GEORGIA
WATER PLANNING

Regional Water Plan

MIDDLE CHATTAHOOCHEE

DRAFT – MARCH 2023

TABLES

FIGURES

Executive Summary

Middle Chattahoochee Regional Water Plan

This document is the revised Regional Water Plan of the Middle Chattahoochee Water Planning Council (the Council). The original Regional Water Plan of the Council was adopted in 2011. This updated plan was adopted in 2023. This Plan was developed by the Council and approved by the Georgia Environmental Protection Division (EPD). The Plan provides a roadmap to guide long-term use of this water planning region's water resources and is to be implemented by water users in the region along with state agencies and other partners. It will also help guide state agency decisions on water permitting and grants and loans for water and wastewater-related projects.

Regional Water Plans in Georgia are developed in accordance with the Georgia Comprehensive State-wide Water Management Plan (State Water Plan), which was adopted by the General Assembly in January 2008. The State Water Plan establishes ten water planning regions across the State, each guided by a regional water planning council, except for the Metropolitan North Georgia Water Planning District, which has a separate water planning process created by the Metropolitan North Georgia Water Planning District Act of 2001.

Middle Chattahoochee Council, December 2022

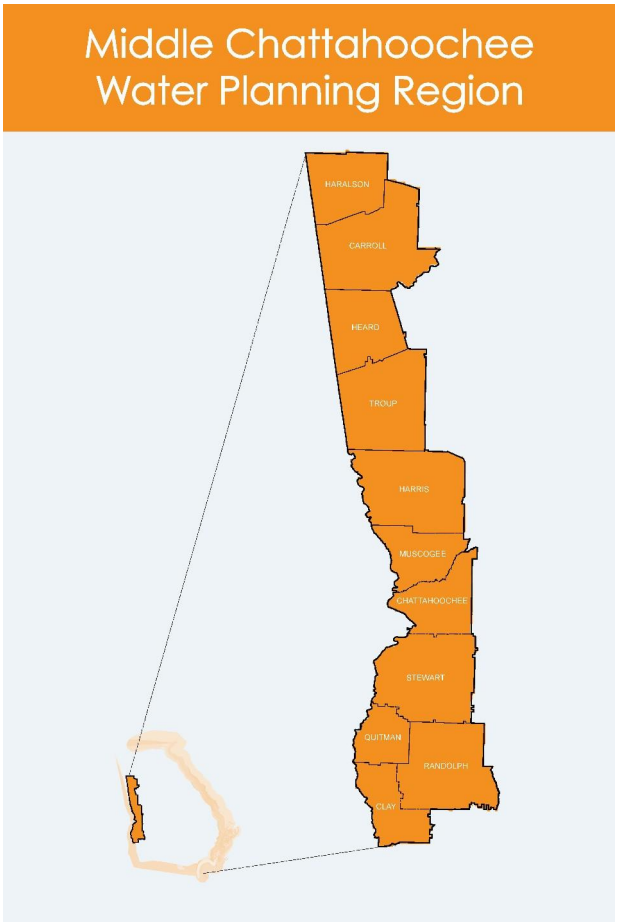
The State Water Plan calls for the preparation of Regional Water Plans designed to manage water resources in a sustainable manner. This plan has a planning horizon that forecasts conditions to 2060. Regional water planning is designed to incorporate input from state agencies, other regional water planning councils, local governments, watershed stakeholders, and the public.

The Middle Chattahoochee Water Planning Council is charged with developing this Regional Water Plan. The Council includes up to 30 members from throughout the water planning region, which includes 11 counties and 34 towns and cities. Members are appointed by the Governor, the Lieutenant Governor, and the Speaker of the House. The Council has been active since 2009, when it initiated the development of the first version of this Plan. This plan reflects the revisions from the second update to the plan in 2017. The Council completed review and revision of this Plan from 2021 to 2023.

Middle Chattahoochee Water Planning Region

Most of the Middle Chattahoochee Water Planning Region is part of the Apalachicola-Chattahoochee-Flint (ACF) River Basin, which includes the Chattahoochee and Flint Rivers that converge at Lake Seminole on the Georgia-Florida state line to form the Apalachicola River. In addition, the water planning region includes Carroll and Haralson Counties, which have areas that are in the headwaters of the Tallapoosa River basin.

Surface water and groundwater in the water planning region provide water supply for cities and counties, industry, thermoelectric power generation, agriculture, and individual homes. Water resources in this water planning region also support various instream uses including navigation, recreation, treated wastewater assimilation, and environmental uses. Major reservoirs are extremely important in this water planning region and provide system storage for flood control, recreation, and hydropower generation.



Current water use in the Middle Chattahoochee Water Planning Region is approximately 150 million gallons per day (mgd). Water use in the region is projected to increase to 153 mgd in 2060. Municipal water use makes up the largest proportion of 2020 water use in this water planning region, and this trend is expected to continue through the planning horizon. Wastewater flows in the region are currently approximately 80 mgd and expected to decrease to 74 mgd in 2060. Around 74% of the wastewater in the region is discharged through point sources.

Planning Process

In 2009, at the beginning of the regional water planning process, the Middle Chattahoochee Water Planning Council developed a vision statement supported by specific goals. The goals addressed protecting the quantity, quality, and environmental resources of the Middle Chattahoochee Water Planning Region in the face of political, climate variability, and economic uncertainties. The vision and goals guided the Council in developing this Regional Water Plan, particularly the selection of management practices, which are outlined in Section 6.

Vision Statement

Our vision is that our descendants have safe, clean, abundant, and sustainable water in the Middle Chattahoochee Region through cooperation, education, scientific research, best available data, conservation, and stewardship.

To support the regional water planning process, EPD developed resource assessment models for surface water availability, groundwater availability, and water quality.

The purpose of the resource assessments is to estimate the capacity of streams and aquifers to meet water consumption demands and the capacity of streams to meet wastewater discharge demands, within thresholds that indicate the potential for local or regional impacts. The resource assessments are modeling exercises that use several conservative assumptions. Results of the assessment models were compared against estimates of current and projected water use and wastewater flows. The assessment models identified potential challenges in the capacity of water resources to meet water supply and wastewater demands, within thresholds EPD selected to indicate potential local or regional impacts. The Middle Chattahoochee Water Planning Council considered the assessment model results, this water planning region's water needs, and potential impacts on the water planning region, both environmental and economic. The Council developed the rest of this plan to address challenges identified by the models and meet the Council's vision and goals for this water planning region. The results of the assessments are summarized in the table on the next page.

Table ES-1: Resource Assessments – Summary of Current and Future Results

Resource Assessments	Description	Summary of Model Results
Surface Water Availability	Modeled the ability of surface water resources to meet consumptive water demands and thresholds for streamflow or reservoir storage.	The surface water availability assessment model identified moderate water supply and wastewater assimilation challenges in Middle Chattahoochee region. The results indicated 3 facilities with water supply challenges and 8 facilities with wastewater assimilation challenges.
Groundwater Availability	Modeled the estimated range of sustainable yield for prioritized groundwater aquifers.	Results for the Claiborne Aquifer indicate that the existing withdrawals are lower than the estimated sustainable yield range.
Surface Water Quality	Measures the capacity of Georgia's surface waters to assimilate pollutants without unacceptable degradation of water quality below state water quality standards.	The Dissolved Oxygen results indicated that there is only moderate to limited assimilative capacity in the Chattahoochee River downstream of Walter F. George Reservoir. Watershed modeling identified that point sources contribute more to total phosphorus nutrient loading than nonpoint sources in the Chattahoochee River below Lake Lanier. Specific stream segments in this water planning region are listed as impaired for a variety of constituents, primarily for fecal coliform. For dissolved oxygen, modeling results showed that assimilative capacity can be managed in the future through point source permit effluent limits.

The Middle Chattahoochee Water Planning Council identified challenges relative to the operation of the reservoirs on the Chattahoochee River by the U.S. Army Corps of Engineers. The Council has identified specific operational improvements that it recommends for further evaluation in order to better balance the multiple authorized purposes of the federally operated reservoirs and address impacts on instream uses throughout the Basin.

Recommended Management Practices

The Middle Chattahoochee Water Planning Council developed a set of nineteen management practices, including three water conservation, one returns management, four supply management, three instream use management, and eight water quality management practices. The Council selected seven [*to be updated at March Council meeting*] high priority management practices, which are highlighted in the box to the right.

For each management practice, this Plan describes implementation steps, responsible parties, implementation schedules, cost estimates, and funding sources. The Plan also identifies benchmarks by which implementation can be evaluated.

The Middle Chattahoochee Water Planning Council also presents a number of recommendations to the State in this regional Water Plan. These address the following:

High Priority Management Practices [*To be updated at March Council Meeting*]

- Support implementation of water conservation activities
- Encourage use of point source discharges for wastewater treatment effluent disposal for major facilities
- Study the development of new and/or enhancement of existing surface water storage reservoirs
- Implement new and/or enhance existing surface water storage as necessary
- Utilize and improve upon reservoir release quantity and timing in the Chattahoochee River to maintain and/or improve water quality in the Chattahoochee River below the Columbus planning node
- Assess the potential to modify Chattahoochee River operations to protect instream uses and increase system conservation storage
- Improve water quality monitoring to provide the data for water quality improvements in the future

- Improving USACE operations in the ACF,
- Improving water demand forecasting for the energy sector and Alabama water use,
- Increasing water returns from metropolitan Atlanta and decreasing nutrient loading from upstream sources,
- Researching additional groundwater development,
- Developing increased water storage capacity, evaluating water conservation measures,
- Increasing funding for improved resource assessments and implementation of management practices, and
- Strengthening coordination in regional water planning.
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The Middle Chattahoochee Water Planning Council coordinated closely with neighboring water planning councils and developed a set of joint recommendations with the Upper Flint and Lower Flint-Ochlockonee Water Planning Councils to address shared concerns. These joint recommendations emphasize the need for more water storage capacity and more effective use of existing storage capacity in the ACF, continued improvement of the information base for water planning and management, proactive engagement among Georgia, Alabama, and Florida to collaborate on opportunities to improve planning for shared water resources, and recognizing the need for identifying contributors that diminish water quality.

SUMMARY: The Middle Chattahoochee Water Planning Council's vision and goals for the Middle Chattahoochee Water Planning Region guided the Council in the development of this Regional Water Plan.

Section 1. Introduction

1.1 The Significance of Water Resources in Georgia

Of all Georgia's natural resources, none is more important to the future of our state than water. The wise use and management of water is critical to support the State's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.

Georgia has abundant water resources, with fourteen major river systems (Figure 1-1) and multiple groundwater aquifer systems. These waters are shared natural resources. Streams and rivers run through many political jurisdictions. The rain that falls in one part of Georgia may replenish the aquifers used by communities many miles away. While water in Georgia is abundant, it is not an unlimited resource. It must be carefully managed to meet long-term water needs.

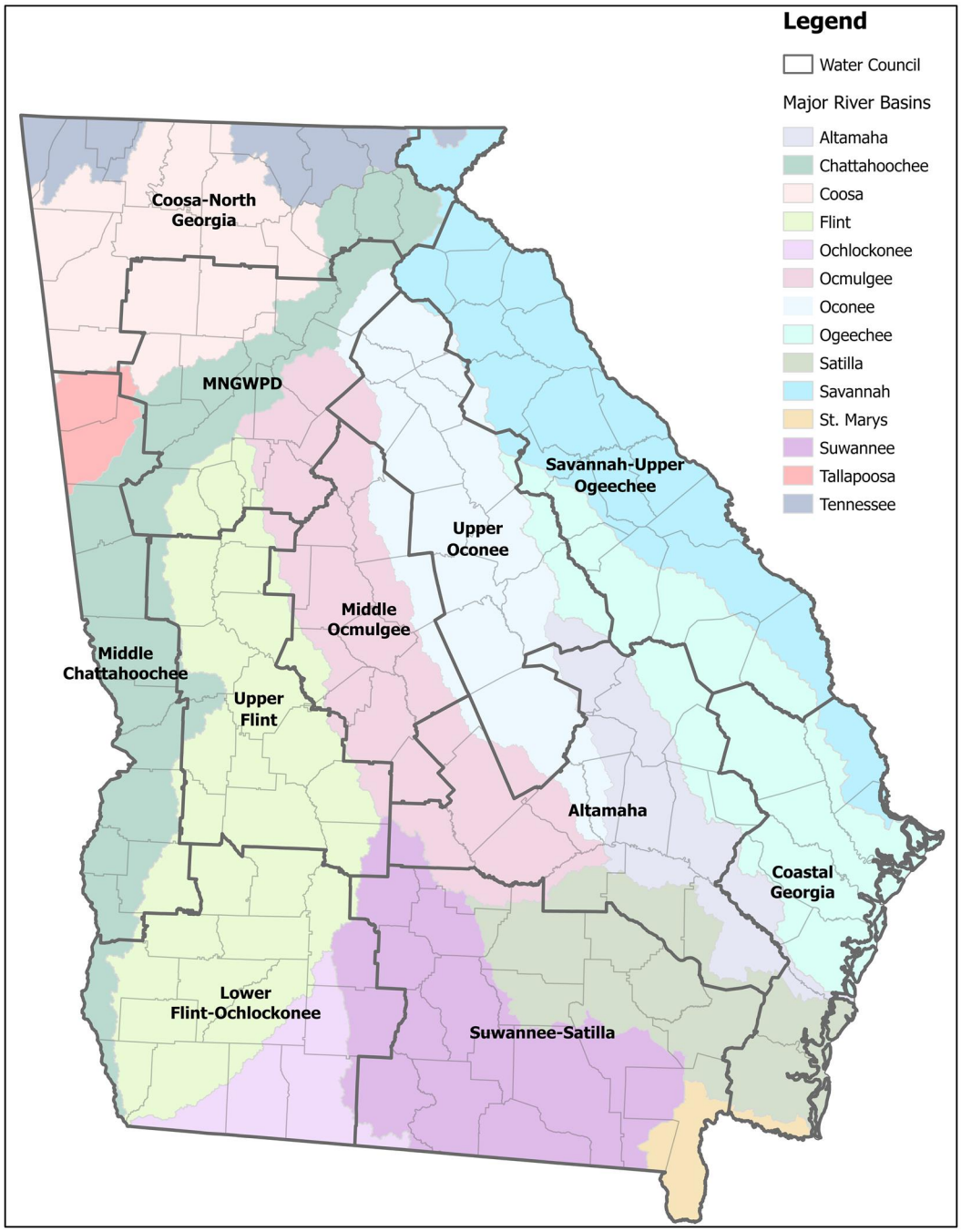
Since water resources, their conditions, and their uses vary greatly across the State, selection and implementation of management practices on the regional and local levels is the most effective way to ensure that current and future needs for water supply and assimilative capacity are met.

Therefore, the Georgia Comprehensive State-wide Water Management Plan (State Water Plan) calls for the preparation of regional water development and conservation plans (Regional Water Plans) for the ten water planning regions, outside of the Metropolitan Atlanta area, depicted in Figure 1-1. The District has a separate water planning process created by the Metropolitan North Georgia Water Planning District Act of 2001. The District's planning process is aligned with those of the ten regional water planning councils, so the District and neighboring councils work together to coordinate on planning for shared water resources.[1]

This Regional Water Plan (this Plan) was prepared for the Middle Chattahoochee Water Planning Region by the Middle Chattahoochee Water Planning Council (the Council). It describes the regionally appropriate water management practices to be employed in Georgia's Middle Chattahoochee Water Planning Region over the next several decades.

[1]Regional Water Plans and supporting information about the regional water planning councils can be found on the Georgia regional water planning website: https://waterplanning.georgia.gov/. This website includes information about the Metropolitan North Georgia Water Planning District. The full website for the District includes the District's plan and supporting materials: http://www.northgeorgiawater.org/.

Figure 1-1: River Basins and Water Planning Regions of Georgia



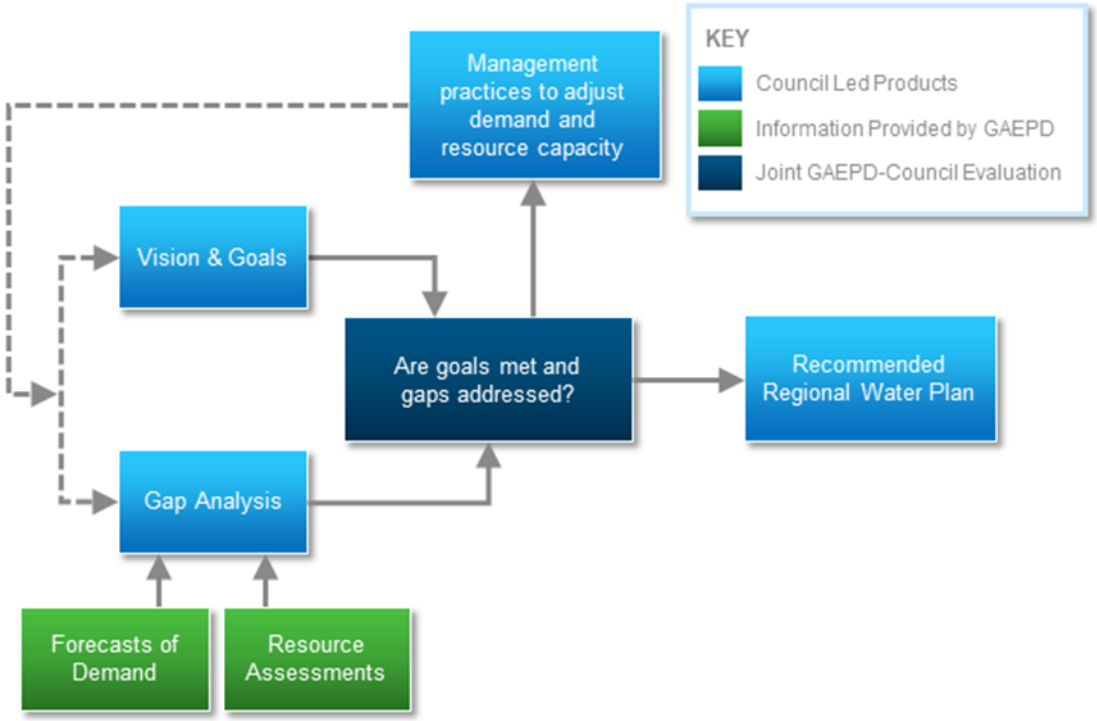
1.2 State and Regional Water Planning Process

The State Water Plan calls for the preparation of Regional Water Plans designed to manage water resources in a sustainable manner through 2050. It establishes ten regional water planning councils and provides a framework for regional planning consistent with the following policy statement:

> *Georgia manages water resources in a sustainable manner to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.*

This Regional Water Plan has been prepared following the consensus-based planning process illustrated in Figure 1-2. As detailed in Middle Chattahoochee Water Planning Council's Memorandum of Understanding with the Georgia Environmental Protection Division (EPD) and the Department of Community Affairs (DCA), the planning process required and benefited from input of other regional water planning councils, local governments, and the public.[2]

Figure 1-2: Water Planning Process



[2] The Middle Chattahoochee Water Planning Council's Memorandum of Agreement, updated in 2016, can be found on the Council's website: https://waterplanning.georgia.gov/water-planning-regions/middle-chattahoochee-water-planning-region/middle-chattahoochee-council

The Middle Chattahoochee Water Planning Council initiated its work in 2009. The Council meets regularly to consider water resource related information and activities in the region.[3] The Council adopted its first Regional Water Plan in 2011 after a public review period and approval by EPD. Since that time, the Council has conducted two cycles of review and revision to the regional water plan in 2016-2017 and 2021-2023. Revised plans were adopted in June 2017 and June 2023, after a public review period and approval by EPD. This version of the document reflects the revised plan adopted in June 2023.

1.3 The Middle Chattahoochee Water Planning Council's Vision and Goals

In 2009, the Middle Chattahoochee Water Planning Council developed a vision statement to describe its desired outcomes for the water planning region's future and adopted goals for the Regional Water Plan that support the vision. In 2016, and again in March 2022, the Council reviewed and updated its vision statement and goals.

The following is the Council's vision statement, as approved by the Council in 2022:

> *Our vision is that our descendants have safe, clean, abundant, and sustainable water in the Middle Chattahoochee Region through cooperation, education, scientific research, best available data, conservation, and stewardship.*

The following are the Council's goals, as approved by the Council in 2022:

1. **Maintain collaboration** that acknowledges the significant differences of geography, population, economic conditions, and biodiversity in the region to build consensus around how to provide for the needs of this region sustainably and for the foreseeable future.
2. **Plan to protect the quality of the water** in the rivers, streams, reservoirs, and aquifers in our region for the purposes of enhancing the quality of life for the people in our region, conserving fish and wildlife, promoting recreation, supporting our economy, and protecting public health, with due consideration of environmental and economic sustainability.
3. **Plan the use of water** in the rivers, streams, reservoirs, and aquifers within our region to provide sufficient flow and lake levels for public and private uses, including transportation, commerce, energy production, agriculture, public water supply, flood control, recreation, industry, and economic development, with due consideration of environmental and economic sustainability.

[3] Meeting summaries for the Middle Chattahoochee Water Planning Council meetings are available on the Council's website: https://waterplanning.georgia.gov/water-planning-regions/middle-chattahoochee-water-planning-region

The Middle Chattahoochee Water Planning Council's vision and goals were adopted to guide the Council in developing this Regional Water Plan. While the Council does not directly manage water resources in the region, the vision and goals address resource management in order to indicate the Council's priorities and inform Council decision-making in its planning process. The vision and goals were used by the Council to guide the selection of water management practices and recommendations, which are discussed in Sections 6.

SUMMARY: The Middle Chattahoochee Water Planning Region includes 11 counties in the Chattahoochee, Flint, and Tallapoosa River Basins. Major factors influencing water resources management in this water planning region include federal operations of reservoirs on the Chattahoochee River and federal and state policies that concern water management and quality.

Section 2. The Middle Chattahoochee Water Planning Region

2.1 Geography

The Middle Chattahoochee Water Planning Region encompasses over 3,760 square miles in west-central Georgia and includes 11 counties (Carroll, Chattahoochee, Clay, Haralson, Harris, Heard, Muscogee, Quitman, Randolph, Stewart, and Troup) as well as approximately 34 towns and cities partially or fully within these counties. Major river basins in the region include the Chattahoochee, Flint, and Tallapoosa. The geography of the region are illustrated in the map in Figure 2-1. Dams in the Apalachicola-Chattahoochee-Flint are summarized in Table 2-1.

The majority of the Middle Chattahoochee Water Planning Region is part of the Apalachicola-Chattahoochee-Flint River Basin. The ACF River Basin drains about 19,800 square miles in western Georgia, eastern Alabama, and the Florida panhandle and is comprised of the Chattahoochee and Flint Rivers, which converge at Lake Seminole on the Georgia-Florida state line to form the Apalachicola River.[1] The Apalachicola River flows south through the Florida panhandle into Apalachicola Bay, which discharges into the Gulf of Mexico.

The Chattahoochee River Basin, including the river, its tributaries, headwater and tributary streams, and its underlying groundwater, is intensively utilized for numerous purposes. The watershed is vital to this water planning region with nearly 75 percent of the region within the basin. Its waters are withdrawn to supply water for cities and counties, industry, thermoelectric power generation and agriculture. Also important are its instream uses, defined in the State Water Plan as “all those human and ecological uses which occur within the banks of rivers and streams, including waste assimilation, hydropower production, recreation, maintenance of aquatic habitats, and support of biological integrity.”

Approximately nine percent of the land area in the region falls in the Flint River Basin, primarily in Randolph County. This area is primarily agricultural, with irrigation withdrawals from both surface water and groundwater sources. The Tallapoosa River Basin, accounting for nearly 16 percent of this water planning region’s land area, is a vital municipal and industrial supply for Haralson and Carroll counties.

[1] Couch, C. A.; Hopkins, E. H.; Hardy, P. S., USGS Water-Resources Investigations Report, *Influences of environmental settings on aquatic ecosystems in the Apalachicola-Chattahoochee-Flint River basin*, 1996: https://pubs.usgs.gov/wri/1995/4278/report.pdf.

In the ACF Basin, hydrology is influenced by 16 major reservoirs that cause approximately half of the mainstem river miles to be in backwater and play a major role in controlling flow and influencing the quality of water in the basin. Along the 400 miles of Chattahoochee River between Lake Seminole and Lake Lanier, over 300 miles are measured across reservoirs. The U.S. Army Corps of Engineers (USACE) operates the five federal reservoir projects on the Chattahoochee River. Privately-owned hydroelectric impoundments are regulated through licensing requirements established by the Federal Energy Regulatory Commission (FERC). Currently, five FERC projects are licensed in the ACF Basin for seven small to medium-sized impoundments (Morgan Falls Dam, Lake Harding, Goat Rock Lake, Lake Oliver, North Highland Lake, Lake Blackshear, and Lake Chehaw).

The headwaters of the Tallapoosa River are located in northwestern Georgia, including Haralson County in the Middle Chattahoochee Water Planning Region. The Little Tallapoosa River originates in this water planning region in Carroll County. The two rivers converge, and further downstream, combine with the Coosa River near Wetumpka, Alabama to form the Alabama River. The Alabama River and Tombigbee River converge to form the Mobile River, which flows through southwestern Alabama into Mobile Bay, which discharges into the Gulf of Mexico. This drainage network forms the 22,739 square mile Alabama-Coosa-Tallapoosa Basin (ACT). Hundreds of reservoirs are located throughout the ACT Basin, with 18 (6 federal and 12 non-federal) located on the three principal rivers (Alabama, Coosa, and Tallapoosa) or their major tributaries.[2]

The Tallapoosa River Basin drains about 4,680 square miles, of which 720 square miles (15 percent) lie in Georgia, and 3,960 square miles (85 percent) lie in Alabama. Four non-federal mainstem reservoirs have been constructed by the Alabama Power Company on the Tallapoosa River including: Lake Harris, Lake Martin, Lake Yates, and Lake Thurlow. No major impoundments or dams are currently located on the Tallapoosa or Little Tallapoosa Rivers in Georgia.[2]

Approximately 71 percent of the drainage area of the ACF Basin and 23 percent of the ACT Basin are in Georgia. Georgians are highly dependent upon these basins in a variety of ways. The Chattahoochee River, including Lake Lanier, is the primary source of water supply for the metropolitan Atlanta as well as for many Georgians downstream. Lake Allatoona and the rivers and streams of the ACT Basin are another major source of water supply to metropolitan Atlanta as well as the City of Rome and other communities in Georgia. The ACF Basin in Georgia is a rich agricultural region, and Georgia's farmers rely upon its surface and ground waters for irrigation. The waters of the ACF and ACT Basins support a rich diversity of fish and wildlife species.

[2] U.S. Army Corps of Engineers, et al., Final Environmental Impact Statement, Update of the Water Control Manual for the Alabama-Coosa-Tallapoosa River Basin in the Georgia and Alabama, October 2014: https://www.sam.usace.army.mil/Missions/Planning-Environmental/ACT-Master-Water-Control-Manual-Update/Oct14.pdfr.

Figure 2-1: Middle Chattahoochee Water Planning Region

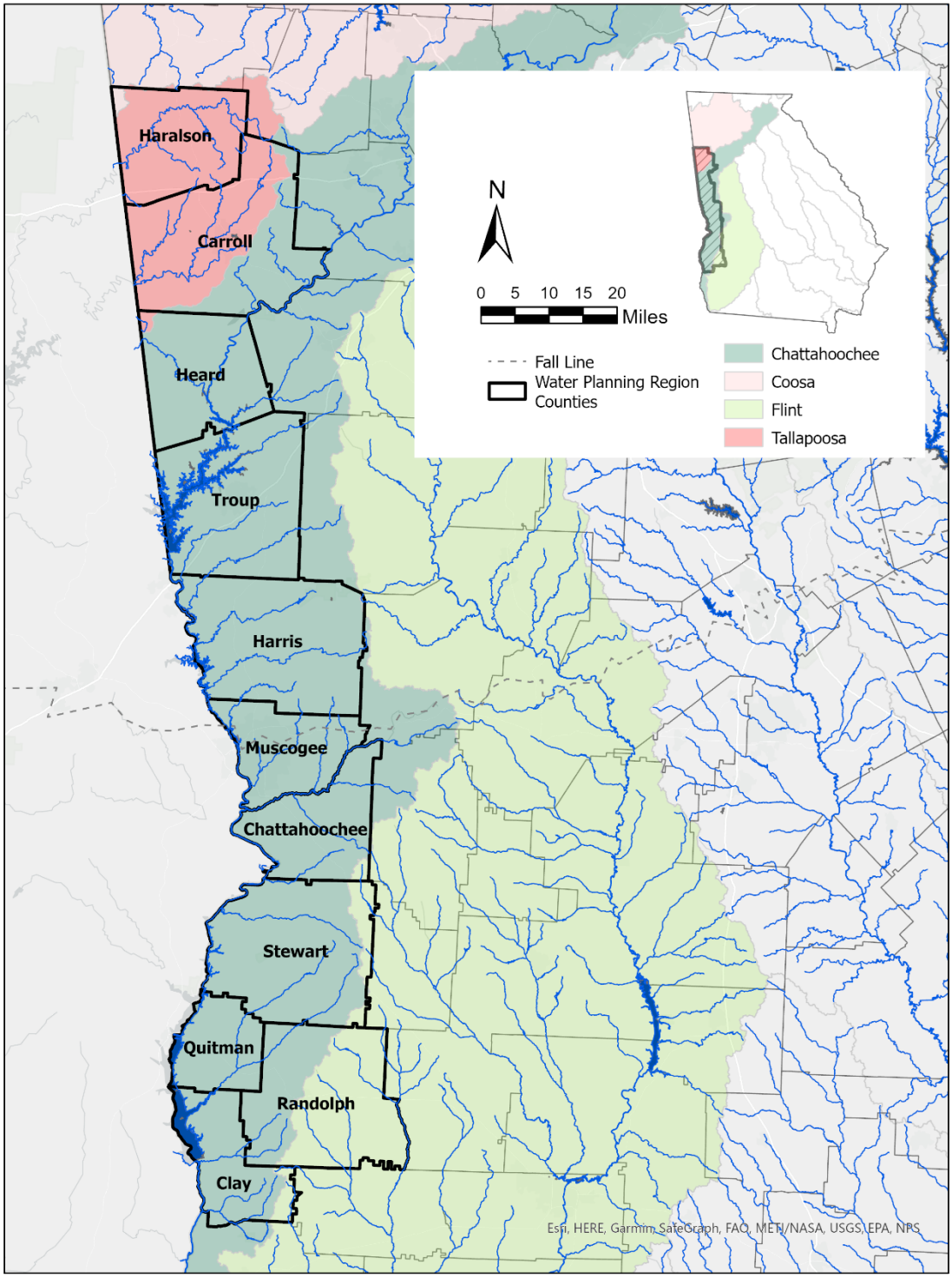


Table 2-1: Dams in the Apalachicola-Chattahoochee-Flint Basin

Basin/ River/ Project Name	Owner/State Year Initially Completed	Reservoir Size (Ac.)	Total Usable Storage (Ac-Ft.)	Power Capacity (kW)	Normal (Summer) Lake Elevation (Ft.)	Authorized Purposes for USACE Owned Projects	Congressionally Authorized Purposes for USACE-Owned Projects
Buford Dam Lake Lanier	USACE/GA 1957	38,425	1,074,645[a]	132,100	1,071	FRM, HP, NAV, REC, WQ, WS, FW	HP, FRM, NAV (RHA 1946)
Morgan Falls Dam	GPC/GA 1903	580	2,450[b]	16,800	866		
West Point Dam and Lake	USACE/GA 1975	25,864	306,131[a]	87,000	635	FRM, HP, NAV, REC, WQ, WS, FW	FRM, HP, REC (RHA 1962)
Bartletts Ferry Dam	GPC/GA 1926	5,850	181,000[b]	190,500	521		
Goat Rock Dam	GPC/GA 1912	1,050	11,000[b]	39,400	404		
Oliver Dam	GPC/GA 1959	2,150	32,000[b]	60,000	337		
North Highlands Dam	GPC/GA 1900	131	1,500[b]	34,700	269		
W. F. George Lock, Dam, & Lake (Lake Eufaula)	USACE/GA 1963	41,800	232,800 [a]	168,000	190	HP, NAV, REC, WQ, FW	NAV, HP (RHA 1962)
George W. Andrews Lock, Dam, & Lake	USACE/GA 1963	1,540	18,180[b]	None	102	NAV, REC, WQ, FW	NAV (RHA 1946)
Blackshear Dam and Lake	Crisp County/GA 1930	8,700	144,000 [b]	17,200	237		
Flint River Dam Lake Worth	GPC/GA 1920	1,400	NA	6,300	182.3		
Jim Woodruff Lock and Dam Lake Seminole	USACE/FL 1954	37,500	367,318[b]	43,500	77	HP, NAV, REC, WQ, FW	NAV, HP (RHA 1946)

Legend: a=Conservation Storage; b=Total Storage; FRM=Flood Risk Management; GPC=Georgia Power Company; HP=Hydroelectric Power Generation; NAV=Navigation; REC=Recreation; WQ=Water Quality; WS=Water Supply; FW=Fish and Wildlife Conservation; NA=Not Available; RHA=Rivers and Harbors Act; *The Langdale, River View, and Crowhop Dams are slated for removal.

Source: Adapted from the Master Water Control Manual for the Apalachicola-Chattahoochee-Flint (ACF) River Basin in Alabama, Florida, and Georgia, USACE, March 2017: https://www.sam.usace.army.mil/Missions/Planning-Environmental/ACF-Master-Water-Control-Manual-Update/. Power Capacity (kW) updated from Preliminary Monthly Electric Generator Inventory, U.S. EIA, December 2022: https://www.eia.gov/electricity/data/eia860m/.

The Middle Chattahoochee Water Planning Region is bisected by the geographic fall line splitting regions into two distinctive physiographic regions, the Piedmont and Coastal Plain. The

City of Columbus in Muscogee County occurs at the fall line in the Middle Chattahoochee Water Planning Region. The fall line as a geographic boundary is approximately twenty miles wide with elevation dropping nearly 200 feet. This relatively rapid change in topography is the primary reason for the concentrated grouping of hydropower dams in this water planning region. The piedmont physiographic region is characterized by gently rolling topography. At the fall line, metamorphic rock and clayey soils give way to sedimentary rock and sandy soils. The coastal plain physiographic region, south of the fall line is underlain by relatively soft, weakly consolidated rocks and unconsolidated sediments deposited by the sea or streams when the shoreline was at or near the fall line between 80 and 100 million years ago.[3]

The Middle Chattahoochee Water Planning Region and surrounding regions are underlain by five major aquifer systems: crystalline-rock aquifers in the Blue Ridge, Piedmont physiographic provinces north of the fall line, and four aquifers in the Coastal Plain physiographic province south of the fall line, including the Cretaceous, Clayton, Claiborne, and Floridan aquifer systems. The southern portion of the Middle Chattahoochee Region (Clay, Quitman, and Randolph counties), all located below the fall line, exhibit karstic topography (formed via the dissolution of layers of soluble bedrock, typically limestone). The greatest use and recharge of groundwater in this water planning region occurs here. The interaction between surface and groundwater in the region is not fully understood, especially in regard to recharge, connectivity, water quality, lake influence on groundwater levels, and drought effects.

