Regional Water Plan

September 2011

TABLES

FIGURES

LIST OF SUPPLEMENTAL DOCUMENTS[1]

Supplemental Document 1	Middle Chattahoochee Council Meeting Summaries
Supplemental Document 2	Memorandum of Agreement
Supplemental Document 3	Public Participation Technical Memorandum
Supplemental Document 4	U.S. Army Corps of Engineers Water Control Manual Status
Supplemental Document 5	Existing Regulatory and Local Plan Summary
Supplemental Document 6	Georgia OPB Population Projections March 2010

[1] All supplemental documents can be accessed from the Middle Chattahoochee Water Planning Council's website: < http://www.middlechattahoochee.org/pages/our_plan/index.php>

AAD-MGD	Annual Average Day in Million Gallons per Day
ACF	Apalachicola-Chattahoochee-Flint River Basin
ACT	Alabama-Coosa-Tallapoosa River Basin
AFR	Adjusted Flow Regime
ASR	Aquifer Storage and Recovery
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CAFO	Concentrated Animal Feeding Operation
CBOD	Carbonaceous Biochemical Oxygen Demand
CFS	Cubic Feet per Second
CVIOG	Carl Vincent Institute of Government
CWA	Clean Water Act
DCA	Department of Community Affairs
DEcD	Department of Economic Development
DEM	Digital Elevation Maps
DNR	Department of Natural Resources
DO	Dissolved Oxygen
EFDC	Environmental Fluids Dynamic Code
EPA	U.S. Environmental Protection Agency
EPA-PCS	Environmental Protection Agency's Envirofacts Data Warehouse Permit Compliance System
EPD	Environmental Protection Division
FERC	Federal Energy Regulatory Commission
GA Dosag	Georgia Dosag
GAEMN	Georgia Automated Environmental Monitoring Network
GDEcD	Georgia Department of Economic Development
GEFA	Georgia Environmental Finance Authority
Georgia DOA	Georgia Department of Agriculture
GFC	Georgia Forestry Commission
GGCSA	Georgia Golf Course Superintendents Association of America
GIS	Geographic Information Systems
GLUT	GA Land Use Trends
gpcd	gallons per capita per day

GSWCC	Georgia Soil and Water Conservation Commission (GSWCC)
GW	groundwater
HUC	hydrologic unit code
IC	Industrial and Commercial
I/I	inflow and infiltration
LDA	local drainage area
LSPC	Loading Simulation Program
MGD	Million Gallons per Day
MOA	Memorandum of Agreement
MODFE	Modular Finite Element
MS4	Municipal Separate Storm Sewer System
NAICS	North American Industry Classification System
NARSAL	Natural Resources Spatial Analysis Laboratory
NBOD	Nitrogenous Biochemical Oxygen Demand
NCDC	National Climate Data Center
NCGC	National Cartography and Geospatial Center
NED	National Elevation Dataset
NEPAct1	National Energy Policy Act of 1992
NH3	Ammonia
NHD	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrate+Nitrite
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
NRW	Non-Revenue Water
O&M	Operation and Maintenance
O.C.G.A.	Official Code of Georgia Annotated
OOA	Oconee-Ocmulgee-Altamaha river basin
OSSS	Ochlockonee-Suwanee-Satilla-St. Mary's river basin
Org-N	Organic Nitrogen
Org-P	Organic Phosphorus
OSSMS	Onsite Sewage Management Systems
PO4	Orthophosphate
RBPT	River Basin Planning Tool

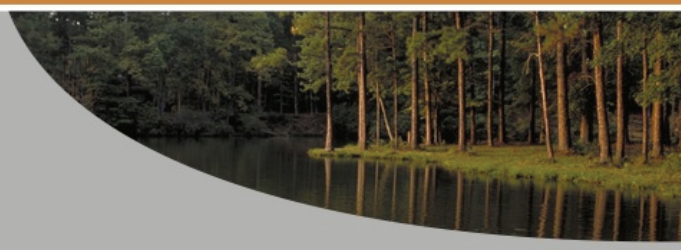
RIOP	Revised Interim Operation Plan
RMU	Reduced Modeling Units
SIC	Standard Industrial Classification
SLEUTH	Slope, Land Cover, Exclusion, Urban, Transportation, and Hillshade Urban Growth Model
SO	Savannah-Ogeechee river basin
SOD	Sediment Oxygen Demand
SSURGO	Soil Survey Geographic Database
SW AVAIL	Surface Water Availability
SW QUAL	Surface Water Quality
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
UGA	University of Georgia
UIF	Unimpaired Flow
ULFT	Ultra-low Flow Toilet
USACE	United States Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WCIP	Water Conservation Implementation Plan
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Acknowledgements

The authors gratefully acknowledge the cooperation, courtesy, and contributions of the following members of the Middle Chattahoochee Council. The Council members volunteered their time and talents for more than a dozen Council Meetings, Joint Council Meetings, and countless conference calls during the development of this Regional Water Plan.

Name	City	County
Alan Bell	Bremen	Haralson
Jimmy Bradley	Cuthbert	Randolph
Paul W. Chappell	Pine Mountain	Harris
Larry Clark (deceased)	Georgetown	Quitman
Steven R. Davis	Columbus	Muscogee
Larry Dillard	Cusseta	Chattahoochee
Philip Eidson	Tallapoosa	Haralson
Thomas A. Ellis	Tallapoosa	Haralson
Gardiner W. Garrard	Columbus	Muscogee
William C. Gregory (Alternate)	LaGrange	Troup
Joseph B. Griffith	Buchanan	Haralson
James E. Knight	Whitesburg	Carroll
Harry Lange (Vice-Chairman)	Cataula	Harris
W. Jeff Lukken	LaGrange	Troup
Joseph Maltese	LaGrange	Troup
Aaron McWhorter	Whitesburg	Carroll
Gordon Moss	Columbus	Muscogee
Kenneth Penuel	Fort Gaines	Clay
Denney Rogers	Ephesus	Heard
Walter F. Rosso	Cusseta	Chattahoochee
Randy Simpkins	Carrollton	Carroll
Jimmy Thompson (Alternate)	Shellman	Randolph
Robert Watkins	Hamilton	Harris
Don A. Watson (Alternate)	LaGrange	Troup
Matt Windom (Chairman)	Bowdon	Carroll
James R. Woods	West Point	Troup
Michael B. Yates	Franklin	Heard
Robert M. York	Bowdon	Carroll
Representative Gerald Greene		Ex-Officio
Senator Bill Heath		Ex-Officio

EXECUTIVE SUMMARY



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Executive Summary

The first Comprehensive State-wide Water Management Plan (State Water Plan) was adopted by the Georgia General Assembly in January 2008. The State Water Plan included a provision to create 10 water planning regions across the state, each guided by a regional water planning council. An eleventh Council, Metropolitan North Georgia Water Planning District, encompassing the Atlanta metro area already existed.

The State Water Plan required the preparation of regional water development and conservation plans (Regional Water Plans) to manage water resources in a sustainable manner through 2050 incorporating input from state agencies, other regional water planning councils, local governments, watershed stakeholders, and the public.

The Middle Chattahoochee Regional Water Planning Council (the Council), was charged with developing this Regional Water Plan. The Council was comprised of 30 individuals from throughout the planning region which includes 11 counties and 34 incorporated municipalities. A total of eleven full council meetings were held to develop the Regional Water Plan over a 30-month period.

Middle Chattahoochee Water Planning Region

Middle Chattahoochee Council at Council Meeting 10

The majority of the Middle Chattahoochee planning region is part of the Apalachicola-Chattahoochee-Flint (ACF) River Basin and is comprised of the Chattahoochee and Flint Rivers that converge at Lake Seminole on the Georgia-Florida state line to form the Apalachicola River. In addition, both Carroll and Haralson counties have areas that are in the headwaters of the Tallapoosa River basin.

Water resources of the planning region support various instream uses including navigation, recreation, treated wastewater assimilation, and environmental uses while major reservoirs are also extremely important to the region and provide system storage for flood control, recreation, and hydropower generation.

Throughout the planning process, there was strong recognition by the Council that the water resources in the ACF River Basin are highly complex with significant political and environmental issues that remain unresolved. Several rulings on the consolidated litigation between the Corps of Engineers, Georgia, Alabama, and Florida disputing Corps operations of the federal reservoirs were made during the plan development. In addition, EPA issued new nutrient standards for free flowing streams and lakes in Florida, which may have substantial implications for water quality management in this region.

Planning Process

At the beginning of the planning process, the Middle Chattahoochee Council developed a Vision statement supported by specific goals including such things as protecting the quantity, quality, and environmental resources of ACF system 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 as outlined in Section 6.

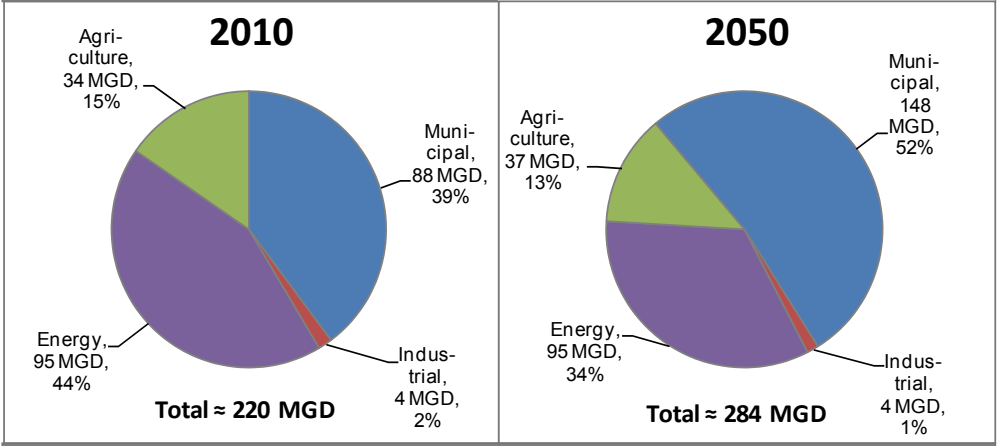
Vision Statement

Our vision is that our descendants have safe, clean and abundant water to meet their needs in the Middle Chattahoochee Region; seeking to accomplish that through reasonable efforts in cooperation, education, and preservation.

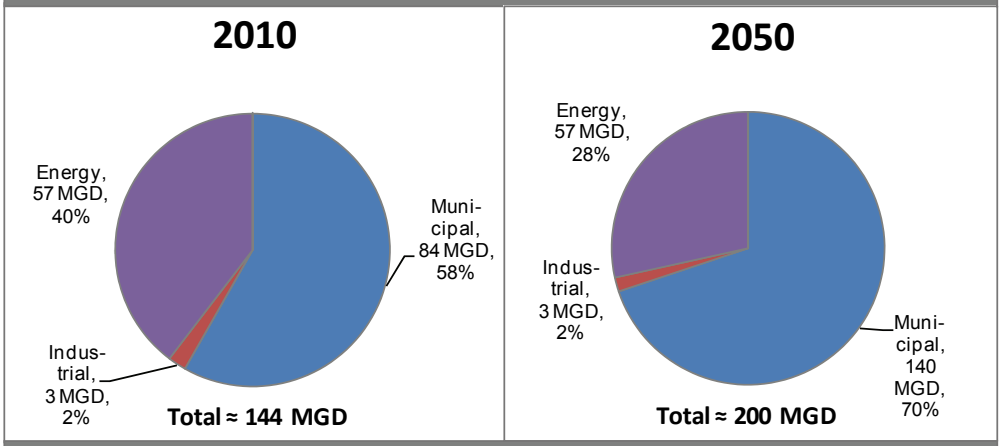
After completing the vision and goals, the next step in the planning process was to identify and quantify demands for water in the basin. With input from various stakeholders, support from EPD and using population projections provided by the Office of Planning and Budget, regional water and wastewater projections were developed thru 2050. With the region's population almost doubling (91.3% increase) by 2050, and with increasing efforts to conserve water, water needs are forecast to increase significantly as shown in the figure below.

Agricultural water needs are projected to increase by approximately 10% by 2050. Findings of this analysis also show that municipal and industrial water uses are primarily supplied from surface water while agriculture in the region generally relies on the use of ground water.

Water Demand in 2010 and 2050



Wastewater Flow in 2010 and 2050



Notes:
1 - Data Sources: Middle Chattahoochee Municipal & Industrial Forecasts (Black & Veatch 2010), Energy Forecasts (EPD 2010), Agricultural Forecasts (UGA 2010)
2 - The 2005 thermoelectric water demands and returns were assumed constant through 2050.
3 - Values are totals for the entire water planning region, which includes portions of several watersheds.

As part of the statewide water planning process, EPD developed water availability and water quality Resource Assessments (RA) for the State's river basins and aquifers to evaluate the capacity of water resources to meet current and future demands for water supply and wastewater assimilation without causing unreasonable impacts. Potential shortcomings based on the results of these RA are classified as "gaps." A gap means that the existing or future conditions exceeded a RA metric, e.g., the sustainable yield of a specific groundwater aquifer is exceeded, thus, a potential "gap" exists in groundwater availability in that area. The Council disagreed with the definition of the surface water availability gaps, as the assessment methodology did not consider desired river flows at specific locations and did not prioritize lake level. The three resource assessments with both current and future results summarized are shown in the following table.

Resource Assessments with Summarized Current and Future Results

Resource Assessments	Description	Current Results	Future Results
Surface Water Availability	Modeled the ability of surface water resources to meet current needs without substantially altering the hydrologic flow regime.	Results in the Chattahoochee basin show significant "gaps" (see note 1) between available water and minimum lake levels to meet authorized purposes and river flows (see Table 5-1). Current USACOE operation of the system is inadequate. Water availability gaps were also identified in the Tallapoosa and Little Tallapoosa basins.	Results in the Chattahoochee basin show significant "gaps" (see note 1) between available water and minimum lake levels to meet authorized purposes and river flows (see Table 5-1). Current USACOE operation of the system is inadequate. Water availability gaps were also identified in the Tallapoosa and Little Tallapoosa basins.
Groundwater Availability	Modeled the sustainable yield for prioritized groundwater aquifers.	Results for the Claiborne aquifer indicate that the existing withdrawals are generally lower than the sustainable yield range.	The results showed that future projected use is within the sustainable yield of the Claiborne aquifer.
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 results found that most of the region had available assimilative capacity in terms of dissolved oxygen. The watershed modeling identified that point sources contributed a higher amount of nutrients (nitrogen and phosphorus) than nonpoint sources discharged in the Chattahoochee River. Specific stream segments in the region are listed as impaired for a variety of constituents, primarily for fecal coliform.	The results showed some specific reaches where dissolved oxygen levels under future conditions needed improvement, and increased levels of nutrient discharges, both of which, while impacted by nonpoint source contributions, are more heavily impacted by point source contributions.

Notes:

1. "Gap" as defined by the Georgia EPD for the surface water availability resource assessment does not account for dramatically reduced lake levels that have been lowered to augment mandated river flows.

The results of the resource assessment for Groundwater Availability shows the current and projected uses are within the sustainable yield of this resource.

The results of the Surface Water Quality resource assessment show that point-source discharges impact nutrient loadings more than non-point sources. At the 2050 modeled conditions, a significant increase in nutrients at the Whitesburg gage is projected, originating from the upper Chattahoochee region. Long term, contributions of nitrogen and phosphorus will need to decrease in order to improve water quality.

In regard to Surface Water Availability, the Council identified significant "gaps" between desired lake levels and river flows citing specific objections to the current operations of the Chattahoochee system as operated by the USACOE under the Revised Interim Operations Plan (RIOP). The Council identified the need for an improved operating plan for the Apalachicola-Chattahoochee-Flint (ACF) Basin

which better balances the multiple authorized purposes of the federally operated reservoirs and addresses impacts on instream uses throughout the basin.

Recommended Management Practices

Since gaps were identified, the Council identified and recommended three water conservation, two returns management, six supply management, three instream use management, and eight water quality management practices. The Council prioritized the management practice recommendations, with the following practices identified as the highest priority.

Recommended management practices also had benchmarks identified, where appropriate, that would enable the demonstration of compliance and progress in the future.

The Council also voiced a number of recommendations to the state. These included the following:

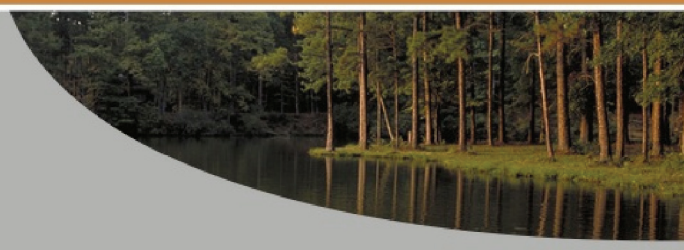
- asking the State to advocate for council-recommended changes to the USACOE Water Control Manual,
- improving water demand forecasting for energy and Alabama, documenting metro Atlanta returns,
- studying scientifically based minimum flow targets, considering additional groundwater development,
- developing increased storage,
- studying additional water conservation measures, increasing funding for improved resource assessments and implementation of management practices, and
- considering creating local water management agencies.

High Priority Management Practices

- **Support implementation of Tier 1 and Tier 2 conservation activities**
- **Encourage use of point source discharges for wastewater treatment effluent disposal for major facilities (greater than one million gallons per day)**
- **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**
- **Advocate for changes to the US Army COE Water Control Manual for the ACF basin**
- **Improved 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)**

Of particular note is that through discussions with the adjacent Flint basin water councils, several coordinated recommendations were emphasized. Council coordination is considered an important ongoing need for future rounds of planning.

1. INTRODUCTION



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SUMMARY: The 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 region of Georgia may replenish the aquifers used by communities many miles away. And, 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 a regional and local level is the most effective way to ensure that current and future needs for water supply and assimilative capacity are met.

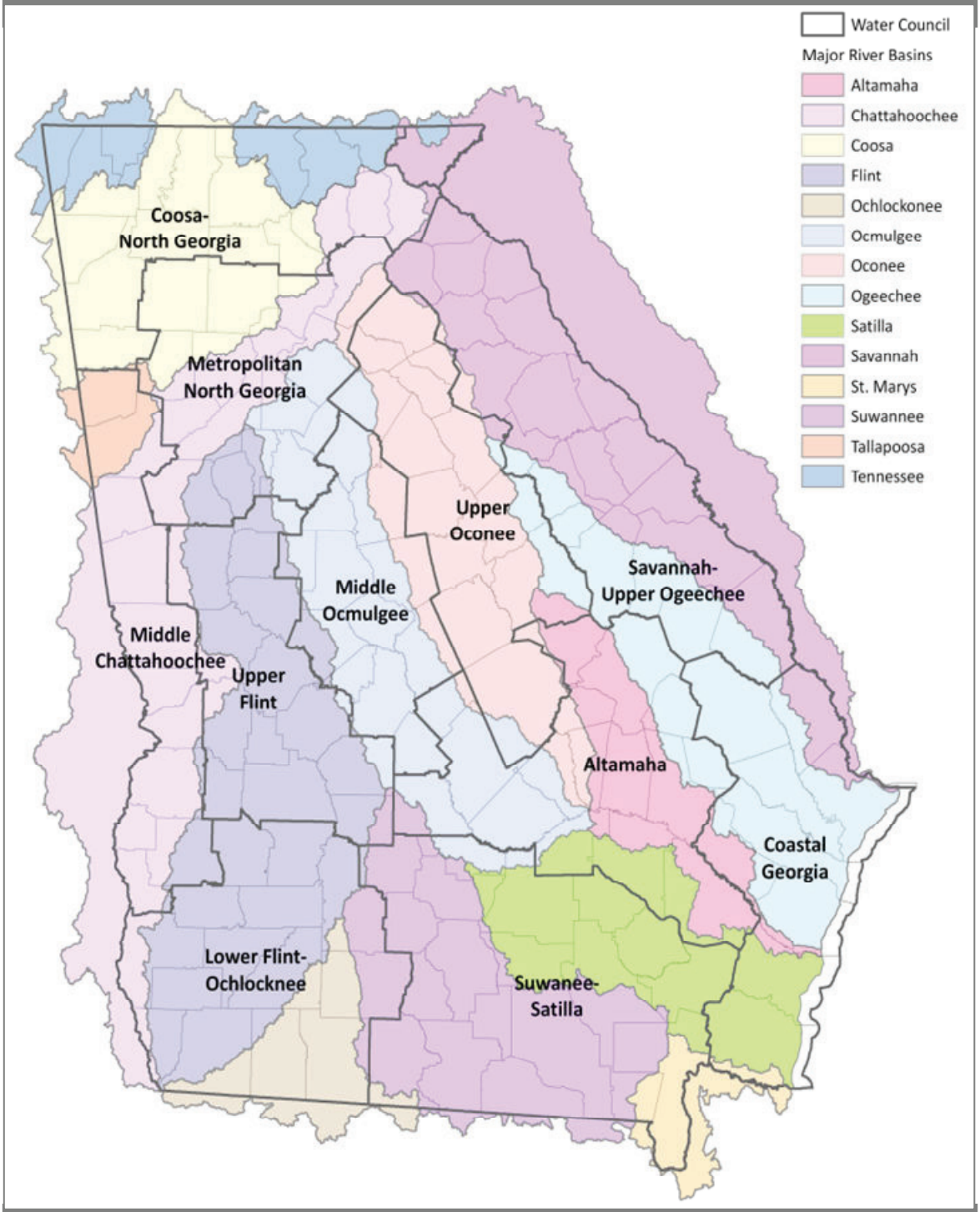
Therefore, the State Water Plan called for the preparation of regional water development and conservation plans (Regional Water Plans) for the ten water planning regions, outside of the Metropolitan Atlanta area, depicted in Figure 1-1. (The Metropolitan North Georgia Water Planning District (MNGWPD) has a separate water planning process created by the Metropolitan North Georgia Water Planning District Act of 2001.)

This Regional Water Plan prepared for the Middle Chattahoochee Water Planning Region by the Middle Chattahoochee Regional Water Planning Council describes the regionally appropriate water management practices to be employed in Georgia's Middle Chattahoochee Water Planning Region over the next 40 years.

1.2. State and Regional Water Planning Process

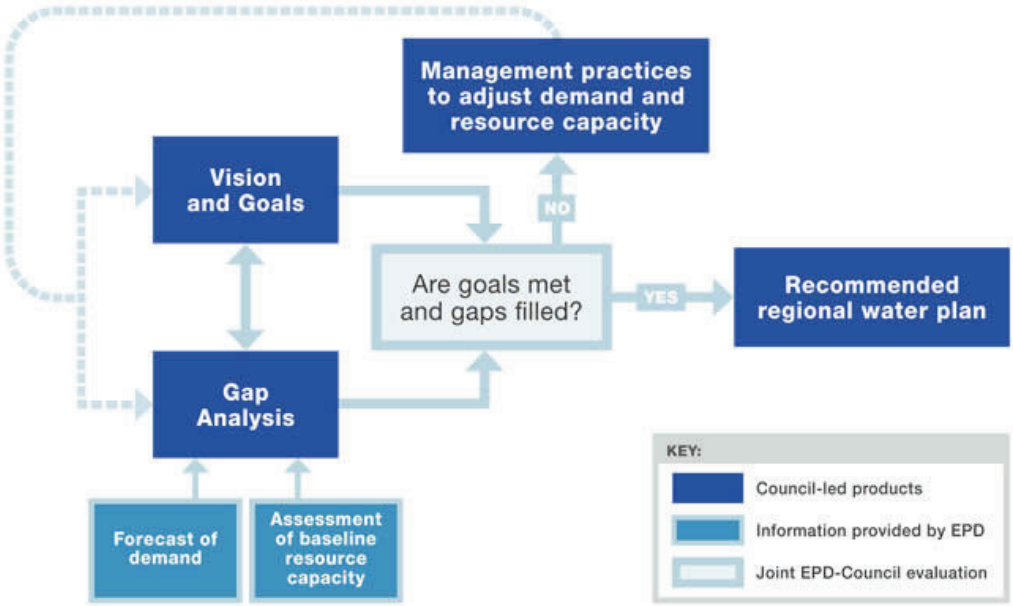
The State Water Plan calls for the preparation of regional water plans designed to manage water resources in a sustainable manner through 2050. It establishes ten regional water planning councils and provides a framework for regional planning consistent with the policy statement that "Georgia manages 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."

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



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 EPD and DCA as well as the Council's Public Involvement Plan[1], the process required and benefited from input of other regional water planning councils, local governments, and the public.

Figure 1-2: State Water Planning Process



Source: Georgia Environmental Protection Division, 2009.

1.3. The Middle Chattahoochee Regional Vision and Goals

The Council developed a regional vision statement to describe the planning region's water future. The Council adopted the following vision statement:

[1] See the Memorandum of Agreement & Public Participation Technical Memorandum available on the Middle Chattahoochee Water Planning Region's website. <http://www.middlechattahoochee.org/pages/our_plan/Middle_Chattahoochee_Supplemental_Material.php>

Our vision is that our descendants have safe, clean and abundant water to meet their needs in the Middle Chattahoochee Region; seeking to accomplish that through reasonable efforts in cooperation, education, and preservation.

