC-ResSim model. Those manuals define the existing operations for the ACT River Basin and are included in each alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.2 Future Without-Project Alternative

The FWOP alternative represents a set of assumptions and conditions that would occur in the future absent any action by USACE. This includes no additional reallocation of storage at Allatoona Lake, but it does include increased water supply demands through year 2050. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM update. Those manuals define the existing operations for the ACT River Basin and are included in each alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.3 Water Supply 1

The Water Supply 1 (WS1) alternative represents a set of assumptions and conditions that would occur in the future, including meeting the full need (94 mgd) identified in the 2018 Georgia water supply request from Allatoona Lake. This alternative includes a reallocation of conservation storage and incorporates the storage accounting methodology put forth by the State of Georgia. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM update. Those manuals define the existing operations for the ACT River Basin and are included in the alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.4 Water Supply 2

The Water Supply 2 (WS2) alternative represents a set of assumptions and conditions that would occur in the future, including meeting the full need (94 mgd) identified in the 2018 Georgia water supply request from Allatoona Lake. This alternative includes a reallocation of conservation storage. It also incorporates the USACE storage accounting methodology. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM update. Those manuals define the existing operations for the ACT River Basin and are included in this alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.5 Water Supply 3

The Water Supply 3 (WS3) alternative represents a set of assumptions and conditions that would occur in the future, as defined in the 2018 Georgia water supply request. Reallocated storage would be met from a combination of the flood and conservation pools. It also incorporates the storage accounting methodology put forth by the State of Georgia. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM Update. Those manuals define the existing operations for the ACT River Basin and are included in this alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.6 Water Supply 4

The Water Supply 4 (WS4) alternative represents a set of assumptions and conditions that would occur in the future, including meeting the full need (94 mgd) identified in the 2018 Georgia water supply request from Allatoona Lake. The full need would be met out of the flood pool. It also incorporates the USACE storage accounting methodology. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM update. Those manuals define the existing operations for the ACT River Basin and are included in the alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.7 Water Supply 5

The Water Supply 5 (WS5) alternative represents a set of assumptions and conditions that would occur in the future, including meeting the full need (94 mgd) identified in the 2018 Georgia Water Supply Request from Allatoona Lake. The full need would be met out of the inactive storage. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM update. Those manuals define the existing operations for the ACT River Basin and are included in the alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.8 Water Supply 6

The Water Supply 6 (WS6) alternative represents a set of assumptions and conditions that would occur in the future, including meeting the full need (94 mgd) identified in the 2018 Georgia Water Supply Request from Allatoona Lake. The full need would be met out of a combination of flood pool and conservation pool storage. It also incorporates the USACE storage accounting methodology. USACE evaluated preliminary combinations of conservation pool/ flood pool reallocations. Raising the flood pool more than 2ft would have had an impact in the ability to meet our FRM purpose without providing additional a large enough incremental water supply yield. Therefore the combination put forth for detailed evaluation is a 1ft raise in the summer elevation and a 1.5ft raise in the winter elevation. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM update. Those manuals define the existing operations for the ACT River Basin and are included in the alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.9 The Modified Flood Operation (MFO) 1

The Modified Flood Operation 1 (MFO1) alternative represents a set of assumptions and conditions that would occur in the future, including satisfying the requested modifications to Weiss and Logan Martin project flood operations. Systemwide operations are those that were approved in the 2015 ACT River Basin WCM update. Those manuals define the existing operations for the ACT River Basin and are included in each alternative unless otherwise specified. Additional details are provided in Table 4-2.

4.4.1.10 Water Supply 2 + Modified Flood Operation 1

The WS2+MFO1 alternative represents a set of assumptions and conditions that would occur in the future, including satisfying the requested modifications to Weiss and Logan Martin projects flood operations as well as meeting the full need from the State of Georgia request out of Allatoona Lake. The full need would be met out of the conservation pool. It also incorporates the USACE storage accounting methodology. Additional details are provided in Table 4-2.

4.4.1.11 Water Supply 6 + Modified Flood Operation 1

The WS6+MFO1 alternative represents a set of assumptions and conditions that would occur in the future, including satisfying the requested modifications to Weiss and Logan Martin projects flood operations as well as meeting the full need from the State of Georgia request out of Allatoona Lake. The full need would be met out of a combination reallocation from the conservation and flood pools. It also incorporates the USACE storage accounting methodology. Additional details are provided in Table 4-2.

4.4.1.12 Water Supply 1 + Modified Flood Operation 1

The WS1+MFO1 alternative represents a set of assumptions and conditions that would occur in the future, including satisfying the requested modifications to Weiss and Logan Martin projects flood operations as well as meeting the full need from the State of Georgia request out of Allatoona Lake. The full need would be met out of the conservation pool. It also incorporates the storage accounting methodology put forth by the State of Georgia. Additional details are provided in Table 4-2.

4.4.1.13 Water Supply 3 + Modified Flood Operation 1

The WS3+MFO1 alternative represents a set of assumptions and conditions that would occur in the future, including satisfying the requested modifications to Weiss and Logan Martin projects flood operations as well as meeting the full need from the State of Georgia request out of Allatoona Lake. The full need would be met out of a combination reallocation from the conservation and flood pools. It also incorporates the storage accounting methodology put forth by the State of Georgia. Additional details are provided in Table 4-2.

Table 4-2. Initial Array of Alternatives

Alternative Component \ Alternative	NAA	FWOP	WS1	WS2	WS3	WS4	WS5	WS6	MFO1	WS2+ MFO1	WS6+ MFO1	WS1+ MFO1	WS3+ MFO1
Allatoona Lake													
Continue to operate for existing water supply storage agreements: Storage. 6.86% of conservation storage	X	X	X	X	X	X			X	X		X	X
Continue to operate for existing water supply storage agreements: Storage. 6.57% of conservation storage								X			X		
Reasonably foreseeable that water supply storage users could exceed their existing agreements as happened in the past	X												
Water supply storage users cannot exceed their available storage		X							X				
Reallocation of 14,524 ac-ft of conservation storage (5.37% of conservation storage)			X									X	
Reallocation of 32,812 ac-ft of conservation storage (12.14% of conservation storage)				X						X			
Reallocation of 15,041 ac-ft of conservation storage (5.34% of conservation storage)					X								X
Reallocation of 52,775 ac-ft of conservation storage (16.34% of conservation storage)						X							
Reallocation of 33,872 ac-ft of conservation storage (12.01% of conservation storage)								X			X		
Reallocation from inactive pool							X						
Conservation storage–270,247 ac-ft. (93.14% available to all other authorized purposes)	X	X							X				
Conservation storage–270,247 ac-ft. (87.77% available to all other authorized purposes)			X									X	
Conservation storage–270,247 ac-ft. (81% available to all other authorized purposes)				X						X			
Conservation storage–281,917 ac-ft (88.09% available to all other authorized purposes)					X								X

Alternative Component \ Alternative	NAA	FWOP	WS1	WS2	WS3	WS4	WS5	WS6	MFO1	WS2+ MFO1	WS6+ MFO1	WS1+ MFO1	WS3+ MFO1
Conservation storage–281,917 ac-ft. (81.41% available to all other authorized purposes)								X			X		
Conservation storage–323,022 ac-ft. (77.92% available to all other authorized purposes)						X							
HEC-ResSim model uses 2006 water demands	X												
HEC-ResSim model uses 2050 water demands for Allatoona		X	X	X	X	X		X	X	X	X	X	X
SAD USACE storage accounting methodology. Detailed assumptions include: • A user's portion of inflow is fixed. • A user gets partial credit of made inflows that are prorated based on user portion of yield. • All storage accounts are full at 840 or 841 ft	X	X		X		X		X	X	X	X		
Georgia recommended storage accounting methodology. Detailed assumptions include: • A user's portion of inflow increases during the winter. • All storage accounts are full at guide curve • User receives full credit for made inflows including: ○ Hickory Log Creek Reservoir releases ○ Return flows to reservoir.			X		X							X	X
Dedicated summer flood storage of 288,606 ac-ft between 840 ft and 860 ft.	X	X	X	X					X	X		X	
Dedicated summer flood storage of 276,936 ac-ft between 841.5 ft and 860 ft					X			X			X		X
Dedicated summer flood storage of 235,831 ac-ft between 844.5 ft and 860 ft.						X							

Alternative Component \ Alternative	NAA	FWOP	WS1	WS2	WS3	WS4	WS5	WS6	MFO1	WS2+ MFO1	WS6+ MFO1	WS1+ MFO1	WS3+ MFO1
Weiss Lake													
Dedicated flood control storage of 397,759 ac-ft between 564 ft and 574 ft	X	X	X	X	X	X	X	X					
Dedicated flood control storage of 302,000 ac-ft between 564 ft and 572 ft									X	X	X	X	X
Real estate easements purchased by APC up to 572 ft	X	X	X	X	X	X	X	X	X	X	X	X	X
Winter drawn down begins in Sept from 564 ft to 558 ft	X	X	X	X	X	X	X	X					
Winter drawdown begins in Oct from 564 ft to 561 ft									X	X	X	X	X
Induced surcharge operation begins at 564 ft (see Section 2.5.1)	X	X	X	X	X	X	X	X					
Modified induced surcharge operation begins at 564 ft (see Section 2.6.1)									X	X	X	X	X
Logan Martin Lake													
Dedicated flood control storage of 245,673 ac-ft between 465 ft and 477 ft	X	X	X	X	X	X	X	X					
Dedicated flood control storage of 160,100 ac-ft between 465 ft and 473.5 ft									X	X	X	X	X
Real estate easements purchased by APC up to 473.5 ft	X	X	X	X	X	X	X	X	X	X	X	X	X
Winter drawdown begins in Oct from 465 ft to 460 ft	X	X	X	X	X	X	X	X					
Winter drawdown begins in Oct from 465 ft to 462 ft									X	X	X	X	X
Induced surcharge operation begins at 465 ft (see Section 2.5.2)	X	X	X	X	X	X	X	X					
Modified induced surcharge operation begins at 465 ft (see Section 2.6.2)									X	X	X	X	X

Note : *The various reallocation amounts provide storage to meet a need of 94mgd. The storage yield relationship changes depending on which pool or pool the storage is reallocated from.

4.4.2 Screening of Initial Array of Alternatives

The following criteria were identified to evaluate and screen the initial array of alternatives:

1. *Is it implementable by current law and by USACE policy and practice?* – This screening criteria was used to determine if an alternative would require additional authorization from Congress or a change in current USACE policy.
2. *Does it meet all authorized project purposes?* – USACE reservoirs within the ACT River Basin are operated for multiple project purposes in a balanced fashion. An action that would result in a major operational change would need additional authorization from Congress.
3. *Does it produce an increased risk to public life and safety?* – Any recommended alternative should not increase the current level of risk.
4. *Does it meet minimum flow requirements of the ACT basin?* – There are minimum releases required from Carter's Reregulation Dam and Allatoona Dam. These are detailed in the ACT River Basin Master Manual and project WCMs. A recommended alternative would need to meet these minimum flow requirements.
5. *Does it impact State Line Flow?* – The Georgia/Alabama state line flow trigger was used in formulating the drought management plan included in the 2015 ACT River Basin WCM update. The trigger is activated when the Mayo's Bar USGS gage measures a flow below the monthly historical 7Q10 low flow. 7Q10 is the lowest 7-day average flow (Q) that occurs (on average) once every 10 years. If this trigger is activated, drought operations would be initiated or expanded if one of the other triggers in the drought plan have already been met.

Table 4-3 summarizes the screening process for the initial array of federal action alternatives using the planning objectives and the evaluation and screening criteria. Similarly, Table 4-4 summarizes the screening of the initial array of nonfederal alternatives.

4.4.2.1 Screened Federal Action Alternatives

Two alternatives were screened from the initial array of federal action alternatives: WS4 and WS5. Both alternatives were screened because they would fail to meet all authorized project purposes (Screening Criteria 2). The WS4 alternative would result in loss of approximately 173,990 ac-ft (39.1 percent) of winter flood storage and 52,775 ac-ft (18.3 percent) of summer flood storage. Additionally, multiple recreation facilities would need to be moved. USACE would not be able to provide an acceptable level of flood risk management at Allatoona Lake. Such a large reduction in flood storage at Allatoona Lake caused this alternative to be screened out. The WS5 alternative was also screened out because it would require changes to hydropower facilities at Allatoona Lake. The intakes for the hydropower turbines are within the reservoir's inactive storage and would require structural changes to accommodate a reallocation from the inactive storage.

4.4.2.2 Screened Non-federal Action Alternatives

All but two of the nonfederal action alternatives were screened from the initial array. The alternatives were screened because they would not effectively meet the water supply objective and/or the overall cost of the alternative would be prohibitive. The purpose of the nonfederal alternative is to determine the next least costly/most likely alternative to storage reallocation and to estimate the federal water supply benefit. Additional details for the screened nonfederal action alternatives are presented in Appendix B.

4.4.3 Final Array of Alternatives

Table 4-5 presents the final array of federal and nonfederal alternatives, including a summary of the major features of each alternative.

Table 4-3. Initial Array of Federal Action Alternatives

Initial Federal Alternatives	Evaluated in HEC-ResSim during Alternatives Milestone	Planning Objectives		Evaluation and Screening Criteria				
		Reduces Risk of Water Supply Shortage for Allatoona Users through year 2050	Maintains Acceptable level of Flood Risk	Implementable by current law, USACE policy and practice	Meets all authorized project purposes	Produces an increased risk to life and public safety	Meets ACT Basin minimum flow requirements	Impacts state line flow
NAA	Yes	No	Yes	Yes	Yes	No	Yes	11.60%
FWOP	Yes	No	Yes	Yes	Yes	No	Yes	11.40%
WS1	No	Yes	Yes	No	Yes	No	TBD	TBD
WS2	Yes	Yes	Yes	Yes	Yes	No	Yes	12.40%
WS3	No	Yes	TBD	No	TBD	TBD	TBD	TBD
WS4	Yes	Yes	No	Yes	No	Yes	Yes	11%
WS5	No	Yes	Yes	Yes	No	TBD	TBD	TBD
WS6	No	Yes	TBD	Yes	Yes	TBD	TBD	TBD
MFO1	No	No	TBD	Yes	TBD	TBD	TBD	TBD
WS2 + MFO1	No	Yes	TBD	Yes	TBD	TBD	TBD	TBD
WS6 + MFO1	No	Yes	TBD	Yes	TBD	TBD	TBD	TBD
WS1 + MFO1	No	Yes	TBD	No	TBD	TBD	TBD	TBD
WS3 + MFO1	No	Yes	TBD	No	TBD	TBD	TBD	TBD

TBD – To be determined (For the screening of the initial array of federal action alternatives, detailed technical analyses had not yet been conducted for multiple alternatives.)

Table 4-4. Initial Array of Nonfederal Water Supply Alternatives

Initial Nonfederal Water Supply Alternatives	Evaluated in HEC-ResSim during Alternatives Milestone	Planning Objectives		Evaluation and Screening Criteria					
		Reduces Risk of Water Supply Shortage for Allatoona Users through year 2050	Maintains Acceptable level of Flood Risk	Implementable by current law, USACE policy and practice	Meets all authorized project purposes	Produces an increased risk to life and public safety?	Meets ACT basin minimum flow requirements	Impacts State Line Flow?	Complete, Effective, Efficient, Acceptable
Conservation (CCMWA and Cartersville)	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Complete, Not Effective, Efficient, Acceptable
Construct a pipeline to convey water from Hickory Log Creek Reservoir to Wyckoff Water Treatment Plant (CCMWA)	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Complete, Less Effective, Efficient, Acceptable
Pipe desalinated water from the Georgia coast (CCMWA and Cartersville)	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Complete, Effective, Not Efficient, Acceptable
Pipe water from the Tennessee River (CCMWA and Cartersville)	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Complete, Effective, Not Efficient, Not Acceptable
Drill new wells (CCMWA and Cartersville)	No	No	Yes	N/A	N/A	N/A	N/A	N/A	Complete, Not Effective, Not Efficient, Acceptable

Initial Nonfederal Water Supply Alternatives	Evaluated in HEC-ResSim during Alternatives Milestone	Planning Objectives		Evaluation and Screening Criteria					
		Reduces Risk of Water Supply Shortage for Allatoona Users through year 2050	Maintains Acceptable level of Flood Risk	Implementable by current law, USACE policy and practice	Meets all authorized project purposes	Produces an increased risk to life and public safety?	Meets ACT basin minimum flow requirements	Impacts State Line Flow?	Complete, Effective, Efficient, Acceptable
Construct new reservoirs (CCMWA and Cartersville)	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Complete, Effective, Efficient, Acceptable
Purchase water from existing nonfederal reservoirs (CCMWA and Cartersville)	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Complete, Not Effective, Not Efficient, Acceptable
Withdraw more water from the Chattahoochee River (CCMWA)	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Complete, Less Effective, Efficient, Not Acceptable
Withdraw water from the Etowah River below Allatoona Dam (Cartersville)	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Not Complete, Less Effective, Less Efficient, Not Acceptable

Table 4-5. Final Array of Alternatives

#	Alternative	Meets GA 2050 Demands 94 mgd	Storage Accounting Method		Reallocation			APC Requested Changes	Screened or Carried Forward
			USACE	GA	Inactive Pool	Conservation Pool	Flood Pool		
1	NAA		✓						**Carried Forward**
1a	NAA (Baseline-Capped)		✓						**Carried Forward**
2	FWOP		✓						**Carried Forward**
3	WS1	✓		✓		✓			**Carried Forward**
4	WS2	✓	✓			✓			**Carried Forward**
5	WS3	✓		✓		✓	✓		**Carried Forward**
6	WS4	✓	✓				✓		Screened
7	WS5				✓				Screened
8	WS6	✓	✓			✓	✓		**Carried Forward**
9	MFO1		✓					✓	**Carried Forward**
10	WS2 + MFO1	✓	✓			✓		✓	**Carried Forward**
11	WS6 + MFO1	✓	✓			✓	✓	✓	**Carried Forward**
12	WS1 + MFO1	✓		✓		✓		✓	**Carried Forward**
13	WS3 + MFO1	✓		✓		✓	✓	✓	**Carried Forward**
	Nonfederal Water Supply Alternatives								
14	*Conservation*								Screened

#	Alternative	Meets GA 2050 Demands 94 mgd	Storage Accounting Method		Reallocation			APC Requested Changes	Screened or Carried Forward
			USACE	GA	Inactive Pool	Conservation Pool	Flood Pool		
15	*Construct a pipeline to convey water from Hickory Log Creek Reservoir to Wyckoff Water Treatment Plant (CCMWA)*	✓ (partial)							**Carried Forward**
16	*Pipe desalinated water from the Georgia coast*	✓							Screened
17	*Pipe water from the Tennessee River*	✓							Screened
18	*Drill new wells*								Screened
19	*Construct new reservoirs*	✓							**Carried Forward**
20	*Purchase water from existing nonfederal reservoirs*								Screened
21	*Withdraw more water from the Chattahoochee River (CCMWA)*	✓							Screened
22	*Withdraw water from the Etowah River below Allatoona Dam (Cartersville)*	✓							Screened

Note: Alternative 1a is used for analysis purposes only to identify effects of storage exceedances. This is not an implementable alternative.

4.4.4 Alternative Milestone Meeting

USACE conducted the Alternative Milestone Meeting (AMM) on December 14, 2018. Attendees included members of the USACE Mobile District PDT, Major Subordinate Command (MSC) South Atlantic Division (SAD) members, and Headquarters USACE, Office of Water Project Review and SAD Regional Integration Team.

The purpose of the AMM was to obtain concurrence on the final array of alternatives and the path forward to the Tentatively Selected Plan (TSP) Milestone. The PDT discussed the study purpose, completed activities, the request received from the State of Georgia, the request received from APC, current water supply storage and storage accounting methodologies, measures and preliminary alternatives, screening of the initial array of alternatives, the final array of alternatives, next steps to the TSP milestone, and key risks moving forward.

The SAD Planning Chief concurred with moving forward with the final array of alternatives and the process to evaluate, compare, and select alternatives.

4.5 Evaluation of Alternatives

4.5.1 Evaluation, Comparison, and Screening Criteria

The PDT developed a set of criteria to evaluate, compare and screen the alternatives. The criteria utilized are as follows:

1. Does the alternative comply with P.L. 83-436 (Coosa Power Act)? The Coosa Power Act is discussed in Section 2.1. Section 5 of the Coosa Power Act requires the nonfederal project to meet the following standards:
   - The project shall provide the maximum flood control that is economically feasible;
   - The flood control storage may not be less than the displaced valley storage; and
   - The flood control storage may not be less in quantity and effectiveness than the amount of flood control storage provided by the Howell Mill Shoals project. Howell Mill Shoals was the original federal project proposed for construction on the Coosa River. It was never constructed, and non-federal hydropower development was allowed in its place, subject to meeting this provision.
2. Is it implementable under current law?
3. Are there impacts to authorized project purposes?
4. Is the alternative successful at meeting one or more project objectives?
5. Does it increase overall flood risk in the basin?
6. Does the alternative change the level of protection to life and safety? Is there an increased risk to dams and levees overtopping as a result of a change in flood operations?
7. Does the alternative meet ACT River Basin minimum flow requirements?
8. Does the alternative impact the State Line flow?
9. What are the benefits foregone for the alternative?
10. What are the revenues foregone for the alternative?
11. What is the updated cost of storage for the alternative?

4.5.2 Modeling of Alternatives

The PDT utilized various types of modeling in order to evaluate the final array of alternatives against the criteria identified in section 4.5.1. Models include HEC-ResSim, HEC-RAS, HEC-5Q and, HEC-FIA. A full description of the models used and reasons each model was utilized is discussed in Appendix E, Section E.3.1. Appendix C also includes modeling reports for HEC-ResSim, HEC-5Q, and HEC-RAS. Appendix D discusses the HEC-FIA modeling.

4.5.3 Evaluation Criteria 1

Alternative 1, Alternative 2, Alternative 3, Alternative 4, Alternative 5, and Alternative 8 all comply with P.L. 83-436. These alternatives do not include a change to flood operations at Logan Martin and Weiss and therefore are compliant. The current WCMs direct flood operations that require inundation to elevation 574 ft at Weiss. APC only owns easements to elevation 572 ft at Weiss. If any of these alternatives are selected by the decision maker, it is reasonably foreseeable that flood operations would require use of the flood storage from elevation 572 ft to 574 ft. USACE has conducted additional analysis of impacts to private property both upstream and downstream of Weiss and Logan Martin dams. The results of this analysis is discussed in Appendix D Section 8 and Section 9. Pursuant to ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient documentation is available to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Weiss and Logan Martin dams. The correspondence received from FERC on October 22, 2020, stated that APC has acquired all necessary real estate for the proposed operation. It is the responsibility of APC to acquire all necessary real estate interests prior to implementation.

Alternative 9, Alternative 10, Alternative 11, Alternative 12, and Alternative 13 include changes to the flood operations at Weiss and Logan Martin. The PDT reviewed the documentation provided by APC and is satisfied that the change in flood operations still provides more flood storage than the displaced valley storage. The total revised flood storage between Weiss and Logan Martin is 586,700 ac-ft. This exceeds the proposed flood storage of Howells Mill Shoals of 451,500 ac-ft. APC has not yet provided documentation to support the requirement that this alternative is providing the maximum flood control that is economically feasible. USACE received email correspondence from FERC on October 22, 2020 which indicated that they will defer to USACE's judgement for the sufficiency of flood control storage.

4.5.4 Evaluation Criteria 2

All federal action alternatives can be implemented under current law..

4.5.5 Evaluation Criteria 3

The PDT evaluated the potential effects on project purposes using outputs from the HEC-ResSim model as well as a range of other economic models. The comparison of the alternatives relative to selected metrics for hydropower, flood risk management, navigation, and recreation are presented in Table 4-6. Additional details are presented in Appendix B and Appendix D.

Table 4-6. Selected Metrics for Authorized Project Purposes

Metric \ Alternative No.	1	1a	2	3	4	5	8	9	10	11	12	13
Hydropower System Annual Generation (GWh)	5,556.7	5,558.4	5,555.1	5,549.7	5,549.6	5,551.3	5,551.1	5,545.0	5,539.3	5,540.8	5,539.6	5,541.1
Hydropower System Energy Value ($M)	$131,98	$132,03	$130,87	$131,82	$131,74	$131,87	$131,86	$131,63	$131,79	$130,45	$131,49	$131,54
Hydropower System Capacity (MW)	2142.77	2142.27	2141.97	2152.58	2140.71	2155.12	2154.99	2153.16	2151.43	2153.78	2151.62	2154.13
Hydropower Capacity Value ($M)	$275.58	$275.52	$275.48	$276.84	$275.32	$277.17	$277.15	$276.92	$276.69	$276.99	$276.72	$277.04
Flood Risk – 0.5% 1979 event at Rome, GA ($M)	$134.21	No Change	No Change	No Change	No Change	+3.6%;	+3.6%;	No Change	No Change	+3.6%;	No Change	+3.6%;
Flood Risk – APC Apr 1979 event ($M)	$38.72	No Change	No Change	No Change	No Change	No Change	-5.2%;	-5.2%;	-5.2%;	-5.2%;	-5.2%;	-5.2%;
Flood Risk – APC Feb 1990 event ($M)	$42.42	No Change	No Change	No Change	No Change	No Change	-57.6%	-57.6%	-57.6%	-57.6%	-57.6%	-57.6%
Flood Risk – APC Oct 1995 event ($M)	$12.94	No Change	No Change	No Change	No Change	No Change	+18.8%	+18.8%	+18.8%	+18.8%	+18.8%	+18.8%
Navigation – Percent of time a 7.5-ft channel would be available	85.9%	85.9%	85.9%	85.4%	85.9%	85.9%	86.1%	85.9%	85.0%	85.1%	85.0%	85.1%
Recreation - Allatoona ($M avg. annual)	$75.1	$75.1	$75.1	$75.1	$75.1	$75.8	$75.8	$75.1	$75.1	$75.8	$75.1	$75.8
Recreation - APC ($M avg. annual)	$32.6	$32.6	$32.6	$32.6	$32.6	$32.6	$32.6	$33.5	$33.5	$33.5	$33.5	$33.5

Note: Alternative 1a is used for analysis purposes only to identify effects of storage exceedances. This is not an implementable alternative.

4.5.6 Evaluation Criteria 4

All alternatives maintain an acceptable level of flood risk within the ACT basin. Alternative 3, Alternative 4, Alternative 5, Alternative 8, Alternative 10, Alternative 11, Alternative 12, and Alternative 13 meet Georgia's need for additional water supply from Allatoona Lake. Alternative 1, Alternative 1a, and Alternative 2 do not fully reduce the risk of water supply shortages at Allatoona Lake.

4.5.7 Evaluation Criteria 5

Alternative 1, Alternative 2, Alternative 3, and Alternative 4 do not include modifications to flood operations at Allatoona Lake, Weiss Lake or Logan Martin Lake. Therefore, there are no changes to the level of flood risk with these alternatives.

Alternative 5, Alternative 8, Alternative 11, and Alternative 13 include a 1-ft summer pool level increase at Allatoona and a 1.5-ft increase to the winter pool. This is equivalent to a 4 percent reduction in summer flood storage and 2.4 percent reduction in winter flood storage. The PDT evaluated flood impacts using the HEC-FIA tool. Details on the HEC-RAS and HEC-FIA modeling can be found in Appendix C, Attachment 4, and Appendix D, respectively.

From a total impact perspective, the modeled events/frequencies that impacted the largest number of structures was the Base and Proposed 1979 (0.2 percent) USACE scenario (500-year event). These scenarios produced impacts to 509 structures at base conditions, and 514 structures at proposed conditions along the Etowah, Oostanaula, and Coosa Rivers. Most impacts would occur in Rome, GA, within Floyd County. A summary of structure impacts is shown below in Table 4-7. A summary of damages at Allatoona Lake are shown in Table 4-8.

Table 4-7. Allatoona Flood Impacts—Structures

Base				Proposed				
Storm	Frequency	Structures Impacted		Storm	Frequency	Structures Impacted		Percent Change from Base
1961	0.002	418		1961	0.002	418		0.00%
1961	0.005	350		1961	0.005	350		0.00%
1961	0.01	315		1961	0.01	315		0.00%
1961	0.02	271		1961	0.02	271		0.00%
1961	0.05	87		1961	0.05	87		0.00%
1979	0.002	509		1979	0.002	514		0.97%
1979	0.005	362		1979	0.005	369		1.88%
1979	0.01	251		1979	0.01	251		0.00%
1979	0.02	184		1979	0.02	184		0.00%
1979	0.05	159		1979	0.05	159		0.00%
1990	0.002	328		1990	0.002	328		0.00%
1990	0.005	263		1990	0.005	263		0.00%
1990	0.01	203		1990	0.01	203		0.00%
1990	0.02	177		1990	0.02	177		0.00%
1990	0.05	158		1990	0.05	158		0.00%

Table 4-8. Flood Impact Damages at Allatoona Lake

Base				Proposed				
Storm	Frequency	Structure Damages		Storm	Frequency	Structure Damages		Percent Change from Base
1961	0.002	$184,263,968		1961	0.002	$184,337,424		0.04%
1961	0.005	$149,342,255		1961	0.005	$149,395,789		0.04%
1961	0.01	$136,706,588		1961	0.01	$136,706,430		0.00%
1961	0.02	$122,477,595		1961	0.02	$122,514,216		0.03%
1961	0.05	$15,005,491		1961	0.05	$15,089,046		0.56%0.55%
1979	0.002	$186,086,367		1979	0.002	$191,604,020		2.97%
1979	0.005	$134,210,201		1979	0.005	$139,254,496		3.76%
1979	0.01	$109,473,795		1979	0.01	$109,472,926		0.00%
1979	0.02	$88,235,892		1979	0.02	$88,212,326		-0.03%
1979	0.05	$67,342,136		1979	0.05	$68,578,803		1.84%1.80%
1990	0.002	$135,416,987		1990	0.002	$135,432,160		0.01%
1990	0.005	$121,029,960		1990	0.005	$121,057,034		0.02%
1990	0.01	$106,969,300		1990	0.01	$106,996,607		0.03%
1990	0.02	$95,726,553		1990	0.02	$95,764,228		0.04%
1990	0.05	$76,237,342		1990	0.05	$76,491,144		0.33%

Alternative 9, Alternative 10, Alternative 11, Alternative 12, and Alternative 13 include a proposed change to flood operations at Weiss Lake and Logan Martin Lake. At Weiss Lake and Dam the proposed changes include a 30 percent reduction in the flood storage during the winter months and a 24 percent reduction in flood storage during the summer months. At Logan Martin Dam and Lake, the proposed changes include a 35 percent reduction in flood storage during the winter months as well as a 35 percent reduction in the summer months. To account for the reduction in flood storage, APC proposes to modify the current Flood Regulation Schedules for Weiss and Logan Martin Dams. A summary of impacts is shown below in Table 4-9 and Table 4-10.

Table 4-9. APC Projects Flood Impacts—Structures

Storm	Existing	Proposed	Percent Change from Existing
	Structures Impacted		
Design	1,142	847	-25.83%
Back to Back	495	419	-15.35%
April 1979	796	757	-4.90%
February 1990	1,008	445	-55.85%
March 1990	457	424	-7.22%
May 2003	361	316	-12.47%
October 1995	393	383	-2.54%

Table 4-10. APC Projects Flood Impacts—Damages

Storm	Existing	Proposed	% Change from Existing
	Structure Damages		
Design	$49,734,218	$36,507,766	-26.59%
Back to Back	$23,305,895	$19,334,049	-17.04%
April 1979	$38,717,563	$36,724,324	-5.15%
February 1990	$42,421,189	$17,989,152	-57.59%
March 1990	$18,748,315	$17,740,564	-5.38%
May 2003	$15,971,455	$13,079,966	-18.10%
October 1995	$12,939,940	$15,370,944	18.79%

4.5.8 Evaluation Criteria 6

Alternative 1, Alternative 2, Alternative 3, and Alternative 4 do not include any changes to the flood pool and therefore do not change risks to over-topping of the Allatoona Dam or downstream levees at Rome, Georgia.

Alternative 5, Alternative 8, Alternative 11, and Alternative 13 do not increase the risk to life and public safety as a result of dam or levee overtopping. USACE reports that there are no resultant impacts to the routed Probable Maximum Flood maximum pool elevation and no significant downstream impacts to routed flood discharge. Additional details of the analysis are discussed in Appendix C, Attachment 4.

Alternative 9, Alternative 10, Alternative 11, Alternative 12, and Alternative 13 include a change to flood operations at both Weiss Lake and Logan Martin Lake. APC did not provide documentation of a dam safety analysis associated with the proposed changes to flood operations at either Weiss Lake or Logan Martin Lake. USACE recommends that an assessment covering the impacts to dam safety from the proposed changes should be required under the updated FERC license.

4.5.9 Evaluation Criteria 7

All alternatives meet minimum releases required at USACE projects. Minimum releases are detailed in the project water control manuals.

4.5.10 Evaluation Criteria 8

USACE evaluated the percent of time over the 73-year period of record that each alternative would be expected to activate the state line flow drought trigger under the Drought Plan that was established in the 2015 ACT River Basin Master Manual update. Table 4-11 displays the results for each alternative. There are minimal differences between the alternatives which USACE concludes as minimal to no effect for an impact to drought operations.

Table 4-11. Percent of Time State Line Flow Trigger

Alternative	Alternative Description	Percent of Time State Line Flow Trigger Would be Met
1	NAA	12.7%
1a	NAA (Baseline capped)	12.4%
2	FWOP	12.4%
3	WS1	13.2%
4	WS2	13.2%
5	WS3	13.1%
8	WS6	13.1%
9	FWOP+MFO1	12.4%
10	WS2+MFO1	13.2%
11	WS6+MFO1	13.1%
12	WS1+MFO1	13.2%
13	WS3+MFO1	13.1%

4.5.11 Evaluation Criteria 9, 10, and 11

These criteria specific to determining the recommendation of water supply reallocation at Allatoona Lake are discussed in Section 7.5.1. They are only evaluated for the RP.

4.6 Comparison of the Final Array of Alternatives

4.6.1 System of Accounts

Table 4-12 presents the System of Accounts for all the Alternatives considered in detail.

Table 4-12. System of Accounts for Alternative Plans

Item	Alternative										
	1	2	3	4	5	8	9	10	11	12	13
A. PLAN DESCRIPTION (detailed description in section 4)											
A1. Water Supply at Allatoona Lake	Continue existing water supply storage agreements.	Continue existing water supply storage agreements. Next least cost water supply alternative implemented	Continue existing water supply storage agreements. Reallocate 14,524 ac-ft conservation storage	Continue existing water supply storage agreements. Reallocate 32,812 ac-ft conservation storage	Continue existing water supply storage agreements. Reallocate 15,041 ac-ft conservation storage	Continue existing water supply storage agreements. Reallocate 33,872 ac-ft conservation storage	Continue existing water supply storage agreements. Next least cost water supply alternative implemented	Continue existing water supply storage agreements. Reallocate 32,812 ac-ft conservation storage	Continue existing water supply storage agreements. Reallocate 33,872 ac-ft conservation storage	Continue existing water supply storage agreements. Reallocate 14,524 ac-ft conservation storage	Continue existing water supply storage agreements. Reallocate 15,041 ac-ft conservation storage
A2. Flood Operations at Weiss and Logan Martin Dams	No change	No change	No change	No change	No change	No change	Revised APC flood operations at Weiss and Logan Martin	Revised APC flood operations at Weiss and Logan Martin	Revised APC flood operations at Weiss and Logan Martin	Revised APC flood operations at Weiss and Logan Martin	Revised APC flood operations at Weiss and Logan Martin
B. IMPACT ASSESSMENT											
B1. National Economic Development											
Water Supply	Shortage likely without non-federal alternative	Shortage likely without non-federal alternative	Full requested need met	Full requested need met	Full requested need met	Full requested need met	Shortage likely without non-federal alternative	Full requested need met	Full requested need met	Full requested need met	Full requested need met
Hydropower (000s)	$407,543	$406,352	$408,660	$407,059	$409,038	$409,018	$408,543	$408,490	$407,445	$408,212	$408,584
Flood Risk Management	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7	For event-based values see 4.5.7
Recreation (000s)	$107,685	$107,685	$107,685	$107,685	$107,685	$108,394	$108,482	$108,526	$109,236	$108,526	$109,236
B2. Environmental Quality – Refer to Section 5.0 (Table 5-1)											
B3. Regional Economic Development											
Impacts to employment	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Impacts to tax base	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
B4. Other Social Effects – Refer to Section 5.0 (Table 5-1)											

Item	Alternative										
	1	2	3	4	5	8	9	10	11	12	13
C. PLAN EVALUATION											
C1. Performance Relative to Authorized Project Purposes – Refer to Section 4.5.5											
C2. Planning Objectives – Refer to Section 4.5.6											
C3. P&G Criteria											
Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
Effective	Not Effective	Not Effective	Partially Effective	Partially Effective	Partially Effective	Partially Effective	Partially Effective	Effective	Effective	Effective	Effective
Efficient	Efficient	Efficient	More Efficient than Alt 2	More Efficient than Alt 2	More Efficient than Alt 2	Most Efficient	More Efficient than Alt 2	More Efficient than Alt 2	Most Efficient	More Efficient than Alt 2	More Efficient than Alt 2
Acceptable	Not Acceptable	Not Acceptable	Partially Acceptable	Partially Acceptable	Partially Acceptable	Partially Acceptable	Partially Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
D. IMPLEMENTING RESPONSIBILITY	None	None	USACE/ State of Georgia	USACE/ State of Georgia	USACE/ State of Georgia	USACE/ State of Georgia	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC
E. STATE OR OTHER NON-FEDERAL COORDINATION	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC	USACE/ State of Georgia/ APC

4.6.2 Comparison to the No Action Alternative

A detailed impacts comparison is presented in Section 5.0.

4.6.2.1 Alternative 3

Alternative 3 has only a few select areas where there are differences from the NAA. Alternative 3 has slightly lower lake level conditions over the period of record. DO levels are likely to be slightly adverse. This is due to increased lake withdraws over the period of record. Availability for M&I water supply is slightly beneficial compared to the NAA as this alternative provides reallocation to meet the full need. Alternative 3 has slightly adverse hydropower impacts compared to the NAA. All other changes are negligible compared to the NAA.

4.6.2.2 Alternative 4

Alternative 4 has only a few select areas where there are differences from the NAA. Alternative 4 has slightly lower lake level conditions over the period of record. Flow conditions are also slightly adverse compared to the NAA. DO levels are likely to be slightly adverse. This is due to increased lake withdraws over the period of record. Availability for M&I water supply is slightly beneficial compared to the NAA as this alternative provides reallocation to meet the full need. Alternative 4 has slightly adverse impacts to hydropower compared to the NAA. All other changes are negligible compared to the NAA.

4.6.2.3 Alternative 5

Alternative 5 has only a few select areas where there are differences from the NAA. Alternative 5 has slightly higher lake level conditions over the period of record. Flow conditions are also slightly adverse compared to the NAA. DO levels are likely to be slightly beneficial. Availability for M&I water supply is slightly beneficial compared to the NAA as this alternative provides reallocation to meet the full need. Alternative 5 has slightly beneficial impacts to hydropower compared to the NAA. All other changes are negligible compared to the NAA.

4.6.2.4 Alternative 8

Alternative 8 has only a few select areas where there are differences from the NAA. Alternative 8 has slightly higher lake level conditions over the period of record. Flow conditions are also slightly adverse compared to the NAA. DO levels are likely to be slightly beneficial. Availability for M&I water supply is slightly beneficial compared to the NAA as this alternative provides reallocation to meet the full need. Alternative 8 has slightly beneficial impacts to hydropower compared to the NAA. All other changes are negligible compared to the NAA.

4.6.2.5 Alternative 9

Alternative 9 has beneficial impacts compared to the NAA for Allatoona lake level conditions and flow conditions above Weiss Lake. Alternative 9 also has slightly adverse impacts to hydropower compared to the NAA. Alternative 9 has slightly beneficial flood impacts compared to the NAA. Alternative 9 has slightly adverse impacts to M&I Water Supply as it does not meet any additional need over the NAA. Alternative 9 has slight beneficial impacts to recreation at Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the NAA.

4.6.2.6 Alternative 10

Alternative 10 has slightly adverse impacts compared to the NAA for Allatoona lake level conditions and flow conditions above Weiss Lake. Alternative 10 also has slightly adverse impacts to hydropower compared to the NAA. Alternative 10 has slightly beneficial flood impacts compared to the NAA. Alternative 10 has slightly beneficial impacts to M&I Water Supply as it does provide for the full need in Georgia's request. Alternative 10 has slight beneficial impacts to recreation at Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the NAA.

4.6.2.7 Alternative 11

Alternative 11 has slightly beneficial impacts compared to the NAA for lake level conditions and slightly adverse flow conditions above Weiss Lake. Alternative 11 also has slightly adverse impacts to hydropower compared to the NAA. Alternative 11 has slightly beneficial flood impacts compared to the NAA. Alternative 11 has slightly beneficial impacts to M&I Water Supply as it does provide for the full need in Georgia's request. Alternative 11 has slight beneficial impacts to recreation at Allatoona due to a higher summer level and Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the NAA.

4.6.2.8 Alternative 12

Alternative 12 has slightly adverse impacts compared to the NAA for Allatoona lake level conditions and flow conditions above Weiss Lake. Alternative 12 also has slightly adverse impacts to hydropower compared to the NAA. Alternative 12 has slightly beneficial flood impacts compared to the NAA. Alternative 12 has slightly beneficial impacts to M&I Water Supply as it does provide for the full need in Georgia's request. Alternative 12 has slight beneficial impacts to recreation at Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the NAA.

4.6.2.9 Alternative 13

Alternative 13 has slightly beneficial impacts compared to the NAA for lake level conditions and slightly adverse flow conditions above Weiss Lake. Alternative 11 also has slightly adverse impacts to hydropower compared to the NAA. Alternative 13 has slightly beneficial flood impacts compared to the NAA. Alternative 13 has slightly beneficial impacts to M&I Water Supply as it does provide for the full need in Georgia's request. Alternative 13 has slight beneficial impacts to recreation at Allatoona due to a higher summer level and Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the NAA.

4.6.3 Comparison to the Future Without Project Condition

4.6.3.1 Alternative 3

Alternative 3 has only a few select areas where there are differences from the FWOP. Alternative 3 has slightly lower lake level conditions over the period of record. DO levels are likely to be slightly adverse. This is due to increased lake withdraws over the period of record. Availability for M&I water supply is substantially beneficial compared to the FWOP as this alternative provides reallocation to meet the full need. Alternative 3 has slightly adverse hydropower impacts compared to the FWOP. Alternative 3 meets the full 2050 demand need. All other changes are negligible compared to the FWOP.

4.6.3.2 Alternative 4

Alternative 4 has only a few select areas where there are differences from the FWOP. Alternative 4 has slightly lower lake level conditions over the period of record. Flow conditions are also slightly adverse compared to the FWOP. DO levels are likely to be slightly adverse. This is due to increased lake withdraws over the period of record. Availability for M&I water supply is substantially beneficial compared to the FWOP as this alternative provides reallocation to meet the full need. Alternative 4 has slightly adverse impacts to hydropower compared to the FWOP. Alternative 4 meets the full 2050 demand need. All other changes are negligible compared to the FWOP.

4.6.3.3 Alternative 5

Alternative 5 has only a few select areas where there are differences from the FWOP. Alternative 5 has slightly higher lake level conditions over the period of record. Flow conditions are also slightly adverse compared to the FWOP. DO levels are likely to be slightly beneficial. Availability for M&I water supply is substantially beneficial compared to the FWOP as this alternative provides reallocation to meet the full need. Alternative 5 has slightly beneficial impacts to hydropower compared to the FWOP. Alternative 5 meets the full 2050 demand need. All other changes are negligible compared to the FWOP.

4.6.3.4 Alternative 8

Alternative 8 has only a few select areas where there are differences from the FWOP. Alternative 8 has slightly higher lake level conditions over the period of record. Flow conditions are also slightly adverse compared to the FWOP. DO levels are likely to be slightly beneficial. Availability for M&I water supply is substantially beneficial compared to the FWOP as this alternative provides reallocation to meet the full need. Alternative 8 has slightly beneficial impacts to hydropower compared to the FWOP. Alternative 8 meets the full 2050 demand need. All other changes are negligible compared to the FWOP.

4.6.3.5 Alternative 9

Alternative 9 has beneficial impacts compared to the FWOP for Allatoona lake level conditions and flow conditions above Weiss Lake. Alternative 9 also has slightly adverse impacts to hydropower compared to the FWOP. Alternative 9 has slightly beneficial flood impacts compared to the FWOP. Alternative 9 has no impact to M&I Water Supply as it does not meet any additional need over the FWOP. Alternative 9 has slight beneficial impacts to recreation at Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the FWOP.

4.6.3.6 Alternative 10

Alternative 10 has slightly adverse impacts compared to the FWOP for Allatoona lake level conditions and flow conditions above Weiss Lake. Alternative 10 also has slightly adverse impacts to hydropower compared to the FWOP. Alternative 10 has slightly beneficial flood impacts compared to the FWOP. Alternative 10 has substantially beneficial impacts to M&I Water Supply as it does provide for the full need in Georgia's request. Alternative 10 has slight beneficial impacts to recreation at Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the FWOP.

4.6.3.7 Alternative 11

Alternative 11 has slightly beneficial impacts compared to the FWOP for lake level conditions and slightly adverse flow conditions above Weiss Lake. Alternative 11 also has slightly adverse impacts to hydropower compared to the FWOP. Alternative 11 has slightly beneficial flood impacts compared to the FWOP. Alternative 11 has substantially beneficial impacts to M&I Water Supply as it does provide for the full need in Georgia's request. Alternative 11 has slight beneficial impacts to recreation at Allatoona due to a higher summer level and Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the FWOP.

4.6.3.8 Alternative 12

Alternative 12 has slightly adverse impacts compared to the FWOP for Allatoona lake level conditions and flow conditions above Weiss Lake. Alternative 12 also has slightly adverse impacts to hydropower compared to the FWOP. Alternative 12 has beneficial flood impacts compared to the FWOP. Alternative 12 has substantially beneficial impacts to M&I Water Supply as it does provide for the full need in Georgia's request. Alternative 12 has slight beneficial impacts to recreation at Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the FWOP.

4.6.3.9 Alternative 13

Alternative 13 has slightly beneficial impacts compared to the FWOP for lake level conditions and slightly adverse flow conditions above Weiss Lake. Alternative 11 also has slightly adverse impacts to hydropower compared to the FWOP. Alternative 13 has slightly beneficial flood impacts compared to the FWOP. Alternative 13 has substantially beneficial impacts to M&I Water Supply as it does provide for the full need in Georgia's request. Alternative 13 has slight beneficial impacts to recreation at Allatoona due to a higher summer level and Weiss and Logan Martin due to higher winter lake levels. All other changes are negligible compared to the FWOP.

4.6.4 Tentatively Selected Plan Milestone Meeting

USACE conducted the Tentatively Selected Plan Milestone Meeting (TSP) on September 30, 2019. Attendees included members of the USACE Mobile District PDT, Major Subordinate Command (MSC) South Atlantic Division (SAD) members, and Headquarters USACE, Office of Water Project Review and SAD Regional Integration Team.

The purpose of the TSP was to obtain concurrence on the Tentatively Selected Plan, permission to release the draft report for concurrent review and the path forward to the Agency Decision Milestone (ADM). The PDT discussed the alternative evaluation, effects on project purposes, comparisons between alternatives, timeline for the concurrent review, and key risks moving forward.

The USACE vertical team concurred with identification of the Tentatively Selected Plan and approved release of the DR/SEIS.

4.6.5 Agency Decision Milestone Meeting

USACE conducted the Agency Decision Milestone Meeting (ADM) on April 30, 2020. Attendees included members of the USACE Mobile District PDT, Major Subordinate Command (MSC) South Atlantic Division (SAD) members, and Headquarters USACE, Office of Water Project Review and SAD Regional Integration Team.

The purpose of the ADM was to obtain concurrence on the Tentatively Selected Plan as the USACE Recommended Plan, discussion of comments received during concurrent review including public and agency comments as well Independent External Pier Review comments and the path forward to completion of the FR/SEIS. The PDT discussed comments received, additional analysis completed after the DR/SEIS was released, tasks to complete the FR/SEIS, timeline for completions of the FR/SEIS, and key risks moving forward.

The HQUSACE Planning Chief confirmed the TSP as RP and approved the path forward to completing the FR/SEIS.

4.7 Identification of the Recommended Plan (RP)

The PDT reviewed all the modeled outputs, application of the screening criteria, the environmental impact analysis (presented in Section 5), and agency and public comments on the Draft FR/SEIS in order to select the RP from the final array of alternatives. The PDT selected Alternative 11 as the RP. Alternative 11 was identified as the Tentatively Selected Plan at the Draft FR/SEIS stage of the study process. Alternative 11 fully meets both study objectives by reducing risk of water supply shortages with a reallocation of storage for water supply and including revised flood operations at the Weiss and Logan Martin projects. Alternative 11 will meet the full 2050 need of 94 MGD which is a net amount of 60MGD. The current storage provides an equivalent yield of 34 MGD Alternative 11 has no significant impacts to any authorized project purposes.

The USACE has carefully considered both USACE and Georgia's proposed storage accounting method. The RP retains the current, USACE storage accounting method. The RP would fully meet the water supply needs identified by Georgia in its water supply request, and therefore does not conflict with Georgia law with respect to the ability of water supply users to meet their state-permitted withdrawal needs from storage allocated in Allatoona Lake. The analysis set forth in the SEIS indicated that the Georgia users' water supply needs could be met using either storage accounting methodology, without requiring any significant changes to the operation of Allatoona Lake and without significantly affecting other authorized purposes or the human environment. The RP includes the USACE accounting methodology for a variety of reasoning, including current and past practice at Allatoona Lake, where existing water supply storage agreements have allocated storage based on the USACE methodology for estimating yield. The current storage accounting methodology credits basin inflow to all users, but charges the winter drawdown solely to the USACE storage account, ensuring that this annual drawdown does not reduce the yield of the allocated water supply storage. By allocating an amount of storage that is expected to provide sufficient yield to meet the users' water supply needs even in the event of severe drought, the USACE methodology provides the greatest likelihood that those needs will, in fact, be met. For this reason, the USACE considers the storage amount and accounting methodology in the RP to most accurately reflect the overall water supply benefit that would result from accommodating Georgia's water supply request, while also enabling the Georgia water supply users to make full use of their withdrawal rights as permitted by the State. There is a substantial beneficial impact to recreation. Annual recreation benefits increase by approximately $1.5 million. The reallocation from flood control storage would provide improved pool level conditions for year-round recreational use at Allatoona Lake, from October through February at Weiss Lake, and from November through mid-March at Logan Martin Lake. Recreation was a key issue for many of the stakeholders and discussed heavily during the scoping meetings.

Alternative 11 has no significant environmental effects compared to the NAA or other alternatives. Alternative 11 was the best alternative at achieving the objectives and providing for the least negative effects across the resource areas. Section 5 provides summary tables and detailed impacts for the environmental resources in the ACT River Basin for the RP. Table 5-1 provides a full color-coded summary of impacts of all the alternatives evaluated in detail. A full discussion of the RP is detailed in Section 7.0.

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5.0 ENVIRONMENTAL CONSEQUENCES *

The environmental and socioeconomic effects of Georgia's water supply storage reallocation request at Allatoona Lake and the APC-proposed modifications to flood operations at Weiss and Logan Martin lakes are presented in this section. The affected environment described in Section 3.0 serves as the baseline condition from which potential environmental and socioeconomic effects likely to result from the proposed changes were determined.

For each natural and socioeconomic resource area discussed in this section, an impact matrix table (Table 5-1) summarizes the expected environmental consequences for each of the 11 alternatives that were carried forward for detailed analysis in the plan formulation process, including the NAA. Note on the table that Alternatives 6 and 7 were screened from the original list of 13 federal alternatives. The table also does not include non-federal alternatives that were screened during the plan formulation and evaluation process as presented in Section 4. The impact matrix includes relevant parameters and/or indicators for each resource area upon which the general assessment of effects is based. The following terms are used to describe the nature and relative intensity of natural and socioeconomic impacts presented in the impact matrix:

- *Negligible/no change*—Any positive or negative impacts would be negligible, amounting to no effective change.
- *Slightly adverse/slightly beneficial*—Any impact would be perceptible and measurable but would not have an appreciable effect.
- *Adverse/beneficial*—Any impact would be clearly detectable and would have an appreciable effect.
- *Substantially adverse/substantially beneficial*—Any impact would result in a highly noticeable effect.

The above terms to characterize the environmental consequences were specifically developed and defined to provide a qualitative assessment and general comparison of the effects of the alternatives across a wide range of natural and socioeconomic resource areas. These descriptors are intended to provide the reader a comprehensive summary of the relative impacts of the alternatives compared to the NAA, and they have been established by subject matter experts based on their review of model outputs and other relevant information. The narrative for each environmental/socioeconomic resource area which follows in Section 5 supplements the general characterization of environmental effects by providing more specific and detailed information, including metrics where possible (e.g. direct model outputs), to describe the nature of the effects and their relative intensity or magnitude.

In response to comments and questions offered during public review of the Draft FR/SEIS, additional clarification is provided to more fully define the difference between *negligible/no change* and *slightly adverse/slightly beneficial* as applied in Table 5-1. *Negligible/no change* is applicable in cases where model results or other available information on impacts between the NAA and another alternative would be exactly the same or the difference would be so small as to be "discountable." *Slightly adverse/slightly beneficial* would apply where differences in the analysis between alternatives would be perceptible (or observable) and measurable such that a subject matter expert could conclude that a minor beneficial or adverse impact would occur. Generally, these minor changes or effects would not equate to a significant factor in the selection of an alternative. As stated above, the detailed narrative in the Final FR/SEIS provides more detailed information for each natural and socioeconomic resource area to support the assigned qualitative values in Table 5-1.

While the generalized summary of environmental consequences covers all 11 alternatives considered in detail during the plan formulation process, three alternatives (in addition to the NAA) were selected for detailed analysis of impacts in accordance with NEPA. They are Alternative 11 (the RP), Alternative 10, and Alternative 3. The other alternatives in Table 5-1 are variations of these three alternatives, and they would likely involve similar impacts to one of these three. The text for each resource area in this section provides more detailed information and analysis (both qualitative and quantitative) on the NAA and Alternatives 11, 10, and 3 to support the general characterization of environmental effects in the matrix. In some cases, pertinent appendices include additional details for reference by the reader.