2.2 Characteristics of this Water Planning Region

The Middle Chattahoochee Water Planning Region has an exceptional quality of life with diverse and growing mix of business and industry. Major employers include Southwire in Carroll County, Koch Foods and Callaway Gardens in Harris County, and Kia Motor Corporation and its suppliers in Troup County. Kia Motors began production at its manufacturing facility in the region in November of 2009, and ten years later, in November 2019, Kia Motors has produced 3 million vehicles and employed over 3,000 people in Troup County.[4] More than 15,000 jobs have been created in the surrounding area due to this plant. The Greater Columbus Georgia Region is home to world leaders in financial, health and information technology industry, such as Aflac, Blue Cross Blue Shield of Georgia, CB&T, Synovus, and TSYS. Besides a growing number of new commercial and industrial projects in the region, new public facilities and recreational assets anchor new growth in the region, such as the Columbus State University RiverPark campus in Columbus' Uptown District and the Chattahoochee Whitewater Park, the longest urban whitewater rafting course in the world. The recent addition of the Mercer University Medical School Campus in Columbus will add new healthcare capacity to this reigon. Existing universities and colleges located within the region, such as the University of West Georgia in Carroll County, Columbus State University in Muscogee County, and LaGrange College in Troup County, also provide employment and economic benefits to this water planning region.

[3] EPD, *Flint River Basin Regional Water Development and Conservation Plan*, 2006: (https://epd.georgia.gov/georgia-river-basin-management-planning/georgia-flint-river-basin-plan).
[4] LaGrange News. https://www.lagrangenews.com/2019/11/18/kia-motors-manufacturing-georgia-celebrates-10-years-in-troup-county/ l

The federal reservoirs in the ACF and ACT Basins are among the nation's most visited for recreation, and Lake Lanier and West Point Lake alone have been estimated to contribute well in excess of several billion dollars in annual revenue attributable to recreation. Federal dams and reservoirs also produce hydropower and provide limited support for commercial navigation.

Also in this water planning region, Fort Benning in Chattahoochee and Muscogee Counties is an important military training facility and regional economic engine for over 38,000 people who come to work and train daily while supporting over 208,000 military, civilian, retiree and reserve personnel. The economic impact of this 182,000 acre post with over 20,000,000 square feet of facilities is over $4.75 billion annually.[5]

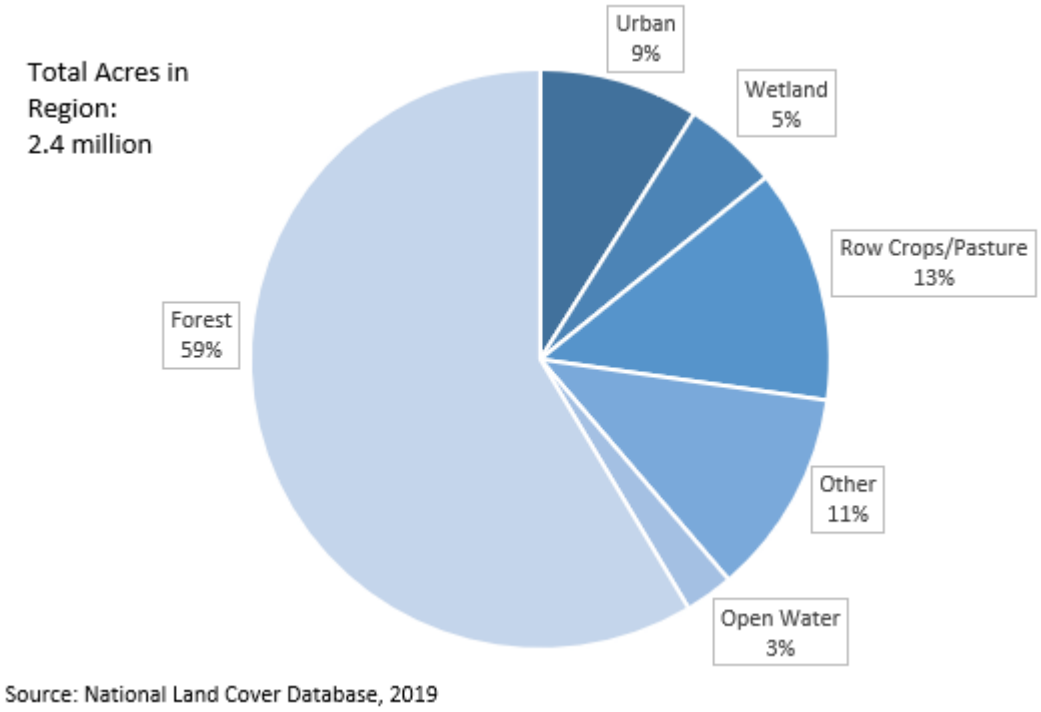
The five federal reservoirs that are operated by the U.S. Army Corps of Engineers on the Chattahoochee River greatly affect the regional ecology, economy and social context. As an example of local economic impact, at full pool (elevation 635 feet above mean sea level) West Point Lake generates an estimated $710 million a year from direct and indirect spending for the regional economy. At 630 feet, the estimated impact from the lake contributes only $154 million a year.[6]

[5] Columbus Chamber of Commerce, http://www.columbusgachamber.com/military-ft-benning/potential-cuts.

[6] Basile Baumann Prost Cole & Associates, Inc., *Economic Impact of West Point Lake at Various Lake Water Levels*, December 15, 2007.

Land use in the Middle Chattahoochee water planning region is predominantly forested; however, urban centers have expanded significantly in the past few decades. Land cover in the region, based on data derived from the 2019 National Land Cover Data, is illustrated in Figure 2-2.

Figure 2-2: Land Cover in the Middle Chattahoochee Water Planning Region, 2019



Source: National Land Cover Database, 2019

2.3 Policy Context for this Regional Water Plan

The Middle Chattahoochee Water Planning Region is subject to several overlapping layers of water resource management by state and federal agencies. State permitting programs for water withdrawals and wastewater dischargers affect all water users (OCGA §§12-5-32, 12-5-30(a), 12-5-30(b), 12-5-96, 12-5-105; Georgia Department of Natural Resources (DNR) Rules 391-3-6-.06, 391-3-6-.07, 391-3-2-.03). The water resources in the ACF River Basin are highly complex and there are significant regulatory programs and environmental issues that are directly relevant to water management:

- Federal Energy Regulatory Commission licensing requirements for privately-owned hydroelectric impoundments apply to non-federal dams listed in Table 2-1.
- The Florida Department of Environmental Protection (FDEP), with approval from the Environmental Protection Agency, adopted new nutrient criteria for free-flowing streams and lakes in Florida in 2013. These criteria may impact water quality management in this

region and other regions with river systems that cross into Florida. At this time, Georgia is monitoring water quality and focused on the development of a nutrient strategy that is likely to include point source discharge limits and nonpoint source management to address these criteria.[7]

- Under the federal Endangered Species Act, several species of freshwater mussels have been listed as endangered or threatened in the ACF Basin (see Table 2-3). Additionally, the Gulf sturgeon is listed as threatened, and flow requirements for the Gulf sturgeon affect the management of the ACF as a whole.[8] The Endangered Species Act prohibits takings of these species and sets requirements for protection of their critical habitats.
- The U.S. Army Corps of Engineers operations at five federal reservoirs on the Chattahoochee are a key component of water management in the Middle Chattahoochee Region and in the Apalachicola-Chattahoochee-Flint Basin as a whole. A revision of the Master Water Control Manual for the ACF was approved in March 2017.[9]
- The ACF Basin has been the subject of protracted litigation over the management and allocation of water resources among Florida, Georgia, and Alabama and other interested parties. In 2013, Florida filed a suit against Georgia in the U.S. Supreme Court in a case of original jurisdiction. Florida asked the court to impose equitable apportionment in the ACF. The US Supreme Court ultimately ruled in Georgia's favor on April 1, 2021, denying Florida's request for equitable apportionment.[10] It held determining that Florida's exceptions to the Special Master's report were overruled.

Public dialogue among a variety of parties interested in water allocation and water planning in Georgia, Florida and Alabama has been affected by conflict and litigation for decades. Flow targets, lake levels, and environmental flows for the ACF are not agreed upon by the three states. ACF Stakeholders, Inc. (ACFS) is a non-profit corporation with a governing board of 56 stakeholder members representing interests from all areas of the Basin, including Alabama, Florida and Georgia. ACFS members have sought to develop a better dialog and mutual understating of how the basin operates and how to improve conditions in the basin. In May of 2015, ACFS published a Sustainable Water Management Plan which made several recommendations to enhance water management in the future. The Council has reviewed the ACFS Sustainable Water Resources Plan and references information from that plan at several points in this Regional Water Plan.

[7] More information on Florida's nutrient criteria is available on-line: https://floridadep.gov/dear/water-quality-standards/content/numeric-nutrient-criteria-development

[8] More information about Gulf sturgeon (*Acipenser oxyrinchus)* is available from the US Fish and Wildlife Service: https://ecos.fws.gov/ecp/species/651.

[9] Information on the updated ACF Master Water Control Manual can be found on the following USACE website: https://www.sam.usace.army.mil/Missions/Planning-Environmental/ACF-Master-Water-Control-Manual-Update/

[10] The decision of the U.S. Supreme Court in this case can be found at this link: https://www.supremecourt.gov/opinions/20pdf/22o142_m648.pdf

Table 2-2: Federally Listed Endangered and Threatened Freshwater Mussels in the Middle Chattahoochee Water Planning Region

Common Name	Scientific Name	Status	More Information
Coosa Moccasinshell	*Medionidus parvulus*	Endangered	https://ecos.fws.gov/ecp/species/2575
Finelined Pocketbook	*Lampsilis altilis*	Threatened	https://ecos.fws.gov/ecp/species/1393
Gulf Moccasinshell	*Medionidus penicillatus*	Endangered	https://ecos.fws.gov/ecp/species/7663
Oval Pigtoe	*Pleurobema pyriforme*	Endangered	https://ecos.fws.gov/ecp/species/4132
Ovate Clubshell	*Pleurobema perovatum*	Endangered	https://ecos.fws.gov/ecp/species/5430
Purple Bankclimber	*Elliptoideus sloatianus*	Threatened	https://ecos.fws.gov/ecp/species/7660
Shinyrayed Pocketbook	*Hamiota subangulata*	Endangered	https://ecos.fws.gov/ecp/species/6517
Southern Clubshell	*Pleurobema decisum*	Endangered	https://ecos.fws.gov/ecp/species/6113
Southern Pigtoe	*Pleurobema georgianum*	Endangered	https://ecos.fws.gov/ecp/species/1520
Triangular Kidneyshell	*Ptychobranchus greenii*	Endangered	https://ecos.fws.gov/ecp/species/4396
Upland Combshell	*Epioblasma metastriata*	Endangered	https://ecos.fws.gov/ecp/species/317

2.3.1 Corps of Engineers Reservoir Operations

As noted above, the U.S. Army Corps of Engineers Mobile District operates five federal reservoir projects on the Chattahoochee River: Buford Dam (Lake Lanier), West Point Dam, Walter F. George Lock and Dam, George W. Andrews Lock and Dam, and Jim Woodruff Lock and Dam (Lake Seminole). These are multi-purpose projects for which operations have been Congressionally authorized (see Table 2-1).

The USACE's ACF operations are guided by a Master Water Control Manual. The manual is intended to set operational guidelines to "*achieve and balance all authorized project purposes*" by operating the federal projects as a system.[11] Until March 2017, the USACE operated the ACF Basin under a Water Control Manual from 1958 and modified by a set of guidelines referred to as the Revised Interim Operation Plan (RIOP). The RIOP governed releases from Woodruff Dam and was formulated to address protection of endangered and threatened species and critical habitat in the Apalachicola River, meet drought contingencies, and in conjunction with the Water Control Manual provisions, manage reservoir storage for other project purposes. The RIOP was largely incorporated in the revised Master Water Control Manual that was adopted in March 2017.[12]

In 2015, during the update of the Water Control Manual, the Middle Chattahoochee Water Planning Council reviewed the draft Environmental Impact Statement (EIS) for the updated Master Water Control Manual and submitted comments to EPD for consideration in the consolidated state comments on the document. Many of the Council's concerns expressed in that letter persist. The Council is concerned that the updated Water Control Manual does not adequately address concerns over lake levels and river flows in the Middle Chattahoochee region. Lake levels and river flows are important to this region to support recreation, water quality, and economic development. The Council has observed that modeling of the ACF shows that better outcomes for lake levels and river flows in the Middle Chattahoochee can be attained more than 90% of the time (see: Georgia Contemplation model by GAEPD, ACF Stakeholders, Inc. model). Suggestions for improvements in ACF operations by the USACE are made by the Council in the Management Practices in Section 6.

[11] Andy Ashley, Chief of Water Management USACE, Mobile District, *ACF Water Control Manual Update*, slides presented at the Middle Chattahoochee Water Council meeting on June 22, 2010.

[12] Information on the updated ACF Master Water Control Manual can be found on the following USACE website: https://www.sam.usace.army.mil/Missions/Planning-Environmental/ACF-Master-Water-Control-Manual-Update/

*SUMMARY: This section assesses the **current** use, capacity, and condition of water resources in the Middle Chattahoochee Water Planning Region.*

Section 3. Water Resources of the Middle Chattahoochee Water Planning Region

This section summarizes the major water uses in this water planning region and the results of the current conditions resource assessments, and it also provides a summary of ecosystem conditions.

3.1 Water Uses in this Water Planning Region

Water use and wastewater treatment in the region presented in this plan is generally categorized in four sectors:

- **Municipal** supply water use is water withdrawn by public and private water suppliers and delivered for a variety of uses (e.g., residential, commercial, light industrial). **Industrial** water use includes fabrication, processing, washing, and cooling for facilities that manufacture products, including steel, chemical and allied products, paper, and mining.
- **Energy** water use is water withdrawn primilarily for cooling purposes in the production of electricity at thermoelectric plants. (Hydroelectric energy uses water to produce energy, but because this use is nonconsumptive, hydroelectric water use is not included in the forecasts.)
- **Agriculture** includes row and orchard crops as well as most vegetable and specialty crops. Nursery, animal livestock, and golf course irrigation water use estimates are also included.

Water use in the region is estimated in a few different ways in this Plan. Section 4 discusses forecasts of water use and wastewater treatment demands in the region from 2020 to 2060 for the above sectors. The 2020 baseline use estimates for the forecasts are frequently cited in this plan in discussions of current use. The methods of estimating 2020 use for the baseline are described in Section 4. In this section, an initial snapshot of current water use in the region is provided based on USGS estimates of water withdrawals and returns for 2015 (Figure 3-1). The USGS data are not as current as the forecast baseline, and the methods of estimation are not the same as those used in the baseline forecasts in Section 4.

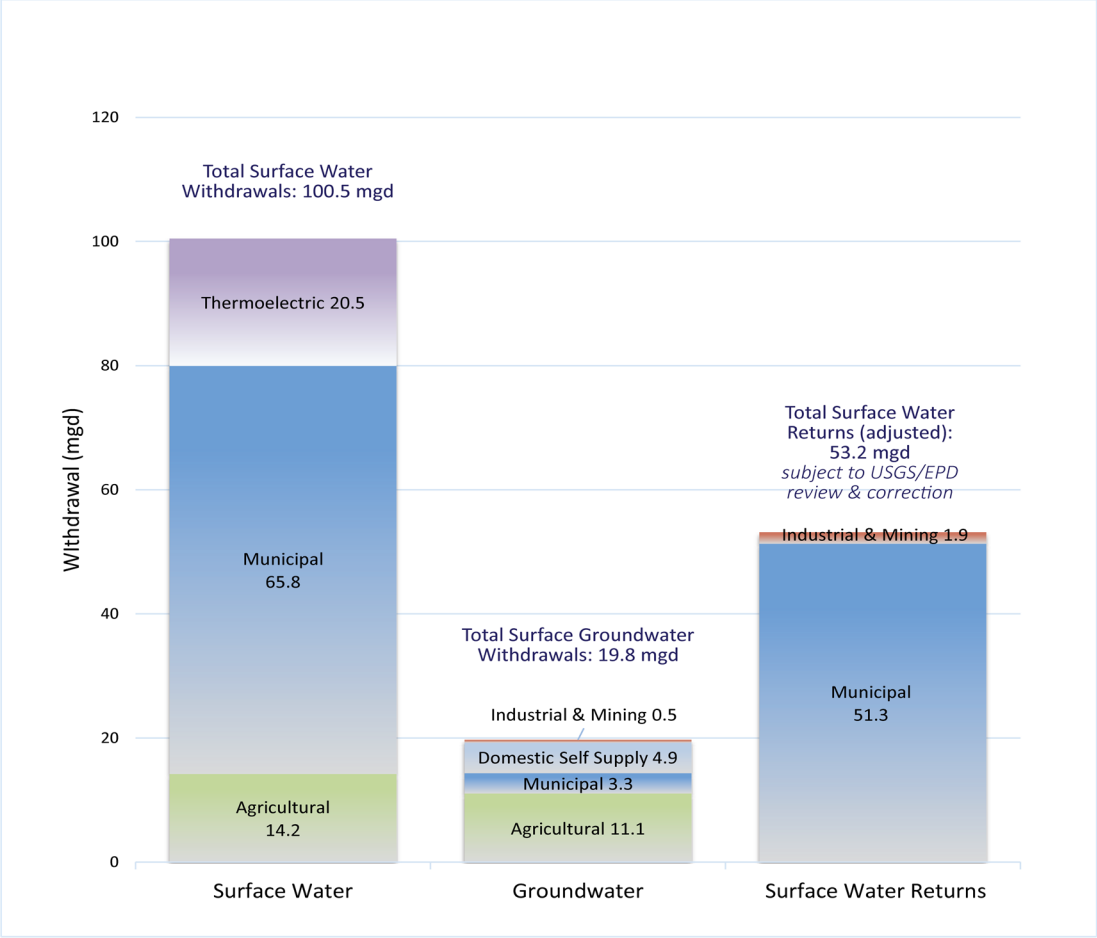
The USGS 2015 estimates are reported here because they provide an overview of use in the region that is generally comparable to other regions of the state and the nation. The USGS estimates are generated every five years across the U.S. Figure 3-1 illustrates the USGS estimates of 2015 water withdrawals, by source, as well as the returns to surface water of treated wastewater. This figure illustrates the importance of surface water as a source of water

in the region (accounting for 84% of withdrawals). The municipal sector accounts for the majority of water withdrawals in the region (57%).

This section describes the results of water resources assessments in this region. Each assessment used slightly different estimates of water use, depending on the methods and assumptions for that assessment. While there are differences, most try to assess the region's water resources as a baseline that is close in time to 2020 and a future planning horizon of 2060. The estimates of water use for each assessment are described in the sub-sections that follow.

In this water planning region, it is important to consider Alabama's water demands from the Chattahoochee River Basin. A summary of these demands by water use category is provided in Table 3-1.

Figure 3-1: USGS Estimates of Water Withdrawals and Surface Water Returns in the Middle Chattahoochee Region, 2015



Source: Painter, J.A., 2019, Estimated use of water in Georgia for 2015 and water-use trends, 1985–2015: U.S. Geological Survey Open-File Report 2019–1086, 216 p., https://doi.org/10.3133/ofr20191086. Surface water return estimates adjusted per review by facilities operators and GA EPD. Suggestions for adjustments submitted to USGS for adjustment of 2019 report.

Different means of wastewater treatment and disposal result in different levels of flow being returned to the hydrologic system. The three categories of wastewater treatment and disposal are defined below:

- **On-Site Sewage Management Systems (septic systems):** These systems include sewage management systems other than a public or community sewage treatment system that serves one or more buildings, mobile homes, recreational vehicles, residences, or other facilities designed or used for human occupancy and which is permitted by a local county board of health under rules promulgated by the Department of Community Health.
- **Land Application System (LAS):** Any method of disposing of pollutants in which pollutants are applied to the surface or beneath the surface of a parcel of land and which results in the pollutants percolating, infiltrating, or being absorbed into the soil and then into the waters of the state.
- **Point Source Discharge:** A point source is defined as "any discernible confined and discrete conveyance" including, but not limited to, a pipe, ditch, channel, or conduit from which pollutants are or may be discharged.

Section 4.1.3 estimates the volume of wastewater treated by these methods in this region.

For planning purposes, it is important to understand the amount of water that is returned to the hydrologic system after it is used. Consumptive use is the difference between the total amount of water withdrawn from a defined hydrologic system and the total amount of the withdrawn water that is returned to the same hydrologic system. Resource assessments for this Plan are particularly concerned with the amount of water that is returned in a time frame that makes it available to support other uses. Consumptive use can be difficult to measure when returns to instream flows are not through a point source discharge. As a result, in this planning process, on-site sewage treatment and land application systems are treated as 100 percent consumptive. Similarly, agricultural water use for irrigation is treated as 100 percent consumptive. These conservative assumptions do not mean that no amount of water ever returns to the hydrologic system, but for the purposes of this assessment, they are treated as 100 percent consumptive. Under actual conditions, returns from onsite sewage management, land application, and agricultural irrigation vary based on site specific conditions and timeframes.

Table 3-1: Alabama Water Withdrawals (2015): Chattahoochee River Basin (mgd)

Basin	Category	Groundwater Withdrawals	Surface Water Withdrawals	Total
Lower Chattahoochee	Public Supply	10.35	0.00	10.35
	Residential	0.58	0.00	0.58
	Irrigation	2.89	3.40	6.30
	Aquaculture	0.00	0.00	0.00
	Livestock	0.10	0.16	0.26
	Industrial	0.56	0.00	0.56
	Mining	0.00	0.00	0.00
	Thermoelectric	0.00	99.08	99.08
	Subtotal	**14.49**	**102.64**	**117.13**
Middle Chattahoochee (Walter F. George)	Public Supply	3.46	6.87	10.33
	Residential	0.58	0.00	0.58
	Irrigation	0.73	9.90	10.63
	Aquaculture	0.30	0.11	0.42
	Livestock	0.16	0.24	0.40
	Industrial	2.94	26.00	28.95
	Mining	0.53	0.26	0.78
	Thermoelectric	0.00	0.00	0.00
	Subtotal	**8.70**	**43.38**	**52.08**
Middle Chattahoochee (Lake Harding)	Public Supply	0.00	7.98	7.98
	Residential	0.52	0.00	0.52
	Irrigation	0.12	0.53	0.65
	Aquaculture	0.01	0.01	0.02
	Livestock	0.09	0.12	0.21
	Industrial	0.00	0.00	0.00
	Mining	0.00	0.00	0.00
	Thermoelectric	0.00	0.00	0.00
	Subtotal	**0.74**	**8.64**	**9.38**
CHATTAHOOCHEE BASIN	**TOTAL**	**21.67**	**148.93**	**170.60**

Source: ADECA, Estimated 2015 Water Use and Surface Water Availability in Alabama Report, https://adeca.alabama.gov/wp-content/uploads/2015-Water-Use-Report-Appendix-C.pdf

3.2 Instream Water Uses in this Water Planning Region

Current instream uses in the Middle Chattahoochee Water Planning Region significantly impact the region's economy and quality of life. Major regional instream uses include hydroelectric power, flood control, navigation, recreation, fish and wildlife protection, and sport fishing.

1. **Hydroelectric power** utilization in the Apalachicola-Chattahoochee-Flint Basin is significant, with approximately 729 megawatts of installed capacity in the Chattahoochee River and 24 megawatts installed in the Flint River.

   In total, the Chattahoochee River has four federal and five private dams used for the production of energy while two private impoundments are located in the Flint River. Several hydropower projects are located within the Middle Chattahoochee Water Planning Region, with the largest generating installations at Bartletts Ferry Dam (impounding Lake Harding), Walter F. George Dam, and West Point Dam.

2. **Flood control** is a Congressionally authorized purpose for the three large federal reservoir projects on the Chattahoochee River (Lake Lanier, West Point Lake, and Lake Walter F. George). Flood management of the federal reservoirs currently mandates that during winter months the lakes be drawn down to provide adequate flood storage.

   The timing and the extent of seasonal drawdown operation is currently established via seasonal action zones established within each major federal storage project. The level to which each lake is reduced is a function of inflow at certain periods of the year, drainage area, surface area, and the climatologic conditions anticipated in the coming months.

3. **Navigation** is one of the Congressionally authorized purposes of the federal reservoir projects on the Chattahoochee River. The head of navigation begins at Columbus and extends south to Apalachicola Bay. Maintaining this navigational channel is the responsibility of the U.S. Army Corps of Engineers and flow control is provided by upstream reservoirs. The U.S. Army Corps of Engineers (USACE) Water Control Manual (WCM) for Apalachicola-Chattahoochee-Flint operations notes when hydrologic conditions are met, the USACE will provide a navigation season between January and May, dependent on actual and projected system-wide conditions in the ACF Basin.[1]

   At this time, navigation of the river is hindered by an inability to maintain the locks and dams due to lack of funding. In a Report to Congress, the U.S. Army Corps of Engineers estimated that the total costs of returning these facilities to service in support of navigation would cost an estimated $94.2 million for dredging and

[1] Information on the updated ACF Master Water Control Manual can be found on the following USACE website: https://www.sam.usace.army.mil/Missions/Planning-Environmental/ACF-Master-Water-Control-Manual-Update/

maintenance repair needs.[2] Navigation is important to the regional economy, and the Council recommends that navigation be maintained between Columbus and Apalachicola Bay. (See Recommendation #11 in Section 6.3.)

4. **Recreation** is an authorized purpose of West Point Lake and a stated purpose of other federal reservoir projects. Several of the larger non-federal hydroelectric impoundments also offer public access for recreational opportunities, including shoreline access for water sports such as swimming, boating, sailing, water and jet skiing, and fishing. With a diverse and easily accessible river environment, the Chattahoochee River also provides opportunities for boating and fishing.

   West Point Lake, a major recreational reservoir, "was developed as a demonstration project for the purpose of providing a wider variety of recreational facilities and opportunities for the public than normally provided at Corps lakes."[3] Lake levels directly impact the ability to provide for its designated recreational purpose which, as discussed in Section 2, can have a dramatic effect on the regional economy.

   Another important recreational use of the Chattahoochee River in this region is whitewater rafting. The Chattahoochee Whitewater Park in Columbus is a two-mile stretch that offers the longest urban whitewater course in the world. This recreational resource is an important driver of waterfront development. The course attracts tourism, hosts international competitions, and enhances quality of life for the region. Recreational opportunities on the course are dependent on river flow levels, which are directly tied to upstream dam releases by Georgia Power and the US Army Corps of Engineers. Timing of releases is important to recreational opportunities, and coordination of dam operators and recreational stakeholders is important to maintaining this important in-stream use of the river. Management Practice IU-3 in Section 6 addresses the need for cooperation to support recreation in the whitewater park.

5. **Sport Fishing** within the region is managed by the Georgia Department of Natural Resources Wildlife Resources Division and the U.S Army Corps of Engineers. At the state level, the Fisheries Management Section of the Wildlife Resources Division manages lakes, warm water streams, and trout streams for sport fishing, surveys fish populations to determine sound management approaches and set regulations, constructs and maintains public boat ramps and fish attractors, investigates pollution and fish kills, reviews environmental impact reports, provides technical assistance to environmental agencies, operates fish hatcheries and Public Fishing Areas, and sponsors youth fishing events. Fishing is enjoyed throughout the Middle Chattahooche Water Planning Region, and anglers have ample opportunity to fish in the region's

[2] U.S. Army Corps of Engineers, Dredging and Maintenance Needs Walter F. George, George Andrews, and Jim Woodruff Locks and Dams Report for Congress, June 2020.

[3] Basile Baumann Prost Cole & Associates, Inc., *Economic Impact of West Point Lake at Various Water Levels*, December 15, 2007.

many streams and lakes. Angling opportunities in the lakes include catfish, bream, black crappie, striped bass, and largemouth bass. The Department of Natural Resources manages State Parks and Historic sites, one Public Fishing Area, and three Wildlife Management Areas in this water planning region.

6. **Boating** opportunities in the Middle Chattahoochee Water Planning Region are abundant in the federal and private reservoirs. In the early-2010s, the U.S. Army Corps of Engineers, Mobile District, removed two existing dams on the Chattahoochee River near Columbus, Georgia. Removal of the City Mills and Eagle and Phenix Dams provided additional shoal habitat and un-impounded river habitat from the tailwater below North Highlands Dam downstream to the backwaters of Lake Walter F. George. In this stretch of the river, the Chattahoochee Whitewater Park, the longest urban whitewater rafting course in the world, was completed in 2013.
7. **Wildlife** management areas in the Middle Chattahoochee Water Planning Region are located along the shores of many federal and non-federal reservoirs, including 10,000 acres located at the northern end of West Point Lake. The U.S. Fish and Wildlife Service manages the Eufaula National Wildlife Refuge on the northwest shore of Lake Walter F. George, which provides winter habitat for wintering waterfowl and other migratory birds.
8. **Wastewater Assimilative Capacity**, or the capacity and ability of receiving waters to assimilate pollutants, is dependent upon the instream flow quantity available. Instream flow quantities available in the surface water courses within the Middle Chattahoochee Water Planning Region, and the State at large, are used in establishing permit limits for point sources of pollution and allowable loads of nonpoint sources of pollution.

3.3 Water Resource Assessments: Current Conditions

GAEPD has developed three resource assessments for the State's water resources: ***surface water availability, groundwater availability, and surface water quality.*** These assessments used models to analyze the capacity of streams and aquifers to meet water consumption demands and streams to meet wastewater discharge assimilation capacity needs within thresholds selected by GAEPD to indicate the potential for local or regional impacts. The resource assessments were conducted on a resource basis (i.e., river basins and aquifers). The results of these assessments for ***current*** conditions in this water planning region are summarized in this section. Section 5 describes ***future*** conditions projected by the resource assessment models. Full details of each resource assessment can be found in the resource assessment reports, which are available on the Council's website.

3.3.1 Surface Water Availability

The purpose of the surface water availability resource assessment is to model the response of surface water bodies (streams and lakes) to meeting current and forecasted consumptive water demands. In this planning cycle, a new model – the Basin Environmental Assessment Model (BEAM) – was developed for use in planning and permitting. The new model greatly improves our ability to evaluate surface water availability at a high level of resolution. Figure 3-2 is a

schematic of the BEAM model domains in the Middle Chattahoochee region. Models for the Apalachicola-Chattahoochee-Flint (ACF) Basin and the Alabama-Coosa-Tallapoosa (ACT) provided results for this region. Each point in the schematic represents a water resource facility, for which the BEAM model can generate results on surface water availability. In prior planning cycles, model results were only generated at a few nodes in each basin.

Important inputs to the model include water supply demands, treated wastewater returns, reservoir operations, and instream flow requirements. The model was calibrated to stream gage data from the modeled river basins and using estimates of unimpaired flows for the modeling horizon. The unimpaired flow estimates were updated for this assessment.

For reservoir operations, the assessment was conducted using the current US Army Corps of Engineers Water Control Manual (WCM) for Apalachicola-Chattahoochee-Flint operations for federal reservoirs. For other reservoirs, the resource assessment incorporates data from reservoir owners if they provided storage and operational data to GAEPD for this purpose. Storage and operational data was not available for Georgia Power reservoirs in the region, and these reservoirs were modeled as run-of-river projects

In this planning cycle, the following baseline scenarios for current conditions were evaluated:

- Baseline: Water demands average for 2010-2018
- Baseline Drought: Water demands for 2011

The 2011 demands reflect water use during an extremely dry year. The Baseline Drought scenario uses water demand data that supports a conservative approach to assessing the availability of resources to meet peak water demands during drought. Scenarios that consider future water demands are discussed in Section 5.

In these scenarios, the same levels of demand (monthly averages) are applied to the whole assessment period. For this assessment the period included 80 years: 1939-2018. This period represents a long range of historical stream flow conditions and a broad range of hydrologic conditions. The assessment incorporated instream flow protection requirements from existing water withdrawal permits.

For the Middle Chattahoochee region, GAEPD presented the model results to the Council from the ACF and ACT Basins. In the ACF Basin, while most of the planning region is in the Chattahoochee Basin, a small portion of the region is in the Flint Basin. In the ACT, the results for this planning region pertain to the Tallapoosa River Basin. Consumptive water demands in the scenarios included municipal, industrial, agricultural, and energy (thermoelectric power production) uses.

The assessment evaluated where water availability challenges were observed in the model results. GAEPD provided an assessment of where, when, and by how much surface water availability could not meet the following needs:

- Available water for a water withdrawal (municipal, industrial, energy) based on applicable instream flow protection thresholds for surface water users
- Available water to assimilate a wastewater discharge (municipal, industrial) as measured against the low flowused to set the effluent limitations for the discharge (i.e., 7Q10 flow)[4]

For these challenges, GAEPD provided results in terms of the amount of time, in the modeling horizon, when the challenge was observed and the amount of the shortfall (total shortfall for the modeling horizon).

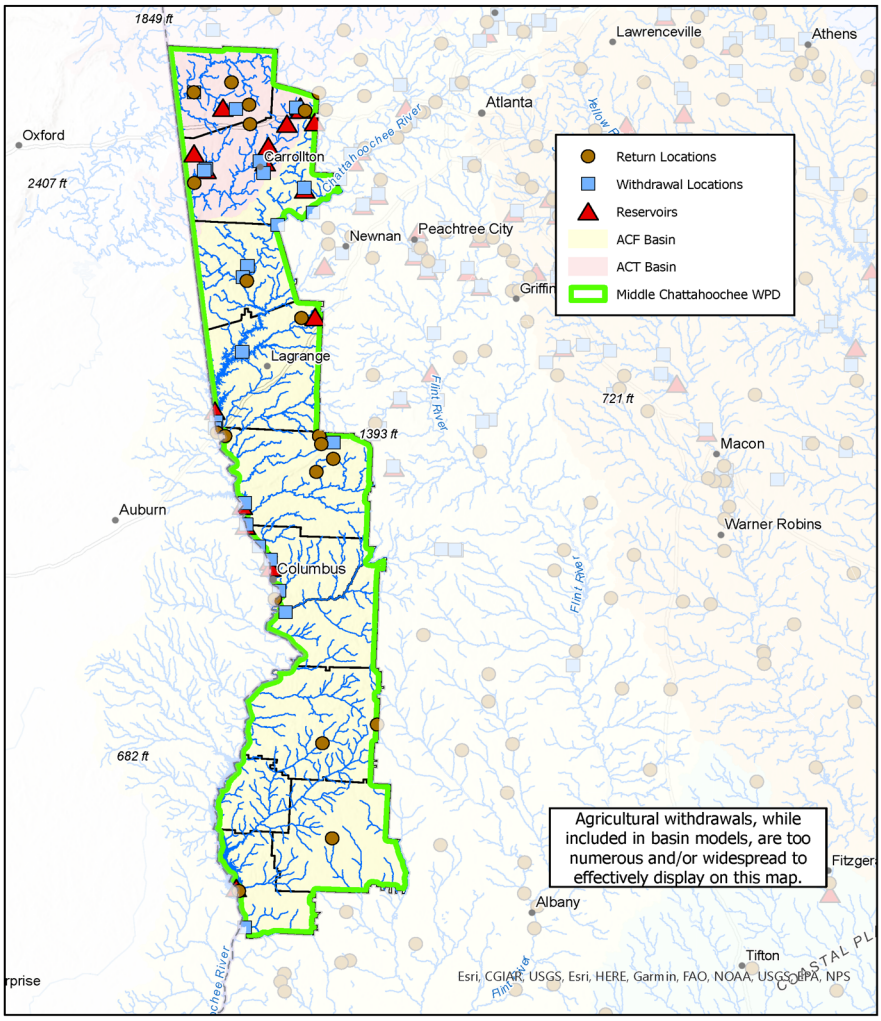
GAEPD asked the Council about additional metrics for which it would like to receive model results. The Council asked GAEPD to evaluate the instream flows at the Columbus node within the Chattahoochee River Basin using a threshold of daily flows greater than 1,350 cfs and the 7-day average flow greater than 1,850 cfs. Flow levels used in the metrics were selected to reflect conditions of a low flow. Lake elevations at West Point were also used as a metric using the following thresholds for recreational impact: West Point elevation greater than the top of the conservation pool (628-635 ft), West Point less than the initial impact level (632.5 ft), West Point less than recreation impact level (628 ft), and West Point less than the water access level (627 ft). No additional metrics were identified for the Tallapoosa River Basin at this time. The metrics for the BEAM model assessment for this region are summarized in Table 3-2.