After developing the vision, the Middle Chattahoochee Council developed specific goals to support this vision which were as follows:

1. **Political** - The plan will provide the technical basis to help resolve the issues pertaining to water resources management and competing interests.

2. **Uncertainties** – The plan will provide guidance for effective policies and appropriate actions during drought, economic uncertainty, regulatory or political influences, and affects of climate variability.
3. **River System** – The Apalachicola-Chattahoochee-Flint (ACF) river systems are a unique asset within the region. The management of the rivers and their uses (hydropower, navigation, water quality, water supply, flood control, fish and wildlife conservation, recreation and cooling water for nuclear and coal fired power plants) are vital to the region. The plan will recommend adjustments to the management directives and uses of the river systems in order to achieve a balance of future water requirements within the region.

4. **Land Use Changes** – The plan will acknowledge the increasing tax value of land and resulting trends: increasing urbanization, fewer natural forests, and decreasing agricultural land. However the plan will seek to encourage agricultural land and forest land conservation by providing for their water requirements.

5. **Water Balance** – The plan will provide a better understanding of water balance and consumptive use and clearly define returns to surface water, the need for storage, and provide guidance for the increasing trend for groundwater usage.

6. **Population** – The plan will address the water needs for an increasing [resident] population as well the increased transient population at such locations as Fort Benning.

7. **Quantity and Quality** – The plan will establish the necessary goals to achieve water quality and quantity throughout the Middle Chattahoochee basin.

8. **Conservation / Green** – The plan will encourage forest, agriculture and open land and habitat preservation. It will also encourage cost effective alternative energy sources, water conservation, and sustained protection of habitat and natural resources.

The Council's vision and goals were adopted in order 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 the planning process. The regional vision and goals were used by the Council to guide the selection of water management practices, which are discussed in Section 6.

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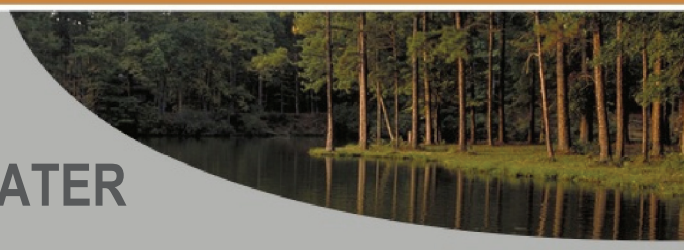

2. THE MIDDLE CHATTACHOOCHEE WATER PLANNING REGION

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SUMMARY: The Middle Chattahoochee Region includes 11 counties in the Chattahoochee, Flint, and Tallapoosa River Basins. The water resources and hydrology of the Apalachicola-Chattahoochee-Flint Basin is influenced and highly regulated by the presence of federal and non-federal reservoir operations. The headwaters of the Tallapoosa and Little Tallapoosa River are located in the region. The region is bisected into two physiographic regions by the geographic fall line with the major regional groundwater resources located to the south.

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 regional river basins include the Chattahoochee, Flint, and Tallapoosa.

The majority of the Middle Chattahoochee planning region is part of the Apalachicola-Chattahoochee-Flint (ACF) 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 that 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.

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 Corps of Engineers 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 Paulding (Metro North Georgia District), a small portion of Polk (Coosa-North Georgia Water Planning

[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.

Region) and Haralson counties. The Little Tallapoosa River originates in Carroll County and the two rivers converge in northeastern Alabama 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 22,800 square mile Alabama-Coosa-Tallapoosa Basin (ACT). Hundreds of reservoirs are located throughout the ACT Basin, but 18 (6 federal and 12 non-federal) are located on three principal rivers: the Alabama, Coosa, and Tallapoosa Rivers 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.[3] 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.

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 generally represents the centroid of 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 (see Figure 2-1) in the Middle Chattahoochee 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[4].

The Middle Chattahoochee and surrounding regions are underlain by five major aquifer systems: crystalline-rock aquifers in the Blue Ridge and 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

[2] U.S. Army Corps of Engineers, et al., *Water Allocation for the Alabama-Coosa-Tallapoosa River Basin (ACT Draft EIS)*, September 1998.

[3] Environmental Protection Division, Georgia Department of Natural Resources, *Tallapoosa River Basin Management Plan*, 1998.

[4] Couch et al, GA EPD, *Flint River Basin Regional Water Development and Conservation Plan*, March 20, 2006.

bedrock, typically limestone). The greatest use and recharge of groundwater for the Middle Chattahoochee Planning Region occurs here. The interaction between surface and groundwater in the basin is not fully understood, especially in regard to recharge, connectivity, water quality, lake influence on groundwater levels and drought effects.

Approximately 74 percent of the drainage area of the ACF Basin and 23 percent of the ACT Basin are in Georgia[5]. 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 north Georgia region[6] 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.

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[7,8]. The region with its water resources are summarized in Figure 2-1. Dams in the Apalachicola-Chattahoochee-Flint (ACF) are summarized in Table 2-1.

[5] U.S. Army Corps of Engineers, et al., *Draft Environmental Impact Statement for the Water Allocation Formula for the ACF River Basin (ACF EIS)*, September 1998.

[6] Metropolitan North Georgia Water Planning District, *Water Supply and Water Conservation Management Plan*, May 2009.

[7] U.S. Army Corps of Engineers, Mobile District, http://water.sam.usace.army.mil/recreat.htm.

[8] Lake Lanier Association, Gainesville, GA, *About Lake Sidney Lanier*, http://www.lakelanier.org/

Figure 2-1: Middle Chattahoochee Water Planning Region

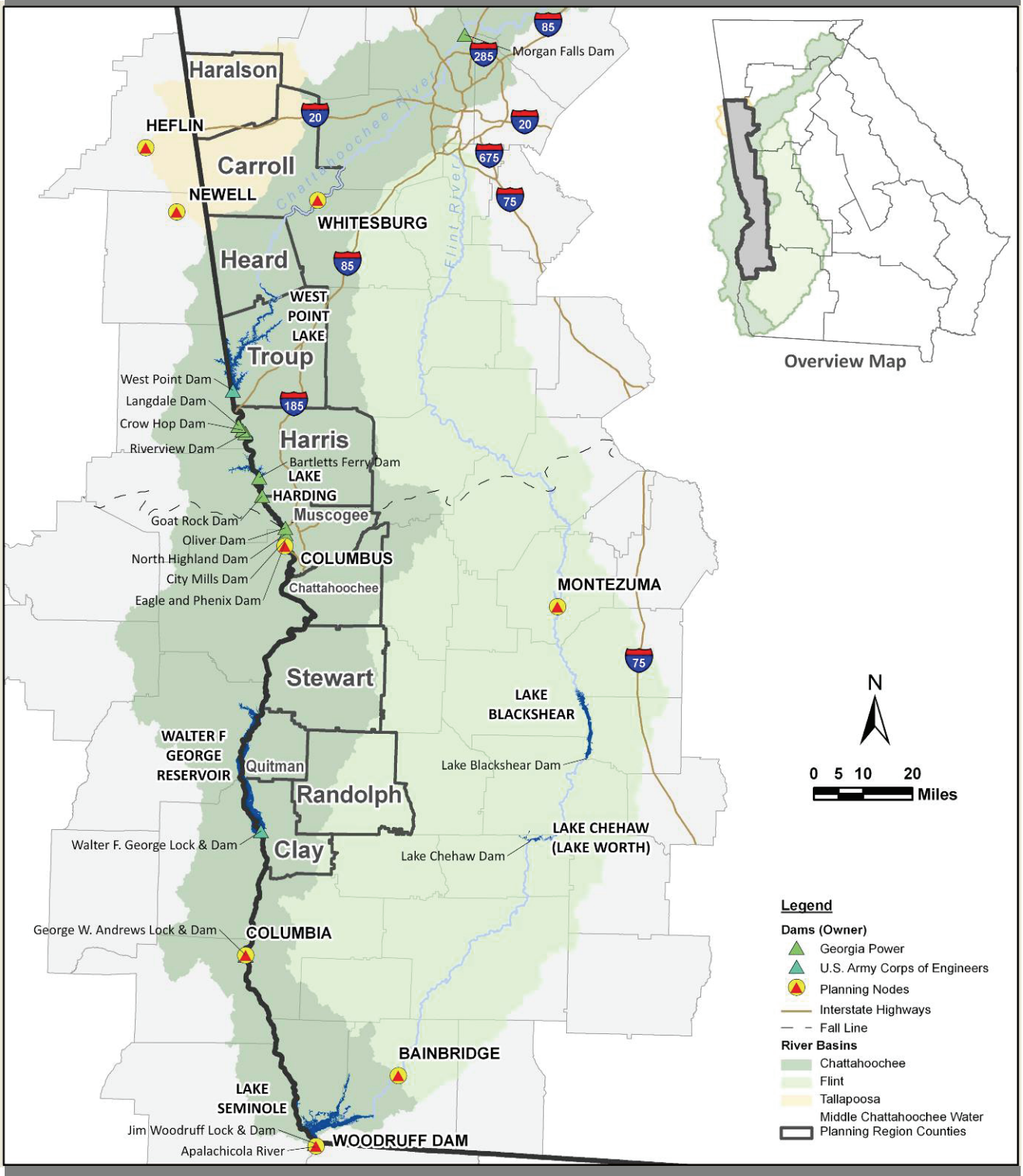


Table 2-1 Dams in the Apalachicola-Chattahoochee-Flint Basin

Basin/River/Project Name	Owner/State/ Year Initially Completed	Reservoir Size (Ac.)	Storage (Ac-Ft.)	Power Capacity (kW)	Normal (Summer) Lake Elevation (Ft.)	Stated Purposes – Draft 1989 Water Control Manual	Congressionally Authorized Purposes for Corps-Owned Projects
Buford Dam/Lake Lanier	COE/GA/1957	38,542	1,087,600 [a]	86,000	1,071	FRM, HP, NAV, REC, WQ, WS, FW	HP, FRM, NAV (RHA 1946)
Morgan Falls Dam	GPC/GA/1903	580	2,240 [a]	16,800	866		
West Point Dam and Lake	COE/GA/1975	25,900	306,100 [a]	82,200	635	FRM, HP, NAV, REC, WQ, WS, FW	FRM, HP, REC (RHA 1962)
Langdale Dam	GPC/GA/1860	152	NA	401	548		
Riverview Dam	GPC/GA/1902	75	NA	480	531		
Bartletts Ferry Dam	GPC/GA/1926	5,850	57,000 [a]	129,300	521		
Goat Rock Dam	GPC/GA/1912	965	4,960 [a]	68,100	404		
Oliver Dam	GPC/GA/1959	2,280	6,080 [a]	60,000	337		
North Highlands Dam	GPC/GA/1900	131	139 [a]	29,600	269		
City Mills Dam*	City Mills/GA/1863	110	684 [b]	740	226		
Eagle and Phenix Dam*	Consolidated Hydro/GA1834	NA	260 [b]	4,260	215		
W. F. George Lock and Dam and Lake (Lake Eufaula)	COE/GA/1963	45,180	244,400 [a]	130,000	190	HP, NAV, REC, WQ, WS, FW	NAV, HP (RHA 1962)
George W. Andrews Lock and Dam and Lake	COE/GA/1963	1,540	NA	None	102	NAV, REC, WQ	NAV (RHA 1946)
Blackshear Dam and Lake	Crisp Co./GA1930	8,700	144,000 [b]	13,000	237		
Flint River Dam/Lake Worth	GPC/GA/1920	1,400	NA	5,400	182		
Jim Woodruff Lock and Dam/ Lake Seminole	COE/FL/1954	37,500	NA	30,000	77	HP, NAV, REC, WQ, WS, FW	NAV, HP (RHA 1946)

Legend: a=Conservation Storage; b=Total Storage; FRM=Flood Risk Management; 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; *Currently Inoperative

Source: Adapted from the U. S. Army Corps of Engineers Final Scoping Report, Environmental Impact Statement, Update of the Water Control Manual for the Apalachicola-Chattahoochee-Flint River Basin, in Alabama, Florida, and Georgia

2.2. Characteristics of the Region

The region has an exceptional quality of life with diverse and growing mix of business and industry. Major employers include Southwire in Carroll County, Cagles and Callaway Gardens in Harris County and the new Kia Motor Corporations manufacturing plant in Troup County. The 2009 opening of the Kia Motors new operation in West Point represents an investment of more than one billion dollars;

the plant is predicted to produce 300,000 vehicles per year. Additional regional employment is anticipated from the suppliers to the new plant, representing 4,100 jobs and $830 million in investments[9]. At a newly opened, 350,000 square foot industrial plant in Columbus, Georgia, NCR Corporation manufactures automated teller machines that will add 870 jobs over the next 5 years. Aflac is a Fortune 500 company based in Columbus with annual revenues at the end of 2009 of $18 billion that employs over 8,000 people.

Fort Benning in Chattahoochee and Muscogee Counties is an important military training facility and regional economic engine. The base is reported to have trained 115,000 military personal and awarded $250 million in contracts in 2009. The Base Realignment and Closure (BRAC) and other military structure changes will generate $25-$35 million more regional contract dollars per month in the near future[10]. By September 2011 nearly $3.5 billion in capital investment will have been made and the number of trained personnel will increase to nearly 146,000 troops per year. Two public universities and colleges located within the region, including the University of West Georgia in Carroll County and Columbus State University in Muscogee County, create a combined total annual economic impact of $362 million[11]. LaGrange College in Troup County also provides employment and economic benefits to the region.

The Corps operation of five federal reservoirs greatly affects 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 funnels an estimated $710 million a year from direct and indirect spending into the regional economy. At 630 feet, the estimated impact from the lake contributes only $154 million a year[12].

Land use in the Middle Chattahoochee water planning region is predominantly forested; however, urban centers have experienced tremendous growth over the past 20 years. Regional land use estimates for 2005 are summarized in Figure 2-2.

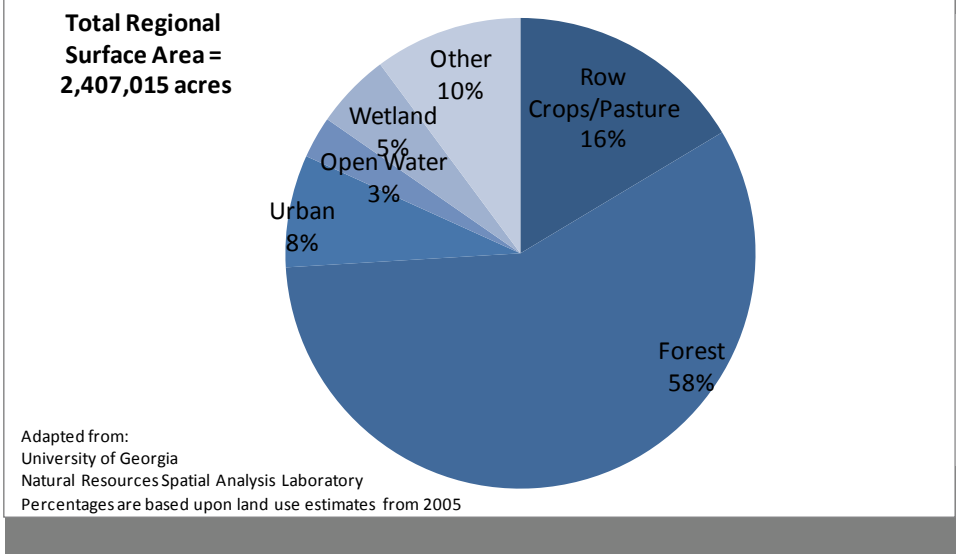
[9] Georgia Industries/Automotive, Georgia Department of Economic Development. Retrieved December 17, 2009: http://www.georgia.org/

[10] Fort Benning Impact Summary, Fort Benning and the Valley Region. Retrieved December 17, 2009: http://www.fortbenningandthevalley.com

[11] USG Institutions, University System of Georgia. Retrieved December 17, 2009: http://www.usg.edu

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

Figure 2-2: Middle Chattahoochee Land Use Percentages



2.3. Local Policy Context

The water resources in the ACF River Basin are highly complex and there are significant political and environmental issues that remain unresolved.

At the time this plan is being written, several rulings have been issued on the consolidated litigation between the Corps of Engineers, Georgia, Alabama, and Florida disputing Corps operations of the federal reservoirs.

Public dialog between Georgia, Florida and Alabama in regard to water allocation and water planning has been limited. As an example, while representatives from Alabama and Georgia have discussed the need for Alabama's future water demand forecasts in the basin, such forecasts are unavailable. Alabama Department of Environmental Management (ADEM) would only provide current consumptive demands and these were obtained by EPD through the Corps of Engineers (not directly from ADEM to EPD).

Flow targets, lake levels, and environmental flows along the river are not agreed upon between the three states. Corps operating practices for the river system and uses of the projects have been challenged in State and Federal court. Rulings issued by Federal Courts at the time of this writing indicate much of the Corps' current operating plans are inadequate and new plans are under development.

With regard to water quality regulation, the Environmental Protection Agency (EPA) signed final nutrient standards for free flowing streams and lakes in Florida[13] as a result of a federal lawsuit under the Clean Water Act. As promulgated, these criteria require increased control of nutrients in Georgia in order to meet downstream standards. These new nutrient standards, scheduled to take effect on March 6, 2012, may impact water quality management in this region and other regions with river systems that cross into Florida. The state of Florida has filed a federal lawsuit challenging the agency's final rule on the grounds that "the rule and the agency's necessity determination for promulgating nutrient criteria were arbitrary, capricious, and an abuse of discretion."[14]

With this local policy context as a backdrop, the Middle Chattahoochee Water Council began this planning process in 2009. At the outset, it became clear that the plan would be based on the current scenarios due to the uncertainties of the outcome of political and environmental issues.

2.3.1 Corps of Engineers Reservoir Operations

The U.S. Army Corps of Engineers (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 Corp of Engineer'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[15].

In the absence of an updated Master Water Control Manual, the Corp of Engineers has been operating the ACF Basin under a set of guidelines currently referred to as the Revised Interim Operation Plan (RIOP). The RIOP is intended to govern the releases from Woodruff Dam until replaced with a new Master Water Control Manual. The RIOP was formulated to address protection of endangered and threatened species and critical habitat in the Apalachicola River, manage reservoir storage for other project purposes, and meet drought contingencies.

[13] "Federal Water Quality Standards for the State of Florida | Regulatory Information | US EPA." EPA Office of Water Home | Water | US EPA. Web. 16 Dec. 2010. http://water.epa.gov/lawsregs/rulesregs/florida_index.cfm>.

[14] Environment Reporter: News Archive > 2010 > 12/10/2010 > Florida: State Sues to Block Implementation Of EPA's Numeric Water Quality Standards.

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

The RIOP defined four action zones for Buford, West Point, and Walter F. George that were intended to address the use of conservation storage in conjunction with operation of the other two federal reservoirs in the system (Lakes Andrews and Seminole). The Middle Chattahoochee Water Planning Council has identified that the action zone values as developed contradict and compromise authorized purposes, specifically, recreational use at West Point Lake.

Also according to the RIOP, the Corps of Engineers must provide a minimum release from the Woodruff Lock and Dam at Lake Seminole of 5,000 cubic feet per second (cfs) to address protection of endangered and threatened species and critical habitat in the Apalachicola River. This flow target can be reduced to 4,500 cfs when the storage left in the three major storage reservoirs on the Chattahoochee fall below the total composite storage of Action Zone 4. The 5,000 cfs minimum release is not agreed upon between the three states, yet greatly impacts the surface water and water quality assessment performed as part of the regional water planning effort.

As a matter of record for the Middle Chattahoochee Council's Regional Water Plan, it should be made clear that the Master Water Control Manual update had not been issued at the time of the plan finalization in September 2011. An update to the master water control manual is expected to be published in 2012 as the U.S. Army Corps of Engineers responds to the court's directions in the ongoing litigation; however, the exact schedule is unknown at this point. Further details regarding the Master Water Control Manual update are provided in the U.S. Army Corps of Engineers Water Control Manual Status supplemental document available on the Middle Chattahoochee website[16] and on the U.S. Army Corps of Engineers' website.

It should also be noted that the Middle Chattahoochee Water Council has made clear that the 1989 Water Control Plan and the current RIOP are both inadequate. In fact, the Council has stated that these operational practices contribute to many of the river and lake problems that cause social, economic, biological and supply and quality impacts along the Chattahoochee. It is the Council's expectation that the revised Master Water Control Manual will put forth significant operational changes contemplated to address the gaps.

[16] http://www.middlechattahoochee.org/pages/our_plan/index.php

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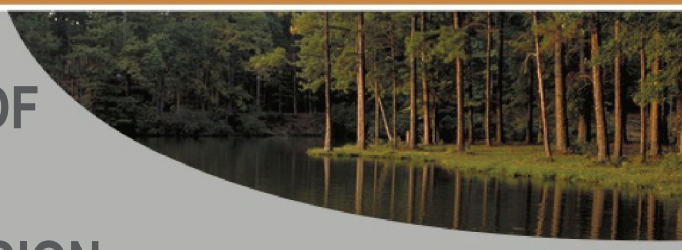

3. WATER RESOURCES OF OF THE MIDDLE CHATTAHOOCHEE REGION

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

Section 3. Water Resources of the Middle Chattahoochee Region

This section summarizes the major water uses in the region, the current conditions from the resource assessments, and provides a summary of ecosystem conditions.

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 the region with nearly 75 percent of the Middle Chattahoochee region within the basin. Its waters are withdrawn to supply water for cities and counties, industry, thermoelectric power generation and agriculture. Equally important, however, are its instream uses, defined in the state-wide 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."[1] Presently, the demands in the Chattahoochee basin are exceeding its ability to meet the many competing uses and requirements. The ongoing federal litigation is only one example that the interests in the basin are competing for a limited resource.

Approximately 9 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 regional land area, is a vital municipal and industrial supply for Haralson and Carroll counties.

A first step in the planning process is to identify and quantify the demands for water in the basin. A key outcome of this plan aims to reconcile the supply and competing demand for water through structural and non-structural measures, to ensure that the watershed retains its capacity to meet competing needs, and to steer water use in directions that are economically, socially, and environmentally responsible.

3.1. Water Withdrawal Uses in the Region

Current water withdrawal use information in this region was developed as a part of the development of water forecasts for different water use categories. *Water withdrawal* is defined as the removal of water from a natural water body, such as river, stream or aquifer[2,3]. *Consumptive use* is defined as the difference between the

[1] Georgia Comprehensive State-wide Water Management Plan, January 8, 2008.
[2] See O.C.G.A. Section 12-5-31

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[4].

Water withdrawal use categories included municipal, industrial, energy, and agriculture.

- **Municipal** supply water use is water withdrawn by public and private water suppliers and delivered for a variety of uses. Water-using industries were compiled separately in the "industrial" category.
- **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 includes water used in the generation of thermoelectric power, mainly for cooling purposes (water for hydroelectric power is discussed later).
- **Agriculture** includes row and orchard crops as well as most vegetable and specialty crops. Nursery and golf course irrigation water use estimates were also included. Animal livestock water use was estimated for current conditions but was not included in the forecasts.

When discussing consumptive water use in the Chattahoochee Basin, it is important to consider the Alabama demands. Current demand values were provided to EPD from the Corps of Engineers. A summary of these demands and associated users represented by those quantities is summarized in Table 3-1.

Table 3-1: Summary of Current Alabama Consumptive Demand

Node	Current Alabama Consumptive Water Use and Water Users	
Columbus	Reported Alabama Consumptive Demand: 11.1 MGD Annual Average	
	Withdrawals • Chattahoochee Valley Water Supply District (Chambers County) • West Point Stevens, Inc. (Chambers County) • Opelika Water Works Board (Lee County) • Smiths Station (Lee County) • Phenix City (Russell County)	Returns • Lanett WWTP (Chambers County) • Lower Valley WWTP (Chambers County) • West Point Stevens, Inc. (Chambers County) • Opelika Water Works Board (Lee County)
Walter F. George	Reported Alabama Consumptive Demand: 14.0 MGD Annual Average	
	Withdrawals	Returns

[3] Couch, C.A., and Keyes, A.M., *Georgia's Water Conservation Implementation Plan*, May 2009.

[4] Georgia Comprehensive Statewide Water Management Plan. Section 2: Definitions

Table 3-1: Summary of Current Alabama Consumptive Demand		
Node	**Current Alabama Consumptive Water Use and Water Users**	
	• Meadwestvaco (Russell County)	• Meadwestvaco (Russell County) • Phenix City (Russell County)
Columbia	Reported Alabama Consumptive Demand: -0.90 MGD Annual Average	
	Withdrawals	Returns • City of Eufaula Water Works and Sewer Board (Barbour County)
Woodruff	Reported Alabama Consumptive Demand: 36.4 MGD Annual Average	
	Withdrawals ▪ Plant Farley (Southern Company)	Returns Plant Farley (Southern Company)
Total	Reported Alabama Consumptive Demand: 60.6 MGD Annual Average	

Sources:
1. Hutson, S.S., Littlepage, T.M., Harper, M.J., and Tinney, J.O., 2009, Estimated use of water in Alabama in 2005: U.S. Geological Survey Scientific Investigation Report 2009-5163
2. Fort Benning Regional Growth Management Plan, Fort Benning and the Valley Region, April 2009
3. Facility Registry System, EPA

Surface water is the major source of water for the region as shown in Figure 3-1. Two major uses for surface water include Municipal and Energy use categories as shown in Figure 3-2. The majority of groundwater water use in the region is for agricultural production as shown in Figure 3-3.