Table 5-1. Allatoona-Coosa Reallocation Study—Summary of Environmental Consequences of Alternatives

Resource Area \ Alternative No. / Name	1 NAA	2 FWOP	3 WS01	4 WS02	5 WS03	8 WS06	9 FWOP_MF	10 WS02_MF	11 WS06_MF	12 WS01_MF	13 WS03_MF
Water Quantity											
Lake level conditions											
Allatoona Lake	Baseline	Negligible/ No change	Slightly adverse	Slightly adverse	Beneficial	Beneficial	Negligible/ No change	Slightly adverse	Beneficial	Slightly adverse	Beneficial
Weiss Lake	Baseline	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
H. Neely Henry Lake	Baseline	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change
Logan Martin Lake	Baseline	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
R.E. "Bob" Woodruff Lake	Baseline	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change	Negligible/ No change
Stream flow conditions											
Etowah River - Allatoona Dam to Rome, GA	Baseline	Slightly beneficial	Negligible/ No Change	Slightly adverse	Slightly adverse	Slightly adverse	Slightly beneficial	Slightly adverse	Slightly adverse	Negligible/ No Change	Slightly adverse
Coosa River - Rome, GA, to Weiss Lake	Baseline	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change
Coosa River - Logan Martin Dam Discharge	Baseline	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial
Alabama River near Montgomery, AL	Baseline	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change	Negligible/ No Change
Drought operations	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly adverse	Slightly adverse	Slightly adverse	Slightly adverse	Slightly adverse
Releases to support navigation	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Water Quality											
Water temperature											
Etowah River - Canton, GA, to Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Etowah River - Allatoona Dam to Rome, GA	Baseline	Slightly adverse	Negligible/ no change	Slightly beneficial	Slightly beneficial	Slightly beneficial	Negligible/ no change	Slightly beneficial	Slightly beneficial	Negligible/ no change	Slightly beneficial
Coosa River - Rome, GA, to Weiss Lake	Baseline	Slightly adverse	Negligible/ no change	Slightly beneficial	Slightly adverse	Slightly adverse	Negligible/ no change	Slightly beneficial	Slightly adverse	Negligible/ no change	Slightly adverse

Resource Area \ Alternative No. / Name	1 NAA	2 FWOP	3 WS01	4 WS02	5 WS03	8 WS06	9 FWOP_MF	10 WS02_MF	11 WS06_MF	12 WS01_MF	13 WS03_MF
Weiss Lake	Baseline	Slightly adverse	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly beneficial	Slightly beneficial	Negligible/ no change	Slightly beneficial	Slightly beneficial
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly adverse	Slightly adverse	Slightly adverse	Slightly adverse	Slightly adverse
Dissolved oxygen											
Etowah River - Canton, GA, to Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Allatoona Lake	Baseline	Slightly adverse	Slightly adverse	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly adverse	Slightly beneficial
Etowah River - Allatoona Dam to Rome, GA	Baseline	Slightly adverse	Negligible/ no change	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly adverse	Slightly beneficial	Slightly beneficial	Negligible/ no change	Slightly beneficial
Coosa River - Rome, GA, to Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Phosphorus											
Etowah River - Canton, GA, to Allatoona Lake	Baseline	Negligible/ no change	Slightly adverse	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Etowah River - Allatoona Dam to Rome, GA	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River - Rome, GA, to Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change

Resource Area \ Alternative No. / Name	1 NAA	2 FWOP	3 WS01	4 WS02	5 WS03	8 WS06	9 FWOP_MF	10 WS02_MF	11 WS06_MF	12 WS01_MF	13 WS03_MF
Nitrogen											
Etowah River - Canton, GA, to Allatoona Lake	Baseline	Negligible/ no change	Slightly beneficial	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly beneficial	Negligible/ no change
Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Etowah River - Allatoona Dam to Rome, GA	Baseline	Negligible/ no change	Negligible/ no change	Slightly beneficial	Negligible/ no change	Negligible/ no change	Slightly adverse	Slightly beneficial	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River - Rome, GA, to Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly adverse	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly adverse	Slightly adverse	Slightly adverse	Negligible/ no change	Negligible/ no change
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly adverse	Slightly adverse	Slightly adverse	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly adverse	Slightly adverse	Slightly adverse	Negligible/ no change	Negligible/ no change
Chlorophyll a											
Etowah River - Canton, GA, to Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Etowah River - Allatoona Dam to Rome, GA	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River - Rome, GA, to Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly adverse	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Geology and Soils											
Allatoona Dam and Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Weiss Dam and Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
H. Neely Henry Dam and Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change

Resource Area \ Alternative No. / Name	1	2	3	4	5	8	9	10	11	12	13
	NAA	FWOP	WS01	WS02	WS03	WS06	FWOP_MF	WS02_MF	WS06_MF	WS01_MF	WS03_MF
Logan Martin Dam and Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Climate Conditions	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Land Use											
Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Lay Lake (flowage easements for modified flood operations at Logan Martin Dam)	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly adverse	Slightly adverse	Slightly adverse	Slightly adverse	Slightly adverse
Biological Resources											
Vegetation – terrestrial communities											
Etowah River	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Vegetation – wetlands											
Etowah River - Canton, GA, to Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly beneficial	Slightly beneficial	Negligible/ no change	Negligible/ no change	Slightly beneficial	Negligible/ no change	Slightly beneficial
Etowah River - Allatoona Dam to Rome, GA	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River - Rome, GA, to Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change

Alternative No. / Name / Resource Area	1	2	3	4	5	8	9	10	11	12	13
	NAA	FWOP	WS01	WS02	WS03	WS06	FWOP_MF	WS02_MF	WS06_MF	WS01_MF	WS03_MF
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial
Wildlife											
Etowah River	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Riverine fish and aquatic resources											
Etowah River - Canton, GA (HLC), to Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Etowah River - Allatoona Dam to Rome, GA	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River - Rome, GA, to Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River - Weiss Lake to H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River - H. Neely Henry Dam to Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Coosa River – Logan Martin Dam to Lay Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Reservoir fish and aquatic resources											
Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly beneficial	Slightly beneficial	Negligible/ no change	Negligible/ no change	Slightly beneficial	Negligible/ no change	Slightly beneficial
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial
Lay, Mitchell, Jordan lakes	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
R.E. "Bob" Woodruff Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Estuarine fish and aquatic resources											
Essential Fish Habitat [a]	Baseline	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect

Alternative No. / Name / Resource Area	1	2	3	4	5	8	9	10	11	12	13
	NAA	FWOP	WS01	WS02	WS03	WS06	FWOP_MF	WS02_MF	WS06_MF	WS01_MF	WS03_MF
Protected Species											
Mammals	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Birds	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Reptiles	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Amphibians	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Freshwater fishes	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Mussels	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Snails	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Plants	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Fish and Wildlife Management Facilities	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Socioeconomic Resources											
Municipal and industrial water supply											
Etowah River (including Allatoona Lake)	Baseline	Adverse	Substantially beneficial	Substantially beneficial	Substantially beneficial	Substantially beneficial	Adverse	Substantially beneficial	Substantially beneficial	Substantially beneficial	Substantially beneficial
Coosa River	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Navigation Channel (channel availability in the Alabama River downstream of Montgomery, AL)											
7.5-ft depth	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
9-ft depth	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Hydropower	Baseline	Slightly adverse	Slightly beneficial	Slightly adverse	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial	Slightly beneficial
Agricultural water supply	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Flood risk management											
Allatoona Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change

Resource Area \ Alternative No. / Name	1 NAA	2 FWOP	3 WS01	4 WS02	5 WS03	8 WS06	9 FWOP_MF	10 WS02_MF	11 WS06_MF	12 WS01_MF	13 WS03_MF
Etowah and Coosa Rivers - Allatoona Dam to Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Coosa River - Below Weiss Dam (H. Neely Henry Lake)	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Coosa River - Below Logan Martin Dam (Lay Lake)	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Recreation resources											
Allatoona Lake	Baseline	Slightly beneficial	Slightly adverse	Slightly adverse	Slightly beneficial	Slightly beneficial	Negligible/ no change	Slightly adverse	Slightly beneficial	Slightly adverse	Slightly beneficial
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Environmental justice	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Protection of children	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Aesthetic resources											
Allatoona Lake	Baseline	Slightly beneficial	Slightly adverse	Slightly adverse	Slightly beneficial	Slightly beneficial	Negligible/ no change	Slightly adverse	Slightly beneficial	Slightly adverse	Slightly beneficial
Weiss Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
H. Neely Henry Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Logan Martin Lake	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Air quality	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change

Resource Area \ Alternative No. Name	1	2	3	4	5	8	9	10	11	12	13
	NAA	FWOP	WS01	WS02	WS03	WS06	FWOP_MF	WS02_MF	WS06_MF	WS01_MF	WS03_MF
Noise	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Traffic and transportation	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Cultural resources [b]	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change
Hazardous and toxic waste	Baseline	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change	Negligible/ no change

a. Areas subject to the Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat) are outside the ROI for the proposed actions considered in this study. Therefore, the effects are characterized as “No Effect.”

b. The impacts depicted are based on preliminary assessment of effects to cultural resources. USACE is establishing a Programmatic Agreement with Georgia and Alabama SHPOs to further investigate potential cultural resource effects associated with the RP (Alternative 11).

Note:

Impacts descriptions in the Alternatives Impacts Comparison Matrix are drawn from evaluations of the post processing outcomes compared to the no action simulation. The no action simulation is the NEPA baseline. Conclusions in this matrix are based upon the best information available at the time of the matrix’s preparation and are subject to change if new information becomes available.

5.1 Water Resources–Water Quantity

This section describes the expected effects of the NAA, Alternative 11 (the RP), Alternative 10, and Alternative 3, relative to water quantity considerations. It focuses on the extent of physical change in water resource parameters in the ACT River Basin that would likely result from implementation of these alternatives and provides the principal basis for assessment of other natural and socioeconomic resource impacts. The evaluation includes selected plots from the HEC-ResSim simulation over the 73-year hydrologic period of record (1939-2011) in the basin. Table 5-2 summarizes the alternatives evaluated in detail in this section, including the names of the alternatives as modeled in HEC-ResSim and a brief description of the key features of each alternative. More details on the HEC-ResSim modeling for this Final FR/SEIS may be found in the modeling report in Appendix C.

Table 5-2. Summary of Alternative Numbers and Model Names from HEC-ResSim

Alternative Number	Alternative Name in Model	Description
1	A0-BASE2018	No Action Alternative (NAA)
3	A03_WS1	Allatoona storage reallocation to enable withdrawals up to 94 mgd from conservation storage only, using Georgia's proposed storage accounting methodology
10	A10_WS2MF	Allatoona storage reallocation to enable withdrawals up to 94 mgd from conservation storage only, using USACE current storage accounting methodology, and modified flood operations at APC Weiss and Logan Martin projects
11 (RP)	A11_WS6MF	Allatoona storage reallocation to enable withdrawals up to 94 mgd from combination of flood storage and conservation storage, using USACE current storage accounting methodology, and modified flood operations at APC Weiss and Logan Martin projects

Figures throughout the section depict model results to facilitate comparison of the effects of the NAA, the RP, and the other alternatives. In many cases, plots for two or more alternatives were nearly identical for a portion of the plot (or curve) or over their entire range. The NAA is the last alternative plotted on each figure to help distinguish the extent to which other alternatives deviate or produce identical results compared to the NAA. The text of the report provides specific clarification on the figures as necessary. All elevation data for project structures, reservoir water surface elevations, and other pertinent elevation information are referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).

Appendix E, Section E.3, includes a more detailed analysis of the water quantity-related effects of the NAA and Alternatives 11, 10, and 3.

5.1.1 Lake Levels and Reservoir Storage Conditions

The likely effects of the alternatives on lake levels and associated storage conditions at Allatoona Lake on the Etowah River, the APC reservoirs on the Coosa River, and Robert F. Henry L&D (R.E. "Bob" Woodruff Lake) on the upper Alabama River are addressed in this section. Figures depicting "median" lake level conditions in the basin provide a representative characterization of "typical" conditions for evaluation and comparison among alternatives. The median value represents the point at which 50 percent of the values are higher and 50 percent are lower over the modeled period of record. Selected figures depicting the 90 percent exceedance level represent daily values that would be exceeded 90 percent of the time over the period of record, reflecting extremely dry conditions in the basin.

5.1.1.1 No Action Alternative

Allatoona Lake. Lake level and storage conditions in Allatoona Lake, including its seasonal pool level variations, would be consistent with those described in Section 2.1.1 and in more detail in Appendix E, Section E.1.1.4.2. Median lake levels would generally align with the current project guide curve from January through mid-July, subsequently declining gradually from about 840 ft to 832 ft by the end of November, and thereafter aligning with the guide curve down to elevation 823 ft by the end of December (Figure 5-1). At the 90 percent exceedance level (dry conditions), the pool level would not reach to the project guide curve at any time of the year. Pool levels would be slightly below the winter guide curve elevation of 823 ft in January to a peak elevation of about 838 ft in May, thereafter declining at a steady rate to an elevation around 823 ft by the end of December (Figure 5-2). Over the modeled period of record, the lowest water surface elevation that the lake would be expected to reach would be elevation 818.5 ft, about 4.5 ft below the winter guide curve level of 823 ft. Under current operations, the Allatoona Lake surface area decreases dramatically as the lake level drops during seasonal drawdown and periods of basin inflow. At the normal summer pool elevation of 840 ft, the lake's surface area is 11,164 ac. The lake's surface area drops to 6,962 ac at the winter drawdown level of 823 ft, almost a 38 percent reduction in surface area.

Weiss Lake. Lake level and storage conditions in Weiss Lake, including its seasonal variations, would be consistent with those described in Section 2.1.2 and in more detail in Appendix E, Section E.1.1.4.3. Median lake levels would align with the current project guide curve from January through mid-July, decline slightly below the guide curve (up to 1 ft) from mid-July through mid-November, and align with the guide curve from mid-November through December (Figure 5-3). At the 90 percent exceedance level, the pool levels would align with the project guide curve from January through mid-April, decline slightly below the guide curve to a peak level of 563.6 ft by the end of May, decline gradually to about 558.2 ft by the end of November, and remain between 558.0 and 558.7 through December (Figure 5-4). Over the modeled period of record, the lowest water surface elevation that the lake would be expected to reach would be elevation 556.1 ft, about 1.9 ft below the current minimum winter guide curve level of 558 ft. Under current operations, the Weiss Lake surface area decreases appreciably as the lake level drops during seasonal drawdown and periods of low basin inflow. At the normal summer pool elevation of 564 ft, the lake's surface area is 30,027 ac, but the surface area drops to 19,603 ac at the current winter drawdown level of 558 ft, almost a 35 percent reduction in surface area.

H. Neely Henry Lake. Lake level and storage conditions in H. Neely Henry Lake, including its seasonal variations, would be consistent with those described in Section 2.1 and in more detail in Appendix E, Section E.1.1.4.4. Over the modeled period of record, median lake levels would align with the current project guide curve level of 507 ft from December through March and would subsequently increase to the guide curve level of 508 ft through the end of June. The median pool levels would decline slightly (up to 0.5 ft) below the guide curve from July through mid-November. At the 90 percent exceedance level, the pool levels would be 1 to 4 ft lower than the project guide curve level of 507 ft from January through March and guide curve level of 508 ft through May. Thereafter, the pool levels would remain consistently about 1 ft below the guide curve for the balance of the year. Over the modeled period of record, the lowest water surface elevation that the lake would be expected to reach would be elevation 502.5 ft, about 4.5 ft below the winter guide curve level of 507 ft.

Logan Martin Lake. Lake level and storage conditions in Logan Martin Lake, including its seasonal variations, would be consistent with those described in Section 2.1.3 and in more detail in Section E.1.1.4.5. Over the modeled period of record, median lake levels would align with the current project guide curve from January through June, decline slightly below the guide curve (up to 1 ft) from July through mid-November, and align with the guide curve from mid-November through December (Figure 5-5). At the 90 percent exceedance level, the pool levels would align with the guide curve from January through mid-April, decline slightly below the guide curve (0.7 ft below) to a peak level of 464.3 ft by mid-May, and then decline gradually to about elevation 460 ft by the end of December (Figure 5-6).

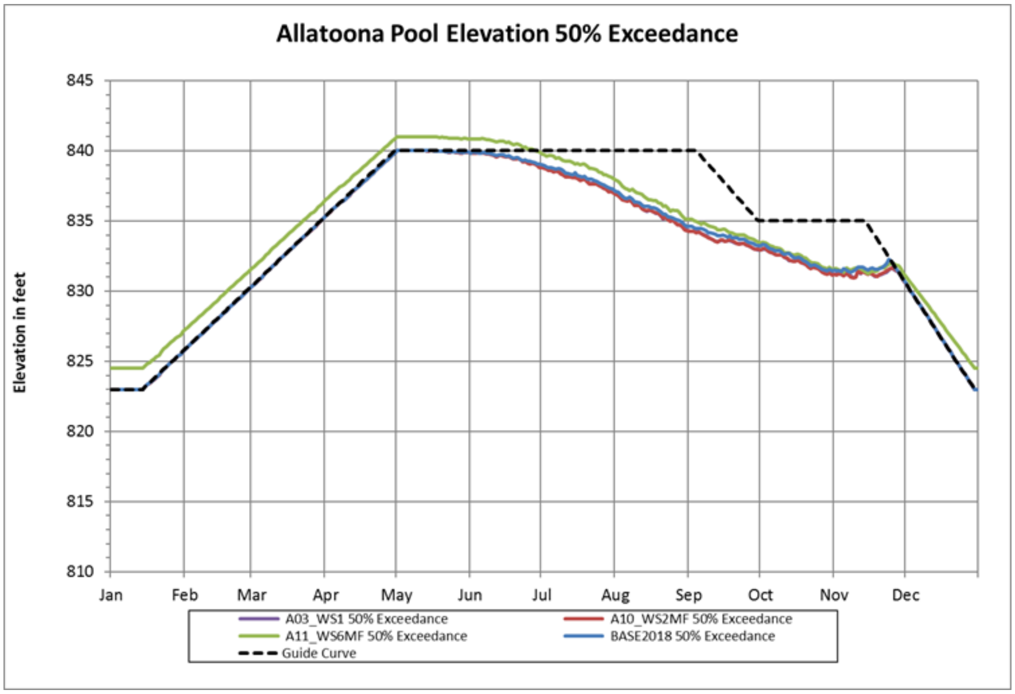


Figure 5-1. Allatoona Lake—Median Daily Pool Elevation.

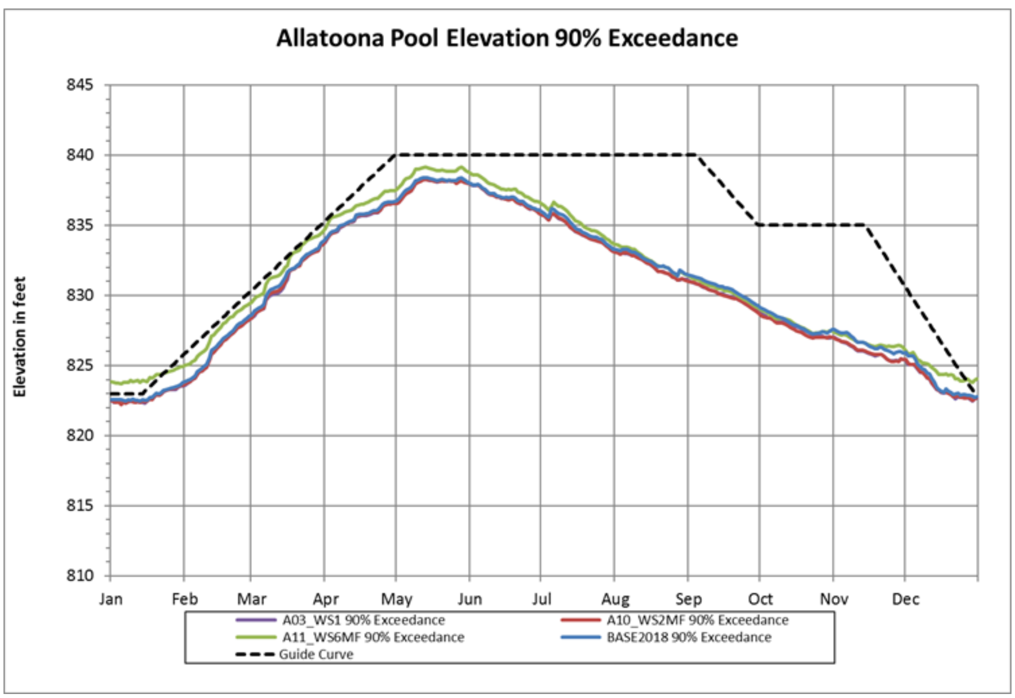


Figure 5-2. Allatoona Lake—Daily Pool Elevations Exceeded 90 Percent of the Time.

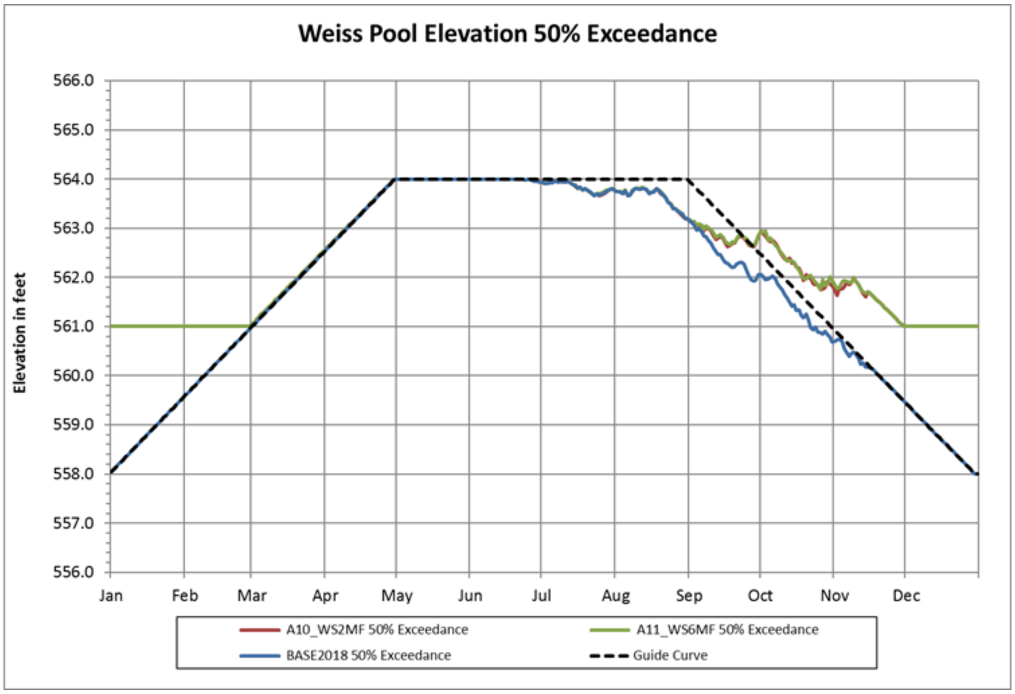


Figure 5-3. Weiss Lake—Median Daily Pool Elevation.

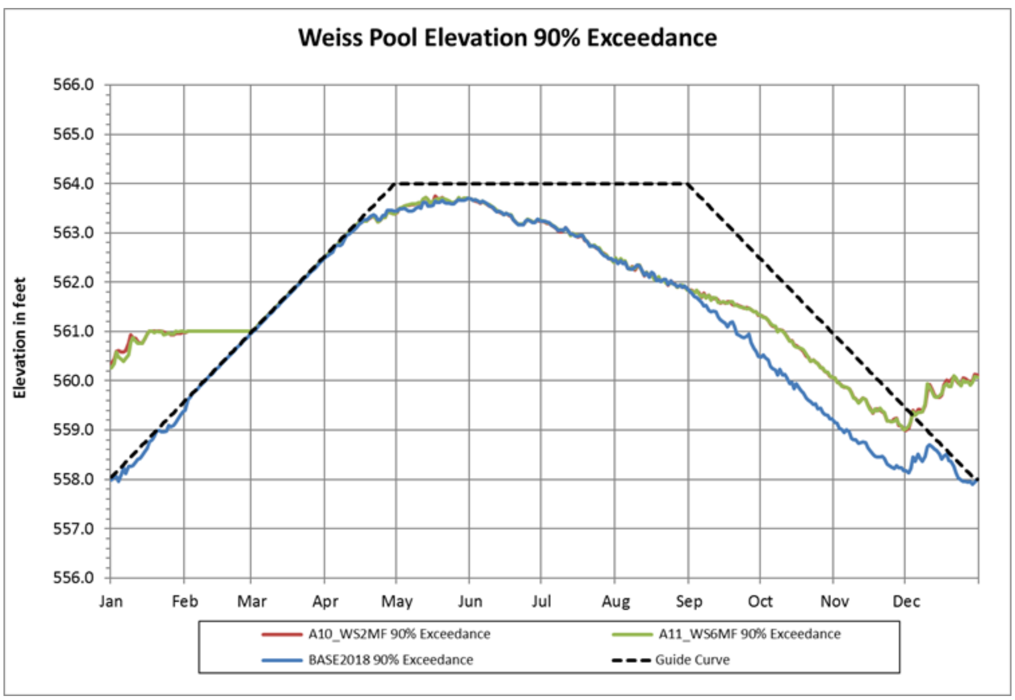


Figure 5-4. Weiss Lake—Daily Pool Levels Exceeded 90 Percent of the Time.

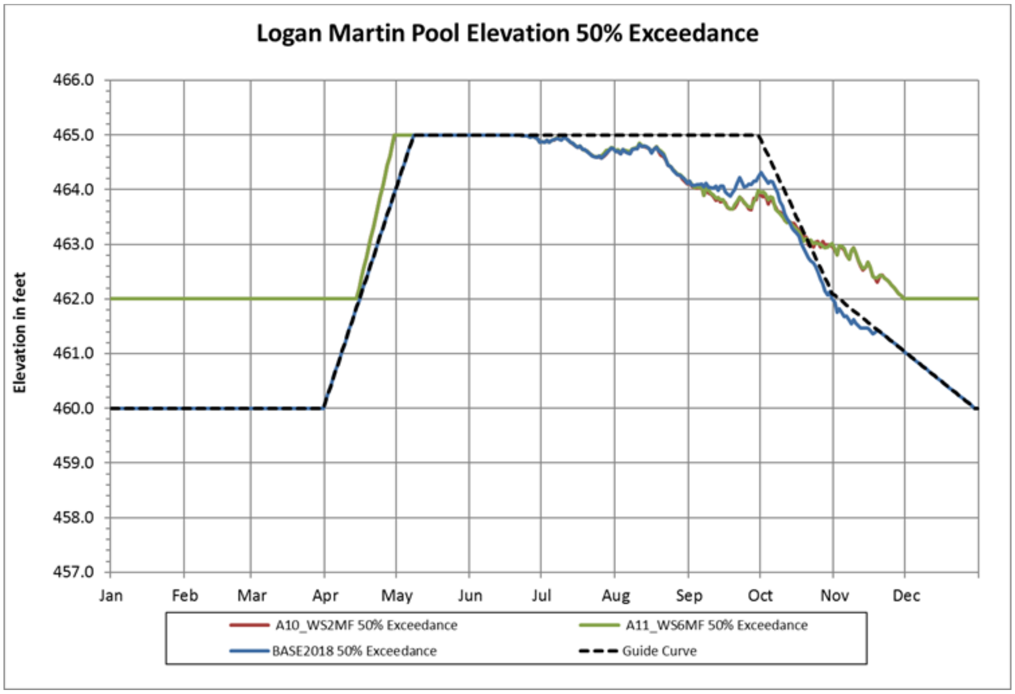


Figure 5-5. Logan Martin Lake—Median Daily Pool Elevation.

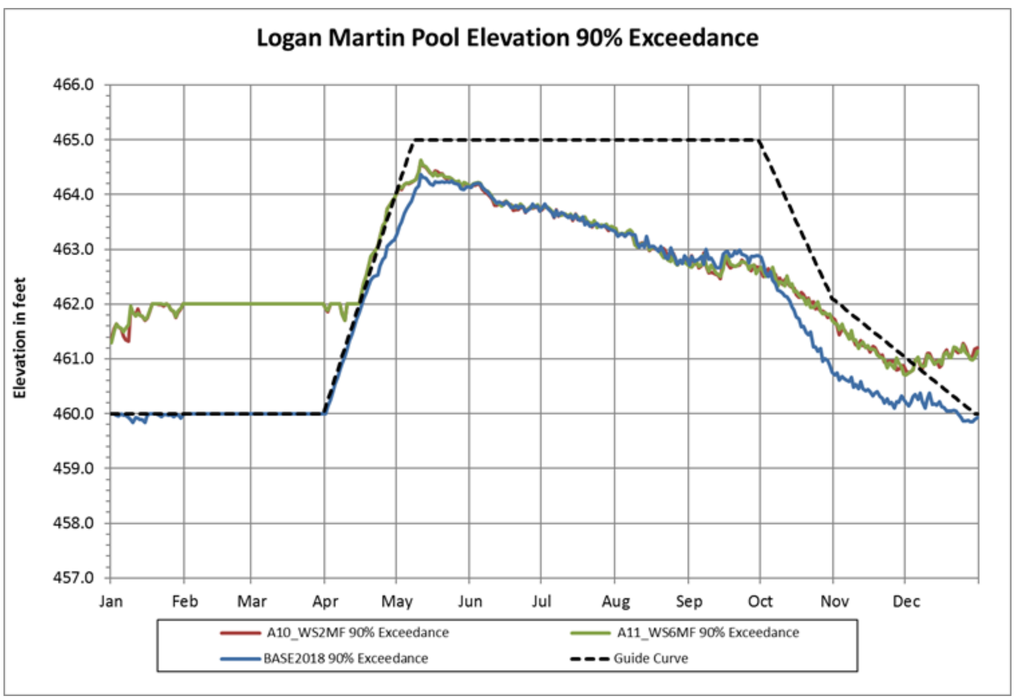


Figure 5-6. Logan Martin Lake—Daily Pool Levels Exceeded 90 Percent of the Time.

Over the modeled period of record, the lowest water surface elevation that the lake would be expected to reach would be elevation 458.1 ft, about 1.9 ft below the current minimum winter guide curve level of 460 ft. Under current operations, the lake's surface area decreases appreciably as the pool level drops during seasonal drawdown and periods of low basin inflow. At the normal summer pool elevation of 465 ft, the lake's surface area is 15,269 ac, and the surface area drops to 11,894 ac at the current winter drawdown level of 460 ft, about a 22 percent reduction.

Lay, Mitchell, and Jordan Lakes. These lakes, in descending order (upstream to downstream), lie between Logan Martin Dam and the mouth of the Coosa River, just upstream from Montgomery, AL. APC would continue to operate the three reservoirs as run-of-river hydropower projects under the NAA as generally described in Sections 2.1 and 3.1.1.3 and in more detail in Appendix E, Sections E.1.1.4.6 through E.1.1.4.8.

Robert F. Henry L&D /R.E. "Bob" Woodruff Lake. This project is the most upstream of three USACE reservoirs on the Alabama River, with a stable pool elevation of 126 ft under normal conditions from the L&D upstream to Montgomery, AL, near the confluence of the Coosa and Tallapoosa rivers. USACE would continue to operate the project for federally authorized purposes under the NAA as described in Sections 2.1 and 3.1.1.3 and in more detail in Appendix E, Section E.1.1.4.13.

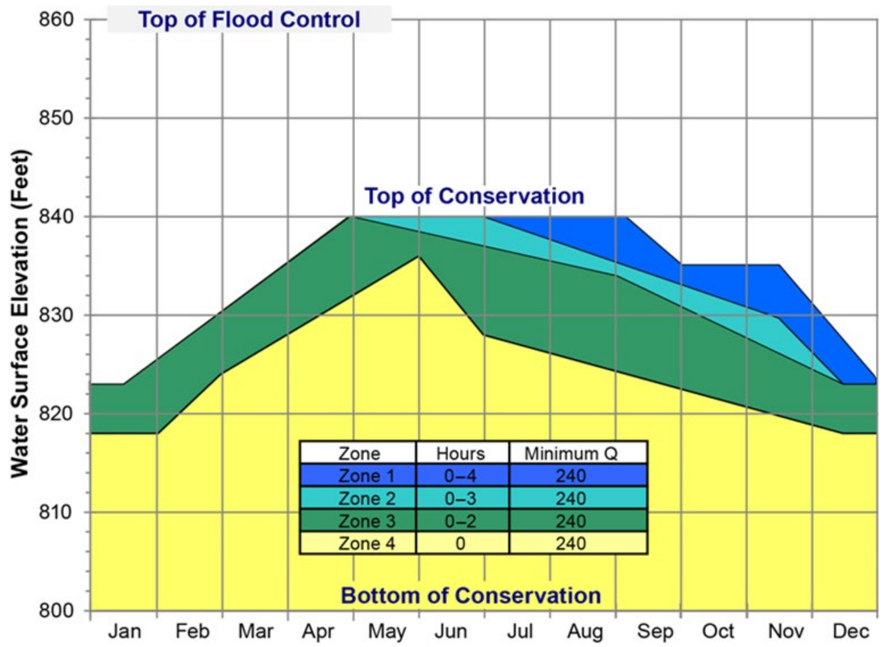
5.1.1.2 Recommended Plan (Alternative 11)

Allatoona Lake. Under Alternative 11, USACE would reallocate an additional 33,872 ac-ft of reservoir storage at Allatoona Lake from its current purpose(s) to M&I water supply. The reallocation would come from a combination of flood storage (11,670 ac-ft) and conservation storage (22,202 ac-ft). The summer guide curve elevation would be raised from 840 ft to 841 ft and the winter guide curve elevation would be raised from 823 ft to 824.5 ft. Thus, the pool level in Allatoona Lake would be maintained at a slightly higher level throughout the year compared to current operations under the NAA.

Over the simulated 73-year period of hydrologic record, median pool levels in Allatoona Lake would be between about 1 to 1.5 ft higher than the NAA from January through July and from 0 to 1 ft higher from August through December (Figure 5-1). At the 90 percent exceedance level (dry conditions), the pool levels would be about 1 to 1.5 ft higher than the NAA from mid-December through May, about 0.5 to 1 ft higher from June through July, and about the same as the NAA from August to early December (Figure 5-2). Over the modeled period of record, the lowest water surface elevation that the lake would be expected to reach would be elevation 817.3 ft, about 1.2 ft lower than the NAA and about 5.7 ft below the current winter guide curve level of 823 ft.

Four action zones have been established in the conservation pool of Allatoona Lake (see Figure 5-7), each action zone with an established set of operating criteria that are increasingly constrained to conserve storage as reservoir pool levels decline under extended dry conditions. Action zones are discussed in more detail in Appendix E, Section E.1.1.4.2. Table 5-3 presents model outputs for several conservation storage metrics for Allatoona Lake. They indicate that Alternative 11 would result in minor overall differences in conservation storage conditions compared to the NAA.

Weiss Lake. Under Alternative 11, flood operations at Weiss Dam and Lake would be revised as described in Section 2.6.1. The maximum surcharge level at the project would be lowered from 574 ft to 572 ft, and the winter guide curve level would be raised from 558 ft to 561 ft. Compared to the NAA, pool levels at Weiss Lake would be expected to be higher from September through February each year.



Minimum Q = minimum continuous release from Allatoona Dam (in cfs).

Figure 5-7. Allatoona Lake Current Guide Curve and Conservation Storage Action Zones.

Table 5-3. Allatoona Lake—Effects of Alternatives on Conservation Storage

Conservation storage metric	NAA	Alternative 11	Alternative 3	Alternative 10
Percent of time in Zone 1	47%	46%	45%	45%
Percent of time at full pool (840 ft) by May 1	64%	62%	62%	62%
Percent of time refilled from Zone 3 to Zone 1 by May 1 of the next year	0%	17%	17%	17%
No. of years over 73-year period of record pool would be in or below Zone 3 by Dec 1	4 years	6 years	6 years	6 years

Over the period of hydrologic record, median pool levels in Weiss Lake would range from a few inches up to about 3 ft higher than the NAA from September through February and would be the same level as the NAA from March through August (Figure 5-3). At the 90 percent exceedance level, pool levels would range from a few inches higher up to about 2 ft higher than the NAA from September through February and would be the about same level as the NAA from March through August (Figure 5-4). Over the modeled period of record, the lowest water surface elevation that the lake would be expected to reach would be 556 ft, about the same minimum level as the NAA and 2 ft below the current winter guide curve level. Under Alternative 11, the Weiss Lake pool level would likely drop below the current winter pool level of 558 ft in 3 years over the 73-year period of record analyzed compared to 24 years for the NAA. The Weiss Lake surface area at the proposed winter guide curve level (561 ft) under Alternative 11 would be 24,693 ac compared to 19,603 ac at the current winter guide curve level under the NAA (558 ft).

H. Neely Henry Lake. No changes to project operations are proposed at H. Neely Henry Dam, but proposed changes in flood operations upstream at Weiss Dam and Lake under Alternative 11 may affect pools levels in H. Neely Henry Lake.

Over the period of hydrologic record, median pool levels in H. Neely Henry Lake would be about the same as the NAA from mid-November through August and slightly lower (up to about 0.2 ft) than the NAA from September through mid-November. At the 90 percent exceedance level (dry conditions), the plotted values for Alternative 11 and the NAA are essentially the same. Over the modeled period of record, the lowest water surface elevation that the lake would be expected to reach would be 502.5 ft, about the same minimum level as the NAA and 4.5 ft below the current winter guide curve level. The H. Neely Henry Lake pool level would likely drop below the current winter pool level of 507 ft in all 73 years over the modeled period of record for both Alternative 11 and the NAA.

Logan Martin Lake. Under Alternative 11, flood operations would be revised as described in Section 2.6.2. The maximum surcharge level at the project would be lowered from 477 ft to 473.5 ft, and the winter guide curve level would be raised from 460 ft to 462 ft. Compared to the NAA, pool levels at Logan Martin Lake would be expected to be higher from October through April each year based on the guide curve change.

Over the period of hydrologic record, median pool levels in Logan Martin Lake under Alternative 11 would range from a few inches up to about 2 ft higher than the NAA from mid-October through the first week of May, the same level as the NAA from the first week of May through August, and up to 0.5 ft lower than the NAA in September through mid-October (Figure 5-5). At the 90 percent exceedance level, the pool levels would range from a few inches higher up to about 2 ft higher than the NAA from October through about mid-May and would be essentially the same level as the NAA from mid-May through September (Figure 5-6). Over the modeled period of record, the lowest water surface elevation that the lake would be expected to reach would be 458 ft, which would be the same minimum level as the NAA and 2 ft below the current winter guide curve level. The pool level would likely drop below the current winter pool level of 460 ft in 5 years over the 73-year period of record compared to 38 years for the NAA. Under Alternative 11, the Logan Martin Lake surface area at the proposed winter guide curve level (462 ft) would be 13,157 ac compared to 11,894 ac at the current winter guide curve level under the NAA (460 ft).

Lay, Mitchell, and Jordan Lakes. As run-of-river projects, Alternative 11 would be expected to have a negligible incremental effect on lake levels compared to current operations under the NAA, even with the inclusion of modified flood operations at Weiss and Logan Martin dams. The upstream end of Lay Lake may experience slight and short-term increases in pool levels during flood events when modified flood operations at Logan Martin Dam would be triggered.

R.E. "Bob" Woodruff Lake. Based upon review of model outputs over the hydrologic period of record, Alternative 11 would have no discernable effects on pool levels at R.E. "Bob" Woodruff Lake, formed by the Robert F. Henry L&D. The physical effects on reservoir pool levels and stream flow associated with the proposed storage reallocation at Allatoona Lake and the proposed modified flood operations at the Weiss and Logan Martin projects, as included in Alternative 11, are negligible in the Alabama River downstream of the confluence of the Coosa and Tallapoosa rivers.

5.1.1.3 Alternative 10

Allatoona Lake. Alternative 10 includes reallocation of storage for water supply from the conservation pool only and application of the current USACE storage accounting practices. Model outputs over the period of record for Alternative 10 are presented in Figure 5-1 and Figure 5-2. Median pool levels for Alternative 10 would be nearly identical to the NAA from late November through July and slightly lower than the NAA (from 0 to 0.5 ft lower) from August through late November. At the 90 percent exceedance level, pool levels for Alternative 10 would be nearly identical to the NAA from December through July and slightly below the NAA (from 0 to 0.7 ft lower) from August through November.

Weiss, H. Neely Henry, and Logan Martin Lakes. Pool levels at Weiss Lake under Alternative 10 would be nearly identical to those described for Alternative 11 compared to the NAA. Over the modeled period of record. the proposed storage reallocation options under consideration at Allatoona Lake would essentially have no effect on Weiss Lake pool levels. Any changes in pool levels at Weiss Lake under Alternative 10 would be solely attributable to features of the APC-proposed modifications to flood operations at Weiss Lake. Similarly, any effects on pool levels at H. Neely Henry Lake and Logan Martin Lake under Alternative 10 compared to the NAA would be nearly identical to those described for Alternative 11.

Lay, Mitchell, and Jordan Lakes. Compared to the NAA, Alternative 10 would have the same effects on these run-of-river reservoirs as those described for Alternative 11. Alternative 10 would not affect reservoir pool levels in the ACT River Basin downstream of Jordan Dam and Lake/Bouldin Dam.

R.E. "Bob" Woodruff Lake. Based upon review of model outputs over the hydrologic period of record, Alternative 10 would have no discernable effects on pool levels at R.E. "Bob" Woodruff Lake. The physical effects of the proposed actions at Allatoona, Weiss, and Logan Martin lakes included in Alternative 11 do not extend downstream of the mouth of the Coosa River.

5.1.1.4 Alternative 3

Allatoona Lake. Alternative 3 includes reallocation of storage for water supply from the conservation pool only and application of the State of Georgia's proposed storage accounting method. The effects on pool levels at Allatoona Lake under Alternative 3 compared to the NAA are nearly identical to those described for Alternative 10. Thus, based on the HEC-ResSim model simulation, the impact of the current USACE or proposed Georgia storage accounting method on Allatoona Lake pool levels is negligible.

Weiss, H. Neely Henry, Logan Martin, Lay, Mitchell, Jordan, and R.E. "Bob" Woodruff Lakes. The effects of Alternative 3 on pool levels in these lakes would be identical to the NAA.

5.1.2 Streamflow Conditions

This section summarizes the effects of alternatives to address proposed reallocation of reservoir storage for water supply in Allatoona Lake and APC-proposed flood storage and flood operations modifications at the Weiss and Logan Martin reservoir projects on stream flow conditions at critical locations in the ACT River Basin. Representative plots of HEC-ResSim model outputs are based on simulated project operations under the alternative plans over the modeled period of record (1939–2011) and provide a foundation upon which to describe the expected effects of the NAA, the RP (Alternative 11), Alternative 10, and Alternative 3 on stream flow conditions at the following locations in the basin: (1) Etowah River downstream of Allatoona Dam; (2) Coosa River near Rome, GA; (3) Coosa River downstream of Logan Martin Dam; and (4) Alabama River near Montgomery, AL.

Figures depicting median flow conditions in the basin are considered to provide a representative characterization of "typical" conditions for evaluation and comparison among alternatives. Selected figures depicting the 90 percent exceedance level have been included and are representative of substantially dry conditions in the basin.

5.1.2.1 No Action Alternative

Etowah River downstream of Allatoona Dam. USACE would continue to operate Allatoona Dam and Lake in accordance with the ACT River Basin Master Manual and Allatoona WCM updates approved in May 2015. An important feature of Allatoona Dam operations is the requirement to provide a continuous minimum release of 240 cfs to the Etowah River. Note that, in modeling the releases from Allatoona Dam, the minimum flow in the model includes both the continuous releases from the small service generator at the project plus an allowance for leakage at the dam. Thus, the minimum releases in the model outputs, as depicted in the figures that follow, are shown as 365 cfs.

Figure 5-8 depicts median daily flow in the Etowah River downstream of Allatoona Dam for the NAA, analyzed over the 73-year period of record. Median daily flows would be as follows: 1,200 to 1,700 cfs from January through April; 1,500 cfs from May through July (except for one brief peak up to 1,900 cfs in early May); 800 to 1,200 cfs from August through November (except for a few daily peaks in August up to 1,500 cfs); and 2,000 to 2,300 cfs in December. The variations in flow conditions throughout the year are a direct function of the number of hydropower units operating and number of hours they are in operation on any day during the year. Figure 5-9 presents the 90 percent exceedance daily flow values over the modeled period of record. Daily flows for the NAA would likely be as follows: 365 to 1,320 cfs from December through mid-January; 365 to 780 cfs from mid-January through mid-May; and stable at 365 cfs from mid-May through November. The 90 percent exceedance values for the NAA downstream of Allatoona Dam would be equal to the modeled minimum flow value of 365 cfs over a substantial portion of the year. However, Figure 5-9 indicates that some hydropower generation consistently occurs from December through May, even during extremely dry conditions.

Coosa River near Rome, GA. The specific location for evaluation of flow conditions for the NAA and other alternatives is the Coosa River at Mayo's Bar, about 7.5 mi downstream from the confluence of the Oostanaula and Etowah rivers at the location of the USGS gage station number 02397000. Under the NAA, USACE project operations at Carters Dam and Lake/Carters Reregulation Dam and at Allatoona Dam and Lake would continue in accordance with the ACT River Basin Master Manual and Allatoona WCM updates approved in May 2015.

Figure 5-10 depicts median daily flow in the Coosa River near Rome for the NAA, analyzed over the 73-year period of record. Under the NAA, median daily flows would range from about 6,000 cfs to 11,000 cfs from January through mid-April, from about 6,000 cfs to a low point of 2,000 cfs from May through mid-September, and gradually increasing back to around 6,000 cfs by the end of December. Figure 5-11 presents the 90 percent exceedance daily flow values (dry conditions) over the modeled period of record. Daily flows for the NAA would likely range from about 2,800 cfs in January to a peak around 4,800 cfs in mid-March, thereafter, gradually declining to a low point of about 1,200 cfs by the end of September; and increasing to around 3,200 cfs by the end of December.

Coosa River downstream of Logan Martin Dam. For the NAA, APC project operations at Weiss Dam, H. Neely Henry Dam, Logan Martin Dam, and the three APC run-of-river projects on the Coosa River (Lay, Mitchell, and Jordan/Bouldin dams) would continue under the current FERC license. Specifically, flood operations at the Weiss and Logan Martin dams, as described in Section 2.5, would continue in coordination with USACE as they have been conducted in the past. Project operations at USACE upstream reservoir projects in the basin, Carters Dam/Reregulation Dam and Allatoona Dam, would continue as currently operated. APC reservoirs on the Tallapoosa River would continue to operate in accordance with their current FERC licenses.

Figure 5-12 depicts median daily flow in the Coosa River below Logan Martin Dam for the NAA, analyzed over the 73-year period of record. Median daily flows would range from about 10,000 to 20,000 cfs from mid-December through mid-April and 5,000 to 10,000 cfs from mid-April to mid-December (July through late November would be level at 5,000 cfs). Figure 5-13 presents the 90 percent exceedance daily flow values (dry conditions) over the modeled period of record. Daily flows for the NAA would likely range from about 5,000 to 9,400 cfs in December through May. From June through mid-November, daily flows under the NAA would decline gradually from about 5,000 cfs to a low ranging between 1,800 and 2,600 cfs during September and October, thereafter increasing to about 5,000 cfs by late November.

Alabama River at the confluence of the Coosa and Tallapoosa Rivers. The modeled discharges at this location are not based upon or referenced to a specific USGS gage station on the Alabama River. As described in more detail in Appendix E, Section E.3.1.2.1.4, the modeled discharges represent the sum of the releases over time from Jordan Dam, Bouldin Dam (two outlets from Jordan Lake on the Coosa River) and Thurlow Dam (the most downstream dam on the Tallapoosa River) and is referred to as the Jordan-Bouldin-Thurlow (JBT) flow. The JBT flow is considered representative of the flow conditions in the Alabama River at the juncture of the Coosa and

Tallapoosa Rivers and serves as one of the key locations in the ACT River Basin for comparison of the physical effects (flow conditions) of proposed actions considered in this Final FR/SEIS.

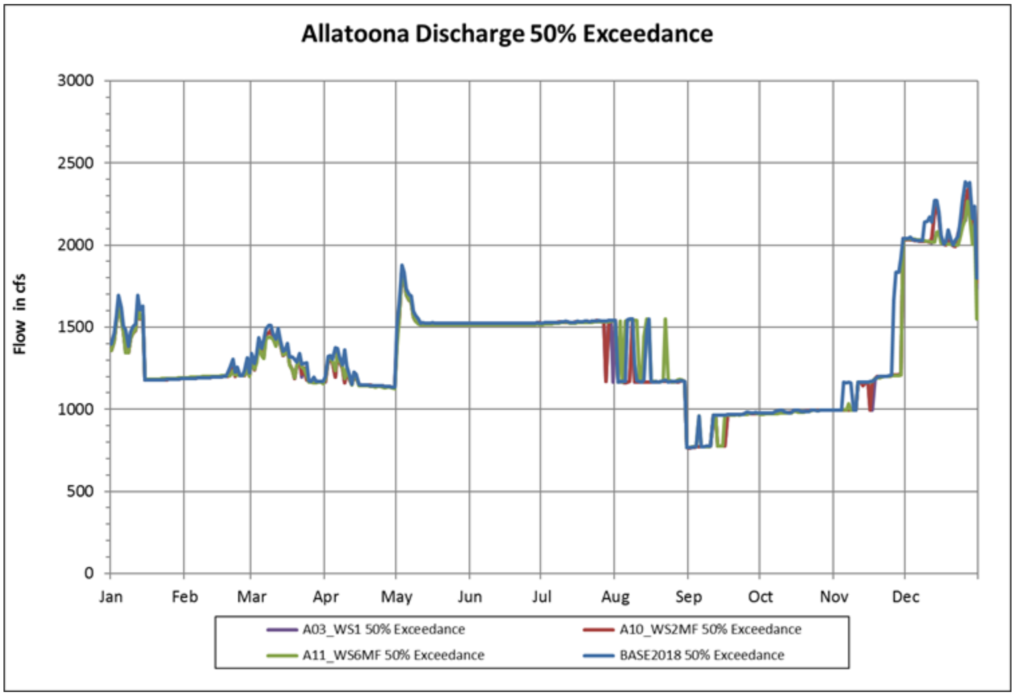


Figure 5-8. Etowah River Downstream of Allatoona Dam—Median Daily Discharge.

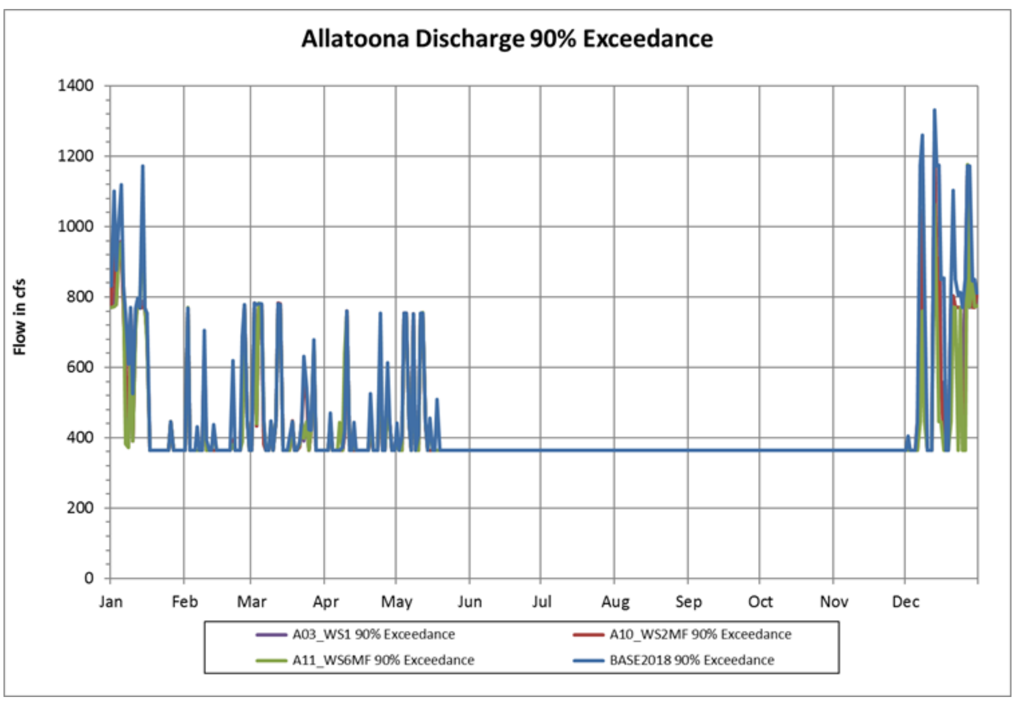


Figure 5-9. Etowah River Downstream of Allatoona Dam—Daily Discharge Exceeded 90 Percent of the Time.

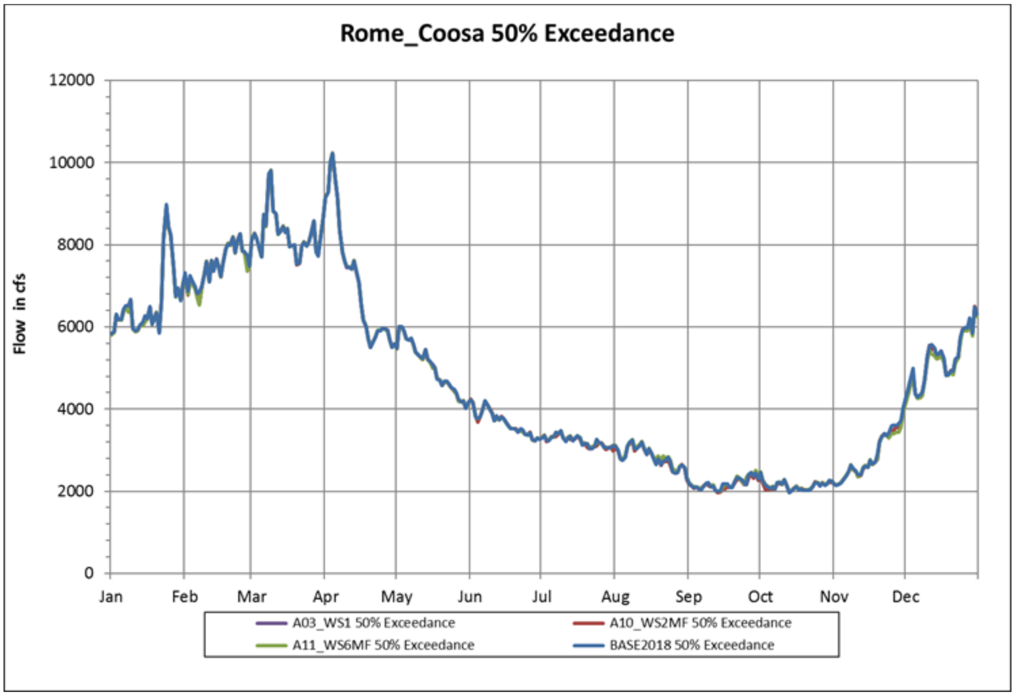


Figure 5-10. Coosa River Near Rome, GA—Median Daily Discharge.