Table 3-2: Middle Chattahoochee Region Metrics Evaluated in BEAM Model Assessment

Water Supply Availability	% Model period with water supply challenge Total volume of shortage (for the model period) Shortage volume in 2007-2008 drought Shortage volume in 2011-2012 drought
Wastewater Discharge Assimilation	% Model period with wastewater assimilation challenge
Lake Elevation	West Point > top of conservation pool: 628-635 ft (it varies by month) West Point < Initial impact level: 632.5 ft West Point < Recreation impact level: 628 ft West Point < Water access level: 627 ft
Streamflow	Columbus: % model period daily flows ≥ 1,350 cfs Columbus: % model period 7-day average flows ≥ 1,850 cfs

[4] 7Q10 is a commonly applied metric for assessing low flow conditions. It is the lowest 7-day average flow that occurs on average once every 10 years. Additional information about low flow metrics is available from the Environmental Protection Agency: https://www.epa.gov/ceam/definition-and-characteristics-low-flows

Figure 3-2: BEAM Model Schematic for ACF River Basin



ACF Basin Results

The results for the water supply and wastewater discharge metrics in the ACF Basin are summarized in Table 3-3. The results for the Tallapoosa River Basin follow the discussion of the ACF Basin results. At the end of Section 3.3.1 is a discussion of the results in the ACF relative to concerns of the Council.

Table 3-3: Summary of Water Supply and Wastewater Discharge Results for Apalachicola-Chattahoochee-Flint Basin in the Middle Chattahoochee Region

	Facility Type	**Analyzed** *(# of facilities)*	**Challenge Indicated** *(# of facilities)*

Water Withdrawals	Municipal	11	3
	Industrial	2	0
	Energy	1	0
Wastewater Discharges	Municipal	12	7
	Industrial	1	1
Note: For each challenge indicated in the assessment results, the challenges were observed under both current and future conditions. Future assessment results are discussed in Section 5.1.			

Table 3-4 summarizes the results for the 3 facilities in the ACF part of this region where water supply challenges were observed. Of these challenges, all are municipal facilities, and all are located in the Chattahoochee River Basin.

Tables 3-5 summarizes the results for 8 facilities in the ACF part of this region where flows fell below the 7Q10 flow at some time(s) during the 80-year model period. . Most of these low flow periods would not be considered to result in substantial wastewater assimilation challenges, as the percent of time that the instream flow fell below the 7Q10 value is less than 10%. At Lumpkin Water Pollution Control Plant, the percent of time exceeds 10% and indicates a wastewater assimilation challenge. Of the facilities listed in Table 3-5, seven are municipal wastewater treatment facilities and one is an industrial facility. All are located in the Chattahoochee River Basin, except for two municipal facilities: Richland and Cuthbert Water Pollution Control Plants (WPCP), which are located in the Flint River Basin.

These challenges were reviewed by the Council. In general, they indicate where potential shortfalls may be a challenge in meeting the water and wastewater needs of the region. The amounts, locations, duration, and volume of the shortfalls, especially during dry periods, were examined where additional information was requested by the Council. GAEPD will use this information to guide communications with these facilities about future capacity and permit requirements.

Table 3-4: Water Supply Challenges Indicated in Assessment Results for ACF Part of Middle Chattahoochee Region

Facility	Metric		Scenario	
			Baseline	Baseline Drought
Heard County Water Authority (permit 074-1220-02)	% Time		25.6%	25.9%
	Shortage *million*	Model Period	8,774	9,916
		2007-08 Drought	300	334

Facility	Metric		Scenario	
			Baseline	Baseline Drought
	gallons	*2011-12 Drought*	313	338
Heard County Water Authority (permit 074-1220-03)	% Time		0.7%	0.2%
	Shortage *million gallons*	Model Period	22	7
		2007-08 Drought	0.1	0
		2011-12 Drought	1	0
PVA Water Association, Inc.	% Time		0.6%	0.0%
	Shortage *million gallons*	Model Period	28	0
		2007-08 Drought	0	0
		2011-12 Drought	1.1	0

**% Time is calculated as a proportion of the full model period (1939-2018). Shortage is total volume for full model period.*

Table 3-5: Wastewater Assimilation Challenges Indicated in Assessment Results for ACF Part of Middle Chattahoochee Region

Facility	% Time Flow Below 7Q10*		Required Flow (7Q10) *cfs*
	Baseline Scenario	Baseline Drought Scenario	
Hogansville	3.4%	3.5%	0.98
Pine Mountain	0.2%	0.2%	0.1
Callaway Gardens Resort, Inc. WPCP	1.1%	0.1%	0.09
Koch Foods of Pine Mountain Valley	0.4%	0.4%	0.33
Hamilton WPCP	1.7%	1.7%	0.96
Lumpkin WPCP	9.9%	10.6%	6.31
Richland WPCP	0.0%	0.0%	0.08
Cuthbert WPCP	0.1%	0.4%	0.68

**% Time is calculated as a proportion of the full model period (1939-2018).*
WPCP: Water Pollution Control Plant
[Shortage volumes removed from this table per input from GAEPD.]

Table 3-6 summarizes the results of the assessment for lake elevations at West Point. As mentioned previously, the lake elevation metrics were used to analyze the percentage of days during the model period, during which lake levels may be below elevation needed for activities like recreation.

Table 3-6: West Point Lake Level Assessment Results

West Point Recreation Impacts Summary	Scenario	Metric			
		Above top of conservation pool†	Below initial impact level: 632.5 ft	Below recreation impact level: 628 ft	Below water access level: 627 ft
% Time	Baseline	5.3%	23.5%	1.6%	0.9%
	Baseline Drought	5.1%	25.7%	2.3%	1.5%

**% Time is calculated as a proportion of the full model period (1939-2018).*
†Top of the conservation pool varies by month from a level of 628 to 635 feet.

Table 3-7 summarizes the results of the assessment for streamflows at the Columbus node in the Middle Chattahoochee River Basin. As noted above, the streamflow metrics were selected to evaluate the frequency of flows above 1,350 cfs (daily flow) and 1,850 cfs (7-day average

flow) at Columbus under various scenarios. This information can be used by the Council to better understand the occurrence of flows, especially during droughts. Additional metrics will be discussed by the Council for consideration in future planning cycles.

Table 3-7: Surface Water Availability Streamflow Results: Chattahoochee River at Columbus

Columbus Flow Summary	Scenario	Metric	
		Daily Flow ≥ 1,350 cfs	7-Day Average Flow ≥ 1,850 cfs
% Time Above Streamflow Metric	Baseline	92.3%	98.0%
	Baseline Drought	92.1%	97.9%
**% Time is calculated as a proportion of the full model period (1939-2018).*			

In the last planning cycle, GAEPD extended the resource assessment to evaluate the potential impacts of farm ponds used for irrigation on surface water availability. To support this analysis, GAEPD collected data on the bathymetry of a set of farm ponds in South Georgia and gathered input from farmers on how farm ponds are managed. This information was limited in scope, but it provided enough data to support a preliminary analysis. This analysis used the model from the prior planning cycle, and it was not incorporated in the BEAM analysis in this planning cycle. However, the results of this analysis showed that farm ponds had a mitigating impact on the magnitude of availability shortfalls but not on their duration.

Tallapoosa River Basin Results

A small portion of the Middle Chattahoochee Water Planning Region is located in the Tallapoosa River Basin. The BEAM model for the Alabama-Coosa-Tallapoosa (ACT) Basin provided results for the Tallapoosa Basin portion of this planning region in the Tallapoosa River Basin. These results are presented below in Tables 3-8 through 3-10. All the model metrics and approaches are similar from the ACF model to the ACT model, except no lake elevation or stream flow metrics were modeled at this time. Table 3-9 summarizes the resource assessment results for the two water supply challenges, both of which are municipal facilities. Table 3-10 summarizes the 6 municipal facilities in the region where flows fell below the 7Q10 flow at some time(s) during the 80-year model period. Most of these low flow periods would not be considered to result in substantial wastewater assimilation challenges, as the percent of time that the instream flow fell below the 7Q10 value is less than 10%.

Table 3-8: Summary of Water Supply and Wastewater Discharge Results for Tallapoosa River Basin in the Middle Chattahoochee Region

	Facility Type	Analyzed *(# of facilities)*	Challenge Indicated *(# of facilities)*
Water Withdrawals	Municipal	6	2
	Industrial	1	0

	Facility Type	Analyzed *(# of facilities)*	Challenge Indicated *(# of facilities)*
	Energy	0	0
Wastewater Discharges	Municipal	6	6
	Industrial	0	0
Note: For each challenge indicated in the assessment results, the challenges were observed under both current and future conditions. Future assessment results are discussed in Section 5.1.			

Table 3-9: Water Supply Challenges Indicated in Assessment Results for Tallapoosa River Basin in the Middle Chattahoochee Region

Facility	Metric		Scenario	
			Baseline	Baseline Drought
City of Bremen (permit 071-1301-02)	% Time		0.03%	0.02%
	Shortage *million gallons*	Model Period	0.6	0.3
		2007-08 Drought	0.6	0.3
		2011-12 Drought	0	0
Haralson County Water Authority (permit 071-1301-01)	% Time		2.8%	2.8%
	Shortage *million gallons*	Model Period	1,586	1,546
		2007-08 Drought	435	426
		2011-12 Drought	356	357
**% Time is calculated as a proportion of the full model period (1939-2018). Shortage is total volume for full model period.*				

Table 3-10: Wastewater Assimilation Challenges Indicated in Assessment Results for Tallapoosa River Basin in the Middle Chattahoochee Region

Facility	% Time Flow Below 7Q10*		Required Flow (7Q10) *cfs*
	Baseline Scenario	Baseline Drought Scenario	
City of Bremen	1%	1%	0.31
City of Buchanan	2.2%	2.2%	0.11
City of Tallapoosa	1.8%	1.8%	17.88
City of Villa Rica	0.4%	0.4%	0.13
City of Bremen	0.4%	0.4%	0.19
City of Bowdon	0.1%	0.1%	0.03
**% Time is calculated as a proportion of the full model period (1939-2018). Shortage is total volume for full model period.* *[Shortage volumes removed from this table per input from GAEPD.]*			

Discussion of ACF Results

The next eight pages include several updates based on discussion with GAEPD and the Water Quantity Committee since the last Council meeting.

The surface water availability assessment was conducted assuming that federal reservoirs on the Chattahoochee River are operated per the current ACF Water Control Manual, which was updated in March 2017.[5] According to the USACE, the updates to the WCM include a drought plan, increase the reliability of navigation, and incorporate other changes to improve system performance for authorized project purposes, including protection of listed species. The Middle Chattahoochee Water Planning Council takes exception to the manner in which the USACE operated the system under the prior Water Control Manual and Revised Interim Operating Plan (RIOP), and the Council has continuing concerns about the current Water Control Manual. The Council has identified impacts associated with those operations, described later in this section.

Surface water availability in the Chattahoochee River is constrained by multiple instream flow requirements, and the resource assessment model reflects them as follows:[6]

- Whitesburg – The USACE and Georgia Power operate to meet a minimum streamflow rate at the Peachtree Creek USGS gauging station located approximately 40 miles upstream of Whitesburg. The flow target is met through operations coordinated by the Atlanta Regional Commission under the Chattahoochee River Management System. Until adoption of the updated ACF WCM, the minimum flow target at Peachtree Creek was 750 cubic feet per second (cfs). The updated ACF Water Control Manual includes a Peachtree Creek flow target of 750 cfs from May to October and 650 cfs from November to April. The WCM targets were incorporated in the BEAM Model for the resource assessment.
- West Point Dam – A minimum flow of 675 cfs is required to be released below West Point Dam, and this flow requirement was incorporated in the resource assessment model.
- Columbus – A minimum flow is established at Georgia Power's North Highland Dam, located approximately three miles upstream of Columbus. The requirement, as stated in the FERC license for this project, provides three metrics for minimum release which must be adhered to: minimum instantaneous release of 800 cfs or inflow (whichever is lower), 1,350 cfs daily average release or inflow (whichever is lower), and 1,850 cfs 7-day average release or inflow (whichever is lower). The USACE is not bound by these

[5] Information on the updated ACF Master Water Control Manual can be found on the following USACE website: https://www.sam.usace.army.mil/Missions/Planning-Environmental/ACF-Master-Water-Control-Manual-Update/

[6] Upstream of the Middle Chattahoochee region, the WCM reflects water demands in the metropolitan Atlanta area. Furthermore, in January 2021, the USACE and the State signed a contract allocating storage in Lake Lanier for water supply. In September 2022, Georgia and water suppliers in the region signed subcontracts regarding the use of that storage.

FERC provisions in its operation of the ACF reservoirs including West Point, and its operation of West Point determines to a large extent the inflow to North Highlands Dam.

- USGS Gauge on the Apalachicola River near Chattahoochee, Florida – The updated WCM includes seasonal flow requirements that are maintained by the USACE as determined by time of year, total basin inflow, amount of composite storage remaining, and whether or not drought triggers measured by total composite federal reservoir storage are met.

The surface water availability assessment evaluated the capacity of the ACF to meet water demand and wastewater assimilation needs in the region, as well as flows at Columbus and West Point Lake levels. However, the Council acknowledges and emphasizes that potential adverse impacts to some other water uses may exist due to the inability of the basin operating plan to meet instream uses. These impacts are further described below. The Council makes recommendations regarding its preferred flows, based on FERC license requirements, and lake levels in the Middle Chattahoochee Basin in Management Practice IU-1 (Section 6) and Table 6-2. The Council will discuss developing additional metrics for the BEAM surface water availability assessment for future planning cycles to expand assessment of other water uses.

The following describes the Council's concerns about potential impacts of ACF operations under the current WCM:

Economic and Recreational Impacts. Current seasonal action zones established for West Point Lake have contributed to the loss of recreational opportunities and economic development due to issues regarding adverse impacts of prolonged low and inconsistent water levels. The initial impact level for West Point Lake, which is defined as the level where it is recognized that "recreational use and safety impacts become significant at or near this level," is established by the U.S. Army Corps of Engineers at 632.5 feet NVGD.[7,8] Depending on total conservation storage in the system, current action zones require drawing down West Point Lake to at least 628 feet NVGD for flood storage beginning in November. According to the 2016 USACE Final Environmental Impact Statement (EIS) for the revised WCM adopted in 2017, the revised WCM, compared to the baseline operations (No Action Alternative in Final EIS), results in some slightly adverse effects to lake levels and land use at Lake Lanier, slightly beneficial effects to lake levels at West Point Lake, and adverse effects to lake levels at Walter F. George Lake.[9]

Prolonged operation below the USACE designated impact level has resulted in job and income losses for water-dependent and recreation/tourism-based businesses, sharp declines in property values, lost recreational opportunities and declining quality of life, and lost opportunities for economic growth. A study of the economic impact of West Point Lake estimated that at full

[7] USACE, *West Point Project Plan for Low Water Levels During Recreation Season*, July 1999.
[8] National Vertical Geodectic Datum
[9] USACE, Final Environmental Impact Statement: Update of the Water Control Manual for the Apalachicola-Chattahoochee-Flint River Basin in Alabama, Florida, and Georgia and a Water Supply Storage Assessment, December 2016. Available on-line: http://www.sam.usace.army.mil/Missions/Planning-Environmental/ACF-Master-Water-Control-Manual-Update/ACF-Document-Library/.

pool (elevation 635 feet above mean sea level), West Point Lake generates an estimated $710 million a year from direct and indirect spending for the regional economy. At 630 feet, the estimated impact from the lake is only $154 million a year.[10] The resource assessment estimates that lake levels are below the Initial Impact Level (632.5 feet) for recreation 23.5% of the time and below the Recreational Impact Level (628 feet) 1.6% of the time in the baseline scenario (see Table 3-6). Due to the importance of navigation to the regional economy, the Council advocates for conditions that will support navigation between Columbus and Apalachicola Bay (see Recommendation to the State #11 in Section 6.3). Additionally, the Council advocates for providing flows that will support the Chattahoochee Whitewater Park (see Management Practice IU-3 in Section 6.1). The economic opportunities offered by the park can be adversely affected if the USACE, in partnership with Georgia Power, does not continue to meet flow needs for course operation. The Council discussed assessment of whitewater park flows with the GAEPD modelers. The model has a daily time step that does not support evaluation of flows on an hourly basis as would be needed to assess impacts to whitewater recreation.

Fish & Wildlife Conservation Impacts. Fluctuating water levels in reservoirs used for flood storage are a necessity. However, further study defining long-term ecological response to this fluctuation in West Point Lake as a result of the seasonal action zones is warranted and could be used to better inform future management decisions. Preliminary research at West Point Lake concluded that "continued annual fluctuation of the water level is expected to cause further deterioration in soil composition of the exposed littoral areas, leading to lower production of benthic fish-food organisms."[11]

Future reservoir operations should also fully consider and address impacts of reservoir operation on rare and threatened species such as the bluestripe shiner. The bluestripe shiner, designated by the Georgia Wildlife Resources Division as rare, inhabits flowing areas in large creeks and medium-sized rivers and "tributaries whose lower reaches have been impounded by main stem reservoirs."[12] Further analysis regarding fluctuation in reservoir levels in the Chattahoochee River should be analyzed with regards to potential impacts to this species.

The health of the fisheries in West Point and Walter F. George Lakes is dependent in part on the balance of nutrient availability in the form of phosphorous and nitrogen contributions from point and nonpoint sources of pollution and resulting algal productivity measured in terms of chlorophyll-*a*. Similarly, the relationships between water turbidity, water detention/velocity, water temperature, weather/flow conditions, pH, growing season duration, and algal growth require

[10] Basile Baumann Prost Cole & Associates, Inc., Economic Impact of West Point Lake at Various Lake Water Levels, December 15, 2007.

[11] Hale, Marty M. and Bayne, David R., *Effects of Water Level Fluctuations on the Littoral Macroinvertebrates of West Point Reservoir*, 1980 Annual Conference of the Southeastern Fish and Wildlife Agencies.

[12] Freeman, Byron J. et. al. Bluestripe Shiner, August 2009. Website visited October 13, 2010. www.georgiawildlife.com/sites/default/files/uploads/wildlife/nongame/pdf/accounts/fishes/cyprinella_callitaenia.pdf

further study in West Point and Walter F. George lakes to support re-evaluation of the Chlorophyll-*a* standards that are appropriate for these reservoirs. A chlorophyll-*a* standard of 25 micrograms/liter for Walter F. George Lake has been suggested as reflective of Southeastern Plains Ecoregion reservoirs.[13] At Walter F. George Lake, GAEPD plans to develop a total maximum daily load (TMDL) standard and will analyze the requirements needed to meet the TMDL for total phosphorus and total nitrogen. If the evaluation indicates the criteria cannot be met, GAEPD may re-evaluate the standards at Walter F. George. At West Point, GAEPD lowered the lake's chlorophyll-a standard levels in 2015 and additional studies are not planned at this time. In 2021, EPD released a new lake criteria guidance document for recommended ambient water quality criteria to address pollution in lakes and reservoirs.[14]

The Middle Chattahoochee Water Planning Council recognizes the need for a better understanding of ecological cause and response variables in the Middle Chattahoochee reservoirs in order to support setting an operating management strategy. The Council believes that precautions should be taken to ensure the long-term sustainability of the reservoirs as fishery and wildlife habitat.

The Georgia Department of Natural Resources is involved in regional restoration efforts for the shoal bass, Alabama shad, and the Gulf strain of striped bass. Shoal bass, as their name implies, inhabit large shoal areas. The removal of dams near Columbus has resulted in more shoal habitat. Creating passage for Alabama shad to move upstream through the lock system at Jim Woodruff Dam (Lake Seminole) has re-established these fish in upriver areas and provided them with important habitat for spawning and rearing young. Gulf striped bass are stocked and distributed throughout the region as an integral part of the region's sport fishery. These restoration programs are cooperative efforts between various combinations of: the states of Georgia, Florida, and Alabama, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the U.S. Geological Survey, the National Park Service, Auburn University, Georgia Power, and The Nature Conservancy.

Critical Habitat Impacts. The Middle Chattahoochee Water Planning Council is concerned that the minimum flow requirements below Woodruff Dam, specified in the updated WCM and based in the RIOP, are not founded upon sound scientific justification. The Council shares the concerns expressed in the comments submitted to the USACE by the State of Georgia which state that the USACE has not used the most updated and accurate information to support evaluation of impacts on endangered species and question the performance measures used by

[13] U.S. Environmental Protection Agency, Office of Water, *Ambient Water Quality Criteria Recommendations Information Supporting the Development of State and Tribal Nutrient Criteria for Wetlands in Nutrient Ecoregion XIII*, December 2000.
[14] U.S. Environmental Protection Agency, Ambient Water Quality Criteria to Address Nutrient Pollution in Lakes and Reservoirs, August 2021: https://www.epa.gov/nutrient-policy-data/ambient-water-quality-criteria-address-nutrient-pollution-lakes-and-reservoirs

USACE. An analysis by the State demonstrated that the potential habitat for the fat threeridge mussel is maximized at flows lower than 5,000 cfs.[15]

Furthermore, the Biological Opinions issued by the U.S. Fish and Wildlife Service to the USACE in 2006, 2008, 2012, and 2016 sanctioned the USACE's requested operation of the system without truly addressing the underlying question of the scientific basis for the minimum flows required to adequately protect threatened and endangered species. The Council recommends that the USACE and USFWS continue to work with stakeholders to evaluate the release schedule from Woodruff Dam for critical habitat.

Additionally, the Middle Chattahoochee Water Planning Council feels the USACE has not properly addressed or considered the following when determining appropriate measures for the protection of downstream critical habitat:

- The analysis of alternative structural hydraulic measures such as temporary weirs, gates, and/or steps to control river stage and sediment transport and scour at or below Woodruff Dam in order to protect critical habitat.
- The impacts on lake habitat associated with the impediment to store flows during the spring refill period at West Point and Walter F. George Lakes due to the stringent inflow-outflow requirements of the WCM.

Hydropower Impacts. The timely release of water from the federal reservoir projects allows peak power generation. The potential energy production of hydropower facilities is directly proportional to the amount of water stored in the reservoir. Therefore, a lake held at a higher level for a greater proportion of the time will have the capability to provide power supply more often. The USACE operating regime for West Point Lake has adversely impacted the potential for production of hydroelectric power. The revised WCM did not significantly change hydropower production by West Point Lake; the Final Environmental Impact Statement estimated the revised WCM would reduce power generation by the dam by 0.38%.

Water Quality Impacts. Water quality standards are established for West Point and Walter F. George Lakes by GAEPD for chlorophyll-*a*, total nitrogen, total phosphorous, dissolved oxygen, and pH, among other standards. The impact on those constituents by lake elevations has been considered in the lake models developed by GAEPD. Additional water quality monitoring data is needed to document lake conditions and support review of standards and evaluations of changes needed to meet water quality standards.

USACE operations can affect downstream water quality, and the USACE should operate in a manner that supports water quality downstream. For example, instream flows in the Chattahoochee River at Columbus and Columbia have been identified as areas of concern by the Middle Chattahoochee Water Planning Council regarding flow availability for the assimilation

[15] Apalachicola-Chattahoochee-Flint River Basin Water Control Manual and Draft Environmental Impact Statement (October 2015) COMMENTS OF THE STATE OF GEORGIA, January 2016.

of permitted wastewater discharges, including the discharge of the City of Columbus. The WCM acknowledges flows needed for assimilative capacity at Columbus, but it is not obligated to meet those flows as operational controls. Georgia Power projects located above Columbus are required in their FERC licenses to provide minimum flows at Columbus, but those releases are dependent on releases from West Point Dam. The flow release pattern by the USACE and concern regarding the available assimilative capacity in the Chattahoochee River are a driver for the Council's desire to achieve an equitable balance of flow contributions from the Chattahoochee and Flint Basins to meet required downstream flows. Heavy rainfall and resulting high river flows in the Flint River can result in more water storage and lower flow releases in the Chattahoochee River.

The surface water availability assessment results presented in Table 3-7 show that under baseline demands, a daily flow of 1,350 cfs is attained about 92% of the time and a 7-day average flow of 1,850 cfs is attained about 98% of the time at Columbus. Additionally, Columbus's wasteload allocations (WLA) have been developed by GAEPD using a 7Q10 flow of 1,150 cfs, and this flow is expected to be met more than 93% of the time. As long as the effluent discharge by Columbus meets the limits required by their permit, periodic excursions of the streamflow below 1,150 cfs do not constitute a water quality violation. The Council's preferred flows in the Chattahoochee are addressed in Management Practice IU-1 and Table 6-2.

Flood Control Impacts. Maintaining higher reservoir levels to achieve recreational, economic, and water quality benefits must be analyzed critically against flood protection requirements for downstream communities. As noted in 2016 in the comments by the State of Georgia on proposed revisions to the WCM, modeling by GA EPD indicates that the USACE could operate West Point Lake more flexibly to accomplish improved flood risk management and reduced impacts on lake levels. The State requested that the USACE incorporate into the WCM the use of real-time and probability-based forecasts to support flexible storage management practices for West Point Lake. The Council supports this approach that it believes can support better economic benefits for the region while also providing for flood risk management.[16] While desirable benefits for higher winter pool lake level elevations have been identified, specific operating targets will need to come from further study which includes risk/benefit analysis of economic versus flood control benefits for West Point Dam.

River Flow Impacts. In addition to USACE operations and the effects on river flow, the Middle Chattahoochee Water Planning Council is concerned about upstream and regional consumptive use and flow returns to the river. Upstream interbasin transfers and increases in consumptive use can reduce downstream flows and can reduce the natural flows in the river. The Council encourages better stewardship through land use planning and permitting to maximize flow returns to the river. Furthermore, a more scientific understanding is needed for such uses as agricultural irrigation, wastewater land application, and septic systems in order to better quantify the water balance in terms of the true consumptive use levels associated with these uses.

[16] Apalachicola-Chattahoochee-Flint River Basin Water Control Manual and Draft Environmental Impact Statement (October 2015) COMMENTS OF THE STATE OF GEORGIA, January 2016.

Reservoir Operations and River Flow Impacts. The conflicts and inconsistencies in how federal reservoirs have been operated have historically impacted the instream uses, as previously discussed. These issues are compounded in West Point Lake, which the USACE has heavily utilized in attempting to balance the needs and authorized purposes of the federal reservoir projects. In the WCM, the USACE revises Action Zone divides in West Point Lake and Walter F. George. In West Point Lake, the zone divides in general moved upwards which means the higher elevation zones are smaller, while the lower elevation zones are larger. Also, the zone divides in Walter F. George have been revised downwards in general, meaning a more active usage of Walter F. George. The net effect of these changes could result in better protection of storage in West Point Lake in comparison to operations under the RIOP. However, the top of the conservation pool rule curves in Lanier, West Point Lake, and Walter F. George are unchanged in the revised WCM. As noted above, the Council supports the State's comments on the draft WCM that requested incorporation into the WCM of flexible flood storage management practices for West Point Lake.[17]

The resource assessments were conducted following the operations and storage management described in the current Water Control Manual for the Federal reservoirs in the Chattahoochee River. For other reservoirs, the resource assessment incorporates data from reservoir owners if they provided storage and operational data to GAEPD for this purpose. Storage and operational data were not available for Georgia Power reservoirs in the region, and these reservoirs were modeled as run-of-river projects.

Based on its concerns, the Middle Chattahoochee Water Planning Council has identified the need for additional system storage and better utilization of existing storage in reservoir operations. Additional storage and existing storage utilization changes could be included in an adaptive set of operational practices to accumulate flows in storage while maintaining the minimum flow required below Woodruff Dam. The ability to consistently meet the needs of instream uses are a challenge that the Middle Chattahoochee Water Planning Council, GAEPD, USACE, and representatives from Alabama and Florida must work toward solving. The Council encourages the adoption of adaptive reservoir management throughout the ACF Basin to provide regional benefits for multiple stakeholders while maintaining all authorized instream uses.

As a result of these impacts, the Middle Chattahoochee Water Planning Council has identified the need for an improved operating plan for the Apalachicola-Chattahoochee-Flint Basin which equitably balances the multiple authorized purposes of the federally operated reservoirs and addresses impacts on instream uses throughout the basin. This desired state aims to equitably balance reservoir storage in the basin and meet instream needs. Major goals of such a desired state include the following:

- Adopt the use of real-time and probability-based forecasts to support flexible storage management practices to enhance the ability to attain both economic and flood control

[17] Apalachicola-Chattahoochee-Flint River Basin Water Control Manual and Draft Environmental Impact Statement (October 2015) COMMENTS OF THE STATE OF GEORGIA, January 2016.

benefits at West Point Lake. Council members have stated that they desire that West Point Lake be operated to maintain levels above the prescribed Initial Impact Level of 632.5 feet as often as possible provided that adequate winter drawdown is maintained to provide for flood storage. Council members believe that induced storage for flood control above the 635 foot elevation should be examined and, if found to be acceptable by the USACE, used as routine flood storage.

- Establish and maintain instream flow guidelines below Columbus and Columbia to ensure adequate protection of water quality for downstream users. The USACE's RIOP did not recognize any flow targets in the vicinity of Columbus, and the updated WCM does not include such flow targets.[18] The Council recommends that a starting point to establishing flow guidelines would be to acknowledge the FERC permit flow guidelines in the permits for upstream reservoirs.
- Ensure critical habitat for federally and state protected species are managed in accordance with state and federal policy requirements. Ensure that requirements aimed at doing so are founded upon thorough and accepted science by all stakeholders for the range of species and habitats throughout the basin.

As a historical note, flows above 1,350 cfs at Columbus were observed more than 95% of the time between 1939 and 2011. Since 1976, when West Point Lake was placed in operation, the observed Columbus flow has exceeded 1,350 cfs over 97% of the time.[19] It is the Council's contention that water quality would be enhanced if the USACE were to operate the system to consistently meet flows needed for assimilative capacity at Columbus.

The Council encourages discussion between GAEPD, regional water planning councils, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and stakeholders in the tri-state area regarding further refinement and analysis of the model.

3.3.2 Groundwater Availability

For regional water planning, GAEPD prioritizes aquifers for assessment based on aquifer characteristics, availability and use of the aquifer, evidence of negative effects, and other considerations. The Council considers the results of the groundwater availability assessment when selecting the management practices (Section 6.2) and recommendations to the State (Section 6.3). Figure 3-3 illustrates the aquifers of Georgia, and Figure 3-4 illustrates a cross-section of the aquifers of the Coastal Plain of Georgia. These figures are important for

[18] The only USACE control points in the ACF Basin are at USGS gauging stations at Peachtree Creek and Chattahoochee (FL). Until adoption of the updated ACF WCM, the minimum flow target at Peachtree Creek was 750 cubic feet per second. The WCM includes a Peachtree Creek flow target of 750 cfs from May to October and 650 cfs from November to April. At the Chattahoochee (FL) gauge, seasonal flow requirements are maintained based on time of year, total basin inflow, amount of composite storage remaining, and whether or not drought triggers measured by total composite federal reservoir storage are met.

[19] The model results from the surface water availability assessment presented in Table 3-7 show that under baseline demands, a daily flow of 1,350 cfs is attained about 92% of the time and the 7-day average flow of 1,850 cfs is attainted about 98% of the time at Columbus.

understanding the locations and characteristics of the assessed aquifers. The groundwater assessments estimate metrics such as sustainable yield range, current use (based on 2020 use estimates), and forecasted 2060 demands (Section 5.2) for the prioritized aquifers. In some cases, special assessments are also completed. In the Middle Chattahoochee region, GAEPD prioritized assessment of estimated sustainable yield ranges for the Claiborne and Crystalline Rock Aquifers and conducted special assessments for the Cretaceous Aquifer.