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

- **On-Site Sewage Management Systems (septic 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.

Only point source discharges are expected to return flows to the hydrologic system in a timely manner. Land application and on-site sewage management systems are

considered 100 percent consumptive. Agricultural water use is also assumed to be 100 percent consumptive. As shown in Figure 3-4, most of the wastewater discharges are point source discharges in the Middle Chattahoochee region.

Figure 3-1: Current Water Supply by Source Type [1]

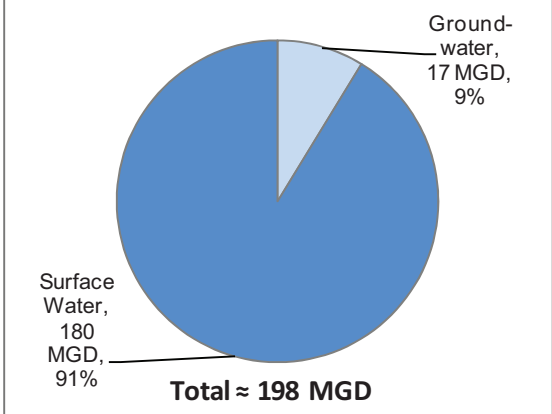


Figure 3-2: Current Surface Water Withdrawal by Category [1, 2]

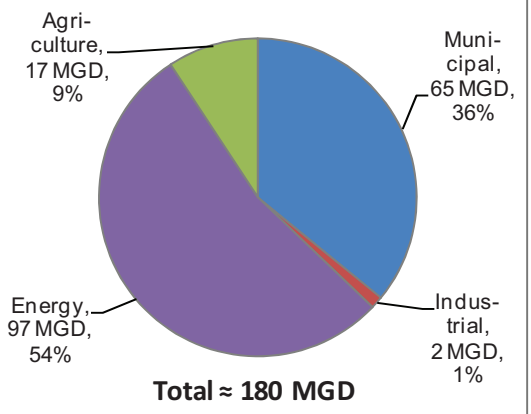


Figure 3-3: Current Groundwater Withdrawal by Category [1]

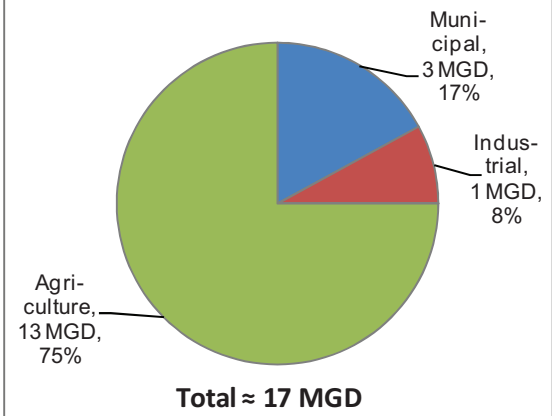
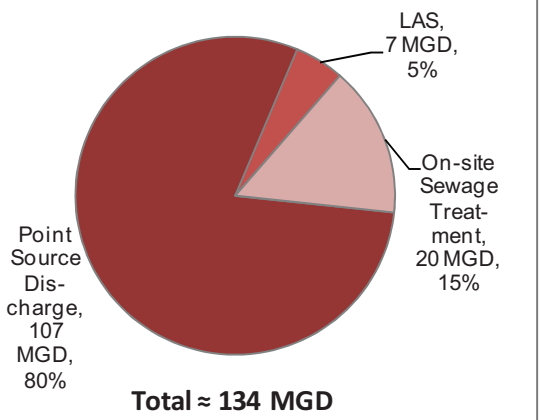


Figure 3-4: Current Wastewater Treatment by Category [1,3]



Notes:
1 - Data Sources: 1) Georgia EPD reported water withdrawal and discharge data for 2005; 2) "Water Use in Georgia by County for 2005; and Water-Use Trends, 1980-2005" (USGS) 3) "Baseline & Projected Annual Water Withdrawals for Irrigation by Probability within Water Planning Regions and Counties" (NESPAL, University of Georgia)
2 - Energy totals shown represent total thermoelectric water withdrawal; 39 MGD of the total 97 MGD (41%) is consumptive.
3 - Point Source Discharge includes 57 MGD total returns from thermoelectric facilities.
4 - Values are totals for the entire water planning region, which includes portions of several watersheds.

3.2. Instream Water Uses in the Region

Current instream uses in the region significantly impact the region's economy and quality of life for the region. Major regional instream uses include hydropower, flood control, navigation, recreation, fish and wildlife protection, and sport fishing.

- **Hydropower** utilization in the Apalachicola-Chattahoochee-Flint (ACF) Basin is significant, with approximately 724 megawatts of installed capacity in the Chattahoochee River and 21 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 planning region, with the largest generating installations at Bartletts Ferry Dam (impounding Lake Harding), Walter F. George Dam, and West Point Dam.

- **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 anticipated climatologic conditions anticipated in the coming months.

- **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, which currently maintains a nine-foot deep by 100-foot wide channel from Columbus to the mouth of the Apalachicola River. Flow control is provided by upstream reservoirs.

  Navigation is important to the regional economy and must be maintained between Columbus and Apalachicola Bay.

- **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".[5] 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.

- **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 (PFAs) and sponsors youth fishing events. Fishing is enjoyed throughout the region and anglers have ample opportunity to fish in the area's 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 the region.

- **Boating** opportunities in the region are abundant in the federal and private reservoirs. The U.S. Army Corps of Engineers, Mobile District is planning to remove two existing dams on the Chattahoochee River near Columbus, Georgia. Removal of the City Mills and Eagle and Phenix Dams would provide additional shoal habitat and unimpounded river habitat from the tailwater below North Highlands Dam downstream to the backwaters of Lake Walter F. George. An engineered whitewater course is envisioned to be constructed, which is expected to create 700 jobs and draw over 180,000 visitors annually to this section of the river. Construction is expected to begin in 2011, and once the project is completed, it will be one of the largest urban whitewater courses in the country.

- **Wildlife** management areas 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.

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

- **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 region, and the state at large, are used in establishing permit limits for point and nonpoint sources of pollution.

3.3. Resource Assessments

Three resource assessments were prepared as part of the regional planning process:

1. Surface water availability
2. Groundwater availability
3. Surface water quality

These assessments determined the capacity of water resources to meet demands for water supply and wastewater discharge without unreasonable impacts.

The resource assessments were completed on a resource basis (river basins and aquifers) and the current conditions are summarized here as they relate to the Middle Chattahoochee water planning region. Full details of each resource assessment can be found on the EPD website. Section 5 will describe the future conditions excerpted from the resource assessments.

In guidance documents by EPD to the Council, it was clear that the resource assessments would use the RIOP and FERC license requirements on the Chattahoochee River to set its metrics for the baseline assessment of surface water availability. The baseline surface water availability assessment therefore does not take into account meeting all of the instream water uses described in Section 3.2. The Council takes exception to this aspect of the planning process and has therefore modified the definition of the term 'gap' (used in other statewide water planning documents) to include gaps that are created by failure to meet *either* water withdrawal uses *or* instream water uses.

3.3.1 Surface Water Availability

The Surface Water Availability Assessment estimates the availability of surface water to meet current municipal, industrial, agricultural, and thermoelectric power water needs as well as the needs of instream and downstream users. The assessment determines the reliability of the surface water to meet demands in terms of both magnitude (how much flow would drop below minimum instream requirements) and duration (number of days below minimum instream requirements). Critical inputs for the model include: the desired flow of the river system, expected return of treated wastewater to the system, and the desired water supply.

The Council notes that unimpaired stream flows were used as a modeling assumption for the surface water availability assessment. In unregulated portions of the basin, *flow regime* is defined by the State's Interim Instream Flow Protection Policy, which calls for the protection of monthly 7Q10 or natural inflow, whichever is

lower. The Council supports the current DNR policy for water supply permitting. In the regulated portions of the basin, flow regime is limited to locations where an explicit flow requirement is specified, such as by the Corps of Engineers.

The Chattahoochee and Flint River basins are included in one surface water quantity model; the Tallapoosa River Basin is included in its own model.

Planning nodes represent locations of interest on the rivers where assessments of surface water availability are performed. The Chattahoochee, Flint and Tallapoosa River Basin planning nodes include the following:

Tallapoosa Planning Nodes

- **Heflin (Tallapoosa):** Located on the Tallapoosa River downstream of the Alabama border
- **Newell (Tallapoosa):** Located on the Little Tallapoosa River downstream of the Alabama border.

Chattahoochee-Flint Planning Nodes

- **Whitesburg (Chattahoochee):** Located approximately midway downstream of Atlanta and upstream of West Point Lake.
- **Columbus (Chattahoochee):** Located downstream of several Georgia Power projects and West Point Lake, and downstream of the city of Columbus.
- **Columbia (Chattahoochee):** Located on the downstream side of Andrews Dam.
- **Woodruff (Chattahoochee):** Located at the confluence of the Chattahoochee and Flint rivers below Woodruff Dam.
- **Montezuma (Flint):** The most upstream node on the Flint River.
- **Bainbridge (Flint):** Located upstream of Lake Seminole.

The first iteration of the Surface Water Availability Assessment was to determine "*baseline assessments*". Baseline assessments depict the state of the basin under current uses and demands.

The current conditions model depicts how current water usage and reservoir operation would impact water availability if these factors were held constant over the 1939 to 2007 period of record. Current water usage is explicitly derived from actual, current observed data and not from assumptions or projections about water use. Reservoir operation is that which is currently in effect for the major reservoirs.

Water availability at unregulated nodes is examined by the percent of time flow is below the adjusted flow regime (AFR), the average shortfall, the long-term average flow, the maximum shortfall, and the flow regime corresponding to the maximum shortfall. Summary statistics for the unregulated and regulated nodes in the Chattahoochee, Flint, and Tallapoosa Basins are presented in Table 3-2 and Table 3-3, respectively. The baseline assessments for regulated nodes were evaluated

based on current demands and uses and the current Army Corps of Engineers RIOP. A key criterion for the assessment was the premise that water availability would be measured against the total amount of conservation storage in the reservoir system. If storage could not provide for the current demands and uses, it would be noted as a shortfall, or '*gap*'. The gaps were expressed as the numeric calculation of the shortfall.

The baseline (and future) assessments were determined using the available storage in the Federal reservoirs. At the time of this plan, FERC requirements for private, FERC licensed reservoirs did not include drought contingency releases. Future FERC licensing requirements may include some form of drought contingency plans on the part of the permit holder (ex. Bartletts Ferry Dam relicensing[6]). The Council discussed this during review of the water quantity assessments and concluded that while private reservoir storage is omitted from the analysis at this time, future assessments should consider private reservoir storage during drought conditions consistent with the FERC jurisdiction.

Unregulated planning node modeling results are presented in Table 3-2. In the Flint River Basin, the anticipated gap is insignificant for the Montezuma node. At Bainbridge, however, there is a much greater shortfall. Flows are below the desired flow target, which means that during such time periods, less flow from the Flint River Basin flows into Lake Seminole to help meet the required seasonal RIOP flows downstream of Woodruff Dam. The Council is seeking collaborative solutions to this problem with both the Upper Flint and Lower Flint-Ochlockonee Water Planning Regions. Shortfalls in the Tallapoosa River Basin will need to be addressed through the selection and implementation of management practices.

Table 3-2: Summary of Current Surface Water Availability Results – Unregulated Nodes

Node	Length of Shortfall (% of time)	Average Shortfall (cfs)	Long-term Average Flow (cfs)	Maximum Shortfall (cfs)	Corresponding Flow Regime (cfs)
Montezuma	0.01%	< 1	3,421	< 1	593
Bainbridge	13%	352	7,910	1,376	2,506
Heflin	6%	3	659	4	65
Newell	7%	9	590	12	23

Source: March 2010 Surface Water Availability Assessments by Georgia EPD

[6] Georgia Power Company, *Study Report – Project Operations and Drought Management Plan Study Bartletts Ferry Hydroelectric Project FERC Project No. 485.* March 2011. (This project is currently in relicensing and operations data has been filed with FERC which will be used by FERC to evaluate the need for a Drought Management Plan).

The resource availability of the Chattahoochee River is constrained by multiple instream flow requirements including the following:

- Whitesburg Planning Node – A minimum required streamflow rate of 750 cubic feet per second is required past the Peachtree Creek USGS gauging station located approximately 40 miles upstream of the Whitesburg planning node. This minimum flow, established by EPD for wastewater assimilation, is incorporated in the FERC license for the Morgan Falls Dam. The license requires flow releases from Morgan Falls to conform with a "*Statement of Policy* issued on March 5, 2001, by Georgia Power and the Atlanta Regional Commission (ARC)."[7]
- West Point Dam – A minimum flow of 675 cubic feet per second is required to be released below West Point Dam.
- Columbus Planning Node – A minimum flow is established at Georgia Power's North Highland Dam, located approximately 3 miles upstream of the Columbus planning node. 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 cubic feet per second or basin inflow (whichever is lower), 1,350 cubic feet per second daily average release or basin inflow (whichever is lower), and 1,850 cubic feet per second 7-day average release or basin inflow (whichever is lower).
- USGS Gauge on the Apalachicola River near Chattahoochee, Florida – Seasonal RIOP flow requirements are maintained by the Army Corps of Engineers as determined by time of year, total basin inflow, and whether or not drought triggers measured by total composite federal reservoir storage are met.

Subject to the premise of the availability of conservation storage in the federal lakes, Table 3-3 shows no apparent surface water availability gaps for the Chattahoochee River under current conditions (i.e. baseline assessment). However, impacts to other uses remain due to the inability of the current basin operating plan (RIOP) to meet instream uses.. These impacts are further described below.

Table 3-3: Summary of Current Surface Water Availability Results – Chattahoochee River

Node	Demand Shortage (cfs)	At-site Flow Requirement Shortage (cfs)	Minimum Reservoir Conservation Storage (acre-feet)	Minimum Percentage Reservoir Conservation Storage	Basin-wide Flow Requirement Shortage
Whitesburg	0	0	540,021	50%	Note 1
Columbus	0	0	14,310	5%	Note 1
Columbia	0	0	41,076	17%	Note 1

[7] Georgia Power Company, *Morgan Falls Hydro, FERC Project Number 2237, An Operations Primer*. September 2004.

Table 3-3: Summary of Current Surface Water Availability Results – Chattahoochee River

Node	Demand Shortage (cfs)	At-site Flow Requirement Shortage (cfs)	Minimum Reservoir Conservation Storage (acre-feet)	Minimum Percentage Reservoir Conservation Storage	Basin-wide Flow Requirement Shortage
Woodruff	0	0	652,974 at Buford, WP, & WFG	40% at Buford, WP, & WFG	Note 1

Source: March 2010 Surface Water Availability Assessments by Georgia EPD

Note 1: Significant gaps identified between desired lake levels and river flows and, significant impacts are identified for instream uses. Current USACE operation of the system is inadequate.

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, 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.[8,9] 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. Prolonged operation below the Corps 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.

Fish & Wildlife Conservation Impacts. Fluctuating water levels in reservoirs used for flood storage is a necessity by definition. 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."[10] No known update to this study has been published. Future reservoir operations should also fully consider and address impacts of reservoir operation on rare and threatened species such as the bluestripe

[8] U.S. Army Corps of Engineers, *West Point Project Plan for Low Water Levels During Recreation Season*, July 1999.

[9] National Vertical Geodectic Datum

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

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."[11] Further analysis regarding fluctuation in reservoir levels in the Chattahoochee River should be analyzed with regards to potential impacts to this species.

The concern that research on wildlife impacts is lacking in this part of the basin and for the basin at large is echoed in comments published in the March 2010 *Scoping Report for the ACF River Basin* which included the following:

> *"Commenters stated that the Interim Operating Plan (IOP) and RIOP are "flawed" because of a lack of studies on the endangered species at West Point Lake. Some commenters said that more research needs to be conducted on endangered wildlife in the ACF River Basin. EPA recommended that the Corps address and fully document the effects of any proposed actions on threatened and endangered species when considering alternatives for the EIS."*[12]

The health of the fisheries in West Point and Walter F. George Lakes is further dependent 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. During pre-impoundment studies, West Point Lake was anticipated to gradually become a more eutrophic (nutrient rich) water body due to cumulative nutrient loading effects caused by wastewater discharges upstream. While this impact has been mitigated to some extent via stricter NPDES permit limits set for phosphorous, the impacts associated with the relationship of nutrient concentration, algal productivity, and rapid reduction in lake levels is not well-defined and requires further study.

Similarly, the relationships between water turbidity, water detention/velocity, water temperature, precedent weather/flow conditions, pH, growing season duration and algal growth require further study in West Point and Walter F. George lakes to establish a chlorophyll-a standard that is 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]

The Council, recognizing the need for a better understanding of ecological cause and response variables in the Middle Chattahoochee reservoirs to set an operating management strategy, concurs that this strategy is flawed and precautions should be taken to ensure the long-term sustainability of the reservoirs as a fishery and wildlife habitat.

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[11] 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>

[12] U.S. Army Corps of Engineers, *Scoping Report for the ACF Basin*, March 2010

[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.

The 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 which have become increasingly degraded by sedimentation or lost through reservoir inundation. The removal of dams near Columbus should result in greater numbers of shoal bass and new fishing opportunities. Creating ways for Alabama shad to move upstream through the lock system at Jim Woodruff Dam (Lake Seminole) has reestablished 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 to become 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 Council is concerned that the minimum flow requirements designated in the RIOP below Woodruff Dam are not founded upon sound scientific justification regarding protection of threatened and endangered species. Furthermore, the context from which the Biological Opinions issued by the U.S. Fish and Wildlife Service to the Corps in September 2006 for the IOP and later in June of 2008 for the RIOP, sanctioned the Corps' requested operation of the system without truly addressing the underlying question of what minimum flows adequately protect threatened and endangered species.

The Council has analyzed unimpaired, run-of-the river model data over the 68 year hydrologic period from 1939-2007 as modeled by EPD. In this model run, it was assumed that no consumptive demands or Corps operation was present in the system and it was observed that at times RIOP minimum flows would not be achieved. The probability of falling below 5,000 cubic feet per second accounted for approximately 2.8% of the time period, while the 4,500 cubic feet per second target was not met approximately 1.8% of the time. This is indicative that even without the influences of the millions of water users or Corps operation, the system would not achieve the designated RIOP minimum flow during critical drought conditions. The Council is concerned that during such times of exceptional drought, the federal storage reservoirs upstream of Woodruff Dam are being penalized for a flow requirement which would otherwise not be naturally met 100% of the time and furthermore, that operational measures in the future be rational and equitable for all users in the basin during critical low flow periods.

Additional considerations that the Council feels that the Corps has failed to properly address or consider in determining appropriate measures for the protection of downstream critical habitat include the following:

- The relationship between high flow conditions and the stranding of endangered mussel species on upper embankments of the Apalachicola River have not been adequately addressed in the Corps operating regime

- 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 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 RIOP

Reservoir Drought Operations Impacts. The ability of the federal reservoir projects to recover from flood storage drawdown during the spring is impeded by exceedingly stringent seasonal inflow targets established by the RIOP below which water can be held back for storage. The operation of many engineered and federally operated systems throughout the country work to refill reservoirs as soon as possible after drought conditions, whereas the Chattahoochee River inflows are required to be significantly high prior to allowing the projects to refill. This has the anticipated effect of prolonging storage deficits on the order of three or more years to replenish lakes to full pool based upon past hydrological conditions for all three of the major storage projects.

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 use of the Corps operating regime for West Point Lake has adversely impacted the potential for production of hydroelectric power.

Water Quality Impacts. While water quality standards are currently established for West Point and Walter F. George Lakes by EPD for chlorophyll a, total nitrogen, phosphorous, dissolved oxygen, and pH, the impact of those constituents as impacted by lake elevations has not been clearly defined. Sufficient and readily available water quality monitoring data from federal, state, and local governments has not been sufficiently pulled together and analyzed critically.

Instream flows in the Chattahoochee River at the Columbus and Columbia planning nodes have been identified as areas of concern by the Council regarding flow availability for the assimilation of permitted wastewater discharges, including the discharge by the City of Columbus. Flow quantities sufficient to maintain water quality parameters are not always reliable below the Columbus and Columbia planning nodes due to current federal reservoir operations under the RIOP. For example, 17 of the 31 days from June 26th through July 29th in 2009 fell below an average daily flow rate of 1,350 cubic feet per second measured just below the Columbus Planning Node (USGS gage number 02341505). The EPD basis for assimilative capacity requirements below the Columbus Planning Node on an average daily basis is currently set at 1,150 cubic feet per second. This was not met on 9 of the 31 days over the same flow record. During such times, the streamflow may be inadequate to provide desired assimilative capacity and result in a

degradation of water quality until such a point that operational changes are decided upon by the Corps. This type of erratic flow release pattern by the Corps and the concern regarding the available assimilative capacity in the Chattahoochee River are a primary driver for the Council's desire to set an equitable balance of flow contributions between the Chattahoochee and Flint Basins.

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. 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 Corp operations and the effects on river flow, the Council is concerned about upstream and regional consumptive use and flow returns to the river. Upstream interbasin transfers and increases in consumptive use reduce downstream flows and 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 with truer representations of consumptive uses associated with these uses.

Reservoir Operations and River Flow Impacts. The conflicts and inconsistencies in how federal reservoirs are operated under the current RIOP have historically impacted the instream uses as previously discussed. These issues are compounded in West Point Lake, which the Corps has heavily utilized in attempting to balance the needs and authorized purposes of the federal reservoir projects. The lack of a coherent operating regime and absence of key desired instream flow metrics has had a debilitating effect on the ability to maintain the designed balance between the authorized purposes.

As a result, the Council has identified the need for better utilization of storage and modification of the RIOP. Storage utilization changes could account for environmental flow requirements and reevaluate the authorized purposes in the basin to account for environmental flows. A modified RIOP would provide for a more adaptive set of operational practices to accumulate flows in storage while maintaining the minimum flow required below Woodruff Dam. These gaps in the ability to meet instream uses are a challenge that the Regional Council, EPD, the Corps of Engineers, and representatives from Alabama and Florida must work toward solving. The Council is exploring options to optimize adaptive reservoir management throughout the ACF Basin to provide regional benefits for multiple stakeholders while maintaining all authorized instream uses.

3.3.2 Groundwater Availability

The groundwater availability assessment estimated the sustainable yield for prioritized groundwater resources based on existing data. Groundwater modeling was not performed for the entire Middle Chattahoochee region. EPD prioritized the aquifers modeled based on the characteristics of the aquifer, evidence of negative effects, anticipated negative impacts, and other considerations.

The groundwater resource assessments identified the sustainable yield, or the volume of groundwater that can be used without negative impacts. Negative impacts included limiting use of neighboring wells (drawdown), reducing groundwater contributions to stream baseflows, and the permanent reduction of groundwater levels. Only one of the prioritized aquifer areas modeled fell within the region. The Claiborne aquifer, which delineated an area in southwestern Georgia, included portions of Clay, Quitman, and Randolph counties. The Middle Chattahoochee water planning region must coordinate usage of this aquifer formation with other water planning regions, particularly the Lower Flint-Ochlockonee and Upper Flint, to ensure the sustainable yield for this groundwater source is maintained.

The sustainable yield estimates for the Claiborne aquifer were determined using numerical flow model simulation with various combinations of withdrawals from existing wells and, where applicable, from simulated new wells. Results of the simulations indicated a range of sustainable yields for this prioritized aquifer as shown in Table 3-4.

Table 3-4: Groundwater Sustainable Yield Results

Prioritized Aquifers	Estimated Current Groundwater Withdrawal (Million Gallons per Day)	Sustainable Yield of Individual Aquifer (Min/Max, Million Gallons per Day)
Claiborne Aquifer	123-148	(140/635)

Source: Georgia EPD, March 2010, Synopsis Report: Groundwater Availability Assessment, Review Draft and subsequent results updates provided by EPD

The withdrawal of groundwater in some areas of the Coastal Plain exceeds the sustainable yield. The impacts of groundwater on surface water flows in the Flint River and its tributaries are known and represented in the surface water availability model results for the Bainbridge planning node presented in Table 3-2. During times of drought, groundwater pumpage in the Flint Basin increases for agricultural irrigation purposes. This in turn reduces the available Flint River flow contribution to Lake Seminole, which ultimately is made up from storage on the Chattahoochee River. The Middle Chattahoochee Council has and will continue to facilitate interregional coordination efforts with the Lower Flint-Ochlockonee and Upper Flint planning regions in finding solutions to alleviate this gap. This must include coordination in the continued use of groundwater resources in the region. For areas that rely on sustainable groundwater yields, a detailed well-field analysis may be required.