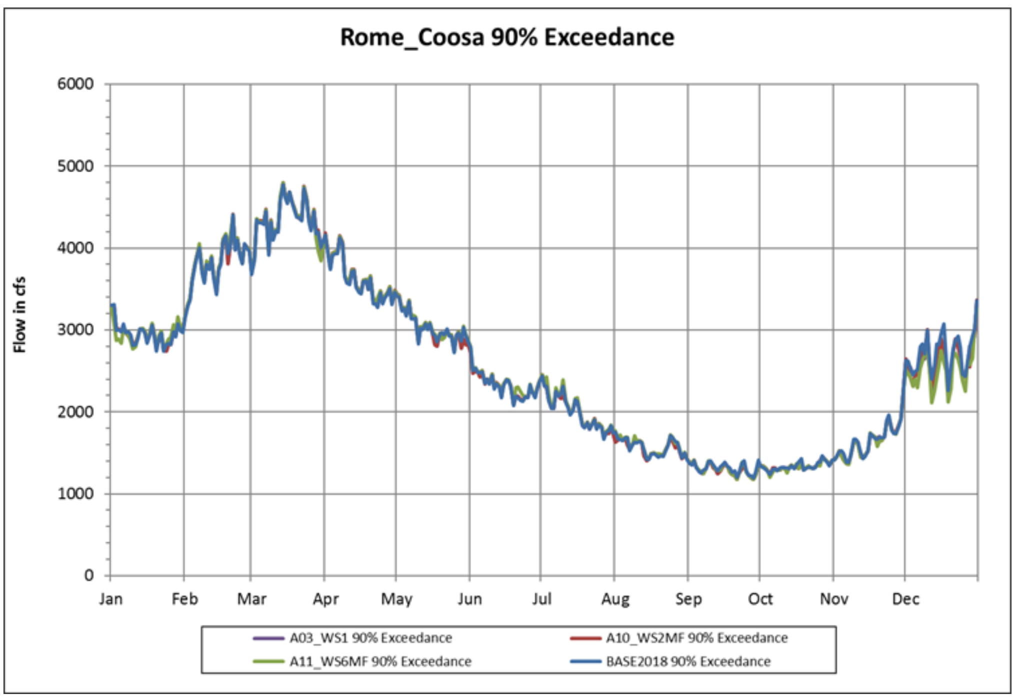


Figure 5-11. Coosa River Near Rome, GA—Daily Discharge Exceeded 90 Percent of the Time.

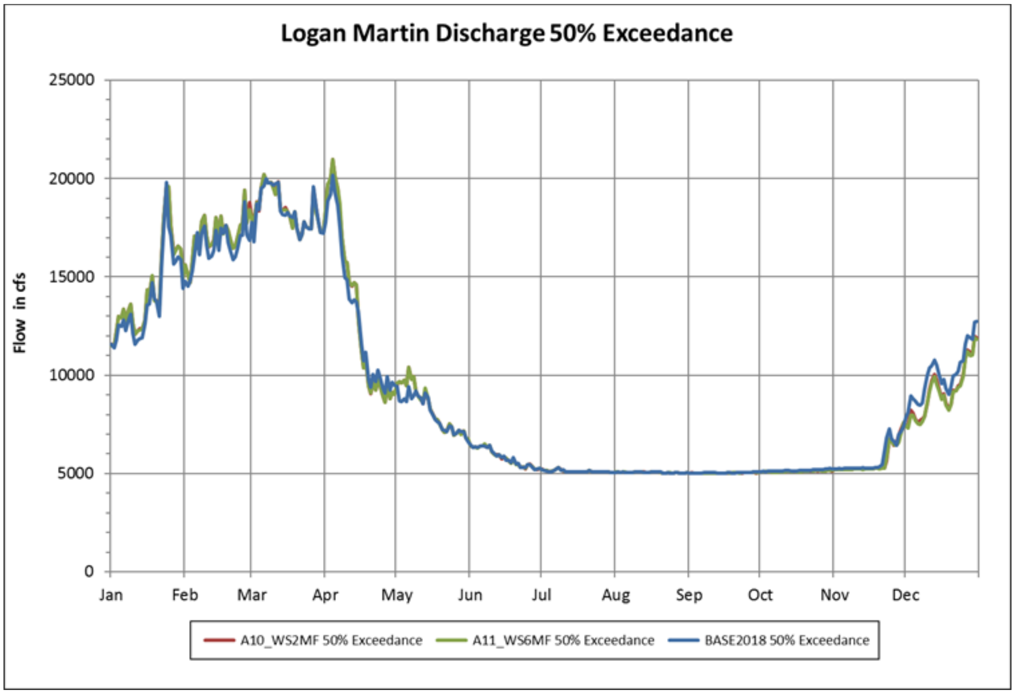


Figure 5-12. Coosa River Downstream of Logan Martin Lake—Median Daily Discharge.

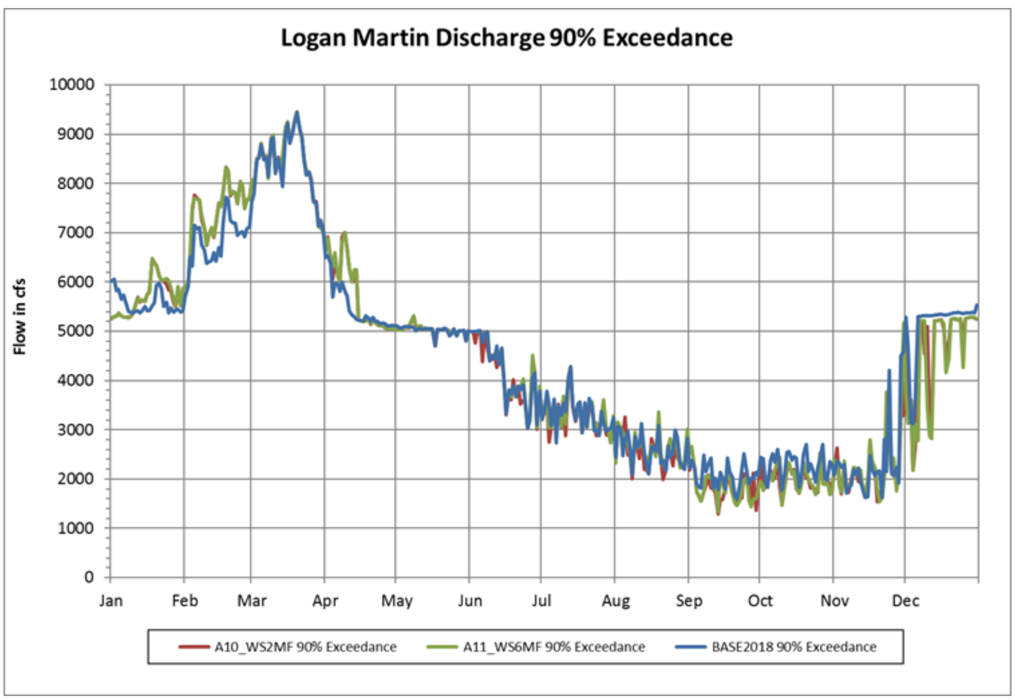


Figure 5-13. Coosa River Downstream of Logan Martin Dam—Daily Discharge Exceeded 90 Percent of the Time.

Figure 5-14 depicts median daily flow in the Alabama River at the confluence of the Coosa and Tallapoosa rivers for the NAA, analyzed over the 73-year period of record. Median daily flows would range from about 20,000 to 34,000 cfs from January through mid-April, declining gradually from 20,000 cfs to about 7,500 cfs in September, and gradually increasing to 20,000 cfs by the end of December. Figure 5-15 presents the 90 percent exceedance daily flow values over the modeled period of record. Daily flows for the NAA would likely range from about 8,000 to 16,000 cfs from mid-December through May. From June through mid-December, 90 percent exceedance daily flows under the NAA would range between 8,000 cfs and 4,600 cfs, with flows mid-June to mid-November level at about 4,600 cfs.

Figure 5-16 is the annual flow duration curve for the Alabama River at the confluence of the Coosa and Tallapoosa rivers. For the NAA, median daily flows over the year would be about 12,050 cfs, 49,030 cfs would be exceeded on about 10 percent of the days, and 4,990 cfs would be exceeded on 90 percent of the days. On 99 percent of the days over the period of record, flows would exceed 3,700 cfs.

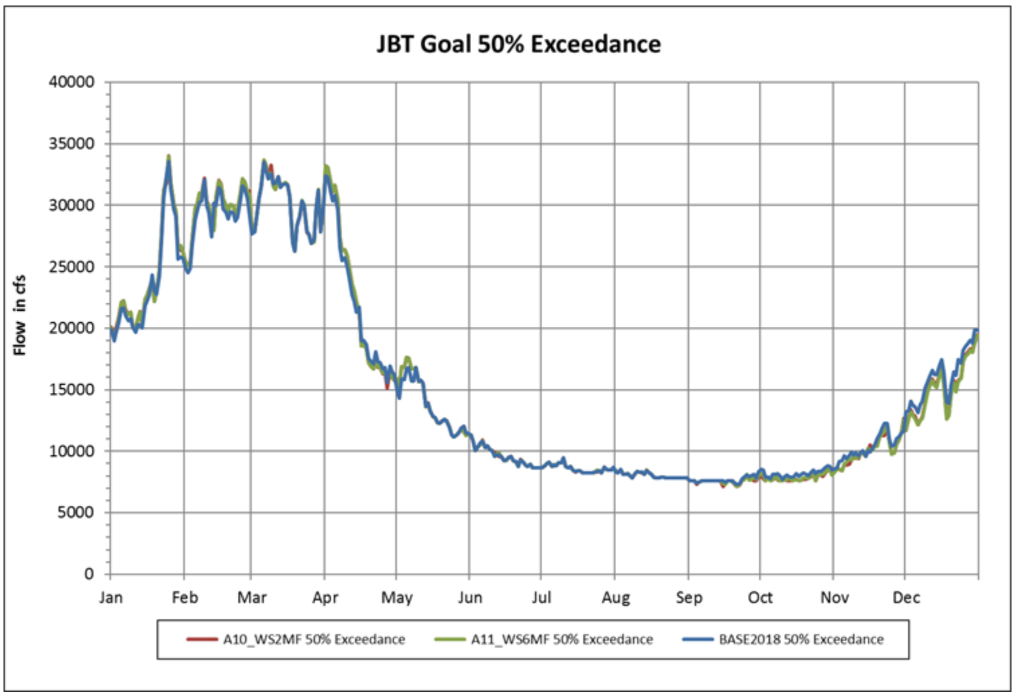


Figure 5-14. Alabama River at Confluence of Coosa and Tallapoosa Rivers—Median Daily Discharge.

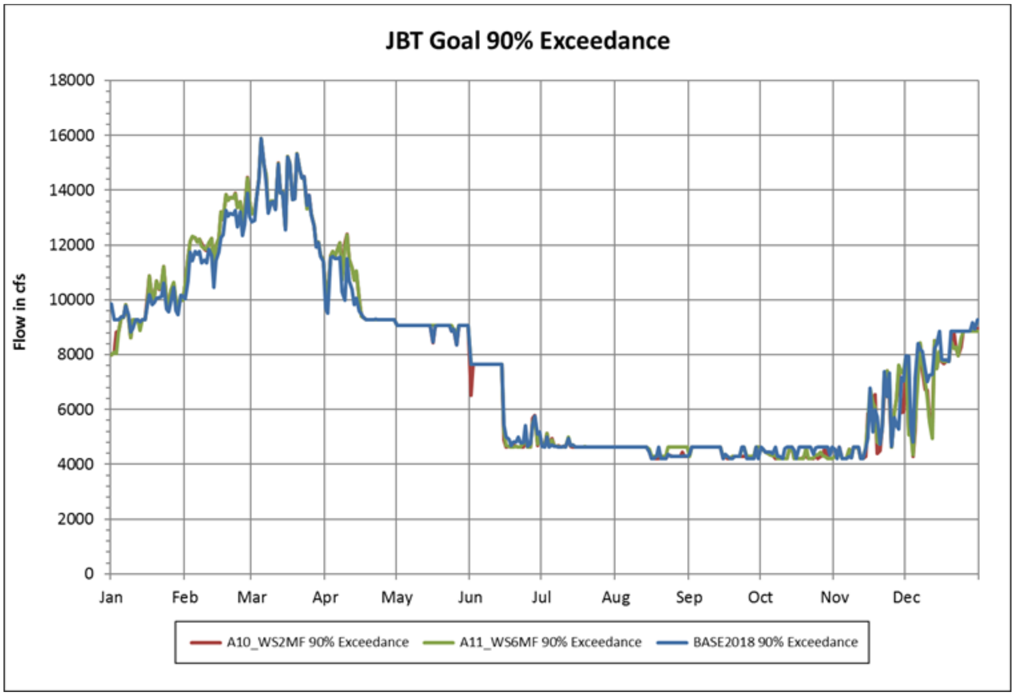


Figure 5-15. Alabama River at Confluence of Coosa and Tallapoosa Rivers—Daily Discharge Exceeded 90 Percent of the Time.

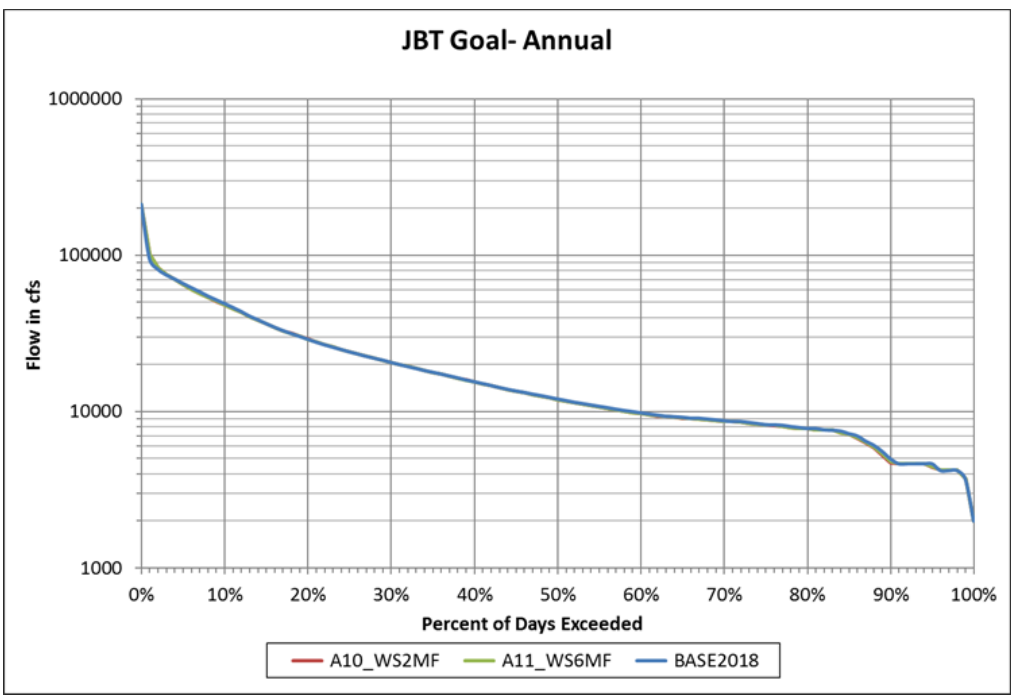


Figure 5-16. Alabama River at Confluence of Coosa and Tallapoosa Rivers—Annual Flow Duration Curve.

5.1.2.2 Recommended Plan (Alternative 11)

Etowah River downstream of Allatoona Dam. Alternative 11 would likely result in minor changes to flow conditions in the Etowah River below Allatoona dam compared to the NAA. The minor differences from flow conditions under Alternative 11 compared to the NAA are likely to be a direct result of some adjustments in the number of units generating and the number of hours they would be generating in order to maintain the pool in Allatoona Lake at a slightly higher level (about 1 to 1.5 ft) during the year. Releases from Allatoona Dam under Alternative 11 would closely align with those under the NAA at the median, and 90 percent exceedance levels (Figure 5-8 and Figure 5-9), but would be marginally lower, mostly in the November through March period. Little change in releases from Allatoona Dam would be expected in the late spring and summer months.

Table 5-4 provides a comparison of the extent of change in releases that would occur between Alternative 11 and the NAA on an annual basis, for the month of September, and for the month of December at the 10, 25, 50, 75, and 90 percent of days exceedance levels. Generally, the differences are marginal to negligible. At the 90 percent exceedance level for the month of December, the modeled flow for the NAA appears to be notably larger than Alternative 11 (769 cfs compared to 365 cfs). However, the 90 percent exceedance flow values for the NAA and Alternative 11 do not fully reflect how close their values are. For example, at the 91 percent exceedance level, the modeled NAA flow drops to 422 cfs. At 92 percent exceedance, the modeled NAA flow is 365 cfs, the same as Alternative 11, reflecting a negligible shift in the duration curve for Alternative 11.

Table 5-4. Etowah River Downstream of Allatoona Dam—Selected Flow Duration Data Over the Modeled Period of Record

Period	Percent of days exceeded	NAA (cfs)	Alternative 11 (cfs)	Alternative 10 (cfs)	Alternative 3 (cfs)
Annual (entire year)	10	3,063	2,963	3,007	3,005
	25	1,929	1,911	1,921	1,921
	50	1,197	1,192	1,187	1,187
	75	776	773	772	772
	90	365	365	365	365
September	10	1,762	1,935	1,673	1,661
	25	1,160	1,156	1,151	1,151
	50	965	961	962	962
	75	569	569	365	365
	90	365	365	365	365
December	10	4,295	4,108	4,218	4,218
	25	2,805	2,651	2,760	2,758
	50	2,091	2,025	2,038	2,036
	75	1,979	1,534	1,872	1,828
	90	769	365	365	365

Coosa River near Rome. The USGS gage 02397000 at Mayo's Bar (Rome-Coosa) is an important location for measuring changes in flow conditions in the Coosa River because it is located just few miles upstream of the GA/AL state line and about 56 mi downstream of Allatoona Dam. The Oostanaula River joins the Etowah River at Rome, about 49 mi downstream of Allatoona Dam. Alternative 11 would likely result in negligible changes to flow conditions compared to the NAA. Any detectible changes from flow conditions under the NAA would likely be related to adjustments in the number of units generating and the number of hours of generation in order to maintain the pool at Allatoona Lake at a slightly higher level during the year under Alternative 11. Median flows in the Coosa River throughout the year would closely align with those for the NAA and show no appreciable differences, except for some limited occurrences in late November through February when flows under Alternative 11 would be slightly lower than the NAA (Figure 5-10). At the 90 percent exceedance level (dry conditions), flows under Alternative 11 would closely match the NAA, except that they would likely be slightly lower than the NAA (by 100-200 cfs) during December and early January (Figure 5-11).

Table 5-5 compares the extent of change in flow conditions that would occur between Alternative 11 and the NAA on an annual basis, for the month of September, and for the month of December at the 10, 25, 50, 75, and 90 percent exceedance levels. The differences in flow conditions on an annual basis and for the selected months of September and December are negligible. The largest differences between the NAA and Alternative 11 would be decreases of less than 4 percent at the 75 and 90 percent exceedance levels in the month of December.

Table 5-5. Coosa River Near Rome, GA—Selected Flow Duration Data Over the Modeled Period of Record

Period	% of days exceeded	NAA (cfs)	Alternative 11 (cfs)	Alternative 10 (cfs)	Alternative 3 (cfs)
Annual (entire year)	10	14,148	14,099	14,136	14,136
	25	7,152	7,107	7,128	7,122
	50	4,078	4,068	4,069	4,070
	75	2,604	2,608	2,580	2,583
	90	1,798	1,805	1,791	1,792
September	10	4,422	4,541	4,360	4,364
	25	2,966	3,020	2,935	2,937
	50	2,173	2,179	2,135	2,131
	75	1,653	1,651	1,638	1,641
	90	1,291	1,280	1,279	1,278
December	10	14,281	14,172	14,246	14,247
	25	8,263	8,167	8,244	8,244
	50	5,276	5,135	5,255	5,259
	75	3,530	3,397	3,486	3,489
	90	2,669	2,575	2,575	2,568

The current drought operations plan for the ACT River Basin was approved in May 2015 as an integral part of the USACE update of the ACT River Basin Master Manual and project WCMs (see Appendix E, Section E.3.1.3, and Appendix A for more details on the drought operations plan). One of the three key triggers that activates the drought operations plan for the ACT River Basin is based on 7Q10 flows at the Alabama/Georgia state line as measured at USGS gage 02397000, Coosa River (Mayo's Bar) near Rome, GA. The 7Q10 flows for the drought trigger are derived from historic flow data at the USGS gage. When flows decline below the monthly 7Q10 value, drought operations would be activated for management of downstream APC reservoirs (at Level 1 or higher depending on whether one or more of the other triggers have been exceeded). Table 5-6 below presents the 7Q10 values by month at the Rome-Coosa gage and the percent of days over the modeled period of record that 7Q10 flows would likely be exceeded for the NAA and Alternative 11. Alternative 11 would result in a negligible change in the percent of days that 7Q10 flows would be exceeded compared to the NAA.

Table 5-6. Coosa River Near Rome, GA—Percent of Days Over the Modeled Period of Record that Flows Would Likely Exceed the Monthly 7Q10 Value

		Percent of days flow would exceed 7Q10 values	
Month	Monthly 7Q10 Value (cfs)	No Action Alternative (BASE2018)	Alternative 11 (WS6MF)
January	2,544	94.1%	94.2%
February	2,982	94.6%	94.7%
March	3,258	97.0%	97.1%
April	2,911	94.6%	94.7%
May	2,497	93.2%	93.4%
June	2,153	91.6%	92.0%
July	1,693	93.5%	93.6%
August	1,601	88.2%	88.6%
September	1,406	85.7%	85.4%
October	1,325	89.6%	89.4%
November	1,608	89.8%	88.8%
December	2,043	96.3%	95.2%

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

Since the Coosa River near Rome is a critical location in consideration of drought conditions and drought management activities, Figure 5-17 plots the modeled flow values for Alternative 11 and the NAA for the period from January 2007 through December 2009, which includes the drought of record in the ACT River Basin, to determine how flow conditions under Alternative 11 would compare to the NAA during that period. The plot shows little to no difference between Alternative 11 and the NAA. Any deviations between Alternative 11 and the NAA over that three-year period would be minor as shown in the figure. Therefore, the proposed reallocation of storage at Allatoona Lake would not be expected to worsen flow conditions in the Coosa River near Rome, GA, under a similar extreme drought event in the future.

Based on a review of model outputs over the modeled period of record, Alternative 11 would not be expected to deviate appreciably from flow conditions in the Coosa River near Rome (Mayo's Bar) under the NAA.

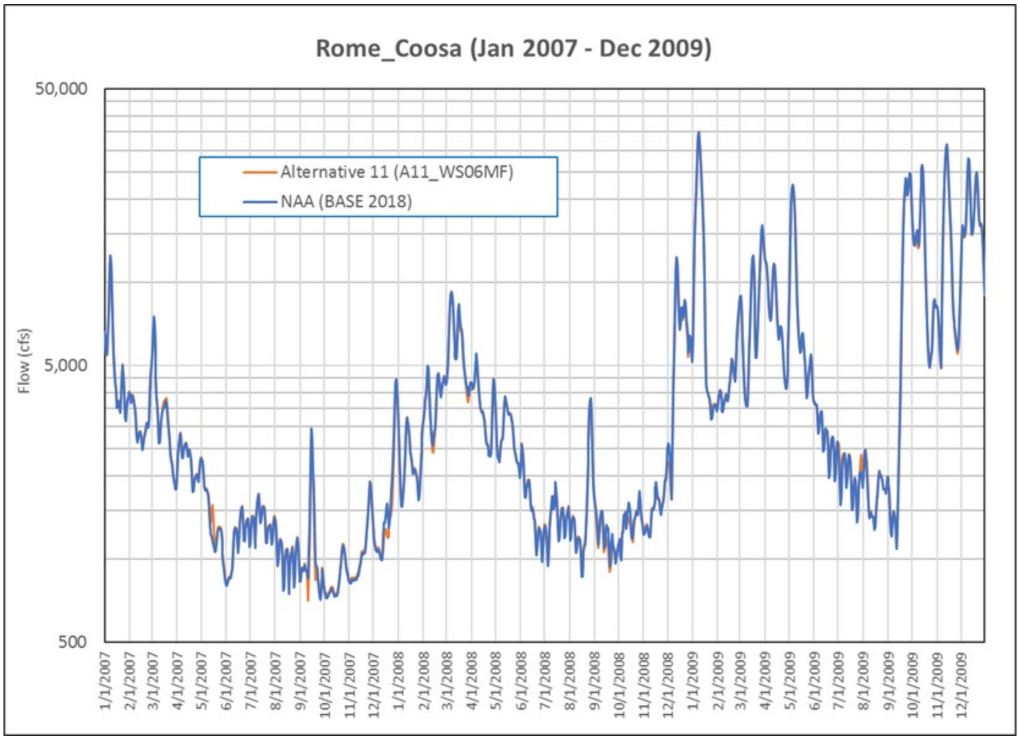


Figure 5-17. Coosa River Near Rome, GA—Modeled Flows for the NAA and Alternative 11 for the Period from January 2007 through December 2009.

Coosa River downstream of Logan Martin Dam. Potential changes in flow conditions in the Coosa River downstream of Logan Martin Dam under Alternative 11 are principally influenced by the APC-proposed modifications to flood operations and proposed changes to maximum surcharge levels and guide curves at the APC Weiss and Logan Martin projects. The HEC-ResSim model simulation demonstrates that the reservoir storage reallocation feature at Allatoona Lake in Alternative 11 would have little to no influence on flow conditions downstream of Logan Martin Dam.

Alternative 11 would likely result in minor changes to flow conditions in the Coosa River downstream of Logan Martin Dam compared to the NAA. Median flows in the Coosa River throughout the year under Alternative 11 would closely align with those for the NAA but would be slightly lower than the NAA in November and December as releases from Logan Martin Dam would decrease to maintain a higher winter pool level in the lake. Releases from the dam would be slightly higher than the NAA during January through April in response to modified flood operations that would increase releases during flood events (Figure 5-12). At the 90 percent exceedance level, flows under Alternative 11 would be notably lower than the NAA from September through early January (ranging from 200 to 2,000 cfs lower) as releases would be reduced to maintain a higher winter pool level, but they would be higher from early January through February and in April associated with increased releases associated with the modified flood operations. (Figure 5-13).

Compared to the NAA, Alternative 11 model outputs over the period of record show a slight increase in releases at the 2 to 3 percent exceedance level compared to the NAA, a slight reduction in releases at the 3 to 10 percent exceedance level, and a slight reduction in releases at the 85 to 99 percent exceedance level (see Table 5-7). Overall, Alternative 11 would likely have a minor effect on flow conditions in the Coosa River below Logan Martin Dam between September and March each year and little to no effect on flow conditions between April and August each year.

Table 5-7. Coosa River Downstream of Logan Martin Dam—Selected Flow Duration Data Over the Modeled Period of Record

Period	% of days exceeded	NAA (cfs)	Alternative 11 (cfs)	Alternative 10 (cfs)	Alternative 3 (cfs)
Annual (entire year)	10	29,840	29,289	29,283	29,783
	25	14,414	14,414	14,440	14,384
	50	7,026	6,955	6,959	7,001
	75	5,094	5,081	5,080	5,094
	90	3,474	3,268	3,217	3,456
March	10	50,000	48,036	48,109	50,000
	25	33,028	31,625	31,620	32,994
	50	18,293	18,322	18,344	18,294
	75	12,007	12,015	12,005	11,948
	90	8,069	8,117	8,128	8,075
September	10	7,856	7,009	6,826	7,820
	25	5,120	5,108	5,105	5,117
	50	5,037	5,023	5,021	5,037
	75	3,398	2,826	2,820	3,377
	90	2,108	1,742	1,732	2,020

Alabama River at the confluence of the Coosa and Tallapoosa Rivers. As described in Section 5.1.2.1, the modeled discharges for this location represent the sum of the releases over time from JBT.

In the Alabama River at the confluence of the Coosa and Tallapoosa rivers, median flows throughout the year for Alternative 11 over the modeled period of record would closely align with those for the NAA. However, due to the residual downstream effects of proposed modifications to flood operations at the APC Weiss and Logan Martin projects, flows at this location would be marginally lower than the NAA in October through December, resulting from water management actions to maintain higher winter pool levels in Weiss and Logan Martin lakes. Median flows under Alternative 11 would be marginally higher from January through March associated with modified flood operations at the Logan Martin and Weiss projects (Figure 5-14). At the 90 percent exceedance level, flows for Alternative 11 would be nearly the same as those for the NAA throughout the year, except for a slight decrease in December and slight intermittent increases in January, February, and April (Figure 5-15).

Compared to the NAA, the annual duration curve for Alternative 11 (Figure 5-16) is nearly identical to the annual duration curve for the NAA. See also the pertinent data presented in Table 5-8. Review of monthly duration curves for flows in the Alabama River at the confluence of the Coosa River and Tallapoosa River revealed that the curves for Alternative 11 would be nearly identical to those for the NAA in all months of the year except for September, October, and December. In each of those three months, flows under Alternative 11 would be marginally lower on the portion of the curve that represents drier conditions at that location. This occurrence reflects the remaining residual effects of reduced releases at Weiss Dam and Logan Martin Dam in the fall to maintain a higher winter pool level.

Table 5-8. Alabama River Near Montgomery (JBT Flow)—Selected Flow Duration Data Over the Modeled Period of Record

Period	% of days exceeded	NAA (cfs)	Alternative 11 (cfs)	Alternative 10 (cfs)	Alternative 3 (cfs)
Annual (entire year)	10	49,025	47,971	47,970	48,981
	25	24,089	24,091	24,101	24,067
	50	12,047	11,931	11,931	12,038
	75	8,260	8,232	8,232	8,241
	90	4,989	4,771	4,682	4,949
September	10	12,519	11,436	11,281	12,491
	25	9,005	8,768	8,705	8,988
	50	7,600	7,600	7,600	7,600
	75	4,640	4,640	4,640	4,641
	90	4,614	4,638	4,638	4,639
December	10	50,837	48,781	48,872	50,836
	25	26,606	25,508	25,628	26,508
	50	15,862	14,864	14,994	15,855
	75	9,985	9,340	9,345	9,930
	90	8,332	7,752	7,752	8,298

Alternative 11 is expected to have a negligible overall effect on flow conditions in the Alabama River at the confluence of the Coosa and Tallapoosa rivers and further downstream of Montgomery, AL. HEC-ResSim outputs addressing conditions under Alternative 11 and the NAA for Robert F. Henry L&D /Robert “Bob” Woodruff Lake were reviewed to confirm this conclusion.

5.1.2.3 Alternative 10

In the Etowah River below Allatoona Dam and the Coosa River near Rome, Alternative 10 would have nearly the same effects as Alternative 11 when compared to the NAA. Alternative 10 includes reallocation of reservoir storage in Allatoona Lake from the conservation pool only, whereas Alternative 11 includes reallocation of storage from a combination the conservation pool and the flood storage pool. There are some limited cases in the fall and early winter months where releases from Allatoona Dam under Alternative 10 may be marginally lower than releases under Alternative 11 (see Figure 5-8, Figure 5-9, and Table 5-4. However, those instances would be intermittent and the release reductions for Alternative 10 would be small compared to Alternative 11. In the Coosa River near Rome, the effects of Alternative 10 compared to the NAA would be the same as those described for Alternative 11. Refer to Figure 5-10, Figure 5-11, and Table 5-5.

Compared to the NAA, the effects of Alternative 10 on flow conditions in the Coosa River from Weiss Lake downstream to the confluence of the Coosa and Tallapoosa rivers would be the same as those described for Alternative 11.

5.1.2.4 Alternative 3

For the Etowah River below Allatoona Dam and for the Coosa River near Rome, GA, Alternative 3 has the same effects on flow conditions as Alternative 10 in comparison to the NAA. The features of Alternatives 3 and 10 with respect to the proposed reservoir storage reallocation in Allatoona Lake are identical except that Alternative 3 applies Georgia's proposed storage accounting method and Alternative 10 applies the current USACE storage accounting practice in the HEC-ResSim simulation over the modeled period of record (see Table 5-4). There are no appreciable differences in flow conditions between Alternatives 3 and 10 in the Etowah River below Allatoona Dam or in Coosa River near Rome. Thus, the storage accounting methodology has a negligible effect on flow conditions downstream of Allatoona Dam.

Alternative 3 includes no features that directly affect Weiss Lake or Logan Martin Lake. HEC-ResSim simulations demonstrate that effects of reservoir storage reallocation at Allatoona Lake on downstream flow conditions have effectively dissipated in Weiss Lake and are equal to modeled conditions under the NAA. No incremental effects of Alternative 3 are discernable downstream of Weiss Dam.

5.1.3 Drought Operations

The ACT River Basin WCM update, completed in May 2015, includes a drought operation plan for the basin, prepared in collaboration with the APC, that was incorporated into the ACT River Basin Master Manual and individual project manuals. The plan basically specifies more conservative reservoir operations in the system with the onset and persistence of drought conditions in the basin based on established triggers, or thresholds, for three critical indicators of drought conditions: (1) low Coosa River flow conditions at the Alabama/Georgia state line; (2) low basin inflow; and (3) low composite conservation storage in the APC reservoirs in the basin. Drought operations actions are initiated when a drought trigger is met for any one of the three critical indicators, called Drought Intensity Level 1 (DIL1). Drought operations become increasingly more conservative when two triggers (DIL2) or three triggers (DIL3) are met concurrently. DIL1 is referred to as moderate drought, DIL2 as severe drought, and DIL3 as exceptional drought. The currently approved ACT River Basin drought plan is summarized in Appendix A.

The RP (Alternative 11), Alternative 10, and Alternative 3 may have effects on implementation of the current drought operations plan compared to the NAA, which in turn could potentially affect natural and socioeconomic resources. Generally, a more proactive approach to conserve reservoir storage as drier conditions develop in the basin, while continuing to meet downstream commitments and needs, is a beneficial effect of drought operations. Activation of the drought plan would result in slightly constrained operations for the duration of the period that the drought trigger thresholds(s) are met. Drought operations could become more constrained as worsening drought conditions may dictate over time. The currently approved drought operations plan enables USACE and APC to operate their reservoir projects in the basin more effectively under drought conditions like those experienced several times over the modeled period of record, and it positions USACE and APC to effectively address a more severe drought of record in the future.

5.1.3.1 No Action Alternative

The drought operations plan for the ACT River Basin under the NAA would be administered as defined in the Master Manual for the basin approved in May 2015. Based upon HEC-ResSim model simulation over the 73-year period of hydrologic record, the NAA would be expected to trigger Drought Level 1 operations 127 times over the period of record (Table 5-9). Drought Level 1 conditions could be encountered more than once in any year. Drought Levels 2 and 3 would likely be encountered much less frequently—32 and 3 occurrences, respectively, over the modeled period of record (Table 5-9). The number of times that a specific drought level is triggered does not indicate the duration of drought conditions. Based upon established protocols by which the drought level is monitored and updated, the minimum duration for a drought level designation would be 14 days. The drought level duration could extend from 14 days to several weeks or months if the conditions that activated drought operations in the ACT River Basin persist.

Table 5-9. Number of Times Drought Operations Triggered Over the Modeled Period of Record

	No Action Alternative (NAA)	Alternative 11	Alternative 10	Alternative 3
Drought Level 1	127	140	142	127
Drought Level 2	32	41	41	31
Drought Level 3	3	3	3	3

Table 5-10 summarizes the percent of time over the modeled period of record that operations would be considered *normal* versus various levels of drought operation. *Normal operations* in this context would include any period when drought operations have not been activated. For the NAA, the ACT River Basin projects would be in normal operations about 82 percent of the time and in drought operations the remaining 18 percent of the time, with most of the time in drought operations at the moderate Drought Level 1 (12.8 percent). Drought Level 3 operations (reflecting the most severe conditions) would only be expected about 1.1 percent of the time under the NAA.

Table 5-10. Percent of Time that ACT System Would Be Operating in Normal and Drought Mode Over the Modeled Period of Record

	No Action Alternative (NAA)	Alternative 11	Alternative 10	Alternative 3
Normal	82.0%	80.1%	80.0%	81.6%
Drought Level 1	12.8%	14.4%	14.5%	13.3%
Drought Level 2	4.1%	4.6%	4.6%	4.0%
Drought Level 3	1.1%	0.9%	0.9%	1.0%

The state line flow is the drought trigger most often reached to activate drought operations, followed closely by the basin inflow trigger. Table 5-11 summarizes the percent of time over the modeled period of record that drought operations would likely be activated and the individual drought triggers met. For the NAA, the state line flow trigger would be in effect about 12.7 percent of the time, the basin inflow trigger about 9.9 percent of the time, and the composite conservation storage trigger about 1 percent of the time.

Table 5-11. Percent of Time that Drought Operations Activated and Individual Drought Triggers Met Over the Modeled Period of Record

	No Action Alternative (NAA)	Alternative 11	Alternative 10	Alternative 3
Drought Operations Activated	18.0%	19.9%	20.0%	18.4%
State Line Flow Trigger Met	12.7%	13.1%	13.2%	13.2%
Basin Inflow Trigger Met	9.9%	11.5%	11.5%	9.9%
Composite Conservation Storage Trigger Met	1.0%	1.0%	1.0%	1.0%

5.1.3.2 Recommended Plan (Alternative 11)

Based on HEC-ResSim modeling over the period of record, Alternative 11 would be expected to activate drought operations about 10 percent more often than the NAA (140 occurrences versus 127) (Table 5-9). The overall increase to drought operations occurrences would be almost entirely attributable to the APC's modified flood operations proposal included in Alternative 11. Raising the winter guide curve elevations at the Weiss and Logan Martin projects under the APC's proposal would result in a moderate increase in the number of times the basin inflow trigger would be activated compared to the NAA. Maintaining a higher winter pool level at these projects would generally result in slightly decreased releases from these projects in the fall months, enough to activate the basin inflow drought trigger more frequently. Proposed storage reallocation at Allatoona Lake would have a negligible effect on the number of times drought operations would be activated compared to the NAA. Alternative 11 would likely result in a slightly higher percent of time in drought operations than the NAA (20 percent versus 18 percent) (Table 5-10). Most of the time in drought operations under Alternative 11 would be at the least severe Drought Level 1 (14.4 percent of the time versus 12.8 percent for the NAA). Drought Level 3 (the most severe drought condition) would occur about 0.9 percent of the time under Alternative 11 (versus 1.1 percent for the NAA) (Table 5-10). Alternative 11 would activate the state line flow and basin inflow drought triggers slightly more often than the NAA (Table 5-11). Overall, Alternative 11 would be expected to slightly increase the number of times and the overall percent of time that drought operations in the ACT River Basin would be activated compared to the NAA.

5.1.3.3 Alternative 10

Based on data presented in Table 5-9 through Table 5-11, Alternative 10 would be expected to have the same effect on drought operations as Alternative 11 when compared to the NAA.

5.1.3.4 Alternative 3

Based on data presented in Table 5-9 through Table 5-11, Alternative 3 would be expected to have the same effect on drought operations as the NAA.

5.1.4 Releases to Support Commercial Navigation

The ACT River Basin WCM update, completed in May 2015, included a navigation plan with specific protocols for upstream reservoir releases to support commercial navigation in the Alabama River when sufficient basin inflow is available and for specific reductions in upstream reservoir releases when basin inflows are insufficient support navigation. This navigation plan, summarized in Appendix A, was incorporated into the ACT River Basin Master Manual and individual project manuals and provides for greater reliability and predictability to meet the needs of commercial navigation in the Alabama River.

The effects of the NAA and other alternatives on the implementation of the navigation plan in the ACT River Basin Master Manual were evaluated by comparing HEC-ResSim model results depicting the percent of days for each month of the year over the period of record during which flow targets for 7.5-ft and 9-ft navigation channel depths would likely be met. Section 5.6.2 (Socioeconomics – Navigation) also includes Table 5-14, which presents additional information on the percent of the time that navigation channel depths would be available under the alternatives considered in detail.

5.1.4.1 No Action Alternative

The navigation plan for the ACT River Basin would be administered as defined in the Master Manual for the projects in the basin approved in May 2015. Based upon model simulation over the period of record, the NAA would be expected to provide adequate flows in the Alabama River to sustain a minimum 7.5-ft navigation depth for at least 90 percent of the time during six months of the year (December through May). For the remaining months of the year (June through November), generally the low flow season, the percent of time that flows would likely be adequate to support a 7.5-ft navigation depth varies from 89 percent in June down to 62 percent in September. The NAA would be expected to provide adequate flows in the Alabama River to sustain a minimum 9-ft navigation depth for at least 90 percent of the time during five months of the year (January through May). For the remaining months of the year (June through December), the percent of time that flows would likely be adequate to support a 9-ft navigation depth varies from 89 percent in December down to 56 percent in September.

5.1.4.2 Recommended Plan (Alternative 11)

Under Alternative 11, the percent of time adequate flows would be available in the Alabama River to sustain 7.5-ft and 9-ft channel depths would be nearly the same as described for the NAA. During the months of September through December, the percent of time adequate flows would be available (for both channel depths) would range from 0 to 6 percent lower than those for the NAA. These slight decreases during these months would have a negligible effect on navigation channel availability compared to the NAA.

5.1.4.3 Alternative 10

The effects of Alternative 10 compared to the NAA are the same as those presented for Alternative 11.

5.1.4.4 Alternative 3

The effects of Alternative 3 would be identical to the NAA.

5.2 Water Resources–Water Quality

The HEC-5Q model was used to evaluate the effects of ACT project operations on basin water quality. The HEC-5Q model was linked with the HEC-ResSim model through an input of flows by reach to examine the changes in water quality for the ACT Basin mainstems. The proposed operations of USACE reservoirs would not be expected to affect tributaries in the basin. The benefit of using the HEC-5Q model is its ability to simulate the entire riverine and reservoir system in a single model. It can perform a holistic examination of the basin from top to bottom and simulate the watershed inflows, reservoirs, and river segments. Modeled output was produced in that way allows a clear, longitudinal presentation of conditions for comparison between various operations scenarios to illustrate how water quality varies along the reach, and how water quality might be affected by dams, other structures, or discharges from point and nonpoint sources.

The model results provide the 5th, 50th (or median), and 95th percent occurrences. The median values reflect the points at which 50 percent of the calculated values are higher and 50 percent are lower. The 95th percent occurrence and 5th percent occurrence bracket the range of high and low calculated values that rarely occur. The results from the alternatives were analyzed along reaches and reservoirs within the ROI addressed by the Final FR/SEIS (Coosa River and Etowah River upstream to Canton, Georgia) to determine the magnitude of any negative changes to water quality from the NAA and whether those changes would result in exceedances or additional exceedances of water quality standards.

The HEC-5Q model was also used to evaluate the effects of operational changes considered in the 2015 ACT River Basin WCM update process. The overall effect of the approved plan on water quality would be expected to be negligible, even though more potentially impactful operational changes were evaluated for the WCM update than those considered in the ACR Study. State agencies are expected to continue to apply adaptive management techniques to more precisely define the ACT River Basin's assimilative capacity. Water management activities under the approved 2015 WCM update could potentially have some slightly adverse effects on water quality under extreme low-flow conditions, such that the state regulatory agencies may consider reevaluation of some NPDES permits to confirm the system's assimilative capacity (USACE Mobile District, 2014b).

The operational changes in the approved 2015 WCM update were expected to have little effect on water temperature in the basin. The operational changes in the approved 2015 plan were expected to have variable results in the basin. The greatest changes in median DO were expected during dry-weather conditions. The timing and quantity of flow influence the system's ability to assimilate oxygen-demanding pollutants, which results in changes in DO. During low-flow conditions, some NPDES permits limit point source discharges, and permit conditions may be temporarily changed during extreme low-flow conditions. The operational changes in the approved 2015 plan were expected to have a negligible effect on median total phosphorus over a period of various flow conditions (wet, dry, and normal). While not substantially affecting nitrogen levels, the largest effect on nitrogen concentrations were expected during dry-weather conditions when drought operations are activated, although these changes were expected to have a negligible overall effect when compared with other water quality parameters. The operational changes in the approved 2015 plan were expected to have a negligible effect on algal growth under various flow conditions (wet, dry, and normal). During periods of dry weather, changes in median total phosphorus from baseline conditions were expected to influence algal growth. Thus, the approved 2015 plan was expected to increase algal growth in the headwaters of Weiss Lake. However, for the most critical year (2007 - the year with highest predicted chlorophyll *a*), the growing season chlorophyll *a* in Weiss Lake near the state line decreased in the model when compared to the baseline conditions (USACE Mobile District, 2014b).

No water quality conditions have been documented in the basin since the implementation of the 2015 WCM update that conflict with the basic findings from the water quality modeling in the basin conducted in support of that WCM update process.

5.2.1 No Action Alternative

The NAA represents the current conditions with the current withdrawals at Allatoona Lake and the USACE storage accounting methodology. Water quality conditions under the NAA would generally be consistent with those described above for the current conditions. There are some water quality impairments within the ROI that would remain under the NAA.

5.2.2 Recommended Plan (Alternative 11)

The results from Alternative 11 were analyzed along reaches and reservoirs within the region of interest (ROI) addressed by the Final FR/SEIS (Coosa River and Etowah River upstream to Canton, Georgia) to determine the magnitude of any negative changes to water quality from the NAA and whether those changes would result in exceedances or additional exceedances of water quality standards. For this evaluation, the all-year model results were analyzed that reflect average water quality values throughout the year. Model results for specific time periods were analyzed if water quality standards specify use of growing season averages (e.g., chlorophyll *a* and TN). Table 5-12 cross-references the alternative numbers with the alternative names included on the model graphs presented in the below.

Table 5-12. Summary of Alternative Numbers and Model Names for HEC-5Q

Alternative Number	Alternative Name in Model	Description
1	A0-BASE2018	No Action Alternative (NAA) (represents baseline conditions)
2	A02-FWOP	Future Without Project
3	A03-WS1	Allatoona storage reallocation up to 94 mgd from conservation storage only and Georgia's proposed storage accounting methodology
9	A09-FWOPMF0	Modified flood operations at the APC projects only and no Allatoona storage reallocation
10	A10-WS2MF	Allatoona storage reallocation up to 94 mgd from conservation storage only, USACE current storage accounting methodology, and modified flood operations at APC Weiss and Logan Martin projects
11	A11-WS6MF	Allatoona storage reallocation up to 94 mgd from combination of flood storage and conservation storage, using USACE current storage accounting methodology, and modified flood operations at APC Weiss and Logan Martin projects

Note: The figures in this section depict the differences between the NAA (Alternative 1) and other alternatives. Therefore, the only specific references to the NAA appear in the figure titles.

Along the Etowah River, there is no discernible difference between Alternative 11 and NAA water temperatures. For the Coosa River, the simulated temperatures for Alternative 11 only have small deviations from the NAA between H. Neely Henry and Weiss and downstream of Weiss (Figure 5-18).

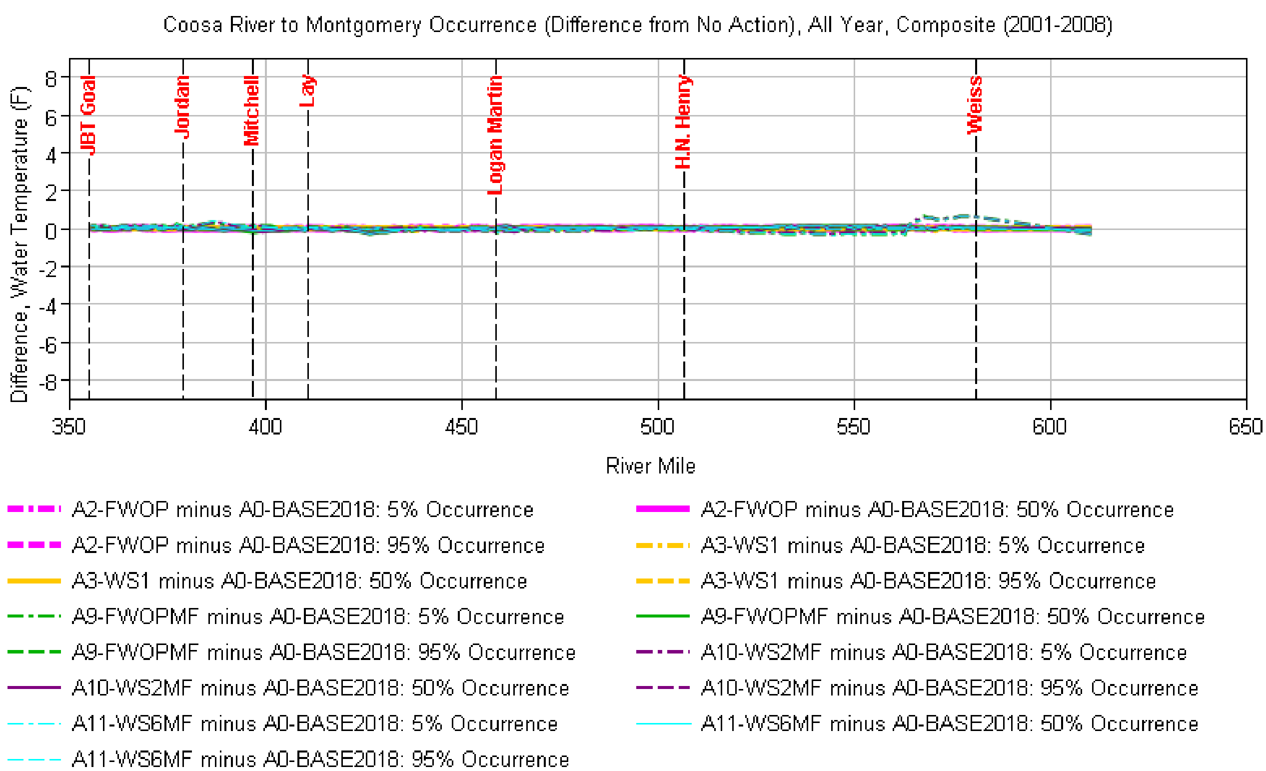


Figure 5-18. Water Temperature Occurrence Difference from the NAA for the Coosa River (2001–2008).

The model results demonstrate that Alternative 11 would not be expected to have a detectable effect on the DO concentrations upstream of Allatoona Lake compared to the NAA. There is no distinguishable difference in the modeled DO levels in the Etowah River downstream of Allatoona Dam between the NAA and Alternative 11. For Coosa River, Alternative 11 would have a minimal effect on the DO concentrations. Alternative 11 model results show a minor decrease in DO from the NAA of 0.16 mg/L downstream of Weiss Lake at the 95 percent occurrence; however, this change is not expected to have a significant impact on water quality (Figure 5-19).

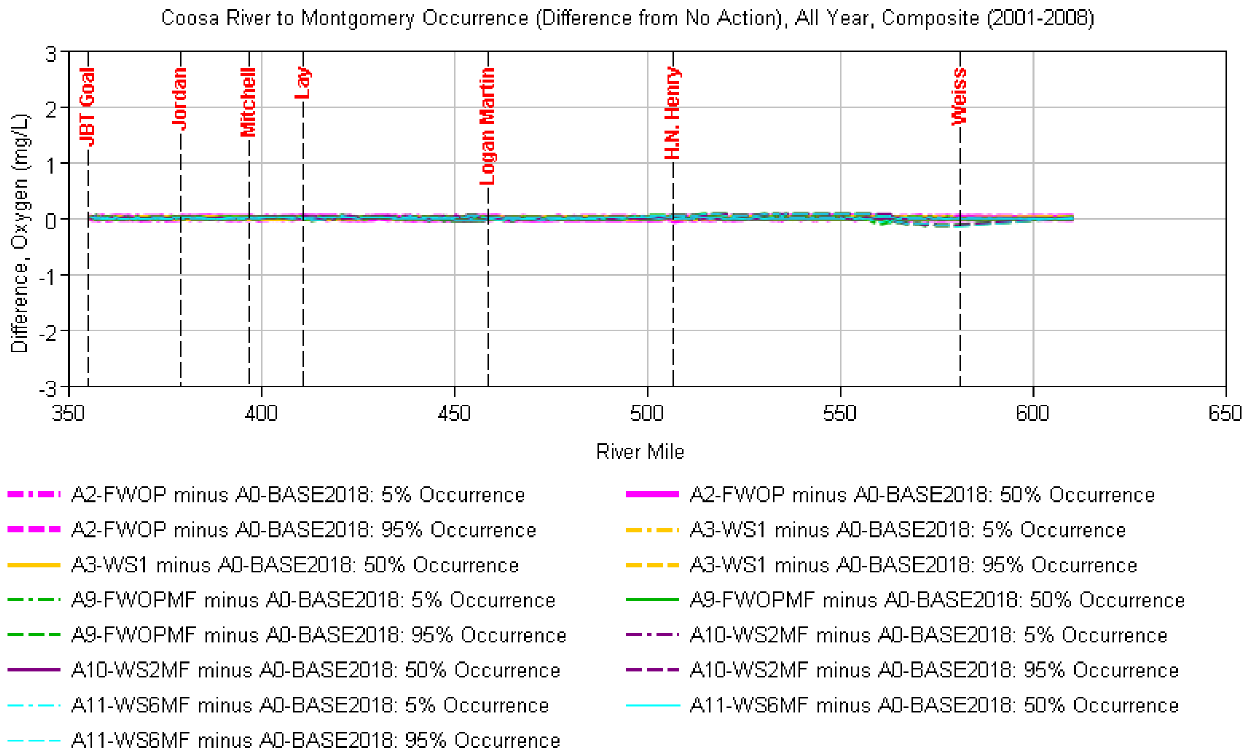


Figure 5-19. DO Occurrence Difference from the NAA for the Coosa River (2001–2008).