Figure 3-3: Georgia's Aquifers

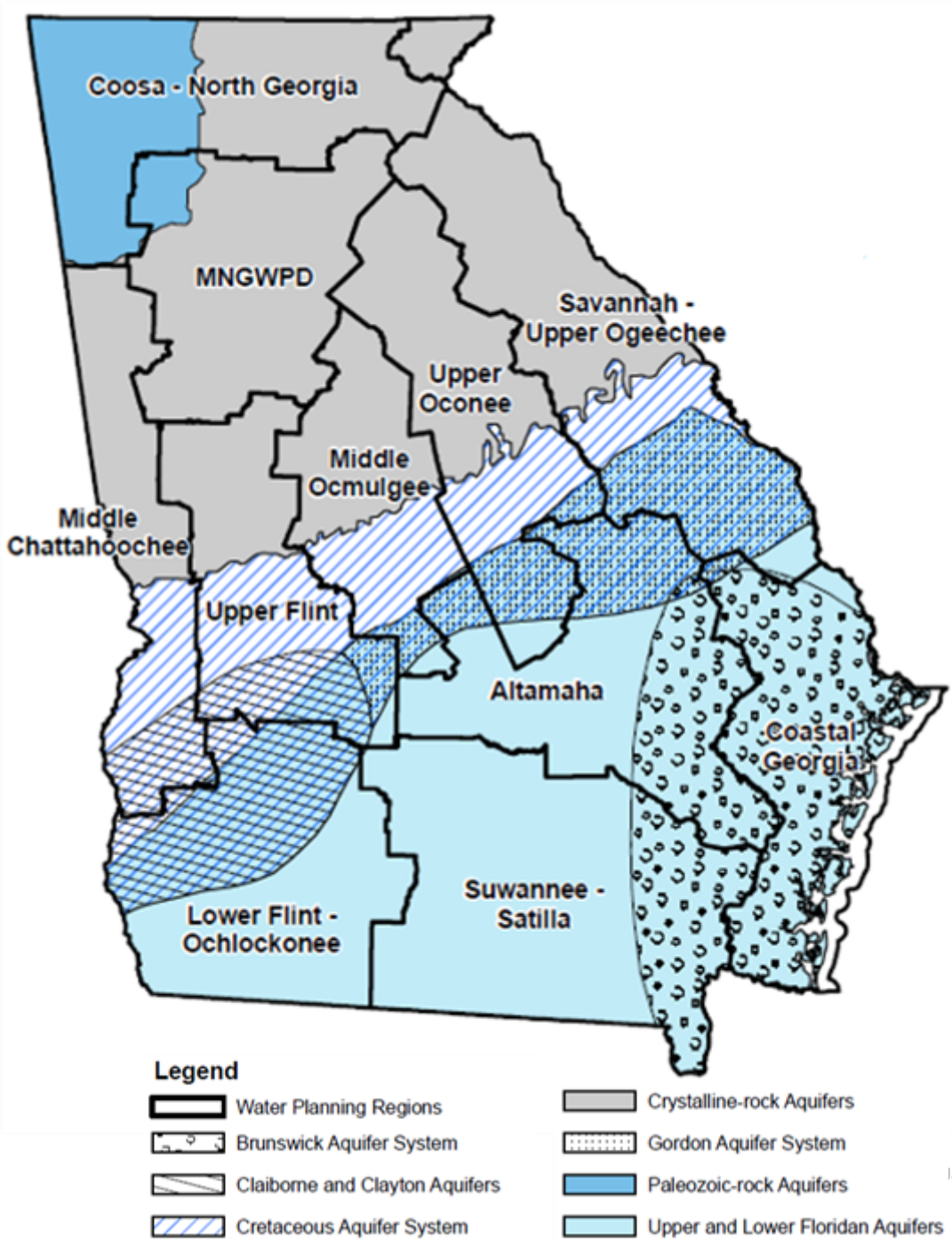
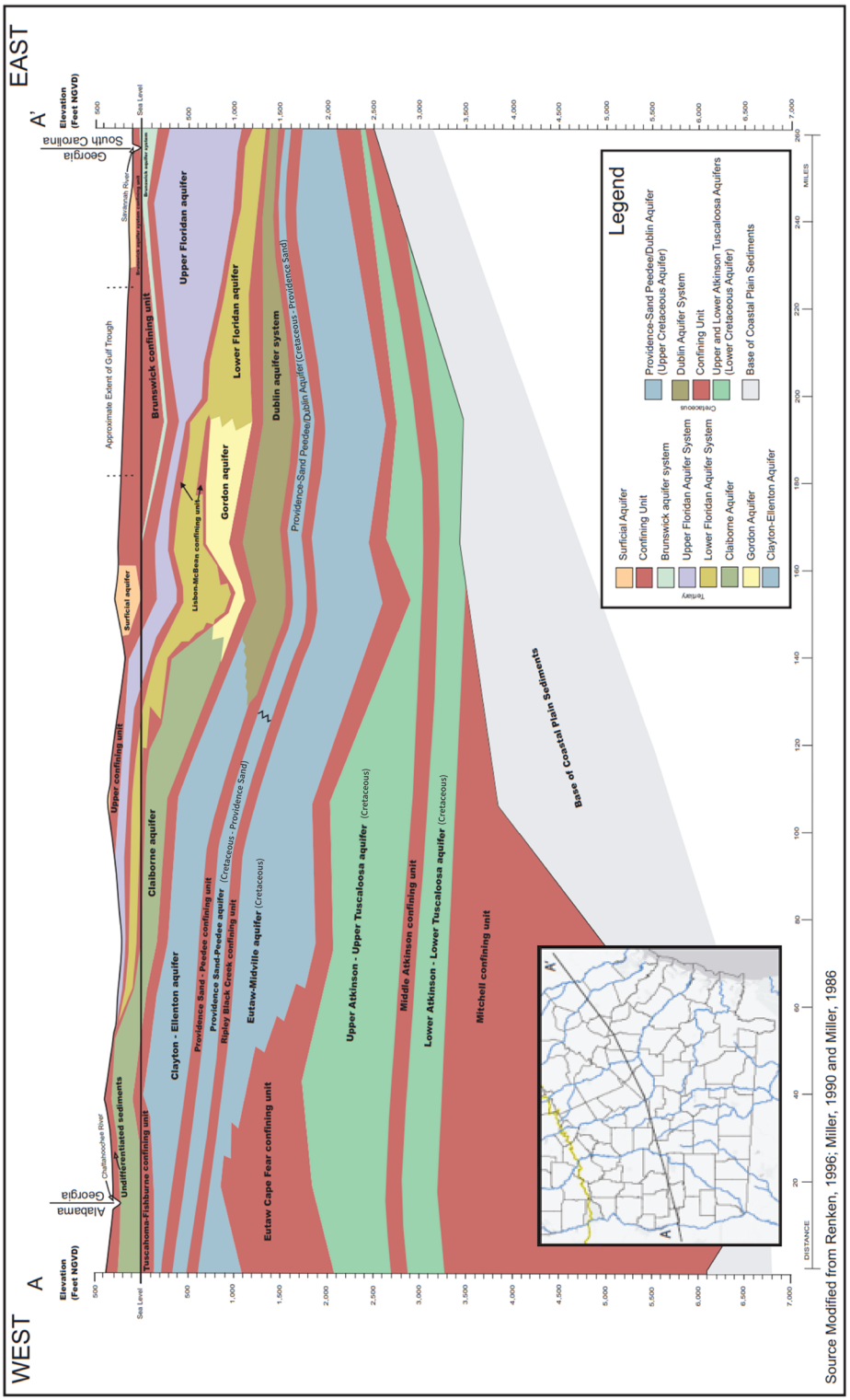


Figure 3-4: Coastal Plain Aquifers Cross-Section



Source Modified from Renken, 1996; Miller, 1990 and Miller, 1986

Groundwater Availability Assessment Results

For the purposes of this groundwater assessment, estimated sustainable yield is the amount of groundwater that can be withdrawn without causing potential adverse impacts at the local or regional level by violating any of the following thresholds:

- Drawdown between pumping wells exceeds 30 feet
- Reduction in aquifer storage goes beyond a new base level
- Groundwater does not recover between periods of higher pumping
- Reduction in groundwater contributon to stream baseflow exceeds 40%
- Groundwater levels go below top of confining layer

In the assessments, GAEPD estimates sustainable yield by simulating withdrawals until a threshold is reached. That threshold is then used to estimate the sustainable yield range. Aquifer characteristics determine how sustainable yield can be estimated but these same usage metrics are used to evaluate different usage scenarios.

The sustainable yield model results for each aquifer are expressed as a range to encompass two model scenarios with different assumptions about groundwater use (low-end and high-end). In some cases, the estimated sustainable yield range (low-end to high-end) is large because of the different pumping assumptions used to estimate the range.

The low-end range is defined by a model scenario assuming that groundwater pumping will increase uniformly across the aquifer from existing well locations.

The high-end range is defined by an idealized model scenario assuming that groundwater use will increase in a non-uniform manner geographically to optimize efficient aquifer use. This scenario allows for a flexible distribution of water use that holds use constant in areas where adverse impacts are observed and increases use from hypothetical new well locations in other areas where adverse impacts are not observed. This pumping scenario spreads the withdrawals out over the aquifer area, which yields potentially higher levels of use from the aquifer. The high-end scenario spreads pumping to areas where there is less pumping and helps to estimate the maximum amount that the aquifer can yield.

The true sustainable yield of an aquifer likely falls somewhere within the range. The low-end value is not necessarily the level at which impacts will be seen. The high-end value reflects optimal pumping locations to maximize how much water can be used in an aquifer. This scenario does not reflect real-world pumping scenarios as pumping rates vary and new wells tend to be clustered near developed areas or existing agricultural regions. When withdrawals are estimated or projected to exceed the estimated sustainable yield range, the results do not necessarily indicate that the aquifer is likely to be exhausted by use. Usually, this exceedance

indicates a need for more information and implementation of management practices to address potential impacts. Aquifer responses in the future depend on pumping configurations – where wells are located and how much pumping is applied at each location.[20]

In summary, model results indicate for the Claiborne and Crystalline Rock aquifers that there is sustainable yield available in some locations. The results for the Cretaceous Aquifer demonstrated potential drawdown impacts but also recovery of aquifer levels during the non-growing season. These results are discussed in more detail for each aquifer in the sections below.

Claiborne Aquifer Results

A small portion of the Claiborne Aquifer use area extends into the Middle Chattahoochee Planning region. Estimates of sustainable yield range and 2020 use are presented in Figure 3-5. Figure 3-5 shows the area of the aquifer assessed in the yellow shaded area. In this planning cycle, the assessed portion of the aquifer was extended from the orange line to include the yellow shaded area to the north and northeast of the orange line. The assessed area was extended to the north and northeast to include portions of Webster, Schley, Stewart, Randolph, Macon, Houston, Dooly, and Crisp Counties to include more areas where there were active Claiborne aquifer wells.

The current use estimates in Figure 3-5 are provided at two scales:

1. Middle Chattahoochee Region Use: Use that occurs in the portion of the assessed aquifer within the water planning region (estimated for 2020).
2. Aquifer-wide use: Use that occurs in the full assessed area of the aquifer (illustrated on the map in Figure 3-5).

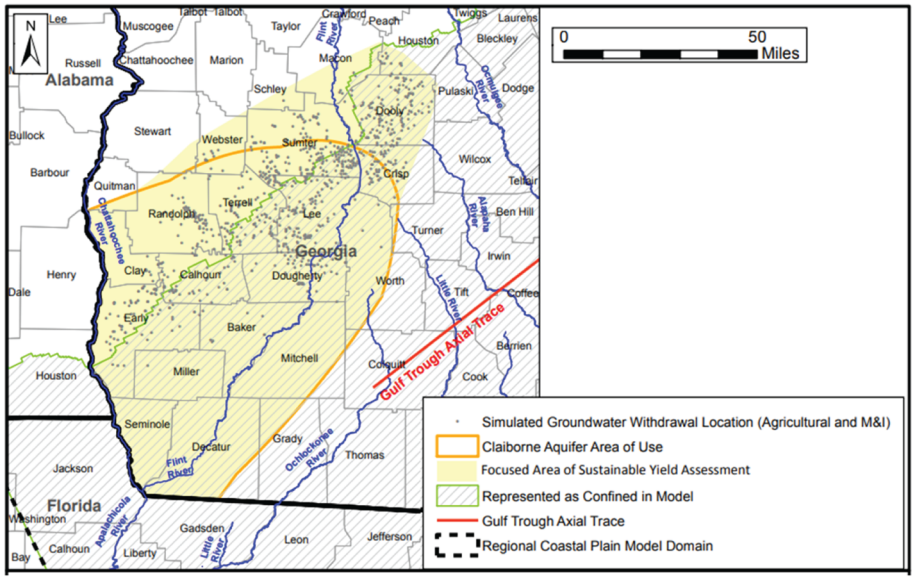
These metrics incorporate municipal, industrial, and energy sector groundwater use, as well as agricultural use during dry year conditions (see Section 4 for details on estimated 2020 water use).

The effects of use on the Claiborne aquifer are dependent upon the location of withdrawals. As a part of the Claiborne Aquifer assessment in this planning cycle, county level estimates of sustainable yield were developed. Table 3-11 lists the county level estimates for sustainable yield ranges and 2020 current use for counties in the Middle Chattahoochee region that are located in the Claiborne Aquifer area of use. The results indicate that some areas may have

[20] For more detail on the groundwater availability resource assessment and results, see the March 2010 Synopsis Report: Groundwater Availability Resource assessment and the March 2017 Synopsis Report: Groundwater Availability Assessment Updates; both are available on the state water planning website: https://waterplanning.georgia.gov/resource-assessments/ground-water-availability.

additional amounts of water that can be used sustainably, while other parts may show potential adverse impacts of use.[21]

Figure 3-5: Claiborne Aquifer: Model Domain and Estimated Sustainable Yield



Estimated Sustainable Yield Range	*Current Use (2020)*	
	Middle Chattahoochee Region	**Aquifer-Wide**
141 to 803 mgd	4 mgd	71 mgd

[21] These results are corroborated by those of a GEFA-funded study on characteristics of the Claiborne Aquifer (CDM Smith, *Claiborne Aquifer Specific Capacity and Transmissivity Analysis Draft Report*, December 2016).

Table 3-11: Claiborne Aquifer – High-End of Sustainable Yield for the Counties in the Middle Chattahoochee Region

County	Current Use (Baseline in Model Simulation, 2020) *mgd*	High-End Sustainable Yield *mgd*
Clay	0.5	28.8
Quitman	0	4.2
Randolph	4.6	87.4
Stewart	0	11.4

Cretaceous Aquifer Results

During the 2017 Plan update GAEPD conducted a new special assessment focused on the Cretaceous Aquifer. The assessment of the Cretaceous Aquifer was extended with an initial analysis of the response of these aquifers to increased time-varying withdrawals during peak usage (i.e., agricultural growing season) and during non-use (i.e., winter months). This analysis provides initial results in response to the Council's Recommendation to the State 4. about the development of new wells to reduce reliance on direct surface water withdrawals.

The Cretaceous Aquifer assessment approach differs from other approaches (i.e., the Claiborne assessment) because of specific aquifer characteristics. The aquifer is comprised of a series of water-bearing units divided by confining layers. The predominant water-bearing units include Providence Sand (model layer 5), Eutaw-Midville (model layer 6), and Upper/Lower Atkinson (model layer 7). The assessment does not provide an estimated sustainable yield range. Instead, the model uses the drawdown thresholds typically applied to estimating sustainable yield to assess the capacity of the different aquifer layers.

To understand whether new wells would reduce reliance on surface water withdrawals, the assessment focused on simulating increased withdrawals from confined water-bearing units. Unconfined water-bearing units are often in direct contact with surface water streams, therefore, drawdowns would more directly impact the groundwater contribution to stream baseflow.

Providence Sand water-bearing units (model layer 5): The 30-foot drawdown threshold metric was exceeded by baseline pumping levels during the peak growing season in northeastern Stewart County and eastern Chattahoochee and Muscogee Counties. The 30-foot drawdown threshold also occurred in an area where the Providence Sand is unconfined and could potentially impact surface water streams, so no additional simulations were run for this water-bearing unit. The Providence Sand aquifer did recover during periods of non-use.

Eutaw-Midville water-bearing units (model layer 6): The metrics for evaluating use were not exceeded for baseline withdrawals. The assessment indicates aquifer recovered to baseline levels during the non-growing season. Pumping was increased to five times the baseline withdrawals of 4 mgd, and the simulated drawdown impacts expanded to include almost all of Randolph County, part of Quitman County, and eastern Stewart, Chattahoochee, and

Muscogee Counties and the simulated drawdown was more than 70 feet. Groundwater levels in this layer did not fully recover to baseline levels during periods of low pumping under the five times baseline withdrawal simulation.

The Upper/Lower Atkinson water-bearing units (model layer 7): These units were not assessed due to potential water-quality issues. There is limited information on the Cretaceous Aquifer in this area. Additional studies may be needed to better assess the ability of the capacity of these water-bearing units.

Crystalline Rock Aquifer Results

The Crystalline Rock aquifer occurs in the northern part of the Middle Chattahoochee Region in Carroll, Haralson, Harris, Heard, and Troup Counties. A water budget approach was selected as the most appropriate system to provide a planning level assessment due to the characteristics of the aquifer system.

A water budget estimation approach known as the Tennant Method was used because it can account for the movement of water in a hydrologic cycle and assumes that consumption reflects withdrawals minus aquifer recharge. For the sustainable yield criteria, the approach focuses on streamflow as the primary estimator of recharge and groundwater availability. Daily streamflow data from 1989-2008 were used to calculate mean annual streamflow and baseflow and to evaluate streamflow and baseflow reductions. A level of 50% streamflow was chosen to estimate the net amount of groundwater available for use.

The results of this approach estimate the range of sustainable yield for this aquifer only in the Piedmont Region (where the Middle Chattahoochee Region occurs). The estimated sustainable yield range is 1.6 mgd to 7.9 mgd and current use is 3.05 mgd (Table 3-12). The forecasted demands for this aquifer in the Middle Chattahoochee Region are presented in Section 5-2.

Given these results, show use within the sustainable yield range, there appears to be additional capacity for use in some locations. However, for this aquifer, water availability is location dependent and requires finding a water-bearing fracture that can yield the desired amount of water for extended periods. These results should be interpreted with this limitation in mind. Developing new water withdrawals requires site-specific assessment of aquifer conditions.

Table 3-12: Crystalline Rock Aquifer – Current Water Use (2020)

Estimated Sustainable Yield Range	Current Use (2020): Middle Chattahoochee Region
1.6 to 7.9 mgd	3.05 mgd

3.3.3 Surface Water Quality

The surface water quality resource assessment was performed to model the capacity of Georgia's surface waters to process pollutants without unacceptable degradation of water quality. The term assimilative capacity refers to the ability of a water body to naturally absorb pollutants via chemical and biological processes without exceeding state water quality standards or harming aquatic life. Two water quality model evaluations are utilized to demonstrate the current status of the available assimilative capacity based on wastewater discharges at currently permitted levels:

1. River Model (Dissolved Oxygen Modeling) – This model evaluates dissolved oxygen (DO) due to existing point discharges under low-flow, high-temperature critical conditions. For portions of the Chattahoochee River, a dynamic model was used that reflects varying conditions and also incorporated potential effects from nonpoint source stormwater runoff based on various land uses.
2. Lake and Watershed Models (Nutrient Modeling) – These models evaluated the impacts of nutrient loading from point and nonpoint sources. Nutrients modeled included total nitrogen and total phosphorus. For lakes chlorophyll-*a* was modeled (a green pigment found in algae; the concentration of chlorophyll-*a* is one parameter used to assess lake water quality). The watershed and lake models accounted for nutrient sources from both wastewater discharges and nonpoint source stormwater runoff based on various land uses.

The water quality assessment models are not the same as the 303(d) list of impaired waters (see section 3.4.1) or total maximum daily loads for two reasons. First, this assessment only looked at dissolved oxygen and nutrients; the 303(d) list includes stream reaches listed as impaired on the basis of dissolved oxygen and other parameters such as metals, bacteria, and biota. Second, the 303(d) list is based on analytical results from stream monitoring while the water quality assessment is based on model results. Determining assimilative capacity requires information on the stream flow, in-stream water quality, wastewater discharges, water withdrawals, existence of land application systems, weather information, land use, stream hydrology, topography, and state water quality standards.

Dissolved Oxygen Modeling

Figures 3-6 and 3-7 show the in-stream dissolved oxygen model results with existing discharges during critical low flow, high temperature conditions. The current conditions assimilative capacity analysis incorporated municipal and industrial wastewater facilities operating at their full permitted discharge levels (flow and effluent discharge limits as of 2022). Stream segments where the model results showed available assimilative capacity as exceeded are red; segments predicted to have no available assimilative capacity under critical low flow (7Q10) and high temperature conditions are pink. Those predicted to have very good DO levels relative to state water quality standards are blue.

Figure 3-6: Assimilative Capacity Results from Dissolved Oxygen Assessment: Chattahoochee River Basin (Current)

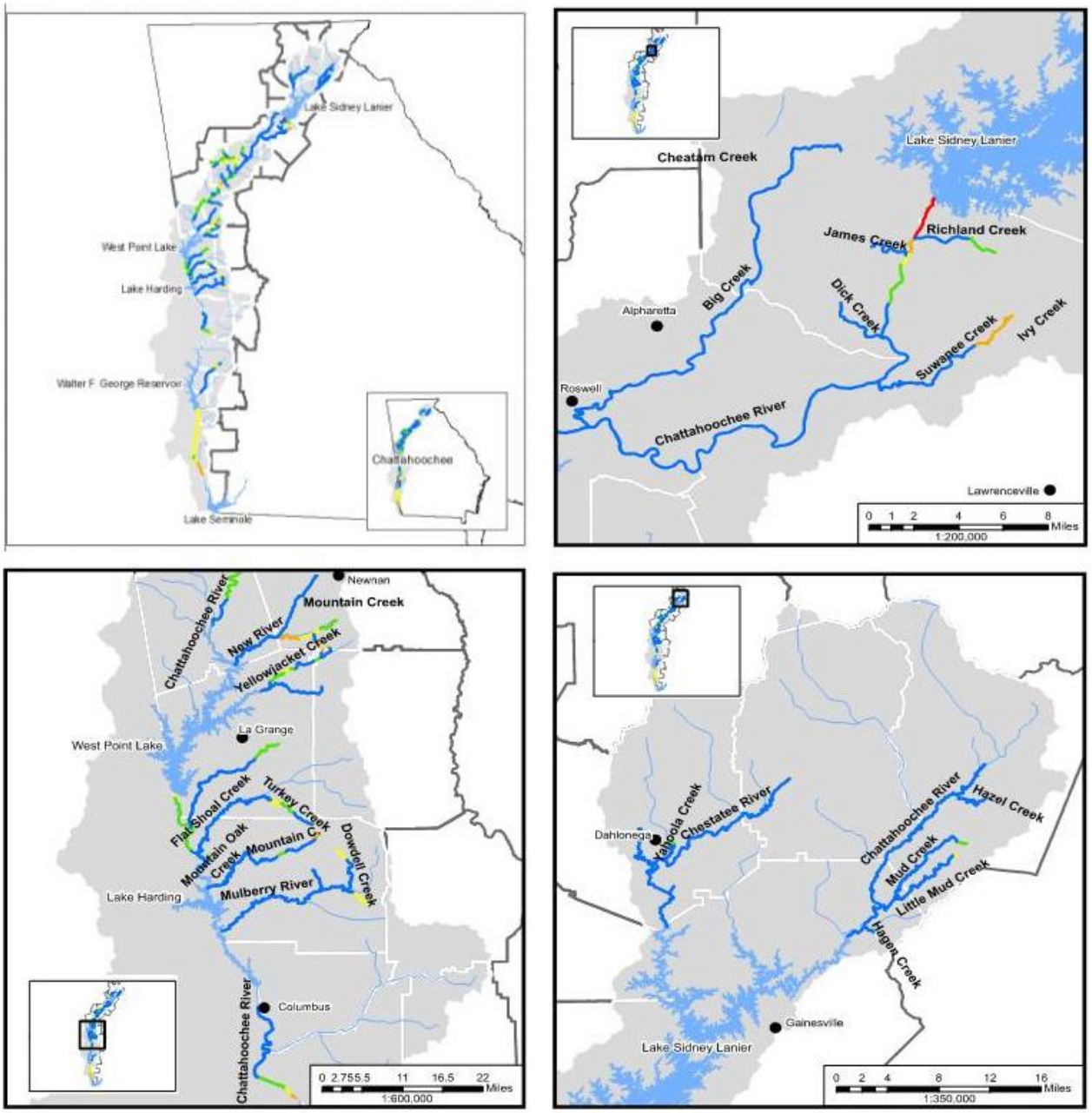
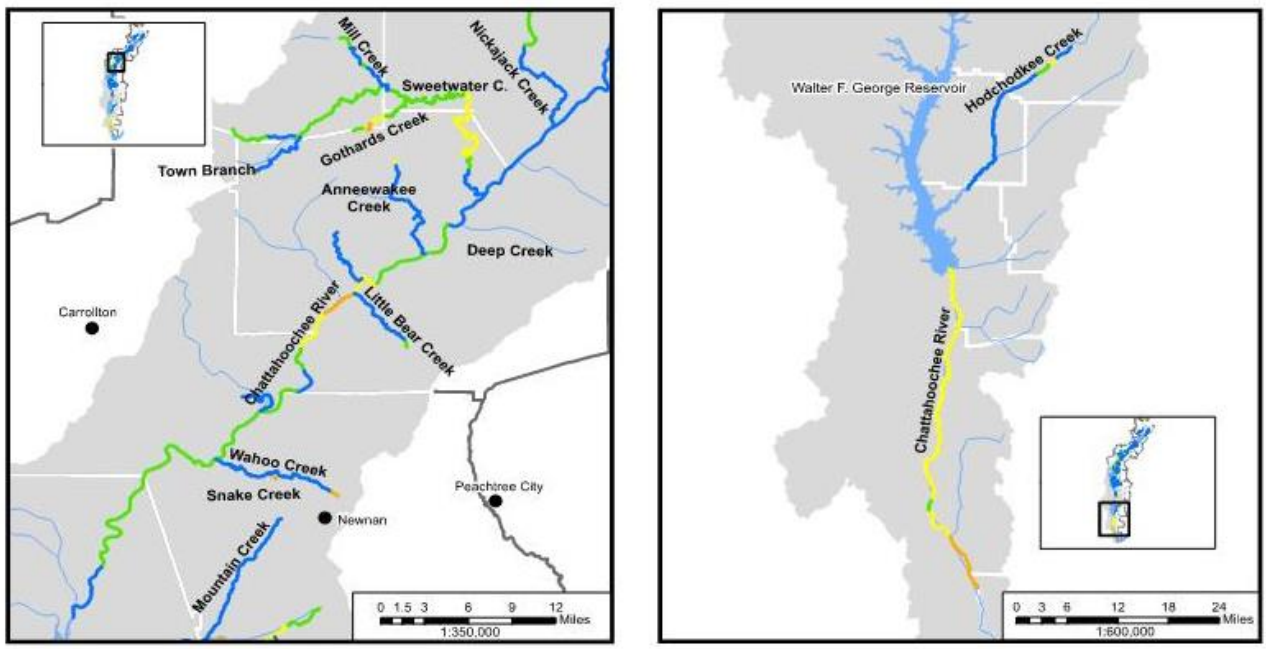


Figure 3-6: Assimilative Capacity Results from Dissolved Oxygen Assessment: Chattahoochee River Basin (Current) – cont.



	Chattahoochee Basin-Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
Current	454	110	72	25	0	2

Source: EPD, Synopsis Report – Surface Water Quality (Assimilative Capacity) Resource Assessment, July 2022.

The Council has discussed that there is only moderate to limited assimilative capacity in the Chattahoochee River downstream of Walter F. George Reservoir. Figure 3-7 below is a graph of the dissolved oxygen measured 0.36 miles downstream of the dam from USGS data. The data shows that the operations of the dams (flow releases and operation of aerator systems) by the US Army Corps of Engineers may be contributing to a violation of the water quality standards of dissolved oxygen level never below 4 mg/L. The occurrence of low dissolved oxygen below the dam is a concern for the Council, and it is the basis for recommendations in management practice IU-2 in Section 6.

Figure 3-7: Dissolved Oxygen in the Chattahoochee River Downstream of Walter F. George Reservoir

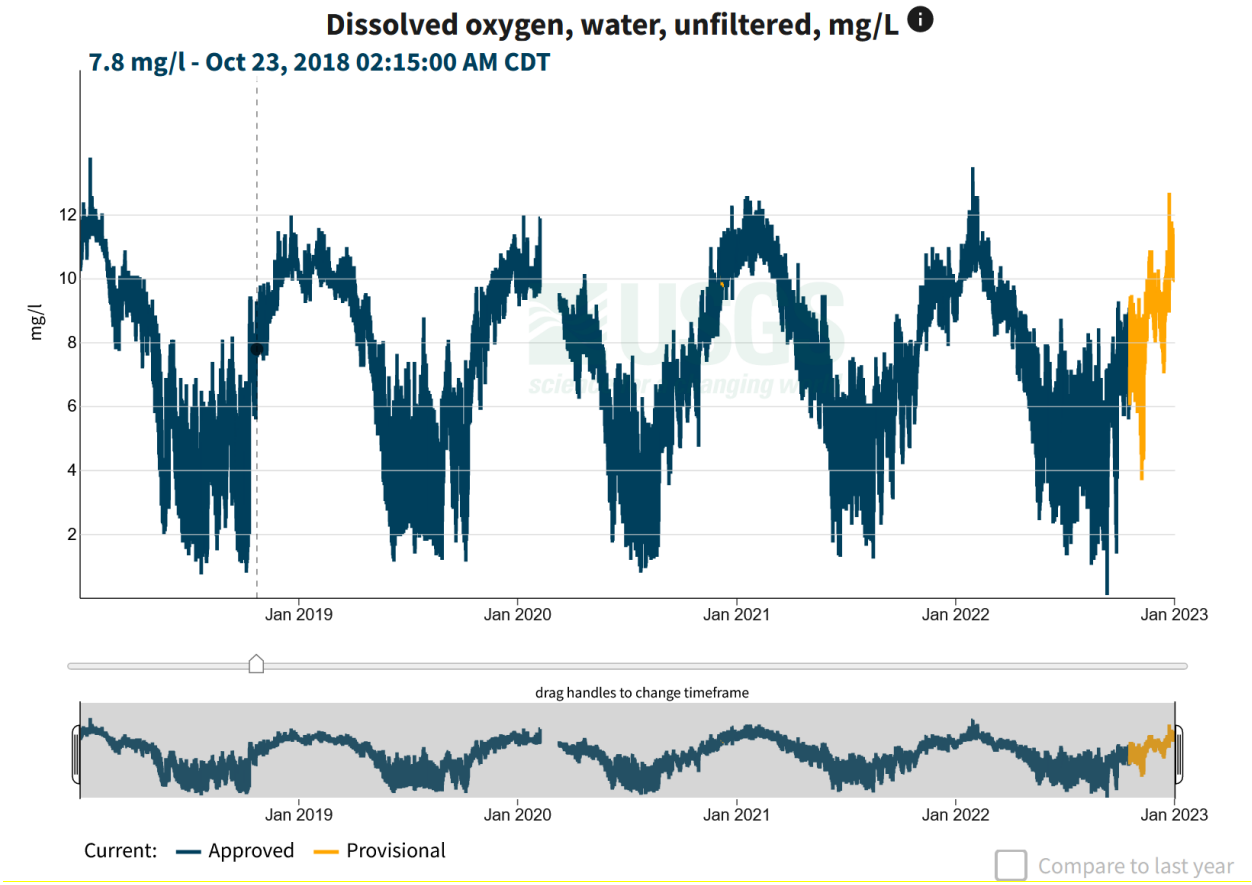
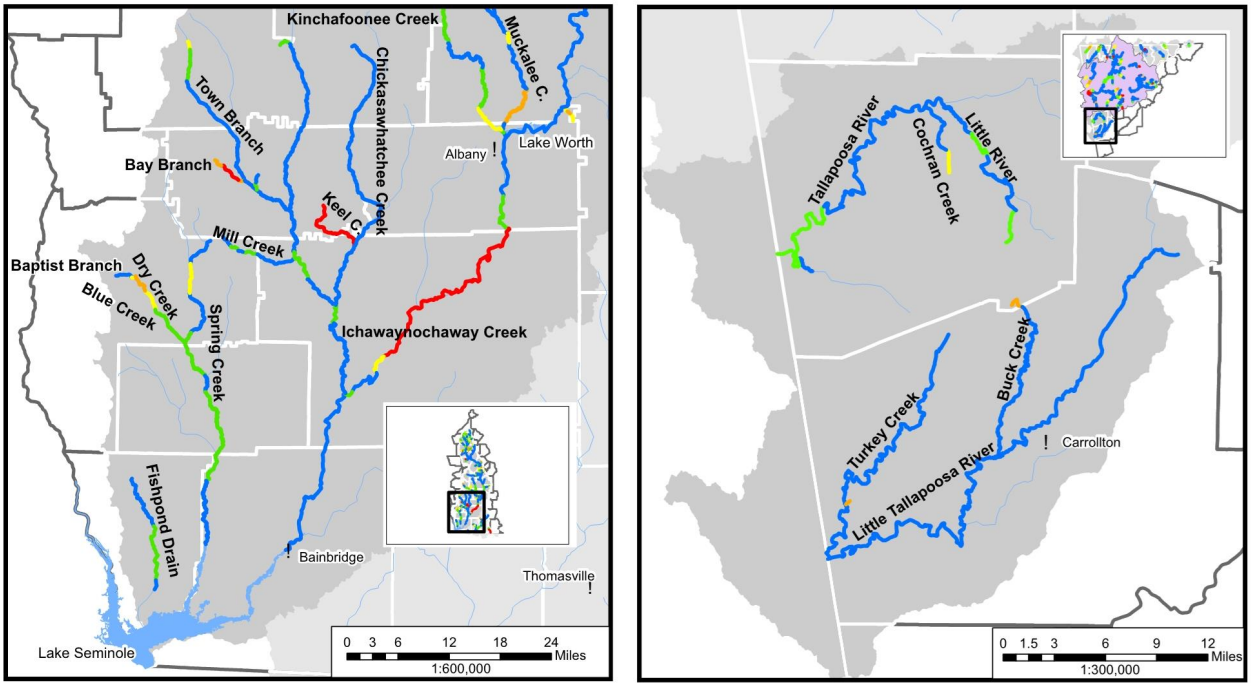


Figure 3-8: Assimilative Capacity Results from Dissolved Oxygen Assessment: Flint and Tallapoosa River Basins (Current)



	Flint Basin-Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
Current	664	267	72	32	0.51	56
	Tallapoosa Basin-Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
Current	111	16	1	1	0	0

Legend
Available Assimilative Capacity
- Very Good ≥ 1 mg/L DO available
- Good 0.5 mg/L to < 1 mg/L DO available
- Moderate 0.2 mg/L to < 0.5 mg/L DO available
- Limited > 0 mg/L to < 0.2 mg/L DO available
- At Assimilative Capacity 0 mg/L DO available
- None or Exceeded < 0.0 mg/L DO available
- Unmodeled Lakes and Streams

Source: EPD, Synopsis Report – Surface Water Quality (Assimilative Capacity) Resource Assessment, July 2022.

Nutrients

Watershed and lake models results assume water use and wastewater disposal data and corresponding land use profiles as inputs. At the time of publication, the latest data inputs for nutrient loading from the contributing watershed utilize twelves years of observed hydrology from 2005 through 2017. The results from the previous planning cycle will continue to be used to inform water quality related management practices The 2017 Watershed model results are summarized as follows:

- Lake Lanier Watershed: Nitrogen and phosphorous loads are primarily nonpoint source related.
- Chattahoochee Watershed: Point sources are the primary contributors of nitrogen and phosphorous loading in the watershed.
- Tallapoosa Watershed: In this smaller watershed, nitrogen and phosphorus loads are impacted by both point and nonpoint sources.

For lakes, the multi-year modeling period was used to determine the algal response, in terms of chlorophyll-*a*, to the nutrient loads at current conditions. The modeled chlorophyll-*a* levels were compared with existing chlorophyll-*a* standards for the major reservoirs along the Chattahoochee and Flint Rivers. Lake model results are summarized as follows:

- Lake Lanier Modeling Results –
  - Chlorophyll-*a* exceedances are projected under current conditions
  - Exceedances are due to a combination of point and nonpoint sources
  - Total phosphorus loading to the lake is expected to primarily be from nonpoint sources (~86%)
- West Point Lake Results –
  - No chlorophyll-*a* exceedances currently
  - Total phosphorus is primarily from point sources
- Walter F. George Results –
  - Chlorophyll-*a* exceedances are projected under current conditions
  - Current total phosphorus load is primarily from point sources (~67%), with the main sources being municipal point sources upstream of the lake
- Lake Seminole Results –
  - No water quality standards are yet established
  - Total phosphorus loading to the lake is primarily from point sources
- Lake Blackshear Results –
  - No water quality standards yet established
  - Total phosphorus loading to the lake is primarily from point sources

The Council notes that data provided by GAEPD below supports the model finding that existing Chlorophyll a standards have not been met in Walter F. George at either the mid-lake or dam forebay sampling locations in the 2018-2022 timeframe. The result of this finding is that GAEPD must develop a TMDL as required by the Clean Water Act.