3.3.3 Surface Water Quality (Assimilative Capacity)

The assimilative capacity assessment estimates the capacity of Georgia's surface waters to naturally reduce pollutant levels without unacceptable degradation of water quality. The term assimilative capacity refers to the ability of a water body to naturally reduce pollutants to a level that does not exceed state water quality standards or harm aquatic life.

Two water quality model evaluations were developed to show the current status of the available assimilative capacity based on current discharges:

1. River Model (Dissolved Oxygen Modeling) – This model evaluates dissolved oxygen due to existing point discharges under critical conditions.

2. Lake and Watershed Models (Nutrient Modeling) – These models evaluate the impacts of point and nonpoint sources from nutrient loadings. Nutrients modeled included nitrogen and 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 account for nutrient sources from both wastewater discharges and nonpoint source stormwater runoff based on various land uses.

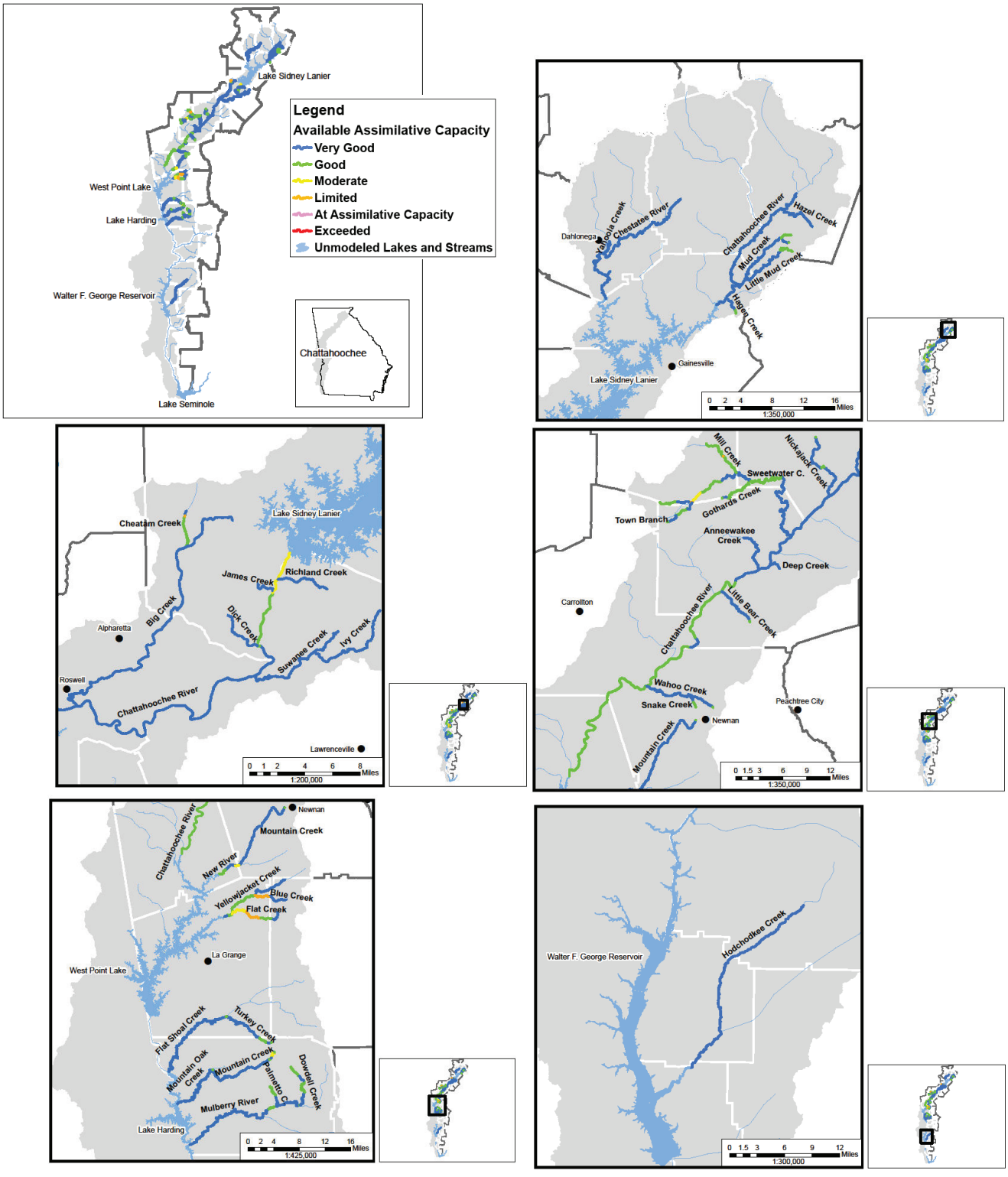
The water quality assessment models are not the same as the 303(d) list of impaired waters (see section 3.4.1) or total maximum daily loads, because this assessment is only looking at dissolved oxygen and nutrients; the 303(d) list includes stream reaches listed as impaired on the basis of dissolved oxygen and other parameters such as metals, bacteria, and biota. Furthermore, the 303(d) list is based on analytical results from stream monitoring and not model results.

Determining assimilative capacity is dependent on different parameters and 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 the state's water quality standards.

Dissolved Oxygen Modeling

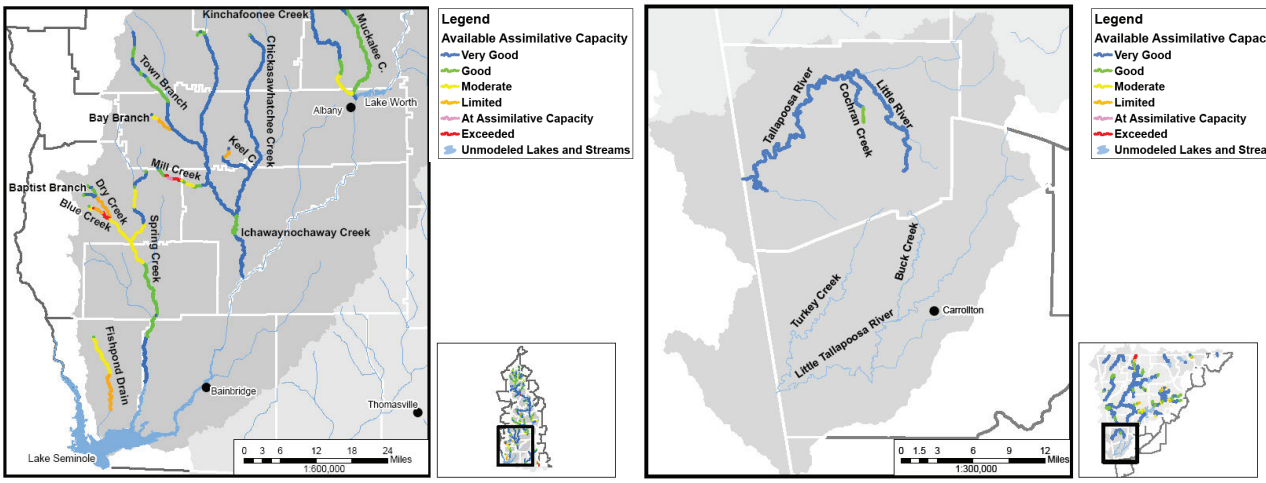
Figures 3-5 and 3-6 shows the in-stream dissolved oxygen model results with existing discharges during critical low flow, high temperature conditions. Stream segments where available assimilative capacity is exceeded are red; segments that have no available assimilative capacity under critical low flow (7Q10) and high temperature conditions are pink. Those with DO levels well in excess of state water quality standards are blue.

Figure 3-5 Assimilative Capacity Results from Dissolved Oxygen Assessment: Chattahoochee River (Current Conditions)



Source: Georgia EPD, October 2010

Figure 3-6 Assimilative Capacity Results from Dissolved Oxygen Assessment: Flint & Tallapoosa Rivers (Current Conditions)



Lower Flint River Basin

Upper Tallapoosa River Basin

Source: Georgia EPD, October 2010

Nutrients

Watershed and lake models were run assuming current levels of water use and wastewater disposal and current land use profiles as inputs. These inputs accounted for nutrient loading from the contributing watershed over an eight year hydroperiod recreated from historical data. Watershed model results are summarized as follows:

- Lake Lanier Watershed Results –
  - 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

While the Tallapoosa River Basin has not been developed during this round of regional planning, the Council believes that similar management practices (Section 6) are appropriate for the basin in the absence of modeling.

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 chlrophyll-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 standards are exceeded now at specific locations
  - Exceedances due to combination of point and nonpoint sources
  - Phosphorus loading to lake is primarily (~70%) from nonpoint sources

- West Point Lake Results –
  - No chlorophyll a exceedances currently
  - Phosphorus is primarily from point sources
- Walter F. George Results –
  - Chlorophyll a exceedances are projected under current conditions
  - Current phosphorus load is primarily (~63%) from nonpoint sources
- Lake Seminole Results –
  - No water quality standards are yet established
  - Phosphorus loading to the lake is primarily from nonpoint sources
- Lake Blackshear Results –
  - No water quality standards yet established
  - Phosphorus loading into lake is primarily from nonpoint sources

3.4. Ecosystem Conditions

In order to better protect the health of aquatic ecosystems and to conserve water for downstream users, Georgia EPD established an interim minimum instream flow policy, effective April 1, 2001. 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 Georgia Comprehensive State-wide Water Management 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 (CWA). Waters of the state are monitored by EPD, USGS, and other 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 is included on a list of impaired waters. Impairments must be addressed through the development of a Total Maximum Daily Load, which sets a pollutant load and outlines a strategy for corrective action. Several stream reaches in the Middle Chattahoochee region are on the state’s list of impaired waters and are illustrated and summarized in Figure 3-7. An expanded discussion on water use classification and a full list of impaired waters in the region

is provided in the Existing Regulatory and Local Plan Summary supplemental document available on the Middle Chattahoochee website.[14]

3.4.2 Conservation Resources

Protection of rare plants and animals in the ACF Basin is of critical importance to the Middle Chattahoochee Region as witnessed in Phase 2 of the Multi-District Litigation. The Federal Court upheld the U.S. Fish and Wildlife's Biological Opinions in 2006 and 2008 to the Army Corps of Engineers, establishing water flows and water elevations which were opined to adequately protect the gulf sturgeon and two species of endangered mussel. The Council and the EPD must continue to be engaged in the development of further scientific studies which better define the water quantity and water quality conditions which best support ecological health, as such results have proven to impact stakeholders throughout the basin. Critical information needs to be gathered to determine how and what species are impacted by water flow, water quality, and lake elevations in the ACF.

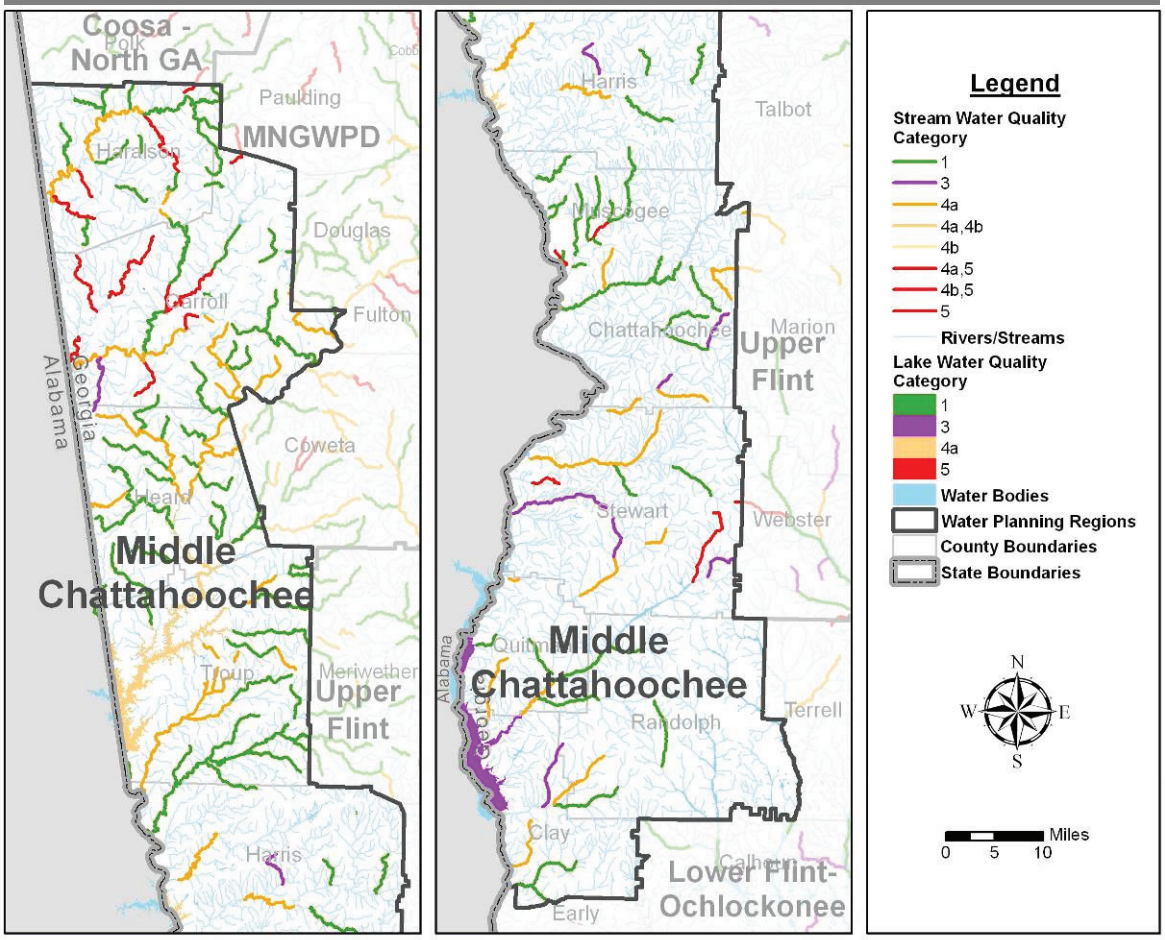
Georgia's Wildlife Resources Division (WRD) developed a comprehensive wildlife conservation strategy "to conserve Georgia's animals, plants, and natural habitats through proactive measures emphasizing voluntary and incentive-based programs on private lands, habitat restoration and management by public agencies and private conservation organizations, rare species survey and recovery efforts, and environmental education and public outreach activities." Results were published on August 31, 2005 in *A Comprehensive Wildlife Conservation Strategy for Georgia.*

High priority species and habitats were identified and summarized at the ecoregion level, with a total of five ecoregions being designated for the state. Portions of the Middle Chattahoochee water planning region fall within the southeastern plains ecoregion with the remainder in the piedmont. A total of 85 high priority animal species, 145 high priority plants species, and 27 high priority habitat types were identified for the southeastern plains ecoregion. A total of 55 high priority animal species, 71 high priority plants species, and 16 high priority habitat types were identified for the piedmont ecoregion. 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 region are included in the Existing Regulatory and Local Plan Review supplemental document available on the Council website. [15]

[14] http://www.middlechattahoochee.org/pages/our_plan/index.php

[15] Protected species accounts and detailed information regarding high priority plants, animals, and habitat types can be viewed at http://www.georgiawildlife.com/node/1370. Detailed information regarding high priority waters can be viewed at http://www.georgiawildlife.com/node/1377.

Figure 3-7: 305(b)/303(d) Listed Streams



Category Definitions:

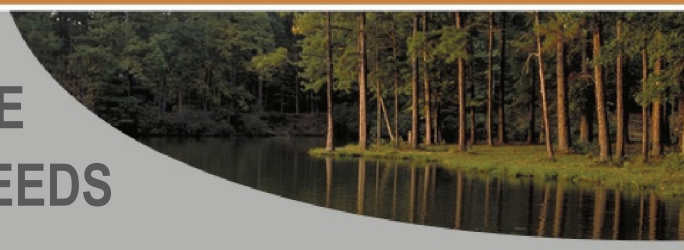
1 – Waters meeting designated use(s).
2 – Waters having more than 1 designated use and data indicate at least one is being met, but there is insufficient evidence to determine that all uses are being met.
3 – Insufficient data or other information to make a determination as to whether or not the designated use(s) is being met
4a – Data indicate that at least one designated use is not being met, but TMDL(s) have been completed for the parameter(s) that are causing impairment
4b – Data indicate that at least one designated use is not being met, but there are actions in place (other than a TMDL) that are predicted to lead to compliance with water quality standards.
4c – Data indicate that one designated use is not being met, but the impairment is not caused by a pollutant.
5 – Data indicates that at least on designated use is not being met and TMDL(s) need to be completed for one or more pollutants.

River Basin	Total River Miles Impaired in the Middle Chattahoochee Region				Total
Chattahoochee	2	220	2	174	314
Flint	0	0	0	7	7
Tallapoosa	0	84	10	63	120
Criterion Violated	DO	Fecal Coliforms	Metal	Other	Regional Total = 441 miles

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

Source: "Water Quality in Georgia 2006-2007." Georgia EPD. June 2008.

4. FORECASTING FUTURE WATER RESOURCE NEEDS



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*SUMMARY: This section forecasts **future** demands for water and wastewater treatment in the region.*

Section 4. Forecasting Future Water Resource Needs

Water and wastewater demand forecasts, along with the resource assessments (Section 3), form the foundation for water planning in the Middle Chattahoochee Region and serve as the basis for the selection of water management practices (Section 6). The tables and graphics in this section present the regional water and wastewater forecasts for 10-year intervals from 2010 through 2050 for four water use sectors: municipal, industrial, agriculture, and thermoelectric generation.

During development of this plan, EPD requested water use forecasts for the four use sectors from the Alabama Department of Environmental Management (ADEM). Because of the current tri-state litigation, ADEM did not provide forecasts, only current day demands were provided. The Middle Chattahoochee Council directly appealed to ADEM requesting this data as well and had not received a response as of the writing of this plan.

4.1 Municipal Forecasts

The residential and commercial water demand and demands of small (non-major water using) industries were projected as one combined category and referred to as the municipal demand. Demands for major water using industries were projected separately and are discussed in Section 4.2.

Population Projections

Municipal water and wastewater forecasts are closely tied to the population projections for the counties within the Middle Chattahoochee Region. The population projections were developed by the Governor's Office of Planning and Budget (OPB) for the entire state. The OPB is charged in state law (O.C.G.A. 45-12-171) with the responsibility for preparing, maintaining, and furnishing official demographic data for the state. The population projection results by county are shown in Table 4-1.

Table 4-1: Population Projections by County

County	2010 [1]	2020 [1]	2030 [1]	2040 [2]	2050 [2]	Difference [2] (2010 - 2050)	% Change [2] (2010 – 2050)
Carroll	120,019	155,641	198,891	243,310	289,439	169,420	141.2%
Chattahoochee	15,641	21,182	23,617	25,624	27,991	12,350	79.0%
Clay	3,223	3,150	3,006	2,866	2,745	-478	-14.8%
Haralson	30,062	36,779	44,436	51,107	57,383	27,321	90.9%
Harris	31,178	41,001	52,606	65,047	78,213	47,035	150.9%
Heard	11,898	14,407	17,033	20,145	23,789	11,891	99.9%

Table 4-1: Population Projections by County							
County	2010 [1]	2020 [1]	2030 [1]	2040 [2]	2050 [2]	Difference [2] (2010 - 2050)	% Change [2] (2010 – 2050)
Muscogee	191,259	218,254	247,474	278,659	313,294	122,035	63.8%
Quitman	2,747	2,929	3,094	3,351	3,635	888	32.3%
Randolph	7,131	6,866	6,392	5,840	5,246	-1,885	-26.4%
Stewart	4,624	4,510	4,339	4,184	4,018	-606	-13.1%
Troup	66,608	81,046	97,191	109,211	121,031	54,423	81.7%
TOTAL	**484,390**	**585,765**	**698,079**	**809,344**	**926,784**	**442,394**	**91.3%**

Notes:
1. Georgia 2030 Population Projections, Office of Management and Budget, 2010.
2. Population projections provided to EPD by OPB.

Municipal Water Forecasts

The municipal water forecasts were calculated by multiplying the per capita water use by the population served. As 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. For publicly-supplied water use, a baseline per capita water use rate, on an annual average daily basis was determined for each county and applied to the projected population to obtain the projected future municipal water demand. This baseline per capita water use rate was calculated and refined to ensure that it was representative of the actual water use of the county. Adjustments of the baseline per capita water use rate were made based on input from water suppliers, council members, and from historical survey data as provided by EPD.

Further adjustments to the per capita rate were made based upon Georgia state code, Title 8, Section 8-2-3 which states that after April 1, 1992, all residential buildings of all types shall not be constructed with a toilet that uses more than 1.6 gallons of water per flush. After the initial round of forecasting had been completed the Water Stewardship Act was passed by the Georgia General Assembly further reducing the volumetric flush rates of toilets to 1.28 gallons per flush effective after July 1, 2012. The methodology used to determine the water savings associated with toilet replacements and overall municipal and industrial forecasting is further discussed in the Municipal and Industrial Water and Wastewater Forecasting Memorandum provided as a supplemental document available on the Middle Chattahoochee website.[1] A Water Conservation Technical Memorandum is also provided on the website, which quantifies the water savings associated with high efficiency flush toilets.

The municipal water forecasts are shown in Figure 4-1.

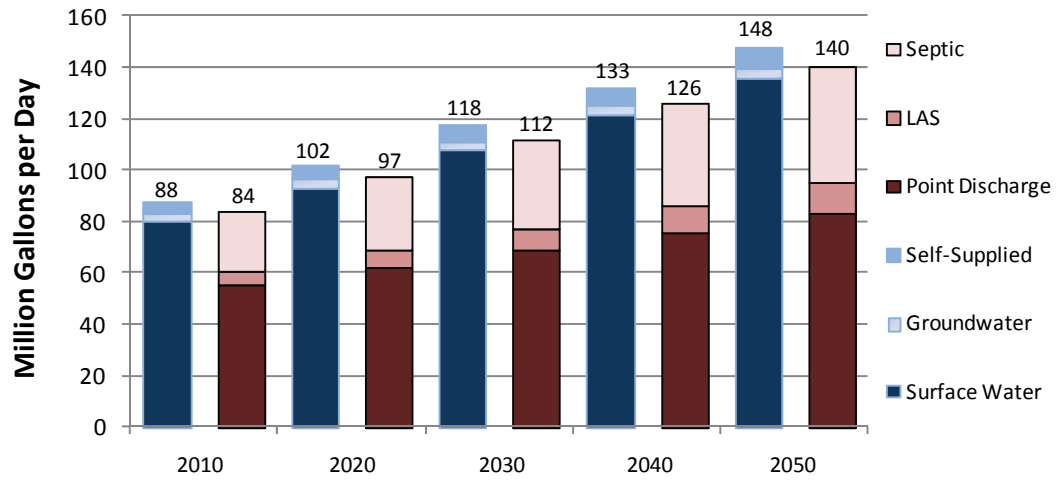
[1] http://www.middlechattahoochee.org/pages/our_plan/index.php

Municipal Wastewater Forecasts

Municipal wastewater forecasts were calculated by multiplying the municipal water use by a factor to estimate indoor water use, because outdoor water use does not require wastewater treatment. Indoor water use 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 an onsite sanitary sewage management system (OSSMS), also called septic systems.

Subtracting the flow to OSSMS from the total indoor water use provides the estimated flow to a municipal wastewater treatment plant. The wastewater flows to the municipal wastewater treatment plants are increased to account for inflow and infiltration (I/I). I/I is a term used to describe groundwater and stormwater that enters into the dedicated wastewater system. Figure 4-1 shows the municipal wastewater flows over the planning period. Forecasts were performed for state of Georgia based demands only. The current Alabama based consumptive demands as presented in Section 3 were held constant through the planning horizon.

Figure 4-1: Municipal Water & Wastewater Forecast



Notes: Values are totals for the entire water planning region, which includes portions of several watersheds.

4.2 Industrial Forecasts

Industrial water and wastewater demand forecasts anticipate the future needs for the industries that are expected to be the major water users through 2050. 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 either the rate of growth in employment for specific industrial sectors, the rate of growth in the units of production for specific industrial sectors, or other credible and relevant information and data provided by specific industrial water users. Forecasts were performed for state of Georgia based demands only. The current

Alabama based consumptive demands as presented in Section 3 were held constant through the planning horizon.

Employment Projections

The employment projections provided information on the anticipated employment growth rate for each industrial sector. The University of Georgia produced the industry-specific rates of growth for employment for EPD, which were used to calculate the future water needs for specific industries within the water planning region. The current industrial water use volume within a particular basin or aquifer unit was assumed to grow in direct proportion to the projected growth in regional industrial employment for the major water using industries. Water use for any industry with a projected decline in employment remained at the level of water use before the employment begins to decline. The assumption is that industrial water needs may not remain tied to employment in the future and a decline in employment may not reflect a decrease in water use for the industry. Furthermore, for regional planning purposes, the regions should plan to retain current water use levels and plan for growth. In the Middle Chattahoochee Region overall employment from major industrial water using industries is anticipated to increase by 45% over the 2010-2050 planning horizon.