Downstream of Canton, the model predicts a peak difference in total phosphorous (TP) at the 95 percent occurrence between Alternative 11 and NAA of approximately 0.01 mg/L (10 µg/L). There are no other discernible changes in TP concentrations on the Etowah River (Figure 5-20). The difference in TP near Canton is expected to amplify during a dry year to approximately 0.02 mg/L (20 µg/L) (Figure 5-21). The Coosa River responds to Alternative 11 with very little change in TP from the NAA. A peak increase of less than 0.01 mg/L (10 µg/L) is modeled at 95 percent occurrence near Weiss Lake, but no other significant changes can be discerned.

For the Etowah River, modeled results show no discernible change in total nitrogen (TN) between Alternative 11 operations and the NAA. The HEC-5Q model simulations show a potential increase in TN concentrations of 0.03 mg/L immediately downstream of Weiss Lake at the 50 percent occurrence for Alternative 11 but a decrease in TN concentrations of approximately 0.14 mg/L at the 95 percent occurrence upstream of Weiss Lake (Figure 5-22). Other less significant decreases in TN concentration can be noted farther downstream where concentrations are modeled about 0.04 mg/L lower at the 95 percent occurrence between Weiss Lake and H. Neely Henry Lake and by about 0.03 mg/L at the 95 percent occurrence upstream of Mitchell Lake.

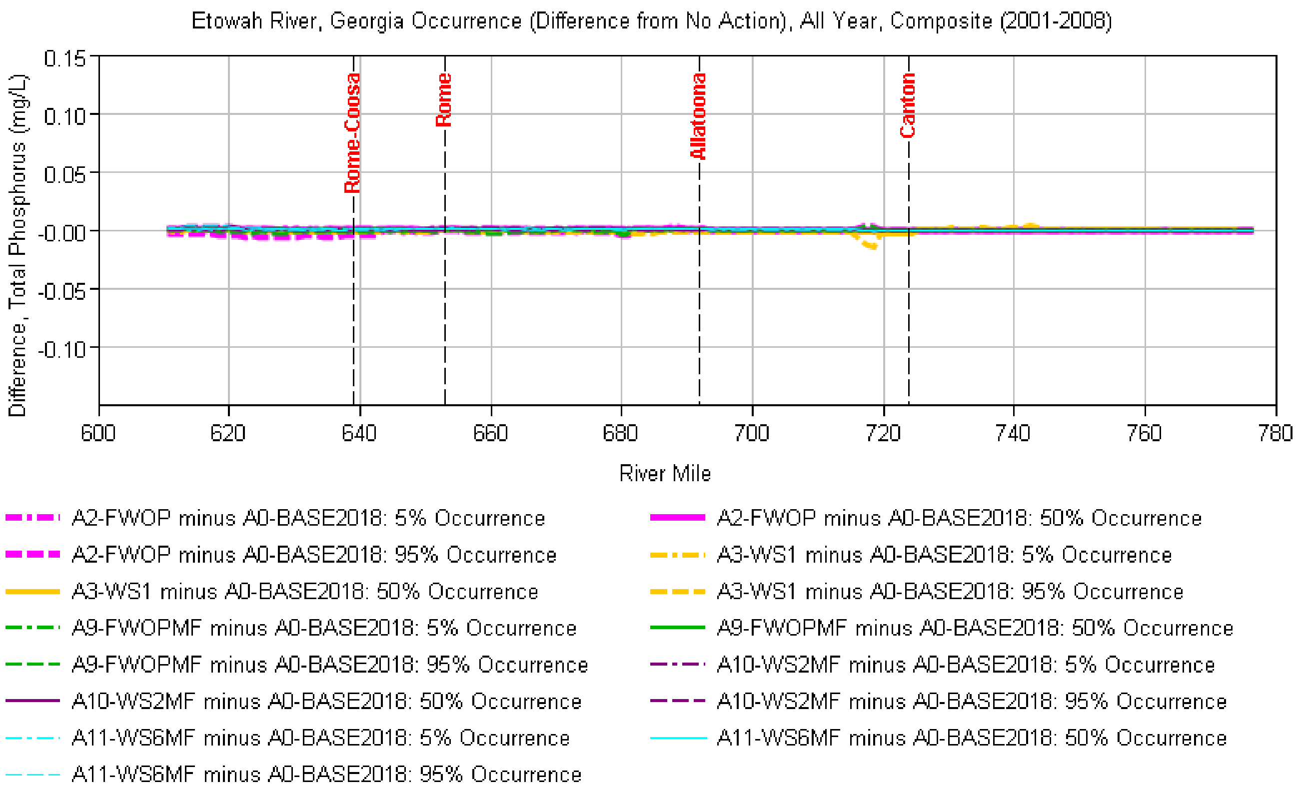


Figure 5-20. TP Occurrence Difference from the NAA for the Etowah River (2001–2008).

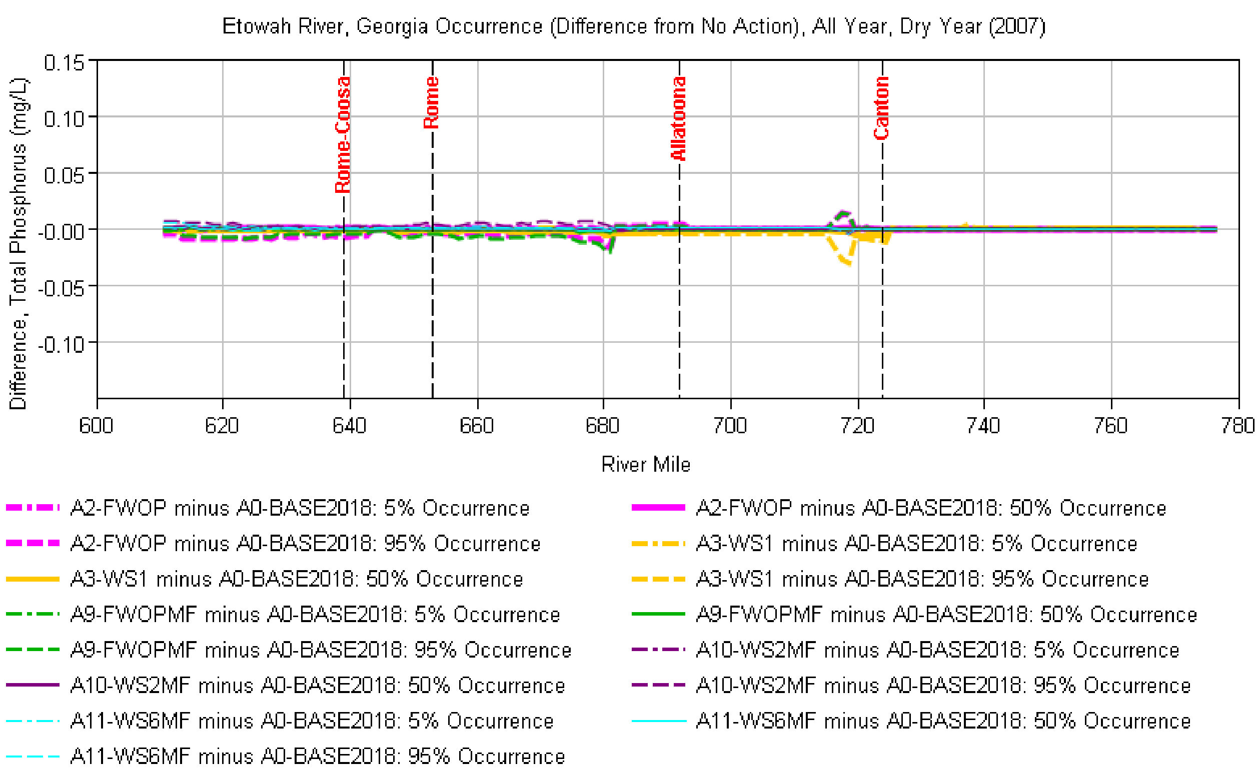


Figure 5-21. TP Occurrence Difference from the NAA for the Etowah River (2007 dry year).

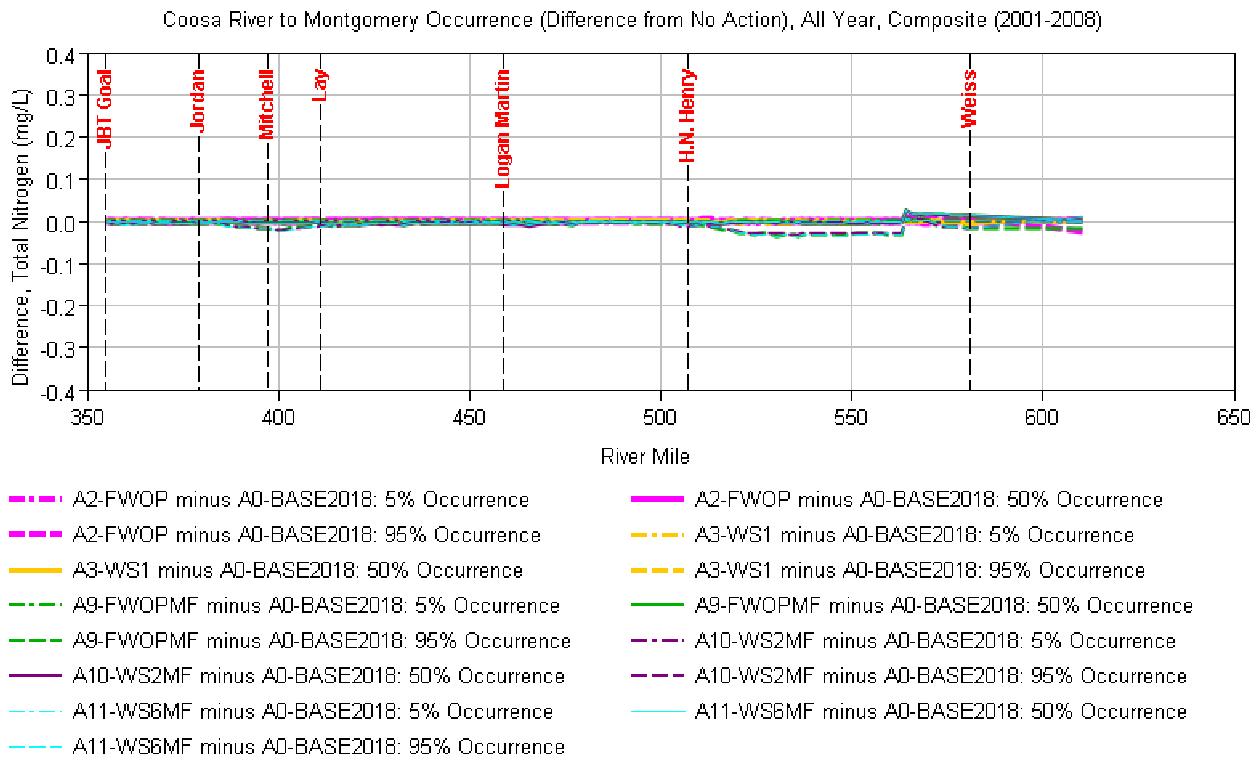


Figure 5-22. TN Occurrence Difference from the NAA for the Coosa River (2001–2008).

The model results demonstrate that Alternative 11 would not be expected to have an incremental effect on chlorophyll *a* concentration in Allatoona Lake compared to the NAA. Some temporary exceedances of standards at equivalent concentrations for both the NAA and Alternative 11 would occur (Figure 5-23). For the Coosa River, Alternative 11 would have no discernible incremental effect on chlorophyll *a* concentration compared to the NAA.

Overall, median values that were modeled in HEC-5Q meet all state water quality standards along the Etowah River and the Coosa River and their reservoirs except for the TP concentration in Weiss Lake. Modeled values at the 95 percent occurrence fail to meet state standards in all reservoirs for chlorophyll *a* and in Weiss Lake for TP. DO standards are met at every reservoir for every occurrence level except Allatoona Lake and Logan Martin Lake at the 5 percent occurrence level. Modeled results at the 50 percent and 95 percent occurrence levels fail to meet the USEPA acceptable ranges for TP in all reservoirs and at the 5 percent occurrence level in Weiss Lake and H. Neely Henry Lake; however, USEPA acceptable ranges for TN are met in all reservoirs for all occurrence levels. The reservoirs failing to meet state standards or USEPA acceptable ranges fail regardless of whether Alternative 11 or NAA is implemented. Changes in concentrations of water quality parameters resulting from the implementation of Alternative 11, have no significant effects on the water quality in the region of interest.

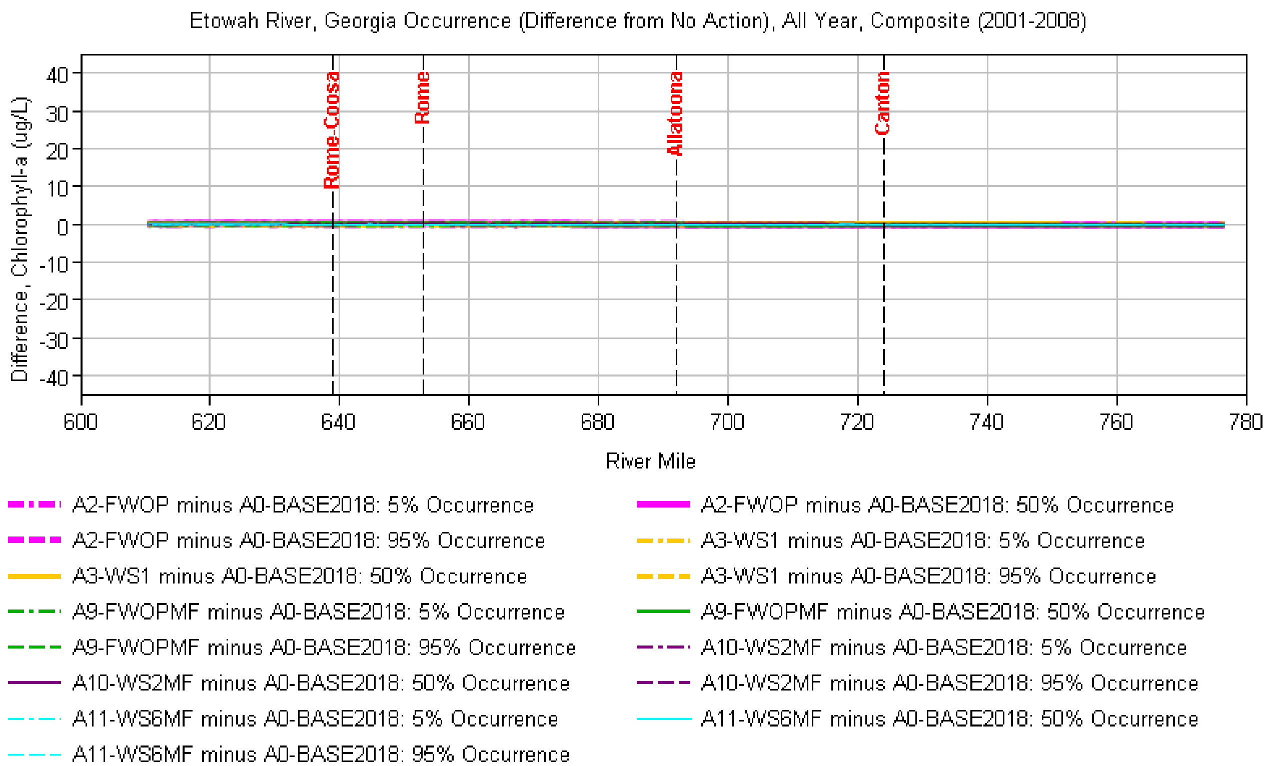


Figure 5-23. Chlorophyll *a* Occurrence Difference from the NAA for the Etowah River (2001–2008).

5.2.3 Alternative 10

For the Etowah River, there would be no discernible difference between Alternative 10 and NAA water temperatures. For the Coosa River, the simulated temperatures for Alternative 10 would have only small deviations from the NAA between H. Neely Henry and Weiss lakes and upstream of Weiss Lake, none of which are more than 1.5 °F. Alternative 10 would have a slight benefit to the DO concentrations downstream of Allatoona Lake compared to the NAA but minimal effect on the DO concentrations along the Coosa River. Downstream of Canton, GA, there would be a decrease in TP at the 95-percent occurrence between Alternative 10 and NAA of approximately 0.01 mg/L (10 µg/L). Along the Coosa River, there would be little change from Alternative 10 to the NAA. Alternative 10 would be expected to have very slight decreases in TN concentrations compared to the NAA along both the Etowah River and the Coosa River. Alternative 10 would have no discernable differences in chlorophyll *a* from the NAA along the Etowah River or Coosa River.

5.2.4 Alternative 3

The simulated temperatures for Alternative 3 have only small deviations from the NAA, none of which are more than 1.5 °F. The model results demonstrate that Alternative 3 would have a slight benefit to the DO concentrations downstream of Allatoona Lake compared to the NAA but would have minimal effects on DO concentrations on the Coosa River. Alternative 3 has very little changes in TP and TN from the NAA. Alternative 3 would have some very minor increases in chlorophyll *a* upstream of Canton compared to the NAA but no discernible effect on chlorophyll *a* concentration in the Coosa River compared to the NAA.

5.3 Geology and Soils

Effects on geology and soils that can be influenced by USACE and APC water management activities are limited to sedimentation and erosion of the river and lake beds and shorelines under their jurisdiction. Any sediment sources outside the USACE and APC jurisdiction are considered a background condition in which the management measures must function. Prime and unique farmland resources within the ACT River Basin are located primarily outside of USACE and APC jurisdiction and thus would not be appreciably affected under the NAA or any of the other alternatives.

Sedimentation and erosion activity within ACT River Basin projects, can be divided into two general types: (1) river bed shoaling and bank erosion, and (2) lake bed sedimentation and shoreline erosion. In general, riverine sedimentation and bank erosion processes are most active during floods. A portion of sediments eroded from landscapes during intense rainfalls and from stream and river banks during high-flow events are transported to the USACE and APC lakes where much of the sediment is deposited as shoals. River channel erosion can take the form of tailwater degradation downstream of projects. (Section 3.1.3.3).

Lake shoreline erosion activity is not limited to times of high water and can occur at all water levels and flow conditions under the influence of waves that are driven by wind and boat traffic versus density of shoreline vegetation and durability of shoreline soils. Thus, management measures within control of USACE and APC that influence shoreline erosion include lake elevation and duration at any given elevation.

5.3.1 No Action Alternative

Geology and soils conditions under the NAA would be consistent with those described in Section 3.1.3 and the additional general introductory information for this section.

The shoreline detail of Allatoona Lake in Figure 5-24 shows a general trend of higher erosion during the first 30 years following impoundment and have since slowed (USACE Mobile District, 2011). Sedimentation range surveys were not available for Weiss Lake, H. Neely Henry Lake, and Logan Martin Lake. However, the shoreline erosion over time for these three lakes is likely similar to that shown in Figure 5-24. Thus, under the NAA, it is likely that shorelines of all four lakes would continue to erode at the present rate, and lake sedimentation would continue at the present rate.

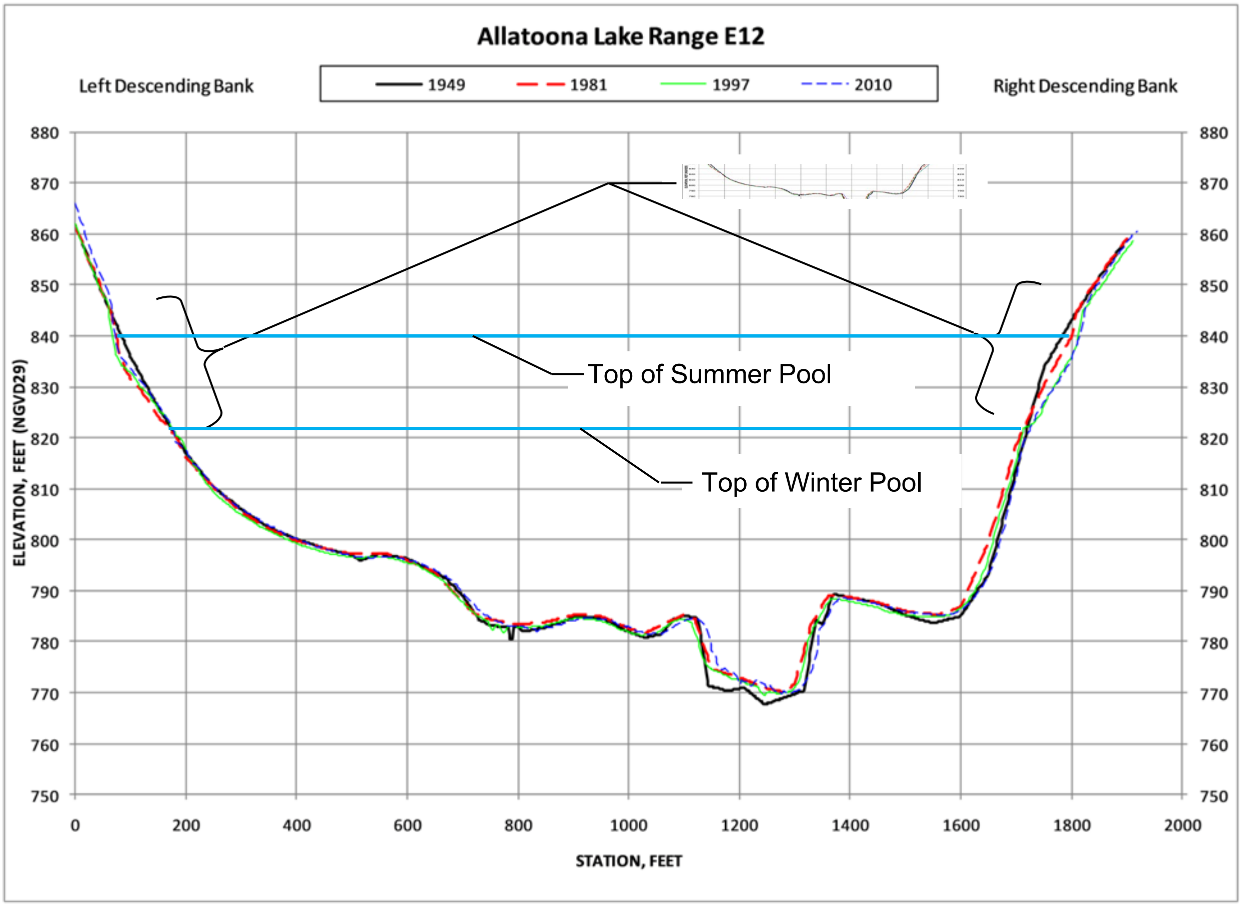


Figure 5-24. Allatoona Lake Typical Sedimentation Range Cross Section

5.3.2 Recommended Plan (Alternative 11)

The management measures for Alternative 11 include an increase to the elevations of three of the four lakes for portions of the year with H. Neely Henry remaining essentially unchanged. For the other three lakes, the increased elevation, or increased duration of summer pool would be expected to have a slight impact on shoreline erosion and corresponding slight impact on sediment deposition within the lakes. As described in more detail in Section 5.14 and Section 7.7.4, USACE may supplement areas subject to erosion and already protected by riprap at Allatoona Lake with small amounts of additional riprap, as needed, to offset the effects of the increase in the summer pool level from 840 ft to 841 ft. This action would provide additional protection and stability to vegetation resources along the shoreline in these areas.

Under Alternative 11 discharges from Allatoona Dam, Weiss Dam, and H. Neely Henry Dam closely match those under the NAA. Thus, any changes in channel erosion and sedimentation the Etowah and Coosa Rivers below these projects would likely be negligible.

The discharges at Logan Martin Dam under Alternative 11 are increased from 50,000 cfs to a range of 50,000 to 65,000 cfs for about the 1 to 3 percent exceedance range (Figure 5-25). Since the mid-1960's the Coosa River impoundments have effectively reduced the annual peak flows below Logan Martin Dam by about 20,000 cfs on average. Thus, it is likely that any changes to the present channel erosion and sedimentation rates of the Coosa River below Logan Martin Dam would be negligible compared to the NAA.

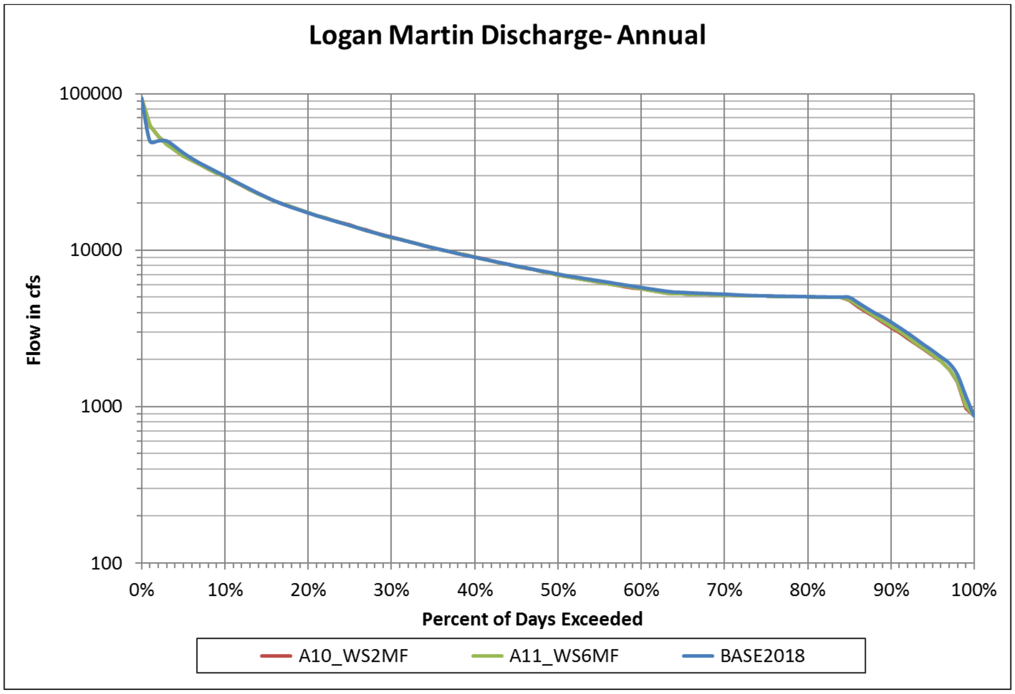


Figure 5-25. Coosa River Downstream of Logan Martin Dam—Annual Flow Duration Curve

5.3.3 Alternative 10

Compared to the NAA, Alternative 10 would essentially have the same effects on geology and soil resources in the basin as those described for Alternative 11.

5.3.4 Alternative 3

Alternative 3 would have the same effects on geology and soil resources at Allatoona Lake as Alternative 10. In the Coosa River from Weiss Lake to its confluence with the Tallapoosa River, Alternative 3 would likely have the same effects on geology and soil resources as the NAA.

5.4 Land Use

An adverse effect on land use would be the result of a land use change that would be incompatible with adjacent land uses. The degree to which the proposed action and alternatives conflict with established land uses in the area, disrupt or divide established land use configurations, represent a substantial change in existing land uses, or are inconsistent with adopted land use plans will determine the severity of adverse effects.

5.4.1 No Action Alternative

No effects would be expected. Under the NAA, current water control operations at Allatoona, Weiss, and Logan Martin lakes in the ACT Basin would continue; therefore, effects on land use would be expected to be the same as in the past, with deviations in lake elevations caused by seasonal and yearly variations in flow and climatic conditions.

5.4.2 Recommended Plan (Alternative 11)

Alternative 11 would be expected to have long-term minor beneficial effects on land use at Allatoona, Weiss, and Logan Martin lakes, and no effects on H. Neely Henry, Lay, Mitchell, Jordan, or Walter Bouldin lakes. APC's purchase of flowage easements downstream of Weiss and/or Logan Martin dams would not be expected to appreciably affect current land use.

Under Alternative 11, USACE would maintain Allatoona Lake at a slightly higher pool elevation throughout the year. This would be beneficial for land use, as there would be fewer weeks throughout the year with lower water levels that expose the shoreline, and more time for usability of the Allatoona Lake shoreline for recreational land use such as boating, fishing, picnicking, and swimming. At Allatoona Lake, raising the summer pool level from 840 ft to 841 ft under the Alternative 11 would inundate about 258 additional acres, expanding the reservoir at summer pool from 11,164 acres to 11,422 acres (a 2.3 percent increase). This change would be spread over about 270 mi of shoreline, averaging less than 1 ac of affected land per mi of shoreline. USACE owns 49,545 ac of lands and water at the Allatoona project, used for project operations, recreation, and natural resource management. The 1-ft increase in the summer pool level would represent a negligible effect on land use, or land-use allocations, around the reservoir. The pool level is frequently at or above 841 ft for short periods during and following storms events even under current operations. Land uses adjacent to the federal project lands would not be adversely affected by implementing Alternative 11.

On Weiss and Logan Martin lakes, lowering the maximum surcharge elevations at both reservoirs would not likely change current land uses but would likely have a beneficial effect on existing land uses because of the reduced potential for inundation of lands above the revised levels during flood events. APC would maintain Weiss and Logan Martin lakes at a higher winter pool elevation under Alternative 11. Raising the winter pool levels from 558 ft to 561 ft at Weiss Lake and from 460 ft to 462 ft at Logan Martin Lake would have no effect on current land use within those ranges because they are comprised of unvegetated lake bottoms within the boundaries of the summer pools of those reservoirs. The adjacent land uses on those reservoirs would benefit from improved access to the higher winter water levels. Maintaining higher lake levels during the fall and winter months would allow residents and visitors more time to use the recreational facilities around the Weiss and Logan Martin lake shorelines. Changes in operations at Allatoona, Weiss, and Logan Martin lakes would not be expected to adversely affect current land use downstream of those projects.

Alternative 11 is not expected to result in effects to land use at H. Neely Henry, Lay, Mitchell, Jordan, or Walter Bouldin lakes. Alternative 11 would not change operations at H. Neely Henry, Lay, Mitchell, Jordan, or Walter Bouldin lakes. The pool elevations at these lakes would be maintained at about their normal level (with continuation of some deviation in reservoir elevation due to seasonal and yearly variations in flow and climatic conditions). Thus, no effects on land use would be expected.

USACE has conducted additional analysis of potential impacts to private property downstream of Weiss and Logan Martin dams that could occur under Alternative 11. The correspondence received from FERC on October 22, 2020, stated that APC has acquired all necessary real estate for the proposed operation. Pursuant to ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient data is available to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Weiss Dam. It is the responsibility of APC to acquire all necessary real estate interests prior to implementation.

5.4.3 Alternative 10

Under Alternative 10, the effects on land use at Allatoona Lake would likely be the same as those described for the NAA. At the APC lakes on the Coosa River, the effects of Alternative 10 compared to the NAA would likely be the same as those described for Alternative 11.

5.4.4 Alternative 3

Under Alternative 3, the effects on land use at Allatoona Lake and the APC reservoir projects on the Coosa River would likely be the same as those described for the NAA.

5.5 Biological Resources

5.5.1 No Action Alternative

Effects on vegetation resources, wildlife resources, fish and aquatic resources, protected species, and fish and wildlife management facilities are expected to be negligible under the NAA.

There would be no change in the degree of floodplain (lateral) connectivity under the NAA and thus, no adverse effects on riparian, wetland, or submerged aquatic vegetation would be expected. Under the NAA, vegetation resources will continue to be exposed to a hydrologic regime that is influenced by current water control operations at USACE and APC reservoirs.

Non-aquatic wildlife resources, including birds, mammals, reptiles, amphibians, and insects, are generally not as sensitive to flow and water quality as aquatic animals. There would be negligible change in flow and water quality conditions under the NAA, and thus, any effects on wildlife resources in the ROI would be negligible. Wildlife resources in riparian or wetland areas will continue to be influenced by current water control operations at USACE and APC reservoirs.

Fish and aquatic resources, as well as protected species, would continue to be affected to the same degree as under current water control operations at USACE and APC reservoirs. The current management of pool elevations and discharges at these reservoirs provides stable deepwater lacustrine habitat within each of the reservoirs and shallow water lacustrine habitat that shifts up and down-slope along the margins of the lakes as lake levels are raised and lowered. Allatoona Lake has the most drastic annual change in the ACT system, commonly experiencing a change of 20 ft in water surface elevation throughout an average year. Flow in the rivers downstream of the reservoirs is influenced more so by discharges from the reservoirs than by storm events and seasonal changes in precipitation.

Water quality conditions under the NAA would generally be consistent with those described for the affected environment. There are some water quality impairments within the ROI that would remain under the NAA, including chlorophyll *a* concentrations that fail to meet water quality standards throughout the ROI at the 95 percent occurrence interval and TP concentrations that fail to meet water quality standards throughout the ROI under most conditions. However, the effect of these impairments on existing vegetation, wildlife, aquatic resources, protected species, and fish and WMAs should be negligible.

5.5.2 Recommended Plan (Alternative 11)

Effects on vegetation resources, wildlife resources, fish and aquatic resources, protected species, and fish and wildlife management facilities are expected to be negligible under Alternative 11.

Effects of changes to reservoir operations under Alternative 11 would be limited to the ROI, including the Etowah River, the Coosa River, and reservoirs along these rivers. Effects include changes to water quantity including reservoir pool elevations and stream flow, and water quality including slight changes in nutrients, water temperature, and DO.

The annual duration curve for Allatoona Lake shows that there will be a 1-ft increase in the range of lake elevation over much of the year compared to the NAA. Raising the summer pool level from 840 ft to 841 ft under Alternative

11 would inundate about 258 additional acres, expanding the reservoir at summer pool from 11,164 acres to 11,422 acres (a 2.3 percent increase). This change would be spread over about 270 mi of shoreline and would affect an average of less than 1 ac of land per mi of shoreline and equate to a narrow fringe averaging about 8 ft wide around the current lake shoreline. The shorelines are generally comprised of forested land, some intermittent grassland, and developed public use areas for recreational activities (boat ramps, parking, beaches, etc.). Vegetated wetland habitats around the shoreline are limited because the reservoir pool levels under Alternative 11 would typically range from a minimum of 824.5 ft in December (823 ft under current operations) to well above the normal summer pool of 841 ft during high rainfall events. Alternative 11 would produce a slightly larger area of deep-water habitat and a slightly larger area of shallow-water habitat and wetland habitat during these times of higher lake levels. At the 90 percent exceedance level during the year, lake levels will be 1–2 ft higher than the NAA from December to June, and at 50 and 10 percent exceedance levels during the year, lake levels will be 1–2 ft higher than the NAA from December to August. As described in more detail in Section 5.6.5.2, USACE may supplement areas subject to erosion and already protected by riprap with small amounts of additional riprap, as needed. This action would provide additional protection and stability to vegetation resources along the shoreline in these areas and a negligible effect on aquatic resources in the reservoir.

Flows immediately below Allatoona Dam demonstrate minor changes from NAA to Alternative 11. The months when flows may be slightly lower than the NAA (late fall/winter) are periods of relatively low biological productivity. Little change is shown during the more active months (spring/early summer). In the Coosa River near Rome, Georgia, the only changes in flow for Alternative 11 compared to the NAA are very slight increases in flow for during December in the 80-95 percent of days exceeded range (dry conditions).

Changes in the flood storage and flood operations at Weiss and Logan Martin Lakes result in generally higher pool levels in both reservoirs under most conditions, and slight seasonal changes in flows in the Coosa River downstream of these reservoirs. The proposed winter pool raise at these projects would result in the exposure of less unvegetated lake bottom between the months of September and March each year than currently occur under the NAA. The changes in pool levels and flows are expected to have slightly beneficial effects on vegetation communities in these reservoirs.

Changes to reservoir operations may result in slight changes in nutrients, water temperature and DO, environmental parameters that are important to aquatic resources. Effects of Alternative 11 on TP and TN are negligible compared to the NAA, with the most notable effect being a decrease in TN concentrations of approximately 0.14 mg/L at the 95 percent occurrence upstream of Weiss Lake. TP concentrations would continue to exceed standards under most conditions. Some temporary exceedances of chlorophyll *a* standards would occur at equivalent concentrations for both the NAA and Alternative 11.

For the Coosa River, the simulated temperatures for Alternative 11 only have small deviations from the NAA between H. Neely Henry and Weiss and downstream of Weiss, none of which are greater than 1.5 °F. Alternative 11 would have a minimal effect on the DO concentrations for the Coosa River. Alternative 11 model results show a minor decrease in DO from the NAA of 0.16 mg/L downstream of Weiss Lake at the 95 percent occurrence; however, this change is not expected to have a significant impact on water quality.

Minor changes in flow are expected to have a negligible effect on vegetation resources in the Etowah River below Allatoona Lake because the vegetation community currently withstands an altered hydrology based on water control operations at Allatoona Dam and is not dependent on natural stream hydrology. Slight seasonal changes in flow should continue to support the current vegetation community. Likewise, minor changes in reservoir pool elevations and flow in the Coosa River are not expected to have a notable influence on vegetation communities.

Studies of ecological response to altered flow regimes indicate that fishes show consistent negative responses to alteration of flow magnitude. However, most studies examine higher values of flow alteration. There is a lack of studies on the response of fishes to more moderate ranges of flow alteration (Poff & Zimmerman, 2010). The slight alterations of flow that will result from changes in reservoir operations are not expected to create notable changes in the presence or abundance of specific habitat types (such as riffle habitat with moderate flow) and are not expected to have notable effects on population dynamics of aquatic species.

Slight water quality changes that are expected under Alternative 11 would not be likely to impact biological resources in the ROI. Slight changes in nutrients are expected to have a negligible effect on vegetation. Slight changes in water temperature and DO are expected to have a negligible effect on aquatic resources. Protected fish, mussel, and snail species would be the most susceptible to changes in water quality. A detailed examination of the effects of the proposed action on federally protected species and critical habitat is provided in the 2020 BA (in Appendix F to the Final FR/SEIS). There are twelve federally protected fish species within the Coosa River and Etowah River basins. Three of these species inhabit the main stem of these rivers and their associated reservoirs: the blue shiner which occurs in the Coosa River near Weiss Lake, and the Cherokee Darter and the Etowah darter which inhabit the Etowah River and Allatoona Lake (USFWS, 2019e). Additionally, the state-protected lake sturgeon inhabits both the Coosa River and the Etowah River. Thirteen federally protected mussel species are present within the Coosa River and Etowah River basins. Ten of these species inhabit the main stem of these rivers and their associated reservoirs: the Alabama moccasinshell, Coosa moccasinshell, finelined pocketbook, Georgia pigtoe, ovate clubshell, southern acornshell, triangular kidneyshell, and upland combshell inhabit parts of the Coosa River. The southern clubshell and southern pigtoe inhabit parts of both the Coosa River and Etowah River. There are seven federally protected snail species within the Coosa River and Etowah River basins. Four of these species inhabit the main stem of these rivers and their associated reservoirs: the interrupted rocksnail, painted rocksnail, rough hornsnail, and tulotoma snail inhabit parts of the Coosa River. Seventeen federally protected flowering plant species are present within the Coosa River and Etowah River basins; nine of those species have a range that overlaps with the main stem of the rivers and their associated reservoirs: the Alabama leather flower, Georgia rockcress, green pitcher-plant, harperella, large-flowered skullcap, Mohr’s Barbara’s buttons, Tennessee yellow-eyed grass, white fringeless orchid, and whorled sunflower.

Critical habitat has been designated for 17 species in the Coosa River and Etowah River basins based on the USFWS Official Species Lists (USFWS, 2019b) (USFWS, 2019c) (USFWS, 2019d); those species are: Alabama moccasinshell, Amber darter, Conasauga logperch, Coosa moccasinshell, Finelined pocketbook, Georgia pigtoe, Georgia rockcress, Interrupted rocksnail, Ovate clubshell, Rough hornsnail, Southern acornshell, Southern clubshell, Southern pigtoe, Triangular kidneyshell, Trispot darter (proposed), Upland combshell, and Whorled sunflower.

Three of the 17 species do not have critical habitat within the ROI, including the Amber darter, Conasauga logperch, and Trispot darter (proposed).

The remaining 14 species do have critical habitat within the ROI. The following mussel and snail species have critical habitat within an 11-mile reach of the Coosa River immediately below Weiss Dam (old channel): Coosa moccasinshell, Finelined pocketbook, Georgia pigtoe, Interrupted rocksnail, Ovate clubshell, Southern acornshell, Southern clubshell, Southern pigtoe, Triangular kidneyshell, and Upland combshell (Unit GP 2, Unit IR 1, and Unit 18). The Georgia pigtoe and the interrupted rocksnail have critical habitat within 7 miles of the 11-mile reach of the old channel (Unit GP 2 and Unit IR 1, respectively).

Four critical habitat units are located within (or adjacent to) a 13-mile reach of the lower Coosa River, downstream of Jordan Dam to just above its confluence with the Tallapoosa River. Unit RH 1, for the rough hornsnail, includes this entire 13-mile reach of the lower Coosa River. Unit IR 3 includes critical habitat designated for the interrupted rocksnail; Unit 26 includes critical habitat designated for the southern acornshell, ovate clubshell, southern clubshell, upland combshell, triangular kidneyshell, Coosa moccasinshell, southern pigtoe, fine-lined pocketbook, and Alabama moccasinshell. Unit IR 3 and Unit 26 both extend along the lower Coosa River from Jordan Dam downstream to Alabama Highway 111 Bridge (approximately 8 miles). Unit 12, for the Georgia rockcress, includes designated critical habitat that runs along the left descending bank of the lower Coosa River just upstream of its confluence with the Tallapoosa River near Montgomery, AL, on the bluffs at Fort Toulouse State Park.

The Rough hornsnail has critical habitat in approximately four miles of the Lower Yellow Leaf Creek channel, just above its confluence with the Coosa River (Unit RH2). The Georgia rockress has designated critical habitat (Unit 15) on the privately-owned Blacks Bluff Preserve along the left descending bank of the Coosa River, approximately 4.0 miles downstream of the Etowah River. These Critical Habitat units extend slightly into the ROI. In addition, a small area of the critical habitat for the Whorled sunflower extends into the ROI at one point along the perimeter of Weiss Lake; the area is noted as Mud Creek (Unit 1).

Supplemental to the extensive modeling conducted and analyzed for lake pool levels and river flows along the Coosa River, the BA (Appendix F) used data from a modeled 5-year (yr) flood annual exceedance event (based off of an approximate October 1995 event) and a 100-yr flood annual exceedance event (based off of an approximate February 1991 event) for the Coosa River to assess flood event elevation changes and potential impacts to tributaries from the modified flood operations under the proposed action. Modeled elevation data for the Coosa River extend from below Weiss Dam to Jordan Dam. In addition to the old Coosa River channel being evaluated in this analysis, the primary tributaries with designated critical habitat within the ROI were evaluated; they are Terrapin Creek (tributary to the old Coosa River channel below Weiss Dam), Big Canoe Creek in the H. Neely Henry Lake area, Kelly Creek (2 miles below Logan Martin Dam) and Yellowleaf Creek (near Wilsonville, AL) in Lay Lake area, and Hatchet Creek in the Mitchell Lake area, just upstream of the Mitchell Dam. Other tributaries where the model limit extends upstream into the narrower portion of the creek were also evaluated for potential impacts. This review showed that while the proposed action would cause some changes to the stage and flow hydrographs along the Coosa River, the magnitude and duration of these changes were unlikely to cause a measurable change in sedimentation rates from the NAA. Based on the information available, there is not expected to be a measurable change in sedimentation induced impacts to Coosa River tributaries as a result of the implementation of the proposed action. The review also determined that the proposed action may affect, but is not likely to adversely modify or destroy, critical habitat in these tributaries.

Changes to flow and water quality are expected to be minimal under Alternative 11 and are not likely to adversely affect aquatic resources, including protected species that might be sensitive to changes in water quality. The proposed changes under Alternative 11 may affect but are not likely to adversely modify or destroy critical habitat within the ROI and within primary tributaries.

In compliance with Section 7 of the ESA, the USACE Mobile District submitted the BA Assessment to the USFWS on November 25, 2019. The BA evaluated the effects of implementing Alternative 11 on threatened and endangered species and critical habitat in the ROI within the ACT River Basin. Following additional coordination with the USFWS, USACE submitted a revised BA to the USFWS on May 11, 2020 with several clarifications and updates. The USFWS concurred with the USACE determinations in the revised BA by letter dated November 6, 2020, completing informal consultation under Section 7. The ESA compliance documentation is included in Appendix F.

A more detailed analysis of the effects of Alternative 11 on biological resources in the ROI is provided in Appendix E, Section E.3.7.

5.5.3 Alternative 10

The effects of Alternative 10 are nearly the same as those described for Alternative 11, except that Allatoona Lake would not have the benefit of a slightly higher pool level year-round because the reallocation of reservoir storage for water supply would come for conservation storage only. Even with this slight difference, Alternative 10 is expected to have negligible effects on vegetation and wildlife resources in the Etowah River and Coosa River basins compared to the NAA. Compared to the NAA, the effects of Alternative 10 on fish and aquatic resources, in general, would be negligible. Seasonally higher pool levels may provide a slight benefit to fishery resources in the reservoirs. Alternative 10 is expected to have negligible effects on protected terrestrial and avian species and protected upland plant species. Effects on protected aquatic species (fish, mussels, and snails) and protected wetland/aquatic plant species are expected to be minimal and not likely to adversely affect those species or their critical habitats. No adverse effects on fish and wildlife management facilities are expected.

5.5.4 Alternative 3

Alternative 3 is limited to proposed reservoir storage reallocation in Allatoona Lake. The effects of Alternative 3 on vegetation, wildlife, and fish and aquatic resources in the Etowah River and Coosa River basins would be negligible. Alternative 3 is expected to have negligible effects on protected terrestrial and avian animal species and protected upland plant species. Effects on protected aquatic species (fish, mussels, and snails) and protected wetland/aquatic plant species are expected to be minimal and not likely to adversely affect those species or adversely modify or destroy their critical habitats. No adverse effects on fish and wildlife management facilities are expected.

5.6 Socioeconomics Resources

The following subsections briefly describe the expected changes to M&I water supply, navigation, hydropower generation, flood risk management, recreation, agricultural water supply, environmental justice, and the protection of children. Additional details can be found in the Plan Formulation and Economics appendices.

5.6.1 Municipal and Industrial Water Supply

This section provides a summary of the effects of M&I water supply as resulting from an increase in demand due to future projections and the ability of alternatives to meet those demands. Additional information can be found in Section D.4 of Appendix D. The 2050 forecasted demand by CCMWA and the City of Cartersville is presented in Table 5-13.

Table 5-13. Forecasted 2050 Water Supply Demands for Withdrawal from Allatoona Lake

Water Provider	Average Annual Day – Million Gallons per Day (aad-mgd)
Cobb County-Marietta Water Authority	57
City of Cartersville / Bartow County	37
Total Demand	94

5.6.1.1 No Action Alternative

Under the NAA, no additional storage would be allocated to meet the year 2050 projected demand of 94 average annual day-million gallons per day (aad-mgd). CCMWA and Cartersville customers would either face future shortfalls in water supply due to the limitations in the current water supply storage agreements, or CCMWA and Cartersville would have to obtain additional water supply from other sources, such as new water supply reservoir construction.

5.6.1.2 Recommended Plan (Alternative 11)

Under Alternative 11, the year 2050 M&I water supply demand of 94 aad-mgd would be met through reallocation of water supply storage out of the conservation and flood control pool at Allatoona Lake.

5.6.1.3 Alternative 10

Under Alternative 10, the year 2050 M&I water supply demand of 94 aad-mgd would be met through reallocation of water supply storage out of the conservation pool at Allatoona Lake.

5.6.1.4 Alternative 3

Under Alternative 3, the year 2050 M&I water supply demand of 94 aad-mgd would be through reallocation of water supply storage out of the conservation pool at Allatoona Lake. Alternative 3 is equal to alternative 10 for the M&I water supply, however the alternatives differ in proposed operational changes of the APC projects on the Coosa River in Alabama.

5.6.2 Navigation

Navigation is an authorized purpose in the ACT River Basin. Channel availability was modeled for both a 7.5-ft and 9-ft channel. The percentage of time the navigation channel depths would likely be available differs slightly among alternatives (see Table 5-14). However, navigation on the ACT River Basin is currently underutilized with less than 1 million total tons being transported between years 1999 and 2017 as shown in Table 3-9.

Table 5-14. ACT River Basin - Alabama River Navigation Channel Depth Availability

Alternative	Storage Accounting Method	Percentage of Time 9-ft Navigation Depth Channel Available	Percentage of Time 7.5-ft Navigation Depth Channel Available
NAA	USACE	82.9%	85.8%
3	GA	82.8%	85.8%
10	USACE	82.3%	85.3%
11	USACE	82.3%	85.5%

5.6.2.1 No Action Alternative

Under the NAA, the percentage of time that project operations would provide for 9-ft and 7.5-ft navigation channel depth would be 82.9 percent and 85.8 percent, respectively. Due to the underutilization of the navigation channel, the current availability percentages are not expected to impact navigation on the Alabama River.

5.6.2.2 Recommended Plan (Alternative 11)

For Alternative 11, the percentage of time that project operations would provide for 9-ft and 7.5-ft navigation channel depth would be 82.3 percent and 85.3 percent, respectively. These slightly reduced percentages compared to the NAA are associated with APC-proposed changes to flood operations at Weiss and Logan Martin Dams. The reductions to a negligible effect on navigation channel availability. Due to the current and expected future underutilization of the navigation channel, these slightly reduced availability percentages are not expected to impact navigation on the Alabama River.

5.6.2.3 Alternative 10

For Alternative 10, the percentage of time that project operations would provide for 9-ft and 7.5-ft navigation channel depth would be 82.3 percent and 85.3 percent, respectively. These slightly reduced percentages compared to the NAA are associated with APC-proposed changes to flood operations at Weiss and Logan Martin Dams. The reductions to a negligible effect on navigation channel availability. Due to the underutilization of the navigation channel, these slightly reduced availability percentages are not expected to impact navigation on the Alabama River.

5.6.2.4 Alternative 3

For Alternative 3, the percentage of time that project operations would provide for 9-ft and 7.5-ft navigation channel depth would be 82.8 percent and 85.8 percent, respectively. These percentages are nearly identical to those for the NAA. Due to the underutilization of the navigation channel, these availability percentages are not expected to impact navigation on the Alabama River.

5.6.3 Hydropower

The hydropower analysis was performed by the USACE Hydropower Analysis Center (HAC) over the entire ACT River Basin system, including both federal and private generation plants. Table 5-15 presents the current value of hydropower generation dependable capacity for all the hydropower projects (USACE and APC) in the ACT River Basin for the NAA and Alternatives 11, 10, and 3. For more details on the hydropower analysis, refer to Section 6 of Appendix D.

Table 5-15. ACT River Basin Hydropower Projects - Value of Dependable Capacity

Alternatives > Projects V		NAA (Base2018)	Alternative 11 (A11_WS6MF)	Alternative 10 (A10_WS2MF)	Alternative 3 (A03_WS1)
Allatoona	Federal	$9,725,232	$9,777,061	$9,609,996	$9,621,229
Carters	Federal	$75,489,581	$75,489,440	$75,489,440	$75,489,396
Millers Ferry	Federal	$11,205,660	$11,411,051	$11,407,964	$11,409,319
Robert F. Henry	Federal	$9,763,461	$10,205,847	$10,205,847	$10,203,925
Federal	**Subtotal**	**$106,183,933**	**$106,883,398**	**$106,713,247**	**$106,723,868**
R.L. Harris	Non-Federal	$16,080,059	$16,947,326	$16,944,882	$16,946,663
H. Neely Henry	Non-Federal	$7,304,157	$7,302,476	$7,294,245	$7,301,512
Jordan	Non-Federal	$13,481,412	$13,486,688	$13,482,444	$13,479,699
Lay	Non-Federal	$20,495,364	$20,477,799	$20,476,255	$20,490,832
Logan Martin	Non-Federal	$16,377,419	$16,356,748	$16,354,176	$16,371,576
Martin	Non-Federal	$23,239,618	$23,248,701	$23,235,969	$23,244,096
Mitchell	Non-Federal	$20,496,844	$20,495,161	$20,473,940	$20,491,009
Thurlow	Non-Federal	$9,878,252	$9,885,222	$9,883,293	$9,883,591
W. Bouldin	Non-Federal	$26,988,635	$26,974,404	$26,919,488	$26,972,926
Weiss	Non-Federal	$9,165,574	$9,159,604	$9,140,699	$9,159,464
Yates	Non-Federal	$5,890,338	$5,779,733	$5,777,804	$5,778,594

Alternatives > Projects V		NAA (Base2018)	Alternative 11 (A11_WS6MF)	Alternative 10 (A10_WS2MF)	Alternative 3 (A03_WS1)
Non-Federal	**Subtotal**	**$169,397,672**	**$170,113,862**	**$169,983,194**	**$170,119,963**
System	**Total**	**$275,581,606**	**$276,997,260**	**$276,696,441**	**$276,843,831**
Change from NAA	**-**	**-**	**+0.51%**	**+0.40%**	**+0.46%**

5.6.3.1 No Action Alternative

Under the NAA, the current value of hydropower generation dependable capacity in the ACT River Basin is $275,581,606 annually.

5.6.3.2 Recommended Plan (Alternative 11)

For Alternative 11, changes in operations are forecasted to create a 0.51 percent increase in total system dependable capacity (Federal and non-Federal projects) from $275,581,606 to $276,997,260 annually.

5.6.3.3 Alternative 10

For Alternative 10, changes in operations are forecasted to create a 0.40 percent increase in total system dependable capacity (Federal and non-Federal projects) from $275,581,606 to $276,696,441 annually.

5.6.3.4 Alternative 3

For Alternative 3, changes in operations are forecasted to create a 0.46 percent increase in total system dependable capacity (Federal and non-Federal projects) from $275,581,606 to $276,843,831 annually.

5.6.4 Flood Risk Management

5.6.4.1 No Action Alternative

Under the NAA, water surface elevations and flows are not expected to change from the existing level of flood risk, which is beyond that of an unregulated system.