Figure 3-9: Walter F. George Mid Lake Growing Season Average Chlorophyll a Levels

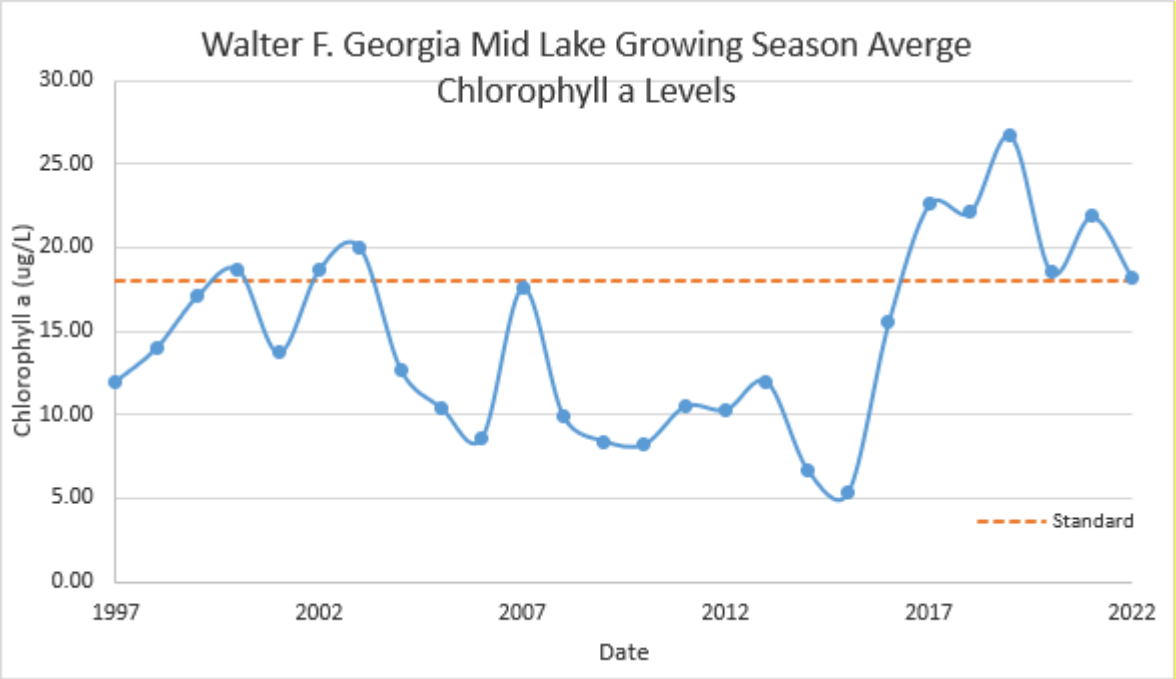
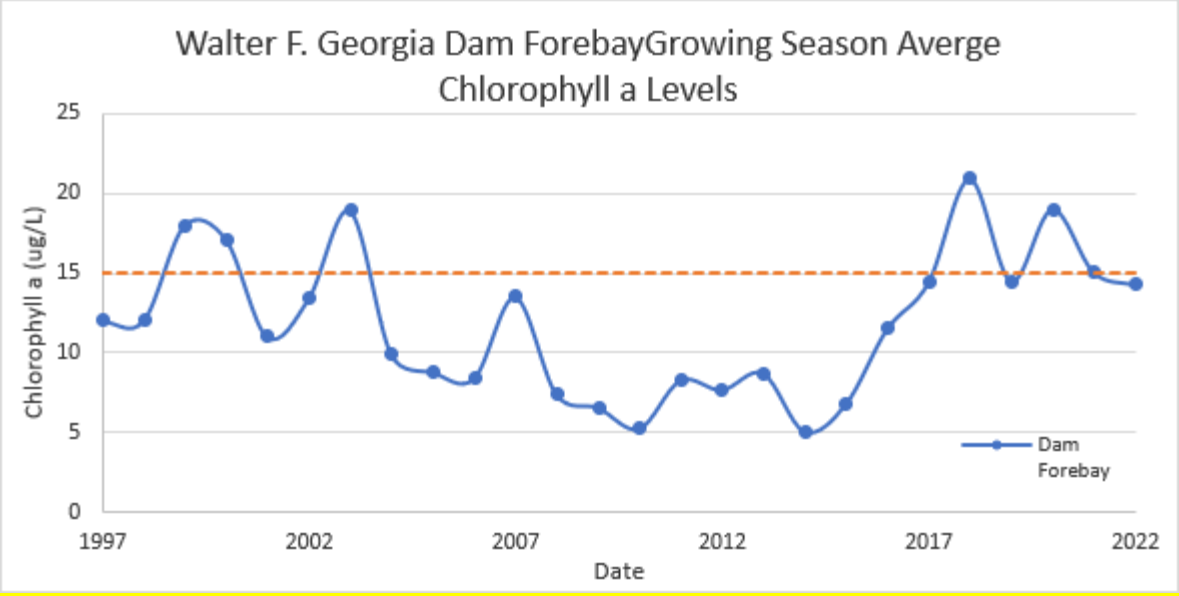


Figure 3-10: Walter F. George Forebay Growing Season Average Chlorophyll a Levels



3.4 Ecosystem Conditions

In order to better protect the health of aquatic ecosystems and to conserve water for downstream users, the Georgia Board of Natural Resources established an interim minimum instream flow policy, effective April 1, 2001. At the time of this publication, the interim minimum instream flow policy is the prevailing regulation for surface water withdrawals. All new applications for new or expanded surface water withdrawals are required to demonstrate that instream uses will be protected by one of the following means: an established monthly 7Q10 minimum flow, a site-specific flow study from which seasonal instream flows would be derived, or a percentage of the mean annual flow based on whether the source is a reservoir or a water withdrawal.

The State Water Plan states that "so long as water permit holders (i.e., withdrawal and/or discharge) are in compliance with permit conditions that require conformance with Georgia's water quality standards, with the Board of Natural Resources May 2001 instream flow protection strategy (or superseding instream flow policy adopted by the Board of Natural Resources), and with other permit conditions as set by the EPD Director, activities covered under the water permits will be considered to be consistent with protection of natural systems and biological integrity of the water resources to which the permits apply."

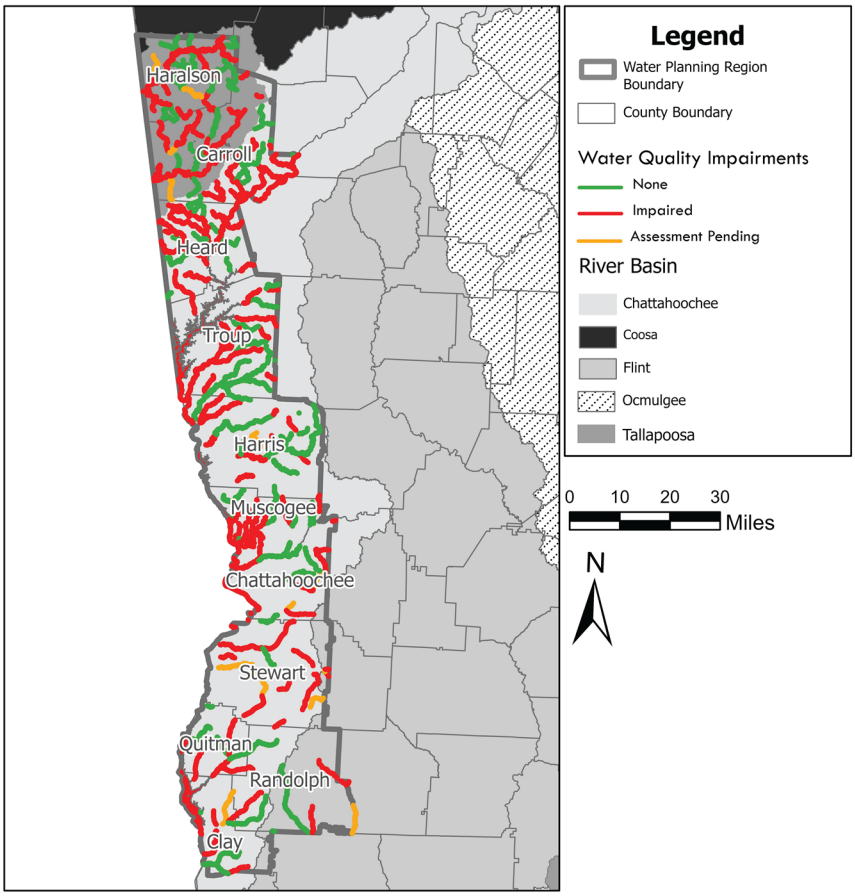
3.4.1 303(d) List and TMDLs

The State of Georgia assesses water bodies for compliance with water quality standards, as required by the federal Clean Water Act. Waters of the State are monitored by EPD, USGS, and local authorities contracted by EPD. If an assessed water body is found not to meet standards, then it is considered "not supporting" its designated use(s), and it is included on a list of impaired waters (303(d) list). Impairments must be addressed through the development of a Total Maximum Daily Load (TMDL), which sets a pollutant load and outlines a strategy for corrective action. The latest 303(d) 2022 Report lists several stream reaches in the Middle Chattahoochee Water Planning Region as impaired waters. A summary of impaired waters in this water planning region is provided in Figure 3-11.[22]

Additional resources for water quality data can be found at GAEPD's Water Quality in Georgia page which includes downloadable data for 303(d) information (https://epd.georgia.gov/https%3A/epd.georgia.gov/assessment/water-quality-georgia), Georgia Environmental Monitoring and Assessment System (GOMAS) (https://gomaspublic.gaepd.org), and Georgia EPD Water Quality in Georgia Story Map (https://storymaps.arcgis.com/stories/67b7b29771b842268f878b94cb7c6d69) .

[22] More detailed geographic information on the Georgia 303(d) list can be found on the GAEPD website: https://epd.georgia.gov/geographic-information-systems-gis-databases-and-documentation.

Figure 3-11: Surface Water Quality Assessment in Middle Chattahoochee Water Planning Region 305(b) Report 2022



River Basin	Total River Miles Impaired in the Middle Chattahoochee Region			
Chattahoochee	9	406	11	263
Flint	1	14	0	3
Tallapoosa	17	98	51	86
Criterion Violated	DO	Fecal Coliforms	Metal	Other

Note: Stream reaches may have more than one criterion violated, i.e. the sum of DO, Fecal Coliform, Metals, and Other may be greater than the total number of stream miles listed as impaired. Metals include mercury trophic weighted residue value and fish consumptive guidance.

Source: EPD, Water Quality in Georgia 2022

3.4.2 Conservation Resources

Protection of rare plants and animals in the ACF Basin is of critical importance to the Middle Chattahoochee Water Planning Region as witnessed by the series of Biological Opinions from the U.S. Fish and Wildlife to the U.S. Army Corps of Engineers. Issued in 2006, 2008, 2012, 2016, and 2020, these Biological Opinions assess the adequacy of water flows and water elevations in protecting the gulf sturgeon and two species of endangered mussels. The Middle Chattahoochee Water Planning Council and EPD must continue to be engaged in the development of further scientific studies to better define the water quantity and water quality conditions which best support ecological health. Critical information needs to be gathered to determine how and which species are impacted by water flow, water quality, and lake elevations in the ACF.

Georgia's Wildlife Resources Division (WRD) developed a broadly focused strategy that indicates areas of the state in which resources should be concentrated to facilitate the conservation of Georgia's animals, plants, and natural communities in the Georgia State Wildlife Action Plan, September 2015.[23] High priority species and habitats were identified and summarized at the ecoregion level, and a total of five ecoregions were designated for the State. Portions of the Middle Chattahoochee Water Planning Region fall within the Southeastern Plains Ecoregion with the remainder in the Piedmont Ecoregion.

The WRD plan identified 145 high priority animal species in the Southeastern Plains Ecoregion. These included 22 birds, 7 mammals, 11 reptiles, 10 amphibians, 13 mollusks, 22 fishes, 9 aquatic arthropods, and 57 terrestrial arthropods. Further qualification of the high priority species needs to be performed to begin to better understand the impacts of water quantity, water quality, and lake elevations on those species. A summary of aquatic species which are currently under state or federal protection and a list of high priority waters specific to the Middle Chattahoochee Water Planning Region are included in the Existing Regulatory and Local Plan Review, a supplemental document which is available on the Council's website.

[23] The Georgia State Wildlife Action Plan, September 2015 is available on-line: https://georgiawildlife.com/WildlifeActionPlan

SUMMARY: This section summarizes future demand forecasts for water and wastewater treatment in the Middle Chattahoochee Water Planning Region. Between 2020 and 2060, water demands are forecasted to increase by 2%, and wastewater flows are forecasted to decrease by 3%.

Section 4. Forecasting Future Water Resource Needs

Water and wastewater demand forecasts, along with the resource assessments (Sections 3 and 5), form the foundation for water planning in the Middle Chattahoochee Water Planning Region and serve as the basis for the selection of water management practices (Section 6). The tables and graphics in this section present regional water and wastewater forecasts from 2020 through 2060 for four water use sectors: municipal, industrial, agriculture, and thermoelectric power generation. These forecasts provide estimates of baseline levels of water use in this water planning region and illustrate how those levels are expected to change over the planning horizon. More details on demand forecasts for each water use sector can be found in the technical memorandums for each water use sector and Georgia Water Planning Forecast Dashboard, which are available on the Regional Water Planning website[1].

4.1 Municipal Forecasts

Municipal forecasts include residential, commercial, and small industry demands. Demands for major water using industries were projected separately and are discussed in Section 4.2.

4.1.1 Population Projections

Municipal water and wastewater forecasts are based on population projections for the counties of the Middle Chattahoochee Water Planning Region. The population projections were developed by the Governor's Office of Planning and Budget (OPB). The OPB is charged in state law (OCGA § 45-12-171) with the responsibility for preparing, maintaining, and furnishing official demographic data for the State. The population projection results from OPB by county for the Middle Chattahoochee Water Planning Region are shown in Table 4-1. In summary, population in this water planning region is projected to grow by 6% between 2020 and 2060. County-level population projections for the region are available in the water demand forecasting technical memorandum, which is cited above and available on the Regional Water Planning website.

The Council has discussed these population projections in detail and met with demographers that worked with OPB, as well as demographers from Columbus State University. The Muscogee County population projections reported in Table 4-1 do not match with local understanding of the current population levels and trends in that county, which is the largest in

[1] More information regarding Municipal, Industrial, Agricultural, and Energy forecasts can be found on the Regional Water Planning website: https://waterplanning.georgia.gov/forecasting

the region. The U.S. Census estimates that the 2020 population of Muscogee County is 206,922, which is higher than the 2020 estimate which was the basis for the GA OPB 2019 projections. To reflect this regional understanding, Council members developed an alternative population projection and associated water withdrawal and water discharge estimates for this region. This alternative future water use scenario was utilized in an alternative surface water availability resource assessment model run for comparison of potential future outcomes. This evaluation and the results comparison are described in Section 5.

Table 4-1: Population Projections by County – Middle Chattahoochee Water Planning Region

County	2020	2030	2040	2050	2060	Difference (2020 – 2060)	% Change (2020 – 2060)
Carroll	120,119	133,363	145,151	156,752	169,579	49,460	41%
Chattahoochee	10,749	10,890	10,966	11,273	11,418	669	6%
Clay	2,855	2,705	2,527	2,423	2,421	-434	-15%
Haralson	30,722	35,829	38,981	41,665	43,669	12,947	42%
Harris	34,712	37,327	39,640	41,902	44,818	10,106	29%
Heard	12,370	14,339	15,343	16,048	16,693	4,323	35%
Muscogee*	191,626	179,704	166,681	153,247	141,670	-49,956	-26%
Quitman	2,294	2,251	2,195	2,212	2,319	25	1%
Randolph	6,754	6,425	6,145	5,947	5,986	-768	-11%
Stewart	6,129	5,784	5,434	5,103	4,878	-1,251	-20%
Troup	70,414	72,836	74,307	74,975	75,970	5,556	8%
TOTAL	**488,744**	**501,453**	**507,370**	**511,547**	**519,421**	**30,677**	**6%**

Source: Governor's Office of Planning and Budget (2019)
See concerns about Muscogee population projections in Section 4.1 above.

4.1.2 Municipal Water Forecasts

The municipal water demand forecasts were calculated by multiplying an updated per capita water use estimate by the population served. Because the per capita water use is different for public water systems and those served by self-supply (private wells), the demands are calculated separately and then summed together. [2]

[2] Per capita water demand was calculated based on the data available. For most counties, the average per capita demands values from water loss audits submitted to EPD from 2015 to 2018 were used. For some counties, the demand was calculated using withdrawal data submitted to EPD and the population served in the Safe Drinking Water Information System database or other total population sources.

The updated per capita use rates also were adjusted for expected water savings over time from the transition to ultra-low flow toilets (1.28 gallons per flush), as required by the Water Stewardship Act as of 2010. Additional details regarding development of the municipal water forecasts, including the per capita use rates, plumbing code savings, and results, are provided in the water demand forecasting technical memorandum, which is available on the Regional Water Planning website[3]. The municipal water demand forecasts for the Middle Chattahoochee Water Planning Region are expected to decrease from 70.92 mgd in 2020 to 66.66 mgd in 2060. Municipal Water Demand Forecasts by county are shown in Table 4-2.

Table 4-2: Municipal Water Demand Forecast (MGD)

County	2020	2030	2040	2050	2060
Troup	9.89	10.01	10.00	9.88	9.80
Stewart	0.88	0.82	0.75	0.69	0.65
Randolph	1.04	0.97	0.91	0.87	0.86
Quitman	0.17	0.16	0.15	0.15	0.15
Muscogee*	34.73	32.04	29.23	26.43	24.02
Heard	1.70	1.94	2.04	2.10	2.14
Harris	4.81	5.21	5.60	5.89	6.19
Haralson	3.14	3.57	3.79	3.94	4.02
Clay	0.37	0.34	0.31	0.30	0.29
Chattahoochee	0.86	0.84	0.81	0.80	0.78
Carroll	13.33	14.54	15.70	16.72	17.76
TOTAL	70.92	70.44	69.29	67.77	66.66
*The Council notes that the water demands in this table are based on the population projections discussed in Section 4.1.1, and therefore, the Council developed an alternative forecast for the region for a future conditions resource assessment model run as discussed in Section 5.					

4.1.3 Municipal Wastewater Forecasts

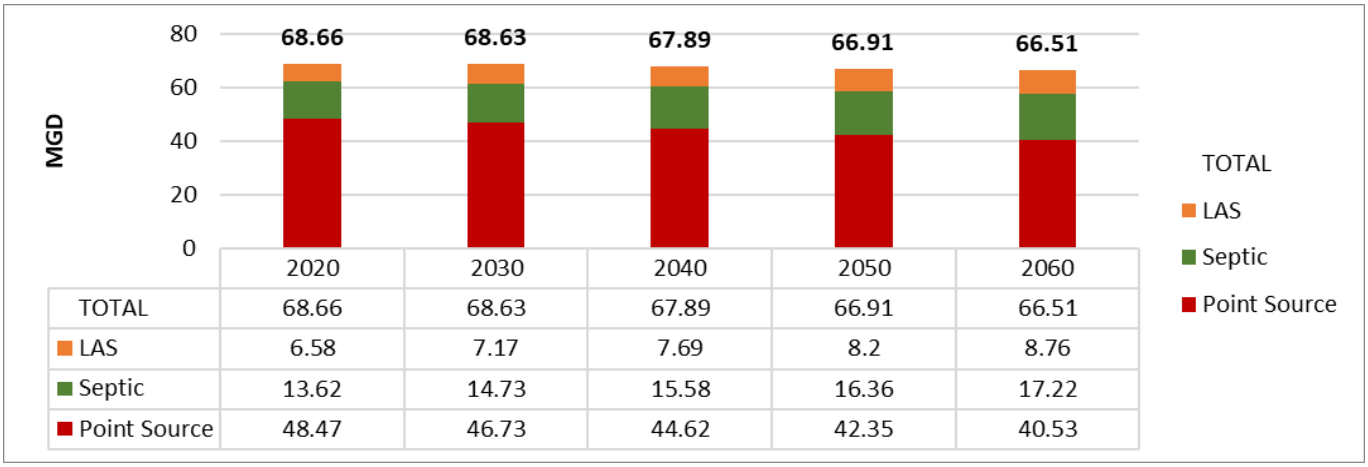
Municipal wastewater may be treated by one of three disposal systems: municipal wastewater treatment plant to point source discharge, municipal wastewater treatment to land application system, or onsite sanitary sewage system, also called septic systems. Average daily discharge flows for 2019 were utilized for forecasting future municipal wastewater flows by county. The ratio of point source flows to land application system flows was generally held proportionate to the 2019 flow conditions. Manual adjustments were made where information was available on future facility flows. Any known (permitted) facility expansion plans were also considered.

To calculate the projected wastewater flow to be treated by septic systems, the percent served by septic systems was multiplied by the county population then multiplied by the per capita use

of 75 gallons per capita per day (gpcd) multiplied by 80 percent indoor water use return ratio. It is noted that the wastewater forecasts do not include combined sewer overflow (CSO) discharges. In addition, this method maintains the same ratio of existing septic use for future growth. If future growth is served by a higher percentage of centralized sewer, the amount of wastewater treated by septic systems presented in this section may be overstated.

The municipal wastewater forecasts for the Middle Chattahoochee Water Planning Region are expected to decrease from 68.66 mgd in 2020 to 66.51 mgd in 2060. The resulting municipal wastewater forecasts[3] for the Middle Chattahoochee Water Planning Region are shown in Figure 4-1.

Figure 4-1: Total Municipal Wastewater Demand (AAD-MGD)



	2020	2030	2040	2050	2060
TOTAL	68.66	68.63	67.89	66.91	66.51
LAS	6.58	7.17	7.69	8.2	8.76
Septic	13.62	14.73	15.58	16.36	17.22
Point Source	48.47	46.73	44.62	42.35	40.53

Source: Black and Veatch., 2017, Middle Chattahoochee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum, 8 p., https://waterplanning.georgia.gov/document/publication/water-and-wastewater-forecasting-technical-memorandum-middle-chattahoochee/download.

4.2 Industrial Forecasts

Industrial water and wastewater demand forecasts anticipate the future needs for the industries in this water planning region. Industries require water for use in their production processes, sanitation, cooling, as well as employee use and consumption. The forecasts presented in this section are based upon the 10-year average withdrawals from 2010 to 2019 and inputs of relevant industry trade groups within the state. The industrial forecasts include major industrial water users and wastewater generators that supply their own water and/or treat their own wastewater. Some industries rely on municipal systems for water supply and wastewater treatment. Where data were available, municipally supplied or treated industrial water use was included in the industrial water and wastewater forecasts memorandum. Other municipally

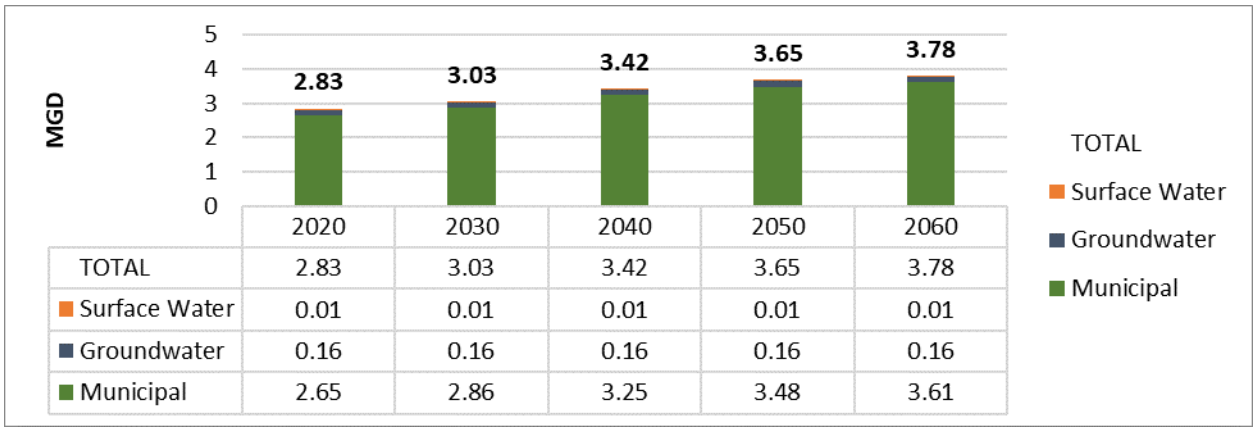
[3] More information regarding Municipal Forecasts can be found on the Regional Water Planning website at: https://waterplanning.georgia.gov/forecasting/municipal-water-use

served industrial users, generally with lesser demands, were accounted for in the municipal forecasts. Further detail can be found in the industrial forecasting technical memorandum[4].

4.2.1 Industrial Water Forecasts

Industrial water forecasts were calculated using information and data specific to each of the major water using industries. For industries where information was available on water use per unit of production, water forecasts were based on production. For the Middle Chattahoochee region, industrial demand for water is forecast to increase from 2.83 mgd in 2020 to 3.78 mgd in 2060 based on stakeholder input. Of this amount, municipally supplied industries account for 2.65 mgd in 2020 and 3.61 mgd in 2060. The forecasting technical memorandum on the Regional Water Planning website includes detailed information about the industrial water forecasts.

Figure 4-2: Total Industrial Water Demand Forecast (AAD-MGD)



	2020	2030	2040	2050	2060
TOTAL	2.83	3.03	3.42	3.65	3.78
Surface Water	0.01	0.01	0.01	0.01	0.01
Groundwater	0.16	0.16	0.16	0.16	0.16
Municipal	2.65	2.86	3.25	3.48	3.61

Source: Black and Veatch., 2017, Middle Chattahoochee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum, 8 p., https://waterplanning.georgia.gov/document/publication/water-and-wastewater-forecasting-technical-memorandum-middle-chattahoochee/download.

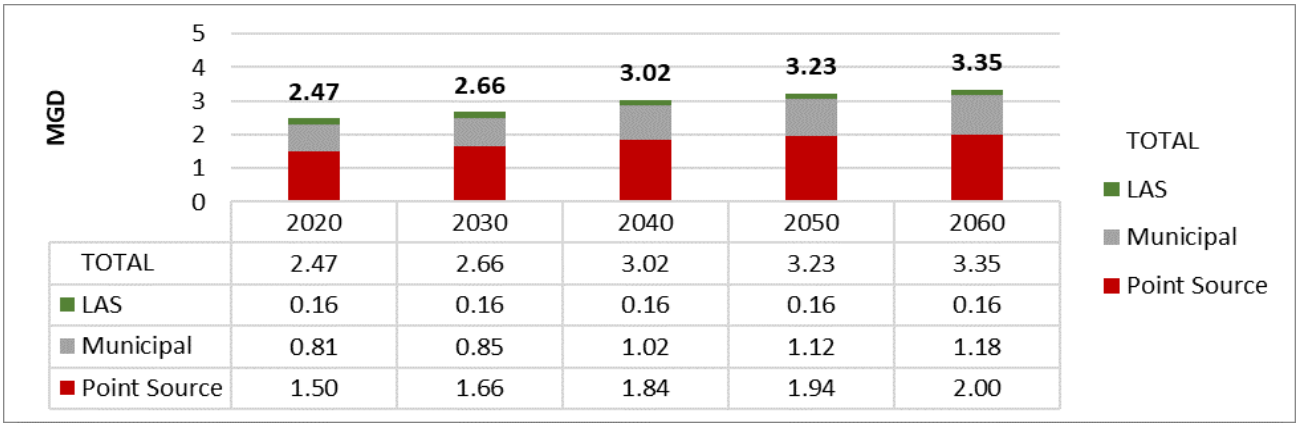
4.2.2 Industrial Wastewater Forecasts

Industrial wastewater forecasts were calculated based on facility wastewater permits reported discharge from 2015–2019. For some industrial facilities, water discharges may include stormwater runoff as well as the discharge of wastewater. Thus, permitted discharges may be a greater volume than permitted withdrawals, and reported discharges may vary with weather conditions from year to year. Information provided by industrial stakeholder groups was used to project future increases within a region or industry. The forecasting technical memorandum on the Regional Water Planning website includes detailed information about the industrial wastewater forecasts.

[4] More information regarding Industrial Forecasts can be found on the Regional Water Planning website at: https://waterplanning.georgia.gov/forecasting/industrial-water-use

Industrial wastewater demands were forecasted to increase from 2.47 mgd in 2020 to 3.35 mgd 2060 for the Middle Chattahoochee Water Planning Region. Of this amount, industrial wastewater treated by a municipality accounts for 0.81 mgd in 2020 and 1.18 mgd in 2060.

Figure 4-3: Total Industrial Wastewater Demand Forecast (AAD-MGD)



	2020	2030	2040	2050	2060
TOTAL	2.47	2.66	3.02	3.23	3.35
LAS	0.16	0.16	0.16	0.16	0.16
Municipal	0.81	0.85	1.02	1.12	1.18
Point Source	1.50	1.66	1.84	1.94	2.00

Source: Black and Veatch., 2017, Middle Chattahoochee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum, 8 p., https://waterplanning.georgia.gov/document/publication/water-and-wastewater-forecasting-technical-memorandum-middle-chattahoochee /download.

4.3 Agricultural Water Demand Forecasts

Agricultural water demands were prepared by the Georgia Water Planning & Policy Center at Albany State University (GWPPC), with support from the University of Georgia's College of Agricultural and Environmental Sciences. GWPPC was contracted by GAEPD to prepare estimates of water use by the agricultural sector in Georgia. The projections cover irrigation for row and orchard crops as well as most vegetable and specialty crops accounting for more than 95 percent of Georgia's irrigated land. Additionally, estimates of current use were made for animal agriculture, horticultural nurseries and greenhouses.

Agricultural water demands were estimated using two methods:

(1) Current water use levels were estimated based on data collected from the Agricultural Water Metering Program administered by GAEPD. Estimates of current agricultural demand were calculated from metered observation data collected from the 2010 to 2019 growing seasons. Annual and monthly estimates were calculated and provided to Council members during the plan review and revision process.

(2) Estimates of current and forecasted use were made for the period 2020 to 2060 based on updated irrigated acreage, modeled crop water needs (informed by metering data), and economic models of future crop coverage. Agricultural irrigation water demand was projected for groundwater and surface water sources for the decades between 2020 and 2060. Each year's projection included five climatic scenarios ranging from very wet to very dry to simulate a range of weather conditions. Irrigated areas for each crop were projected from the baseline of year 2020 acres using economic models. Water withdrawal quantities were computed as the product of the projected irrigated area for a

crop (acres), the predicted monthly irrigation application depth (inches), and the proportion of irrigation water derived from a source (fraction). For planning purposes, dry year water use values (75th percentile) for each water planning region were used since they represent a more conservative scenario than the normal (50th percentile) value. Table 4-3 summarizes agricultural water demand.

Table 4-3: Total* Agricultural Water Demand Forecast *(AAD-MGD)

Source	2020	2030	2040	2050	2060
Groundwater	22.74	23.47	24.68	36.02	27.60
Surface Water	21.37	21.78	22.51	13.33	24.15
Total	**44.11**	**45.25**	**47.19**	**49.35**	**51.75**

In summary, the agricultural water use forecasts project that dry year agricultural water use in the Middle Chattahoochee Water Planning Region will increase by 17% from 2020 to 2060.

4.4 Thermoelectric Power Production Water Demand Forecasts

Water demands forecasts in this section estimate water requirements for thermoelectric power generation. Water requirements for hydropower generation are not included in the energy sector water demand forecast as these facilities are designed to pass water through and do not entail consumptive use of water. Use of the Chattahoochee River by thermoelectric power producers is significant.

The forecasts for this sector address both water withdrawal requirements and water consumption. Information related to water withdrawals is an important consideration in planning for the water needed for energy production. Water consumption is important to consider in assessing the net impacts of energy production on instream flows. Many power facilities that withdraw large volumes of water also return large portions of those withdrawals to the same source .

The following factors were updated for the revised forecasts for water demand for thermoelectric power: statewide energy demand; existing facilities; facilities under construction; planned and permitted new facilities; facilities recently or to be retired; and changes in generating configuration. The water withdrawal and consumptive use factors that were estimated for each generating configuration were maintained from the previous planning cycle. A full discussion of the statewide water demands forecast methodology for this sector is provided in Energy Water Demand Forecast Technical Memoranda[5].

[5] More information regarding Energy Forecasts can be found on the Regional Water Planning website at: https://waterplanning.georgia.gov/forecasting/energy-water-use

The energy sector facilities with water withdrawals in the Middle Chattahoochee Water Planning Region include Georgia Power Plant Wansley, Southern Power Plant Franklin, Oglethorpe Power Hawk, and Tenaska Georgia Generation.[6] Table 4-3 shows the forecast for water withdrawals and consumptive use for this sector in this water planning region through 2060.

Table 4-4: Energy Sector Forecast of Water Withdrawals and Consumption – Middle Chattahoochee Water Planning Region (MGD)

	2020	2030	2040	2050	2060
Withdrawal	32.1	32.1	25.2	27.9	30.6
Consumption	23.2	23.2	22.2	24.5	26.9
Source: Update of GA Energy Needs & Generating Facilities Memorandum (CDM Smith, November 2020).					
Note: The forecast is presented as withdrawal and consumption values that reflect water use estimates from the "expected growth scenario" evaluations conducted under the energy sector forecast analysis.					

4.5 Total Water Demand Forecasts

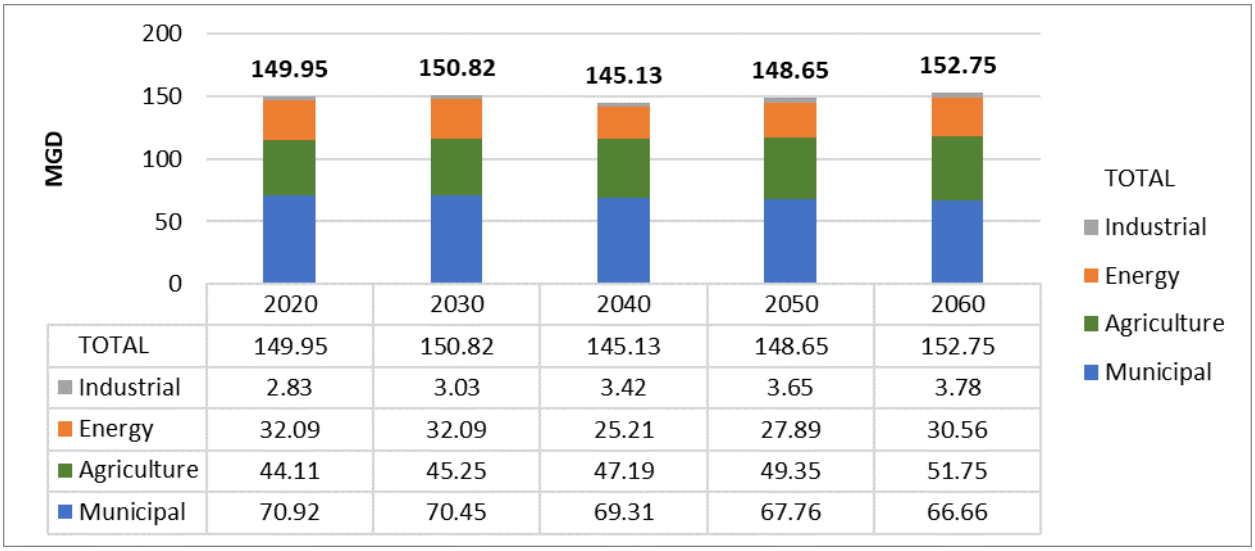
In the Middle Chattahoochee Water Planning Region, as shown in Figure 4-2, estimated total 2020 water use is 150 mgd, and the forecasts project use to increase to 153 mgd in 2060. Municipal water use makes up the largest proportion of water use in this water planning region, and this trend is expected to continue through the planning horizon. Increasing water use will result in increased wastewater generation and disposal needs. The Council notes its concern that the municipal water demand forecast relies on the population projections, the accuracy of which the Council questions in Section 4.1. As shown in Figure 4-3, estimated total 2020 wastewater flows are 80 mgd, and the forecasts project wastewater flows to decrease to 74 mgd in 2060 in the region. These values include total municipal water demand, industrial water demand, 75th percentile of agricultural demand projections, and water withdrawals for energy production (not consumption).