Industrial Water Forecasts

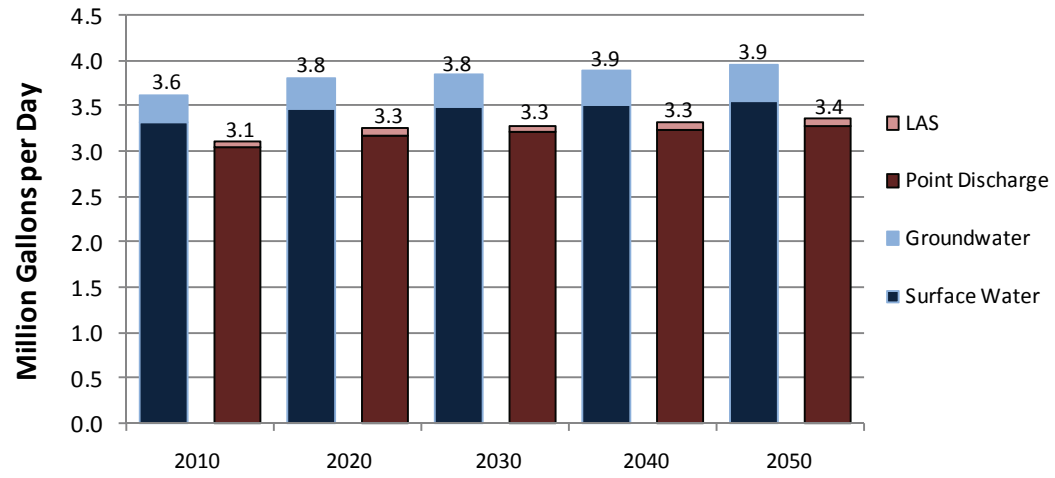
Industrial water forecasts were calculated using information and data specific to each of the major water using industries. For industries where information was available on water use per unit of production, water forecasts were based on production. For industries where product based forecasts were not possible, industry-specific workforce projections were assumed to reflect the anticipated growth in water use within the industry. Figure 4-2 shows the industrial water demands over the planning period.

Industrial Wastewater Forecasts

Industrial wastewater forecasts were calculated for each sector by multiplying the industrial water forecast by the ratio of wastewater generated to water used for that industrial sector. The primary mechanism for deriving the wastewater to water ratios was through a state-wide analysis of multiple years of actual annual average water return and withdrawal data for permitted users. Default ratios were then averaged by industry type and applied to the forecasted water volumes to generate a wastewater forecast. Ratios specific for the region and/or defensible and credible input provided by industrial stakeholder groups were used in lieu of the default ratios where available.

Figure 4-2 shows the industrial water and wastewater demands over the planning period.

Figure 4-2: Industrial Water & Wastewater Forecast



Notes: Values are totals for the entire water planning region, which includes portions of several watersheds.

4.3 Agricultural Forecasts

Agricultural water use includes both crop production and non-crop agricultural (livestock, nurseries, golf courses, etc.) water use. The crop forecasts, developed by the University of Georgia, provide a range of irrigation water use under dry, medium and wet climate conditions based on the acres irrigated for each crop. In collaboration with industry stakeholders, the University of Georgia also forecasted water use for the green industry (in-ground, container and low input nurseries and greenhouse operations). Normal and dry climate conditions were estimated for existing permitted golf courses through a collaborative analysis by EPD and the Georgia Golf Course Superintendents Association. For planning purposes, current dry year estimates were held constant through the planning horizon for golf courses.

The agricultural water demands for non-permitted agricultural uses, such as livestock production, were estimated for current conditions for EPD through a collaborative effort led by the University of Georgia and Albany State University. The livestock estimates represent the water used to raise livestock, not including processing facilities. The non-permitted agricultural use information reflects strong coordination between EPD and these water users. Projected water use forecasts for livestock agricultural use were not developed for this effort due to lack of available data. Furthermore, data did not include geographic or water source information and thus could not be utilized in EPDs resource assessment modeling. The livestock use was therefore not included in the aggregate dry year agricultural forecasts for resource assessment purposes. The agricultural demand for the planning period is shown in Table 4-2.

Table 4-2: Agricultural Water Forecasts by County

County	Aggregate Dry Year Agricultural Forecasts [1,2]					Current Livestock Estimate
	2010	2020	2030	2040	2050	2010
Carroll	0.89	0.90	0.91	0.92	0.93	0.90
Chattahoochee	0.00	0.00	0.00	0.00	0.00	0.00
Clay	5.38	5.49	5.63	5.79	5.96	0.10
Haralson	0.25	0.25	0.25	0.25	0.25	0.27
Harris	0.22	0.23	0.23	0.24	0.24	0.04
Heard	0.00	0.00	0.00	0.00	0.00	0.18
Muscogee	1.17	1.18	1.18	1.18	1.18	0.00
Quitman	0.27	0.28	0.29	0.30	0.31	0.02
Randolph	22.16	22.54	23.05	23.60	24.21	0.06
Stewart	3.14	3.19	3.27	3.34	3.42	0.03
Troup	0.18	0.18	0.18	0.18	0.18	0.16
Total	**33.66**	**34.22**	**34.98**	**35.80**	**36.69**	**1.76**

Notes:
1. Values reflect annual average daily use in millions of gallons per day for dry (75th percentile drought condition) years.
2. Aggregate demand is representative of forecasted water use for crop and nursery (green industry) irrigation. Values for current golf course irrigation are also included and held constant through 2050.

Agricultural water use in the Middle Chattahoochee Water Planning Region represents 4% of the total agricultural use in the ACF Basin by 2050 (not including Alabama demands). The largest agricultural use through the planning horizon occurs in the lower Flint River Basin. Heavy utilization of the surface water and groundwater resources in the lower Flint River impacts the flow quantities available to meet the seasonal RIOP targets below Woodruff Dam. The release of reservoir storage in the Chattahoochee Basin is utilized at times to offset lower flow from the Flint River Basin.

4.4 Water for Thermoelectric Power Forecasts

The use of the Chattahoochee River by thermoelectric power producers is significant. State energy projections show needs for more energy and as a consequence, more water. The additional power plant capacity has not been geographically determined; therefore, lacking this information, the Middle Chattahoochee region shows no increase in water consumption for thermoelectric power requirements for the planning period.

Several large Southern Company facilities are located along the Chattahoochee River and permitted by EPD including Plant McDonough, Plant Yates, Plant Wansley, and Plant Franklin (located in Alabama). A fifth Southern Company plant, Plant Farley also represents a significant water use in the system. The Joseph M. Farley Nuclear Plant, located near Dothan in southeast Alabama, is owned by

Alabama Power and operated by Southern Nuclear Operating Company. The plant is located in Alabama, upstream of the Woodruff Dam planning node and permitted by the Alabama Department of Environmental Management. One additional thermoelectric plant is currently proposed for construction in Early County, Georgia. The project, a 1,200 MW coal facility, has been proposed by Longleaf Energy Associates, a subsidiary of LS Power Development.

Several smaller biomass plants are also proposed in the ACF region. An example is the Yellow Pine Energy Company, LLC, a biomass-fired facility to be located near Fort Gaines, Georgia[2]. The Yellow Pine facility was scheduled to go into operation in 2010 and will produce 110 megawatts of renewable energy using wood product waste material.

The 2005 total annual average consumptive demand for the large thermoelectric facilities located on the Chattahoochee River was approximately 75 million gallons per day (Table 4-3). This demand was included in EPD's surface water availability model for the Chattahoochee River Basin component of the ACF Basin model. The current consumptive use of 38 million gallons per day for Plants Yates and Wansley (95 million gallons per day combined withdrawal minus 57 million gallons per day combined return) represents the geographically located thermoelectric water use in the Middle Chattahoochee region (Figure 4-3 and 4-4).

The Georgia EPD assembled an energy water use task force to provide input on energy water use forecasts for the state. The "Alternative" condition forecast, which represents an upper end estimate for the state, shows an increase in annual energy needs to approximately 330,000 gigawatt hours in 2050. These forecasts indicate that the estimated energy needs for the state will exceed existing and planned[3] power production; therefore, additional power production facilities are needed[4]. Given appropriate transmission infrastructure improvements, these additional power needs could be met by producing energy anywhere in the state (although these needs would preferably be located as near as possible to demand centers); therefore, while the amount of water needed to produce the forecasted electrical needs was calculated, this water need was not geographically determined.

The Middle Chattahoochee Water Council recognizes that the region is projected to grow and that growth will put pressure on all of our state's resources, including water and electricity. Therefore, the Council encourages the use of best management practices for cooling and water use, recommends that energy providers should continue to work with EPD in pursuing the goals of Chapter 3, *Conserving Water*

[2] PR Newswire, *Georgia Power Contracts with Renewable Plant*, January 14, 2010 (www.prnewswire.com)

[3] The energy use task force provided estimates for planned construction, expansion, and/or modification of power producing plants through the 2017 planning horizon. This planned capacity was incorporated into the comparison between installed capacities versus forecasted demands.

[4] CDM, *Statewide Energy Sector Water Demand Forecast Technical Memorandum*, October 29, 2010.

Used for Electric Generation and Use of the State's Water Conservation and Implementation Plan, and recommends that EPD review withdrawal and discharge permits for additional facilities in the region considering the limitations of the region's water resources to prevent exacerbation of instream water use impacts as discussed in Section 3 of this Regional Water Plan.

Table 4-3. Thermoelectric Power Plants along the Chattahoochee River

Plant	County, State	Fuel Type	Generating Capacity (MW)	2005 Consumptive Water Demand (MGD)
Metro North District				
McDonough	Cobb County, GA	Coal/natural gas	568 (see Note 4)	0.0 (see Note 5)
Metro North District Subtotal			**568**	**0.0**
Middle Chattahoochee Region				
Yates (see Note 6)	Coweta County, GA	Coal	1,250	16.0
Wansley	Heard County, GA	Coal//fuel oil/ natural gas	3,999	22.2
Middle Chattahoochee Subtotal			**5,249**	**38.2**
Alabama				
Franklin	Lee County, AL	Natural gas	1,806	0.7
Farley	Houston County, AL	Nuclear	1,776	36.4
Alabama Subtotal			**3,582**	**37.1**
Chattahoochee Basin Total			**9,399**	**75.3**

Notes:
1. Consumptive water demand values represent annual averages; MGD = millions of gallons per day
2. Water use data for all but Plant Farley were provided by EPD.
3. Consumptive water demand estimates for Plant Farley were provided to EPD from the Corps of Engineers. This value (36.4 MGD) represents the estimated consumptive Alabama demand for the Woodruff Planning Node as provided to the Council.
4. After conversion from coal fired to gas fired units in 2012, Plant McDonough's generating capacity will increase from 568 MW to 2,520 MW.
5. The zero (0) MGD estimated consumptive water demand for Plant McDonough reflects the use of once-through cooling employed by that facility for the representative year analyzed for this plan. The addition of cooling towers to this plant will need to be reflected in the water availability resource assessments during the five year update to this plan.
6. Plant Yates is physically located in Coweta County in the Metro North Georgia Water Planning District; however, since the plant intake and discharge is south of the Whitesburg planning node, this plant is listed with Middle Chattahoochee uses.

4.5 Total Water Demand Forecasts

Municipal water use makes up the largest proportion of regional water use. As shown in Figures 4-3 through 4-5, this trend is expected to continue through the planning horizon and become more prominent as residential/commercial development continues to grow. The increase in water use will also result in increased wastewater generation and disposal needs. As the quantity of wastewater discharged to

receiving waters increases, the level of treatment will also need to increase where TMDLs are identified to be reached or exceeded. Additional consideration needs to be taken regarding current operation of the ACF Basin by the U.S. Army Corps of Engineers and the ability to meet the future consumptive demands presented in this section and the instream uses and congressionally authorized purposes presented in Sections 2 and 3.

Figure 4-3: Water Demand in 2010 and 2050

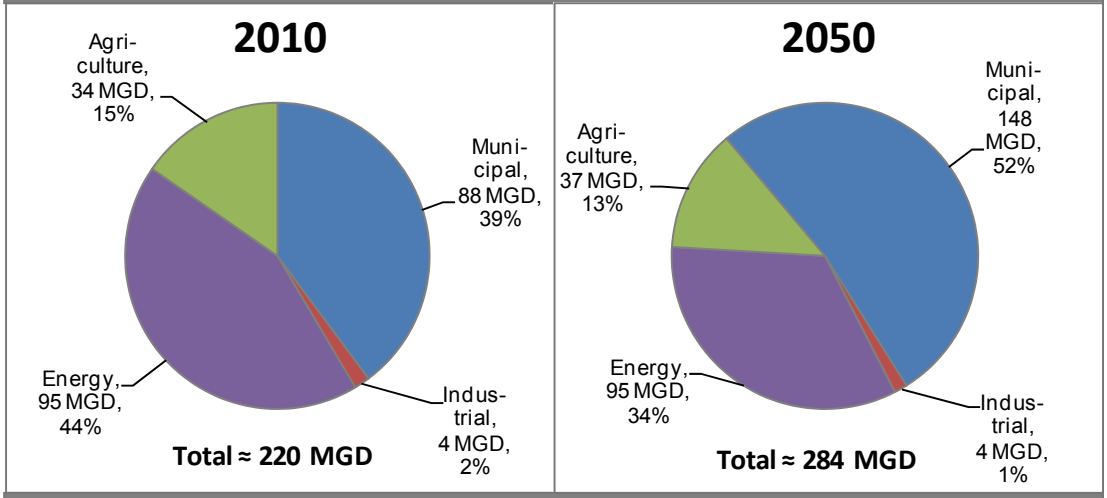
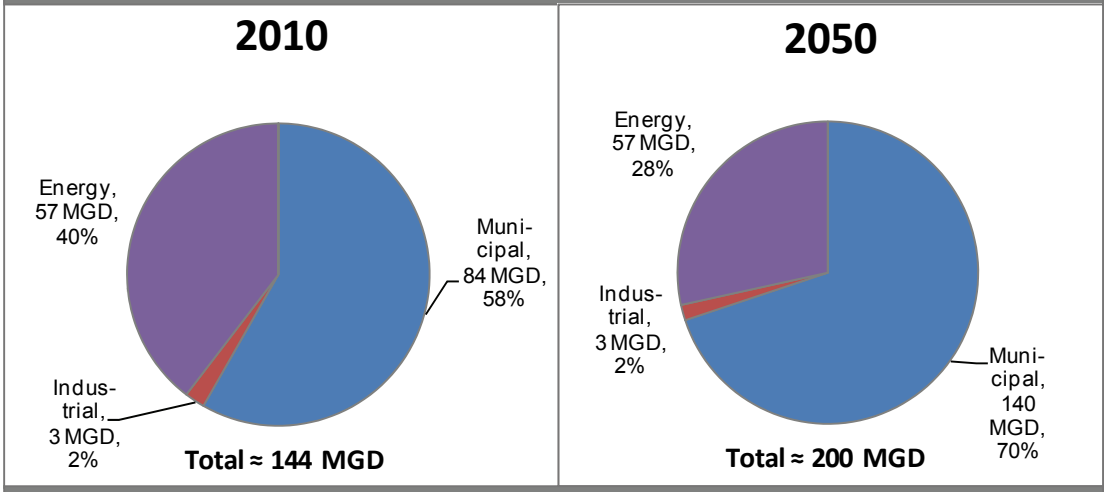
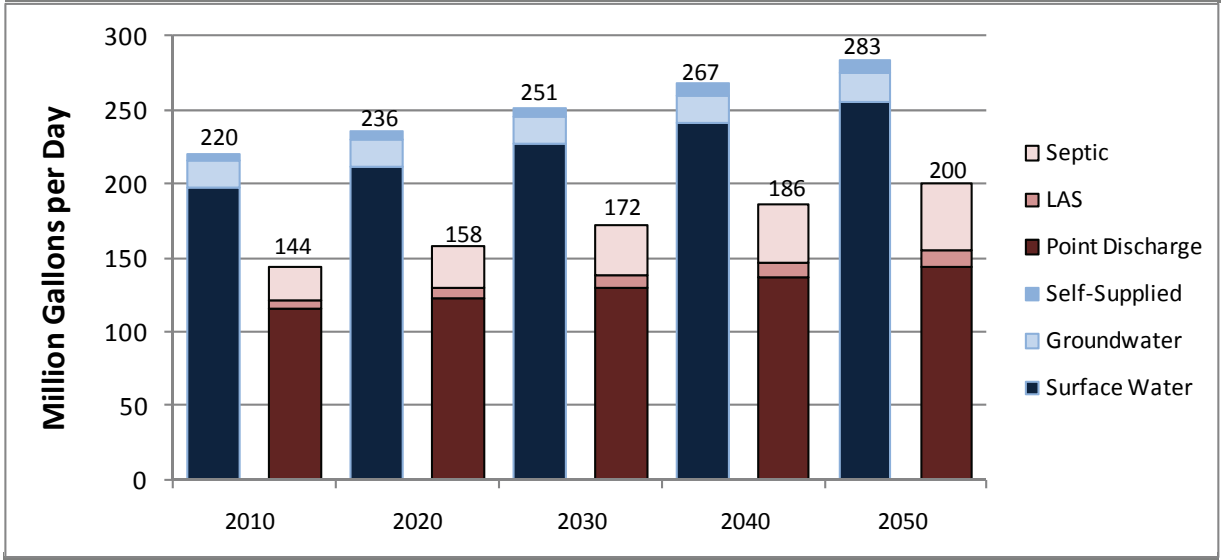


Figure 4-4: Wastewater Flow in 2010 and 2050



Notes:
1 - Data Sources: Middle Chattahoochee Municipal & Industrial Forecasts (Black & Veatch 2010), Energy Forecasts (EPD 2010), Agricultural Forecasts (UGA 2010)
2 - The 2005 thermoelectric water demands and returns were assumed constant through 2050.
3 - Values are totals for the entire water planning region, which includes portions of several watersheds.

Figure 4-5: Total Water and Wastewater Forecasts

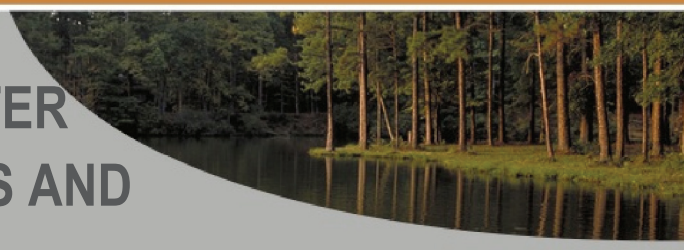


Notes: Values are totals for the entire water planning region, which includes portions of several watersheds.

The Council advocates for an adaptive reservoir management strategy to better meet all existing instream flow and water supply requirements while benefitting multiple stakeholders throughout the basin. One such strategy presented by Dr. Aris Georgakakos of the Georgia Tech Georgia Water Resources Institute and endorsed by the Council is provided as a supplemental document available on the Middle Chattahoochee website.[5]

The total water demand for the ACF Basin must be coordinated through continued collaboration between the Council with the Metro North District, Lower Flint-Ochlockonee, and Upper Flint Councils, to present and implement management practices that represent fair and equitable allocations of the limited resources. Furthermore, the councils will need the State's support in implementing these management practices and coordinating interstate resource issues. Of primary importance to the council are those issues relating to changes in the management of federal reservoirs, the impacts of groundwater pumpage on groundwater contributions to Flint River baseflow and potential impacts on Chattahoochee storage to make up RIOP flow requirements below Woodruff Dam, and the scientific justification of the flows required by the RIOP.

[5] http://www.middlechattahoochee.org/pages/our_plan/index.php



5. COMPARISON OF WATER RESOUCE CAPACITIES AND FUTURE NEEDS

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SUMMARY: This section compares water resource capacities and future demands for water and wastewater treatment in the region. It discusses how the Council considered gaps identified between needs and resource capacities.

Section 5. Comparison of Water Resource Capacities and Future Needs

This Section compares the water and wastewater demand forecasts (Section 4), along with the resource assessments (Section 3), providing the basis for selecting water management practices (Section 6). Areas where the future withdrawal or waste assimilation exceed the capacity of the resource for groundwater, surface water availability and surface water quality (assimilative capacity) will be addressed through water management practices. Areas where instream uses are not satisfied are also discussed.

5.1. Surface Water Availability Comparisons

Projected conditions in 2050 are similar to the current conditions described in Section 3. Significant gaps are identified under future 2050 demand conditions at the Heflin and Newell planning nodes in the Tallapoosa Basin. At the Montezuma planning node, no significant flow gap was identified under 2050 demand conditions. Downstream, at the Bainbridge node, a substantial gap was identified, both under current and future conditions. For the Bainbridge node, the gap is affected both by consumptive use of surface water and by the withdrawals from the Floridan Aquifer in subarea 4 of the Dougherty Plain, where interconnection between the groundwater and surface water system is high. The average shortfall in the Flint River is modeled to increase by less than one percent by 2050. No observed shortfalls are noted for the Chattahoochee River; however, any future demand met in the model by use of existing storage should be considered a potential surface water availability gap and addressed through management practices. Furthermore, the conclusion of no shortfall along the Chattahoochee River is on the basis that the current Revised Interim Operations Plan (RIOP) remains unchanged and conservation storage is available to fulfill demands. As discussed in Section 3, the Council takes exception to the manner in which the Corps has operated the system under the RIOP and identified impacts associated with the RIOP, including the following:

- Economic and Recreational Impacts
- Fish & Wildlife Conservation Impacts
- Critical Habitat Impacts
- Reservoir Drought Operation Impacts
- Hydropower Impacts
- Water Quality Impacts
- Reservoir Operation & River Flow Impacts

A projected increase in surface water consumption of approximately 31 million gallons per day on an annual average basis is anticipated for the region. The results of the future surface water availability model are illustrated in Figure 5-1.

As a result of these impacts, the Council has identified the need for an improved operating plan for the Apalachicola-Chattahoochee-Flint (ACF) Basin which equitably balances the multiple authorized purposes of the federally operated reservoirs and addresses impacts on instream uses throughout the basin. The Council has identified a range of desired outcomes to be accomplished through modification of the existing Corp's RIOP. 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:

- Reduce operational winter drawdown of West Point Lake. Council members have stated that they desire that West Point Lake be operated to maintain levels above the prescribed impact level of 632.5 feet NVGD as often as possible provided that adequate winter drawdown is maintained to provide for flood storage. Council members believe that induced flood storage for flood control between elevations of 635-641 feet NVGD should be examined and, if found to be acceptable by the Corps, used as routine flood storage.

- Establish and maintain instream flow guidelines below the Columbus and Columbia planning nodes to ensure adequate protection of water quality for downstream users. The Corp's RIOP does not recognize any flow targets in the vicinity of the Columbus planning node.[1] 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.

- Allow for operational flexibility to enable storage reservoirs to recover faster after severe droughts and thus reduce the risk of follow-up droughts for all ACF stakeholders.

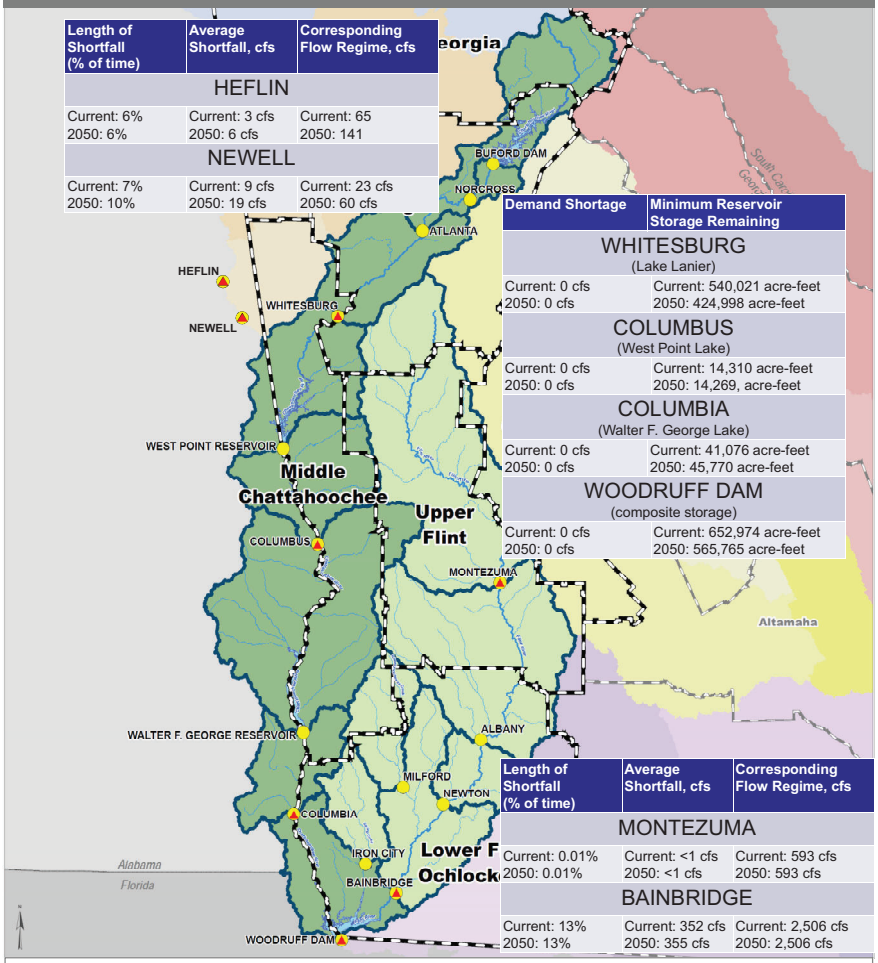
- Ensure critical habitat for federally and state protected species are managed in accordance with state and federal policy requirements. Ensure that requirements aimed at doing so are founded upon thorough and accepted science by all stakeholders for the range of species and habitats throughout the basin.