5.6.4.2 Recommended Plan (Alternative 11)

Under Alternative 11, water surface elevations and flows are slightly increased causing small amounts of induced flooding. Overall, an acceptable level of flood risk would be maintained, and areas that may have never developed under unregulated Oostanaula, Etowah, or Coosa rivers would continue to receive flood risk management benefits provided by the USACE Allatoona project and the APC projects along the Coosa River. Any increases in water surface elevations seen downstream are in fractions of a ft and, except for in events above the 1.0 percent annual chance exceedance, do not appear to expand the extent of flooding to previously unimpacted structures beyond marginal amounts.

5.6.4.3 Alternative 10

Under Alternative 10, water surface elevations and flows are not expected to change from the existing level of flood risk below Allatoona Dam, which is beyond that of an unregulated system. In the areas affected by the APC projects, the affects from Alternative 10 would be the same as those under Alternative 11.

5.6.4.4 Alternative 3

Under Alternative 3, water surface elevations and flows are not expected to change from the existing level of flood risk below Allatoona Dam, and areas affected by the APC projects would remain in the same state as the NAA.

5.6.5 Recreation

NED recreation benefits were used as the basis of comparing alternatives. The Unit Day Value (UDV) analysis methodology was used for computing benefits associated with the alternatives considered in detail, and a summary of the results is provided in Table 5-16. More detail on the UDV analysis methodology and its application to this project is included in Section 5 of Appendix D.

Table 5-16. Recreation Benefits at Allatoona, Weiss, and Logan Martin Lakes Associated with Proposed Alternatives

Project and Scenario	Annualized Recreation Value ($)	Present Value ($)	Annualized Change vs. Without Project	Percent Change
Allatoona				
No Change Scenario	$75,076,600	$2,129,345,000	--	--
With Change Scenario [1]	$75,785,400	$2,149,450,000	$708,800	0.9%
Weiss				
No Change Scenario	$16,159,200	$458,312,000	--	--
With Change Scenario [2]	$16,492,500	$467,766,000	$333,300	2.1%
Logan Martin				
No Change Scenario	$16,449,700	$466,551,000	--	--
With Change Scenario [2]	$16,957,700	$480,959,000	$508,000	3.1%

[1] Allatoona WCS alternatives: 5, 8, 11, 13
[2] Weiss and Logan Martin WCS alternatives: 9, 10, 11, 12, 13

5.6.5.1 No Action Alternative

The NAA is the current level of recreation benefits generated annually at Allatoona, Weiss, and Logan Martin lakes.

5.6.5.2 Recommended Plan (Alternative 11)

Under Alternative 11, estimated annual recreation benefits increase by $1,550,100 from $107,685,500 to $109,235,600 across the 3 projects .

Raising the summer guide curve at Allatoona Lake to 841 ft would result in periods during the summer months (May–August) when the pool level would be 1 ft higher than current operational practices, except during flood events. Based on model simulation over the period of record, pool levels would be expected to be greater than 840 ft and up to, or equal to, 841 ft on 75 percent of days in May, 64 percent of days in June, 30 percent of days in July, and 12 percent of days in August. The slightly higher pool levels at Allatoona under Alternative 11 could require some minor additions to existing riprap/bulkheads, relocation of some aids to navigation, minor modifications to public boat ramps, and modifications to public beaches on the lake, as well as an update to the project's shoreline management plan. These effects are not expected to have substantial effects on public recreation at Allatoona Lake. Estimated mitigation costs for the modifications discussed above have been included as a specific cost to the cost of storage to the water supply providers. These costs are presented in Section 7.6.4.

5.6.5.3 Alternative 10

Under Alternative 10, estimated annual recreation benefits increase by $841,300 from $32,608,900 to $33,450,200. These benefits are the result of changes in lake levels at Weiss and Logan Martin lakes.

5.6.5.4 Alternative 3

Under Alternative 3, no changes to recreation are expected as there would be no lake elevation changes at any of the affected projects.

5.6.6 Agricultural Water Supply

Agricultural water supply withdrawals in the Alabama and Georgia portions of the ACT River Basin are summarized in Section 3.1.6.6. Generally, surface water withdrawals for agricultural water supply in the basin are less than 5 percent of the total surface water withdrawals.

5.6.6.1 No Action Alternative

Under the NAA, agricultural water supply withdrawals would occur as described in Section 3.1.6.6.

5.6.6.2 Recommended Plan (Alternative 11)

Alternative 11 would have a negligible effect on agricultural water supply in the ACT River Basin.

5.6.6.3 Alternative 10

Alternative 10 would have a negligible effect on agricultural water supply in the ACT River Basin.

5.6.6.4 Alternative 3

Alternative 3 would have a negligible effect on agricultural water supply in the ACT River Basin.

5.6.7 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* requires that federal agencies identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations that might result from their programs, policies, and activities. Under the EO, USEPA was directed to ensure that agencies analyze environmental effects on minority and low-income communities, including human-health, social, and economic effects. Table 3-15 provides information on the demographic characteristics of the ACT River Basin with a specific focus on the minority, low-income, and disadvantaged communities.

During the scoping process for this EIS, no significant environmental justice concerns relative to water management operations in the ACT Basin reservoirs were identified. Access and use of the USACE and APC reservoirs in the basin by minority and low-income populations would most likely focus on shoreline access activities like picnicking, wading/swimming, and recreational and subsistence fishing, primarily from the bank or public docks/piers, rather than on boating-related activities that would tend to be somewhat less dependent on high lake levels. Low water levels in the lakes would tend to affect those shoreline access activities slightly more than boating-related activities. Therefore, the access and usability of the lake resources for all visitors may be negatively affected by low lake levels but are likely to be marginally higher for low-income and minority visitors.

5.6.7.1 No Action Alternative

The NAA would be consistent with conditions described in Section 3.1.6.11. Seasonal fluctuations in the water surface elevations under the NAA, even with relatively normal rainfall conditions in the basin, could create minor inconveniences for local residents, including low-income and minority populations, who use USACE and APC reservoirs for fishing and other forms of recreation. Those uses might be more constrained during extreme drought years, but those constraints and their associated effects are not likely to be disproportionately higher for low-income and minority populations. All lake users would be affected under those conditions, which might last for months at a time but are temporary. The USACE resource management staff at Allatoona Lake works closely with the public under such circumstances and pursue reasonable temporary measures to maintain at least a minimum level of access to the lakes until the extreme conditions improve. Similar actions would be expected by APC, working closely with operators of facilities that provide access to the general public at Weiss and Logan Martin lakes.

The Master Manual and the individual project WCMs outline current communication measures to promote and maintain public safety at USACE projects and at the APC projects having federally authorized purposes for flood risk management and downstream navigation support. These measures include communication of warnings during floods, dangerous flow conditions, and other emergencies affecting the reservoirs and the tailrace areas below the dams. For example, the Allatoona project includes an automated warning system associated with rapid changes in flow and stage conditions downstream of the dam when hydropower generation is initiated and/or spillway gates are opened.

5.6.7.2 Recommended Plan (Alternative 11)

Alternative 11 would have essentially the same effects as described for NAA in Section 5.6.7.1 with respect to minority and low-income populations.

5.6.7.3 Alternative 10

Alternative 10 would have essentially the same effects as described for NAA in Section 5.6.7.1 with respect to minority and low-income populations.

5.6.7.4 Alternative 3

Alternative 3 would have essentially the same effects as described for NAA in Section 5.6.7.1 with respect to minority and low-income populations.

5.6.8 Protection of Children

EO 13045 requires federal agencies to consider and address the impacts of their activities on children with respect to environmental health and safety risks (see Section 3.1.6.12 for more details). Table 3-15 provides information on the number and general characteristics of children residing in the ACT River Basin. Operation of large reservoir projects provide increased opportunities for public access and use, particularly in the form of water-based recreation. Public use of the projects inherently includes a level of health and safety risk to both adults and children. USACE, in cooperation with the state of Georgia and operators of project facilities, seeks to minimize such risks at the Allatoona project by promoting and implementing water safety and other education programs, providing clear signage, marking designated uses areas, removing hazards where appropriate, restricting public access to certain areas designated for authorized personnel only, and other activities designed to promote safe use, many of which are directly focused on children who visit the projects. Similarly, the APC, the state of Alabama, and operators of facilities providing access to the general public at Weiss and Logan Martin projects cooperate to reduce health and safety risks at those projects.

5.6.8.1 No Action Alternative

The environmental health and safety activities at USACE and APC projects as described in Section 5.6.8 would be expected to continue and would be adjusted over time as needs might change. Existing water management activities at the reservoirs do not impose any undue risks to children that are not effectively addressed by the current environmental health and safety activities at the projects.

5.6.8.2 Recommended Plan (Alternative 11)

Alternative 11 would have the same effects relative to protection of children as described for the NAA in Section 5.6.8.2. No additional risks would be imposed by the proposed updates to water management practices or increased water supply.

5.6.8.3 Alternative 10

Alternative 10 would have the same effects relative to protection of children as described for the NAA in Section 5.6.8.2. No additional risks would be imposed by the proposed updates to water management practices or increased water supply.

5.6.8.4 Alternative 3

Alternative 3 would have the same effects relative to protection of children as described for the NAA in Section 5.6.8.2. No additional risks would be imposed by the proposed updates to water management practices or increased water supply.

5.6.9 Executive Order 11988

EO 11988 "…is the policy of the Corps of Engineers to formulate projects which, to the extent possible, avoid or minimize adverse impacts associated with use of the base flood plain and avoid inducing development in the base [floodplain] unless there is no practicable alternative." The RP would have negligible effects on the economic activity within the base floodplain. The RP is not designed to encourage future development within the base floodplain.

5.6.9.1 No Action Alternative

Descriptions of the flood plain including the structure inventory assumptions in the future are detailed in Appendix D. Existing water management activities at the reservoirs and existing water supply demands are not expected to impact the base floodplain or development within the floodplain.

5.6.9.2 Recommended Plan (Alternative 11)

Alternative 11 would have the same effects relative to EO11988 as described for the NAA in Section 5.6.8.2. No additional risks would be imposed by the proposed updates to water management practices or increased water supply.

5.6.9.3 Alternative 10

Alternative 10 would have the same effects relative to EO11988 as described for the NAA in Section 5.6.8.2. No additional risks would be imposed by the proposed updates to water management practices or increased water supply.

5.6.9.4 Alternative 3

Alternative 3 would have the same effects relative to EO11988 as described for the NAA in Section 5.7.9.1. No additional risks would be imposed by the proposed updates to water management practices or increased water supply.

5.7 Aesthetic Resources

5.7.1 No Action Alternative

Under the NAA, both USACE and APC reservoirs serve as valuable aesthetic assets in the ACT River Basin. The periods of winter drawdown for Allatoona Lake, Weiss Lake, and Logan Martin Lake under the NAA would continue to decrease their aesthetic value during the winter months, as described in Section 3.1.7. The free-flowing reaches of rivers and streams, wetlands, and upland areas (Piedmont to Southern Appalachian Mountains) across the basin are important visual assets, as presented in Section 3.1.7. These visual assets in the ACT River Basin are generally expected to remain unchanged under the NAA.

5.7.2 Recommended Plan (Alternative 11)

Alternative 11 would raise the winter pool levels in Weiss Lake and Logan Martin Lake by 3 ft and 2 ft, respectively. This would result in about 5,100 ac less of exposed lakebed at Weiss Lake and about 1,300 ac less of exposed lakebed at Logan Martin Lake compared to the current winter drawdown levels at those lakes. The water supply storage reallocation proposal for Allatoona Lake would increase the level of the lake by up to 1 ft throughout the year compared to current operations. At any given time of year, this change would likely result in 200 to 300 ac less of exposed lake bottom than currently experienced. Implementation of Alternative 11 would have a beneficial aesthetic effect on the three reservoirs. No other aesthetic effects in the basin are expected under Alternative 11.

5.7.3 Alternative 10

Compared to the NAA, Alternative 10 would have the same effects on aesthetic resources in the basin as described for Alternative 11.

5.7.4 Alternative 3

Alternative 3 would have the same effects on aesthetic resources in the basin as the NAA.

5.8 Air Quality and General Conformity

5.8.1 No Action Alternative

Under the NAA, air quality and air emissions along the Coosa River and Etowah River (including the Allatoona, Weiss, H. Neeley Henry, and Logan Martin project areas) would continue generally as described in Section 3.1.8. Future changes in population and land use may occur in the project area under the NAA, potentially resulting in some minor changes to regional air quality and air emissions in the project area.

5.8.2 Recommended Plan (Alternative 11)

Alternative 11 is not expected to result in any reasonably foreseeable direct or indirect emissions. Such types of federal activities are specifically exempt from the general conformity regulations. The requirements of the general conformity rule would not apply to Alternative 11 because the proposed activities would result in no emissions increase (40 CFR 93.153(c)(2)). A Record of Non-Applicability (RONA) to the general conformity rule has been prepared and is provided as Attachment 1 to Appendix E. Future changes in population and land use, independent of Alternative 11, could potentially cause minor changes to regional air quality and air emissions in the project area.

5.8.3 Alternative 10

Compared to the NAA, the effects of Alternative 10 for air quality and general conformity would be the same as those described for Alternative 11.

5.8.4 Alternative 3

The effects of Alternative 3 for air quality and general conformity would be essentially the same as those described for Alternative 11 at Allatoona Lake and the same as the NAA for the Coosa River from Weiss Lake to its confluence with the Tallapoosa River.

5.9 Noise

5.9.1 No Action Alternative

Under the NAA, noise levels along the Coosa River and Etowah River (including the Allatoona, Weiss, H. Neeley Henry, and Logan Martin project areas) would continue generally as described in Section 3.1.9. In most areas along this corridor, noise levels typically do not present major challenges or concerns. Small changes in the natural soundscape associated with water movement, and animal movement and vocalizations in and around the projects could occur. Localized higher noise levels would tend to occur in more urbanized areas around the reservoirs or during periods of more concentrated boating/jet ski activity on the reservoirs.

5.9.2 Recommended Plan (Alternative 11)

Alternative 11 would not be expected to cause increased noise levels along the Coosa River and Etowah River (including the Allatoona, Weiss, H. Neeley Henry, and Logan Martin project areas). No new noise from man-made sources would be introduced by implementing Alternative 11. Although noise is partially a function of population and land use throughout the basin, no major changes in current noise level conditions are expected in the foreseeable future.

5.9.3 Alternative 10

Compared to the NAA, the effects of Alternative 10 for noise levels would be the same as those described for Alternative 11.

5.9.4 Alternative 3

The effects of Alternative 3 for noise levels would be essentially the same as those described for Alternative 11 at Allatoona Lake and the same as the NAA for the Coosa River from Weiss Lake to its confluence with the Tallapoosa River.

5.10 Traffic and Transportation

5.10.1 No Action Alternative

Under the NAA, traffic and transportation resources along the Coosa River and Etowah River (including the Allatoona Lake, Weiss Lake, and Logan Martin Lake project areas) would continue to exist as described in Section 3.1.10 and serve local and regional transportation needs as they currently do. No major expansion of transportation resources near the Coosa or Etowah rivers that would potentially affect the continued operations of the USACE and/or APC reservoirs is expected in the foreseeable future. Major changes to the transportation infrastructure in those areas are not expected in the foreseeable future.

5.10.2 Recommended Plan (Alternative 11)

Alternative 11 would not be expected to result in effects to major traffic and transportation resources in the general project area, nor would Alternative 11 have a discernable effect on traffic and transportation resources immediately adjacent to the dams and lakes as needed for project operations, access by local residents, and access by visitors to the shoreline, lake, public use facilities (marinas, parks, and picnic areas). Railroad, interstate highways, and U.S. highways that cross or run along the Coosa and Etowah rivers (including the USACE and APC reservoirs) would not be affected by Alternative 11. The effects of Alternative 11 on commercial navigation and recreational boating activities are discussed in Appendix E.

5.10.3 Alternative 10

Compared to the NAA, the effects of Alternative 10 for traffic and transportation would be essentially the same as those described for Alternative 11.

5.10.4 Alternative 3

The effects of Alternative 3 for traffic and transportation would be essentially the same as those described for Alternative 11 at Allatoona Lake and the same as the NAA for the Coosa River from Weiss Lake to its confluence with the Tallapoosa River.

5.11 Cultural Resources

5.11.1 No Action Alternative

Under the NAA, cultural resources present at Allatoona Lake, Weiss Lake, Logan Martin Lake, and downstream of those three projects are expected to remain in place and would continue to be exposed to the normal range of current operating practices at those projects as described in Section 3.1.11. The APE is expansive and has high potential for cultural resources, including pre-contact Native American and historic period sites. Some portions of the APE have been surveyed for cultural resources and data, particularly from work previously conducted at Allatoona Lake, indicates that some sites have been impacted by normal reservoir operations.

5.11.2 Recommended Plan (Alternative 11)

Alternative 11 would include actions at Allatoona, Weiss, and Logan Martin lakes that would result in changes to seasonal water levels and minor changes in the volume of water released from the dams that fall within the full range of pool elevation and downstream releases that already occur at these projects under current operations. A preliminary review of the Alabama and Georgia state site files indicated that numerous archaeological sites that are potentially eligible for NRHP listing have been recorded within the APE which could be susceptible lake level fluctuations and downstream flow increases under the RP. Specifically, these include 113 cultural sites within Allatoona Lake, 30 sites within Logan Martin Lake, 111 sites within Weiss Lake, and 53 sites along the Coosa River below the Weiss Dam. To determine how these sites within the APE are being affected by current operations and how they could be affected by the proposed modified flood operations will necessitate additional background research and record searches.

Because the changes to pool levels and downstream releases that would occur under Alternative 11 would be well within the range of conditions already being experienced under current operations, it is likely that any adverse effects would be minimal. Nonetheless, Alternative 11 does have some potential to cause adverse effects upon cultural resources within the APE. Differentiating these effects from those caused by normal operations will be difficult. Comparison of the frequency of wet/dry cycles associated with lake level fluctuations under current operations to the frequency of wet/dry cycles under Alternative 11 will be required to determine whether the wetting/drying cycles may occur more frequently under Alternative 11. A wet/dry cycle is defined as an instance of a given water surface elevation that becomes inundated, then dries for at least one week. Section 106 coordination and consultation with the State Historic Preservation Offices (SHPOs) from Alabama and Georgia and the Mobile District’s Tribal Partners will be necessary and has been initiated. Furthermore, as the impacts to listed, eligible, or potentially eligible cultural resources cannot be currently understood, a draft final Programmatic Agreement (PA) has been developed among the Alabama SHPO, Georgia SHPO, and the USACE, Mobile District and will be executed before the ROD is signed. The PA will provide stipulations on identifying National Register of Historic Properties (NRHP) eligible properties, determining the effects of the RP on historic properties, and developing strategies to mitigate any adverse effects of the RP on historic properties.

5.11.3 Alternative 10

The cultural resource effects of Alternative 10 would essentially be the same as Alternative 11.

5.11.4 Alternative 3

The cultural resource effects of Alternative 3 would essentially be the same as Alternative 11 at Allatoona Lake and the same as the NAA for the Coosa River from Weiss Lake to its confluence with the Tallapoosa River.

5.12 Hazardous and Toxic Materials

5.12.1 No Action Alternative

Under the NAA, conditions with respect to management, use, and disposal of hazardous and toxic materials and potential exposure to previously disposed hazardous and toxic wastes in the vicinity of USACE and APC projects along the Coosa and Etowah rivers would be expected to continue as described in Section 3.1.12. Routine project operations activities at USACE and APC reservoirs in the project area would continue to use hazardous and toxic materials. The handling, use, storage, and disposal of such materials from those operations would be conducted in accordance with label recommendations and local, state, and federal regulatory guidelines. No increased risk of exposure to, or release of hazardous or toxic materials along the Coosa River to an extent greater than currently exists would be expected from implementing the NAA.

5.12.2 Recommended Plan (Alternative 11)

Under Alternative 11, no change would be expected relative to the management, use, and disposal of hazardous materials associated with routine O&M activities on the USACE and APC projects. The handling, use, storage, and disposal of such materials would continue being conducted in accordance with label recommendations and local, state, and federal regulatory guidelines.

Implementing the proposed modified flood operations at Weiss and Logan dams and lakes would not likely pose an increased risk of release of hazardous and toxic materials from industrial and commercial sites as identified in Section 3.1.12. Using 1979 Coosa River flood data–the largest on record–and selected locations downstream of Logan Martin Dam, modified flood operations that would be expected to increase the depth of downstream flooding were considered. Based on the 1979 flood data and a cut back of water releases, a similar flood event would likely increase downstream flooding depths by about 1.2 ft approximately 0.25 mi downstream of the dam with flood depths decreasing to about 0.42 ft above 1979 levels approximately 22 mi downstream of the dam. Flood levels up to 7 mi downstream of the dam would likely range between 1.2 ft to 1.0 ft and would occur in areas that are predominantly forested or used for agriculture. Beyond 7 mi downstream, where industrial and commercial activities occur along the river, flood levels decrease to less than 1 ft above 1979 levels. Below Weiss Dam, similar flood levels would be expected along the river where forested and agricultural land dominate. Overall, inundation risks to industrial and commercial facilities where hazardous materials and waste are used or generated are minimized because such facilities along the river are typically on topographic highs or high ground to avoid inundation from such flood events.

5.12.3 Alternative 10

Compared to the NAA, the effects of Alternative 10 relative to hazardous and toxic materials/waste considerations would be the same as those described for Alternative 11.

5.12.4 Alternative 3

The effects of Alternative 3 relative to hazardous and toxic materials/waste considerations at Allatoona Lake would likely be the same as those described for the NAA. Alternative 3 does not include proposed modifications to flood operations at the Weiss and Logan Martin projects.

5.13 Cumulative Effects

Cumulative effect is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative effects can result from actions that may be individually minor but collectively significant over time.

USACE operates five multipurpose reservoir projects and APC operates 11 reservoir projects in the ACT River Basin. The baseline condition for continued operation of those projects is defined by the USACE ACT River Basin Master Manual and individual WCMs that were updated and approved in May 2015 and by the current FERC licenses for the APC projects. The RP includes proposed changes to operations at USACE's Allatoona Dam and Lake (the water supply reallocation request) and at APC's Weiss Dam and Lake and Logan Martin Dam and Lake (the APC-requested modifications to federally authorized flood operations). The proposed changes in operations at these projects might have effects on environmental and socioeconomic conditions in the basin. This analysis addresses the cumulative effects of the proposed actions and other ongoing or reasonably foreseeable actions in the ACT River Basin.

5.13.1 Past, Present, and Reasonably Foreseeable Future Actions

Table 5-17 identifies and summarizes those reasonably foreseeable actions by private sector entities, local governments and water utilities, state agencies, and federal agencies that have cumulative effects on the water and related land resources of the ACT River Basin. The table includes activities that may already be ongoing or recurring, newly initiated, and/or expected to occur in the future. In consideration of the reasonably foreseeable activities, this section discusses the potential incremental cumulative effects of the TSP on ACT River Basin resources. Appendix E, Section E.3.15, presents more detailed information on past, present, and reasonably foreseeable actions and cumulative effects of the proposed action.

The ACT River Basin has been permanently altered by construction of the USACE, APC, and other nonfederal reservoir projects (see Sections 2.1 and 3.1.1.3). One effect of the conversion of flowing water habitat to still water by constructing dams along the mainstem rivers of the ACT River Basin and tributaries has been the decline or loss of river-dependent species of freshwater fishes, mussels, and snails. The habitat fragmentation effects of dams in the basin have resulted in declines in habitat for anadromous fishes. USACE, APC, and other reservoirs in the ACT River Basin have changed the frequency of floodplain inundation in some areas and altered the ecology of the rivers.

Human-induced inputs of various stressors into aquatic and terrestrial ecosystems can further compromise the ability of an ecological system to support a healthy biota. As growth (i.e., increased density of human habitation) continues, terrestrial ecosystems and wetlands adjacent to waterbodies in the basin are expected to become more degraded despite regulation and/or conservation efforts (e.g., adding stream buffers and implementing wetland mitigation requirements). If, however, additional attention is given to protecting the integrity of floodplains and restrictions are placed on land-cover conversions from urban and suburban development, those areas could retain their function in fluvial processes. Those factors are expected to influence conditions in tributaries, but they are expected to have little, if any, effect on the inundation of floodplains and wetlands in the Alabama, Coosa, and Tallapoosa river corridors. Those systems are largely influenced by reservoir operations.

Table 5-17. Past, Present, and Reasonably Foreseeable Future Activities in the ACT River Basin with Cumulative Effects on Water and Related Land Resources

Performing Entity/ Activity	Location of Activity in ACT River Basin	Environmental Effects
Private sector		
Commercial and residential development	Basinwide (with specific focus on rapid development northwest of Metro Atlanta in Etowah River Basin).	Ongoing and future changes in land use from forested and agriculture to urban/suburban; more impervious surfaces will increase runoff during storm events; decreased base flows in streams; potential water quality degradation; potential loss of fish and wildlife habitat and more imperiled aquatic species.
Nonfederal hydropower development	Carters Reregulation Dam and Claiborne L&D.	Between 1982 and 2019, multiple private-sector hydropower interests have pursued FERC licenses to develop nonfederal hydropower facilities at USACE's Carters Reregulation Dam (Coosawattee River) and Claiborne L&D (Alabama River). To date, none have been successful. Additional efforts are likely in the future. Effects include potential for additional hydropower generation and for alteration to flow regimes that could affect aquatic habitat.
APC reservoir management for Coosa River and Tallapoosa River hydropower projects	Coosa and Tallapoosa rivers, AL.	Effects of these established and ongoing activities are addressed in current FERC licenses and their supporting NEPA documents.
APC routine O&M activities at Coosa River and Tallapoosa River hydropower projects	Coosa and Tallapoosa rivers, AL.	Activities include facility maintenance, natural resource stewardship, shoreline management, and operation of limited recreation facilities. Effects of these established and ongoing activities are generally minor and are addressed in current FERC licenses and their supporting NEPA documents.
Local governments and water utilities		
Regional water supply reservoirs	Richland Creek Reservoir (Paulding Co., GA) under construction; Russell Creek Reservoir (Dawson Co., GA) permitted and construction pending; Indian Creek Reservoir (Carroll Co., GA) permit pending.	Direct and localized habitat loss in Richland Creek; potential direct and localized habitat loss in Russell Creek and Indian Creek; potential reduced flows in Etowah River and Tallapoosa River. Would provide additional water supply sources to meet increased demands.

Performing Entity/ Activity	Location of Activity in ACT River Basin	Environmental Effects
Water and wastewater infrastructure	Basinwide but occurring more rapidly in developing areas in the Etowah River Basin (in Cobb, Paulding, and Cherokee counties and other northwest GA counties).	In rapidly developing areas, direct construction impacts on landscape; conversion of land use from primarily forested and agricultural to urban/suburban; more impervious surfaces will increase runoff during storm events and potentially impact base flows in streams; potential loss of fish and wildlife habitat.
Other public service infrastructure (roads, public safety facilities, schools, and so forth)	Basinwide but occurring more rapidly in developing areas in the Etowah River Basin (in Cobb, Paulding, and Cherokee counties and other northwest GA counties).	In rapidly developing areas, direct construction impacts on landscape; conversion of land use from primarily forested and agricultural to urban/suburban; more impervious surfaces will increase runoff during storm events and potentially impact base flows in streams; potential loss of fish and wildlife habitat.
Interbasin transfer of water	Upper Coosa River and Etowah River basins (principally in vicinity of Metro Atlanta).	Typically involves M&I water withdrawal in one river basin and water use, wastewater treatment, and return in an adjacent basin. Potential effects on stream flow (losses or gains in affected streams) and water quality.
State government		
State water planning	Basinwide (GA, AL, and TN).	Water plans facilitate implementing improved water conservation and efficiency measures and support developing long-range estimates of future demands, technical tools, and models to facilitate water planning, and regional plans to meet projected demands. State water planning processes are highly likely to result in reduced impacts to environmental resources compared to a more fragmented, reactive approach.
State water quality regulation	Basinwide (GA, AL, and TN).	The states have effective water quality programs in place. The adverse effects of increased development and land-use change in the future is likely to be partially offset with improved tools and models to assess water quality conditions and implementation of improved wastewater treatment and nonpoint source management measures.
Federal government		
USACE ACT River Basin reservoir management	Basinwide.	USACE will continue water management activities for existing reservoir projects consistent with the updated ACT River Basin Master Manual approved May 2015; the EIS for the updated Master Manual addressed minor alterations in the flow regime, minor water quality impacts, a drought operations plan, and navigation maintenance plan.

Performing Entity/ Activity	Location of Activity in ACT River Basin	Environmental Effects
USACE routine O&M activities at ACT River Basin projects	Basinwide.	Activities include facility maintenance, natural resource stewardship, shoreline management, and operation of recreation areas. USACE will continue routine O&M activities at its reservoir projects in the ACT River Basin. The effects of those activities are generally minor and were addressed in a series of EISs in the 1970s for each ACT River Basin project and a 1987 supplemental EIS for the Alabama-Coosa Rivers project. The ACT River Basin Master Manual update and EIS, approved in May 2015, included some updates regarding routine O&M practices. Those documents describe the effects of these established and ongoing activities.
FERC licensing for APC existing projects in ACT River Basin	Coosa and Tallapoosa rivers, AL.	Under the Federal Power Act, as amended, FERC licenses nonfederal hydropower production subject to NEPA and other relevant environmental laws and EOs. In the licensing process, FERC addresses environmental impacts and requires appropriate mitigation measures through public and agency reviews. The environmental effects of the established APC project operations in the ACT River Basin are documented in their respective FERC licenses. Any change in operation by APC would require environmental review and a modification to the FERC licenses.
FERC licensing of new nonfederal hydropower projects	Carters Reregulation Dam; Claiborne L&D; other potential sites in the basin.	Proposals for nonfederal development at these projects have been active almost since the USACE projects were completed in the 1960s and 1970s. A licensing request for nonfederal hydropower development at the Carters Reregulation Dam is active at the present time. Other proposals are likely in the future. FERC, in coordination with USACE, would evaluate all new nonfederal proposals with respect to impacts on the environment and on USACE project operations, including mitigation of any adverse effects.

5.13.2 Contribution of the Recommended Plan to Cumulative Effects

5.13.2.1 Water Quantity

Overall, the RP would have a minor positive cumulative effect on lake level and streamflow conditions in the ACT River Basin. Winter pool levels would substantially increase at Weiss and Logan Martin lakes and year-round pool level conditions at Allatoona Lake would slightly improve. The RP would likely result in minimal incremental effects on streamflow conditions throughout the basin.

5.13.2.2 Water Quality

Water quality is influenced by multiple factors, including pollutant loads and in-stream flows (water quantity). Pollutant loads include both point and nonpoint sources of pollution. Point sources of pollution are regulated by USEPA through the NPDES program under the CWA. Nonpoint sources of pollution are also targeted to reduce pollutant loads under the CWA through TMDLs. Enforcement of reductions varies because of limited resources. As land uses in the ACT River Basin change from forested to urban land cover, especially in the headwaters areas of the Etowah River Basin, peak flows in the system are likely to increase and base flows in the system are likely to decrease. Urban land cover would generally increase stormwater runoff and decrease interception of rainfall and infiltration, resulting in less assimilative capacity during periods of low flow because base flow would decrease.

Implementing the operational changes included in the 2015 ACT River Basin Master Manual update was expected to result in minor cumulative effects on water quality in the basin. The combination of minor changes to the flow regime and continued discharges during low-flow conditions by some entities holding NPDES permits were expected to affect water temperature, nitrogen, phosphorus, and chlorophyll *a*. For the most part, those effects would be uneven throughout the course of the affected project area and would be expected to occur only during low-flow periods. A waterbody's ability to assimilate pollutants is dependent on the amount of water in-stream, especially during low-flow periods. For that reason, the HEC models were used during the Master Manual update process to ascertain the relationship between quantity and quality in the ACT River Basin. Agencies regulating water quality in rivers and reservoirs will continue to monitor them for impairment and improvement and enforce reductions until standards are met. That balance of what is allowable and what is discharged is an ongoing cycle of monitoring, assessment, and implementation. Under the NAA, water quality standards for total phosphorous are already exceeded in the Coosa River under most conditions and exceeded for chlorophyll a under certain conditions. During the Master Manual update process and continuing into this ACR study, it has been reasonable to expect that water quality conditions in the ACT River Basin would improve over time with the implementation of the TMDLs, improved infrastructure, permitting requirements, and land-use practices.

The operational changes in the RP would have negligible incremental effects on water quality in comparison to the effects of all the other reasonably foreseeable activities identified in the basin (see Section 5.2.2). The RP would have a negligible effect on concentrations for water quality parameters, such as total phosphorous and chlorophyll, in the Coosa River reservoirs that may already exceed state water quality standards from time to time, primarily due to non-point sources of pollution in the watershed and unrelated to reservoir project operations.

5.13.2.3 Geology and Soils

The RP would have a negligible cumulative effect on geology and soils resources in the ACT River Basin compared to the effects of other identified activities in the basin.

5.13.2.4 Climate

The RP would have a negligible cumulative effect on climate conditions in the ACT River Basin compared to the effects of other identified activities in the basin.

5.13.2.5 Land Use

Changes in land use in the basin are expected and will likely be more accelerated in areas northwest of Metro Atlanta, particularly in the Etowah River Basin. The changes will likely result in a loss of forested and agricultural lands in exchange for more urban and suburban types of development. That development is likely to increase runoff during storm events because of an increase in the extent of impervious surfaces.

The ROI for land use for proposed actions in the RP is the reservoir project land, the adjacent shorelines, and lands immediately downstream of the Allatoona, Weiss, and Logan Martin dams. The RP would not change land-use allocations or zoning. It would not have effects that would cause substantial change in established land uses, disrupt or divide established land-use configurations, or be inconsistent with adopted land-use plans. USACE typically considers requests for a variety of real estate easements, leases, and shoreline management permits at its projects. Such actions are not expected to affect water management decisions or project purposes nor would they be impacted by the RP. Therefore, no cumulative effects on land use would be expected because of the RP.

5.13.2.6 Biological Resources

Since the USACE and APC projects are already constructed and operating in the basin, most of the major changes to the biological resources of the basin have already occurred. Further changes in flow regime and water quality driven by additional population growth and urban/suburban development in the basin may have additional effects on fish and wildlife habitat and imperiled aquatic species. New infrastructure to support population growth (including water supply, wastewater, and other public service infrastructure) will likely contribute to effects on habitat and aquatic species. New regional water supply reservoirs, beyond those already constructed or permitted for construction and addressing future needs elsewhere in the ACT River Basin independent of the RP, would likely add to habitat fragmentation and loss and increased risk to species in the basin that are already imperiled. Potential new nonfederal hydropower development may result in further localized effects on the current flow regimes and water quality. Proactive water supply planning and water quality management/regulation by the states will likely offset some of those potential adverse ecological effects. The RP would generally have minor effects on biological resources and would have a minimal incremental effect on the cumulative effects of those other activities in the basin.

5.13.2.7 Socioeconomic Resources

The RP would have a negligible cumulative effect on socioeconomic resources in the ACT River Basin compared to the effects of other identified activities in the basin.

5.13.2.8 Aesthetic Resources

Overall, aesthetic conditions in the natural areas of the ACT River Basin are likely to be adversely affected by the land-use changes associated with the expected population growth and infrastructure development. The RP would result in a slight overall improvement in ACT River Basin aesthetic conditions during the winter months at Weiss and Logan Martin lakes and year-round at Allatoona Lake (see Section 5.7.2) as the winter drawdown in reservoir pool levels is reduced.

5.13.2.9 Air Quality and General Conformity

The RP would have negligible cumulative effects with respect to air quality and general conformity considerations in the basin.

5.13.2.10 Noise

The RP would have negligible cumulative effects with respect to noise considerations in the basin.

5.13.2.11 Traffic and Transportation

The RP would have negligible cumulative effects relative to traffic and transportation conditions in the basin.

5.13.2.12 Hazardous and Toxic Waste

The RP would have negligible cumulative effects relative to hazardous and toxic waste concerns in the basin.

5.13.2.13 Cultural Resources

Regardless of changes in reservoir operations addressed in the RP, populations and associated land-use changes in the ACT River Basin are expected to increase in the future, thus increasing the potential for impact on known and undiscovered archaeological sites in the basin. Increased human interaction along the affected lakeshores and waterways is likely to increase the impact of access as a result of vandalism or artifact collection. The cumulative effects of the RP on cultural resources are expected to be minor compared to the other changes in the ACT River Basin driven by population growth and land use changes.

5.14 Mitigation Considerations

Mitigation includes measures to avoid, reduce, minimize, or compensate for adverse impacts that could result from a selected course of action, in this case, the proposed reallocation of storage in Allatoona Lake and proposed modifications to flood operations at APC's Weiss Lake and Logan Martin Lake. The iterative process employed by USACE for formulation and evaluation of water management alternatives, coupled with substantial coordination with the other entities, provided a strong framework for considering the incremental effects of the various components of the alternative plans and for adjusting proposed operations to minimize adverse effects on the natural environment, as well as social, cultural, and economic impacts.

Based on the expected minor to negligible effects of the RP on significant natural resources, specific compensatory fish and wildlife mitigation measures are not considered necessary. No specific fish and wildlife mitigation commitments have been included in the RP. Potential impacts to cultural resources may occur as a result of proposed guide curve changes at the reservoir projects and from increased downstream flows from some project dams. Within project reservoir pools, guide curve changes may cause changes in pool level fluctuation and erosion patterns, which could potentially affect cultural resources within the drawdown zones of the reservoirs. Additionally, increased flows from some project dams could cause stream bank erosion and impact cultural resources within downstream portions of the project. Those effects and potential mitigation measures are unknown at this time, but they will be the subject of a PA with the Georgia SHPO and Alabama SHPO that will define the approach for assessing the effects and determining appropriate mitigation measures for any cultural resource impacts.

Section 7.7.4 identifies several recreational and shoreline features at Allatoona Lake that may be slightly affected by the summer guide curve increase to elevation 841 ft (from 840 ft) in the RP. The general effects of the RP on these features are also discussed in pertinent subsections of Section 5. The proposed actions to offset the potential and, relatively minor, overall effects to existing shoreline protection measures, public docks, swimming beaches, and aids to recreational boat navigation will be implemented, when necessary and appropriate, and the appropriate environmental clearances will be obtained before their implementation.

Water management inherently involves adapting to unforeseen conditions. Implementing the RP may result in unforeseen changes and conditions that could require further revisions and updates to the 2015 ACT Master Manual. Further refinements or enhancements of the water control procedures may be necessary to account for changed conditions resulting from unforeseen conditions, new requirements, additional data, or changed social or economic goals. Unforeseen conditions with known or potential adverse consequences might occur during routine water management actions performed in accordance with the approved Master Manual. If and when such conditions occur, corrective actions will be taken within applicable authority and policies, and in coordination with other interests, to address these conditions, such as temporary deviations to the Master Manual. Certain temporary deviations from the Master Manual might have impacts that go beyond the scope of the current evaluation. Because it is not possible to predict the entire range of possible water management responses to extraordinary circumstances, an evaluation of each potential action would be made at the time of its consideration. If the action has not been previously considered by a NEPA evaluation, further NEPA documentation may be required.

5.15 Other NEPA Considerations

5.15.1 Irreversible or Irretrievable Commitment of Resources

Irreversible or irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use of those resources will have on future generations. Irreversible effects primarily result from use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments would typically involve the use or loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species).

The proposed reallocation of storage at Allatoona Lake and proposed modifications to current flood operations at Weiss and Logan Martin lakes would not involve structural changes to those projects or construction of new features at those projects. Thus, the proposed actions would not involve an irreversible commitment of financial, energy, or material resources or cause a direct physical impact on natural resources.

Reallocation of additional multipurpose reservoir storage in Allatoona Lake to dedicated water supply storage would be implemented via storage agreements between USACE and both the CCMWA and city of Cartersville. The storage agreements would, in effect, represent a permanent change and a commitment of reservoir storage in Allatoona Lake to a dedicated water supply purpose as the local water providers would likely make investments in water treatment, storage, distribution, and wastewater treatment infrastructure over time to make full use of that reservoir storage to meet 2050 demands. The extent to which treated wastewater is returned to the lake, or at least to the ACT River Basin, would partially offset the commitment of additional reservoir storage to the water supply purpose.

Reducing the top of flood storage pool, raising the winter guide curve elevations, and associated modifications to flood operations at Weiss and Logan Martin lakes would not represent an irreversible or irretrievable commitment of resources. Should future conditions at these projects indicate that further changes would be appropriate to address unanticipated effects associated with these operational changes, partial or full reversal of the proposed modifications to flood operations could occur through a future update to the ACT River Basin Master Manual and pertinent project WCM(s).

The water management actions included in the RP are not consumptive in nature. The RP effectively maintains peak hydropower production and promotes continued use of renewable resources (water) to meet peak power demands in lieu of fossil fuels. The RP, updated ACT River Basin Master Manual, and updated Allatoona, Weiss, and Logan Martin WCMs would continue to have generally positive effects on resources (e.g., potential reduction of damages from flooding). Overall, the RP (Alternative 11) would not result in irreversible or irretrievable commitments of resources, except to the extent described above.

5.15.2 Short-Term Uses of the Human Environment and Maintenance and Enhancement of Long-Term Productivity

The construction of the large dams on the mainstem rivers in the ACT River Basin by USACE and APC, ranging from the first APC projects in the 1920s to the completion of R.L. Harris Dam and Lake in 1983, have permanently altered the basin in multiple ways. The construction of reservoirs replaced free-flowing rivers and streams and adjacent floodplains, significantly altering the habitat and the composition of aquatic species that favor living in high-velocity water or slow-moving, wide rivers versus those that thrive in a series of large impoundments. Storage reservoirs have the effect of reducing the occurrence and magnitude of peak flows downstream of the dams. These projects have provided substantial opportunities for economic growth and development and an improved quality of life in the southeast region of the U.S. through improved flood risk management, increased hydropower production, water-based recreational opportunities, dependable navigation channels, more stable sources of water supply, and other benefits to the public. Concurrently, these projects provide stable, productive, and highly valued environmental benefits in the basin, even in their altered condition.

Reservoir operations have reduced the occurrence and severity of damaging floods and provided a significant source of renewable energy, but they have also changed the character of floodplain vegetation and available habitats. Reservoir operations have also enabled the maintenance of minimum flows downstream of the dams during critically dry periods. Prior to dam and reservoir construction, instream flow conditions during critical drought periods could decline to less than acceptable levels for many aquatic species, potentially impact the viability of community water withdrawal intakes, and severely limit public access and recreation opportunities.

The proposed storage reallocation at Allatoona Lake and changes to flood operations at Weiss Lake and Logan Martin Lake included in the RP would not be expected to substantially alter the present relationship between short-term uses of man's environment and maintenance and enhancement of long-term productivity. The proposed changes under the RP include operational adjustments to current reservoir management practices that best balance the multiple purposes of Allatoona Dam and Lake in the ACT River Basin and would be consistent with hydropower generation, flood risk management, and navigation support purposes of the APC Weiss and Logan Martin projects, including ongoing activities at all three projects that sustain and improve environmental conditions in the basin. Given the current altered state of the ACT River Basin with its multiple USACE and APC dams and reservoirs, the RP would most effectively maintain and enhance long-term productivity compared to the NAA and the other alternatives.

6.0 PUBLIC AND AGENCY INVOLVEMENT *

6.1 Notice of Intent

A Notice of Intent (NOI) announcing the Allatoona Lake Water Supply Storage Reallocation Study and Updates to the Weiss and Logan Martin Reservoir Project WCMs was posted April 30, 2018 (83 FR 18829, April 30, 2018). The initial NOI provided background on the study, as summarized in Section 1.1. USACE announced the time and location of five public scoping meetings through the *Federal Register* in a supplement to the NOI on July 13, 2018 (83 FR 32641, July 13, 2018). The scoping report for this study in Appendix F includes both notices.

In addition, USACE Mobile District sent letters to 26 federally recognized American Indian tribes on July 20, 2018, notifying them of the study and the opportunity to attend one or more of the public meetings. The letters also offered the opportunity to participate in an alternative meeting or communications format upon the request of the tribes. USACE received one response, an August 6, 2018, letter from the Quapaw Tribe of Oklahoma. The letter stated that the project is outside the current area of interest for the Quapaw Tribe and offered no comments on the project. More detailed information on these tribal consultation efforts are provided in the scoping report in Appendix F.

6.2 Scoping Process

USACE held an interagency meeting on July 12, 2018, with state and federal agencies, by web conference, prior to the public scoping meetings. An invitation was distributed to individuals representing several agencies, including ADCNR, ADEM, Alabama Office of Water Resources (ALOWR), GADNR, FERC, USEPA, USFWS, Southeastern Power Administration (SEPA), National Marine Fisheries Service, NPS, Natural Resources Conservation Service, U.S. Coast Guard, U.S. Forest Service, and USGS. Two agencies participated in the meeting in person and six agencies participated by phone. Participants in the web meeting also were invited to attend the public meetings. Several of the participants also attended the public meetings, and some of them attended more than one of the public meetings. A summary of the interagency web meeting is included in the scoping report in Appendix F.

USACE Mobile District conducted public scoping meetings from July 30 through August 3, 2018, to initiate preparation of a combined water supply storage reallocation study and updates to the Weiss and Logan Martin reservoir project WCMs, or the Allatoona-Coosa Reallocation Study (ACR). The PDT had two primary objectives for the scoping meetings: (1) to inform agencies and the public about the project scope; schedule; and project planning, NEPA, and reservoir water management processes; and (2) to seek input on key concerns and issues as well as relevant sources of data and information related to the project that USACE should consider during the project planning process, alternatives analysis, and SEIS preparation.

USACE shared information with attendees about the State of Georgia's water supply request related to the ACR as well as the APC request for changes to lake levels at the Weiss and Logan Martin reservoir projects and the associated Flood Operation Study and WCM updates. Information was presented in an open-house format that allowed attendees to interact with and ask question of USACE technical experts. Six stations were set up at each meeting with poster displays, fact sheets, maps, and other items to disseminate information to the attendees. USACE also sought public input by canvassing attendees using interactive posters and charts at selected stations in the meeting room. Attendees were invited to provide their input in writing using comment forms or by dictating it to an on-site court reporter. Attendees who did not submit their comments at the meeting were encouraged to submit them by email or letter to USACE during the public scoping comment period. To accommodate interested agencies and members of the public not attending the public meetings, the public meeting announcement requested that written comments be submitted to USACE Mobile District by August 15, 2018.

Cumulatively, there were 407 attendees at the five public meetings. Attendees included a limited number of representatives from local U.S. congressional offices, state and local agencies, elected officials, APC, and local news media. The largest share of meeting attendees were members of organizations representing lake users and landowners at Allatoona, Weiss, and Logan Martin lakes; environmental and business interests (primarily recreation and tourism); and members of the public.

6.3 Public Comments

USACE organized comments by issue area and summarized them in a scoping report. The scoping report provided background on USACE's role in managing the ACT River Basin and the purpose and need for the ACR; described the scoping activities conducted by USACE; categorized the issues raised in the public's scoping comments; summarized the comments submitted by federal, state, and governmental agencies; and provided the framework for preparing this Final FR/SEIS to address the potential for significant impacts on the human and natural environment resulting from implementation of the ACR. The scoping report for this study is in Appendix F and is posted at the following link on the USACE Mobile District web site:
https://www.sam.usace.army.mil/Portals/46/docs/planning_environmental/docs/Final%20ACR%20Study%20and%20SEIS%20Scoping%20Report.pdf?ver=2018-10-01-162604-667.

Formal written letters, comment forms, verbal comments (from court reporter transcripts), and emails were summarized into five broad categories, then further subcategorized. Most of the comments received focused on USACE water management practices (24 percent); operations associated with USACE-authorized project purposes (18 percent); and water-based recreational (lake levels), regional economic, and water quality issues/areas of concern (13, 12, and 7 percent, respectively). The last three issues have been combined under the environmental resource considerations category. All other issue areas combined equaled about 25 percent of all the comments received. Lake levels, recreation, water quality, water management, and economic resources were also among the most checked category boxes on the comment forms, representing 58 percent of the response.

Two petitions were also received during the scoping period. A Change.org petition, *Allatoona Lake Concerned Citizens Request a Seat at the USACE Meeting Table*, signed by 726 stakeholders as of September 1, 2018, requested more transparency from USACE. The second petition was a *Call to Action* through Facebook with 85 stakeholders asking to "Add Me" to the Facebook *Call to Action*. The Facebook post offered stakeholders several ways to comment and expressed the importance of keeping Allatoona Lake at full pool and ensuring clean water in the lake.

Throughout the study process, USACE Mobile District has provided updates for the interested public and posted pertinent documents for public viewing as they have become available on the Mobile District website at https://www.sam.usace.army.mil.

6.4 Analysis of Public Scoping Comments

All public scoping comments submitted in letters, emails, comment forms at the public meetings, and court reporter transcripts were categorized and summarized to facilitate a more complete understanding of the critical issues and recommendations from the scoping process across multiple areas of interest. Those key areas of agency and public interest at which the comments, concerns, and recommendations were directed included:

- Implementing the NEPA process for the proposed actions considered in the Draft FR/SEIS.
- Stakeholder perspectives on the potential effects of the proposed actions on authorized project purposes (i.e., flood risk management, hydropower, navigation, recreation, water supply, fish and wildlife conservation, and water quality).

- Potential effects of the proposed actions addressed in the Draft FR/SEIS on established water management activities at USACE reservoir projects.
- Potential effects of the proposed actions addressed in the Draft FR/SEIS on specific environmental and socioeconomic resources.
- Data, studies, and analytical tools needed for an appropriate analysis of the proposed actions addressed in the Draft FR/SEIS.

During the conduct of the study and preparation of the Final FR/SEIS, USACE has considered each comment and/or recommendation offered during the scoping process. The scoping report in Appendix F includes a table that lists all scoping comments received by USACE, organized by issue area.

6.5 Public Review of the Draft FR/SEIS

USACE filed the Draft FR/SEIS with the USEPA on November 7, 2019. On November 15, 2019, the USEPA published a Notice of Availability (NOA) of the Draft FR/EIS in the *Federal Register*, initiating the public review process and requesting comments on the TSP, the alternatives, and the adequacy of the supporting technical analysis. The draft revised WCMs (the ACT River Basin Master Manual and pertinent individual project WCMs) were included for public review as appendices to the Draft FR/SEIS. The NOA stated that the close of the comment period would be December 30, 2019. During the comment period, the USACE Mobile District held public meetings at the following locations in the ACT River Basin on December 9–12, 2019 to share information about the project and to receive comments on the Draft FR/SEIS: Acworth, GA (December 9 – 51 attendees); Rome, GA (December 10 – 22 attendees); Gadsden, AL (December 11 – 38 attendees); and Childersburg, AL (December 12 – 18 attendees). USACE advertised the time and place of the public meetings in local newspapers, by way of a newsletter sent by mail and email, and on the project website. Based on specific requests from agencies and various organizations, the public comment period was subsequently extended to January 29, 2020. The comment period extension was announced via a Mobile District press release, emails to members of the ACR project mailing list, and an amended USEPA NOA, published in the *Federal Register* on December 27, 2019.

All stakeholders (state and federal agencies, Native American tribes, organizations, and individuals) were provided the opportunity to review the Draft FR/SEIS during the comment period. Agencies and members of the public made a total of 583 individual inquiries and/or comments submittals on the Draft FR/SEIS. USACE received submittals by email, U.S. mail, written comment forms at the public meetings, verbal comments provided to court reporters at the public meetings. Several agencies and organizations made inquiries to (1) formally request the comment period be extended beyond December 29, 2019, and/or (2) request USACE to provide copies of the HEC-ResSim and HEC-5Q model outputs for their review. The sources (and associated number) of inquiries and comment submittals were as follows: Native American tribes (3); congressional staff member (1); federal agencies (4); state agencies (5); local government agencies, boards, and authorities (17); non-government organizations (13); businesses (8); and interested individuals (532).

All inquiries and comment submittals were categorized by source, numbered, and recorded in a comment-response matrix for those comments requiring individual responses. Comment submittals that raised more than one issue or concern were parsed into individual comments, and each one was assigned a category code based on the nature of the specific comment (e.g., NEPA process, modeling, biological resources, water quality, recreation, flood risk, etc.). The categorization and grouping of similar individual comments facilitated the development of consistent USACE responses to similar issues and concerns.

Commenting federal agencies generally had limited concerns with the TSP (now the RP) that focused on water conservation and efficiency, water quality, and potential impacts to federal hydropower operations. State agencies, as well as local government, non-government organization, and business stakeholders expressed comments both for and against reallocation of Allatoona Lake storage for water supply and the use of USACE storage accounting practices at Allatoona Lake versus Georgia's proposed storage accounting methodology. These interests also expressed concerns about potential adverse impacts on flow and water quality conditions downstream of Allatoona Dam and potential adverse impacts on federal and non-federal hydropower production. Numerous commenters expressed strong public support for raising the winter guide curve levels at Weiss and Logan Martin lakes. However, some commenters also expressed concerns that lowering the maximum surcharge elevation and raising the winter guide curve levels at Weiss and Logan Martin lakes could increase flooding downstream of those projects.

Copies of all agency and public comments received by USACE, as well as pertinent USACE responses to those comments are included in Appendix F to the Final FR/SEIS. Applicable environmental compliance documentation resulting from consultation with agencies having specific responsibilities under federal or state law are also included in Appendix F.

6.6 Final FR/SEIS

In accordance with USACE ER 1105-2-100, CEQ regulations for the implementation of NEPA (40 CFR 1500-1508), and USACE NEPA guidance (ER 200-2-2), USACE has considered all comments provided by the public and agencies on the Draft FR/SEIS. The Final FR/SEIS addresses all comments received during the public review period and incorporates appropriate revisions based on agency and public comments on the Draft FR/SEIS. The Final FR/SEIS is undergoing final NEPA review prior to a final decision on the proposed action. Copies of the Final FR/SEIS will be available to federal, state, and local agencies and the public.

6.7 Record of Decision

No sooner than 30 days after filing the Final FR/SEIS with USEPA and publication of the NOA for the Final FR/SEIS in the *Federal Register*, USACE will prepare a ROD that will state its decision on the proposed reallocation of storage in Allatoona Lake and proposed modifications to flood operations at the APC Weiss and Logan Martin reservoir projects; summarize alternatives that were considered and relevant factors that were balanced in making the decision; and identify any means that have been adopted to mitigate for adverse effects. USACE will notify the public of the ROD in a newsletter distribution to the project mailing list, press releases to local newspapers radio and television news, and on the project website. The ROD is expected to be completed in March 2021.