As the quantity of wastewater discharged to receiving waters increases, the level of treatment will also need to increase in waters that have limited assimilative capacity or water quality impairments (see Section 3). In this water planning region, when planning to meet future water and wastewater needs, consideration also needs to be given to reservoir operations in the Chattahoochee River Basin by the U.S. Army Corps of Engineers and the ability to meet the needs in the system, including future consumptive demands as presented in this section, instream uses, and Congressionally authorized purposes. The Council discusses this further in other sections of this Plan. Meeting water demands across the ACF Basin requires coordination and continued collaboration by the Middle Chattahoochee Water Planning Council with the Metropolitan North Georgia Water Planning District and the Lower Flint-Ochlockonee and Upper

[6] Southern Company's Plant Farley nuclear plant is located in near Dothan, Alabama and is not incorporated in the forecast for this water planning region. Water consumption from that facility is, however, incorporated into the surface water availability resource assessment.

Flint Water Planning Councils. Additionally, ACF water resources planning requires consideration of Alabama water demands in the Chattahoochee River Basin. Future water demands for Alabama were not available for use in this planning cycle. More coordination is needed to improve data on Alabama water demands, and the Council makes a recommendation about the need for this information in Section 6.

Figure 4-4: Total Water Demand Forecast (AAD-MGD)



	2020	2030	2040	2050	2060
TOTAL	149.95	150.82	145.13	148.65	152.75
Industrial	2.83	3.03	3.42	3.65	3.78
Energy	32.09	32.09	25.21	27.89	30.56
Agriculture	44.11	45.25	47.19	49.35	51.75
Municipal	70.92	70.45	69.31	67.76	66.66

Sources:

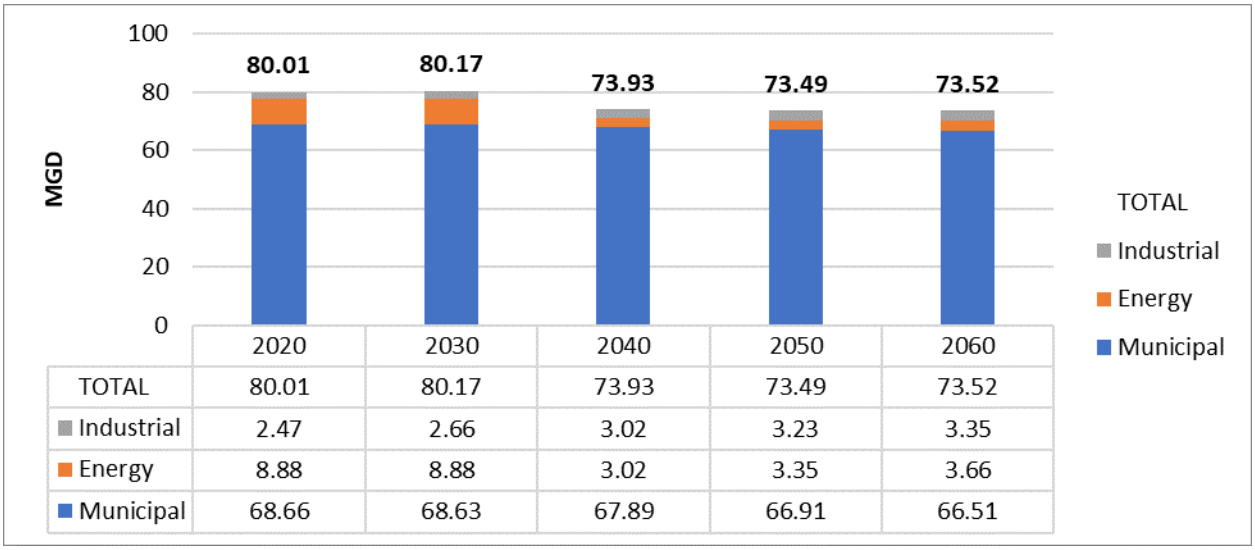
a) Municipal Forecasting Methods Report (2022)
https://waterplanning.georgia.gov/forecasting/municipal-water-use

b) Industrial Water Demand Forecast (2020)
https://waterplanning.georgia.gov/forecasting/industrial-water-use

c) Energy Sector Water Demand Forecast (2020)
https://waterplanning.georgia.gov/forecasting/energy-water-use

Notes: The totals shown above includes estimated energy withdrawals as well as dry year agricultural demands (75th percentile demands). Values represent forecasted annual average demand (AAD) in million gallons per day (MGD)

Figure 4-5: Total Wastewater Forecast (AAD-MGD)



	2020	2030	2040	2050	2060
TOTAL	80.01	80.17	73.93	73.49	73.52
Industrial	2.47	2.66	3.02	3.23	3.35
Energy	8.88	8.88	3.02	3.35	3.66
Municipal	68.66	68.63	67.89	66.91	66.51

Sources:

a) Municipal Forecasting Methods Report (2022)
https://waterplanning.georgia.gov/forecasting/municipal-water-use
b) Industrial Water Demand Forecast (2020)
https://waterplanning.georgia.gov/forecasting/industrial-water-use
c) Energy Sector Water Demand Forecast (2020)
https://waterplanning.georgia.gov/forecasting/energy-water-use

Notes: The total shown above includes estimated energy discharges. Values represent forecasted annual average demand (AAD) in million gallons per day (MGD).

See Section 4.1 for a discussion of Council concerns about the population projections on which the municipal water component of Figure 4-5 is based.

SUMMARY: This section compares water resource capacities and future demands for water and wastewater treatment in the Middle Chattahoochee Water Planning Region. It discusses how the Middle Chattahoochee Water Planning Council considered potential gaps identified between needs and resource capacities.

Section 5. Comparison of Water Resource Capacities and Future Needs

This section discusses the results of the future surface water and groundwater resource assessments, which modeled how the forecasts of future water and wastewater needs in the Middle Chattahoochee Water Planning Region (Section 4) compare with the capacities of the region's water resources. The results of the surface water availability, groundwater availability, and surface water quality resource assessments under future conditions are summarized in this section. The current conditions are described in Section 3.3. The model results provided the Middle Chattahoochee Water Planning Council with an evaluation of potential challenges in water or wastewater needs and resource capacities. They supported the Council in selecting appropriate management practices (Section 6) that will help the region to meet its future water needs, protect water resources, and meet the Council's vision and goals for this water planning region.

Where potential challenges were identified by the resource assessment models, the Council considered the potential adverse impacts – environmental, and economic, and other impacts – of the potential challenges. Management practice selection to address potential challenges was guided by the Council's interpretation of the model results in the context of regional conditions, as well as by the Council's vision and goals for the region (see Section 1.3).

5.1 Future Surface Water Availability Assessment

The surface water availability resource assessment models the response of surface water bodies to meeting current and forecasted consumptive water demands. The current conditions results were described in Section 3.3.1 along with the approach and metrics evaluated by the BEAM model. This section covers the future conditions assessed by the BEAM model using two scenarios for evaluation. In this planning cycle, the following future scenarios were evaluated:

- Forecast (ag constant): 2060 water and wastewater needs with agricultural water demands held constant at baseline levels (average use for 2010-2018)
- Forecast (ag growth): 2060 water and wastewater needs with agricultural water demands set to 2060 forecast levels

The first scenario holds agricultural water demands at baseline levels as a result of uncertainty over future agricultural water demands in the region. Currently, agricultural water use from surface water sources and from the Floridan Aquifer in Subarea 4 of the Dougherty Plain is subject to a permit moratorium. The moratorium currently limits increases in agricultural water

demands in the region. While the moratorium may not continue for the full forecast period and does not affect all sources of water use in the region, it could dampen the projected increases forecasted for agricultural water demands. These two scenarios provide the Council with results that bookend the range of potential change in forecasted agricultural use in the region from no increase to the full forecasted increase. The agricultural growth scenario is based on the forecasts which do not account for the current moratorium.

The assessment model evaluates surface water availability over the same model period used with the current conditions scenarios: 1939-2018. Therefore, all of the scenarios were subjected the same climatic conditions. The results for the current and future scenarios for the water facilities include specific results for the scenarios under the climatic conditions of the 2007-2008 and 2011-2012 droughts.

The future surface water availability results are presented for the same river basins (Apalachicola-Chattahoochee-Flint Basins and Alabama-Coosa-Tallapoosa Basins) and the same metrics (see Table 3-2) assessed for current conditions (discussed in Section 3.3.1).

The evaluation of water availability for water and wastewater facilities in the ACF Basin indicates challenges at three water facilities (municipal) and eight wastewater facilities (municipal and industrial). Table 3-3 in Section 3.3.1 summarizes these results. All of these challenges were observed in the assessment results in the current and future scenarios.

Table 5-1 describes the future conditions assessment results for the three facilities where water supply challenges in the region were observed. The results for the future scenarios were similar to those for the current scenarios, especially in terms of percentage of days during the modeled period where water supply challenges were identified (see Table 3-4).

Table 5-1: Water Supply Challenges Indicated in Assessment Results for ACF Part of Middle Chattahoochee Region

Facility	Metric		Scenario	
			Forecast (ag constant)	Forecast (ag growth)
Heard County Water Authority (permit 074-1220-02)	% Time		25.2%	25.2%
	Shortage *million gallons*	Model Period	7,325	7,325
		2007-08 Drought	252	252
		2011-12 Drought	262	262
Heard County Water Authority (permit 074-1220-03)	% Time		3.5%	3.5%
	Shortage *million gallons*	Model Period	557	557
		2007-08 Drought	44	44
		2011-12 Drought	48	48

Facility	Metric		Scenario	
			Forecast (ag constant)	Forecast (ag growth)
PVA Water Association, Inc.	% Time		1.8%	1.8
	Shortage *million gallons*	Model Period	216	216
		2007-08 Drought	4	4
		2011-12 Drought	7	7
**% Time is calculated as a proportion of the full model period (1939-2018). Shortage is total volume for full model period or for the drought period indicated. Each drought period includes the full two years listed.*				

Table 5-2 summarizes the results for the eight facilities in the ACF Basin where flows fell below the 7Q10 flow at some time(s) during the 80-year model period. Most of these low flow periods would not be considered to result in substantial wastewater assimilation challenges, as the percent of time that the instream flow fell below the 7Q10 value is less than 10%. At Lumpkin Water Pollution Control Plant, the percent of time exceeds 10% and indicates a wastewater assimilation challenge. The future scenario results indicated similar results to that observed for 2020 conditions (see Table 3-5). The level of similarity is especially close for the Baseline 2020 and Future Ag Constant scenarios. The similarity of results for these two scenarios is not surprising, given that agricultural water demand is the same in both scenarios (average demands for 2010-2018). While the Future Ag Constant scenario includes non-agricultural demands, these uses are small relative to agricultural demands in this region.

In some cases, the Future Ag Constant scenario shows improved results over the Baseline scenario. These results are location specific but can result when upstream consumptive use decreases. Because some municipal systems in the region source water from groundwater and return treated wastewater to surface water, increases in water use by these systems can result in net decreases in total consumptive use of surface water.

Table 5-2: Wastewater Assimilation Challenges Indicated in Assessment Results for ACF Part of Middle Chattahoochee Region

Facility	% Time Flow Below 7Q10*		Required Flow (7Q10) *cfs*
	Forecast (ag constant) Scenario	Forecast (ag growth) Scenario	
Hogansville	3.4%	3.2%	0.98
Pine Mountain	0.2%	0.2%	0.1
Callaway Gardens Resort, Inc. WPCP	2.5%	2.5%	0.09

Facility	% Time Flow Below 7Q10*		Required Flow (7Q10) *cfs*
	Forecast (ag constant) Scenario	Forecast (ag growth) Scenario	
Koch Foods of Pine Mountain Valley	0.4%	0.4%	0.33
Hamilton WPCP	1.7%	1.7%	0.96
Lumpkin WPCP	9.9%	9.9%	6.31
Richland WPCP	0.0%	0.0%	0.08
Cuthbert WPCP	0.1%	0.1%	0.68
**% Time is calculated as a proportion of the full model period (1939-2018).* *WPCP: Water Pollution Control Plant* *[Shortage volumes removed from this table per input from GAEPD.]*			

Table 5-3 summarizes the results of the assessment for lake elevations at West Point. The future scenario results indicated similar results to that observed for 2020 conditions (see Table 3-6). The Ag Growth scenario resulted in a greater percentage of time below the impact level and access level metrics than the Ag Constant scenario. In general, the Baseline Drought scenario had the most severe results for all the metrics assessed of the two baseline and two future scenarios evaluated by the model. The Baseline scenario had the greatest percentage of time above the top of the conservation pool in the model.

Table 5-3: West Point Lake Level Assessment Results

West Point Recreation Impacts Summary	Scenario	Metric			
		Above top of conservation pool†	Below initial impact level: 632.5 ft	Below recreation impact level: 628 ft	Below water access level: 627 ft
% Time	Forecast (ag constant)	5.0%	24.4%	1.4%	0.7%
	Forecast (ag growth)	5.0%	25.0%	1.6%	1.0%
**% Time is calculated as a proportion of the full model period (1939-2018).* †*Top of the conservation pool varies by month from a level of 628 to 635 feet.*					

Table 5-4 summarizes the results of the assessment for streamflow at the Columbus node to better understand the occurrence and severity of low flows. The results indicate that low flow periods occur similarly between the Ag Growth scenario and the Ag Constant scenario. The table also includes results for an alternate population scenario, described below. Streamflow results for the baseline scenarios are presented in Table 3-7 of Section 3.3.1. In general, the Baseline Drought scenario had the least severe results by a small margin for all the metrics assessed of the two baseline and two future scenarios evaluated by the model. The Baseline Drought scenario applied water demand conditions from the 2011 drought year throughout the model period. Agricultural water demands in the baseline scenario are approximately 90th percentile demands and account for most of the water use in the scenario. In the Future Ag Growth scenario, agricultural water demands are assumed to be 75th percentile demands, which reflects use in a dry year but not a severe drought, such as that observed in 2011.

Additionally, the Council recommended that an alternative scenario be analyzed for Columbus, based on a higher population growth projected for Harris and Muscogee Counties. The Council was concerned that these population projections were too low and did not reflect current trends in the region. The Council requested that GAEPD model surface water availability using an alternate population projection, based on analysis from Columbus State University and input from Council members from Columbus Water Works and Harris County. Table 5-5 shows the original and the alternate population projections. For 2060, the alternate population projection show an increase of almost 116,000 over the original projection for 2060. GAEPD ran BEAM using the alternate population projections for the Future (ag constant) scenario, and the results are displayed in Table 5-4. The results indicate that despite the significant change in population, the impacts to instream flows are not substantial.

Table 5-4: Surface Water Availability Streamflow Results: Chattahoochee River at Columbus

Columbus Flow Summary	Scenario	Metric	
		Daily Flow ≥ 1,350 cfs	7-Day Average Flow ≥ 1,850 cfs
% Time Above Streamflow Metric	Forecast (ag constant)	92.2%	97.7%
	Forecast (ag growth)	92.2%	97.9%
	Alternate Forecast (ag growth & alternate population scenario)	92.0%	97.5%
*% Time is calculated as a proportion of the full model period (1939-2018).			

Table 5-5: Population Projections: Harris and Muscogee Counties

County	Year	Population Projection	Alternate Population Scenario
Harris	2020	34,712	34,668
	2060	44,818	54,907
Muscogee	2020	191,626	206,922
	2060	141,670	247,548

The surface water availability assessment evaluated the capacity of the ACF to meet water demand and wastewater assimilation needs in the region, as well as flows at Columbus and West Point Lake levels. However, the Council acknowledges and emphasizes that potential adverse impacts to some other water uses may exist due to the inability of the basin operating plan to meet instream uses. These impacts are discussed in Section 3.3.1. The Council makes recommendations regarding its preferred flows, based on FERC license requirements, and lake levels in the Middle Chattahoochee Basin in Management Practice IU-1 (Section 6) and Table 6-2. The Council will discuss developing additional metrics for the BEAM surface water availability assessment for future planning cycles to expand assessment of other water uses.

To address the small portion of the Middle Chattahoochee Water Planning Region located in the Tallapoosa River Basins, the future surface water availability assessment results are presented below for the ACT Basin in Table 5-7 through 5-8. For the six facilities with wastewater assimilation challenges, none are identified as substantial challenges. The current conditions for the ACT were discussed in Section 3.3.1 in Tables 3-8 through 3-10. Only the Future Ag Growth scenario was modeled under the ACT resource assessment. The model did not include the Ag Constant scenario because the ACT portion of the region is not subject to a permit moratorium.

Table 5-6: Water Supply Challenges Indicated in Assessment Results for ACT Part of Middle Chattahoochee Region

Facility	Metric		Scenario
			Ag Growth
City of Bremen (permit 071-1301-02)	% Time		0.2%
	Shortage *million gallons*	Model Period	7
		2007-08 Drought	5
		2011-12 Drought	1
Haralson County Water Authority (permit 071-1301-01)	% Time		3%
	Shortage *million gallons*	Model Period	2,361
		2007-08 Drought	643
		2011-12 Drought	532
**% Time is calculated as a proportion of the full model period (1939-2018). Shortage is total volume for full model period.*			

Table 5-7: Wastewater Assimilation Challenges Indicated in Assessment Results for ACT Part of Middle Chattahoochee Region

Facility	% Time Flow Below 7Q10* Ag Growth Scenario	Required Flow (7Q10) *cfs*
City of Bremen	1%	0.31
City of Buchanan	2.2%	0.11
City of Tallapoosa	1.8%	17.88
City of Villa Rica	0.44%	0.13
City of Bremen	0.42%	0.19
City of Bowdon	0.1%	0.03

**% Time is calculated as a proportion of the full model period (1939-2018).*
[Shortage volumes removed from this table per input from GAPED.]

5.2 Future Groundwater Availability Assessment

This section compares ***2060 forecasted demand,*** presented in Section 4**,** with the estimated sustainable yield range for the assessed aquifers. Section 3.3.2 discusses estimated sustainable yields and ***current use*** for assessed aquifers, which included the Claiborne, Cretaceous, and Crystalline Aquifers.

Results from the 2060 forecasts of aquifer demand for the three assessed aquifers are summarized in Tables 5-9 to 5-11. The results from the assessment for the Claiborne Aquifer include additional county-level forecasts (Table 5-10). This section concludes with a discussion of the results for the Crystalline Rock Aquifer (Table 5-11). More detail on the methods and results of the groundwater availability resource assessment can be found in the Synopsis Report: Groundwater Availability Assessment (GAEPD, 2010) and Synopsis Report – Groundwater Availability Assessment Updates (GAEPD, 2017), both of which are available on the state water planning website.[1]

Future Groundwater Availability Results

Claiborne Aquifer Results: The resource assessment estimated the sustainable yield range for the Claiborne Aquifer to be 141-803 mgd. The current and forecasted use are below the estimated sustainable yield range for this aquifer (see Table 5-9 and Table 3-5).

As a part of the Claiborne Aquifer assessment in this planning cycle, county level estimates of sustainable yield were developed. Table 5-10 lists estimates of demand and the high end of the sustainable yield range for the Claiborne Aquifer for counties in the Middle Chattahoochee region. For comparison, Table 3-11 provides the 2020 withdrawal estimates at the county level for this aquifer.

Table 5-8: Claiborne Aquifer – Forecasted 2060 Water Demand

Estimated Sustainable Yield Range	Forecasted 2060 Demand	
	Middle Chattahoochee Region	Aquifer-Wide Demand
141 to 803 mgd	5 mgd	94 mgd

Table 5-9: Claiborne Aquifer – High End of Sustainable Yield for the Counties in the Middle Chattahoochee Region

County	Forecasted 2060 Demand *mgd*	High End Sustainable Yield *mgd*
Clay	0.5	28.8
Quitman	0	4.2

[1] https://waterplanning.georgia.gov/resource-assessments/ground-water-availability

County	Forecasted 2060 Demand *mgd*	High End Sustainable Yield *mgd*
Randolph	5.8	87.4
Stewart	0	11.4

Cretaceous Aquifer Results:

The assessment did not include forecasted demand estimates from the Cretaceous aquifer.

Crystalline Rock Aquifer Results:

Forecasted results for the Crystalline Rock aquifer (2.91 mgd) indicate little difference from the 2020 current use estimate (3.05) presented in Section 3. It is important to recognize that more information is needed to develop additional withdrawals in this aquifer. As noted in Section 3, water availability in this aquifer is location dependent and requires finding a water-bearing fracture that can yield the desired amount of water for extended periods.

Table 5-10: Crystalline Rock Aquifer – Forecasted 2060 Demand

Estimated Sustainable Yield Range	Middle Chattahoochee Region
1.6 to 7.9 mgd	2.91 mgd

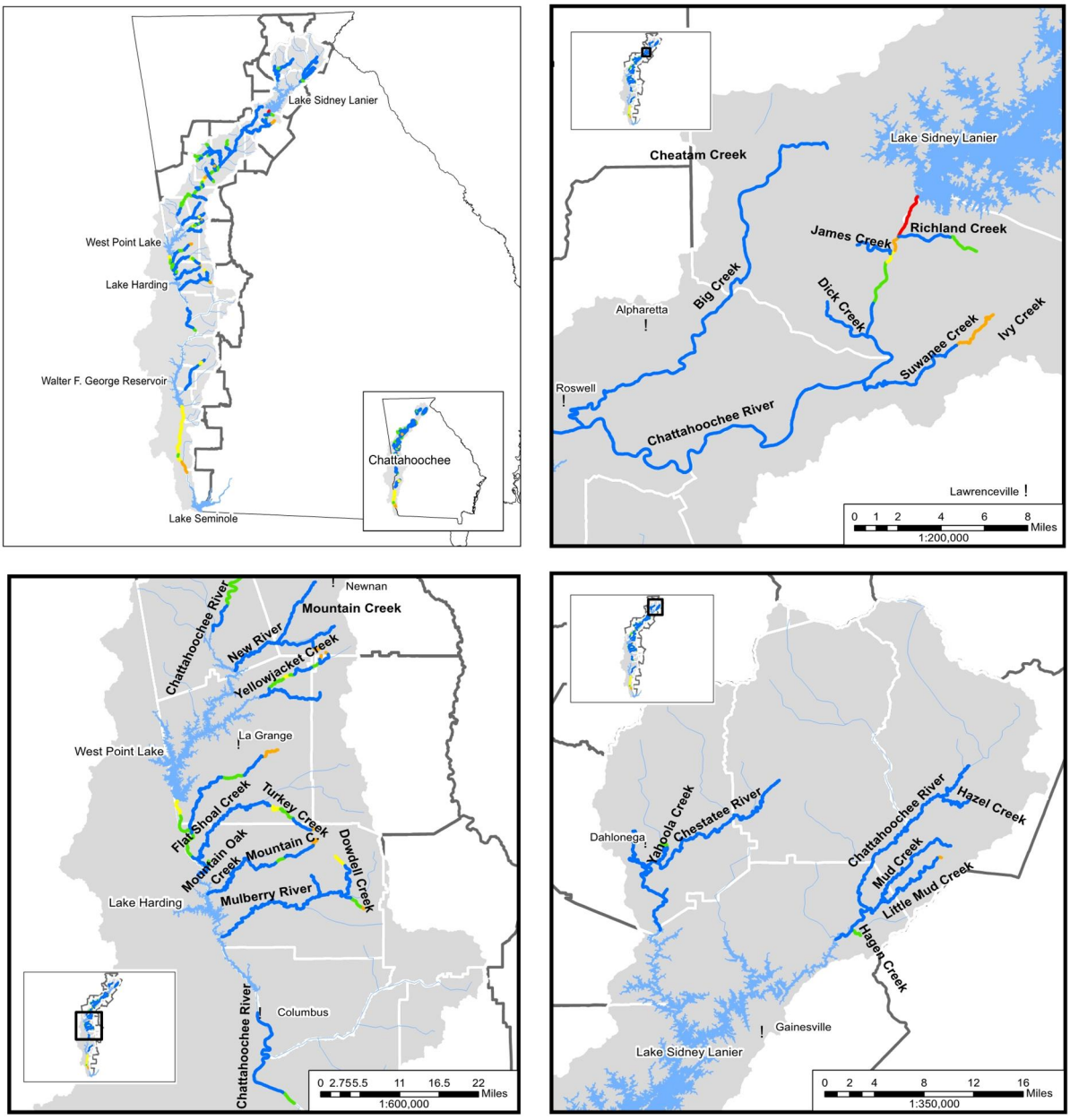
5.3 Surface Water Quality Comparisons

Results of dissolved oxygen modeling under current conditions are discussed in Section 3.3.3. EPD also conducted surface water quality modeling using wastewater flows projected for 2060. Assimilative capacity evaluates how DO levels compare to water quality standard of 5.0 mg/L (or natural conditions). In order to address areas with limited capacity to assimilate oxygen-demanding wastewater, EPD incorporated assumptions regarding 2060 permitted flows and modifications to permit effluent limits in future conditions modeling. Because EPD cannot issue permits that would violate water quality standards, EPD will continue to evaluate and modify future permit requests, including adjusting permit limits, to avoid potential dissolved oxygen violations and provide capacity to additional discharges. The dissolved oxygen results under the updated future conditions for this plan update utilized conservative approach used to model results, including minimum instream flows and warm water temperatures. The future conditions improve on many of the stretches of stream as permitting becomes more stringent on wastewater NPDES permits.

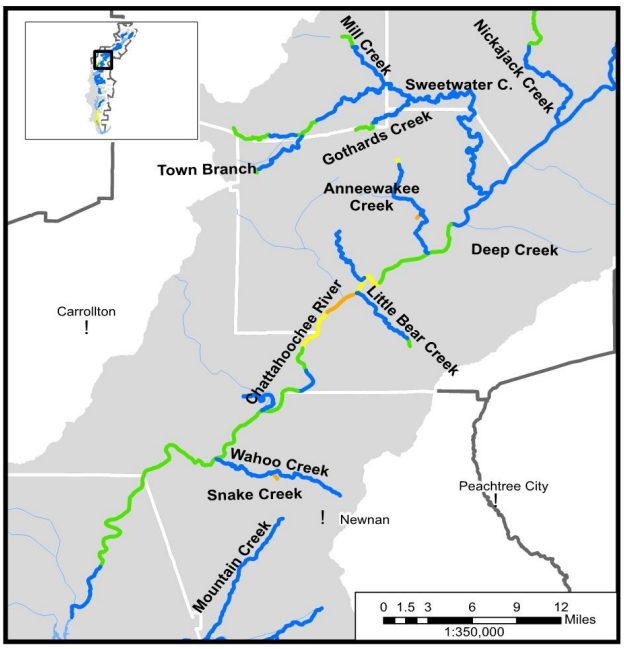
Figures 5-1 and 5-2 show assimilative capacity at assumed 2060 permitted flows and effluent limits for the Flint, Chattahoochee, and Tallapoosa River Basins. More information regarding assumptions made under future conditions modeling will be provided in updated resource assessment information which will be accessible on the state water planning website at https://waterplanning.georgia.gov/resource-assessments. The Chattahoochee River dow

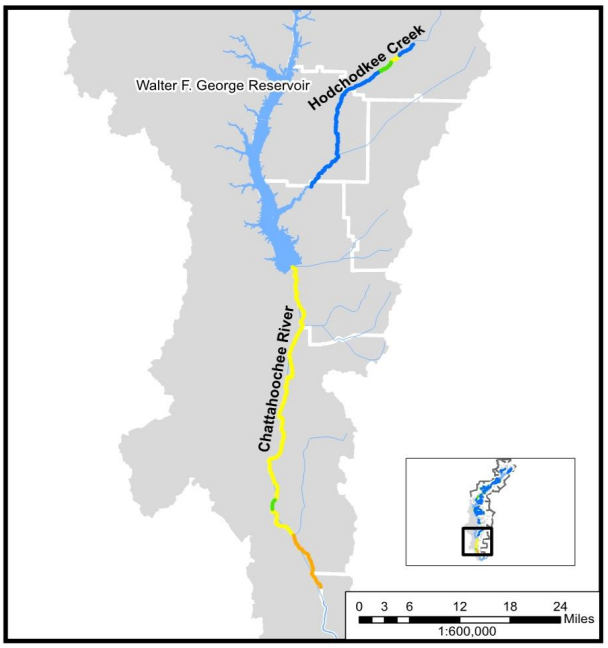
nstream of Walter F. George is projected to have limited assimilative capacity in the future similar to the existing conditions as noted in Section 3, and this supports the Council's recommendation in management practice IU-2 in Section 6.

Figure 5-1: Assimilative Capacity Results from Dissolved Oxygen Assessment: Chattahoochee River Basin (2060) – cont. on next page

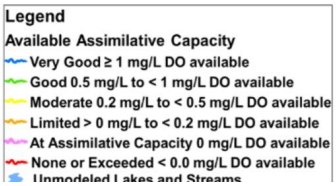


Source: EPD, Synopsis Report – Surface Water Quality (Assimilative Capacity) Resource Assessment, July 2022.



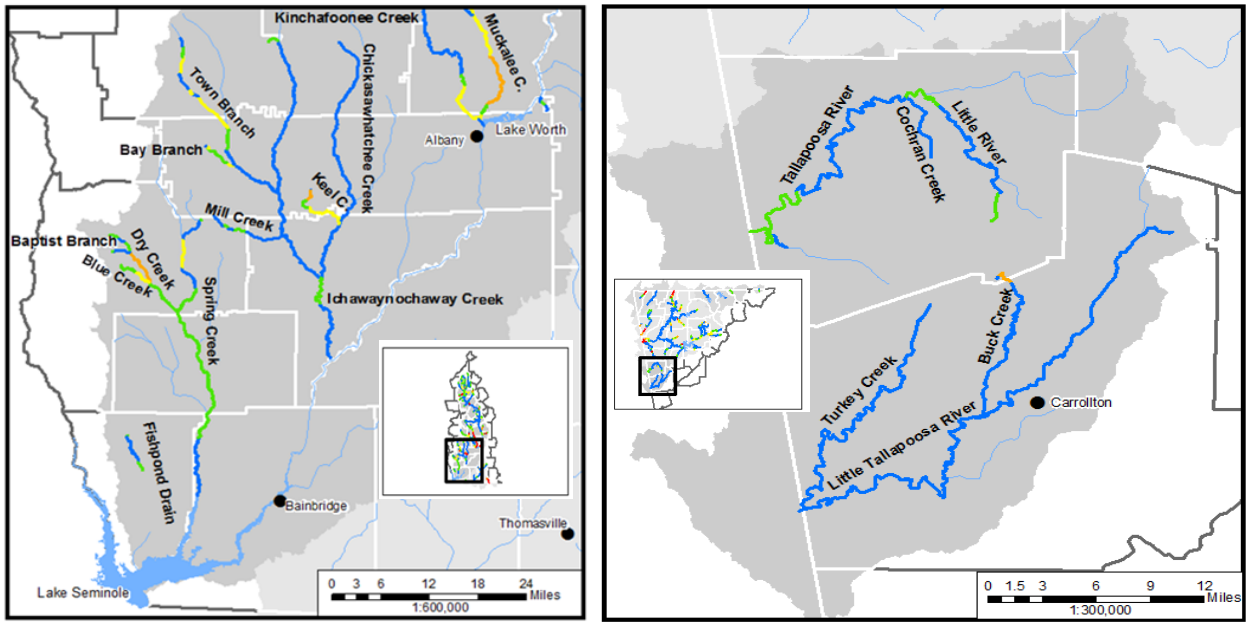


	Chattahoochee Basin-Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
2060	498	86	55	23	0	2



Source: EPD, Synopsis Report – Surface Water Quality (Assimilative Capacity) Resource Assessment, May July 2022.

Figure 5-2: Assimilative Capacity Results from Dissolved Oxygen Assessment: Flint and Tallapoosa River Basins (2050)



	Flint Basin - Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
2050	595.73	262.83	107.93	33.4	0.00	0.00
	Tallapoosa Basin - Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
2050	115.67	14.1	0.00	1.28	0.00	0.00

Legend

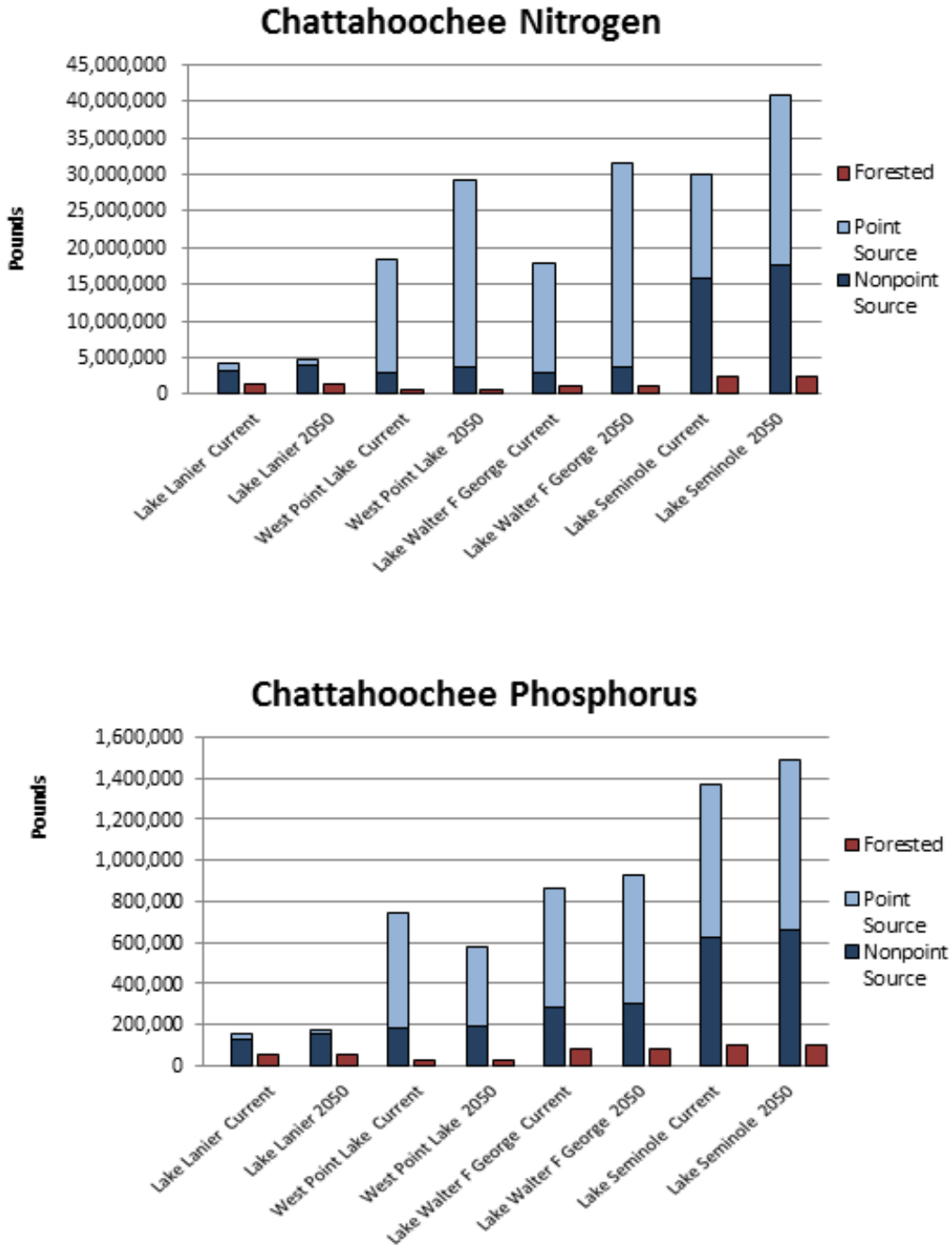
Available Assimilative Capacity

- Very Good ≥ 1 mg/L DO available
- Good 0.5 mg/L to < 1 mg/L DO available
- Moderate 0.2 mg/L to < 0.5 mg/L DO available
- Limited > 0 mg/L to < 0.2 mg/L DO available
- At Assimilative Capacity 0 mg/L DO available
- None or Exceeded < 0.0 mg/L DO available
- Unmodeled Lakes and Streams

Source: EPD, Synopsis Report – Surface Water Quality (Assimilative Capacity) Resource Assessment, May 2017.