As a historical note, in almost all of the Corps' and EPD's ACF Basin models for assessing current operations, a flow target of 1200 cfs has been used in the vicinity of the Columbus planning node. This number is greater than 98% exceedance levels of the observed flow (1939-2007) at this location[2]. Since 1976, when West Point Lake was

[1] The only control points in the entire ACF Basin, according to the Corps, are a 750 cfs flow requirement at Peachtree Creek confluence with the Chattahoochee River and a flow requirement at Chattahoochee, Florida per the Revised Interim Operation Plan.

[2] Black & Veatch, Technical Memorandum, *[Water Quantity] Resource Assessment Summary Graphics Summary*, July 23, 2010, presented at Middle Chattahoochee Water Council Work Group meeting July 27, 2011.

Figure 5-1: Surface Water Availability Comparison



Source: 1) Georgia EPD Surface Water Availability Model Results, May 2010
2) Municipal and Industrial Forecasts (Multiple Planning Contractors, 2010)
3) Agricultural Forecasts (UGA 2010) 4) Current Alabama Consumptive Demand (Provided to EPD by the Corps with permission from ADEM)

placed in operation, the observed Columbus flow has exceeded 1200 cfs 99.2% of the time. In other words, modeling of this flow target does not deviate much from the Corp's actual historic operation. It is the Council's contention that water quality would be enhanced if these flow guidelines were recognized by inclusion in the RIOP.

The Council recognizes that specific operating targets should come from more detailed modeling and analysis; however, modeling which has already been performed illustrates the possibility of achieving the above listed goals and meets future demands. One model, produced by Dr. Georgakakos of the Georgia Institute of Technology's Georgia Water Resources Institute, shows that simple modifications to the RIOP could meet instream flow and future water supply requirements, result in higher Lake Lanier and West Point Lake levels during droughts, meet planning level flow targets below the Columbus and Columbia planning nodes, and aid in more rapid recovery of reservoir levels after severe drought conditions. Furthermore, the model constrained flows below Woodruff Dam to achieve a minimum flow of 5,000 cubic feet per second. Resulting flow distributions below Woodruff Dam would not be appreciably different than what currently occurs under the RIOP. Despite this insight, the Council still recognizes a need for further scientific evaluation regarding the protection of critical habitats.

EPD resource assessment modelers have confirmed that the model produced by Dr. Georgakakos is similar to the modeling tools utilized by EPD and that with the same constraints and modeling inputs the two models would produce very similar results. The model results as presented to the Council are provided as a supplemental document on the Middle Chattahoochee website[3] and model targets and constraints summarized in Table 5-1.

[3] http://www.middlechattahoochee.org/pages/our_plan/index.php

Table 5-1: Modeling Constraints for Modified Operation of Federal Reservoirs	
Proposed Flow Requirements	
Gauging Station	**7-Day Average Flow (cubic feet per second)**
Whitesburg Node	1,350
Columbus Node	1,850
Columbia Node	2,000
Chattahoochee Gauge below Woodruff Dam	Modified RIOP (Note 1)
Proposed Reservoir Elevation Ranges	
Reservoir	**Water Level Ranges (feet NVGD)**
West Point Lake	632.5 – 635 (normal) 635 – 641 (induced flood storage)
Walter F. George Lake	187.5 – 190 (normal) 185 (minimum)
Lake Seminole	76.5 – 77.5
Notes: 1. See the Georgia Water Resources Institute of Georgia Tech Modeling Presentation supplemental document located on the Middle Chattahoochee website. http://www.middlechattahoochee.org/pages/our_plan/index.php	

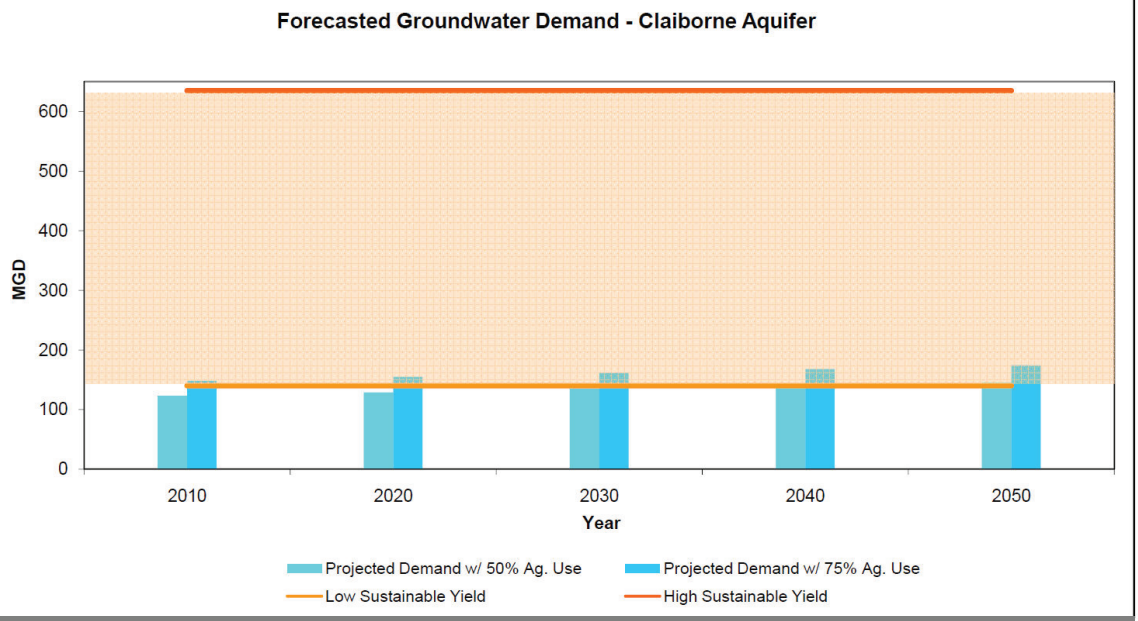
The Council endorses the conditions in the modeling work performed by Dr. Georgakakos for further development and encourages discussion between EPD, regional councils, the Army Corps of Engineers, U.S. Fish and Wildlife Service, and stakeholders in the tri-state area regarding the advantages of this approach and further refinement and analysis which could be required.

5.2. Groundwater Availability Comparisons

Section 3.2.2. discussed the groundwater resource sustainable yields and current use of assessed aquifers. A comparison of sustainable yields and forecasted 2050 demands from those aquifers is included in Figure 5-2 for the Claiborne aquifer. The results indicate that in the Claiborne, forecasted 2050 use will be within the sustainable yield range for this aquifer.

The low end estimate for the sustainable yield was determined by uniformly increasing withdrawals from existing modeled wells. The high end sustainable yield was calculated by distributing the forecasted groundwater demand over the entire prioritized aquifer. The forecasted demand is higher than the low sustainable yield but lower than the upper sustainable yield. Management practice selection (Section 7) will work toward mitigating this and other gaps identified in the resource assessments.

Figure 5-2 Claiborne Aquifer Sustainable Yield vs. Demand



Source: Sustainable Yield Modeling Results, February 2011

5.3. Surface Water Quality Comparisons (Assimilative Capacity)

Dissolved oxygen modeling (DOSAG) has been performed using future 2050 flow at permitted load limits for existing NPDES permit holders and should provide a reasonable approximation of future conditions for most of the council. DOSAG modeling results are presented in Figures 5-3 and 5-4 and indicate that approximately 31 of the 603 Chattahoochee River miles modeled (five percent) will have exceeded their assimilative capacities for dissolved oxygen. All 31 miles of streams modeled as at or above the assimilative capacity limit are located on the mainstem of the Chattahoochee River beginning in central Douglas/Fulton counties in the Metro North Georgia District and terminating where backwater effects from West Point Lake occur in Heard County.

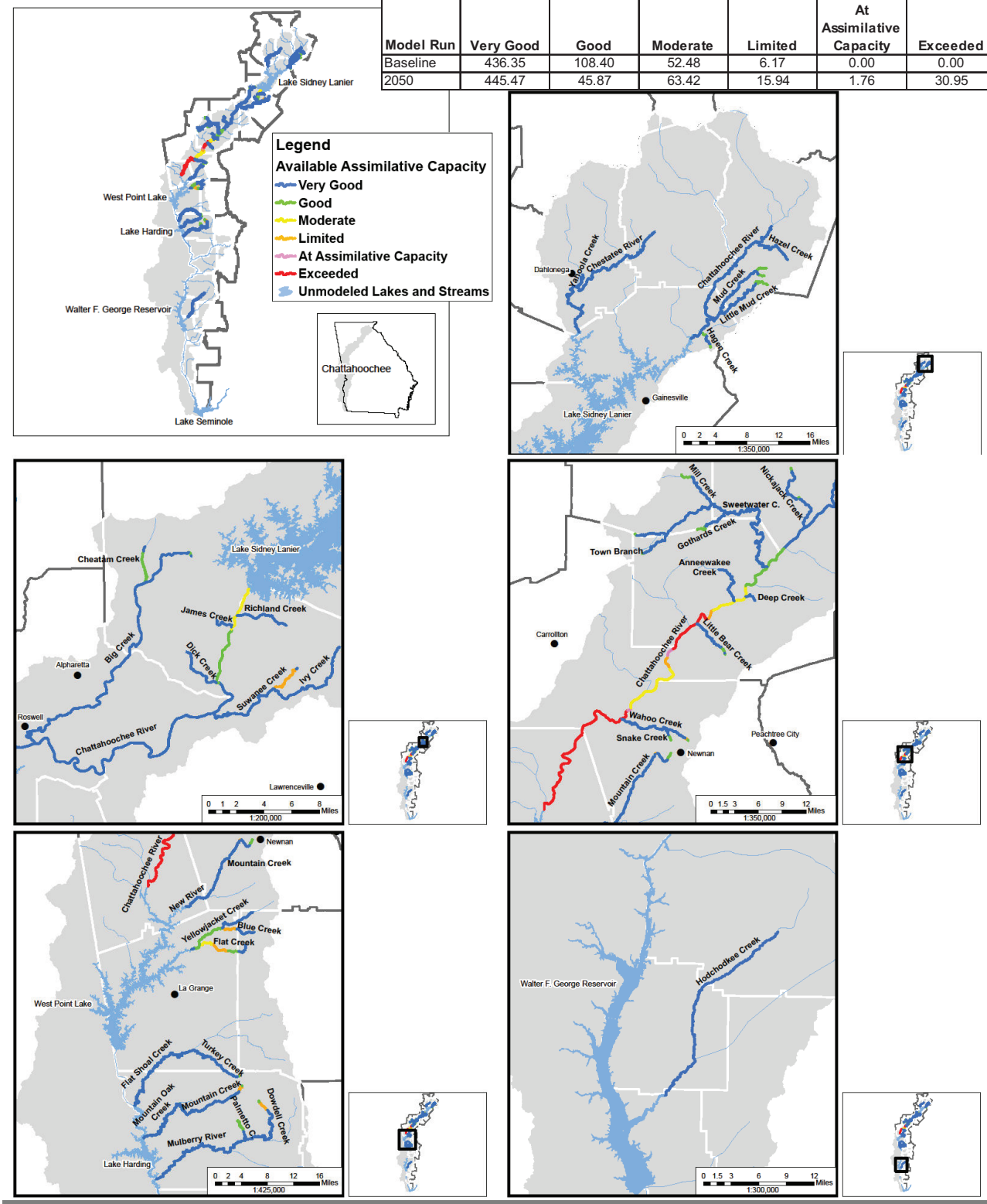
Watershed and lake modeling indicate that future increases in nutrient loads to the Lake Lanier, Chattahoochee, and Flint watersheds are primarily due to the projected increase in point source discharges and secondarily due to changes in land use and nonpoint runoff. The modeled trends for nutrient loads over the planning horizon for the Chattahoochee watershed are illustrated in Figure 5-5. Modeled chlorophyll-a levels were compared with existing chlorophyll-a standards for the major reservoirs along the Chattahoochee and Flint rivers. The models resulted in the following:

- Lake Lanier Modeling Results –
  - Chlorophyll-a standards are exceeded now and in the future at specific locations

  - Exceedances due to combination of point and nonpoint sources
  - Phosphorus loading to lake is primarily (~70%) from nonpoint sources
- West Point Lake Results –
  - Significant increases in phosphorous are anticipated in 2050, which would cause exceedances of the current 27 microgram per liter chlorophyll-a standard (see Figure 5-6)
  - Phosphorus is primarily from point sources
- Walter F. George Results –
  - Chlorophyll-a exceedances are projected under current and future conditions
  - Future phosphorus increases from some nonpoint and significant point sources
- Lake Seminole Results –
  - No water quality standards are yet established
  - Phosphorus loading to the lake is primarily from nonpoint sources
  - Future phosphorus increases are primarily point source related
- Lake Blackshear Results –
  - No water quality standards yet established
  - Phosphorus loading into lake is primarily from nonpoint sources

Figure 5-3 Assimilative Capacity Results from Dissolved Oxygen Assessment: Chattahoochee River (2050)

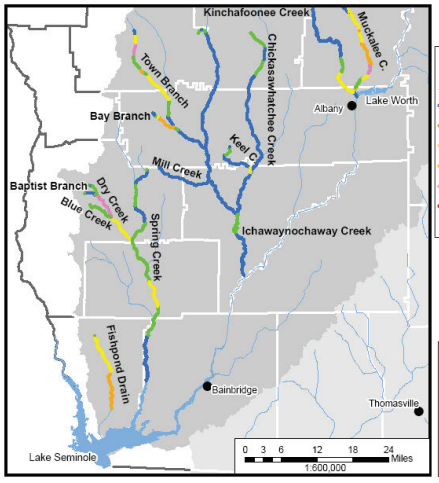
Model Run	Chattahoochee Basin - Available Assimilative Capacity (Total Mileage)					
	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
Baseline	436.35	108.40	52.48	6.17	0.00	0.00
2050	445.47	45.87	63.42	15.94	1.76	30.95

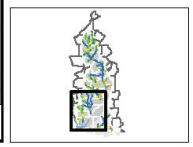


Source: EPD, October 2010

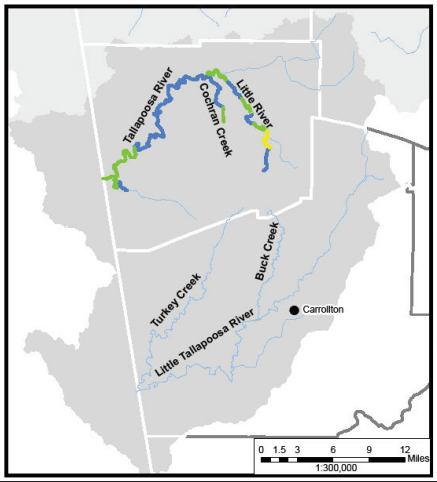
Figure 5-4 Assimilative Capacity Results from Dissolved Oxygen Assessment: Flint & Tallapoosa Rivers (2050)

	Flint Basin - Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
Baseline	551.22	304.59	74.09	21.68	0.62	8.18
2050	515.75	254.97	129.43	49.32	10.92	0.00

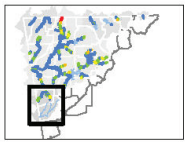




Legend
Available Assimilative Capacity
Very Good
Good
Moderate
Limited
At Assimilative Capacity
Exceeded
Unmodeled Lakes and Streams



Legend
Available Assimilative Capacity
Very Good
Good
Moderate
Limited
At Assimilative Capacity
Exceeded
Unmodeled Lakes and Streams

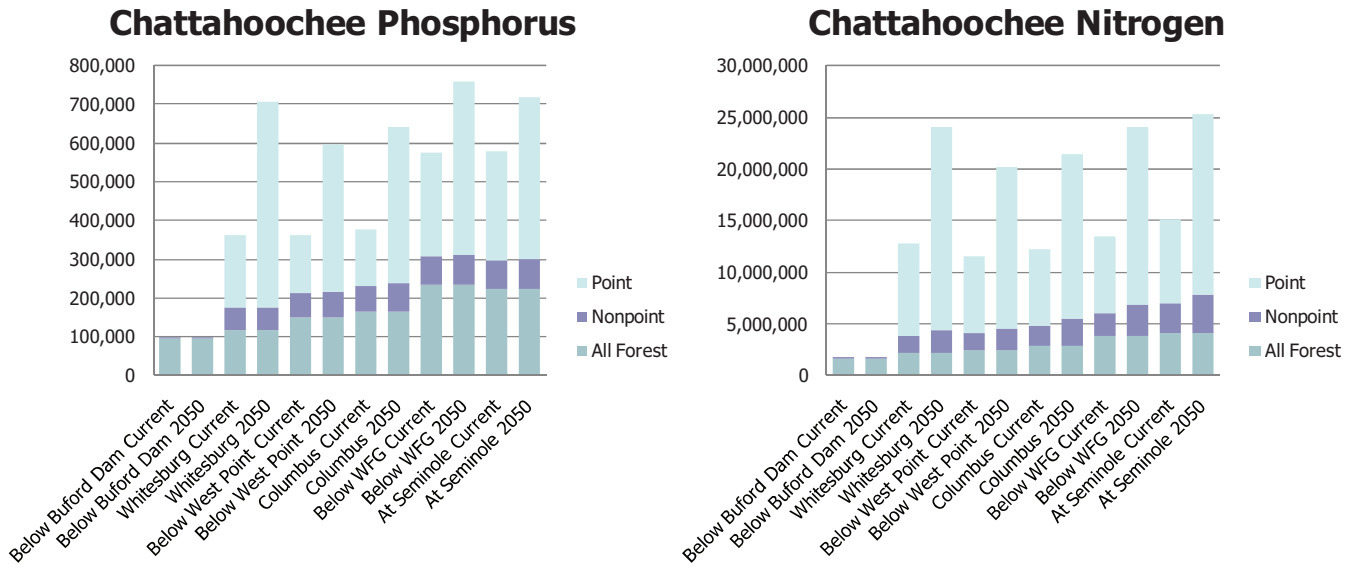


	Tallapoosa Basin - Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
Baseline	46.45	1.25	0.00	0.00	0.00	0.00
2050	28.40	17.21	2.09	0.00	0.00	0.00

Source: EPD, October 2010

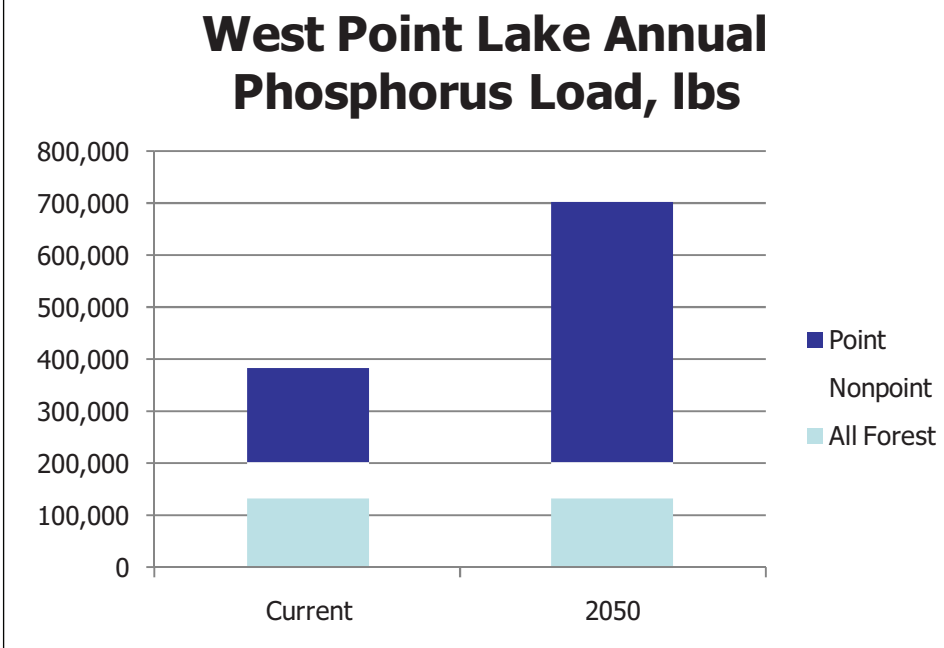
Figure 5-5 Modeled Nutrient Loading Trends from the Chattahoochee Watershed

Chattahoochee Nutrients

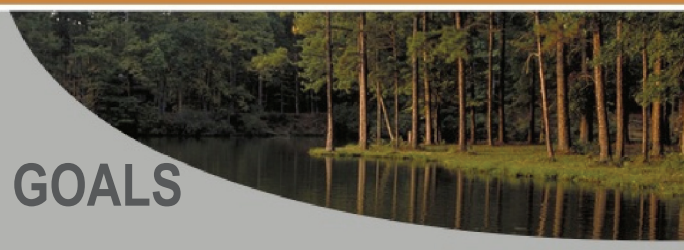


Source: EPD, February 2011

Figure 5-6 West Point Lake Annual Phosphorous Loading



Source: EPD, February 2011



6. ADDRESSING WATER NEEDS AND REGIONAL GOALS

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SUMMARY: The Middle Chattahoochee Water Planning Council considered current (Section 3) and future (Section 5) conditions to identify recommendations for management practices. Selected management practices are used to meet regional goals (Section 1) and address gaps identified by the resource assessments and the Council. This section presents the Middle Chattahoochee Water Planning Council's selected management practices.

Section 6. Addressing Water Needs and Regional Goals

6.1 Identifying Water Management Practices

The comparison of resource assessments and forecasted needs presented in Section 5 identifies the Middle Chattahoochee Region's likely resource gaps and demonstrates the need for water management practices. In the Chattahoochee River Basin, where council-defined gaps are present for instream uses and use of existing storage, the management practices in this section have been selected to also meet those needs. In selecting the actions needed, the Council considered practices identified in existing plans, as well as the Council's vision and goals, and coordination with local governments, water providers, and neighboring councils that share these water resources.

The Council identified several uncertainties that could impact plan implementation, including:

- Revision of the U.S. Army Corps of Engineers water control manual for the Apalachicola-Chattahoochee-Flint (ACF) basin
- Consultation regarding the 2008 Biological Opinion provided to the U.S. Army Corps of Engineers by the U.S. Fish and Wildlife Service has been reinitiated pursuant to provisions of the Endangered Species Act as of September 20, 2010. The consultation will continue ongoing depth distribution data collection and analysis to determine if the minimum flow of 5,000 cubic feet per second required under the RIOP needs to be increased in order to protect listed species
- EPA promulgation of final nutrient criteria for Florida's lakes and flowing waters and resulting requirements for Georgia permittees
- Potential state regulatory changes (e.g., revisions to the state dissolved oxygen standard)
- Information needs to address water quality data gaps for water bodies in the region
- Information needs regarding impacts of identified gaps between resource capacities and demands
- Information needs regarding baseline best management practices implementation in the region
- Alabama forecasted demands

- Coordination needs with other councils, particularly the Upper Flint, Lower Flint-Ochlockonee, and the Metropolitan North Georgia Water Planning District

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

6.1.1 Review of Existing Plans and Practices

The Middle Chattahoochee Regional Water Planning Council conducted a comprehensive review of existing local and regional water management plans and relevant related documents to frame the selection of management practices. When possible, successful management practices already planned for and/or in use in the region formed the basis for the water management practices selected by the Council. In addition, recommended actions were selected so as not to conflict with other existing state or regional plans. A summary of the local and regional plans reviewed is provided as the Existing Regulatory and Local Plan Summary supplemental document on the Middle Chattahoochee website.[1]

6.2 Selected Water Management Practices for the Middle Chattahoochee Region

The management practices selected by the Council are summarized in Table 6-1 and categorized into water quantity, instream use, and water quality management practices. 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 of these resources and that within the region, issues across different water resources are similar enough that the selected practices are appropriate to be applied across the whole region.