7.0 RECOMMENDED PLAN

7.1 Plan Description

The RP includes reallocation of flood storage at Allatoona Lake, Weiss Lake, and Logan Martin Lake. This section describes in detail all elements of the RP.

7.1.1 Allatoona Dam and Lake

The RP includes a reallocation of 33,872 ac-ft of storage of which 11,670 ac-ft is from flood storage. The remainder of 22,202 ac-ft is from the conservation pool. The proposed reallocation for water supply storage will meet the full 2050 need requested by the State of Georgia (94 mgd). With the existing storage allocated to water supply, the total storage allocated equals 52,411 ac-ft, or approximately 18.6 percent of conservation storage. The remaining conservation storage of 81.4 percent of 281,917 ac-ft is available to all other authorized project purposes. Figure 7-1 shows the revised storage allocation.

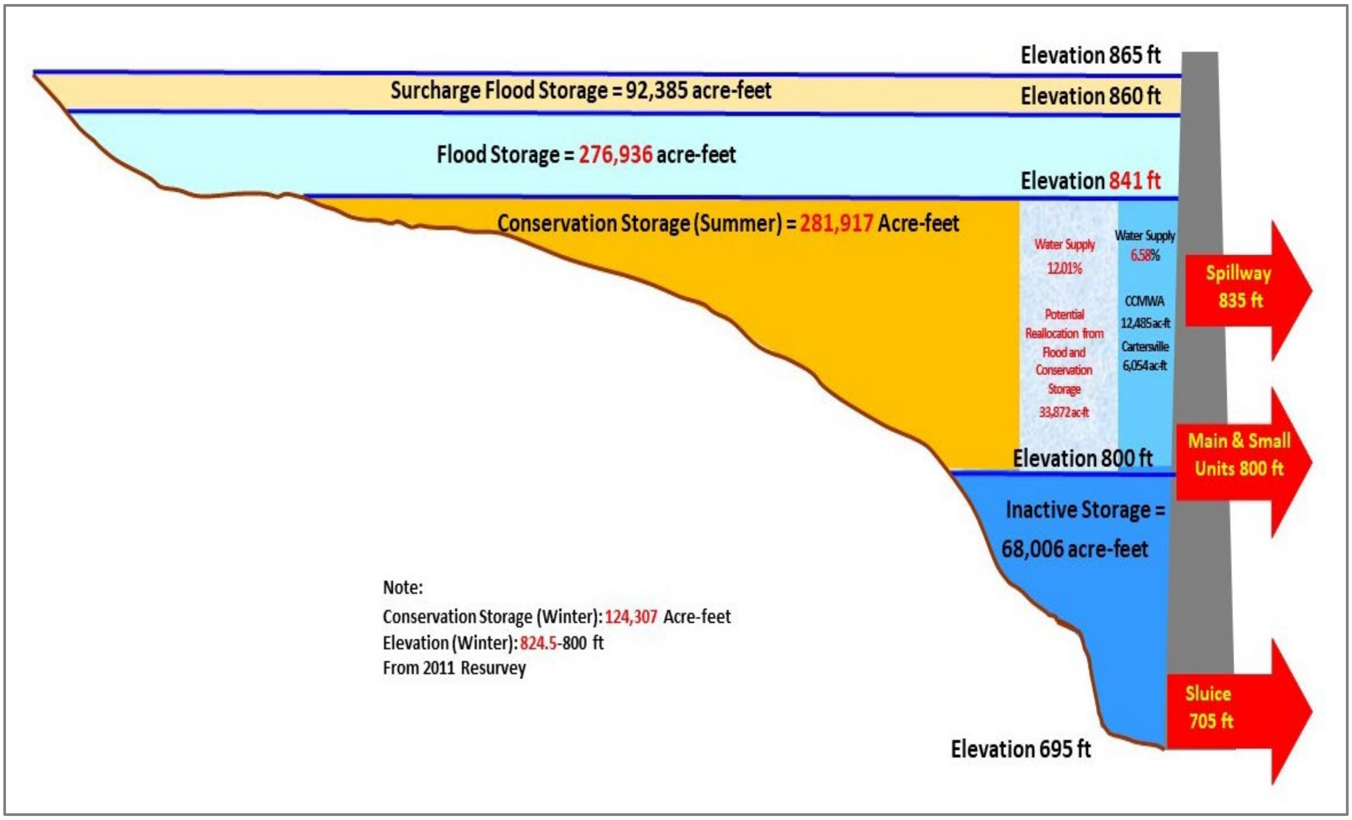


Figure 7-1. Allatoona Dam and Lake—Proposed Storage Allocation.

The flood pool reallocation requires an increase in Allatoona Lake’s summer guide curve of 1 ft from elevation 840 ft. to 841 ft. A change of 1.5 ft in the winter guide curve is also required from elevation 823 ft to 824.5 ft. Figure 7-2 shows the revised guide curve.

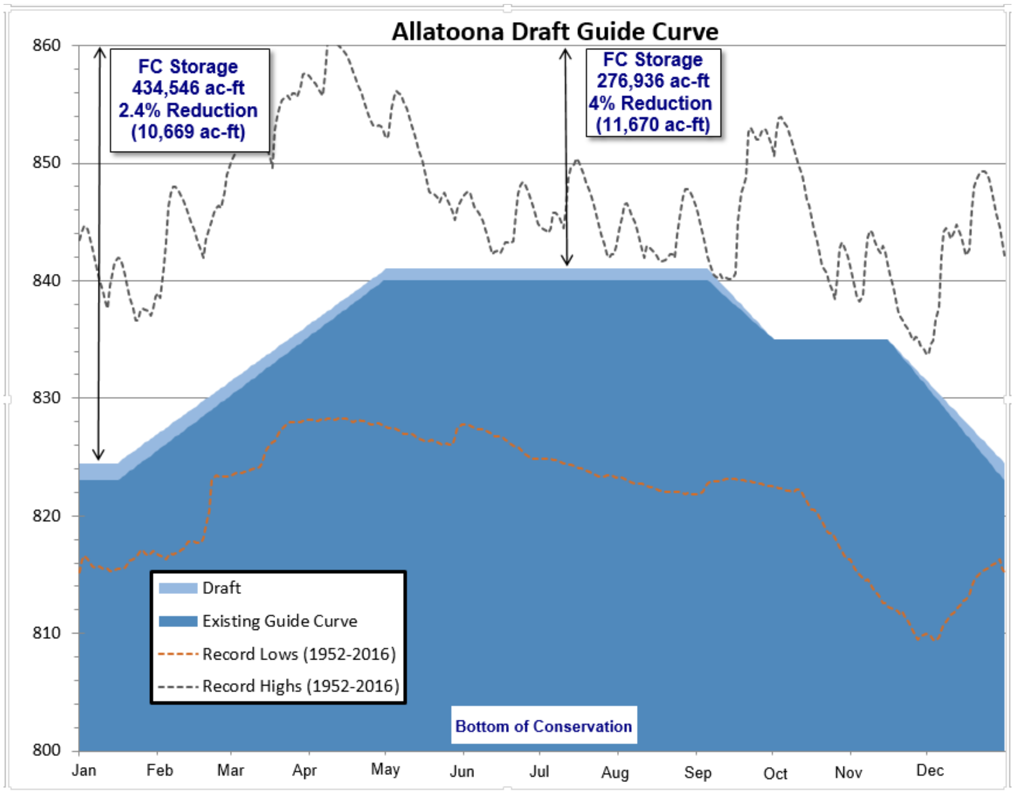


Figure 7-2. Allatoona Dam and Lake—Revised Guide Curve.

The RP also uses the current USACE SAD storage accounting methodology. The RP uses the following formula to calculate a user's available storage on any given day:

End Storage = beginning storage + user's share of inflow – user's share of loss – user's usage

Equation 7-1. Storage Accounting Formula

The current USACE SAD storage accounting methodology uses the following specific guidelines:

- A user's portion of project inflow is fixed.
- A user gets partial credit of made inflows, which are prorated based on user's portion of yield.
- All storage accounts are full at 841 ft.

7.1.2 Weiss Dam and Lake

The RP includes APC-requested changes to flood operations at Weiss Lake. It lowers the top of the flood control pool 2 ft from elevation 574 ft to 572 ft and includes a 3-ft increase in the winter level from 558 ft to 561 ft. The change includes holding the summer level of 564 ft until September 30, compared to the current guide curve of August 31 before winter drawdown begins. Seasonal storage is 82,013 ac-ft. Surcharge storage is 301,300 ac-ft. Total flood storage at Weiss Lake is 383,313 ac-ft. Figure 7-3 shows the revised storage allocation and Figure 7-4 shows the revised guide curve. To enable Weiss Dam flood operations to be conducted in a manner that would not exceed to revised maximum surcharge elevation of 572 ft, APC would increase releases in accordance with a revised flood regulation schedule. Table 2-3 shows the flood regulation schedule. USACE has conducted additional analysis of impacts to private property both upstream and downstream of Weiss Dam. The correspondence received from FERC on October 22, 2020, stated that APC has acquired all necessary real estate for the proposed operation. Pursuant to ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient data is available to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Weiss Dam. It is the responsibility of APC to acquire all necessary real estate interests prior to implementation.

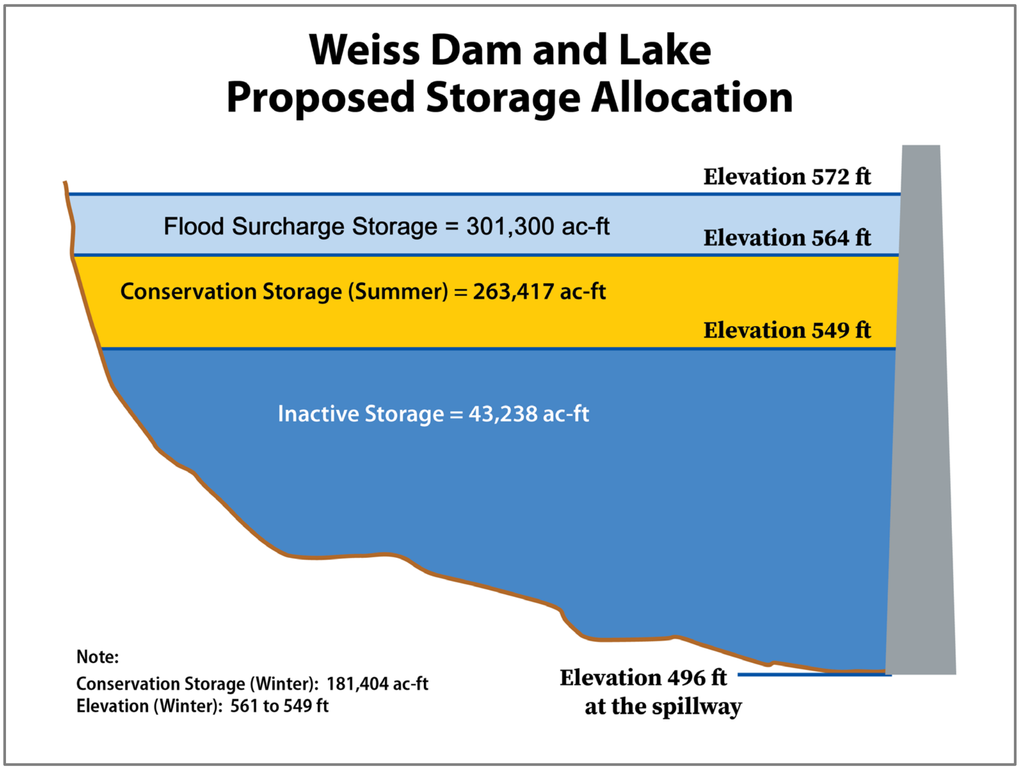


Figure 7-3. Weiss Dam and Lake—Proposed Storage Allocation.

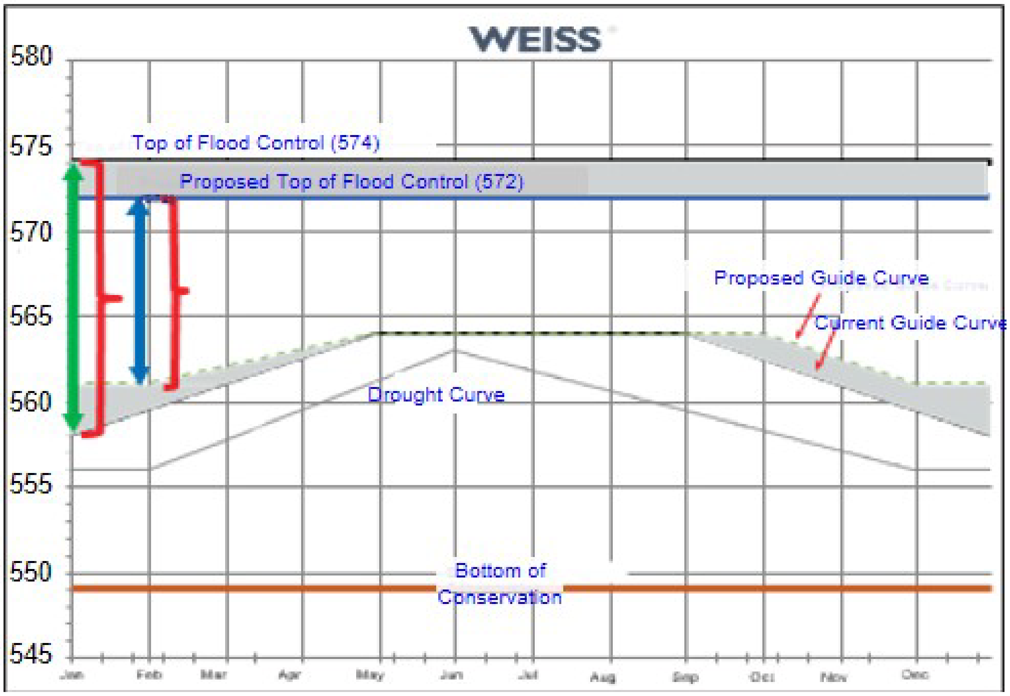


Figure 7-4. Weiss Dam and Lake—Revised Guide Curve.

7.1.3 Logan Martin Dam and Lake

The RP includes APC-requested changes to flood operations at Logan Martin Lake. It lowers the top of the flood control pool 3.5 ft from elevation 477 ft to 473.5 ft. The RP also includes a 2-ft increase in the winter level from 460 ft to 462 ft. Seasonal storage is 41,610 ac-ft. Surcharge storage is 160,000 ac-ft. Total flood storage at Logan Martin Lake is 201,610 ac-ft. Logan Martin storage allocation is shown in Figure 7-5.

To enable Logan Martin Dam flood operations to be conducted in a manner that would not exceed to revised maximum surcharge elevation of 473.5 ft, APC would increase releases in accordance with a revised flood regulation schedule. USACE has conducted additional analysis of impacts to private property both upstream and downstream of Logan Martin Dam. The correspondence received from FERC on October 22, 2020, stated that APC has acquired all necessary real estate for the proposed operation. Pursuant to ongoing USACE interagency coordination with the Federal Energy Regulatory Commission (FERC) at the time of this report, insufficient data is available to determine the sufficiency of APC's current real estate interests for the proposed operational changes at Weiss Dam. It is the responsibility of APC to acquire all necessary real estate interests prior to implementation. Figure 7-6 shows the revised guide curves. The flood regulation schedule is shown in Table 2-4.

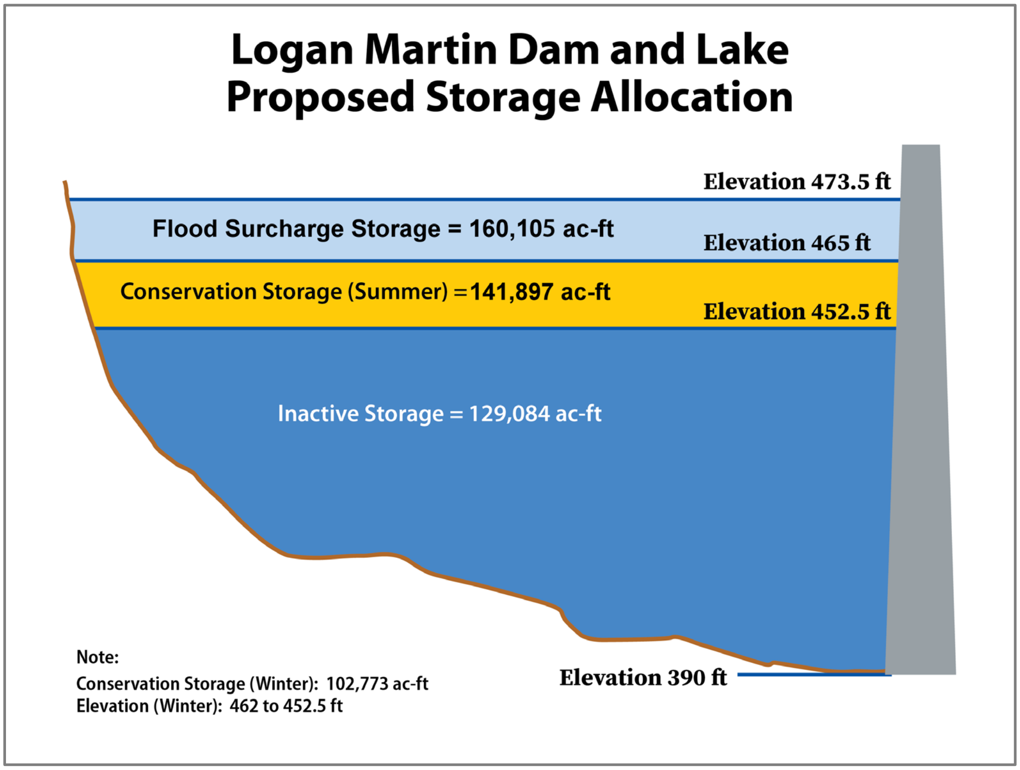


Figure 7-5. Logan Martin Dam and Lake—Proposed Storage Allocation.

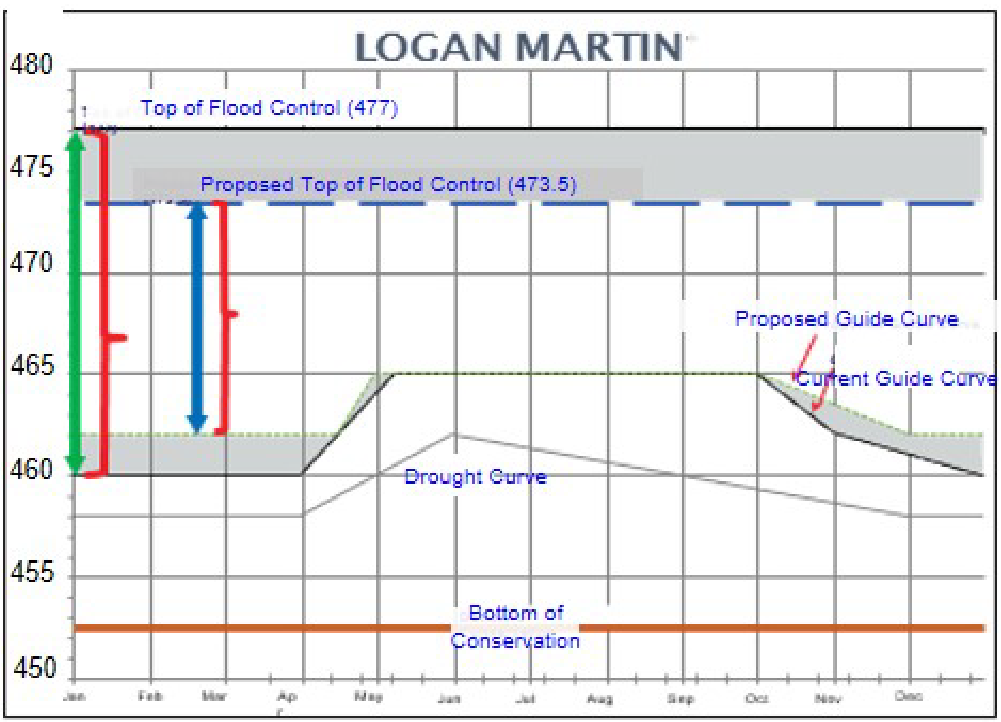


Figure 7-6. Logan Martin Dam and Lake—Revised Guide Curve.

7.2 Plan Accomplishments

The RP fully achieves both planning objectives, including reducing the risk of future water supply shortages for local water supply providers (CCMWA and City of Cartersville, GA) whose future demands exceed their existing water supply storage agreements at Allatoona Lake and maintaining an acceptable level of flood risk in the ACT River Basin.

The 33,872 ac-ft reallocation of storage at Allatoona Lake provides an annualized federal water supply benefit of approximately $22.5 million. While providing additional water supply, the RP also provides an increase benefit in terms of federal hydropower of $698,584 annually. There is also an increase in annual federal recreation benefits of $708,000. These benefits are attributable to an increase in the summer conservation pool at Allatoona from 840 ft to 841 ft.

The reallocation from flood control storage provides improved pool level conditions for recreational use from October through February at Weiss Lake, and from November through mid-March at Logan Martin Lake. The revised flood operations at Weiss Lake and Logan Martin Lake continue to provide flood risk management benefits along the Coosa River and specifically the communities of Gadsden and Childersburg.

The RP does not produce any significant environmental effects within the ACT River Basin. Details of the environmental effects are provided in section 5.0.

7.3 Environmental Compliance *

7.3.1 Compliance with Environmental Laws, Regulations, and Executive Orders

Table 7-1 summarizes compliance with pertinent laws and EOs for the RP. In addition, a more comprehensive summary of compliance activities for selected laws and EOs that are most directly relevant to the RP follows the table. Relevant environmental compliance documentation for specific laws and EOs is included in Appendix F (Public and Agency Involvement).

Table 7-1. Environmental Compliance with Laws and EOs Typically Applicable to Water Resource Projects

Applicable Authority	Status of Compliance [a]	Remarks
Federal Laws		
Archaeological and Historic Preservation Act, 16 U.S.C. §469[b]	Full compliance [a]	Consultation and coordination with the Georgia and Alabama SHPOs to develop a Draft Final Programmatic Agreement have been completed and the agreement will be executed before the ROD is signed (see Section 5.11.2).
Archaeological Resources Protection Act, 16 U.S.C. §§470aa–470mm	Full compliance [a]	Consultation and coordination with the Georgia and Alabama SHPOs to develop a Draft Final Programmatic Agreement have been completed and the agreement will be executed before the ROD is signed (see Section 5.11.2).
Clean Water Act, 33 U.S.C. 1251 *et seq*. (also known as the Federal Water Pollution Control Act Amendments of 1972)	Full compliance	State water quality certification under Section 401 of the CWA would not be applicable to the RP. The RP would not be expected to cause a violation of applicable Georgia or Alabama water quality standards (see Section 5.2.2).
Clean Air Act, 42 U.S.C. §7401 *et seq*.	Full compliance [a]	The RP would not result in any air quality or related impacts (see Section 5.8.2). Per Section 309 of the CAA (42 U.S.C. 7609), full compliance will be attained upon USEPA review of the Final FR/SEIS.
Coastal Zone Management Act of 1972, as amended, P.L. 92-583, 16 U.S.C. §§1451–1464	Not applicable	The ROI for the RP is outside the Alabama coastal zone and would have no effect on that area.
Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§9601–9675	Not applicable	The RP would not be expected to affect hazardous and toxic materials in the basin, nor would the presence of any such materials have an impact on project operations (see Section 5.12.2).
Emergency Wetlands Resources Act of 1986, 16 U.S.C. §§3901–3932	Not applicable	No impact on wetlands would be expected (see Section 5.5.2).
Endangered Species Act, 16 U.S.C. §1531 *et seq.*	Full compliance [a]	Informal consultation with USFWS is completed. USACE biological assessment concludes either “no effect” or “may affect, unlikely to adversely affect.” The USFWS in their letter dated November 6, 2020 concurred with this assessment.
Fish and Wildlife Coordination Act, 16 U.S.C. §§661–667e	Full compliance [a]	A formal Fish and Wildlife Coordination Act Report is not required for the proposed actions addressed in the Final FR/SEIS. The USFWS and Georgia/ Alabama fish and wildlife agency comments are being requested via Final FR/SEIS coordination, pursuant to NEPA.
Federal Land Policy and Management Act of 1976, 43 U.S.C. §§1701–1784	Full compliance	The RP would be expected to have minimal impacts on federal lands and land use (see Section 5.4.2).
Federal Water Pollution Control Act Amendments of 1961, P.L. 87-88	Full compliance	Water quality effects of RP would be negligible (see Section 5.2.2).

Applicable Authority	Status of Compliance [a]	Remarks
Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §1801 *et seq.*, as amended by the Sustainable Fisheries Act of 1996, P.L. 104-267	Not applicable	No resources subject to the jurisdiction of this Act would be affected by the RP. Confirmed by correspondence with NOAA Fisheries.
Marine Protection, Research, and Sanctuaries Act of 1972, 33 U.S.C. §§1401–1445, 16 U.S.C. §1431 *et seq.*, and 33 U.S.C. §1271	Not applicable	The RP would not involve ocean dredged material disposal.
Migratory Bird Treaty Act, 16 U.S.C. §§701–719c	Full compliance	Migratory birds would not be affected by the RP (see Section 5.5.2).
National Environmental Policy Act of 1969, 42 U.S.C. §4321 *et seq.*, and the 1978 CEQ Regulations for Implementing the Procedural Provisions of NEPA, 40 CFR Parts 1500-1508 (85 FR 43340, July 16, 2020)	Full compliance [a]	Full compliance attained upon completion of Final FR/SEIS coordination and signed ROD. Section 5.0 addresses effects on the natural and human environments associated with the RP. The CEQ Regulations for Implementing the Procedural Provisions of NEPA were updated in 2020; however, NEPA review for this action began prior to September 14, 2020, and as such, the 1978 CEQ regulations were used in preparation of this Final FR/SEIS (85 FR 43340, July 16, 2020).
National Historic Preservation Act, 16 U.S.C. §470 *et seq.*	Full compliance [a]	Consultation and coordination with the Georgia and Alabama SHPOs to develop a Draft Final Programmatic Agreement have been completed and the agreement will be executed before the ROD is signed (see Section 5.11.2).
Noise Control Act of 1972 as amended, 42 U.S.C. §4901 *et seq.*	Full compliance	See Section 5.9.2.
North American Wetlands Conservation Act, 16 U.S.C. §4401 *et seq.*	Full compliance	No impact on wetlands would be expected (see Section 5.5.2).
Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§6901–6992k	Not applicable	The RP would not be expected to affect hazardous and toxic materials (see Section 5.12.2).
Safe Drinking Water Act as amended, 42 U.S.C. §300f *et seq.*	Full compliance	The RP would not cause a violation of applicable Georgia or Alabama water quality standards (see Section 5.2.2) or violate any provisions of the Safe Drinking Water Act.
Toxic Substances Control Act of 1976, 15 U.S.C. §2601	Not applicable	The RP would not be expected to affect hazardous or toxic materials (see Section 5.12.2).
Watershed Protection and Flood Prevention Act, 16 U.S.C. §1001	Full compliance	See Section 5.6.4.2.
Executive Orders		
EO 11988: Floodplain Management	Full compliance	See Section 5.6.9.
EO 11990: Protection of Wetlands	Full compliance	No impact on wetlands would be expected (see Section 5.5.2).
EO 12088: Federal Compliance with Pollution Control Standards	Full compliance	Section 5.0 fully considers impacts on the human environment from the RP.

Applicable Authority	Status of Compliance [a]	Remarks
EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	Full compliance	No appreciable effects on minority or low-income populations would be expected (see Section 5.6.7.2).
EO 13045: Protection of Children from Environmental Health Risks and Safety Risks	Full compliance	No increased environmental health or safety risks for children would be expected (see Section 5.6.8.2).
EO 13061: American Heritage Rivers	Not applicable	Requirements of this EO are not specifically relevant to the RP.
EO 13101: Greening the Government Through Waste Prevention	Not applicable	Requirements of this EO are not specifically relevant to the RP.
EO 13123: Greening the Government Through Efficient Energy Management	Not applicable	Requirements of this EO are not specifically relevant to the RP.
EO 13148: Greening the Government Through Leadership in Environmental Management	Not applicable	Requirements of this EO are not specifically relevant to the RP.
EO 13175: Consultation and Coordination with Indian Tribal Governments	Full compliance	Consultation has been initiated and is ongoing (see Section 5.11.2).
EO 13186: Responsibilities of Federal Agencies to Protect Migratory Birds	Full compliance	Migratory birds would not be affected by the RP (see Section 5.5.2).
EO 13807: Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects	Not applicable	This FR/SEIS is not directly applicable to infrastructure development. However, the principles of the EO are being applied to streamline the analysis and decision-making and to meet a court-ordered date for a decision on storage reallocation at Allatoona Lake.

Note:
[a] This SEIS and ROD, when complete, will be fully compliant with applicable laws and EOs.
[b] Sections 469a–c and 469l–o were repealed following enactment of Title 54, National Park Service and Related Programs (P.L. 113–287).

7.3.1.1 *National Environmental Policy Act of 1969 (NEPA), as amended, 42 U.S.C. §4321* et seq.

NEPA requires that all federal agencies use a systematic, interdisciplinary approach to documenting the potential impacts on the environment from federal actions. That approach promotes the integrated use of natural and social sciences in planning and decision-making that could have an impact on the environment. NEPA regulations provide for the use of the NEPA process to identify and assess reasonable alternatives to proposed actions that avoid or minimize adverse effects of those actions on the quality of the environment. Prior to the development of an EIS, scoping is used to identify the scope and significance of environmental issues associated with a proposed federal action through coordination with federal, state, and local agencies; members of the public; and any interested individuals and organizations. The process also identifies and eliminates from further detailed study issues that are not significant or have been addressed by prior environmental review. According to 40 CFR § 1502.9, a supplement to either a draft or final EIS must be prepared if an agency makes substantial changes in an approved project plan that are relevant to environmental concerns, or there are significant new circumstances or information relevant to environmental concerns and bearing on the approved plan or its impacts.

This Final FR/SEIS has been prepared in accordance with the NEPA process for federal actions that might impact the environment and addresses new conditions not evaluated in the Final EIS for the ACT River Basin WCM update. The ROD for the Final ACR FR/SEIS will conclude the NEPA process.

7.3.1.2 Fish and Wildlife Coordination Act, 16 U.S.C. 661-666(c)

The Fish and Wildlife Coordination Act of 1934, as amended, requires consultation and coordination with the USFWS and state fish and wildlife agencies:

> …whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the U.S., or by any public or private agency under Federal permit or license (16 U.S.C. § 662(a)).

A formal Fish and Wildlife Coordination Act Report is not required for the proposed actions addressed in the Final FR/SEIS. This determination was documented via email correspondence in May 2019 between the Chief, Environment and Resources Branch, USACE Mobile District, and the Field Supervisor, USFWS Alabama Ecological Services Field Office (copy in Appendix F, Section F-3). The USFWS and Georgia and Alabama fish and wildlife agencies did not provide direct comments to USACE in response to coordination of the Draft FR/SEIS. Comments from these agencies have been requested during federal and state agency review of the Final FR/SEIS, pursuant to NEPA.

7.3.1.3 Endangered Species Act (ESA), 16 U.S.C. § 1531–1543

The ESA of 1973, as amended, establishes a national policy designed to protect and conserve T&E species and the ecosystems upon which they depend. The ESA is administered by the Department of the Interior, through the USFWS, and by the U.S. Department of Commerce, through the NOAA Fisheries Office of Protected Resources. Section 7 of the ESA specifies that any agency that proposes a federal action that could jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of that species (16 U.S.C. §1536(a)(2)) must participate in the interagency cooperation and consultation process.

USACE developed a biological assessment (BA) addressing the potential effects of the TSP on listed species and/or their critical habitat and initiated informal consultation with the USFWS by letter dated November 25, 2019. No listed species or critical habitat under the jurisdiction of NOAA Fisheries is located within the ROI for the TSP. The USACE BA for the USFWS concluded that: (1) the TSP may affect, but is not likely to adversely affect, federally listed species in the Coosa River and Etowah River basins that are within the ROI; (2) the proposed action would have no effect on federally protected species in those basins that are not within the ROI; and (3) the TSP may affect, but is not likely to adversely modify or destroy, designated critical habitat within the ROI. Following additional coordination with the USFWS, USACE submitted a revised BA to the USFWS on May 11, 2020 with several clarifications and updates. The USFWS concurred with the USACE determinations in the revised BA by letter dated November 6, 2020, completing informal consultation under Section 7 of the ESA. The ESA compliance documentation is included in Appendix F.

7.3.1.4 National Historic Preservation Act, 54 U.S.C. 300101 et seq.

The National Historic Preservation Act (NHPA), enacted in 1966 and amended in 1970 and 1980, is legislation intended to preserve historical and archaeological sites in the United States. The Act created the NRHP, the list of National Historic Landmarks, and the SHPOs. Section 106 of the NHPA requires that each federal agency identify and assess the effects its actions might have on historic properties. Under Section 106, each federal agency must consider public views and concerns about historic preservation issues when making final project decisions. Federal agencies must assess the effects of its proposed actions, determine if affected properties are eligible for the NRHP, and consult with SHPOs and/or Tribal Historic Preservation Officers on measures to resolve adverse effects by avoidance, minimization, or mitigation of those effects.

The USACE Mobile District has initiated consultation with the Alabama and Georgia SHPOs regarding the effects of the RP on cultural resources in and downstream of Allatoona, Weiss, and Logan Martin dams and lakes. The District is developing Programmatic Agreements with the SHPOs to identify, evaluate, and address any effects on cultural resources that might result from implementing the RP. Coordination with the SHPOs regarding the Programmatic Agreements is documented in Appendix F. In addition, the District has initiated consultation with Native American tribes with an interest in the project area, and that consultation will continue as appropriate throughout the development of the FR/SEIS.

7.3.1.5 *Clean Water Act, as amended, 33 U.S.C. 1251* et seq.

The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1972 and subsequently in 1977 and 1987. Under the CWA, USEPA has implemented pollution control programs such as setting wastewater standards for industry. USEPA has also developed national water quality criteria recommendations for pollutants in surface waters. Regulation of discharges of pollutants to waters of the United States is generally accomplished through programs administered by the states.

Reservoir operations conducted to meet federally authorized project purposes are not generally subject to state permits or certifications as they do not introduce pollutants into waters of the United States. Nonetheless, USACE strives to conduct its operations to avoid or minimize occurrences of state water quality standard violations. HEC-5Q model simulations indicate no instances in which changes to reservoir operations under the RP would likely result in a violation of state standards. Those results were coordinated with USEPA, ADEM, and GAEPD through the NEPA process.

7.3.1.6 *Clean Air Act, as amended, 42 U.S.C. 7401* et seq.

The CAA, as amended, authorizes USEPA to regulate emissions of airborne pollutants from stationary and mobile sources. The law authorizes USEPA to establish NAAQS to protect public health and public welfare and to regulate emissions of hazardous air pollutants. Those standards promote uniformity in basic health and environmental protections. Many provisions of the law are carried out by the states. Under the CAA, states must develop State Implementation Plans, which are collections of regulations to clean up areas that exceed applicable air quality standards.

Eight out of 64 counties in the ACT River Basin are designated as nonattainment or maintenance areas for at least one criteria pollutant. The potential air quality impacts expected under the RP are discussed in Section 5.8.2. The RP is not expected to result in direct or indirect emissions and would be exempt from the general conformity regulations. A RONA to the general conformity rule has been prepared and is provided as Attachment 1 to Appendix E.

In addition, Section 309 of the CAA (42 U.S.C. 7609) requires USEPA to review draft EISs prepared by other federal agencies and make those reviews available to the public. USEPA reviews of draft EISs are primarily concerned with identifying and recommending appropriate measures to avoid and mitigate significant environmental impacts associated with the federal agency's proposed action. Full compliance with CAA Section 309 will be attained upon completion of USEPA review of the Final FR/SEIS.

7.3.2 Consistency with USACE Environmental Operating Principles

The USACE Environmental Operating Principles (EOPs) were developed and introduced in 2002 to ensure that USACE missions include totally integrated sustainable environmental practices. The EOPs provide corporate direction to ensure the workforce recognizes the USACE's role in, and responsibility for, sustainable use, stewardship, and restoration of natural resources across the nation and through the international reach of its support missions. The EOPs promote environmental stewardship across business practices from recycling and reduced energy use at USACE facilities to a fuller consideration of the environmental impacts of USACE actions and meaningful collaboration within the larger environmental community (USACE, 2019).

USACE reviewed, updated, and reissued the EOPs in August 2012, recognizing that a strong emphasis on sustainability must be translated into everyday actions that affect the environmental conditions of today, as well as the uncertainties and risks of the future (USACE, 2012). Those challenges are complex, ranging from global trends such as increasing and competing demands for water and energy, climate, sea level change, and declining biodiversity to localized manifestations of those issues in extreme weather events, the spread of invasive species, and demographic shifts. The EOPs are an essential component of the USACE risk management approach to decision-making, allowing the organization to address uncertainty by building flexibility into the management and construction of infrastructure.

The USACE EOPs are as follows:

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all Corps activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

The USACE EOPs are applicable to the proposed actions addressed in this Final FR/SEIS. They were fully considered and applied in the plan formulation and evaluation process and in development of the RP. The Mobile District conducted a transparent and proactive public scoping process at the beginning of the study. The District maintained transparency through the process during coordination of the Draft FR/SEIS and beyond with public meetings, responses to public comments, and posting of pertinent information for public consumption on the District website. Agency and public input have been considered in the planning process. USACE developed planning objectives for the study that considered public input, continuing to meet authorized project purposes in consideration of the requests by CCMWA and APC, and full consideration of environmental consequences associated with the alternatives. USACE has applied a risk-based approach to the planning process and a systems approach in its modeling efforts and other technical analyses. The Mobile District has engaged staff members at pertinent centers of expertise, the Hydrologic Engineering Center, the Hydropower Analysis Center, and numerous other technical support resources to ensure a high-quality defensible planning analysis.

7.4 Dam Safety Considerations

7.4.1 Summary of Allatoona Dam Safety Assessment

The Dam Safety Action Classification (DSAC) System uses a metric to describe incremental loss of life risk associated with a dam project and the types of actions undertaken to manage that risk. The DSAC follows from a risk assessment of the dam, which considers feature design, performance, and condition attributes in conjunction with dam failure impacts. The USACE Dam Safety Policy requires a routine risk assessment, called a ”periodic assessment,” every 10 years. The purpose of a periodic assessment is to validate or modify, as necessary, a dam’s DSAC.

The Allatoona Dam project has two DSACs assigned to it: one for the main dam, and one for Saddle Dike 1. The two DSACs are necessary because a portion of the estimated loss-of-life consequences attendant to failure of the Saddle Dike are separable from those attendant to failure of the main dam.

USACE conducted the project’s first periodic assessment in October 2014 and, subsequent to that assessment, assigned DSAC 4 ratings to both the dam and the Saddle Dike. DSAC 4 is characterized by low incremental risk, in which indicates that for confirmed and unconfirmed dam safety issues, the combination of life, economic, and environmental consequences with likelihood of failure is low to very low and the dam may not meet all essential USACE guidelines. USACE considers that level of life-risk to be tolerable.

The RP contemplates raising the pool 1.5 ft during the winter and 1 ft during the summer. The Hydraulics and Hydrology section reports that there are no resultant impacts to the routed Probable Maximum Flood’s maximum pool elevation and no significant downstream impacts to the routed flood discharge. Thus, there are no apparent reservoir capacity or dam freeboard issues. The proposed pool raise is well within the dam’s design loading conditions, and there are no known flaws or features at or near the level of the proposed pool raise that are detrimentally occupied. No known stability issues exist with the reservoir rim that indicate adverse impacts would result from the pool raise. In short, existing information gives no indication that the proposed pool raise portends an increase in the likelihood of an uncontrolled release of water from the project.

7.4.2 Summary of Weiss and Logan Martin Project Dam Safety Assessments

Dam safety oversight of the APC projects on the Coosa River is covered under the FERC license. Because the USACE does not have dam safety oversight for Weiss and Logan Martin dams, this analysis does not cover impacts to dam safety resulting from the proposed changes. The USACE Mobile District contacted FERC to ascertain and verify the current status of dam safety assessments for the Weiss and Logan Martin dams. FERC replied to the USACE request by letter dated June 29, 2020. The letter is included in Appendix F, Attachment 3. The following excerpt from that letter summarizes the current status of dam safety inspections for the Weiss and Logan Martin dams:

> Due to the current COVID-19 pandemic, we have not yet been able to inspect the project this year. However, our latest dam safety inspections conducted in 2019 found that both projects were in good condition and judged to be acceptable for continued operations. Logan Martin Dam continues to have significant foundation leakage which is being addressed by Alabama Power with their foundation improvement program that started in 1992. The foundation program still has several years of future foundation work scheduled. Surveillance and monitoring at Logan Martin is among the most intense dam surveillance programs in the nation.

7.5 Climate Change Considerations

Scientific evidence demonstrates that the climate is constantly changing. These changes could reflect shifts in average or baseline meteorological conditions and variability in future climate conditions. These changes affect the capacity and effectiveness of USACE projects. Although adaptive water management under the RP helps to address uncertainty associated with in-stream flows and provides an adaptive plan to address changes in precipitation, it is still prudent to consider the impacts of climate change when adjusting long term reservoir operations. Because of this, a two-tiered climate change impact analysis was completed for this study. A qualitative analysis was completed to give a broad perspective on potential climate change impacts to the meteorology and hydrology of the basin.

Also, a quantitative climate change analysis was completed so that climate change impacts to flows, reservoir operations, and water quality could be considered in the alternative analysis and comparison.

7.5.1 Qualitative Analysis

In 2016, USACE issued Engineering and Construction Bulletin No. 2016-25 (hereafter, ECB 2016-25) which mandated climate change be considered for all federally funded projects in planning stages (USACE, 2016). This guidance was updated with ECB 2018-14 (USACE, 2018), which mandates a qualitative analysis of historical climate trends and assessment of future projects. Even if climate change does not appear to be an impact for a particular region of interest, the formal analyses outlined in the guidance result in better-informed planning and engineering decisions. A brief summary of the results of the qualitative analysis are given below, while the full qualitative analysis can be found in Attachment 11 of Appendix C.

Figure 7-7 shows the discussed variables and their overall consensus in trends for both observed and projected scenarios based on the findings of the 2015 USACE IWR literature synthesis (USACE, 2015). There is evidence that supports an increasing temperature trend from the observed data and less supporting evidence for trends in precipitation or streamflow for a majority of the region. However, there is some evidence that precipitation is increasing, while streamflow appears to be decreasing in some areas within the region.

Projections indicate a strong consensus of an increase in projected temperature of approximately 2 to 4 degrees Celsius by the late 21st century. There is some consensus that precipitation extremes may increase in future both in terms of intensity and frequency. However, in general, projections of precipitation have been shown to be highly variable across the region. An analysis of stream gages within the basin show streamflow slightly decreasing through the period of record of each gage. But overall, in the southeast, there is not a consensus regarding the directionality of trends in observed streamflow. Very few conclusions can be drawn regarding future hydrology in the region largely due to the substantial amount of uncertainly in these projections when coupling climate models with hydrology models.

Based on the results of this assessment, including considerations of observed precipitation, temperature, and streamflow in the basin, there is not strong evidence suggesting increased peak annual streamflow will occur in the future within the region. Furthermore, there is only some consensus the region might see a mild increase in the frequency and severity of precipitation events. This evidence, by itself does not indicate high confidence in an increase in peak flows in the Alabama River basin. Based on the lack of clear evidence showing an increase in streamflow, the effects of climate change can be considered within the standard uncertainty bounds associated with the hydrologic/hydraulic analysis being conducted as part of this study.

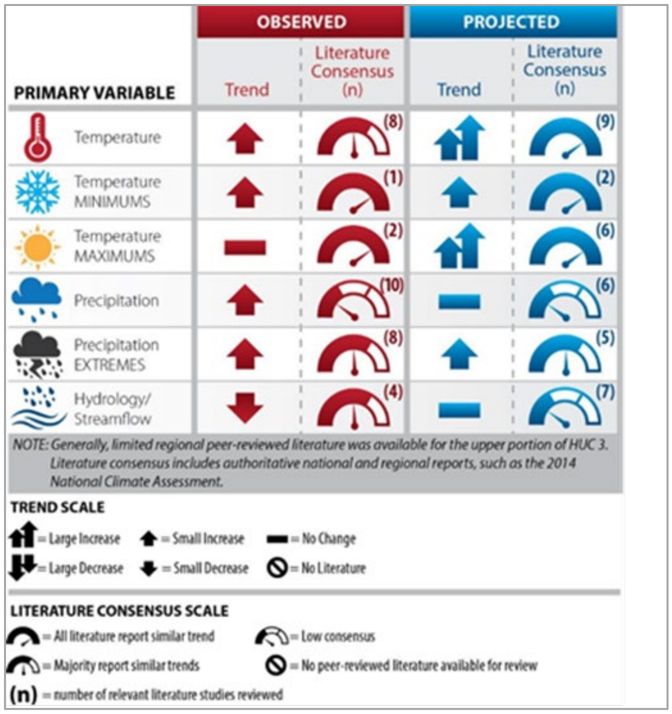


Figure 7-7. Summary Matrix of Observed and Projected Climate Trends and Literary Consensus (Reprinted from USACE, 2015).

7.5.2 Quantitative Analysis

In addition to the qualitative assessment, a numerical approach based on the HEC-ResSim model was developed to provide an indication of the effects of prospective climate change on hydrology and water quality in the ACT River Basin. The objective of this effort was to quantify potential climate change impacts to basin hydrology and, by extension, water management. USACE conducted an analysis of how the TSP (now the RP) would perform under different future climate scenarios using the HEC-ResSim reservoir operation model. The hydrologic input to the model was daily flows at 36 locations in the ACT River Basin. The goal of the climate analysis was to develop future period daily flows at those locations. This analysis was conducted in a manner consistent with Engineering and Construction Bulletin (ECB) 2018-14 (USACE, 2018).

STADJ, a statistical adjustment tool, is used to adjust hydrologic model outputs so they can be used to quantify impacts of climate change on future stream flows. Global climate models (GCMs) provide hindcast and projected climate data that can drive hydrologic modeling. As their title indicates, GCMs model the entire globe and are not intended to be accurate or detailed enough for regional scale climate studies. GCM results are, therefore, adjusted and spatially downscaled by various methods to make their results applicable for project-scale hydrologic modeling. USACE requires climate change studies to use a range of GCM models and representative concentration pathways (RCPs). USACE supports a database of adjusted GCM results that include results from about 100 combinations of GCMs and RCPs. Study hydrologic models need to be run for numerous GCMs/RCPs for both hindcast and projected periods. STADJ currently uses a USACE-supported national database of 97 sets of 1950–2099 daily flows developed with the Variable Infiltration Capacity (VIC) hydrologic model. Additional detailed information on the climate analysis, such as discussion on the use and results of STADJ, flow duration analysis, flow frequency curves, and climate change hydrology uncertainty, is included in the *Climate Change Hydrology Development in Support of the Allatoona-Coosa Reallocation Study*, Attachment 5 of Appendix C (Modeling and Engineering).

Representative models were selected that cover the full range of the model results. A model was selected to cover each of the following conditions: low volume, average volume, and high volume. A discussion of how the representative models were chosen can be found in Appendix 4 of Attachment 5 of Appendix C. The local flow from these three models were then input into HEC-ResSim and ran for the 2044–2095 period (centered on 2069, 50 years in the future). Evaluation of the HEC-ResSim climate study generally found that, for the median 2044-2095 results:

- Duration impacts – Results showed only a small increase in flows for all portions of the duration curve;
- Seasonal duration impacts – There was not a discernable difference in impacts by season;
- Annual exceedance impacts – The average impacts of climate change on annual peak exceedance are somewhat greater than for annual duration. The median projected period results are larger than 1951-1999 observed values for almost all of the exceedance frequencies for each gage analyzed in the study. The increases would be less than 20 percent, but they could have substantial effects in some cases. For example, the median increase in the 1 percent exceedance (100-yr) flood would likely be 15 percent. For many gages, this change may result in a substantial stage increase and an associated increase in flood damages. While there is substantial uncertainty in the results of this study, the median results are consistent and indicate that climate change would likely increase flood flows and stages.

Several representative figures of HEC-ResSim outputs from the climate change analysis for the RP are presented as examples in the following figures, including pool levels at Allatoona Lake (Figure 7-8), Weiss Lake (Figure 7-9), and Logan Martin Lake (Figure 7-10) and streamflow in the Etowah River downstream of Allatoona Dam (Figure 7-11), Coosa River near Rome, GA, (Figure 7-12), Coosa River downstream of Logan Martin Dam (Figure 7-13,Alabama River at Junction of Coosa and Tallapoosa River(Figure 7-14) and Alabama River downstream of Claiborne Lock and Dam (Figure 7-15), ACT Basin Operation Summary (Figure 7-16) and ACT Basin Drought Trigger Summary (Figure 7-17) (Hathorn J. , 2019). The following legend definitions apply to those figures:

- BASE2018–No Action Alternative (NAA)
- A11_WS6MF–Alternative 11 (RP)
- Climate Change Range–Range between maximum (RP with high-volume climate change scenario) and minimum (RP with low-volume climate change scenario) results. The representative model selection for high-volume: CESM1-CAM5 RCP 6.0 and low-volume: MIROC-ESM-CHEM RCP 4.5 are detailed in Appendix 4 of Attachment 5 of Appendix C

The figures include daily averages displayed for a given day taken across all years in the period of record analyzed; 1939 -2011 for NAA and RP, 2044 – 2095 for Climate Change Range.

The potential climate change indicators show a broader range of conditions than have been historically experienced in the ACT River Basin. The upper portion of the ACT River Basin, which is the principal focus area of this study, is likely to be wetter in the future.

As reflected in the following figures, current operations for the Allatoona, Weiss, and Logan Martin projects tend to reflect conditions that would be lower than future hydrology bands under a wide range of climate conditions. Future conditions under climate change may introduce potential challenges to flood risk management and operations at the reservoirs. Conversely, drought operations would likely be required on a slightly less frequent basis than historical operations based on high and average volume results. Drought operation could be triggered 4% more often under the low volume condition. Although there would be climate change induced impacts to some project purposes, for example a 6% reduction in percent of time Alabama River 9ft navigation channel is available under the low volume condition. The previously discussed adaptive nature USACE Water Management operations would help to mitigate the negative impacts. The USACE policy requirement to review WCMs every five years provides frequent opportunities to update and change project and basin operations to meet changing conditions and needs within the basin. There is direct reference to climate change, from ER 1110-2-240 (Water Control Management) 'Water control management policies and procedures, including project regulation, shall be evaluated for adaptation to climate change.' District examples of this would be the adjustment of the West Point Lake guide curve to reflect changes in basin hydrology (refill earlier due to lower spring flows), and changes in the way storage is utilized to support the diminished need for navigation in the ACF River Basin (adjustments in action zones to trigger drought operation earlier).

Since evaporation was not estimated through 2099 as part of the climate change hydrology, the three alternatives described above were run without evaporation. To reflect this, a zero evaporation rate time series was used for each reservoir's input evaporation.

To perform a sensitivity analysis, the existing evaporation time series was extended by copying the evaporation from 1944-1995 to the period 2044-2095 and applying the extended evaporation to Alternative 11 using the Average climate change inflows. Sensitivity analysis of applying the evaporation rate show the greatest impact to Coosa River storage reservoirs Weiss and Logan Martin during extreme low periods for the months August and September. Downstream flow values are not impacted, however there is a slight reduction in reservoir storage during these periods. The authorized project purposes continue to be met with the inclusion of the historic evaporation rates.

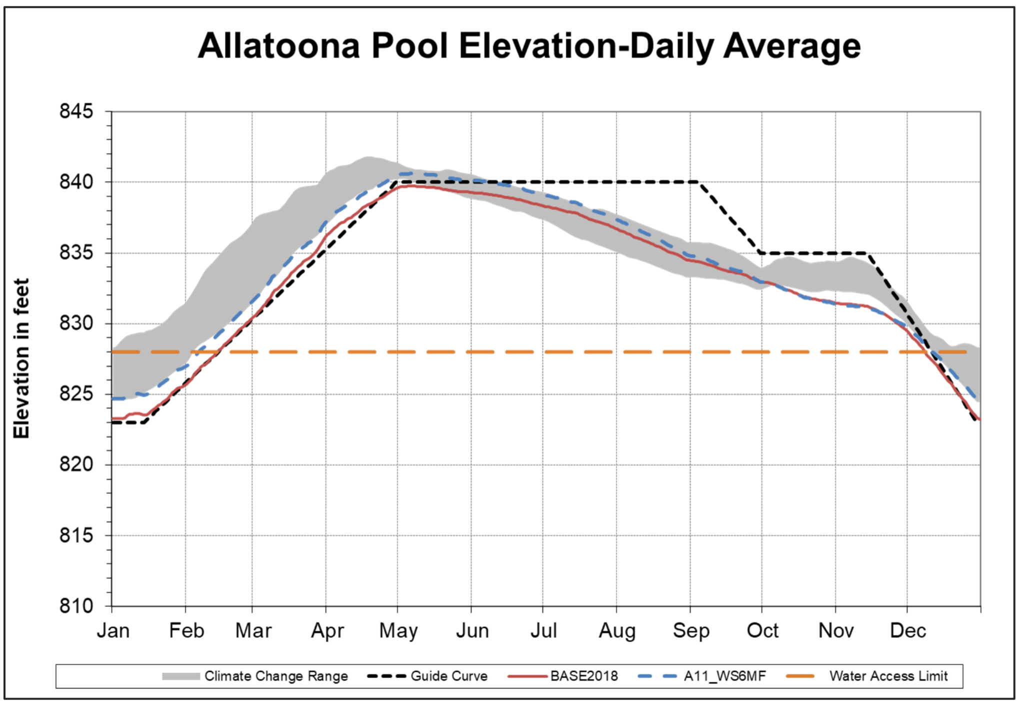


Figure 7-8. Alternative 11 (RP)—Allatoona Lake with Climate Change Scenario.