Watershed and lake models were developed at future (2050) conditions. Watershed and lake modeling indicate that future increases in nutrient loads to the Lake Lanier watershed, Chattahoochee River Basin, and Flint River Basin are primarily due to projected increases in point source discharges and secondarily due to changes in land use and nonpoint runoff. The modeled trends for nutrient loads over the planning horizon for the Chattahoochee River Basin are illustrated in Figure 5-3. Modeled chlorophyll-*a* levels were compared with existing chlorophyll-*a* standards for the major reservoirs along the Chattahoochee and Flint Rivers. The following is a summary of the model results:

Figure 5-3: Modeled Nutrient Loading Trends from the Surface Water Quality Resource Assessment: Chattahoochee River Basin

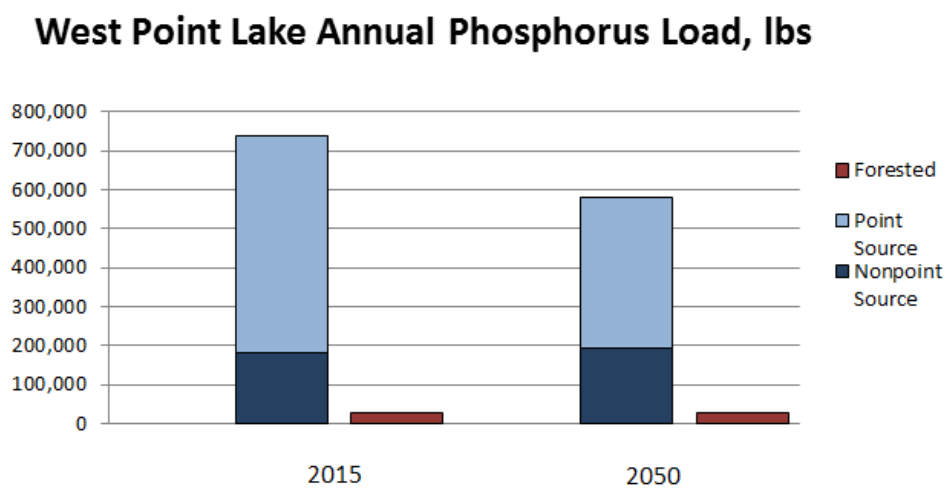


Source: EPD, Surface Water Quality Resource Assessment, May 2017.

- Lake Lanier Modeling Results –
  - Chlorophyll-*a* standards are exceeded now and are projected to be exceeded in the future at specific locations
  - Exceedances are due to combination of point and nonpoint sources
  - Total phosphorus loading to the lake is expected to primarily be from nonpoint sources (~86%)
  - Reductions in total phosphorus loadings are currently being evaluated as part of a draft TMDL for chlorophyll-*a* under consideration for Lake Lanier
- West Point Lake Results –
  - Chlorophyll-*a* standards are projected to be met under future conditions
  - Increases in total nitrogen are projected in 2050, which would cause exceedances in the total nitrogen criteria
  - Future total phosphorus loading is projected to decrease due to point source controls (see Figure 5-4)
- Walter F. George Results –
  - Chlorophyll-*a* exceedances are projected under current and future conditions
  - Future projected increases in nutrient loadings will be primarily point source related
- Lake Seminole Results –
  - No water quality standards are yet established
  - Total phosphorus loading to the lake is primarily from point sources
  - Future projected increases in nutrient loadings will be primarily nonpoint source related
- Lake Blackshear Results –
  - No water quality standards yet established
  - Total phosphorus loading into the lake is primarily from point sources

As noted in Section 3, Walter F. George water quality data shows that water quality conditions do not currently meet standards, and the modeled findings for future conditions projects similar concerns. TMDL development to address this condition and resulting changes in water quality and the water quality assessment will be reviewed by the Council in future regional water plan updates.

Figure 5-4: West Point Lake Annual Phosphorus Load



Source: EPD, Surface Water Quality Resource Assessment, May 2017.

SUMMARY: This section presents the management practices recommended by the Middle Chattahoochee Water Planning Council to address potential water resource management challenges identified by an evaluation of resource needs and capacities, to address Council-defined concerns, and to fulfill the Council's vision and goals.

Section 6. Addressing Water Needs and Regional Goals

6.1 Identifying Water Management Practices

The resource assessments presented in Sections 3 and 5, along with the forecasts presented in Section 4, were designed to help the regional water planning councils identify areas where management practices might be needed to (1) ensure that the region's resources can sustainably meet long-term demands for water supply and wastewater discharge and (2) plan for the fulfillment of the Council's vision and goals. The assessments used different types of metrics to indicate the potential for unacceptable impacts. These metrics measure conditions related to water withdrawal and wastewater discharge, as well as other uses and values that the Council has selected as metrics to address; thus, they do not address all possible impacts to water resources. Each assessment was also intentionally designed to provide a conservative analysis to support long-term planning.

The Middle Chattahoochee Water Planning Council made use of the resource assessment results to guide its selection of management practices for this Regional Water Plan. The Council also selected management practices to address Council identified concerns not identified in the resource assessment results. For the Middle Chattahoochee Water Planning Council, these concerns are focused on instream uses and management of existing storage in the Chattahoochee River Basin. The Council also was guided by its vision and goals in selecting management practices. The Council sought to support coordination with implementing actors, such as local governments, water and wastewater providers, and state agencies, as well as neighboring water planning councils and the Metropolitan North Georgia Water Planning District, which plan for the management of water resources shared with the Middle Chattahoochee water planning region.

The Middle Chattahoochee Water Planning Council identified several uncertainties that could impact implementation of this Regional Water Plan, including:

- Implementation of the recently adopted U.S. Army Corps of Engineers Water Control Manual for the Apalachicola-Chattahoochee-Flint Basin
- Implementation of numeric nutrient criteria for Florida's lakes and flowing waters and any resulting requirements for Georgia permittees
- Information needs to address water quality data gaps for water bodies in this water planning region

- Information needs regarding impacts of potential water resource management challenges identified by the resource assessments
- Information needs regarding baseline best management practice (BMP) implementation in the region
- Forecasts of demands for Alabama water use

Despite these uncertainties, the Council proceeded with review and revision of the Regional Water Plan based on the best information currently available. The Council recognizes that, per the State Water Plan, the Regional Water Plan will be reviewed and revised every five years. The review and revision cycle allows the Council to adapt the Regional Water Plan to any resolution or increased knowledge of the uncertainties identified.

6.2 Selected Water Management Practices for the Middle Chattahoochee Water Planning Region

The management practices selected by the Middle Chattahoochee Water Planning Council are summarized in Table 6-1. The table is categorized by the type of practices:

- Water Quantity includes Demand Management (WC), Returns Management (WW), and Supply Management (WS) practices
- Instream Use (IU) practices
- Water Quality (WQ) includes Enhanced Pollution Management Practices and Enhanced Water Quality Standards and Monitoring

The Council selected the water quantity and water quality management practices to apply to the whole Middle Chattahoochee Water Planning Region. Although the region's boundaries cross multiple surface water and groundwater resources, the Council believes that the management practices will be beneficial to all water resources in the region and beyond. Furthermore, within this water planning region, issues across different water resources are similar enough that the selected management practices are appropriate to be applied across the whole water planning region. A discussion of the management practices follows Table 6-1.

Table 6-1 includes details addressing implementation including responsible parties and implementation timeframes. Short-term practices are those which will be implemented or encouraged over the five-year timeframe leading up to the next update of this Plan. Long-term management practices vary in duration and scope and will require further study and development to define time requirements.

Table 6-1: Water Management Practices Selected for the Middle Chattahoochee Water Planning Region

WATER MANAGEMENT PRACTICES		
Water Quantity		
Issues Addressed	Demand Management Practices	
Council Goals Addressed	1, 2, 3	
WC-1: Support implementation of water conservation activities		
State laws and regulations require water conservation practices that address various water uses in this region including: municipal water supply, industrial water use, landscape irrigation, and car washes. Building code requirements address high efficiency plumbing fixtures, high efficiency cooling towers, and submetering for multi-unit residential buildings and some industrial facilities. Water loss audit requirements for public water systems are also required. Compliance with these requirements is important to responsible management of water availability in the region. Beyond these requirements, the Council supports and encourages the adoption of voluntary water conservation measures with a focus on consumptive use auditing, including: • Water loss auditing by water systems that serve less than 3,300 individuals, per the IWA/AWWA Water Audit Method standards required for larger systems (as noted above) • Installation of submeters on existing non-submetered multifamily complexes and multi-unit commercial and industrial complexes, as encouraged by the Water Stewardship Act of 2010 (SB 370)		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Continue compliance with and implementation and enforcement of regulations (on-going) Implement voluntary water conservation measures (on-going)		GAEPD Surface water and groundwater withdrawal permittees
WC-2: Encourage all water providers to consider conservation-oriented rate structures		
Encourage residential customers to conserve water by providing an economic incentive through the rate structure (e.g., increasing block pricing) while maintaining revenue requirements. May include, but not limited to the following: • Change rate structures to conservation rate structures • Perform a rate and revenue analysis • Ensure adequate billing system functionality • Review and update pricing		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Perform a rate and revenue analysis Adopt and maintain conservation rate structures Ensure billing system functionality	Review and update rate structure periodically	Municipal surface water and groundwater withdrawal permittees
WC-3: Encourage all water providers to implement education and outreach programs		
Raise awareness about the value of local water resources, the need to conserve, and the importance of water returns to the source; empower individuals and businesses to make informed decisions about their water using		

WATER MANAGEMENT PRACTICES		
behavior and the fixtures and appliances they employ.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Evaluate existing local efforts and state-wide programs to engage the public in water conservation Develop or continue a local public education program. Identify and perform education, outreach, and public participation activities	Evaluate and modify program activities as needed	Municipal surface water and groundwater withdrawal permittees
Issues Addressed	Return Management Practices	
Council Goals Addressed	2, 3	
Potential Challenges Addressed	Surface Water Availability	
WW-1: Encourage use of point source discharges for wastewater treatment effluent disposal for major facilities		
Reduce the time in which water is returned to surface water courses in the future and reduce regional consumptive demands; exceptions may apply for systems that demonstrate that use of new or expanded land application systems is necessary due to economic and/or hydrologic reasons. Major facilities are those permitted to discharge more than one million gallons per day.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Preference for return flows via discharge as opposed to land application should be considered in new and expanding permits for wastewater treatment facilities (on-going) Evaluate the applicability of planning new or expanded point discharge facilities based upon costs, impacts to consumptive water use and impacts to modeled surface water availability challenges Account for infrastructure requirements in local planning efforts, secure funding for and execute facility design and technical specifications		Municipal and industrial wastewater system permittees GAEPD
Issues Addressed	Supply Management Practices	
Council Goals Addressed	1, 2, 3	
Potential Challenges Addressed	Surface water and groundwater availability	
WS-1: Study the development of new and/or enhancement of existing surface water storage reservoirs		
• Determine the feasibility for additional storage to relieve potential water resource management challenges identified by the resource assessments. Identify implementation challenges and environmental concerns. • Evaluate storage needs for water utilities to meet forecasted water demands and resolve water resource management challenges identified by the resource assessment models. Expand resource assessment modeling to include worst case scenarios and evaluate findings relative to potential storage needs. Confirm findings with the utilities. • Encourage local utilities to determine the safe yield of their water storage capacity. • Identify opportunities and potential locations to increase volume of storage and minimize evaporative loss.		

WATER MANAGEMENT PRACTICES		
• Investigate funding sources for new surface water reservoirs.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Identify funding source and initiate study (pending availability of funding) Report to Council and policymakers	Begin public outreach efforts for potential sites (pending availability of funding)	Council Neighboring water planning councils University researchers Consulting firms
WS-2: Implement new and/or enhance existing surface water storage as necessary		
• Pursue projects to enhance regional supply to meet future demands and protect instream flows, including projects in the ACF (see WS-1) and Tallapoosa Basin (e.g., Indian Creek Reservoir). • Determine how to increase conservation storage capacity in existing reservoirs through practices such as dredging accumulated sediment (e.g., West Point Lake) and implement those practices. The EIS for the updated ACF Water Control Manual indicated a loss of conservation storage in West Point Reservoir due to sediment accumulation. • Improve sedimentation and erosion control measures to reduce sediment input to reservoirs (see Water Quality Management Practices).		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Identify funding source and initiate implementation Develop impact studies, design memorandum, drawings, and technical specifications and initiate permitting process	Complete permitting process and begin construction and filling phase	Municipal water systems State agencies
WS-3: Encourage interconnection of regional supply systems and other water supply redundancy improvements to improve the reliability of the region's water supplies		
Provide supply reliability for regional systems in times of drought or emergency conditions. The Georgia Water Supply Redundancy Study, completed by Wood for the Georgia Environmental Facilities Authority in 2022, identified and prioritized projects to develop redundant supplies for utilities to support availability and resilience of water supplies, in response to emergencies or other water supply limitations. The study identified potential deficits in this region (current/future) in multiple locations and identified eight projects to address those deficits and enhance resilience. These projects include new interconnections, upgrades to existing interconnections, and a new parallel raw water transmission main. These projects can enhance the reliability of the region's water supplies. Water utilities in the region should review this report and evaluate improvements to address supply redundancy.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Encourage farm pond development Continue to evaluate impacts of farm ponds and incorporation of farm ponds in the surface water availability assessment	Continued implementation (adjusted for assessment findings)	GAEPD University researchers Agricultural irrigators GSWCC Soil and Water Conservation Districts
WS-4: Prepare drought contingency plans that comply with state rules for drought management		

WATER MANAGEMENT PRACTICES		
Water systems with permitted water withdrawals (> 100,000 gallons per day) require the preparation of drought contingency plans (Ga. Comp. R. & Regs R. 391-3-2-.04(11) and 391-3-6-.07(4)). These plans support water systems in preparing for the inevitability of periodic drought by outlining key metrics defining drought condition triggers, system operating procedures and metrics, water use restrictions, water supply alternatives, and emergency protocol for water supply. These plans should be consistent with the state rules for drought management (Ga. Comp. R. & Regs R. 391-3-30). Water providers that are not subject to these requirements (i.e., withdrawals less than 100,000 gallons per day) should adopt similar drought contingency plans that are aligned with the state rules for drought management.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Identify opportunities with neighboring utilities to enhance regional supply reliability via interconnection Begin negotiating terms of agreement regarding system interconnection financing, operation, and water quality considerations	Secure engineering and construction services for infrastructure requirements	Municipal surface water and groundwater withdrawal permittees
Instream Use		
Issues Addressed	Instream Use Management Practices	
Council Goals Addressed	1, 2, 3	
IU-1: Utilize and improve upon reservoir release quantity and timing in the Chattahoochee River to maintain and/or improve water quality in the Chattahoochee River below the Columbus Planning Node		
Protect water quality in the Chattahoochee River in the Middle Chattahoochee Water Planning Region. Advocate for the U.S. Army Corps of Engineers operate such that: 1) the specific minimum flow levels stated in the Federal Energy Regulatory Commission license (800 cfs instantaneous; 1350 cfs daily average; 1850 cfs weekly average) are met at a frequency of 95% or higher at the USGS gauge at Columbus, and 2) any periods where flows are below these levels are managed to avoid possible downstream water quality impacts, including the stretch of river below Walter F. George Reservoir in which the water quality modeling shows assimilative capacity challenges (see Figure 5.2). The Council recognizes that there may be tradeoffs in operations that support the system in meeting some targets while adversely affecting its capacity to meet others. The Council offers targets for flows and lake levels in Table 6-2 as its preferences and does not support implementation that leads to an outcome that is less desirable than historical conditions at any of these locations in the Basin. See also: Recommendation #1 in Section 6.3.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Advocate for changes in Chattahoochee reservoir operations (see Council's preferred flows and lake levels in Table 6-2) Modify Chattahoochee reservoir operations to be consistent with FERC license requirements	Assess operations and modify as needed to meet the needs of all purposes in the Chattahoochee River	Council GAEPD USACE Regional stakeholders
IU-2: Assess the potential to modify Chattahoochee River operations to protect instream uses and increase		

WATER MANAGEMENT PRACTICES		
system conservation storage		
Evaluate the following as possible changes in U.S. Army Corps of Engineers management in the Chattahoochee River Basin (See also: Recommendation #1 in Section 6.3): • Revise the rule curve for West Point Lake winter drawdown operations to improve water resource benefits while also maintaining flood protection. A GAEPD study demonstrated the use of probability-based forecasts to reduce peak releases without compromising flood mitigation operations. Cooperative efforts between the state and the U.S. Army Corps of Engineers should be funded and implemented to fully evaluate and support adoption of the proposed rule curve modifications. • Increase the rule curve at Lake Lanier by two feet to increase storage capacity in the system. • Model Chattahoochee River operations under extreme conditions to evaluate system resilience (i.e., 2009 flood data; 1920's extreme drought data). • Evaluate the stretch of river downstream of Walter F. George Reservoir to verify periods and river locations of low dissolved oxygen, probable causes, and recommendations to enhance assimilative capacity.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Secure funding for studies of changes in rule curves for West Point Lake and Lake Lanier (see Council's preferred flows and lake levels in Table 6-2) Conduct studies	Change rule curves per results of studies	GAEPD USACE U.S. Fish and Wildlife Service Regional stakeholders
IU-3: Promote cooperation among recreational interests, Georgia Power, and the US Army Corps of Engineers to consider improvements to timing of flow releases to address recreational uses in the Chattahoochee River.		
The Chattahoochee Whitewater Park in Columbus is a two-mile stretch that offers the longest urban whitewater course in the world. This recreational resource is an important driver of waterfront development. The course attracts tourism, hosts international competitions, and enhances quality of life for the region. Recreational opportunities on the course are dependent on river flow levels, which are directly tied to upstream dam releases by Georgia Power and the US Army Corps of Engineers. The timing of releases is important to recreational opportunities, and coordination of dam operators and recreational stakeholders is important to maintaining this important in-stream use of the river.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Advocate for changes in Chattahoochee reservoir operations (see Council's preferred flows and lake levels in Table 6-2)	Assess operations and modify as needed to meet the needs of recreational purposes in the Chattahoochee River	Georgia Power USACE Regional Stakeholders
Water Quality		
Issues Addressed	Enhanced Pollution Management Practices	
Council Goals Addressed	1, 2	
WQ-1: Encourage increased/additional funding and attention on erosion and sediment control		
Small local governments lacking financial and/or personnel resources are unable to properly enforce the required erosion and sediment control practices for land disturbing activities; increased enforcement, if properly funded, could lead to enhanced water quality		

WATER MANAGEMENT PRACTICES		
Governments have the ability to become Local Issuing Authorities (LIA) to review plans and enforce erosion and sediment control; however, small local governments lack the fiscal and personnel resources to be an LIA.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Identify funding sources for local implementation of erosion and sedimentation control programs		GSWCC GAEPD Local governments
WQ-2: Improve funding for monitoring, enforcement, and use of stream buffers		
• The Council promotes compliance with the existing requirements for stream buffers in local watershed protection plans for water supply watersheds (Ga. Comp. R. & Regs R. 391-3-16.01) and in local planning documents. The Council encourages the additional incentivization of improved compliance such as added fines, cost-share, or rewards. • For forestry, the Council encourages the continued funding and implementation of complaint response system and BMP survey programs by the Georgia Forestry Commission • For agriculture, row crop farmers are currently exempt from state stream buffer regulations. Encourage agricultural landowners to participate in the Natural Resources Conservation Program (NRCS) Conservation Stewardship Program and to complete farm conservation plans, which may include on-farm nutrient management. • The Council encourages development of a partnership among the Georgia Department of Agriculture, Georgia Soil and Water Conservation Commission, and GAEPD to develop section 319(h) funded surveys similar to those conducted by the Georgia Forestry Commission to assess BMP implementation. The Council encourages the reduction in the recipient match requirement in the 319(h) grants. • Additional 319(h) grant funding is needed to improve TMDL monitoring programs (particularly near animal husbandry operations) • The Council encourages the increase of fines for stream buffers encroachment and cost-share alternatives to encroachment, such as mitigation credits used in stream and wetland mitigation.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Identify specific locations and responsible parties who may be eligible for grant monies to implement stream buffer protection Prepare and submit grant applications Prepare and implement monitoring and oversight plans for stream buffer protection requirements	Implement stream buffer protection and enhancement plans	Local government planning authorities State agencies
WQ-3: Require adoption of the Georgia Stormwater Management Manual by local ordinances for implementation throughout the Middle Chattahoochee Water Planning Region		
Cities and counties in the Middle Chattahoochee Water Planning Region should adopt and/or adapt the policy and engineering guidelines established in the Georgia Stormwater Management Manual to improve water quality by reducing nonpoint source pollution.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Identify changes to local ordinances needed to adopt the manual and implement administrative procedures related to changing those ordinances	Perform periodic review of the program implementation and performance	Local governments

WATER MANAGEMENT PRACTICES		
Adopt and/or adapt the policy and engineering guidelines established in the manual in local ordinances		
WQ-4: Create a conservation land program to increase stream buffers in perpetuity		
Qualified cities and counties, state agencies, and/or non-profit organizations may take advantage of competitive grants, low-interest loans, and/or tax incentives offered through the Georgia Land Conservation Program (GLCP). Individual land owners may also donate a land easement on their property and receive state and federal tax breaks. At the local level, the Council encourages enhanced use of the GLCP as well as consideration of Special Purpose Local Option Sales Tax (SPLOST) or bond measure with green space and stream buffer conservation as a focus. Local communities should support private landowner conservation easements, particularly for forested buffer strip areas, through local property tax abatement.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Identify funding mechanisms such as the GLCP or local SPLOST for green space preservation Identify stream buffers and land areas with the potential for conservation and which would contribute to improved water quality	Develop programs for maintaining preservation easements and stream buffers through activities including debris clearing and tree plantings	Local governments
Issues Addressed	Enhanced Water Quality Standards and Monitoring	
Council Goals Addressed	1, 2	
Potential Challenges Addressed	Water quality violations	
WQ-5: Improve water quality monitoring to provide the data for water quality improvements in the future (increased number of collection sites, increased monitoring frequency and parameters sampled)		
• Each municipality with a treated wastewater discharge is required to perform a watershed assessment and implementation plan. Each of the plans includes water quality monitoring. Municipalities should work together with GAEPD to develop monitoring networks that would complement the monitoring efforts of the GAEPD and others. New monitoring requirements by wastewater treatment plants are being implemented in this water planning region, including total nitrogen, PFAS, and other parameters. The collected data will support the development of nutrient management strategies. • Encourage GAEPD and partnering state and federal agencies to secure funding for and implement increased monitoring of streams and lakes in this water planning region to develop enhanced background data. A clearly defined baseline will better inform GAEPD and the Council on progress in water quality protection. The Council requests updated water quality data for incorporation into future Plan updates. • Maintain updated land-use data to support nonpoint source analysis in the water quality resource assessment.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Develop plan for increased monitoring Request funding for increased monitoring; implement monitoring plan; incorporate monitoring results into plan revision process	Continue monitoring (on-going)	GAEPD Wastewater discharge permittees
WQ-6: Increase implementation, improve documentation, and increase fines of best management practices		

WATER MANAGEMENT PRACTICES		
throughout the Middle Chattahoochee Water Planning Region for all industries		
Define current levels of implementation and encourage increased implementation of best management practices for major industries and sectors throughout the region: • Forestry: The Council encourages increased section 319(h) grant funding through GAEPD to the Georgia Forestry Commission for the continued implementation of complaint response system, BMP monitoring, and educational programs. The Council encourages increasing the funding for the Georgia Forestry Commission for monitoring, compliance, BMP implementation, and educational programs. Better Back Roads: The Council encourages continued section 319(h) grant funding through GAEPD to Georgia Resource Conservation Development Councils for implementation of County Dirt Road BMP educational and demonstration programs. Consider partnering with the Association County Commissioners of Georgia (ACCG) to raise county government awareness of this program to support more effective implementation. • Agriculture: The Council encourages continued section 319(h) grant funding through GAEPD to the Georgia Soil and Water Conservation Commission for the continued implementation of complaint response system, BMP monitoring, and educational programs. Encourage agricultural landowners to participate in the NRCS Conservation Stewardship Program and to complete farm conservation plans, which may include on-farm nutrient management, as well as other water quality management BMPs. • Land Development: The Council recognizes that an established system is in place that incorporates numerous agencies and regulations and includes daily inspections of projects. The Soil and Water Conservation Commission is a leading regulator on Erosion & Sediment plans for various projects. The Georgia Erosion and Sedimentation Control Act is mandated throughout the process. • Heavy industry/ manufacturing/ light industry: The Council encourages continued monitoring, permitting, and compliance through GAEPD and in this industry sector.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Continue to survey BMP implementation in the forestry sector Conduct surveys of BMP implementation in other sectors (agriculture, land development, back roads)	Continued documentation of best management practice implementation Research BMP effectiveness	GFC Other state agencies Farmers Foresters Local governments University researchers GAEPD
WQ-7: Implement protective nutrient criteria for all areas		
• The Council encourages GAEPD to set protective standards for nutrient pollution from both point and nonpoint sources of pollution based upon local contributions throughout this water planning region. Develop appropriate strategies to address the Florida nutrient standards. • The Middle Chattahoochee Water Planning Region should not be penalized for upstream nutrient loadings. The State should consider revision of the Lake Walter F. George water quality criteria and chlorophyll-a standard with recognition of the impact of background loads of nutrients at West Point Lake, standards for other reservoirs, and designated uses. • Raise awareness of pending nutrient management limits and strategies in the region among point and nonpoint sources to support the development and implementation of effective nutrient management strategies. • New requirements for total nitrogen monitoring by wastewater treatment plants are being implemented in the region. The collected data will support the development of nutrient management strategies.		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
Develop nutrient management strategies to address new nutrient criteria (for point	Modify nutrient strategies based on water quality monitoring data and resource	GAEPD Wastewater discharge

WATER MANAGEMENT PRACTICES		
and nonpoint sources) Evaluate nutrient criteria for Lake Walter F. George with consideration of background loads at West Point Lake Raise awareness of pending nutrient standards among point and nonpoint sources Comply with new requirements for Total Nitrogen monitoring (wastewater dischargers)	assessments	permittees Farmers Foresters Local governments
WQ-8: Implementation of monitoring of *E. Coli* to monitor stream quality		
• Raise awareness of new *E. Coli* limits; Fecal Coliform limits were previously used as the bacterial indicator. • Encourage seed grant or other research projects to delineate current water quality conditions in watersheds		
Short-Term Actions	**Long-Term Actions**	**Responsible Parties**
GAEPD will implement new bacterial limit requirement monitoring and limits in revised permits	Potential delisting of impaired streams based on new *E. Coli* data instead of existing Fecal Coliform data	GAEPD Permitted dischargers Watershed monitoring groups
Note: Management practices designated as **HIGH PRIORITY** were identified by the Middle Chattahoochee Water Planning Council as those practices which best address identified water resource management challenges and the Council's regional vision and goals. These high priority practices should take precedence in future implementation.		

The selected management practices were adopted by the Middle Chattahoochee Water Planning Council because they address potential water resource management challenges identified through evaluation of the resource assessment models and concerns identified by the Council regarding protection for instream uses. The management practices were also selected to fulfill the Council's vision and goals for this water planning region (see Section 1).

While the surface water availability resource assessment indicated only a few potential water resource management challenges in the region for specific locations and permittees, the Council views projected instream flows and lake levels as a Council-identified concern in the ability of the system to provide for all uses of the system (hydropower, flood control, water supply, water quality, recreation, and fish and wildlife habitat). The selected management practices are intended to address these Council-identified concerns, as well as potential challenges identified by the resource assessment models.

The Middle Chattahoochee Water Planning Council's preferred flows and lake levels for the Chattahoochee River are listed in Table 6-2. These flows and levels are addressed in the Council's management practices (Table 6-1: IU-1 and IU-2) and recommendations (Section 6.3: Recommendation 1).

Table 6-2: Middle Chattahoochee Water Planning Council Preferred Flows and Lake Levels in Middle Chattahoochee River Basin

Preferred Flows	
Columbus	Meet the following at a frequency of 95% of higher: • 800 cfs instantaneous • 1350 cfs daily average • 1850 cfs weekly average In any periods where flows are below these levels, manage to avoid possible downstream water quality impacts. (See Management Practice IU-1 in Section 6 and Recommendation 1 in Section 6.3.)
Preferred Lake Levels	
West Point	632.5 – 635 feet (normal) 635 – 641 feet (induced flood storage) The Council recommends evaluation of a revision in winter pool rule curve to a lake level of 632.5 feet, with consideration to flood control and water quality impacts. (See Management Practice IU-2 in Section 6 and Recommendation 1 in Section 6.3.)
Walter F George	187.5 – 190 feet (normal) 185 feet (minimum)
Seminole	76.5 – 77.5 feet
Lanier	The Council recommends evaluation of an increase in the rule curve at Lake Lanier by two feet, with consideration to flood control and water quality impacts. (See Management Practice IU-2 in Section 6 and Recommendation 1 in Section 6.3.)

6.2.1 Water Quantity Management Practices

Water quantity management practices include demand management practices selected by the Middle Chattahoochee Water Planning Council to address conservation goals and potential water resource management challenges related to water availability and help mitigate anticipated increased use of existing reservoir storage. Water conservation practices and wastewater returns are a primary focus of the management practices related to water quantity. The Council views consumptive use management as key to sustainability for our region's surface waters. Water savings will be realized through continued water conservation practices.

The forecasts for water use in the region incorporate projections of savings from one water conservation practice: replacing old toilet fixtures with higher efficiency units. These replacements are required by standards enacted under the National Energy Policy Act of 1992 and the Georgia Water Stewardship Act (2010). It is estimated that this practice will result in a reduction in water use through 2050 of five million gallons per day. The realization of these savings will be reflected in regional per capita water use rates over time. The Council considers the continued monitoring of the per capita water use rate as a key indicator of the effectiveness of water conservation measures.

For other types of conservation measures, the absence of baseline implementation data limits the ability to generate meaningful projections for potential water savings. A recent field survey by the Georgia Water Planning and Policy Center estimated the baseline level of the adoption of irrigation efficiency equipment on farms in the Lower Flint River Basin, and so that information is available for the small part of the Middle Chattahoochee Region in that basin. A consistent and sound method for collecting and analyzing data for existing conservation practices is needed to produce meaningful estimates of water savings as well as cost-benefit analyses. Future tracking of conservation measures for water savings would be beneficial; however, local governments and municipal authorities usually lack the resources to develop and implement such tracking programs. Statewide initiatives, direction, and future guidance could help overcome these challenges. Continued dialogue among all major water using sectors (agriculture, energy, industrial, and municipal) is also needed to develop and obtain this type of baseline.

Water supply management practices have also been considered for quantitative analysis to determine their effectiveness in addressing potential water availability challenges identified by the resource assessments. The Middle Chattahoochee Water Planning Council has been engaged in continued dialogue with the Upper Flint and Lower Flint-Ochlockonee Water Planning Councils regarding shared water resources in the Apalachicola-Chattahoochee-Flint River system. The Council would like to further evaluate the relationship between Flint and Chattahoochee flows relative to flow requirements below Woodruff Dam.

The resource assessments are designed to help the regional water planning councils identify areas where management practices might be needed to ensure that regional resources can meet long-term needs. The assessments are designed to be highly conservative in identifying potential impacts rather than observed impacts. The Council recognizes both the value and the limitations of the resource assessment model and relies on them as one input for guidance in planning.

Further data collection and/or analysis needs have also been identified for several water supply management practices, and these information needs are detailed in the management practices and in the Recommendations to the State (Section 6.3).

Management practices including interconnection of regional supply systems and drought contingency planning can aid in the more efficient and reliable use of water resources in the region. These tools do not lend themselves to explicit quantification in terms of their ability to mitigate resource availability concerns. They do, however, add to the portfolio of management practices that will make progress toward addressing identified challenges and fulfilling the Council's vision and goals.

6.2.2 Instream Use Management Practices

The instream use management practices are targeted primarily to engage regional stakeholders, GAEPD, and USACE to further consider Council-defined concerns and support all uses of the system (hydropower, flood control, water supply, water quality, recreation, and fish and wildlife habitat). These identified concerns and the management practices herein form the basis for several of the Middle Chattahoochee Water Planning Council's Recommendations to the State presented in Section 6.3. Of particular concern to the Council is the USACE's management of the lake level at West Point Reservoir, which has detrimental impacts on recreational usage (see Table 6-2). Furthermore, as recommended in Management Practice IU-1, the Council advocates that the USACE operate to meet the specific minimum flows stated in the Federal Energy Regulatory Commission license at a very high frequency and to avoid possible downstream water quality impacts. These minimum flows were included in the USACE EIS modeling, Georgia's "Georgia Contemplation" model, and the ACF Stakeholders "Sustainable Water Management Plan" modeling, all of which indicated that the FERC minimum flows could be met at a very high frequency (95%). The instream use management practices also address the need for coordinating the timing of flows in the Chattahoochee to ensure support for important recreational uses of the river (see Management Practice IU-3).

6.2.3 Water Quality Management Practices

Water quality is an extremely important consideration to stakeholders in the Middle Chattahoochee Water Planning Region and in meeting the vision and goals defined by the Council. The Council advocates for identifying and securing adequate funding sources to continue and expand existing nonpoint source management programs. The Council does not however, condone nor advocate future legislation to address regional or statewide water quality issues that are unfunded or otherwise place economic burdens on local governments or utilities to directly fund such initiatives. Even with the work that has been done in the state and the region, significant data, information, and funding needs to provide for future refinement of management practices and improved regional water quality remain, including:

- Continued collection of water quality data for water bodies in this water planning region to refine and recalibrate current water quality resource assessment models, continued monitoring and oversight of Clean Water Act 303(d) listed stream segments, and improved presentation and access of existing and future water quality data from multiple

state and federal agencies to regional stakeholders and the general public, such as Georgia Environmental Monitoring and Assessment System (GOMAS)[1].

- Additional information on the implementation of best management practices for agriculture, county dirt roads,[2] and major industry in the Middle Chattahoochee Water Planning Region to establish a baseline of practices already in place and their effectiveness in protecting water quality.