A discussion of the management practices follows the table. Further details regarding the process of management practice selection are provided in the Management Practice Selection Technical Memorandum supplemental document on the Middle Chattahoochee website.[1]

[1] http://www.middlechattahoochee.org/pages/our_plan/index.php

Table 6-1: Water Management Practices Selected by the Middle Chattahoochee Water Planning Region	
Management Practice	**Description/Definition of Action**
WATER QUANTITY	
DEMAND MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 6, 7, 8*	
WC-1: Support implementation of Tier 1 and 2 conservation activities ***(HIGH PRIORITY)***	Tier 1 and 2 water conservation practices include those required by existing law or anticipated in upcoming state rule-making: • Submittal of water conservation plans by withdrawal permittees (391-3-6-.07 and 391-3-2-.04(11) • Landscape irrigation limits (4pm to 10am), as required by Water Stewardship Act of 2010 (with exemptions) (12-5-7) • Even-odd watering restrictions for non-irrigation outdoor water uses (391-3-30) • Public car wash facility regulations, which require best management practices (391-31) • Demonstration by water withdrawal permittees of progress toward water conservation goals or water efficiency standards (State Water Plan, Section 8) • Public water systems to conduct water loss audits according to IWA/AWWA Water Audit Method[2] (Water Stewardship Act, Section 3). • Amendment of local building codes to require sub-metering in multi-tenant buildings, installation of high efficiency plumbing fixture in all new construction, and installation of high-efficiency cooling towers in new construction (Water Stewardship Act, Sections 7, 8, & 9)
WC-2: Encourage all water providers to consider conservation oriented rate structures at the time of refinancing or recapitalization	Encourage citizens to conserve water by providing an economic incentive while maintaining revenue requirements. May include, but not limited to the following: • For most customers, change rate structures from predominately declining block type to predominately conservation type • Perform a rate and revenue analysis • Ensure adequate billing system functionality • Review and update pricing
WC-3: Encourage all water providers to implement education and outreach programs	Raise awareness about the value of local water resources and the need to conserve; empower individuals and businesses to make informed decisions about their water using behavior and the fixtures and appliances they employ

[2] American Water Works Association/International Water Association, *IWA/AWWA Water Audit Method*, Manual 36, 2009. <http://www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=48055>

Table 6-1: Water Management Practices Selected by the Middle Chattahoochee Water Planning Region	
Management Practice	**Description/Definition of Action**
RETURNS MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 5, 6, 7*	
WW-1: Encourage use of point source discharges for wastewater treatment effluent disposal for major facilities (greater than one million gallons per day) ***(HIGH PRIORITY)***	Reduce the time in which water is returned to surface water courses in the future and reduce regional consumptive demands; exceptions may be taken for systems that demonstrate that use of new or expanded land application systems is necessary due to economic and/or hydrologic reasons
WW-2: Encourage studies to determine the appropriate water returns ratios for agricultural irrigation and, wastewater and application and septic systems	The assumption of 100% consumptive use is believed to inadequately reflect the quantity and timeliness of water returns from agricultural irrigation and, wastewater land application and septic systems. This exacerbates the magnitude and duration of gaps in the EPD resource assessments. The studies would be scaled to reflect appropriate geographic and physiographic provinces, since returns would be dependent on topography, soil, and climate differences.
SUPPLY MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 2, 5, 7*	
WS-1: Study the development of new and/or enhancement of existing surface water storage reservoirs ***(HIGH PRIORITY)***	Determine the feasibility for additional storage to relieve gaps and shortfalls modeled in resource assessments and identify implementation challenges and environmental concerns. Investigate funding sources for new surface water reservoirs.
WS-2: Implement new and/or enhance existing surface water storage as necessary ***(HIGH PRIORITY)***	Where feasible pursue projects to enhance regional supply to meet future demands and protect instream flows
WS-3: Encourage the construction and use of farm ponds for agricultural irrigation through existing incentive programs	• Storage option for replacing direct pumping from surface streams or wells during the growing season; minimize impact on flow conditions during drought; source water to supplement these ponds may be harvested during periods of high flow • Impacts on flows through intercepted drainage and evaporative loss should be considered to minimize adverse impacts on surface water availability • Instream flow protection should be considered in the

Table 6-1: Water Management Practices Selected by the Middle Chattahoochee Water Planning Region	
Management Practice	**Description/Definition of Action**
	• operation of farm ponds • Incentive funding is available from the Soil and Water Conservation Districts and the Georgia Soil and Water Conservation Commission
WS-4: Encourage interconnection of regional supply systems for reliability	Provide supply reliability for regional systems in times of drought or emergency conditions
WS-5: Encourage local providers to prepare drought contingency plans	Prepare for the inevitability of periodic drought by outlining key metrics defining drought condition triggers, system operating procedures and metrics, water use restrictions, and emergency protocol for water supply. For non-permitted water providers these actions should, at a minimum, meet the requirements and be coordinated with the Georgia Drought Management Plan (March 2003).
WS-6: Study the use of aquifer storage and recovery to enhance water supply	Determine the potential for harvesting peak flows and feasibility of storing those flows in aquifers for later use as a drinking water supply or streamflow augmentation.
INSTREAM USE	
INSTREAM USE MANAGEMENT TO ADDRESS COUNCIL-DEFINED GAPS IN FEDERAL OPERATION OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT BASIN → *GAPS ADDRESSED: INSTREAM USE* → *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 ***(HIGH PRIORITY)***	Protect water quality in the Chattahoochee River section of the Middle Chattahoochee region; Advocate for the U.S. Army Corps of Engineers to acknowledge Federal Energy Regulatory Commission license requirements and permit conditions within the Middle Chattahoochee region for wastewater assimilation and water quality maintenance purposes in revisions to the Water Control Manual for the Apalachicola-Chattahoochee-Flint Basin
IU-2: Advocate for changes to the U.S. Army Corps of Engineers Water Control Manual for the ACF Basin ***(HIGH PRIORITY)***	• Promote further study of the adaptive reservoir management model for the ACF Basin performed by Georgia Tech's Georgia Water Resources Institute (see supplemental documents)[3] • Prevent reservoir levels from dropping below critical levels for the protection of authorized recreational uses • Modify system operation to allow the federal reservoir projects to recover more rapidly after drought conditions • Advocate for current biological flows below Woodruff Dam

[3] See the Georgia Water Resources Institute of Georgia Tech Modeling Presentation on the Middle Chattahoochee website. < http://www.middlechattahoochee.org/pages/our_plan/index.php >

Table 6-1: Water Management Practices Selected by the Middle Chattahoochee Water Planning Region	
Management Practice	**Description/Definition of Action**
	• to be based upon a scientific justification study • Optimize the balance of uses and Congressionally authorized purposes of federal reservoirs in the ACF Basin: advocate for improved balance and priorities for uses and stated purposes (i.e. hydropower, flood control, water supply, recreation, fish & wildlife habitat)
IU-3: Study modeling scenarios under extreme conditions	ACF Basin modeling analysis under extreme hydrologic conditions (i.e. 2009 data for extreme flood and 1920s data for extreme drought); Demonstrate use of induced storage in West Point Lake during extreme flood conditions and demonstrate minimum anticipated instream flow conditions during extreme drought; Consider a range of assumed operating regimes within the Apalachicola-Chattahoochee-Flint Basin
WATER QUALITY	
ENHANCED POLLUTION MANAGEMENT PRACTICES *→ GAPS ADDRESSED: WATER QUALITY VIOLATIONS* *→ COUNCIL GOALS ADDRESSED: 4, 7, 8*	
WQ-1: Improved funding for 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
WQ-2: Improved 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 (391-3-16.01) and in local planning documents • Forestry – the Council encourages the continued funding and implementation of complaint and BMP survey programs by the Georgia Forestry Commission • Agriculture – row crop farmers are currently exempt from establishing stream buffers; the Council encourages development of partnerships between the Georgia Department of Agriculture, Georgia Soil and Water Conservation Commission, and EPD to develop section 319(h) funded surveys similar to what is utilized by the Georgia Forestry Commission; Additional 319(h) grant funding is needed to improve TMDL monitoring programs (particularly near animal husbandry operations)
WQ-3: Require adoption of the Georgia Stormwater Management Manual by local ordinances for implementation throughout the region	Adopt and/or adapt the policy and engineering guidelines established in Georgia Stormwater Management Manual to improve water quality by reducing nonpoint source pollution

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

Management Practice	Description/Definition of Action
WQ-4: Creation of 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 Local Option Sales Tax (SPLOST) or bond measure with green space and stream buffer conservation as a focus
ENHANCED WATER QUALITY STANDARDS AND MONITORING *→ GAPS ADDRESSED: WATER QUALITY VIOLATIONS* *→ COUNCIL GOALS ADDRESSED: 1, 7*	
WQ-5: Improved 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) ***(HIGH PRIORITY)***	• 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 EPD to develop monitoring networks that would complement the monitoring efforts of the EPD and others. • Encourage EPD and partnering state and federal agencies to secure funding for and implement increased monitoring of regional streams and lakes to develop enhanced background data; future data will better inform EPD and the Council on progress made versus a clearly defined baseline
WQ-6: Increased implementation and improved documentation of best management practices throughout the 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: 1. Forestry – the Council encourages continued section 319(h) grant funding through EPD to the Georgia Forestry Commission for the continued implementation of complaint, BMP monitoring and educational programs 2. Better Back Roads – the Council encourages continued section 319(h) grant funding through EPD to Georgia Resource Conservation Development Councils for the continued implementation of County Dirt Road BMP educational and demonstration programs. 3. Agriculture – the Council encourages continued section 319(h) grant funding through EPD to the Georgia Soil and Water Conservation Commission for the continued implementation of complaint, BMP monitoring and educational programs 4. Land Development – the Council recognizes that an established system is in place that incorporates numerous agencies, regulations and includes daily inspections of projects. The Soil and Water Conservation District is a leading regulator on Erosion & Sediment plans for various

Table 6-1: Water Management Practices Selected by the Middle Chattahoochee Water Planning Region	
Management Practice	**Description/Definition of Action**
	projects. The Georgia Erosion and Sedimentation Control Act (GESA) is mandated throughout the process
WQ-7: Continued coordination and cooperation with adjacent water councils	As future data become available and regulatory and operation uncertainties become clearer, the Council encourages EPD to assist in facilitating continued discussion between the water planning regions.
WQ-8: Protective nutrient criteria for all areas	The Council encourages EPD to set protective standards for nutrient pollution from both point and nonpoint sources of pollution based upon local contributions throughout the region; the region should not be penalized for upstream nutrient loadings.
Notes: Management practices designated as ***HIGH PRIORITY*** were identified by the Council as those practices which best address identified gaps and meet regional vision and goals and which should take precedence in future evaluation and implementation.	

The selected management practices were adopted by the Council because they address identified gaps between resource needs and resource capacities, as discussed in Section 5. The practices were also selected in order to fulfill the Council's vision and goals for the region (see Section 1). The Council has discussed the gaps identified in the resource assessments and instream uses extensively. The resource assessment model results indicate gaps in the Tallapoosa River Basin and Claiborne aquifer. The identified gaps in the Tallapoosa Basin relate to the depletion of surface water flows in drought periods as a result of consumptive use of surface water in the Middle Chattahoochee Region. The gap in the Claiborne aquifer represents increased agricultural use during the growing season within the modeled area which is associated with the Claiborne and represents demands from the multiple councils. These selected management practices are anticipated to begin making progress toward closing the gaps identified in the resource assessments.

6.2.1 Water Quantity Management Practices

Water quantity management practices include demand management practices selected by the Council to address conservation goals, water availability gaps, and to help mitigate anticipated increased use of existing reservoir storage. Quantification of savings associated with conservation is currently limited to an estimate of water savings from replacing old toilet fixtures with higher efficiency units; a result of higher efficiency flush rate requirements enacted by the National Energy Policy Act of 1992 (NEPAct). Through the 40 year planning horizon, a reduction in water usage was estimated for toilet replacements as follows:

- Water withdrawal savings of seven (7) million gallons per day and three (3) million gallons per day consumption reduction due to prior toilet conservation legislation (NEPAct, 1992).

The above savings estimate was revised based upon the requirements of the Water Stewardship Act. Through the 40 year planning horizon, the revised reduction in water usage has been estimated for toilet replacements as follows:

- Water withdrawal savings of nine (9) million gallons per day and four (4) million gallons per day consumption reduction due to recent (Water Stewardship Act) toilet conservation legislation.

Additional water savings will be realized through continued water conservation practices already in place and other Tier 1 and 2 practices. The realization of these savings will be reflected in regional per capita water use rates over time. Other practices which could reduce per capita water demand are enhanced public education programs and development and implementation of water conservation rate structures. The Council considers the continued monitoring of the per capita water use rate as a key indicator to measure the effectiveness of such conservation measures.

In the absence of baseline implementation data, the ability to generate meaningful results regarding water savings is not realistic at this time. 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 lack the resources available to develop and implement such tracking programs. State-wide initiatives, direction, and future guidance could help overcome these challenges. Continued dialogue between all major water using sectors (agriculture, energy, industrial, and municipal) is also needed to develop and obtain this type of baseline.

Further details regarding conservation savings are provided in the Water Conservation Technical Memorandum supplemental document on the Middle Chattahoochee website.[4]

Water supply management practices have also been considered for quantitative analysis to determine their effectiveness in addressing water quantity gaps. The Council has also been engaged in continued dialogue with the Upper and Lower Flint-Ochlockonee Councils regarding gaps in the Flint River Basin and the Claiborne aquifer. Those gaps identified in the southern portion of the Flint Basin at the Bainbridge node, are representative of times when outflows from Woodruff Dam are reliant on reservoir storage in the Chattahoochee River. All three Councils requested additional modeling from EPD to determine the scale of storage that would be needed to offset all identified gaps in the surface water availability models with future 2050 consumptive demands. The resource assessment models were run with this objective, and it was determined that the amount of storage needed to offset flow shortfalls would be as follows:

[4] http://www.middlechattahoochee.org/pages/our_plan/index.php

- At the Bainbridge node in the Flint River Basin 162,223 acre-feet would be required
- At the Heflin and Newell nodes in the Tallapoosa River Basin 2,234 and 10,486 acre-feet would be required, respectively

These amounts account only for the volume needed to offset the flow shortfall. It does not include other volumes that would be necessary or that might be added to provide for additional purposes (e.g., recreation). For example, this amount does not include volume needed to offset evaporation, seepage, and does not include a "dead pool". According to the model results, in 2007, a reservoir of 162,223 acre-feet would have been emptied completely at the Bainbridge node. Furthermore, it would not have completely offset the modeled flow shortfall because of evaporation and seepage losses. Therefore, this estimate is not a design estimate for a reservoir. It does, however, indicate that a reservoir of significant size would be needed to close the Bainbridge gap. The Council recognizes that the identified regional and interregional gaps identified need further examination with regards to instream flow protection and environmental impacts and furthermore that construction of large-scale storage would require further evaluation to quantify environmental impacts and cost-effectiveness.

Further data collection and/or analysis needs have also been identified for several water supply management practices, including better quantification of:

- Farm ponds – How would farm ponds affect surface water availability and how can they be incorporated into surface water availability modeling? It should be noted that farm ponds are intended to be used as an alternative agricultural irrigation source during drought periods, not for flow augmentation. A study to analyze appropriate replenishment of water storage in new farm ponds is recommended to ensure that surface water availability gaps during low flow drought conditions are not exacerbated and that model results correctly reflect usage.

- Aquifer Storage and Recovery (ASR) – How would the use of aquifer storage and recovery help alleviate gaps in the modeled area of the Claiborne aquifer in the southern portion of the region? The source of surface water supplies, costs of treatment, wells, and operation and resulting cost-benefit need further definition in order to develop the effectiveness and applicability of this practice for the region.

Additional practices including encouraging interconnection of regional supply systems and encouraging preparation of local drought contingency plans reflect tools to aid in the more efficient use of water resources in the region. These tools are wide ranging and do not lend themselves to explicit quantification in terms of their ability to mitigate against resource availability gaps in the Tallapoosa and/or Claiborne aquifers. They do, however, add to the portfolio of management practices, which will make progress toward closing identified gaps.

The Council recognizes that the quantity and location of future wastewater discharges will need to be reevaluated in the future as better water quality data and modeling scenarios become more well-defined. Dischargers will be affected by pending regulations pertaining to the establishment of more stringent protective levels for nutrients and other constituents in the waters within the region and the state and as existing TMDL limits are reached enhanced treatment will be required.

6.2.2 Instream Use Management Practices

The instream use management practices are targeted primarily to engage regional stakeholders, EPD, and the US Army Corps of Engineers to further consider the council defined gaps and the inability of the Revised Interim Operations Plan (RIOP) to meet instream uses for the ACF Basin as described in Section 3. These identified gaps and the management practices identified herein form the basis for the Council's recommendations to the state as presented in Section 7.4.

6.2.3 Water Quality Management Practices

Water quality is an extremely important consideration to stakeholders in the Middle Chattahoochee region to 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. These include:

- Additional water quality data for water bodies in the region to continually refine and recalibrate current water quality models, increased 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

- Additional information on the implementation of best management practices for agriculture[5], county dirt roads[6], and major industry in the region to establish a baseline of practices already in place and their effectiveness in protecting water quality

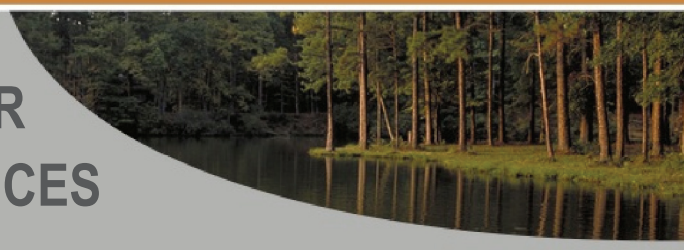
[5] Agricultural BMPs are currently established in the Georgia Soil and Water Conservation Commission's "Best Management Practices for Georgia Agriculture" manual available at <http://www.gaswcc.org/docs/ag_bmp_Manual.pdf>

[6] 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/images/Georgia%20Better%20Back%20Roads%20Field%20Manual%20final.pdf>

The 319(h) grant funded programs and oversight already in place for water quality protection in the region and the state by the Georgia Forestry Commission (GFC) in cooperation with EPD could be considered by other agencies and water using sectors. Benchmark BMP guidelines are in place regarding Streamside Management Zones (SMZs) relative to various topographies, stream flows, and trout fishery values in forested areas.[7] The GFC investigates the complaints and works with landowners, timber buyers, and loggers to correct any problems. In cases where the GFC cannot get satisfactory compliance, the case is turned over to EPD for enforcement. In addition the GFC conducts a biennial statewide Best Management Practice (BMP) compliance survey. The GFC conducts field surveys and documents compliance with implementation of BMPs. In 2009, the GFC completed a standardized survey at 221 sites totaling 27,000 acres. The number of acres with BMP compliances was 99.7%. GFC's total maximum daily load (TMDL) monitoring program in calendar year 2010, resulted in an average BMP Implementation increase of 20% from initial exam to final exam. Water quality risks decreased from five (5) to zero (0). GFC reports TMDL Program results to EPD quarterly. This effort provides the forestry industry with documentation of BMP compliance.

[7] The Georgia Forestry Commission BMPs are defined and implemented per the published "Georgia's Best management Practices for Forestry" manual available at <http://www.gatrees.org/ForestManagement/documents/BMPManualGA0609.pdf>

7. IMPLEMENTING WATER MANAGEMENT PRACTICES



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SUMMARY: This section presents the Middle Chattahoochee 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.

Section 7. Implementing Water Management Practices

This section presents the Middle Chattahoochee Council's roadmap for the implementation of the water management practices identified in Section 6. Schedules for implementation, in addition to the early step(s) required to initiate implementation of a given practice, are presented for both short- and long-term actions. The Middle Chattahoochee Council has defined short-term as those practices which can be implemented prior to the five year update period envisioned in the planning process. Long-term management practices are those which require time beyond the five year planning period, vary in size and scope, and need further refinement. As the State Water Plan provides, this plan will be primarily implemented by the various water users in the region, therefore the Middle Chattahoochee Council has described the roles and responsibilities of the implementing parties as well as the fiscal implications of the practices.

7.1 Implementation Schedule and Roles of Responsible Parties

Table 7-1 ties the resource shortfalls and the needs specified by the Council and the corresponding management practices detailed in Table 6-1 to the parties who will implement those practices. This table also describes the timeframe for implementation and the specific steps required for implementation. The Council has deemed those management practices where EPD or other state agencies are identified as responsible parties, to support the regional vision and goals and assist in the mitigation of gaps identified in the resource assessments (Tallapoosa River Basin Planning Nodes and Claiborne aquifer). They can also help the Council and the state to define future conditions and operations of the federal reservoir system in the Chattahoochee River Basin that are fair and equitable to all users and protective of instream uses.

Table 7-1: Implementation Schedule

Action Needed (Management Practice)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions: Further Action to Complete Implementation and Associated Date(s)	For Long-term Actions: Further Action to Complete Implementation and Associated Date(s)	Responsible Parties
WATER QUANTITY				
DEMAND MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 6, 7, 8*				
WC-1: Support implementation of Tier 1 and 2 conservation activities	Complete DNR Board Rule Making for new conservation requirements by June 2011	Comply with existing and new rules by dates specified in rules	Continue implementation of existing programs (on-going)	DNR Board, EPD, Municipal Surface Water and Groundwater Withdrawal Permittees
WC-2: Encourage all water providers to consider conservation oriented rate structures at the time of refinancing or recapitalization	Identify when refinancing or recapitalization of assets will occur	Perform a rate and revenue analysis	Review and update pricing periodically	Municipal Surface Water and Groundwater Withdrawal Permittees
WC-3: Encourage all water providers to implement education and outreach programs	Evaluate existing local efforts and state-wide programs to engage the public in water conservation	Develop a local public education program; identify and perform education, outreach, and public participation activities	Contingent upon available funding, develop media materials such as brochures, websites, and billing stuffers; Evaluate and modify program activities as needed	Municipal Surface Water and Groundwater Withdrawal Permittees
RETURNS MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 5, 6, 7*				

Table 7-1: Implementation Schedule

Action Needed (Management Practice)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions: Further Action to Complete Implementation and Associated Date(s)	For Long-term Actions: Further Action to Complete Implementation and Associated Date(s)	Responsible Parties
WW-1: Encourage use of point discharges for wastewater treatment effluent disposal for major facilities (greater than one million gallons per day)	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 gaps	Account for infrastructure requirements in local planning efforts; secure funding for and execute facility design and technical specifications	Develop and implement a construction schedule for additional infrastructure as appropriate to meet local discharge needs	Municipal and Industrial Wastewater System Permittees and State Agencies
WW-2: Encourage studies to determine the appropriate water returns ratios for land application and septic systems	Identify local facilities and/or geographic regions for study	Report to Council and policymakers (pending availability of funding)	Revise resource assessment models based upon results from the study	Municipal and Industrial Wastewater System Permittees and State Agencies
SUPPLY MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA *→ GAPS ADDRESSED: SURFACE WATER AND GROUNDWATER AVAILABILITY* *→ COUNCIL GOALS ADDRESSED: 2, 5, 7*				
WS-1: Study the development of new and/or enhancement of existing surface water storage reservoirs	Identify funding source and initiate study	Report to Council and policymakers (pending availability of funding)	Begin public outreach efforts for potential sites (pending availability of funding)	Council, Neighboring councils, University researchers/consulting firms
WS-2: Implement new and/or enhance existing surface water storage as necessary	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 Permittees and State Agencies

Table 7-1: Implementation Schedule				
Action Needed (Management Practice)	**For All Actions: Initial Implementation Step(s) and Associated Date(s)**	**For Short-term Actions: Further Action to Complete Implementation and Associated Date(s)**	**For Long-term Actions: Further Action to Complete Implementation and Associated Date(s)**	**Responsible Parties**
WS-3: Encourage the construction and use of farm ponds for agricultural irrigation through existing incentive programs	Continue implementation of existing incentive programs (on-going)	Continue implementation of existing incentive programs (on-going)	Continue implementation of existing incentive programs (on-going)	Georgia Soil and Water Conservation Commission, Soil and Water Conservation Districts, U.S. Department of Agriculture Natural Resources Conservation Service
WS-4: Encourage interconnection of regional supply systems for reliability	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
WS-5: Encourage local providers to prepare drought contingency plans	Evaluate all water supply sources and interconnections versus historic drought year demands experienced by the system	Establish criteria used by the water provider to identify the onset of water shortage issues and develop a plan of action	Observe the effectiveness of the program during times of drought and refine metrics and action plans accordingly	Municipal Surface Water and Groundwater Withdrawal Permittees
WS-6: Study the use of aquifer storage and recovery to enhance water supply	Identify funding source and initiate study	Identify specific areas to be evaluated	Evaluate potential impacts of any ASR proposal thoroughly	EPD, Underground injection permit applicants (for ASR systems), Municipal or industrial water users that pursue ASR
INSTREAM USE				
INSTREAM USE MANAGEMENT TO ADDRESS COUNCIL-DEFINED GAPS IN FEDERAL OPERATION OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT (ACF) BASIN → *GAPS ADDRESSED: INSTREAM USE* → *COUNCIL GOALS ADDRESSED: 1, 2, 3*				