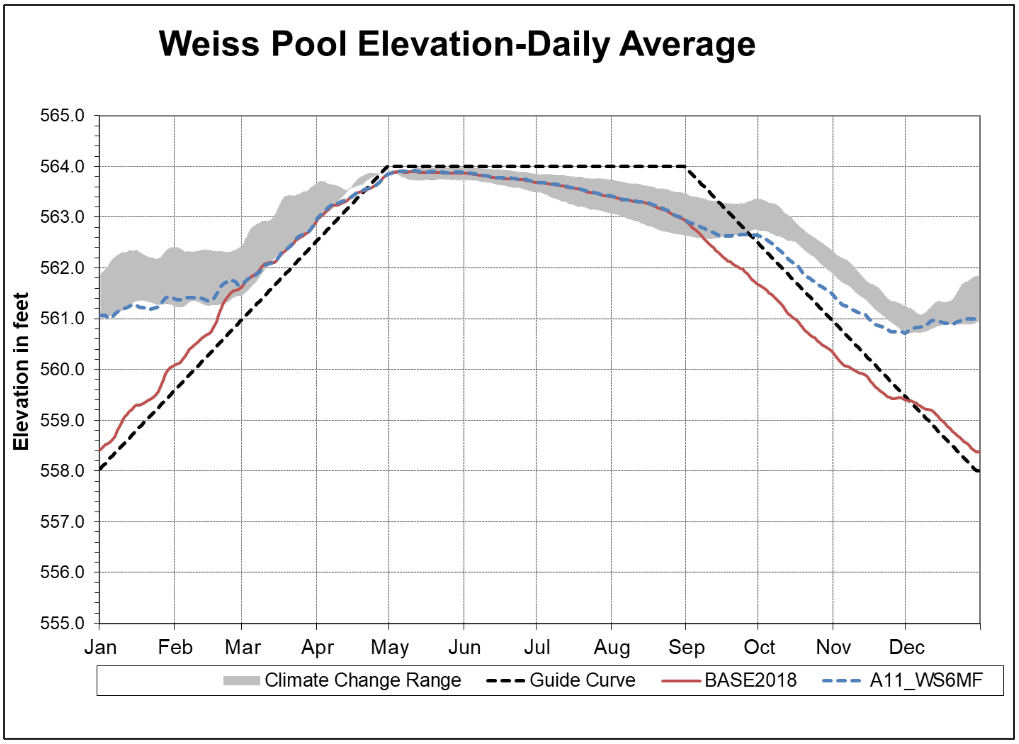


Figure 7-9. Alternative 11 (RP)—Weiss Lake with Climate Change Scenario.

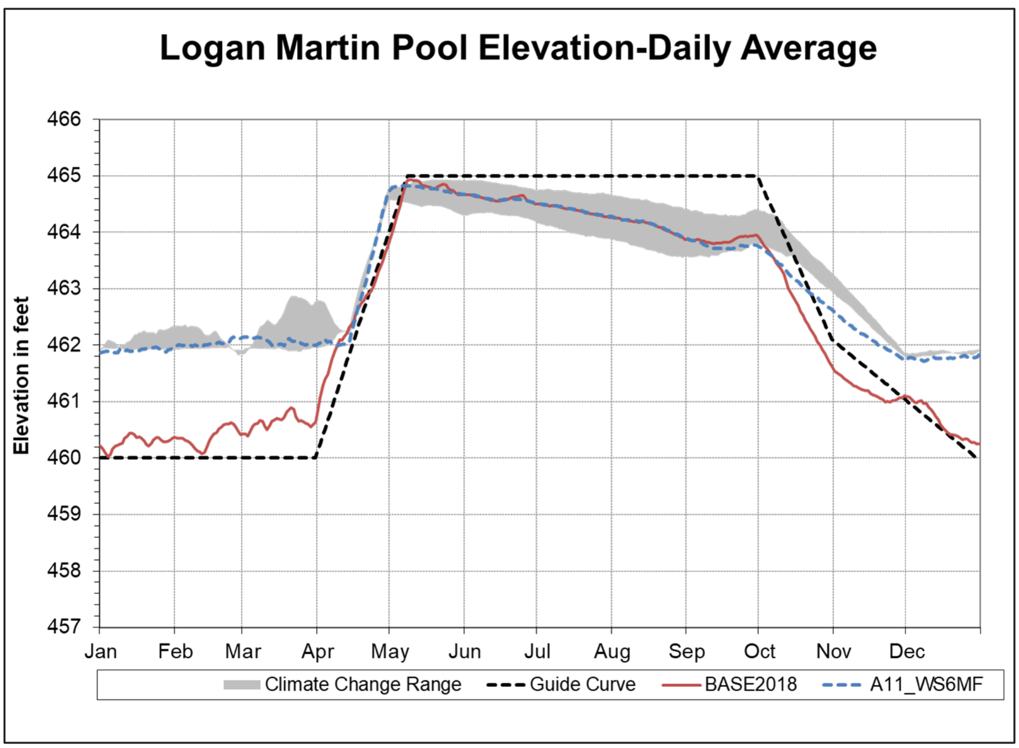


Figure 7-10. Alternative 11 (RP)—Logan Martin Lake with Climate Change Scenario.

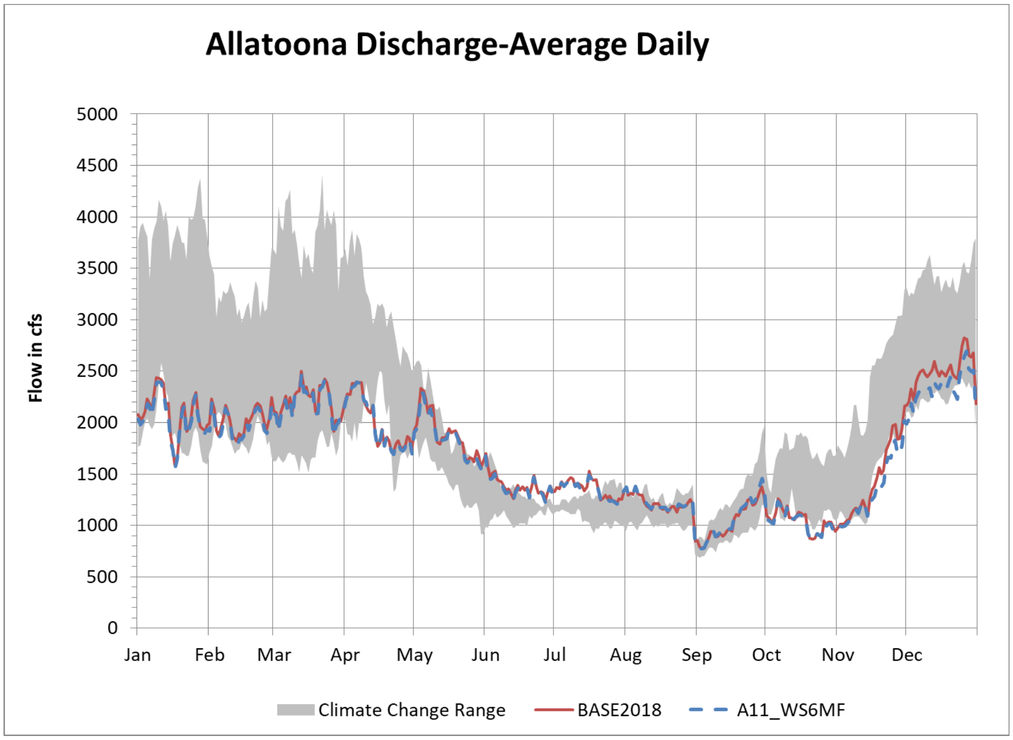


Figure 7-11. Alternative 11 (RP)—Allatoona Discharge with Climate Change Scenario.

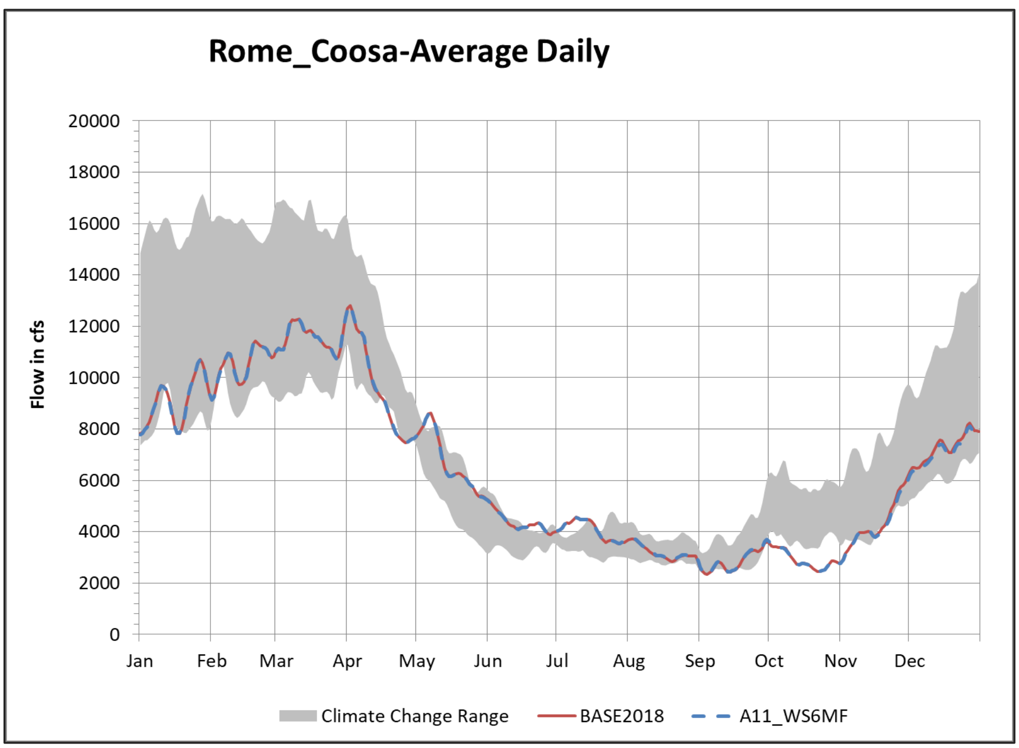


Figure 7-12. Alternative 11 (RP)—Coosa River near Rome with Climate Change Scenario.

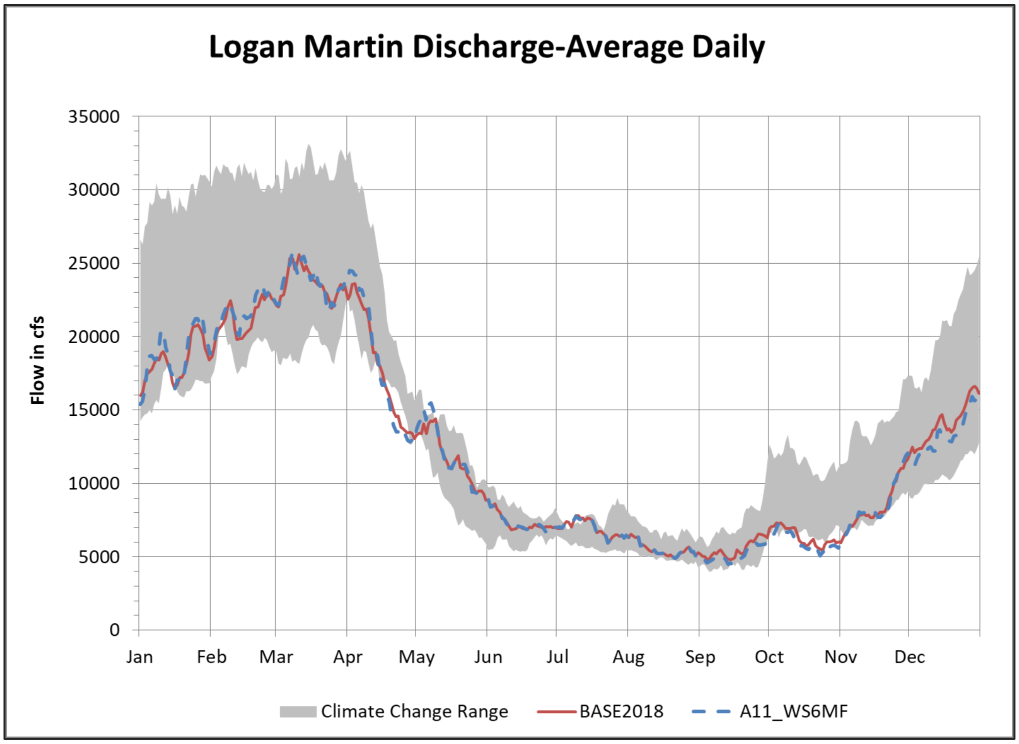


Figure 7-13. Alternative 11 (RP)—Coosa River Downstream of Logan Martin Dam with Climate Change Scenario.

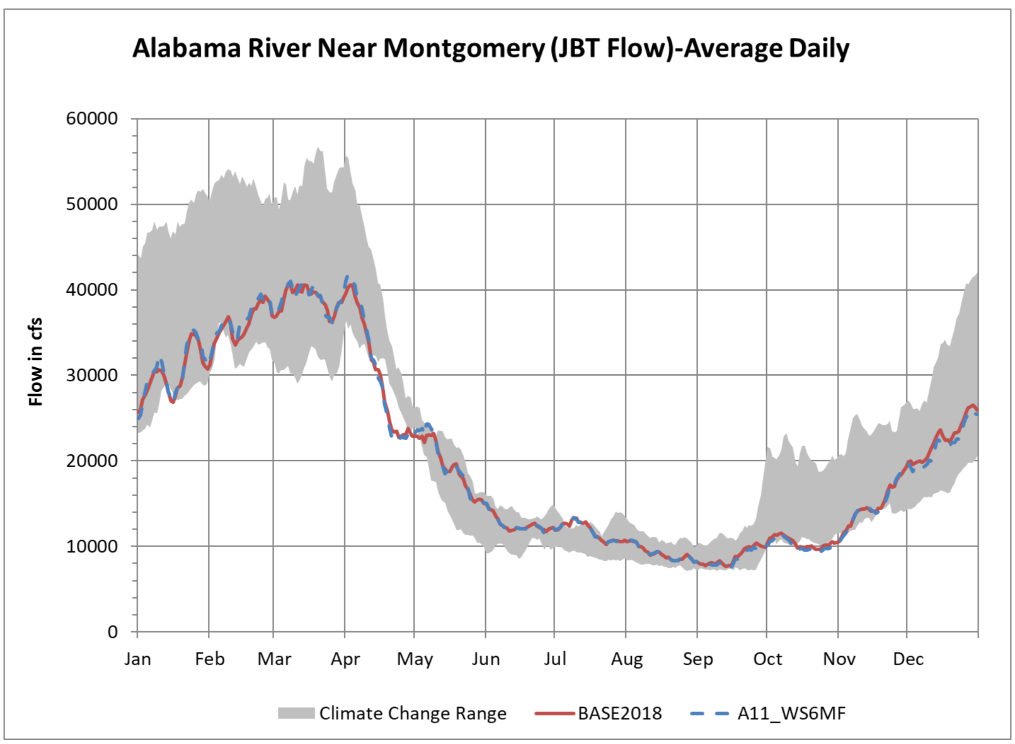


Figure 7-14. Alternative 11 (RP)—Representative of the flow conditions in the Alabama River at the juncture of the Coosa and Tallapoosa Rivers

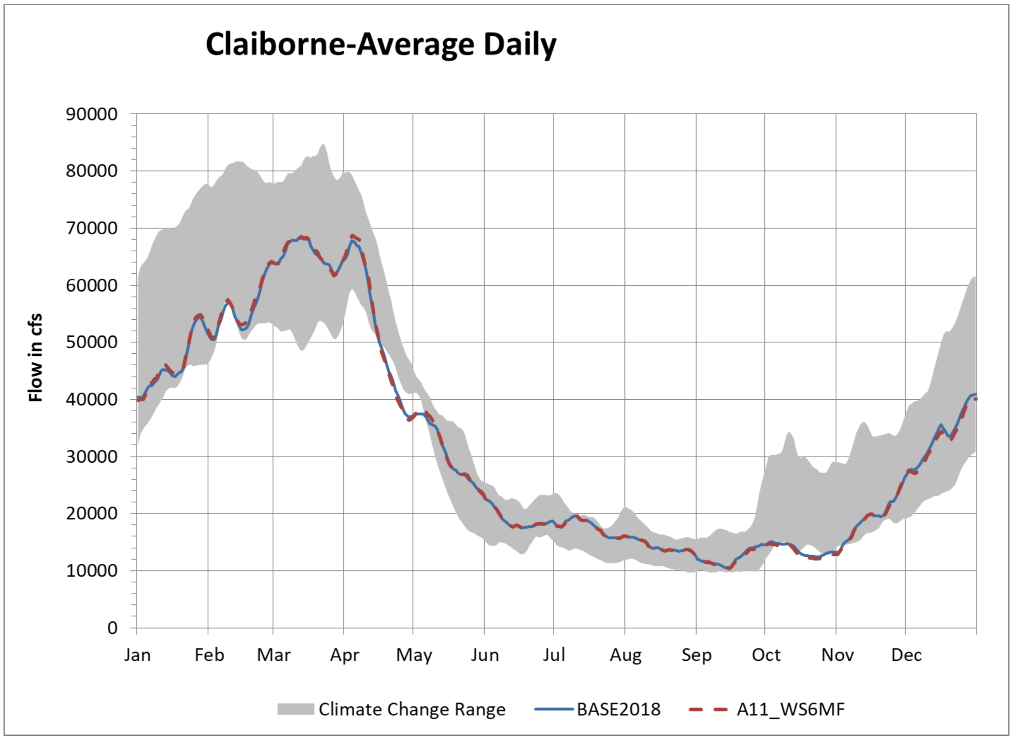


Figure 7-15. Alternative 11 (RP)—Alabama River Downstream of Claiborne Lock and Dam with Climate Change Scenario.

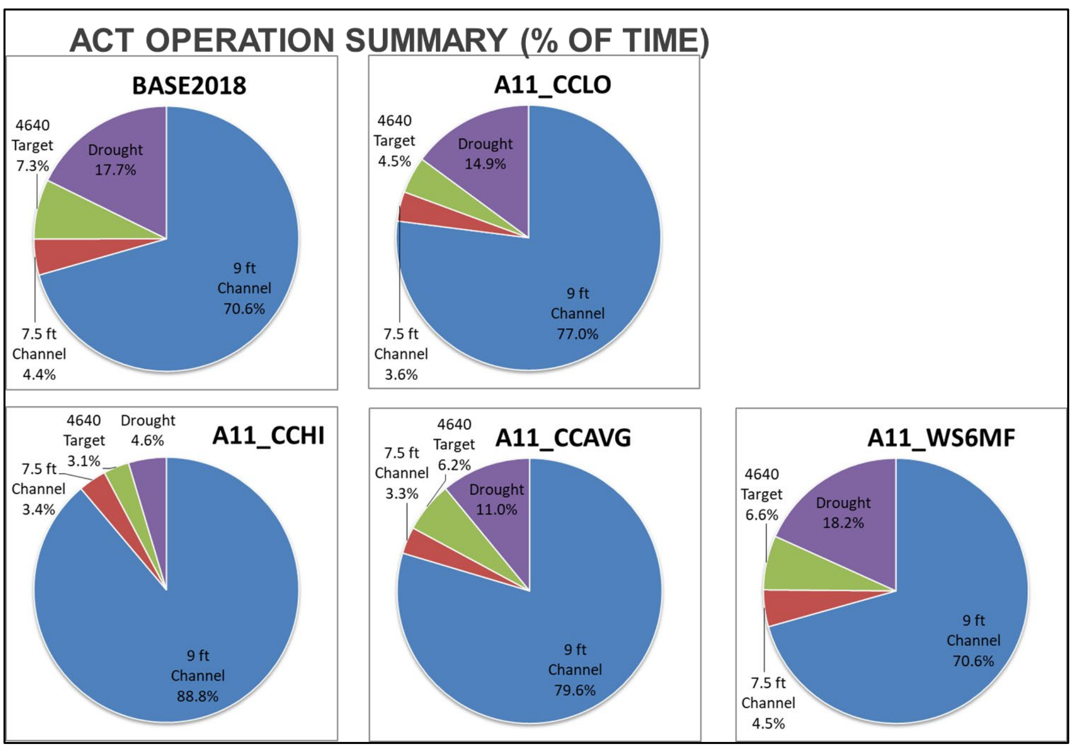


Figure 7-16. Alternative 11 (RP)—ACT Operation Summary with Climate Change Scenario.

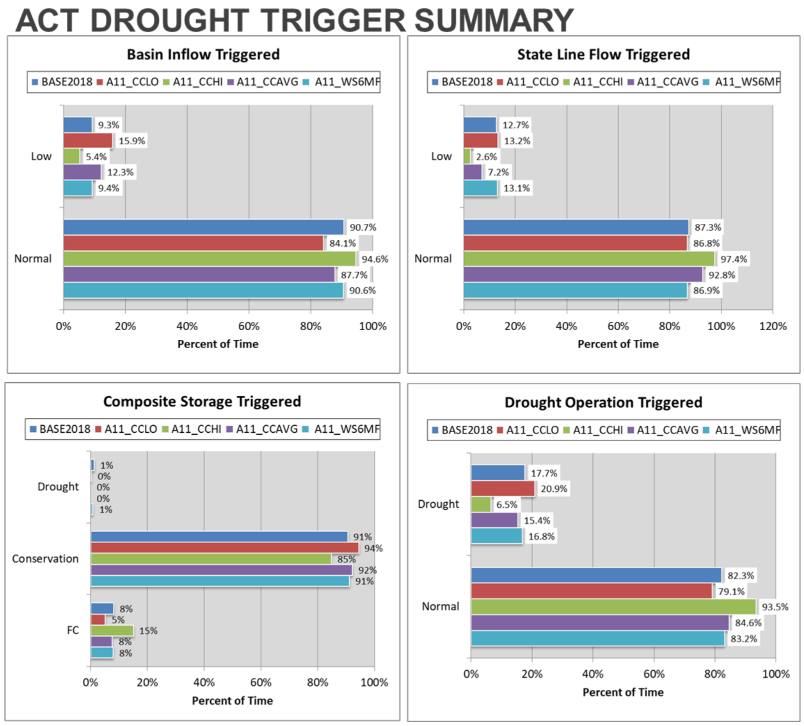


Figure 7-17. Alternative 11 (RP)—ACT Drought Trigger Summary with Climate Change Scenario.

Table 7-2. Summary of Water Quality Effects of the RP under Various Climate Change Scenarios

Climate Scenario	Summary of HEC-5Q Results
RP flows and 1 °C air temperature increase	Relatively small changes in water quality; the largest response was an average increase in water temperature of 2.27 percent.
RP flows and 1 °C air temperature decrease	Relatively small changes in water quality; the largest response was an average decrease in water temperature of 2.28 percent.
RP*0.83 flows and 1 °C air temperature increase	Relatively small changes in most of the water quality parameters, except for orthophosphate as phosphorus, which showed an average concentration increase of 10.16 percent.
RP*0.83 flows and no air temperature increase	Relatively small changes in most of the water quality parameters, except for orthophosphate as phosphorus, which showed an average concentration increase of 7.44 percent.
RP*0.83 flows and 1 °C air temperature decrease	Relatively small changes in most of the water quality parameters; nitrate as nitrogen and orthophosphate as phosphorus exhibited average increases of 4.02 percent and 4.94 percent, respectively.
RP*1.38 flows and 1 °C air temperature increase	Relatively small changes in chlorophyll *a* and ammonia; temperature increased by 3.05 percent; orthophosphate as phosphorus decreased on average by 8.78 percent and nitrate as nitrogen decreased by 3.54 percent.
RP*1.38 flows and no air temperature increase	Relatively modest changes in the water quality parameters, except for a substantial average decrease in orthophosphate as phosphorus by 10.70 percent.
RP*1.38 flows and 1 °C air temperature decrease	Relatively minor changes in the water quality parameters, except for a large average reduction of orthophosphate as phosphorus by 12.44 percent.

7.6 Project Cost and Cost Allocation for Water Supply at Allatoona Lake

The RP includes a reallocation from storage at Allatoona Lake for water supply to meet a future need of an estimated 94 mgd for the CCMWA and the City of Cartersville, GA. USACE guidance requires four different methods to be used to determine the cost of water supply storage to the user, which is discussed in Section 7.6.1. In addition to determining user cost, USACE must ensure that reallocation of federal storage to water supply is the most economical alternative compared to other sources of water (including the Next Least Costly Alternative), which is discussed in Section 7.6.3. Reallocated storage to water supply can be repaid over a period not to exceed 30 years. Details of annual storage costs are discussed in Section 7.6.4.

7.6.1 Summary of Cost of Reallocation Determination

USACE ER 1105-2-100 specifies the four pricing methods used to calculate the value of storage considered for reallocation (i.e., the price to be charged for the capital investment for the reallocated storage): benefits foregone, revenues foregone, replacement cost, and updated cost of storage. The value placed on the storage is the highest of the four methods.

- Benefits Foregone. Benefits foregone are generally estimated using the standard NED evaluation criteria in compliance with ER-1105-2-100. The benefits foregone are evaluated over a 50-year period of analysis.
- Revenues Foregone. Hydropower revenues foregone are defined as the reduction in revenues accruing to the U.S. Treasury as a result of reallocating storage from hydropower to water supply. The revenues are based on the existing repayment agreement between the power marketing agency and USACE. Revenues foregone from other project purposes are the reduction in revenues accruing to the U.S. Treasury based on existing repayment agreements.
- Replacement Cost. Notwithstanding unforeseen circumstances, replacement costs are equal to benefits foregone. If reallocated storage is being taken from the flood control pool, USACE will estimate the replacement cost of equivalent protection if necessary.
- Updated Cost of Storage. The updated cost of reallocated storage is estimated by updating the cost of the joint use features from the midpoint of construction to the fiscal year in which the reallocation of storage is approved. The updated cost of the joint use features is then multiplied by the proportion of useable storage to be reallocated to estimate the value of the reallocated storage.

Table 7-3 displays the costs of the four pricing methods. The benefits foregone method resulted in a total of $1,318,906 benefits gained and included an assessment of NED gains and losses to hydropower, recreation, and flood risk management. A detailed breakout specific to project purposes is included in Appendix B. Revenues foregone/gained for the storage reallocation is $253,000 which is a gain to hydropower. There is a gain under the replacement cost of power. This is equivalent to benefits foregone (gained) to hydropower. The final method, updated cost of storage, is the highest cost of the four methods at $714,000. These costs represent an average annual value in FY2021 dollars.

Table 7-3. Costs to the User Calculations

Storage Option	Benefits Foregone compared to baseline (FWOP)	Revenue Foregone	Replacement Cost	Updated Cost of Storage
Without Project Condition	$0	$0	$0	$0
Reallocation of 33,872 ac-ft (60 mgd)	$1,318,906	$253,000	$0	$714,000

7.6.2 Test for Financial Feasibility

To test the financial feasibility of the reallocation, the annual cost of the reallocated storage is compared to the annual cost of the most likely, least costly alternative water supply source that would provide an equivalent quality and quantity of water if storage reallocation at Allatoona Lake were not an option for the water supply customers. The following sections evaluate the alternative source for the State of Georgia and identify the most likely, least costly water supply source if storage reallocation at Allatoona Lake were not an option.

7.6.3 Summary of Next Least Costly and Most Likely Alternative

The Next Least Costly Alternative was identified from the array of nonfederal water supply alternatives. USACE requested that additional information be provided from the State of Georgia regarding water supply action alternatives absent reallocation from Allatoona Lake. The State of Georgia provided a report that detailed assumptions and relative costs for various alternatives (Hazen and Sawyer, Inc., 2018). These alternatives are summarized in Section 4.4 and discussed in more detail in Appendix B.

7.6.4 Cost of Storage

Based on the analysis, it is recommended that 33,872 ac-ft of usable storage be reallocated to water supply. Of that total of storage, 11,670 ac-ft would be reallocated from the current flood pool. The remainder would be reallocated from the conservation pool. This alternative is the most cost-effective and timely response to satisfy a portion of the projected water demands in the State of Georgia for current Allatoona Lake users, CCMWA, and the City of Cartersville. Cost of storage has been updated to present value from original design estimates using the FY2021 index values found in Engineer Manual 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS). More information regarding the test of financial feasibility and the value of storage can be found in Appendix B Section 9.2. The first cost to the user is $20,242,000 as shown in Table 7-4. An estimate of the user's share of annual O&M cost is $56,000. The annual payment will also include the user's share of repair, rehabilitation, and replacement (RR&R) cost. The estimated annual RR&R costs is $280,265, and the estimated annual payment of $945,987 is displayed in Table 7-4.

Table 7-4. Annual Cost of Storage to the User

Total Usable Storage for Allatoona Lake (STot)		558,853 ac-ft
Storage Recommendation (SRec)		33,872 ac-ft
Percent of Total Usable Storage P = SRec/ STot		6.06%
Total Updated Cost of Storage for Allatoona Lake (CTot)		$333,979,000
Cost of Storage Recommendation (CRec) CRec= P x CTot		$20,242,000
Annual Cost of Storage Recommendation (ARec) ARec=((CRec)*(i))/(1-((1+i)^-N))		$873,000
i(1+i)n-1 ARec= CRec (1+i)n -1	where: CRec = $ i = 1.75% N = 30 years	
Operation and Maintenance for Lake Allatoona(O&MTot)		$ 929,188
Lake Allatoona Annual Operation and Maintenance Estimate (O&MReq) O&MReq = P x O&Mtot		$ 56,000
Replacement and Rehabilitation for Lake Allatoona (R&RTot)		$280,265
Lake Allatoona Annual Replacement and Rehabilitation Estimate (R&RReq) R&RReq = P x R&Rtot		$16,987
Lake Allatoona Mitigation Costs Estimate		$17,435,091
Annual Cost of Mitigation		$751,971
Total Annual Cost =ARec + O&MRec + R,R&Rrec		$1,697,958

Notes:
1 Five-year (FY2019–FY2024) Average of Operations and Maintenance cost are evaluated at October 2020 (FY 2021) price level.
2 Section 932 of the 1986 WRDA requires recalculation of the interest rate at 5-year intervals if the storage is paid annually over a 30-year period.

7.7 Plan Implementation

7.7.1 Water Supply Storage Agreements

Water supply storage agreements are approved by the Assistant Secretary of the Army for Civil Works. The agreements detail the amount and costs of storage, period of repayment, and other stipulations. Draft water supply storage agreements are included as an attachment to Appendix B. USACE and the State of Georgia cannot enter into agreements until the ROD is signed. Each user will have an individual water supply agreement.

7.7.2 Updated Water Control Manuals

Any revised WCMs for the APC projects would require an MOA signed by the MSC Commander and the appropriate representative of APC. USACE anticipates the MOA and new signed WCMs will be incorporated as part of APC's FERC license. USACE has determined that APC operations at Weiss and Logan Martin meet Criteria 2 and Criteria 3 of the Coosa Power Act and have requested FERC provide a determination with respect to Criteria 1 of the Coosa Power Act. USACE received email correspondence from FERC on October 22, 2020 which indicated that they will defer to USACE's judgement for the sufficiency of flood control storage.

7.7.3 Alabama Power Company Real Estate Easements

The PDT has requested documentation from APC and FERC regarding purchased real estate interests. Documentation refers to real estate recorded deeds and flowage easements, methodologies used to identify required flowage easements, as well as any GIS information and schematics delineating the easement boundaries. The correspondence received from FERC on October 22, 2020, stated that APC has acquired all necessary real estate for the proposed operation. Pursuant to ongoing USACE interagency coordination with FERC at the time of this report, insufficient data is available to determine the sufficiency of APC's current real estate interests for the proposed operational changes to the Weiss and Logan Martin dams. It is the responsibility of APC to acquire all necessary real estate interests prior to implementation.

7.7.4 Shoreline Management at Allatoona Lake

Due to the summer pool raise from 840 ft. to 841 ft. the shoreline management plan will need to be updated. Approximately 160,000 linear feet of riprap would likely be added to avoid potential erosion for slightly higher lake elevations. Sixteen public docks would likely be modified as part of the pool raise. Additionally, 17 beaches have been identified that would likely need to be modified in order to maintain the existing capacity. USACE also maintains Aids to Navigation which are currently set to 840 ft elevation. USACE project managers are currently assessing which of these would need to be relocated. Additional costs are included in the cost of storage which is allocated specifically to the water supply users.

7.8 Risk and Uncertainty

While the RP addresses the current and near future need for water supply for users of Allatoona Lake, changes in population or water usage are uncertain and may not fully satisfy future needs in the event of increases in either one of these assumptions. It is the State of Georgia's responsibility to continue to manage risks of water supply shortage now and in the future.

USACE has developed draft Programmatic Agreements with the Georgia and Alabama SHPOs to determine the effects of the proposed operational changes in the RP on cultural resources in Allatoona, Weiss, and Logan Martin reservoirs and downstream of those projects where changes in releases from those projects may be expected and to mitigate any significant adverse effects on those resources, as may be necessary. While substantial impacts on these resources are not likely to occur in response to the relatively minor changes in reservoir pool levels and downstream flow conditions expected under the RP, there is a slight risk that unforeseen impacts might be identified and could require implementation of specific mitigation measures as discussed in Section 5.14.

8.0 RECOMMENDATIONS

Based on the analysis presented in this Final FR/SEIS, I have concluded at this time that the RP, as presented in Section 7, would most effectively meet the objectives of the ACR study. In making this recommendation at this stage of the study, I have considered all significant public interest aspects of the RP, including environmental, social and economic effects, engineering feasibility, compatibility of the project with Departmental policies, and the specific requests made by the State of Georgia for additional water supply storage at Allatoona Lake and by the APC for specific modifications to federally authorized flood operations at APC's Weiss and Logan Martin dams. The recommendations contained herein reflect the most current information available at this time and current Departmental policies governing the actions requested of USACE by the State of Georgia and the APC. To ensure that the RP complies with all applicable laws and policies and is acceptable to the public and pertinent agencies, the Final FR/SEIS will undergo final review. The PDT will address any outstanding issues raised during the review process and confirm the analysis leading to selection of the RP for approval and implementation.

At this time, the RP does not necessarily reflect the national Civil Works program and budgeting priorities nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before final approval of the RP. However, prior to final approval, the States of Alabama and Georgia, federal agencies, and other interested parties will be advised of any substantive modifications and will be afforded an opportunity to comment further.

12 NOV 2020

Date

Sebastien P. Joly
Colonel, U.S. Army
District Commander

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11.0 DISTRIBUTION LIST *

The SEIS was distributed electronically through the project website. Notification of availability was distributed through the *Federal Register* and by an email sent to those on the project mailing list. The project mailing list includes federal, state, and local agencies, Native American tribes, elected officials, other organizations, and individuals.

11.1 Federal Agencies

FEMA (Federal Emergency Management Agency)
FHA (Federal Highway Administration)
FERC (Federal Energy Regulatory Commission)
National Marine Fisheries Service
National Oceanic and Atmospheric Administration, National Ocean Service
National Oceanic and Atmospheric Administration, Office of Oceanic and Atmospheric Research
U.S. Army Environmental Policy Institute
U.S. Army Infantry Center
U.S. Army Infantry School
U.S. Army Signal Center and School
U.S. Coast Guard Group
U.S. Coast Guard, Auxiliary
U.S. Consolidated Farm Service Agency
U.S. Department of Agriculture
U.S. Department of Agriculture, Natural Resources Conservation Service
U.S. Department of Agriculture, Natural Resources Conservation Service, Alabama State Conservation Engineer
U.S. Department of Agriculture, Natural Resources Conservation Service, Office of the Chief
U.S. Department of Agriculture, Natural Resources Conservation Service, Water Resources
U.S. Department of Agriculture, Rural Economic and Community Development
U.S. Department of Commerce
U.S. Department of Energy
U.S. Department of Health and Human Services
U.S. Department of Housing and Urban Development, Region IV
U.S. Department of Justice
U.S. Department of the Interior
U.S. Department of Transportation Maritime Administration, Central Region, Regional Director
U.S. Environmental Protection Agency, NEPA Compliance
U.S. Environmental Protection Agency
U.S. Environmental Protection Agency, Library
U.S. Environmental Protection Agency, Region 4
U.S. Environmental Protection Agency, Water Management Division
U.S. Fish and Wildlife Service
U.S. Fish and Wildlife Service, Ecological Services
U.S. Fish and Wildlife Service, Georgia
U.S. Fish and Wildlife Service, Region 4, Regional Director
U.S. Forest Service, Southern Region, Biological Physical Resources Unit, Georgia Director
U.S. Forest Service, Southern Region, Regional Hydrologist
U.S. Geological Survey, Alabama Water Science Center Office
U.S. Geological Survey, Georgia District
U.S. National Park Service, Horseshoe Bend National Military Park
U.S. National Park Service, Kennesaw Mountain National Battlefield Park
U.S. National Park Service, Southeast Support Office
U.S. Public Health Service
Weeks Bay National Reserve

11.2 State Agencies

Alabama Army National Guard
Alabama Assistant Attorney General
Alabama Association of Conservation Districts
Alabama Attorney General's Office
Alabama Bureau of Environmental and Health Services
Alabama Bureau of Tourism and Travel
Alabama Department of Environmental Management
Alabama Department of Agriculture and Industry
Alabama Department of Conservation and National Resources
Alabama Department of Conservation and Natural Resources, Game and Fish Division
Alabama Department of Conservation and Natural Resources, State Fish Hatchery
Alabama Department of Economic and Community Affairs
Alabama Department of Environmental Management
Alabama Department of Environmental Management, Water Division
Alabama Department of Industrial Relations
Alabama Department of Public Health
Alabama Department of Urban Planning
Alabama Development Office
Alabama Emergency Management Agency
Alabama Forestry Commission
Alabama Game and Fish Office
Alabama Geological Survey
Alabama Historic Commission
Alabama Municipal Electric Authority
Alabama Office of Water Resources
Alabama Oil and Gas Board
Alabama Public Service Commission
Alabama Rural Electric Association
Alabama Soil and Water Conservation District
Alabama State Docks
Alabama State Highway Department
Alabama State Parks
Georgia Department of Industry, Trade and Tourism
Georgia Department of Agriculture
Georgia Department of Community Affairs
Georgia Department of Health and Human Services
Georgia Department of Human Resources
Georgia Department of Natural Resources
Georgia Economic Development Administration
Georgia Environmental Protection Division
Georgia Farm Bureau Federation
Georgia Geologic Survey
Georgia State Clearinghouse
Georgia Ports Authority
Georgia Wildlife Resource Division
Georgia Wildlife Resources Division of Fisheries
Tennessee River Water Authority

11.3 Local Agencies

Abbeville Chamber of Commerce
Acworth, Georgia – City Manager
Alabama Gulf Coast Area Chamber of Commerce
Albany, Georgia – City Engineer
Albertville Chamber of Commerce
Alexander City Chamber of Commerce
Alexander City Water Department
Aliceville Area Chamber Commerce
Alpharetta Environmental Service
Andalusia Area Chamber of Commerce
Anniston Chamber of Commerce
Anniston Water and FPA
Arab Chamber of Commerce
Athens-Limestone County Chamber of Commerce
Atlanta Chamber of Commerce
Atmore Area Chamber of Commerce
Attalla Chamber of Commerce
Auburn Chamber of Commerce
Autauga County Commission
Baldwin County Commission
Baldwin County Solid Waste
Barbour County Alabama Farmers Federation
Barbour County Commission
Bartow County Water Department
Bay Minette Area Chamber Commerce
Bayou La Batre Chamber of Commerce
Bessemer Area Chamber of Commerce
Bibb County Chamber of Commerce
Bibb County Commission
Birmingham Water Works and Sewer Board

Blount County–Oneonta Chamber of Commerce
Board of Commissioners, Americus, Georgia
Board of Commissioners, Barnesville, Georgia
Board of Commissioners, Butler, Georgia
Board of Commissioners, Byromville, Georgia
Board of Commissioners, Camilla, Georgia
Board of Commissioners, Carrollton, Georgia
Board of Commissioners, Cedartown, Georgia
Board of Commissioners, Chatsworth, Georgia
Board of Commissioners, Cleveland, Georgia
Board of Commissioners, Cornelia, Georgia
Board of Commissioners, Cusseta, Georgia
Board of Commissioners, Damascus, Georgia
Board of Commissioners, Dawson, Georgia
Board of Commissioners, Edison, Georgia
Board of Commissioners, Forsyth, Georgia
Board of Commissioners, Fort Gaines, Georgia
Board of Commissioners, Franklin, Georgia
Board of Commissioners, Gainesville, Georgia
Board of Commissioners, Georgetown, Georgia
Board of Commissioners, Hamilton, Georgia
Board of Commissioners, LaFayette, Georgia
Board of Commissioners, LaGrange, Georgia
Board of Commissioners, Leesburg, Georgia
Board of Commissioners, Lovejoy, Georgia
Board of Commissioners, Lumpkin, Georgia
Board of Commissioners, Montezuma, Georgia
Board of Commissioners, Norman Park, Georgia
Board of Commissioners, Preston, Georgia
Board of Commissioners, RockeyFace, Georgia
Board of Commissioners, Rome, Georgia
Board of Commissioners, Sumner, Georgia
Board of Commissioners, Talbotton, Georgia
Board of Commissioners, Thomaston, Georgia
Board of Commissioners, Whigham, Georgia
Boaz Chamber of Commerce
Bullock County Chamber of Commerce
Bullock County Commission
Butler County Commission
Calera Chamber of Commerce
Calhoun County Chamber of Commerce
Calhoun County Commission
Calhoun Utilities
Cartersville Housing Authority
Cartersville Water Department
Cartersville-Bartow County Chamber of Commerce
Central Alabama Regional Planning and Development Commission
Central Baldwin Chamber of Commerce
Centre Water and Sewer Board
Chamber of Commerce of Russellville-Franklin County
Chamber of Commerce of Walker County
Chamber of Commerce of West Alabama
Chamber of Commerce, Alexander City, Alabama
Chamber of Commerce, Athens, Alabama
Chamber of Commerce, Calhoun, Georgia
Chamber of Commerce, Centre, Alabama
Chamber of Commerce, Fayette, Alabama
Chamber of Commerce, Fort Payne, Alabama
Chamber of Commerce, Gadsden, Alabama
Chamber of Commerce, Jasper, Alabama
Chamber of Commerce, Opelika, Alabama
Chamber of Commerce, Ozark, Alabama
Chamber of Commerce, Rome, Georgia
Chamber of Commerce, Russellville, Alabama
Chamber of Commerce, Sumiton, Alabama
Chambers County Commission
Chatsworth Water Works Commission
Chattahoochee County Commission
Cherokee County Chamber of Commerce
Cherokee County Commission
Cherokee County Water and Sewer Authority
Cherokee County, AP Probate Judge
Chickasaw Chamber of Commerce
Childersburg Chamber of Commerce
Childersburg Water Sewer and Gas Board
Chilton County Chamber of Commerce
Chilton County Commission
Choctaw County Chamber of Commerce
Citronelle Area Chamber of Commerce
City of Acworth, Georgia
City of Atlanta, Georgia
City of Auburn, Alabama
City of Bainbridge, Georgia
City of Calhoun, Georgia
City of Calhoun, Water Plant, Georgia
City of Camilla, Georgia
City of Cartersville, Georgia
City of Cartersville-LAPA, Georgia
City of Columbus, Georgia
City of Cordele, Georgia
City of Cumming, Georgia
City of Dallas, Georgia
City of Eufaula, Alabama
City of Gainesville, Georgia
City of Gulf Shores, Alabama

City of Hiram, Georgia
City of Jacksonville, Alabama
City of Kennesaw, Georgia
City of LaGrange, Georgia
City of Lanett, Alabama
City of Montgomery, Alabama
City of Opelika, Alabama
City of Orange Beach, Alabama
City of Orange Beach Planning Department, Alabama
City of Oxford, Alabama
City of Pell City, Alabama
City of Phenix City, Alabama
City of Rome, Georgia
City of Rome Water and Sewer, Georgia
City of Tallapoosa, Georgia
City of Villa Rica, Georgia
City of West Point, Georgia
City of Wetumpka, Alabama
Clarke County Commission
Clay County Board of Commissioners
Clay County Chamber of Commerce
Clayton County Chamber of Commerce
Cleburne County Chamber of Commerce
Cleburne County Commission
Cobb Marietta Water Authority
Cobb County Chamber of Commerce
Cobb County Commission
Cobb County Tag Office
Cobb County Water System
Cobb County-Marietta Water Authority
College Park, Georgia – City Engineer
Columbus Chamber of Commerce
Columbus Consolidated Government
Columbus Travel Bureau
Columbus Water Works
Conecuh County Commission
Coosa County Commission
Coosa River SWCD (Soil and Water Conservation District)
Coosa Valley APDC (Area Planning and Development Commission)
Coosa Valley Regional Development Center
Cordele City Commission
County Supervisor, McDonough, Georgia
Covington County Commission
Coweta County Water and Sewer Department
Crenshaw County Commission
Crisp County
Cullman County Chamber of Commerce
Dadeville Area Chamber of Commerce
Dadeville Water/Gas Board
Daleville Chamber of Commerce
Dallas County Commission
Dauphin Island Chamber of Commerce
Dauphin Island Sea Lab
Davco Development Company
Decatur Chamber of Commerce
Dekalb Chamber of Commerce
Dekalb County
Dekalb Public Works
Dekalb School System
Demopolis Area Chamber of Commerce
Donalsonville Chamber of Commerce
Dothan Area Chamber of Commerce
Dothan Utilities
Dothan-Houston County Chamber of Commerce
Douglas County Commission
Douglasville-Douglas County Authority
Early County Board of Commissioners
Early County Commission
East Alabama Regional Planning and Development Commission
Eastern Shore Chamber of Commerce
Eataw Area Chamber of Commerce
Elba Chamber of Commerce
Ellijay City Hall
Elmore County Commission
Enterprise Chamber of Commerce
Escambia County Commission
Etowah County Commission
Etowah Water Authority
Eufaula Water and Sewer Department
Eufaula, Alabama – Parks and Recreation
Evergreen/Conecuh County Area Chamber of Commerce
Fayette Area Chamber of Commerce
Fayette County Commission
Fayette County Water System
Flomaton Chamber of Commerce
Florence, Alabama – Parks and Recreation Department
Floyd County Commission
Floyd County Commissioners' Office
Floyd County Planning
Forsyth County
Forsyth County Board of Commissioners
Fort Deposit Chamber of Commerce

Fort Payne/DeKalb County Chamber of Commerce
Franklin Water Works
Frisco City Chamber of Commerce
Fulton County Office of Environmental Affairs
Fulton County Public Works Department
Gadsden Water Works and Sewer Board
Gadsden-Etowah Chamber of Commerce
Gainesville Water Department
Gardendale Chamber of Commerce
Geneva County Commission
Georgia Center for Law in the Public Interest
Georgia Chamber of Commerce
Georgia County Commissioners Association
Georgia Municipal Association
Gilmer County Commissioner
Gordon County Commissioners Office
Greater Hall Chamber of Commerce
Greater Leeds Area Chamber of Commerce
Greater Talladega Area Chamber of Commerce
Greater Valley Area Chamber of Commerce
Greenville Area Chamber of Commerce
Guntersville, Alabama – Parks and Recreation Department
Gwinnett County
Gwinnett County Planning and Development
Gwinnett County Water System
Haleyville Area Chamber of Commerce
Hall County
Hall County Commission
Hamilton Area Chamber of Commerce
Haralson County
Haralson County Water
Hartselle Chamber of Commerce
Haralson County Water
Headland Chamber of Commerce
Henry County Water and Sewage Authority
Homewood Chamber of Commerce
Hoover Chamber of Commerce
Houston County Commission
Houston County Port Authority
Hueytown Area Chamber of Commerce
Huguley Water System
Jackson Chamber of Commerce
Lake Guntersville Chamber of Commerce
Lawrence County Chamber of Commerce
Lee County Commission
Lowndes County Commission
Lumpkin County
Luverne/Crenshaw Chamber of Commerce
Macon County Commission
Macon County Water/FPA
Marengo County Commission
Marietta Water Authority
McDonough, Georgia – County Supervisor
MEAG Power (Municipal Electric Authority of Georgia)
Millport Area Chamber of Commerce
Mitchell County Commission
Mobile Area Chamber of Commerce
Mobile Area Water and Sewer System
Mobile City Planning Commission
Mobile County Commission
Mobile County Engineering Department
Mobile County Health Department
Mobile County Wildlife and Conservation Association
Mobile, Alabama – Inspection Services Department
Monroe County Commission
Monroe County, Probate Judge
Monroeville Area Chamber of Commerce
Montevallo Chamber of Commerce
Montgomery Area Chamber of Commerce
Montgomery County Commission
Montgomery Water Works and Sewer Board
Montgomery, Alabama – Parks and Recreation Department
Morrow, Georgia – Public Works Director
Municipal Electric Authority, Montgomery, Alabama
Murray County Commissioners Office
Oakdale Community
Oglethorpe Power Company
Opelika Chamber of Commerce
Opelika Water Works Board
Opp and Covington County Area Chamber of Commerce
Orange Beach Water System
Ozark Area Chamber of Commerce
Paulding County Commission
Pea River Electric Cooperative
Perry County Commission
Phenix City Chamber of Commerce
Phenix City, Alabama – City Engineer
Pike County Chamber of Commerce
Pike County Commission
Pine Hill Water System
Public Works, City of Powder Springs, Georgia

Randolph County Chamber of Commerce
Randolph County Commission
Reform Area Chamber of Commerce
Rome Chamber of Commerce
Rome, Georgia, City Commission
Rome/Floyd Parks and Recreation Department
Russell County Commission, Phenix City, Alabama
Scottsboro-Jackson County Chamber of Commerce
Selma Waterworks and Sewer Board
Shelby County Commission
Shoals Chamber of Commerce
South Baldwin Chamber of Commerce
South Shelby Chamber of Commerce
South Tallapoosa Water Authority
Southeast Power Resources Committee, Inc.
Southeastern Power Administration (SEPA)
Stewart County Commission
Sylacauga Chamber of Commerce
Talladega Water and Sewer
Tallapoosa County Board of Registrars
Tallapoosa County Commission
Thomasville Chamber of Commerce
Thompson Power System
Tillman's Corner Chamber of Commerce
Town of Dauphin Island
Tri Rivers
Trussville Area Chamber of Commerce
Tuscaloosa Park and Recreation Authority
Tuscaloosa, Alabama – Legal Department
Tuskegee Utilities Board
Vernon Chamber of Commerce
Villa Rica, Georgia – City Manager
Walnut Grove Water System
Walton County Board of Commissioners
Walton County Water and Sewerage Authority
Wetumpka Area Chamber of Commerce
Wilcox County Commission

11.4 Native American Tribes

Absentee-Shawnee Tribe of Oklahoma
Alabama-Coushatta Tribe of Texas
Alabama-Quassarte Tribal Town of the Creek Nation
Caddo Nation of Oklahoma
Catawba Indian Nation of South Carolina
Cherokee Nation
Chickasaw Nation
Chitimacha Tribe of Louisiana
Choctaw Nation of Oklahoma
Coushatta Tribe of Louisiana
Eastern Band of the Cherokee Nation
Eastern Shawnee Tribe of Oklahoma
Jena Band of Choctaw Indians
Kialegee Tribal Town of the Creek Nation of Oklahoma
Miccosukee Tribe of Indians of Florida
Mississippi Band of Choctaw Indians
Muscogee (Creek) Nation
Poarch Band of Creek Indians
Quapaw Tribe of Indians of Oklahoma
Seminole Nation of Oklahoma
Seminole Tribe of Florida
Shawnee Tribe
Thlopthlocco Tribal Town
Tunica-Biloxi Indian Tribe of Louisiana
United Keetoowah Band of Cherokee Indians in Oklahoma
United Southern and Eastern Tribes

11.5 State and Local Elected Officials

Alabama House of Representatives
Alabama Senate
Alabama State Governor
Alabama State House District 8
Alabama State House District 9
Alabama State House District 11
Alabama State House District 13
Alabama State House District 14
Alabama State House District 16
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Georgia House District 161
Georgia House District 162
Georgia House District 163
Georgia House District 164
Georgia House District 179
Georgia House of Representatives
Georgia Senate
Georgia State Governor
Mayor and Council, Chatsworth, Georgia
Mayor of Smyrna, Georgia
Mayor, Acworth, Georgia
Mayor, Alabaster, Alabama
Mayor, Albany, Georgia
Mayor, Alexander City, Alabama
Mayor, Alpharetta, Georgia
Mayor, Alto, Georgia
Mayor, Arabi, Georgia
Mayor, Arlington, Georgia
Mayor, Ashford, Alabama
Mayor, Ashland, Alabama
Mayor, Atlanta, Georgia
Mayor, Attalla, Alabama
Mayor, Attapulgus, Georgia
Mayor, Auburn, Georgia
Mayor, Austell, Georgia
Mayor, Avondale Estates, Georgia
Mayor, Baconton, Georgia
Mayor, Bainbridge, Georgia
Mayor, Baldwin, Georgia
Mayor, Barnesville, Georgia
Mayor, Berkeley Lake, Georgia
Mayor, Blakely, Georgia
Mayor, Bluffton, Georgia
Mayor, Boaz, Alabama
Mayor, Bowdon, Georgia
Mayor, Braselton, Georgia
Mayor, Bremen, Georgia
Mayor, Brent, Alabama
Mayor, Brinson, Georgia
Mayor, Bronwood, Georgia
Mayor, Brooks, Georgia
Mayor, Buena Vista, Georgia
Mayor, Butler, Georgia
Mayor, Byromville, Georgia
Mayor, Byron, Georgia
Mayor, Cairo, Georgia
Mayor, Calhoun, Georgia
Mayor, Camden, Alabama
Mayor, Centre, Alabama
Mayor, Centreville, Alabama
Mayor, Chamblee, Georgia
Mayor, Chatsworth, Georgia
Mayor, Childersburg, Alabama
Mayor, Clanton, Alabama
Mayor, Clarkesville, Georgia
Mayor, Clarkston, Georgia
Mayor, Climax, Georgia
Mayor, College Park, Georgia
Mayor, Columbus, Georgia
Mayor, Concord, Georgia
Mayor, Cornelia, Georgia
Mayor, Cowarts, Alabama
Mayor, Cuthbert, Georgia
Mayor, Dacula, Georgia
Mayor, Dadeville, Alabama
Mayor, Dallas, Georgia
Mayor, Damascus, Georgia
Mayor, Decatur, Georgia
Mayor, Demopolis, Alabama
Mayor, Demorest, Georgia
Mayor, Donalsonville, Georgia
Mayor, Doraville, Georgia
Mayor, East Ellijay, Georgia
Mayor, East Point, Georgia
Mayor, Edison, Georgia
Mayor, Ellaville, Georgia
Mayor, Eufaula, Alabama
Mayor, Fairburn, Georgia
Mayor, Fayetteville, Georgia