The 319(h) grant funded programs and oversight already in place for water quality protection in this water planning region and the State by the Georgia Forestry Commission (GFC) in cooperation with GAEPD could be considered a model by other agencies and water using sectors. Benchmark BMP guidelines are in place for forestry regarding Streamside Management Zones, Forest Roads, Stream Crossings, Timber Harvesting, Site Preparation, Reforestation, Special Management Areas and all other forestry related practices.[3] The GFC monitors BMP implementation by conducting a biennial statewide survey in accordance with the Southern Group of State Foresters protocol. Forestry operations of all types are randomly selected and evaluated for appropriate BMP implementation. For the 2021 BMP Implementation Survey, the GFC evaluated 260 sites totaling 50,421 acres statewide. Forestry BMPs were properly implemented at a rate of 92.6%. In the Middle Chattahoochee Water Planning Region, 16 sites were evaluated and a 91.3% implementation rate was observed. GFCs forestry BMP monitoring is documented and provided to the forestry community as an update on current BMP compliance.

The GFC also investigates forest water quality complaints and works with landowners, timber buyers, and loggers to correct any issues of non-compliance with forestry BMPs. In 2021, the GFC investigated 26 complaint cases and initially identified a total of 18 water quality risks. As a result of GFC's involvement and the cooperation from the involved parties, 100% of the water quality risks were eliminated and the final overall average implementation rating was 94.3%, a 12.4% increase. In cases where the GFC cannot get satisfactory compliance, the case is turned over to GAEPD for enforcement. The results of forestry BMP monitoring be GFC are documented and provided to the forest industry as an update on current BMP compliance. Accomplishments of the GFC Forest Water Quality Program are reported to GAEPD quarterly.

The Middle Chattahoochee Water Planning Council recognizes the interconnection between water quality and water quantity management, particularly with respect to treated wastewater returns. The quantity and location of future wastewater discharges will need to be re-evaluated in the future as better water quality data and modeling scenarios become more well-defined. The volumes and locations of these discharges have important implications for instream flows. Dischargers will also be affected by pending regulations pertaining to the establishment of more

[1] Georgia Environmental Monitoring and Assessment System (GOMAS) https://gomaspublic.gaepd.org/

[2] The Georgia Better Back Roads Field Manual includes BMPs currently established but, not yet widely adopted or utilized. Poor county dirt road maintenance combined with deficient county road budgets is a primary source of sediment loading in the region. http://www.tworiversrcd.org/index.php/redshop/ga-better-back-roads.

[3] The Georgia Forestry Commission BMPs are defined and implemented per the published "Georgia's Best Management Practices for Forestry" manual, which is available on-line: https://gatrees.org/wp-content/uploads/2020/02/BMP-Manual-2019-Web.pdf

stringent protective levels for nutrients and other constituents in the waters within this water planning region and the State. Furthermore, where existing TMDL limits are reached, enhanced treatment will be required.

6.3 Recommendations to the State

The Middle Chattahoochee Water Planning Council has identified the following recommendations to the State. The Council intends these actions to begin following approval of this revised Regional Water Plan.

1. Improve the Updated ACF Water Control Manual and Operating Procedures

The Council advocates that the three states in the ACF basin work with the USACE to improve the updated ACF Water Control Manual through:

- Increased protection for water quality in the Chattahoochee River in the Middle Chattahoochee region. Operations in the river by the U.S. Army Corps of Engineers should acknowledge and operate consistently with Federal Energy Regulatory Commission license requirements and permit conditions in the ACF Basin. (See Management Practice IU-1 and Table 6-2).
- Evaluation of revisions in the rule curve for winter drawdown for West Point Lake and the storage capacity for Lake Lanier, as described in Management Practice IU-2 and Table 6-2. Cooperative efforts between the State and the U.S. Army Corps of Engineers should be funded and implemented to fully evaluate and support adoption of the proposed rule curve modifications.
- Modeling of Chattahoochee River operations under extreme conditions to evaluate system resilience, as described in Management Practice IU-2.
- Adoption of the performance measures and operations set used in the Georgia Contemplation, submitted by the State of Georgia to the U.S. Army Corps of Engineers in 2013. The performance measures and operations used in this model reflect many of the interests of the Middle Chattahoochee Water Planning Council in providing for instream uses and demonstrate improvements in instream flows and lake levels to support all uses of the system.
- Evaluation of the recommendations of the ACF Stakeholders Sustainable Water Management Plan https://www.acfstakeholders.org/sustainable-water-management-plan for Chattahoochee operations.
- Evaluation of alternative structural hydraulic measures such as temporary weirs, gates, and/or steps to control river stage and sediment transport and scour at or below Woodruff Dam to protect critical habitat during lower river flows.
- Commitment by the USACE and the three states in the ACF Basin to coordinated and continued improvement of the Unimpaired Flows dataset for the system.

The Middle Chattahoochee Water Planning Council recognizes that specific operating targets should be based on detailed modeling and analysis. However, the Council advocates for improvements to increase available storage in the reservoirs, provide more rapid refill after drought periods, maintain higher lake levels especially on West Point Lake, and provide flow guidelines at the Columbus and Columbia gauges. The Council urges the states in the ACF to work with the USACE to evaluate these recommended improvements.

2. Improve Alabama and Energy Water Use Forecasting

The Middle Chattahoochee Water Planning Region shares several water resources with Alabama. While some information on Alabama water demand estimates are available to support planning for shared resources, although the information is limited, especially with respect to forecasts. Cooperative efforts between Georgia and Alabama are needed to support improvements in planning by both states for shared water resources. Data is needed to support planning with current and future demand estimates that are based on common planning horizons and forecasting assumptions.

GAEPD develops energy water use forecasts for regional water planning, but the forecasts do not identify geographically specific water needs. The Middle Chattahoochee Water Planning Council recommends additional efforts to understand future water use by the energy sector in this water planning region. Energy water use forecasting should also account for greater cooling tower efficiencies, energy conservation, future increases in power production, water quality, and other factors, as appropriate.

The Council recommends that GAEPD seek to improve these aspects of the regional water demand forecasts in future planning cycles.

3. Increase Metropolitan North Georgia Water Planning District Returns and Reduce Nutrient & Sediment Loading

As in previous planning cycles, the Middle Chattahoochee Water Planning Council has coordinated with the Metropolitan North Georgia Water Planning District during this planning cycle and appreciates the District's commitment to cooperation in planning. In May 2022, the Council submitted comments on the District's draft water resource management plan.

In its comments, the Council recognized the value and importance of coordination between the Council and the District. The comments asked the District to:

- Support the Council's recommendation for assessment of modification of the rule curves for West Point Lake and Lake Lanier to increase system storage and improve operations for all uses: This comment relates to the Council's Recommendation 1 above and Management Practices IU-1 and IU-2.
- Advocate for expanded regional water storage to improve water resource management: The Council commended the District for development of the Bellwood Quarry for water storage and asked the District for its support for downstream Councils in seeking additional regional water storage capacity in the shared ACF Basin.

- Offer awards and incentives for commendable examples of outdoor water conservation in new developments: The Council commended the District on its water conservation efforts and advocated for greater support for reducing the consumptive outdoor water use.
- Support the collection and use of better field data for nutrient modeling: The Council commended the District for its action item to increase water quality monitoring and emphasized the importance of data on actual conditions related to nutrient loading and understanding its impacts in our shared water system.
- Pursue increased returns of treated wastewater to support downstream flows and uses: The Council noted its concern over consumptive use of surface water and encouraged the District to monitor the trends of net consumptive use and advance policies to reduce consumptive use. In particular, the Council emphasized that the District should encourage policies for rural development to use centralized wastewater treatment and point source discharges.

The Council's comments reflect concerns over consumptive water use and nutrient loading from upstream water use and pollutant sources in the District. The Council advocates for the District to focus on increasing wastewater returns from the District to the ACF System.

With respect to nutrient loading, the Council is concerned about increases in chlorophyll-*a* in West Point Lake and Lake Walter F. George that may result from upstream nutrient loading and the potential for degradation of lake water quality. The Middle Chattahoochee Water Planning Region should not be burdened with increased costs of wastewater treatment and stormwater management due to increases in upstream discharges. In addition, the Council is also concerned about sediment loading from upstream land management practices.

4. Continue Research on Groundwater Development

The Middle Chattahoochee Water Planning Council recommends that GAEPD support well development to reduce reliance on direct river withdrawals in areas below the Fall Line and in aquifers that are not characterized by substantial interactions with surface water flows (e.g., Floridan Aquifer). The Council recommends such development in aquifers that may currently be under-utilized to augment municipal, industrial, and agricultural supplies as an alternative to continued dependence on major surface water sources such as the Chattahoochee River Basin.

Groundwater withdrawals will be implemented as an alternative for agricultural surface water withdrawals during drought in the Lower Flint River through grant from the Governor's Office of Planning and Budget via allocations established from the American Recovery Plan Act for infrastructure development made in 2022 to a partnership of the Georgia Water Planning and Policy Center, the Georgia Environmental Protection Division, and the Golden Triangle Resource Conservation and Development Council. The project will be implemented as a part of the GA-FIT program. The Middle Chattahoochee region includes portions of the Lower Flint River Basin, especially in Randolph County, which will be targeted in this project. The project will also monitor aquifer health and support regional planning for instream flow management and conservation of federally-listed endangered and threatened freshwater

mussels in the region through the development of a Habitat Conservation Plan (HCP). A Project Advisory Board will guide implementation, make related policy recommendations, and support regional water resource planning and management.

The Council recommends continued efforts to develop this approach as a management practice to reduce surface water reliance in the region.

5. Continue to Improve Agricultural Water Use Data

Continue to implement the agricultural water withdrawal metering program administered by GAEPD. This program has provided important data on agricultural water use to support planning and drought response. Continued implementation will require inspections, maintenance, repair, and replacement to ensure functioning meters. Additional data collection, including monthly use data and information about crops and inputs, would enhance information available to support management and planning.

6. Increase Storage in the ACF and Tallapoosa

This Regional Water Plan discusses the need to increase storage in the ACF system for both water withdrawal and instream uses and in the Tallapoosa Basin (see Management Practices WS-1 and WS-2). Several means to increase storage are discussed, including better utilization of available storage, and building more storage. The Middle Chattahoochee Water Planning Council recommends that GAEPD develop these conceptual ideas further and provide a more comprehensive plan for increasing storage in the ACF and Tallapoosa River Basins. The concept of designating environmental storage in the existing federal reservoirs should be explored for the purpose of improving the reliability of meeting consumptive use and downstream flow targets during drought conditions. The Council encourages the study and development of new storage in the Apalachicola-Chattahoochee-Flint and Tallapoosa basins to improve the reliability of drought contingency plans and alleviate the burden of operational requirements on the federal reservoirs in the Middle Chattahoochee, which have become the “work horses” of the ACF system.

The Council also notes that farm ponds can play an important role in water resource management. Farm ponds are a storage option for replacing direct pumping from surface streams or wells during the growing season. These ponds can be used to minimize impact on flow conditions during drought. Source water to supplement these ponds may be harvested during periods of high flow. However, the impacts of farm ponds on flows through intercepted drainage and evaporative loss should be considered to minimize adverse impacts on surface water availability. Better understanding of farm pond operation and impacts is needed to support more thorough evaluation of these potential impacts.

The Council also recommends further evaluation of the potential for the use of aquifer storage and recovery (ASR). An ASR system withdraws water from peak flows or from groundwater sources and stores that water in aquifers for later use for water supply or streamflow augmentation. A study of the potential for ASR development in Southwest Georgia to augment streamflows found inadequate groundwater productivity to support project implementation, but the results were site specific. Further investigation of this

practice should fully evaluate water quality and aquifer impacts and ensure that ASR implementation will not adversely impact instream flows in dry periods.

7. Evaluate Water Conservation

Water conservation is a critical element of this Regional Water Plan. Currently there are several practical limitations to measuring progress in implementation, including inconsistent terminology, lack of available data, and the need to identify practical ways of collecting data. Periodically, it will be important to assess the progress and benefit of the water conservation implementation. Recommendations throughout this Plan are intended to address the existing limitations to the degree practicable to develop a sound method of measuring regional progress. The Middle Chattahoochee Water Planning Council acknowledges and commends efforts made to assess baseline conservation implementation and recommends continued commitment to developing this information base.

8. Address Regional Assimilative Capacity Limitations and Water Quality Concerns

The Middle Chattahoochee Water Planning Council recommends the following to address potential limitations to assimilative capacity and water quality concerns:

- The State of Georgia should work with USACE and EPA to improve water quality conditions (assimilative capacity) below Walter F. George Reservoir (see Management Practices IU-1 and IU-2.)
- GAEPD should conduct more detailed assimilative capacity model verification and consider existing discharge permit revisions to ensure assimilative capacity is available in the Chattahoochee River below Walter F. George Reservoir to support economic development.
- GAEPD should collect more dissolved oxygen data directly downstream of West Point Lake to identify the need for potential enhancements to ensure water quality standards are met.
- GAEPD should reevaluate the water quality standards for Chlorophyll *a* for both West Point Lake and Walter F. George prior to development of TMDLs and resulting regulatory standard changes, considering the balance between nutrient needs for fisheries and other water quality concerns.

9. Fund Additional Resource Assessments

The Middle Chattahoochee Water Planning Council recommends that the Georgia General Assembly provide funding for on-going additional data collection and the continued refinement of water resource assessments used in the development of this Plan. The Council recommends that the State consider further improvements in its resource assessment modeling to consider:

- Modeling of Chattahoochee River operations under extreme conditions to evaluate system resilience, as described in Management Practice IU-2.

- Better assessment of the regional water balance through improved understanding of consumptive uses and related water returns. The assumption of 100% consumptive use may inadequately reflect the quantity and timeliness of water returns from agricultural irrigation, wastewater land application, and septic systems. Studies should be scaled to reflect appropriate geographic and physiographic provinces, since returns would be dependent on topography, soil, and climate differences. Studies completed to date have been inconclusive and shown conflicting results. Further study is encouraged.
- Assessment of water quality data relative to baseline best management practice (BMP) implementation data and evaluation of the effectiveness of those BMPs: Without this information, it is difficult to assign management practices to address modeled water quality challenges. These information needs could be addressed, at least in part, through: 1) surveys of BMP implementation using an approach similar to that implemented by the Georgia Forestry Commission for forestry BMPS, and 2) increased use in assessment and management of water quality data collected by wastewater and stormwater permittees to fulfill permit requirements. Additionally, research on BMP effectiveness for stormwater and agriculture is needed to evaluate which practices should be prioritized.
- The Georgia Forestry Commission's BMP complaint and survey program could be considered as a model for the agricultural sector. A similar approach could be implemented through a partnership among agricultural producers, the National Resource and Conservation Service, and the Georgia Soil and Water Conservation Commission. This type of approach would provide documentation necessary to substantiate the concerns of the agricultural community regarding nutrient, bacteria, and dissolved oxygen levels in streams. This program could also support the development of a dataset on baseline implementation of agricultural BMPs.
- Wastewater and stormwater permittees are required collect water quality monitoring data as a condition of their permits. GAEPD could work with these permittees to develop monitoring networks that would complement the monitoring efforts of the GAEPD and others if funding were made available. Encourage the utilization and development of the Georgia Environmental Monitoring and Assessment System (GOMAS).

10. Increase State Funding for Implementation of Management Practices

The Middle Chattahoochee Water Planning Council recommends that GAEPD explore all possible funding sources to offset or pay for many of the management practices and recommendations outlined in this Regional Water Plan, and especially for those Management Practices designated by the Council as High Priority. Financial incentives and reimbursement for implementation will expedite the progress needed to achieve the goals of this Plan.

11. Maintain Navigation between Columbus and Apalachicola Bay

Navigation is currently hindered on the Chattahoochee River from Columbus to Apalachicola Bay by a lack of maintenance of the locks and dams. The U.S. Army Corps of Engineers are responsible for maintaining this navigational channel and have reported to State the amount of funding needed to undertake the maintenance repair needs (see

Navigation in Section 3.2). The Council recommends that the State provides the necessary funding in order to return the facilities to service in support of navigation, to ensure the recreational and the economic sustainability of the region.

12. Coordinated Recommendations with Neighboring Councils

Since the beginning of regional water planning in Georgia in 2009, the Middle Chattahoochee Water Planning Council has ensured coordination with neighboring regional water planning councils and the Metropolitan North Georgia Water Planning District to discuss shared water resources and topics of concern. The Council has met several times with the Upper Flint and Lower Flint-Ochlockonee Water Planning Councils and developed a collaborative relationship with these councils that led to their agreement on a set of joint recommendations in 2011, with revisions jointly adopted in 2017. In this planning cycle, the three councils reviewed and revised their joint recommendations again. In 2022, the following joint recommendations were approved by all three water planning councils: Upper Flint, Lower Flint-Ochlockonee, and Middle Chattahoochee. The agreement among these councils on these recommendations indicates the importance of these recommendations to the Apalachicola-Chattahoochee-Flint System, of which all three councils are a part, and to the State as a whole.

These joint recommendations overlap with some of the Middle Chattahoochee Water Planning Council's management practices and recommendations. Where overlap does occur, the Council does not see any conflict; usually, the Council's management practices and recommendations provide more detail than the joint recommendation. In all cases, the Council's Regional Water Plan takes precedence over the joint recommendations.

The Middle Chattahoochee, Upper Flint, and Lower Flint-Ochlockonee Water Planning Councils:

- Recognize the critical need for better use of existing storage and for more storage in the Apalachicola-Chattahoochee-Flint (ACF) System and recommend that a plan for additional storage be developed and implemented and that it consider the following: better utilization of existing storage in the Chattahoochee River Basin, new storage in the Flint River Basin, and enhancement of existing storage capacity.
- Urge GAEPD and those involved in the resource assessment modeling to continue to improve upon existing models for future regional water planning by further expanding use of actual and current data on water use and conditions and continuing to refine assumptions to more closely approximate actual conditions.
- Recommend proactive engagement among Georgia, Alabama, and Florida to collaborate on opportunities to improve planning for shared water resources in the ACF Basin.
- Recognize the need for identifying contributors that diminish water quality. Continue to develop methods, guidelines, and BMPs to improve water quality and continue to educate on these BMPs.

13. Regional Water Plan Use

The State Water Plan specifies that Regional Water Plans are to guide decisions regarding permitting. The Middle Chattahoochee Water Planning Council understands that this Regional Water Plan provides a valuable regional perspective and that it will be an important source of information for GAEPD and stakeholders. The Regional Water Plan (and the resource assessments developed for regional water planning) are just one source of information that can be used in the regulatory process. GAEPD's permit decisions should continue to be based on the full existing framework of laws, rules, and guidance. Permit decisions should continue to rest upon consideration of the body of detailed information provided by an applicant. The Council expects that communications with permit applicants will be informed by the applicant's familiarity with the contents of this adopted Regional Water Plan and the ways in which the proposed activity addresses this Plan's provisions.

SUMMARY: This section presents the Middle Chattahoochee Water Planning Council's roadmap for the implementation of the water management practices identified in Section 6. Implementation actions and responsible parties are described, and schedules and costs are specified, where appropriate. The Council's research and policy recommendations are also included in this section.

Section 7. Implementing Water Management Practices

This section presents the Council's roadmap for the implementation of the water management practices identified in Section 6. It details schedules for implementation and responsible parties for implementation. It also describes the alignment of this Regional Water Plan with other plans that address or relate to water resources in this water planning region. It ends with recommendations from the Council related to information needed to improve future planning and water policy changes that would facilitate attainment of the Council's vision and goals for the Middle Chattahoochee Water Planning Region.

7.1 Fiscal Implications of Selected Water Management Practices

The availability of funding and time are critical determinants in successful implementation of management practices. Sources of funding for programs and studies identified in the selected management practices include revenues generated by water and wastewater providers, local government general funds raised through property taxes, and service fees charged by local governments to citizens. Alternatively, water providers and individuals can apply for loans and/or grants to finance capital improvement practices or programs. Affected authorities and individuals in the water planning region will be responsible for determining the best method for funding and implementing applicable management practices. Several funding methods are outlined below:

- Water/Wastewater Rates – Water rates should be based on a local rate study and be sufficient to support program costs and facility maintenance.
- General Appropriations (General Fund) – Includes revenues from local taxes
- Loans/Bonds – Includes immediate borrowing of funds over a 15 to 20 year period with interest charges; typically used for capital improvement projects
    - General Obligation Bonds – Based upon local government taxing powers
    - Revenue Bonds – Based upon revenues generated by a specific entity for service fees and water/wastewater rates

  - Georgia Environmental Finance Authority Loans – Low interest state loans for environmental projects; the Clean Water State Revolving Loan Fund is administered by GEFA
  - WaterFirst – Administered by the Georgia Department of Community Affairs; communities who apply for and become designated as WaterFirst communities receive discounts on GEFA loan interest rates
- Service Fees – Special taxes established by local governments for specific programs
- Grants – State or federal financial aid which may fully or partially fund projects; typically awarded on a competitive basis
  - Section 319(h) – Under the federal Clean Water Act, Section 319(h) provides federal funding
  - Federal Special Appropriations Act Projects cost-share program

Table 7-1 provides planning-level funding guidance for implementation of the management practices in this Regional Water Plan as provided in Table 6-1. Current funding guidance has not been included as development of cost estimates for these management practices are variable and dependent on several factors including scope of work, market conditions, technological improvements and availability of supplies, equipment, and labor. Georgia EPD developed a "Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison", last revised in April 2011, that provides technical planning guidance of the relative costs of various water management practices (WMPs).[1]

Table 7-1: Cost Considerations for Implementation Responsibilities[1]

Management Practice	Potential Funding Sources	Notes and Sources
WATER QUANTITY		
DEMAND MANAGEMENT PRACTICES *COUNCIL GOALS ADDRESSED: 1, 2, 3*		
WC-1: *Support implementation of water conservation activities* *****HIGH PRIORITY** MANAGEMENT PRACTICE***	State agencies Water and wastewater rates Individuals as required by law	Lower cost WMPs include: residential water audits, policies and ordinances to require sub-meters for multi-family and multi-unit retail and light industrial Higher cost WMPs include: rebate programs, government efficiency programs, and programs targeting high water users *The effectiveness depends on the current level of efficiency[1a]
WC-2: *Encourage all water providers to consider conservation oriented rate structures*	Water and wastewater rates	Costs will involve preparing a rate study with replacement of billing system to accommodate tiers.

[1] Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison, Revised April 2011 provided in Regional Water Planning Guidance: https://waterplanning.georgia.gov/document/publication/cost-guidance/download

Management Practice	Potential Funding Sources	Notes and Sources
WC-3: *Encourage all water providers to implement education and outreach programs*	Water and wastewater rates	Costs include print materials, workshops, classes, and mass media (television, billboards, etc.)[1a]
RETURNS MANAGEMENT PRACTICES *COUNCIL GOALS ADDRESSED: 2, 3*		
WW-1: *Encourage use of point source discharges for wastewater treatment effluent disposal for major facilities* *****HIGH PRIORITY** MANAGEMENT PRACTICE***	Water and wastewater rates	Costs will include conveyance system upgrades. The treatment costs will vary depending on the need for expansion of green field development and the type of treatment required to meet discharge limits at specific sites.[1a]
SUPPLY MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA *COUNCIL GOALS ADDRESSED: 1, 2, 3*		
WS-1: *Study the development of new and/or enhancement of existing surface water storage reservoirs* *****HIGH PRIORITY** MANAGEMENT PRACTICE***	State agencies Water and wastewater rates	This type of study may include costs for, but not limited to the following activities: develop yield and performance criteria and undertake site selection screening process, perform property assessments and conduct appraisals, initiate contact with landowners, and define permitting requirements.
WS-2: *Implement new and/or enhance existing surface water storage as necessary* *****HIGH PRIORITY** MANAGEMENT PRACTICE***	State agencies Water and wastewater rates Loans and bonds	Costs will include the construction of a new or expanded reservoir, land acquisition, permitting, conveyance or treatment costs. Quarries or other sites that do not require dams will have a lower cost. Large dams will incur the highest cost.
WS-3: *Encourage interconnection of regional supply systems and other water supply redundancy improvements to improve reliabilityof the region's water supplies*	Water and wastewater rates Loans and bonds	Costs need to include the cost of pipeline, including a built-in contingency factor of 1.5 and a right of way cost contingency.[1c] Costs may need to include water quality improvements or modifications.
WS-4: *Prepare drought contingency plans that comply with state rules for drought management*	Water and wastewater rates	This type of study may include costs for, but not limited to the following activities: identify climate-based triggers to identify drought conditions, assign tiered management activities during critical water shortage periods to reduce demand, and review processes periodically to optimize program responses.
INSTREAM USE		
INSTREAM USE MANAGEMENT TO ADDRESS COUNCIL-DEFINED GAPS IN FEDERAL OPERATION OF THE ACF BASIN *COUNCIL GOALS ADDRESSED: 1, 2, 3*		

Management Practice	Potential Funding Sources	Notes and Sources
IU-1: *Utilize and improve upon reservoir release quantity and timing in the Chattahoochee River to maintain and/or improve water quality in the Chattahoochee River below the Columbus Planning Node* *****HIGH PRIORITY** MANAGEMENT PRACTICE***	State agencies USACEs	Management practice will have costs of studies and development
IU-2: *Assess the potential to modify Chattahoochee River operations to protect instream uses and increase system conservation storage* *****HIGH PRIORITY** MANAGEMENT PRACTICE***	State agencies USACE	Management practice will have costs of studies and development
IU-3: *Promote cooperation among recreational interests, Georgia Power, and the US Army Corps of Engineers to consider improvements to timing of flow releases to address recreational uses in the Chattahoochee River.*	No costs	
WATER QUALITY		
ENHANCED POLLUTION MANAGEMENT PRACTICES *COUNCIL GOALS ADDRESSED: 1, 2*		
WQ-1: *Encourage increased/additional funding and attention on erosion and sediment control*	319(h) grant funding	Costs could be incurred for, but not limited to, the following activities: increased frequency of site visits by county, state, and/or local authority inspectors to permitted land disturbing activities, increased training for enforcement officers, and enhanced tools or practices for measuring and monitoring sediment loading.
WQ-2: *Improve funding for monitoring, enforcement, and use of stream buffers*	State Agencies, 319(h) grant funding	Costs could be incurred for, but not limited to, the following activities: increased documentation, oversight, and monitoring of stream buffer use and quality by state agencies.
WQ-3: *Require adoption of the Georgia Stormwater Management Manual by local ordinances for implementation throughout the Middle Chattahoochee Water Planning Region*	Local governments Stormwater rates	Costs could be incurred to assimilate the Georgia Stormwater Management Manual into local standards. Further costs will be required if additional staff are needed to review stormwater plans for developments[1a]
WQ-4: *Create a conservation land program to increase stream buffers in perpetuity*	General funds Grants Georgia Land Conservation Program	Costs will be incurred to develop a green space plan. Additional costs will be required to pay for land acquisition.[1a]

Management Practice	Potential Funding Sources	Notes and Sources
ENHANCED WATER QUALITY STANDARDS AND MONITORING *COUNCIL GOALS ADDRESSED: 1, 2*		
WQ-5:** Improve water quality monitoring to provide the data for water quality improvements in the future* *****HIGH PRIORITY** MANAGEMENT PRACTICE	State agencies Wastewater rates	Costs for grab sampling includes monitoring chemical water quality annually for fecal coliform bacteria and traditional stormwater parameters (no metals) using grab sample collection. Costs for habitat and benthos monitoring includes monitoring biological water quality annually looking at habitat and macroinvertebrate populations.[1a]
***WQ-6:** Increase implementation, improve documentation, and increase fines of best management practices throughout the Middle Chattahoochee Water Planning Region for all industries*	State agencies	Costs could be incurred for, but not limited to, the following activities: increased documentation, oversight, and monitoring of best management practice use by state agencies and costs of BMP installation and maintenance by land owners.
***WQ-7:** Implement protective nutrient criteria for all areas*	State agencies Water and wastewater rates Loans and bonds 319(h) grants Private landowners NRCS Soil and Water Conservation Districts	Costs will include increased costs of monitoring and implementation of nutrient controls by point and nonpoint sources.
***WQ-8:** Implementation of monitoring of E. coli versus Fecal Coliform to monitor stream quality*	State agencies Water and wastewater rates Loans and bonds 319(h) grants Private landowners NRCS Soil and Water Conservation Districts	Costs will include increased costs of monitoring and implementation of nutrient controls by point and nonpoint sources.

Notes & Sources:

1) Programmatic costs will vary widely depending on the specific actions selected. Further study and data are needed to refine the evaluation of costs and benefits of selected practices. All values should be viewed as planning level numbers that can be updated through further study and data collection regarding the level of baseline implementation already in place and the corresponding benefits achieved
2) Sources:
   a.) Georgia EPD. Supplemental Guidance for Regional Planning Contractors: Water Management Practice Cost Comparison, April 2010 (Revised April 2011).
   b.) USGS. Methods to Evaluate Influence of Onsite Septic Wastewater-Treatment Systems on Base Flow in Selected Watersheds in Gwinnett County, Georgia (USGS SIR 2008-5220), October 2007.
   c.) Water Contingency Planning Task Force. Appendix IV Option Evaluation Process and Technical Assumptions, December 2009.

7.3 Alignment with Other Plans

The development of this Plan by the Council builds on a knowledge base developed in previous planning efforts by state and local governments and authorities. In the last planning cycle, the Council conducted a comprehensive review of existing local and regional plans relevant related documents that concern water resources to frame the selection of management practices.

Recommended actions in this Plan were selected so as not to conflict with other existing state or regional plans. Management practice selection was also guided by existing state rules, regulations, guidance documents, and best management practices to ensure alignment with and enhancement of existing practices. The authorities, counties, and municipalities throughout the water planning region should consider the resource availability constraints presented herein in future local planning efforts. Those entities also must implement, promote, and/or encourage the selected management practices listed to ensure that they remain aligned with the regional vision and goals of the Council.

The Council also ensured alignment with other Regional Water Plans by coordinating with neighboring water planning councils and the Metropolitan North Georgia Water Planning District. The Council participated in a joint meeting with several other water planning councils, including the Upper Flint and Lower Flint-Ochlockonee water Planning Regions In this meeting, council members discussed shared issues relating to resource availability, quality, policy, regulatory, and funding issues.

The Council included joint recommendations with the Upper Flint and Lower Flint-Ochlockonee Water Planning Councils in its 2011 and 2017 plans, and this revised plan updates the joint recommendations (see Section 6.3). The Council coordinated with these neighboring water planning councils with the support of the planning contractor to align the joint recommendations. Additionally, the Council reviewed the draft water resources plan of the Metropolitan North Georgia Water Planning District and submitted comments to the District on the draft plan in May 2022. Through these efforts, the Council has coordinated its plan with neighboring water planning councils and the Metropolitan North Georgia Water Planning District.

7.3 Benchmarks

The benchmarks listed in Table 7-2 below will be used to assess the effectiveness of this Regional Water Plan's implementation and identify where revisions are needed. As detailed below, the Council selected both qualitative and quantitative benchmarks that will be used to assess whether the Plan's management practices address potential gaps identified by the resource assessments and by the Council and whether the Council's vision and goals are being met. The benchmarks will be used to evaluate the effectiveness of this Plan at the next five-year plan review.

Table 7-2: Benchmarks for Middle Chattahoochee Regional Water Plan

Management Practice	Benchmark	Measurement Tools	Time Period
All Management Practices	Revised resource assessments	Quantify the impacts of implemented management practices on the gaps identified by the resource assessment models for the Tallapoosa and Flint River Basins and Claiborne Aquifer	Next planning cycle (five years)
WATER QUANTITY			
DEMAND MANAGEMENT PRACTICES *COUNCIL GOALS ADDRESSED: 1, 2, 3*			
All Demand Management Practices (WC-1 through WC-3)	Maintain or reduce residential per capita water use	Update of per capita water use estimates for next regional water planning cycle	Next planning cycle (five years)
RETURNS MANAGEMENT PRACTICES *COUNCIL GOALS ADDRESSED: 2, 3*			
WW-1	Reports of consumptive use by permitted municipal, industrial, and thermoelectric water users	Each water withdrawal permittee in the region reports the quantity of water withdrawn and discharged on a monthly average basis	Next planning cycle (five years)
WW-1	Regional wastewater treatment capacity changes	Prepare regional summary identifying all new or expanded wastewater treatment facilities by type	Next planning cycle (five years)
SUPPLY MANAGEMENT PRACTICES *COUNCIL GOALS ADDRESSED: 1, 2, 3*			
All Water Supply Management Practices (WS-1 through WS-4)	Implementation of recommended management practices	Perform regional survey to quantify implementation; surveys to gather details regarding implementation challenges and roadblocks where applicable	Next planning cycle (five years)
INSTREAM USE			
INSTREAM USE MANAGEMENT PRACTICES *COUNCIL GOALS ADDRESSED: 1, 2, 3*			
IU-1 and IU-3	USACE operations in ACF	Analysis of Chattahoochee flow data relative to FERC license requirements and permit conditions	Next planning cycle (five years)
IU-2	Funding for studies of proposed ACF rule curve changes	Identify any new data, reports or other literature published	Next planning cycle (five years)

Management Practice	Benchmark	Measurement Tools	Time Period
WATER QUALITY			
ENHANCED POLLUTION MANAGEMENT PRACTICES *COUNCIL GOALS ADDRESSED: 1, 2*			
WQ-1 through WQ-4	Implementation of recommended management practices	Perform regional survey to determine the level of implementation; surveys to gather details regarding implementation challenges and roadblocks where applicable	Next planning cycle (five years)
WQ-1 through WQ-3	De-listing of impaired streams	303d/305b report	Biennial impaired streams listing
ENHANCED WATER QUALITY STANDARDS AND MONITORING *COUNCIL GOALS ADDRESSED: 1, 2*			
WQ-5	Observed improvements in water quality monitoring results Increased collection of water quality monitoring data and updates to land-use data	EPD Online Water Quality Database;[2] water quality resource assessment inputs	Next planning cycle (five years)
WQ-6	BMP implementation	Identify any new data, reports or other literature published on BMP implementation	Next planning cycle (five years)
WQ-7	Nutrient management strategy development; awareness of nutrient management requirements by wastewater facilities in region	Adoption of nutrient management strategy; monitoring data submitted by dischargers	Next planning cycle (five years)
WQ-8	Reduction of of e.coli in streams	EPD implementation of e.coli limits	Next planning cycle (five years)

7.4 Plan Updates

Meeting current and future water needs will require periodic review and revision of this Regional Water Plan. The State Water Plan and associated rules provide that each Regional Water Plan will be subject to review by the appropriate regional Water Planning Council every five years and in accordance with guidance provided by the Director of EPD, unless otherwise required by the Director for earlier review. These reviews and updates will allow an opportunity to adapt the Regional Water Plan based on changed circumstances and new information arising in the five years after adoption of this Plan by the Council and the EPD Director.

[2] http://epd.georgia.gov/monitoring

7.5 Plan Amendments

Plan amendments may be necessary as water resource policy conditions change in this water planning region. Potential circumstances that may also affect implementation include amendments to the list of endangered species and critical habitats, and implementation of water quality restrictions. The Council intends that this Plan will be modified as necessary to address significant changes in this water planning region.

Plan amendments would need to be considered and approved by the Council and by EPD in a manner similar to that used in the development of this Plan. All Council members would be allowed to propose an amendment, with any amendment approval requiring consideration during at least two called council meetings open to the public.

7.6 Conclusion

In this Regional Water Plan, the Council makes its recommendations to provide for a sustainable future for the Middle Chattahoochee Water Planning Region. While developing this Plan, the Council also identified many information and water policy needs to support improved water resources planning and management in the future. The Council urges policy makers to act on its recommendations. The Council emphasizes the need for continued regional water planning to ensure that the water resources of this water planning region and the State as a whole are managed in a manner that supports safe, clean, and abundant water for the future needs of our descendants.