Mayor, Forest Park, Georgia
Mayor, Fort Deposit, Alabama
Mayor, Fort Gaines, Georgia
Mayor, Fort Payne, Alabama
Mayor, Fort Valley, Georgia
Mayor, Franklin, Georgia
Mayor, Gainesville, Georgia
Mayor, Gay, Georgia
Mayor, Georgetown, Georgia
Mayor, Georgiana, Alabama
Mayor, Glencoe, Alabama
Mayor, Goodwater, Alabama
Mayor, Grantville, Georgia
Mayor, Greenville, Alabama
Mayor, Greenville, Georgia
Mayor, Griffin, Georgia
Mayor, Hamilton, Georgia
Mayor, Hapeville, Georgia
Mayor, Headland, Alabama
Mayor, Heflin, Alabama
Mayor, Helena, Alabama
Mayor, Hiram, Georgia
Mayor, Hogansville, Georgia
Mayor, Hokes Bluff, Alabama
Mayor, Hurtsboro, Alabama
Mayor, Ideal, Georgia
Mayor, Iron City, Georgia
Mayor, Jackson, Alabama
Mayor, Jacksonville, Alabama
Mayor, Junction City, Georgia
Mayor, Lafayette, Alabama
Mayor, Lake City, Georgia
Mayor, Lanett, Alabama
Mayor, Leesburg, Georgia
Mayor, Lincoln, Alabama
Mayor, Linden, Alabama
Mayor, Lineville, Alabama
Mayor, Lithonia, Georgia
Mayor, Loganville, Georgia
Mayor, Lula, Georgia
Mayor, Lumpkin, Georgia
Mayor, Luthersville, Georgia
Mayor, Manchester, Georgia
Mayor, Marietta, Georgia
Mayor, Marion, Alabama
Mayor, Marshallville, Georgia
Mayor, Meansville, Georgia
Mayor, Milner, Georgia
Mayor, Monroeville, Alabama
Mayor, Montevallo, Alabama
Mayor, Montezuma, Georgia
Mayor, Moreland, Georgia
Mayor, Morgan, Georgia
Mayor, Morrow, Georgia
Mayor, Mount Airy, Georgia
Mayor, Newnan, Georgia
Mayor, Newton, Georgia
Mayor, Norcross, Georgia
Mayor, Notasulga, Alabama
Mayor, Oakwood, Georgia
Mayor, Oglethorpe, Georgia
Mayor, Ohatchee Alabama
Mayor, Opelika, Alabama
Mayor, Orange Beach, Alabama
Mayor, Orchard Hill, Georgia
Mayor, Oxford, Alabama
Mayor, Palmetto, Georgia
Mayor, Parrott, Georgia
Mayor, Peachtree City, Georgia
Mayor, Pelham, Alabama
Mayor, Pell City, Alabama
Mayor, Perry, Georgia
Mayor, Phenix City, Alabama
Mayor, Piedmont, Alabama
Mayor, Pine Mountain, Georgia
Mayor, Pinehurst, Georgia
Mayor, Plains, Georgia
Mayor, Poulan, Georgia
Mayor, Powder Springs, Georgia
Mayor, Prattville, Alabama
Mayor, Preston, Georgia
Mayor, Rainbow City, Alabama
Mayor, Rainsville, Alabama
Mayor, Reynolds, Georgia
Mayor, Richland, Georgia
Mayor, Riverdale, Georgia
Mayor, Roberta, Georgia
Mayor, Roopville, Georgia
Mayor, Sale City, Georgia
Mayor, Selma, Alabama
Mayor, Shellman, Georgia
Mayor, Shiloh, Georgia
Mayor, Smyrna, Georgia
Mayor, Southside, Alabama
Mayor, Spanish Fort, Alabama
Mayor, Stone Mountain, Georgia
Mayor, Sugar Hill, Georgia
Mayor, Suwanee, Georgia

Mayor, Sylacauga, Alabama
Mayor, Sylvester, Georgia
Mayor, Talbotton, Georgia
Mayor, Talladega, Alabama
Mayor, Tallassee, Alabama
Mayor, Temple, Georgia
Mayor, Thomaston, Georgia
Mayor, Thomasville, Alabama
Mayor, Town of Argo, Alabama
Mayor, Town of Ashville, Alabama
Mayor, Town of Autaugaville, Alabama
Mayor, Town of Avon, Alabama
Mayor, Town of Billingsley, Alabama
Mayor, Town of Blue Springs, Alabama
Mayor, Town of Butler, Alabama
Mayor, Town of Calera, Alabama
Mayor, Town of Camp Hill, Alabama
Mayor, Town of Clayton, Alabama
Mayor, Town of Clio, Alabama
Mayor, Town of Coffeeville, Alabama
Mayor, Town of Collinsville, Alabama
Mayor, Town of Columbiana, Alabama
Mayor, Town of Coosada, Alabama
Mayor, Town of Cottonwood, Alabama
Mayor, Town of County Line, Alabama
Mayor, Town of Cowarts, Alabama
Mayor, Town of Crossville, Alabama
Mayor, Town of Eclectic, Alabama
Mayor, Town of Edwardsville, Alabama
Mayor, Town of Excel, Alabama
Mayor, Town of Faunsdale, Alabama
Mayor, Town of Five Points, Alabama
Mayor, Town of Franklin, Alabama
Mayor, Town of Fulton, Alabama
Mayor, Town of Fyffe, Alabama
Mayor, Town of Gaylesville, Alabama
Mayor, Town of Geraldine, Alabama
Mayor, Town of Goldville, Alabama
Mayor, Town of Gordon, Alabama
Mayor, Town of Grove Hill, Alabama
Mayor, Town of Harpersville, Alabama
Mayor, Town of Hayneville, Alabama
Mayor, Town of Henagar, Alabama
Mayor, Town of Hobson City, Alabama
Mayor, Town of Ider, Alabama
Mayor, Town of Indian Springs, Alabama
Mayor, Town of Jackson's Gap, Alabama
Mayor, Town of Jemison, Alabama
Mayor, Town of Leesburg, Alabama
Mayor, Town of Loachapoka, Alabama
Mayor, Town of Louisville, Alabama
Mayor, Town of Madrid, Alabama
Mayor, Town of Maplesville, Alabama
Mayor, Town of Maplesville, Georgia
Mayor, Town of Margaret, Alabama
Mayor, Town of Mckenzie, Alabama
Mayor, Town of Mentone, Alabama
Mayor, Town of Midway, Alabama
Mayor, Town of Millbrook, Alabama
Mayor, Town of Millport, Alabama
Mayor, Town of Mosses, Alabama
Mayor, Town of Myrtlewood, Alabama
Mayor, Town of Newville, Alabama
Mayor, Town of Notasulga, Alabama
Mayor, Town of Oak Hill, Alabama
Mayor, Town of Odenville, Alabama
Mayor, Town of Ohatchee, Alabama
Mayor, Town of Orrville, Alabama
Mayor, Town of Pine Apple, Alabama
Mayor, Town of Pine Hill, Alabama
Mayor, Town of Pine Ridge, Alabama
Mayor, Town of Powell, Alabama
Mayor, Town of Providence, Alabama
Mayor, Town of Ragland, Alabama
Mayor, Town of Ranburne, Alabama
Mayor, Town of Reece City, Alabama
Mayor, Town of Riverside, Alabama
Mayor, Town of Rockford, Alabama
Mayor, Town of Sand Rock, Alabama
Mayor, Town of Sardis City, Alabama
Mayor, Shellville, Georgia
Mayor, Town of Shiloh, Alabama
Mayor, Town of Shorter, Alabama
Mayor, Town of South Vinemont, Alabama
Mayor, Town of Springville, Alabama
Mayor, Town of Steele, Alabama
Mayor, Town of Sumiton, Alabama
Mayor, Town of Sweet Water, Alabama
Mayor, Town of Talladega Springs, Alabama
Mayor, Town of Taylor, Alabama
Mayor, Town of Thomaston, Alabama
Mayor, Town of Thorsby, Alabama
Mayor, Town of Valley Head, Alabama
Mayor, Town of Vincent, Alabama
Mayor, Town of Vredenburgh, Alabama
Mayor, Town of Wadley, Alabama
Mayor, Town of Waldo, Alabama
Mayor, Town of Walnut Grove, Alabama

Mayor, Town of Weaver, Alabama
Mayor, Town of Webb, Alabama
Mayor, Town of Wedowee, Alabama
Mayor, Town of West Blocton, Alabama
Mayor, Town of White Hall, Alabama
Mayor, Town of Wilsonville, Alabama
Mayor, Town of Wilton, Alabama
Mayor, Town of Woodland, Alabama
Mayor, Town of Yellow Bluff, Alabama
Mayor, Tuskegee, Alabama
Mayor, Tyrone, Georgia
Mayor, Unadilla, Georgia
Mayor, Union City, Georgia
Mayor, Union Springs, Alabama
Mayor, Valley Head, Alabama
Mayor, Valley, Alabama
Mayor, Vienna, Georgia
Mayor, Villa Rica, Georgia
Mayor, Waverly Hall, Georgia
Mayor, Waverly, Alabama
Mayor, West Point, Georgia
Mayor, Wetumpka, Alabama
Mayor, Whigham, Georgia
Mayor, Williamson, Georgia
Mayor, Woodbury, Georgia
Mayor, Woodland, Georgia
Mayor, Woodstock, Georgia
Rockdale County Commissioner, Georgia
U.S. Congressman John Lewis, 5th District, Georgia
U.S. Congressman Robert Woodall, 7th District, Georgia
U.S. Congressman Barry Loudermilk, 11th District, Georgia
U.S. Congressman Robert Aderholt, 4th District, Alabama
U.S. Congressman Mike Rogers, 3rd District, Alabama
U.S. Senator Doug Jones, Alabama
U.S. Senator Richard Shelby, Alabama
U.S. Senator Kelly Loeffler, Georgia
U.S. Senator David Perdue, Georgia

11.6 Academic Institutions

Alabama Cooperative Extension Service
Alabama Southern Community College
Alabama State University
Andrew College
Athens State College
Auburn University
Auburn University Environmental Institution
Auburn University Field Office
Auburn University Marine Extension and Research Center
Ayers State Technical College
Bessemer State Technical College
Bevill State Community College
Bishop State Community College
Burriss Institute, Kennesaw State College
Calhoun Community College
Central Alabama Community College
Chattahoochee Valley Community College
Columbus College
Columbus State University
Drake State Technical College
Duran Junior High School
Emory University
Emory University – School of Law
Enterprise-Ozark Community College
Faulkner State Junior College
Gadsden State Community College
Gainesville Junior College
Georgia Institute of Technology
Georgia Southwestern State University
Georgia State University
Gordon College
H. Councill Trenholm State Technical College
Huntingdon College
Jefferson County Schools
Jefferson Davis Community College
Jefferson State Community College
Lawson State Community College
Lurleen B. Wallace Junior College
Macarthur State Technical College
Miles College
Northeast Alabama Community College
Northwest-Shoals Community College
Oak Hill Community College
Patterson State Technical College
Reid State Technical College
Shelton State Community College
Shorter College
Snead State Community College
Southern College of Technology
Southern Polytechnic State University
Southern Union State Community College

Sparks State Technical College
Spellman College
Stillman College
Talladega College
Troy State University
Tuskegee University
University of Alabama
University of Georgia
University of Montevallo
University of South Alabama
University of West Alabama
Valdosta State University
Wallace State Community College
Wallace State Community College, Selma

11.7 Other Organizations

ABC 33/40 (Birmingham, AL News, Weather, Sports)
Acworth Lake Authority
Adams and Reese
Addsco Industries
Adopt-A-Stream
AESO Systems, Inc.
Agricultural Services of Alabama, Inc.
Alabama Baptist
Alabama Messenger
Alabama Paisano
Alabama Rivers Alliance
Alabama Association of Conservation Districts
Alabama Association of Water Conservation Districts
Alabama Bass Federation
Alabama Cattlemen's Association
Alabama Chemical Association
Alabama Coastal Foundation
Alabama Council of Farmers Co-ops
Alabama Crop Improvement Association, Inc.
Alabama Electric Cooperative, Inc.
Alabama Environmental Council
Alabama Farmers and Rural Appraiser
Alabama Farmers Cooperative, Inc.
Alabama Farmers Federation
Alabama Forest Resources Center
Alabama Forestry Association
Alabama Industrial Development Training
Alabama Journal
Alabama Kraft Company
Alabama League of Municipalities
Alabama Nurserymen's Association
Alabama Peanut Producers Association
Alabama Pork Producers Association
Alabama Poultry and Egg Association
Alabama Power Company
Alabama Power Foundation
Alabama Pulp and Paper Council
Alabama River Newsprint Company
Alabama River Pulp
Alabama Rivers Alliance
Alabama Sierra Club
Alabama State Rivers Alliance
Alabama Surface Mining Commission
Alabama Textile Manufacturers Association
Alabama Water and Sewer Institute, Inc.
Alabama Water Resources Commission
Alabama Water Watch
Alabama-Tombigbee Regional Commission
All South Machine and Supply Company, Inc.
Allatoona Bay S/O
Allatoona Bay Subdivision
Allatoona Boat and Ski Club
Allatoona Canoe and Sailing Club
Allatoona Community Association, Inc.
Allatoona Lake Association
Allatoona Youth Club
Alpha Phi Alpha
American Consulting Engineers
American Rivers
American Water Works Association
AmeriDream Realty
Amsouth Bank
Amsouth Bank of Dothan
Anniston Star
Arcadis-US
Around Town Acworth
ASCS
Ash Realty
Association of County Commissions
Atlanta Boat Club
Atlanta Business Chronicle
Atlanta Chinese News
Atlanta Daily News
Atlanta Daily World
Atlanta Intown
Atlanta Jewish Times
Atlanta Journal-Constitution
Atlanta Latino

Atlanta Marine Trade Association
Atlanta Metro Observer
Atlanta Regional Commission
Atlanta University Center Digest
Atlanta Voice
Atlanta Water Ski Club
Atmore News
AUC Digest
Audubon Society of Atlanta, Georgia
Audubon Society of Birmingham, Alabama
Audubon Society of Mobile Bay, Alabama
AYC
BASS, Inc.
Balch and Bingham
Baldwin County Now
Barry A. Vittor and Associates
Bassmaster Magazine
Bay Marine
Beat10 Action Group
Bender Shipbuilding and Repair
Betbeze Realty Company, Inc.
Better Backers, Inc.
Bill Harbert International Construction Inc.
Binswanger Southern
Birmingham News
Birmingham Weekly
Birmingham Audubon Society
Birmingham Business Journal
Birmingham Free Press
Birmingham Post Herald
Birmingham Regional Planning Commission
Birmingham Times
Birmingham World Newspaper
Black and White
Blount Countian
Boise Cascade Corporation
Bounds Family Branch YMCA
Bowden Oil Company
Boy Scouts of America, Rome, GA
Bradley Arant Boult Cummings LLP
BRATS (Baldwin Area Transportation System), Baldwin County, Alabama
Brown and Caldwell
Buford Trout Hatchery
Business Council of Alabama
Butler Street YMCA
C&H Enterprises
C. H. Guernsey and Company
C.C. Brown Family Center
Cahaba River Publishing, Inc.
Cahaba River Society
Cahaba River Steering Committee
Cal/Southern
Calhoun Times
Camp Dresser and McKee, Inc.
Campus Digest Tuskegee University
Car Paints, Inc.
CARIA (Coosa-Alabama River Improvement Association, Inc.)
Carters Project
Carver Hills Neighborhood Association, Inc.
Cashing Park
Catfish Producers of Alabama
Catholic Week
Cattlemen’s Association, Alabama
Cattlewomen’s Association, Alabama
CCRG
CDM
CELLO FOAM
Central Atlanta Progress, Inc.
CFROC
CH2M HILL
Charles Hulsey Consulting, Inc.
Chatom Community Center – Washington County, Alabama
Chattahoochee Chapter – Trout Unlimited
Chattahoochee Riverkeeper, Inc.
Chattahoochee-Flint RDC (Regional Development Center)
Chattanooga Courier Newspaper
Cherokee Tribune
Cherokee Coalition for Responsible Growth
Cherokee Ledger News
Childress Company, Inc.
Childress Towing
Chilton County News
Choctawhatchee-Pea-Yellow Rivers
Civil Engineering Consultants, Inc.
Clarke County Democrat
Clarke County Extension Office
Clay News
Cleveland Daily Banner
Cobb County Community Development
Contract Administration
Coosa Basin Water Group
Coosa River Basin Initiative
Coosa Valley Regional Development Center
Coosa-Alabama River Improvement Association

Courtney and Morris Appraisals
Creative Loafing
Crimson White
Crowe Shorter Associates, Inc.
CTSI Corporation
Cummings and White-Spunner, Inc.
Cushing Park
Dade County Sentinel
Dahlonega Nugget
Daily Home
Daily Report
Dallas County Extension Office
Dangler Real Estate Service
Dawson Community News
Dawson News and Advertiser
Dellinger Management Co., Inc.
Demopolis Times
Dempsey, Carson and Steed, P.C.
Denman's Cove Subdivision
Dixie Sailing Club
Dobbs Realty
Dollar Farm Products
Dothan Bassmasters
Dothan Eagle
Dowling Environmental Services
Dravo Basic Material Company, Inc.
Dravo Natural Resources
Drummond Coal Company
Drummond Coal Sales
Drummond Company, Inc.
DTA
Duffey Communications
Dunbarton Corporation
Dunywoody Crier
Dynamac Corporation
East Alabama Fish Farmers Association
East Alabama Regional Planning and Development Commission
East Alabama Water and Sewer and Fire Protection District
Eastern Shore Courier
Eastern Technologies, Inc.
Eclectic Observer
Elberta Lillian Ledger
Electric Systems Operations
Electrical Cost Cutters, Inc.
Emerald Property Owners Association
Emond and Vines Attorneys at Law
Emory Wheel
Englehard Corporation
Enquirer
Enterprise Marine Services, Inc.
Enterprise Water Works
ENTRIX
Environmental Coalition of Concerned Citizens
Environmental Licensing Engineers
Environmental Reporting
Ernest Construction Company
Espisopal Lodge
Etowah Yacht Club
Ezra Cunningham
F. W. Dodge Company
F&W Construction Company
Fairhope Courier
Farley Nuclear Plant
Farm Managers and Rural Appraisers
Farmers Fertilizer Company
Fidelity National Bank
First Alabama Bank
First National Banking Company
First United Methodist Church
Fisheries Information Management Systems
Flint River Mills, Inc.
Forsyth County News
Fort Payne Times-Journal
Fox WFXL-TV
Friends of Locust Fork
Futren Corporation
G.E. Sprenger and Associates, Inc.
Gadsden Time
Gallet and Associates, Inc.
Galts Cottage Subdivision
Galts Ferry Marina
Gemini Interests, Inc.
General Electric
General Electric Plastics
Georgia Adopt-A-Stream
Georgia Bulletin
Georgia Canoeing Association
Georgia Conservancy
Georgia for Children
Georgia Mountains Regional Development Center
Georgia Peanut Commission
Georgia Poultry Federation
Georgia Power Company
Georgians for Clean Water, Inc.
Georgia-Pacific
Geotechnical Eng-Test, Inc.

Girl Scouts of America, Atlanta, Georgia
Golden Stevedoring Company
Golder Associates, Inc.
Goodyear Tire and Rubber Company
Gordon County Sportsmen
GRACC
Great Southern Paper
Gulf Oil Company, US
Gulf Shores Islander
Gulf States Paper Corporation
Gulf States Steel
Gwinnett Homeowners Alliance
H & W Contracting
H. H. Jordan Construction Company
Hammermill Papers Group
Hand, Arendall, Bedsole, Greaves, Johnston
Hankneyville Water/FPA
Harding Lawson Association
Harrison Bros Dry Dock and Repair Yard
Henry County Alabama Farmers Federation
Heritage Riversway Commission
Hillhouse Lodge
Hillside Area Community Center
Hiwassee Land Company
Hofer Construction
Holland Diving Service
Hollinger's Island Community Association
Homeowners (PROWL)
Hughes Missile Electronics, Inc.
Ideal Basic Industries
Indian Village Subdivision
Inner City News
Institute of Community and Area Development
International Brotherhood of Electrical Workers
International Longshoreman's Association
International Paper Company
IUOE Local 653
J.B. Donaghey, Inc.
Jackson Burgin, Inc.
Jackson Sawmill Company
James River Corporation
John Hunsinger and Company
John Smith
Johns Creek Herald
Jordan Industries, Inc.
K Club
Kaleidoscope
Kimberly-Clarke Corporation
King and Spalding
Kingswood Shores
Kinpak, Inc.
Kleinschmidt Association
KPS Group
La Voz de Dalton
LAA
LaGrange Daily News
LAI Engineering
Lake Allatoona Association
Lake Breeze Realty
Lake Lanier Advisory Council
Lake Lanier Association, Inc.
Lake Lanier Corporation, Inc.
Lake Lanier Homeowners Association
Lake Lanier Islands Authority
Lake Lanier Property Owners Association
Lake Lanier Regional Watershed Commission
Lake Martin
Lake Martin Area Association of Realtors
Lake Martin Dock Company
Lake Martin Home Owners and Boat Owners Association, Inc.
Lake Martin Realty
Lake Martin Resource Association
Lake Mitchell Home Owners and Boat Owners Association
Lake Point Marina
Lake Watch
Lake Watch of Lake Martin
Lakefront Property
Lakeland North Florida Chapter
Lakewood Heights Subdivision
Land and Water Magazine
Lanier Canoe and Kayak Club
Lanier Environmental Consultants
Lanier Property Owners' Association
Lan-Mar Marina, Inc.
LAPA (Lake Allatoona Preservation Authority)
Latino News
Law Environmental
Lazy Days Dry Storage – Buford
League of Women Voters
Leeds News
Lever Brothers Company
Lewis-Smith Corporation
Lightfoot, Franklin and White
Little River Grill
LMCPA
LMPA

Lockheed Aircraft Corporation
Logan Martin Lake
Logan Martin Lake Protection Association
Lowe Engineers
Lower Chattahoochee RDC
Lowndes County Extension Office
LPOA
M & N of Alabama
MacMillian Blodel, Inc.
Malcolm Pirnie, Inc.
Mannis Bait Company
Manufacture Alabama
Marietta Board of Lights and Water
Marine Environmental Sciences Consortium
Marine Manufacturers
Marine Trade Association
Marine Trade Association of Atlanta
Maritime Administration
Mcconnell Marine Service, Inc.
McGarity's
McIntosh Community Center
McKenna Longz Aldridge
Mcleod Real Estate
Mead Coated Board, Inc.
MeadWestvaco
Mechanical Enterprises
Metro Bank
Metro Business Forum
Meyer Real Estate
Middle Flint Regional Development Center
Middle Georgia Regional Development Commission
Middle Georgia Water Systems, Inc.
Midland Automotive Products
Miller Brewing Company
Miller Diver, Inc.
Minority Heath Professional Foundation
Minutemen Recreation Association
Mobile Register
Mobile Bay Business Journal
Mobile Bay Audubon Society
Mobile Bay National Estuary Program
Mobile Beacon
Mobile Land Development Corporation
Mobile Press Register
Mobile Regional Senior Community Center
Mobile-Chickasaw Port Facility
Monroe County Extension Office USDA Service Center
Monroe County YMCA
Monsanto Chemical Corporation
Montgomery Clean City Commission
Montgomery Marina, Inc.
Montgomery-Tuskegee Times
Montgomery Clean City Commission
Morgan Dredging and Piledriving, Inc
Morris Tractor Co.
Mullet Wrapper
Mundo Hispanico
Myra Smith Real Estate, Inc.
NPS CHAT
NAACP
NAACP Atlanta Chapter
NAACP Bibb County Chapter
NAACP Carroll County Chapter
NAACP Clarke County Chapter
NAACP Cobb County Chapter
NAACP Conecuh County Chapter
NAACP Dothan Wiregrass Chapter
NAACP Elmore County Chapter
NAACP Escambia County Chapter
NAACP Etowah County Chapter
NAACP Lee County Chapter
NAACP Marengo County Chapter
NAACP Metro County Chapter
NAACP Mobile County Chapter
NAACP Montgomery County Chapter
NAACP NW Jefferson County Chapter
NAACP Phoenix City Russell County Chapter
NAACP Rome Chapter
NAACP Selma/Dallas County Chapter
NAACP Talladega County Chapter
NAACP Tallapoosa County Chapter
NAACP Tuscaloosa County Chapter
NAACP Tuskegee-Macon County Chapter
NAACP West Metro Chapter
National Association of Retired Federal Employees
National Biological Survey
National Marine, Inc.
National Toxics Campaign
Natural Heritage Institute
NBC WXIA-TV 11Alive
Neely Henry Lake Association
Nevins and Associates, Inc.
New Mac, Inc.
Norfolk Southern Corporation
North American Water Mgt. Institute, Inc.

North Georgia News
North Georgia RDC (Regional Development Center)
Northport Gazette
Northside Neighbor
Northside Realty
Northwest Alabama C.L.G.
Northwest Georgia and Lookout Valley Baptist Associations
Northwest Georgia Bass Club
Norton Agency
Nuckolls Construction Co.
OBV, Inc.
Oanow
Offshore Construction Inc
Ogden Environmental
Oil Recovery Co., Inc., of Alabama
Oneill and Company
Over the Mountain Journal
Page and Jones, Inc.
Parker Towing Company
Parsons Engineering Science
Paulding County Sentinel
Paulding Neighbor
Peavy Farm Services
Pelican
Pell City Rotary Club
PH&J Architects
Pickens County Progress
Pickens Today
Pine Apple Community Center
Piney Woods
Pinson News
Planet Weekly
Polk County News
Porter, White and Company
Post
Prattville Progress
Precision Planning, Inc.
Prescott Bait Farm
President Fort Morgan
Protect Allatoona, LLC
Protect Cobb
Pumpkin Kollow Corporation
R. Nuckolls Construction Company
R. C. Fuller Engineers
Radcliff Marine Services, Inc.
Ramada Hotels Corporation
Ranger Directional, Inc.
Ray Comm W and FPA
Real Island Marina
Regional Development Center
Regions Bank
Rheem Manufacturing Company
Rigsby Investment Company
Robertsdale Independent
Robinson Iron-Chairman
Rochester and Associates, Inc.
Rock-Tenn
Rome News
Rome News Tribune
Rowe Realty Company, Inc.
Russell Corporation
Russell County Alabama Farmers Federation
Russell Lands, Inc.
Ryan-Walsh
Sain Associates
Sasser Safton PC
SAVE
Save the Lake Association
Save Weiss Lake
School Board
Scott Paper Company
Scroggins Farms
SE Federal Power Customers
Sea Grant Advisory Services
Seaman Timber Company
SEARP&DC
SEASC
Seminole Sportsman's Lodge and Marina
Serving Alabama Future Environment
Shaw Industries, Inc.
Sierra Club
Sierra Club Southeast Office
Sierra Club-Greater Gwinnett Group
Sirote and Permutt
Small Business
Soil and Water Conservation Committee
SONOPCO Project
SOS West Mobile Bay
South Alabamian
South Alabama Ducks Unlimited
South Alabama Regional Planning Commission
South Central Alabama Development Commission
Southeast Alabama Regional Planning and Development Commission
Southeast Farm Press
Southeast River Forecast Center

Southeastern Natural Resources
Southern Voice
Southern Company
Southern Company Services
Southern Environmental Law Center
Southern Natural Gas Company
Southern Nuclear Company
Southern Organizing Committee for Economic and Social Justice
SREP (Southern Rainbow Education Project)
Southwest Georgia Regional Development Commission
Spanish Fort Sun
Spectrum Maritime, Inc.
St. Clair News Aegis
St. Clair Times
St. Luke's Episcopal Church
Star Fish and Oysters Company
Starboard Marina
State Farm Insurance
Stein Steel and Supply Co.
Steiner Shipyard
Stevedoring Services of America
Stewards of Family Farm
Stormy Petrel
Stovall Marine
Stratus Petroleum Corporation
Subdivision Lutherwood
Summerdale Community Center – Baldwin County
Sunday Paper
Suzuki Manufacturing of America
Sweet Valley/Cobb Town EJ Task Force
Swift Denim
Tai Environmental Sciences
Tallacoosa Highland Lakes
Taylor Corporation
TDP7L
TDPYC
TE Construction
Technical Marine Services
Tenn-Tom Towing
The Lagniappe
The Messenger
The Rockmart Journal
The Sentinel
The Anniston Star
The Atlanta Constitution
The Atlanta Inquirer
The Atlanta Tribune
The Atlanta Voice
The Atmore Advance
The Auburn Plainsman
The Auburn Villager
The AUC Digest
The Brewton Standard
The Bulletin
The Bulletin Board
The Call News
The Campus Digest
The Cedartown Standard
The Centreville Press
The Chanticleer
The Chattanooga Courier
The Chattanooga Minority Business Alliance
The Cherokee Herald
The Clanton Advertiser
The Clay-Times Journal
The Cleburne News
The Coalition for Environmental Consciousness
The Coosa River Basin Initiative
The Corner
The Country Store
The Daily Citizen
The Daily Tribune
The Daphne Bulletin
The Deep South Jewish Voice
The Democrat Reporter
The Dolphin Corporation
The Dothan Eagle
The Dothan Progress
The Enterprise
The Gadsden Times
The Gateway-Beacon
The Greenville Advocate
The Hickox County
The Islander
The Jacksonville News
The Luverne Journal
The Martin Firm Law Offices
The McMullin Group, Consultants
The Monroe Journal
The Montgomery Advertiser
The Monthly View
The Munford Weekly
The Nature Conservancy
The Nature Conservancy Georgia Chapter
The Nature Conservancy of Alabama
The New Times

The News Observer
The North Jefferson News
The Norton Agency
The Outlook
The Panther
The People News
The Peoples Voice
The People's Voice Weekly News
The Piedmont Journal
The Progressive Farmer
The Randolph Leader
The Samford Crimson
The Selma Times-Journal
The Shelby County Reporter
The Signal
The Stephen W. Wright Company
The Summerville News
The Technique
The Thomasville Times
The Times
The Trussville News
The Tuscaloosa Shopper
The Tuskegee News
The Union Sentinel
The Vanguard
The Washington County News
Thompson Engineering Testing
Thompsons Coverings
TIMES
Times Courier
Times Georgian
Tommy Mike Guide Service
Trout Unlimited
Tuscaloosa News
Two Daze Pleasure Club
Tyson Foods, Inc.
U.S. Alliance
Underwood Building Supply Company
Union Foundry Company
United Steelworkers
University of Alabama Center for Public Television
Upper Etowah River
Valley Times News
VCCI
Vinings Marine Group
Volkert and Associates
Volkert Environmental Group, Inc.
WABB
WABM (Channel 68)
WABW (Channel 14), PBS Georgia Public Broadcasting
WACS (Channel 25) PBS
WAGA Fox 5 Atlanta
WAGT (Channel 26) NBC
WAKA (Channel 8)
WALB (Channel 10), NBC
Walker County Messenger
WAPR
Warrior and Gulf Navigation
Warrior-Tombigbee Development Association
Waterways Towing and Offshore Service
WATL-TV
WATV Urban
WAWL 91.5 FM
WBAC 1340 AM
WBHJ
WBHK
WBHM
WBLX
WBMQ 630 AM
WBPT
WBRC (Channel 6)
WCLE 104.1 FM
WCLE 1570 AM
WCNN Dickey Broadcasting Company
WDEF (12), CBS
WDEF 92.3 FM
WDJC
WDUN Talk/News Radio
WDXX
Weekly Post
WEGL, Public Radio
Weideman and Singleton
Weiss Lake HOBO Group
Weiss Lake IMD
Weiss Lake Improvement
Welker and Associates, Inc.
WELR Eagle 102.3
West Alabama Planning and Development Council
West Georgia Regional W.A.
West Georgian
West Point Lake Advisory Commission
West Point Lake Development
West Point Pepperell
West Point Stevens, Inc.
Westover Plantation
WestPoint Pepperell

Wetland Resources
WFXG (Channel 54)
WFXX
WGAC News Talk Radio
WGFS Caribbean
WGLC (Channel 46)
WGOW 1150 AM
WGST 640 AM
WGST Spanish Contemporary
WGTV (Channel 8) PBS Georgia Public Broadcasting
WGXA (Channel 24)
WHIL
White Excavating and Construction
WIAT Channel 42
Wiedeman and Singleton
Wilcox County Extension Office
Wiregrass Audubon Club
Wiregrass Fruit Growers Association
WJBF (Channel 6) ABC
WJCL (Channel 22)
WJOC 1490 AM
WJOX
WJSP (Channel 28) PBS
WJWZ and WBAM
WJXS
WKRG (Channel 5)
WKSJ
WLAG 1240 AM
WLBF
WLJR
WLJS
WLLJ 103.1 FM
WLTZ (Channel 38) NBC
WLWI, WMSP, WMXS
WMAZ (Channel 13) CBS
WMBV
WMBW 88.9 FM
WMGT (Channel 41) NBC
WMJJ
WMN
WMSR 1320 AM
WMXC
WNCB
WNCF (Channel 32)
WNEX 1400 AM
WNSP Sports
WOGT 107.9 FM
Woodstock View
WOOP 99.9 FM
World Wildlife Fund
WPGA (Channel 58) ABC
WPMI/WJTC (Channel 15)
WQEN
WRBC (3), NBC
WRBL (Channel 3) CBS
WRCG
WRDW (Channel 12) CBS
WREK GA Tech Student Radio
WRFG Radio Free Georgia
WRGA 1470 AM
WRST Point Lake
WSAV (Channel 3)
WSB (Channel 2), ABC
WSFA (Channel 12)
WSGM 104.7 FM
WSKZ 106.5 FM
WSMC 90.5 FM
WSST (Channel 55)
WTBC
WTBS (Channel 17) Independent Peachtree TV
WTJB Troy University Public Radio
WTOC (Channel 11) CBS
WTSU
WTTO (Channel 21)
WTVC (9), ABC
WTVM (Channel 9) ABC
WUHT
WUOG 90.5 FM
WUPA (Channel 69) CW
WUSY 100.7 FM
WUTC 88.1 FM
WVAS
WVSU
WVTM (Channel 13)
WVUA (Channel 7)
WWGC
WWIO Public Radio
WYXI 1390 AM
WZEW
WZRR
WZZK
YMCA of Selma-Dallas County, Walker-Johnson Family Center
Youth Achievers USA
Youth Task Force
Youthusa.org
Zeneca Ag Products

11.8 Individuals

Notification of Draft FR/SEIS availability for review sent directly to approximately 950 interested individuals (via mailed newsletters or by email notification)

11.9 Libraries

Adamsville Public Library
Adelia M. Russell Library
Alabama Public Library Service
Anniston Libraries – Main Library
Anniston-Calhoun County Public Library
Ashland City Public Library
Athens Regional Library
Atlanta-Fulton Public Library
Atmore Public Library
Attalla-Etowah County Public Library
Auburn Public Library
Auburn University Libraries
Autauga-Prattville Public Library
Baldwin County Library Cooperative
Bartow County Library
Bay Minette Public Library
Bessemer Public Library
Birmingham Central Library
Birmingham Public Library
Blountsville Public Library
Brantley Public Library
Brent-Centreville Public Library
Brewton Public Library
Calhoun-Gordon County Library
Carnegie Library
Chambers County Library
Chatsworth-Murry County Library
Cheaha Regional Library
Cherokee County Public Library
Chilton-Clanton Public Library
Citronelle Memorial Library
Cobb County Public Library
Crossville Public Library
Dalton Regional Library
Daphne Public Library
DeKalb County Public Library
Demopolis Public Library
Dougherty County Public Library
Douglas County Public Library
East Hall Branch Library
Emmet O'Neal Public Library
Escambia County Cooperative Library
Eunice Kelly Worthington Public Library
Evergreen Public Library
Fairhope Public Library
Flomaton Public Library
Foley Public Library
Forsyth County Public Library
Fort Deposit Public Library
Fultondale Public Library
Gadsden Public Library
Gadsden-Etowah County Public Library
Gainesville College Library
Gardendale-Martha Moore Public Library
Georgia State University Library
Geraldine Public Library
Graysville Public Library
Greenville-Butler County Public Library
Griffin Spalding County Library
Grove Hill Public Library
H. Grady Bradshaw-Chambers County Library
Hayneville/Lowndes County Public Library
Homewood Public Library
Hoover Public Library
Houston Love Memorial Library
Hueytown Public Library
Ider Public Library
Ina Pullen Smallwood Memorial Library
Irondale Public Library
Jacksonville Public Library
Jacksonville State University Library
Jefferson County Library Cooperative
Kennesaw State University Library
Lagrange Memorial Library
Leeds Jane Culbreth Library
Lewis Cooper Jr. Memorial Library
Lineville Public Library
Loxley Public Library
Lucile L. Morgan Public Library
Lumpkin County Library
Luverne Public Library
Macon County-Tuskegee Public Library
Macon/Bibb Public Library
Marengo County Bookmobile

Marengo County Public Library
Marjorie Younce Snook Public Library
Midfield Public Library
Millbrook Public Library
Mobile Public Library
Montgomery City-County Public Library
Mount Vernon Public Library
Newnan-Coweta Public Library
North Columbus Branch Library
Ohatchee Public Library
Oneonta Public Library
Orange Beach Public Library
Oxford Public Library
Paulding County Public Library
Piedmont Public Library
Pleasant Grove Public Library
Price-Gilbert Memorial Library
Prichard Public Library
Rainbow City Public Library
Rainsville Public Library
Rainwater Memorial Library
Robertsdale Public Library
Rockford Public Library
Rome-Floyd County Library
Rufus Floyd Public Library
Sardis City Public Library
Satsuma Public Library
Selma Public Library
Selma-Dallas County Public Library
Southside Public Library
Southwest Georgia Regional Library
St. Clair County Library
State University of West Georgia Library
Tarrant Public Library
Thomas B. Norton Public Library
Thomasville Cultural Center Library
Thomasville Public Library
Trussville Public Library
Union Springs Public Library
University of Alabama at Birmingham Library
University of Georgia Libraries
University of Southern Alabama Library
Vestavia Hills Public Library
Walter J. Hanna Memorial Library
West Blocton Public Library
Westside Public Library
Wetumpka Public Library
White Hall Public Library
White Smith Memorial Library

12.0 GLOSSARY

Number/Symbol

7Q10 flow: The lowest 7-day average flow that occurs on average once every 10 years at a flow-measuring station or gage.

A

Action zones: Partitions of a reservoir's conservation storage, as defined in the reservoir water control manual, and designated according to a range of surface elevations of the water pool for a reservoir; action zones are used to guide reservoir managers in meeting project purposes under a wide variety of hydrologic conditions. Each action zone has a set of specific operational rules or guidelines that govern water management operations for the reservoir when the pool elevation lies within that zone.

Anadromous fish: Fish with a migratory life cycle in which they live most of adult life in ocean water but breed in freshwater, with individual adults often returning from the sea to the rivers where they were spawned.

Assimilative capacity: The amount of pollutants that a waterbody can accommodate without violating a water quality standard or impairing the designated use.

Authorized project purpose: The legally mandated purpose for which USACE must manage each ACT River Basin project.

Available precipitation: The net available moisture in a system resulting from the balance between total precipitation (input) and potential evapotranspiration (loss). Also see *evapotranspiration*.

B

Bankfull capacity (or channel capacity: The discharge, or stage, at which a stream or river is at the top of its banks such that any further increase or rise would result in water moving into the floodplain.

Base flow: The portion of streamflow from groundwater; not attributed to overland runoff.

Brackish: Describes water at the interface of freshwater and saltwater where river discharge is diluting salinity concentrations and average water salinity is between that of seawater (about 35 parts per thousand) and freshwater (upper threshold of about 0.5 parts per thousand).

C

Canopy: Tallest vegetation in a community, usually trees more than 30 feet tall or 3 inches in diameter; the tallest grasses or other herbaceous species.

Catadromous fish: Fish with a migratory life cycle in which they live most of adult life in freshwater but breed in the ocean.

Channel forming discharge: High river flows, with recurrence intervals of about 1.5 years, which are dominant in shaping the river channel.

Comprehensive Study: Consensus-based study in the 1990s to determine the capabilities of the water resources of the basin, describe the water resource demands of the basin, and evaluate alternatives that would use the water resources to benefit all user groups within the basin. The Comprehensive Study was commissioned in the 1992 tri-state (Alabama, Florida, Georgia) Memorandum of Agreement. It collected much valuable data but was never completed.

Confluence: The point of juncture of two or more streams.

Conservation pool: The portion of reservoir storage usually reserved for power production and water supply.

Conservation storage: The volume of reservoir storage available to meet multiple authorized project purposes (e.g., hydropower, water supply, recreation, etc.); equivalent to the storage volume between the top of the inactive pool and the top of the conservation pool.

Consumptive use (or, consumptive water use): The portion of water withdrawn from a waterbody for beneficial use that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the environment.

Critical drought: The most severe drought for a region, either recorded or constructed.

Critical period: The duration of the critical drought. Usually the time starts as the drought begins and reservoirs are full. The time ends after the reservoirs have been returned to full condition.

Critical yield: The maximum amount of water that can be consistently removed from a reservoir(s) through releases from the dam and/or withdrawals from the reservoir, during the most severe drought in the hydrologic period of record, exactly depleting the reservoir conservation storage once during the period of record.

D

Delta: An increment of a variable; measure of change in a variable.

Designated use: A use that is established by state or tribal regulation as appropriate for individual waterbodies (rivers, streams, lakes, and such) under their jurisdiction and that is to be achieved or protected under water quality standards; regulatory designated uses include public water supply; aquatic life protection (protection of macroinvertebrates, fish, shellfish, and wildlife); and recreational (fishing and swimming); agricultural; industrial; and navigational purposes.

Detritus (detrital carbon): Fresh to partly decomposed plant and animal matter.

Draft Supplemental Environmental Impact Statement (SEIS): The publication that documents the environmental conditions, issues, and effects associated with an action affecting the environment and on which the public is invited to review and comment. Comments received from regulatory agencies, organizations, and individuals are addressed in the final SEIS (see *final SEIS*).

Drainage area: All the surface area, including land and any waterbodies, from which water upstream of a location on a stream, river, or waterbody drains to that location (see *drainage basin, drainage divide*).

Drainage basin: The region or area drained by a river and all of its tributaries, where water from rain and melting snow or ice drains downhill to that river (see *drainage area,* and *drainage divide*).

Drainage divide: The boundary line, along a topographic ridge or other landform that separates adjacent drainage basins (see *drainage area, drainage basin*).

Drawdown: The act of lowering a reservoir's water level by beginning or increasing reservoir releases.

E

Ecoregion: An *ecological region*; a geographic area of broadly similar physiographic and environmental conditions (e.g., landforms, climate, and soil conditions) such that it supports broadly similar terrestrial and aquatic plant and animal communities.

Emergent: Describes plants that are entirely above water or mostly above water, with only the base remaining submerged.

Endemic: Characteristic of, or prevalent in, a particular area or environment.

Estuarine: Describes deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.

Euryhaline: Describes an aquatic organism that is able to tolerate wide fluctuations in salinity (contrast *stenohaline*).

Eutrophic (noun: *eutrophication)*: Describes a body of water—commonly a nonflowing body such as a lake, pond, or reservoir—that has high primary productivity resulting from excessive nutrients and can be subject to algal blooms resulting in poor water quality (compare *mesotrophic*).

Evapotranspiration: From *evapo*ration + *transpiration*; the combined discharge of water from the earth's surface to the atmosphere by evaporation from lakes, streams, and soils and by transpiration from plants.

F

Final SEIS: The final product of the supplemental environmental impact statement process, which reflects comments received on the draft SEIS (see *draft SEIS*).

Flood pool: Space above the conservation pool to hold waters throughout the year. Allatoona, Carters, Weiss, H. Neely Henry, Logan Martin, and R.L. Harris lakes in the ACT River Basin are drawn down beginning in the fall through winter and into early spring to provide additional capacity to protect life and property in the basin.

Flood risk management: A systematic approach to both manage flood waters to reduce the probability of flooding (through structural measures such as levees and dams) and floodplains to reduce the consequences of flooding when it occurs. In the context of reservoirs, flood risk management includes water management operations to draw down reservoirs beginning in the fall through winter and into early spring to provide additional storage capacity to protect life and property in the basin.

Flood storage: The volume of reservoir storage between the elevation of the top of the conservation pool and top of the flood storage pool, specifically for storing peak flows into the reservoir until those inflows can safely be passed through the downstream channel system with no or minimal flood damage.

Fork length: Length of a fish measured from the tip of the snout to the end of the middle caudal fin rays; used in fishes in which it is difficult to tell where the vertebral column ends

G

Guide curve: The seasonally variable desired pool elevation in a reservoir, normally defined as the elevation at the top of the conservation storage (synonymous with *rule curve*).

H

Headwater: The source of a river or stream, or the furthest place in that river or stream upstream from its estuary or confluence with another river. Also, the term can apply to the most upstream extent of a reservoir pool.

HEC: Hydrologic Engineering Center, an organization within the USACE that, among other things, developed the ResSim hydrologic modeling software used to analyze reservoir operations (see *ResSim*).

HEC-5Q: Water quality computer modeling software linked to reservoir operations modeling software, developed by the USACE Hydrologic Engineering Center (see *HEC*).

HEC-FIA: A stand-alone, GIS-enabled model for estimating flood impacts due to a specific flood event. The software tool can generate required economic and population data for a study area from readily available data sets and use those data to compute urban and agricultural flood damage, area inundated, number of structures inundated, population at risk and loss of life.

HEC-ResSim: Reservoir operations computer modeling software, developed by the USACE's Hydrologic Engineering Center.

Herbaceous: Describes nonwoody plant species, such as grasses.

Hydroelectric power (hydropower): Electricity produced by converting the energy released by water falling, flowing downhill, moving tidally, or moving in some other way into electrical energy. Hydroelectric power generation is achieved by passing flow releases to the maximum extent possible through the turbines at each project, even when making releases to support other project purposes.

I

Inactive pool: The portion of reservoir storage below the conservation pool that contains *inactive storage.* The top level of the inactive pool is defined for each reservoir as the elevation below which releases are limited to those necessary to meet water supply needs, maintain water quality, and sustain endangered or threatened species and their critical habitats. Releases from the inactive pool for these purposes could continue until the physical limits of the reservoir to release water are reached.

Inactive storage: The portion of reservoir storage in the *inactive pool.*

Interbasin transfer: The process of withdrawal of water from one river basin for beneficial use in another basin that is not naturally connected, resulting in a net loss of water from the donor basin and a net increase to the receiving basin.

L

Lacustrine wetlands: Wetlands that are large, open, water-dominated systems (e.g. lakes).

Land use: Includes existing and planned land use activities and land ownership, as defined in an applicable land use planning document for the potentially affected area. Land use compatibility of a proposed action is determined by comparing the proposed use of the affected area to the existing and planned uses of the adjacent area.

M

Master Water Control Manual (Master Manual): A record of basin-wide water control objectives and operational guidelines developed with thorough consideration of all project purposes to cover a full array of all foreseeable hydrologic conditions, from flood to drought.

Minimum flow (minimum stream flow): A low river flow at a specified point in a river. The minimum flow may be a regulated minimum flow or a specific level needed for water supply or other purposes.

Mitigation: Additional actions taken to avoid, minimize, rectify, reduce, eliminate, or compensate for impacts. The Council on Environmental Quality requires federal agencies, in preparing an environmental impact statement, to identify appropriate mitigation measures for adverse impacts to significant resources not already addressed by the proposed action or alternatives.

N

Navigation: The act of conveying waterborne vessels from place to place. The currently authorized navigation project provides for a 9-foot-deep by 100-foot-wide channel from the confluence of the Alabama and Mobile Rivers upstream to Montgomery, Alabama.

No Action Alternative: The baseline or current operation condition against which the action alternatives are compared. The No Action Alternative provides the baseline flows needed to assess the impacts of the Proposed Action Alternative.

Non-consumptive use (or, *non-consumptive water use*): An activity, such as hydroelectric power generation, that uses water from the basin without any withdrawal or loss of water from the system.

Nonpoint source: Describes water pollution that does not originate only or exclusively from a single location (such as a pipe discharge) but rather is diffuse in origin. Nonpoint sources generally include runoff from broad areas of land wherein the runoff accumulates varieties of pollutants, such as from urban, industrial, agricultural, or silvicultural land areas, and delivers them to waterbodies.

O

Orographic effect: The effect that occurs when a moving air mass approaches a mountain range and is rapidly forced upward by the elevated land surface, thereby causing the air temperature to cool and the moisture in the air to condense and fall as precipitation.

P

Palustrine wetlands: Generally, refers to nontidal wetlands dominated by trees, shrubs, persistent emergents, or emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand.

Peaking project: A project in which hydroelectric power is generated several hours a day, typically on weekdays in the afternoons and early evenings, in response to peak demands on the power system, in response to system demands. Flows downstream of a peaking project can fluctuate rapidly.

Period of record: Typically, the time period for which there are published records for a data collecting station, usually referring to a streamflow gaging station. The HEC-ResSim hydrologic modeling efforts used data from gages with periods of record ranging between 1939 and 2011.

R

Reallocation (of storage): The reassignment of the use of existing storage space in a reservoir project from a currently authorized purpose to an alternate use for water supply (per the Water Supply Act of 1958). If provision of water supply would seriously affect a project's authorized purposes or cause a major operational change, the reallocation would require congressional authorization. Otherwise, it may be accomplished administratively. Reallocation of storage from a currently authorized purpose (e.g., hydropower or navigation) to municipal and industrial water supply use changes the types of benefits produced by a reservoir and the stakeholders served.

Record of Decision (ROD): Document that states the decision with respect to the proposed reallocation of storage in Allatoona Lake and modifications to flood operations at the APC Weiss and Logan Martin dams, summarizes alternatives that were considered and relevant factors that were balanced in making the decision, and identifies means that have been adopted to mitigate for adverse effects. Federal agencies are required to prepare a public decision document that demonstrates consideration of the environmental impacts described in the EIS before a decision or a major federal action. The ROD may also outline additional actions or conditions that may be required prior to implementation of the allocation formula or other management actions in the basin.

Region of Influence (ROI): An area with natural boundaries or geopolitical boundaries that covers the likely extent of impacts on specific environmental or socioeconomic resources.

ResSim: Reservoir operations computer modeling software, developed by the USACE Hydrologic Engineering Center (see *HEC*).

Return flow: Surface water withdrawn from the ACF system that is not consumed when used (see *consumptive use*) and that, subsequent to use, is returned (discharged with appropriate treatment) to the surface water system, generally at or near the point of withdrawal.

River reach: The stream length between two specified points.

Riverine: Relating to, resembling, or having to do with a river.

Rock outcrop: Area of exposed bedrock.

Run-of-river project: A project in which the reservoir does not fluctuate on a seasonal basis or does not seasonally redistribute flows.

S

Salinity: Measure of the salt concentration in water.

Scoping: The process used to determine the range of issues to be addressed and to identify the significant issues to be analyzed in depth with respect to the proposed action and alternatives.

Shoreline: The points in a lake, river, or the ocean where the body of water and the land meet.

Stakeholders: Members of the public and representatives of various interest groups, all of whom have a vested interest, or "stake," in the outcome of a project and might have differing or competing values.

Stenohaline: Describes an aquatic organism that can only survive within a narrow range of salinity, e.g., a freshwater fish that cannot survive in seawater or an ocean fish that cannot survive in freshwater (contrast *euryhaline*).

Storage project: A reservoir designed to re-regulate natural streamflow, providing more dependable yield during the low-flow season. This involves redistributing flow volumes on a seasonal basis. In general, reservoirs are filled in high-flow seasons (winter and spring) and lowered during low-flow seasons (summer and fall).

Streamflow gage: Data-collecting location and device on a river at which water levels, streamflows, and sometimes other data are measured.

Subcanopy: Vegetation less than 30 feet tall or 3 inches in diameter in a vegetative community.

Submersed: In reference to vegetation, refers to plants that are adapted to living in and normally occur entirely below water.

Summer deficit: The available precipitation minus reservoir water withdrawals in June, July, and August—typically the three warmest months of the year which correspond to increased municipal, thermoelectric cooling, and irrigation water demand.

Surcharge storage: A temporary increase in reservoir storage for flood waters that occurs when spillway gates on a dam are raised to release flood waters downstream. As waters are released at a slower rate through the gates than the inflow to the reservoir, the induced surcharge storage level increases; the top of the induced surcharge storage occurs when the gates are fully opened.

T

Tailwater: The water immediately downstream of a hydraulic structure, such a dam.

Tailwater rating: The unique relationship between flow (cfs) and water surface elevation (feet), that exists immediately downstream of a dam.

Transpiration: Discharge of water vapor from land plants into the atmosphere through a variety of biological processes, including evaporation through pores in leaves and through root surfaces; the continuous process caused by the evaporation of water from leaves of plants and the corresponding uptake of water from the soil by plant roots. See *evapotranspiration*.

Trophic level: Classification of organisms in an ecosystem according to feeding relationships.

U

Unimpaired flow: Historically observed flows adjusted to account for, and computationally remove the effects of, some of the human influence within river basins, such as the construction of large surface water reservoirs, withdrawals and returns for municipal and industrial water uses, and withdrawals for crop irrigation, that have altered the otherwise naturally expected flow regime of the system. An unimpaired flow data set is necessary to determine *critical yield* by removing (to the extent possible) identifiable and quantifiable alterations in flow regime attributable to man-made changes in the river basin.

Unregulated flow: Flows that would be present in a stream, at a specific location, if no reservoirs existed. This term also applies to flows after the effects of a reservoir have been removed by some computational method.

W

Water control manual: Document in which water control objectives and operational guidelines for USACE reservoirs in the ACF Basin are recorded. These manuals include water control plans for each project, as well as a master water control manual for the entire basin (see *Master Water Control Manual*).

Withdrawal: The act of removing water from a river system; water so removed from a river system.

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