Table 7-1: Implementation Schedule

Action Needed (Management Practice)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions: Further Action to Complete Implementation and Associated Date(s)	For Long-term Actions: Further Action to Complete Implementation and Associated Date(s)	Responsible Parties
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	Advocate for operational changes in the ACF Basin	Encourage further consideration of model constraints identified in Table 5-1 with the Corps and regional stakeholders	Further actions to be defined after issuance of the revised Water Control Manual for the ACF Basin and resolution of uncertainties and impacts described in Sections 2 & 3	EPD, U.S. Army Corps of Engineers, regional stakeholders
IU-2: Advocate for changes to the U.S. Army Corps of Engineers Water Control Manual for the ACF Basin	Advocate for operational changes in the ACF Basin	Encourage further consideration of model constraints identified in Table 5-1 with the Corps and regional stakeholders	Further actions to be defined after issuance of the revised Water Control Manual for the ACF Basin and resolution of uncertainties and impacts described in Sections 2 & 3	EPD, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service regional stakeholders
IU-3: Study modeling scenarios under extreme conditions	Identify funding and initiate further study	Develop hydrologic conditions for extreme flood and drought conditions under a range of consumptive demand requirements and reservoir operational schemes	Use model results to refine management practices and for use in future integrated water management strategies within state and interstate discussions regarding shared resources	EPD, U.S. Army Corps of Engineers, regional stakeholders
WATER QUALITY				
ENHANCED POLLUTION MANAGEMENT PRACTICES → *GAPS ADDRESSED: WATER QUALITY VIOLATIONS* → *COUNCIL GOALS ADDRESSED: 4, 7, 8*				

Table 7-1: Implementation Schedule				
Action Needed (Management Practice)	**For All Actions: Initial Implementation Step(s) and Associated Date(s)**	**For Short-term Actions: Further Action to Complete Implementation and Associated Date(s)**	**For Long-term Actions: Further Action to Complete Implementation and Associated Date(s)**	**Responsible Parties**
WQ-1: Improved funding for erosion and sediment control	Continue implementation of existing programs	Initiate assessment of regional BMP implementation and enforcement	Establish recommendations for improvement and allocate funding as available	Georgia Soil and Water Conservation Commission, EPD, local governments
WQ-2: Improved funding for monitoring, enforcement, and use of stream buffers	Identify specific locations and responsible parties who may be eligible for grant monies to implement stream buffer protection	Prepare and submit grant applications and monitoring, implementation, and oversight plans	Implement stream buffer protection/ enhancement plans	Local government planning authorities and State Agencies
WQ-3: Require adoption of the Georgia Stormwater Management Manual by local ordinances for implementation throughout the region	Identify changes to local ordinances needed to adopt the manual and implement administrative procedures for changing those ordinances	Adopt and/or adapt the policy and engineering guidelines established in Georgia Stormwater Management Manual in local ordinances	Perform periodic review of the program implementation and performance	Local governments
WQ-4: Creation of a conservation land program to increase stream buffers in perpetuity	Identify funding mechanisms such as the Georgia Land and Conservation Program (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/stream buffers for such activities as debris clearing and tree plantings	Local governments
ENHANCED WATER QUALITY STANDARDS AND MONITORING → *GAPS ADDRESSED: WATER QUALITY VIOLATIONS* → *COUNCIL GOALS ADDRESSED: 1, 7*				

Table 7-1: Implementation Schedule

Action Needed (Management Practice)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions: Further Action to Complete Implementation and Associated Date(s)	For Long-term Actions: Further Action to Complete Implementation and Associated Date(s)	Responsible Parties
WQ-5: Improved water quality monitoring to provide the data for water quality improvements in the future	Develop plan for increased monitoring	Request funding for increased monitoring; implement monitoring plan; incorporate monitoring results into plan revision process	Continue implementation of increased monitoring (on-going)	EPD
WQ-6: Increased implementation and improved documentation of best management practices throughout the region for all industries	Identify all major water using industries in the region	Survey industrial users regarding best management practice implementation and the availability of industry specific guidance; encourage baseline water quality data collection and monitoring	Continued documentation of and best management practices and quantification of effectiveness	EPD, State Agencies, municipal, industrial and agricultural water users, and wastewater generators
WQ-7: Continued coordination and cooperation with adjacent water councils	Continue implementation of joint council coordination (on-going)	Continue implementation of joint council coordination (on-going)	Continue implementation of joint council coordination (on-going)	Council and neighboring councils, EPD
WQ-8: Protective nutrient criteria for all areas	The Council encourages EPD to set standards for nutrient pollution from both point and nonpoint sources reflective of local contributions, throughout the state	Set standards which protect waters of the state and do not penalize users downstream of large pollutant loading sources	Continue refining allocations based upon changing land use and growth	EPD

7.2 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 could come directly from revenues generated by water/wastewater providers, local government general funds raised through property taxes, or 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 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 s specific entity for service fees and water/wastewater rates
    - Georgia Environmental Facilities Authority Loans (GEFA) – 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 (SAAP) cost-share program

Table 7-2 describes the fiscal implications of this plan. Cost estimates for implementation are included, to the extent possible based on available information. Sources of potential funding are also listed.

Table 7-2: Cost Estimates for Implementation Responsibilities

Action Needed (Management Practice)	Capital / Programmatic Costs Range [1]	Potential Funding Sources	Notes and Sources
WATER QUANTITY			
DEMAND MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 6, 7, 8*			
WC-1: Support implementation of Tier 1 and 2 conservation activities	$200 – 3,000 per million gallons [2]	State Agencies, Water/ wastewater rates, Individuals as Required by Law	Low Range: residential water audits, adopting a policy/ordinance to require sub-meters for multi-family and multi-unit retail/light industrial High Range: Includes rebate programs, government efficiency programs, and programs targeting high water users *The effectiveness depends on the current level of efficiency [4a]
WC-2: Encourage all water providers to consider conservation oriented rate structures at the time of refinancing or recapitalization	$500 per million gallons [2]	Water/ wastewater rates	Includes rate study with replacement of billing system to accommodate tiers *The unit costs will vary depending on the current status of billing systems in the region. [4a]
WC-3: Encourage all water providers to implement education and outreach programs	$3 per capita	Water/ wastewater rates	Includes print materials, workshops, classes, and mass media (television, billboards, etc.) [4a]
RETURNS MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 5, 6, 7*			
WW-1: Encourage use of point source discharges for wastewater treatment effluent disposal for major facilities (greater than one million gallons per day)	$1 MM per million gallons per day LAS treatment capacity decommissioned PLUS $5 MM - $11 MM per million gallons per day of expanded or new wastewater treatment capacity ($ MM = millions of dollars)	Water/ wastewater rates	Costs do not include conveyance system upgrades. The range of 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 [4a]

Table 7-2: Cost Estimates for Implementation Responsibilities

Action Needed (Management Practice)	Capital / Programmatic Costs Range [1]	Potential Funding Sources	Notes and Sources
WW-2: Encourage studies to determine the appropriate water returns ratios for land application and septic systems	$ 0.5 MM – 1 MM (dependent upon the scope & scale)	State Agencies, Water/ wastewater rates	This type of study could be watershed or site specific and may include costs for, but not limited to the following activities: desktop study and literature review, field measurements, characterization of base flow quantity and quality, modeling, and calibration. [4b]
SUPPLY MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 2, 5, 7*			
WS-1: Study the development of new and/or enhancement of existing surface water storage reservoirs	$ 0.5 MM – 3 MM (dependent upon the scope, level of outreach, permitting requirements & resulting studies, etc.)	State Agencies, Water/ wastewater rates	This type of study may include costs for, but not limited to the following activities: develop yield and performance criteria & 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	$10,000 - $300,000 per million gallons [2, 4a]	State Agencies, Water/ wastewater rates and/or Loans/Bonds	Cost range reflects the construction of a new or expanded reservoir but does not include land acquisition, permitting, conveyance or treatment costs. Low Range: Quarries or other sites that do not require dams High Range: Larger dams
WS-3: Encourage the construction and use of farm ponds for agricultural irrigation through existing incentive programs	$12.5 per cubic yards of earth excavation and grading	Grants (Ponds Program: administered by the Georgia Soil and Water Conservation Commission)	Estimated cost for earth excavation and grading. The cost does not include pumping and piping costs which would be incurred.
WS-4: Encourage interconnection of regional supply systems for reliability	$ 1.3 MM – 15.1 MM per mile of pipeline	Water/ wastewater rates and/or Loans/Bonds	Costs reflect the cost of pipeline, including a built-in contingency factor of 1.5 and a right of way cost contingency.[4c] The costs do not include water quality improvements or modifications which could be required.
WS-5: Encourage local providers to prepare drought contingency plans	$ 0.1 MM – 0.3 MM (dependent upon the scope & scale)	Water/ 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 periodic review processes to optimize program responses.

Table 7-2: Cost Estimates for Implementation Responsibilities			
Action Needed (Management Practice)	**Capital / Programmatic Costs Range [1]**	**Potential Funding Sources**	**Notes and Sources**
WS-6: Study the use of aquifer storage and recovery to enhance water supply	$ 0.5 MM – 3 MM (dependent upon the scope & scale)	State Agencies, Water/ wastewater rates	This type of study may include costs for, but not limited to the following activities: siting studies and groundwater aquifer characterization, water quality analyses, test wells and pumping studies, field measurements, characterization of base flow quantity and quality, modeling, and calibration.
INSTREAM USE			
INSTREAM USE MANAGEMENT TO ADDRESS COUNCIL-DEFINED GAPS IN FEDERAL OPERATION OF THE ACF BASIN → *GAPS ADDRESSED: INSTREAM USE* → *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	Variable	State Agencies	Costs of studies and development
IU-2: Advocate for changes to the U.S. Army Corps of Engineers Water Control Manual for the ACF Basin	Variable	State Agencies	Costs of studies and development
IU-3: Study modeling scenarios under extreme conditions	$ 0.5 MM – 1 MM (dependent upon the scope & scale)	State Agencies	This type of study may include costs for, but not limited to the following activities: development of modified surface water availability models simulating impacts to reservoir levels and stream flows under extreme flood and drought conditions.
WATER QUALITY			
ENHANCED POLLUTION MANAGEMENT PRACTICES → *GAPS ADDRESSED: WATER QUALITY VIOLATIONS* → *COUNCIL GOALS ADDRESSED: 4, 7, 8*			
WQ-1: Improved funding for erosion and sediment control	Variable	319(h) grant funding	Costs could be incurred for, but not limited to the following activities: the 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

Table 7-2: Cost Estimates for Implementation Responsibilities			
Action Needed (Management Practice)	**Capital / Programmatic Costs Range** [1]	**Potential Funding Sources**	**Notes and Sources**
WQ-2: Improved funding for monitoring, enforcement, and use of stream buffers	Variable	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 of agricultural water users by state agencies using the program implemented by the Georgia Forestry Commission as a model.
WQ-3: Require adoption of the Georgia Stormwater Management Manual by local ordinances for implementation throughout the region	Less than $ 1 per capita	Local governments or Stormwater Rates	Costs to assimilate the Georgia Stormwater Management Manual into local standards. The unit cost does not include additional staff needed to review stormwater plans or additional development costs. [4a]
WQ-4: Creation of a conservation land program to increase stream buffers in perpetuity	Less than $ 1 per capita	General Funds, Grants (Incentives offered through the Georgia Land Conservation Program)	Cost to develop a green space plan. Costs do not include land acquisition. [4a]
ENHANCED WATER QUALITY STANDARDS AND MONITORING → *GAPS ADDRESSED: WATER QUALITY VIOLATIONS* → *COUNCIL GOALS ADDRESSED: 1, 7*			
WQ-5: Improved water quality monitoring to provide the data for water quality improvements in the future	$ 4,000 – 8,000 per site (grab sample) AND/OR $ 5,000 – 20,000 per site (habitat & benthos monitoring)	State agencies	Grab sampling includes monitoring chemical water quality annually for fecal coliform bacteria and traditional stormwater parameters (no metals) using grab sample collection. Habitat and benthos monitoring includes monitoring biological water quality annually looking at habitat and macroinvertebrate populations. [4a]
WQ-6: Increased implementation and improved documentation of best management practices throughout the region for all industries	Variable	State agencies	Costs could be incurred for, but not limited to the following activities: increased documentation, oversight, and monitoring of best management practice use of industrial water users by state agencies using the program implemented by the Georgia Forestry Commission as a model.
WQ-7: Continued coordination and cooperation with adjacent water councils	Variable	State agencies	Costs could be incurred for facilitating future meetings between Council members from multiple regions.

Table 7-2: Cost Estimates for Implementation Responsibilities			
Action Needed (Management Practice)	**Capital / Programmatic Costs Range [1]**	**Potential Funding Sources**	**Notes and Sources**
WQ-8: Protective nutrient criteria for all areas	Variable	State agencies	

Notes & Sources:

1) Programmatic costs will vary widely depending on the types of actions selected and the perceived cost-benefit that communities and/or state government agencies will need further study and data to refine. All values should be viewed as planning level numbers which can only be updated through further study and data collection regarding the level of baseline implementation already in place and the corresponding water quantity and water quality benefits achieved.
2) Cost per million gallons saved is a cost benefit metric, which is defined as the total 2010 costs divided by the project reliable yield or water savings over a one year period.
3) $ MM = millions of dollars
4) 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

This planning process included feedback from regional stakeholders and Council members and data and information from existing regional and local planning documents as provided by the Council. A summary of the local and regional plans reviewed is provided in the Existing Regulatory and Local Plan Summary supplemental document on the Middle Chattahoochee website.[1] Furthermore, management practice selection was 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 region will be held accountable for considering 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 Middle Chattahoochee Regional Planning Council.

[1] http://www.middlechattahoochee.org/pages/our_plan/index.php

7.4 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 acceptance and issuance of the Regional Water Plan. These actions are for immediate action, action between now and the next update to the plan and for consideration in future updates to this plan. They are as follows:

1. **Comprehensive Overhaul of the Water Control Manual and Operating Procedures**

   The Council advocates that EPD review and further consider the model constraints and results performed by Dr. Georgakakos of the Georgia Water Resources Institute at Georgia Tech. The proposed changes in operating parameters for the federal reservoirs in the Chattahoochee River show significant improvement over the current RIOP and appear to provide a much better balance between water withdrawals, instream uses and the Congressional authorized purposes of the federal reservoirs.

   The Council recognizes that specific operating targets should come from more detailed modeling and analysis but in general, expect the outcomes to include more available storage in the reservoirs, more rapid refill after drought periods, higher lake levels especially on West Point Lake, and flow guidelines at the Columbus and Columbia planning nodes. The following modeling constraints (reference Table 5-1 from Section 5) are the beginning point for revisions to the Corps' water control manual.

   Furthermore, the Council requests that on its behalf that EPD convene a meeting with the U.S. Army Corps during the vetting process of the new water control manual and ask them to review the work of this Council and the preliminary modeling work done by the Georgia Water Resources Institute at Georgia Tech regarding adaptive reservoir management in the ACF basin.

2. **Task Forces for Alabama and Energy Water Use Forecasting**

   Future Alabama water use needs were not provided for use in the development of this plan. In collaboration with the State of Alabama, withdrawal and return forecasts for Alabama water users of Chattahoochee River water through the forty year planning horizon should be developed. Utilizing current Alabama demands in the future condition analyses represents a lack of conservatism in the modeling work and is inconsistent with use of forecasted demands for Georgia water users.

   The EPD developed energy water use forecasting, however, this forecasting did not identify geographically specific water needs. Energy water use forecasting must be done to account for greater cooling tower efficiencies,

additional energy conservation measures, increased power production in the future, water quality, and other factors as appropriate.

The Council recommends that EPD designate task forces to develop improved water use forecasts that could be used in future updates of this plan.

3. Metro North District Returns and Nutrient & Sediment Loading

The May 7, 2009 Metro North District Plan includes ambitious predictions of returns to the river for which the Middle Chattahoochee resource assessments now greatly depend. The Council would like a comprehensive audit of these predictions and ongoing measurement and regular reporting on the progress to achieving these goals. Furthermore, the Council desires that such progress be reported as a range of statistical flows, including mean, minimum, and maximum values of consumptive use.

The Middle Chattahoochee Council is also concerned about the nutrient load increase projected for 2050 that is estimated at the Whitesburg gauge. Nutrient loadings of phosphorus and nitrogen are expected to increase 200 percent by 2050. The Middle Chattahoochee region should not be burdened with additional waste water treatment or storm water BMPs caused by increases in upstream discharges. In addition, the Council is also concerned about sediment loading from upstream land management practices.

Specific to nutrients, the Council is concerned about the increases in phosphorus and nitrogen and the resulting chlorophyll-a in West Point Lake and Lake Walter F. George and the potential for degradation of lake water quality.

The Council requests that the Metro North District provide: 1) specific details of how the increased nutrient and sediment loads will be mitigated before it reaches the Middle Chattahoochee basin, and 2) provide annual progress reports of nutrient and sediment levels and reduction effectiveness.

Finally, the Council recommends a peer review of the lake and watershed models to better understand the methodology as it relates to the output and calibration. Pending the review, the council recommends that the model outputs not be utilized for setting water quality standards instream or for any other regulatory purposes, including point source permitting in the region.

4. Science Based Determination of JWLD Minimum Release

Encourage State and Federal Agencies to reevaluate the scientific justification for required minimum flows below Jim Woodruff Lock and Dam in the Apalachicola River. It is the opinion of this Council that the 5,000 cubic feet per second instantaneous flow target in the 1989 Water Control Manual

(current operating plan when this plan was published) does not have sound scientific justification. Furthermore, the Council recommends 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.

5. Further Research on Groundwater Development

During the 2006-2007 drought, small surface water withdrawals and wells became more common to provide irrigation water to avoid irrigation restrictions. Because of the abundance of groundwater below the Fall Line, the cumulative impact of small groundwater withdrawals has the potential to significantly offset direct river withdrawals and thereby improve base flows. The Council asks EPD to encourage well development in those watersheds not directly impacted by surface water to groundwater interactions. The development should focus on wells in aquifers that may currently be under utilized to augment municipal, industrial and agricultural supplies as an alternative to continued dependence on major water courses such as the Chattahoochee River.

In those areas of the Flint River where surface water to groundwater interactions are known to exist, the Council asks that EPD define the reduction in streamflow associated with increased agricultural groundwater withdrawals to aid in increased interregional coordination between the councils in the ACF Basin. A clear understanding of this effect will reveal the degree to which storage in the Chattahoochee River is relied upon to meet downstream flow requirements below Woodruff Dam. To achieve better agricultural water use data (both groundwater and surface water) the Council recommends improved implementation of the agricultural water withdrawal metering program of the Georgia Soil and Water Conservation Commission by:

- Completing comprehensive installation of meters
- Ensuring the meters are functioning properly through regular maintenance inspection
- Increasing data collection on parameters including monthly use, crops, inputs
- Reporting aggregate results annually to permittees and policymakers
- Preparing collected data in a manner that will facilitate use in future resource assessments

6. Increase Storage in the System

This Plan discusses the need to increase storage in the ACF system for both water withdrawal and instream uses and in the Tallapoosa Basin to mitigate modeled surface water availability gaps. Several means to increase storage are discussed, including better utilization of available storage, building more

storage, and seeking to identify new methods of storage such as aquifer storage and recovery for areas with apparent gaps such as the Flint River Basin.

The Council recommends that EPD develop these conceptual ideas further and provide a more comprehensive plan for increasing storage in the region. 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 close gaps (Bainbridge, Heflin, and Newell nodes), improve reliability of drought contingency plans, and alleviate the burden of operational requirements on the federal reservoirs in the Middle Chattahoochee region which have become the "work horses" of the ACF system.

7. Water Conservation Program Evaluation

The water conservation program is a critical element of this Plan. Currently there are several practical limitations to measuring progress such as 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 program. Recommendations throughout this plan are intended to address the existing limitations to the degree practicable to develop a sound method of measuring regional progress.

8. Funding for Additional Resource Assessments

The Council recommends that the Legislature provide funding for ongoing additional data collection and the continued refinement of water resource assessments used in the development of the Plan.

For water quantity, the Council recommends that the state consider further study of the modeling constraints associated with the adaptive reservoir management model for the ACF Basin developed by the Georgia Water Resources Institute at Georgia Tech. This action is recommended within the near-term leading up to the scheduled release of the draft Water Control Manual by the Corps of Engineers July 2011. Additionally, the Council recommends additional modeling scenarios which take into account extreme hydrologic conditions which have occurred outside of the modeled hydro-period currently established (1938-2007) in the surface water availability models developed by EPD. This could include modeling extreme drought conditions documented from the 1920's and the extreme flood event which occurred in 2009.

The Council also recommends an increased awareness of water balance in the region and therefore, requests that additional measurement and water return ratio studies be performed to better understand consumptive uses and related water returns. Once completed, this information will better equip the Council and region for managing consumptive uses and allow the Council's vision of an abundant water supply for our descendants to be achieved.

The lack of baseline data for water quality as compared to the level of best management practice (BMP) implementation already in place, as well as a measure of the effectiveness of those practices, makes it difficult to assign management practices to address modeled water quality gaps. Additional funding for water quality assessments and best management practices (BMP) surveys could be complemented through the development of programs similar to those in already in place through the Georgia Forestry Commission or coordination of existing water quality sampling data already being collected to fulfill permit requirements.

The Georgia Forestry Commission's BMP complaint and survey program could be considered as a model between agricultural users and the National Resource and Conservation Service (NRCS) and Georgia Soil and Water Conservation Commission (GSWCC). Such efforts 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 assist in a baseline set of observed water quality data versus applied BMPs throughout the region.

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 could work together with EPD to develop monitoring networks that would complement the monitoring efforts of the EPD and others if funding were made available.

9. Increase State Funding for Implementation of Management Practices

The Council recommends that EPD explore all possible funding sources to offset or pay for many of the management practices outlined in the Plan. Financial incentives and reimbursement for implementation of practices will expedite the progress needed to achieve the goals of the Plan.

10. Creation of Water Planning Districts and Interstate Compacts

The Council recognizes the historical lack of sufficient study and funding for water planning in the State. The Council therefore recommends that the Legislature study and codify into state law, a plan whereby the planning, management and oversight of water and watershed resources in the state be delegated to stakeholder led water or watershed councils. The new water councils would have funding and staff for ongoing research, studies,

assessments, measurement, monitoring and reporting on the progress of goals and future updates to the Plan. In the case of the Apalachicola-Chattahoochee-Flint Basin councils, the Council urges the state to also consider how these councils would function under an interstate compact.

The Council recognizes and encourages the potential of an interstate compact for the ACF Basin. The Council also recognizes the examples of the Great Lakes Basin Compact, several of the Texas river basin compacts (i.e. Sabine River Compact Commission) and other successful stakeholder led water councils managing large river basins that cross geopolitical boundaries such as the Fraser River Basin Council, British Columbia, Canada. The creation of collective legislative action with member states with shared water resources should be developed to guide Florida, Georgia and Alabama on environmental, economic and operational issues relating to water resources management of the Apalachicola-Chattahoochee-Flint Basin.

11. Coordinated Recommendations with Neighboring Councils

Throughout the process of developing this plan, the Middle Chattahoochee Water Council met several times with neighboring regional water councils to discuss shared water resources and topics of concern. The Council met several times with the Upper Flint and Lower Flint-Ochlockonee Water Councils and developed a collaborative relationship with these councils that led to their agreement on a set of joint recommendations.

The following joint recommendations were approved by all three 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 Council's own 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 own regional water plan takes precedence over the joint recommendations.

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

- Recognize the critical need 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, new storage in the Flint, and enhancement of existing storage capacity.
- Urge EPD and those involved in the resource assessment modeling to improve upon existing models for future regional water planning by making greater use of actual and current data on water use and

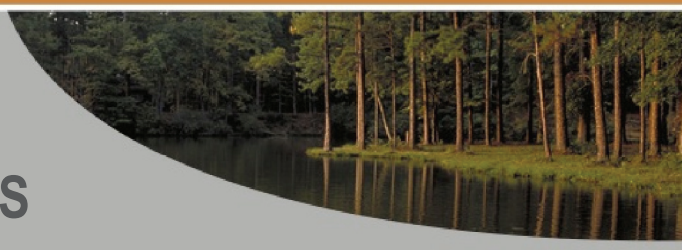
conditions and by developing assumptions that more closely approximate actual conditions.

- Request that state and federal agencies reevaluate the scientific justification for the minimum flow requirements at Woodruff Dam that are intended to maintain healthy aquatic ecosystems.

12. Regional Water Plan Use

The State Water Plan specifies that regional water plans are to guide decisions regarding permitting. The Middle Chattahoochee Council understands that its plan provides a valuable regional perspective and that this regional water plan will be an important new source of information for EPD and stakeholders. Except where noted elsewhere, such as Council concerns regarding use of the water quality models, relevant provisions will inform EPD review and evaluation of factors that have to be balanced during permit review.

However, the Council urges that EPD's permit decisions will 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, and adoption of this regional water plan will not substantially alter permitting processes. 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 plan provisions.



8. MONITORING AND REPORTING PROGRESS

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SUMMARY: This section presents the Middle Chattahoochee Council's selected benchmarks for management practices which will be used to assess their effectiveness.

Section 8. Monitoring and Reporting Progress

The selected water management practices identified in Section 6 will be primarily implemented (as described in Section 7) by the various water users in the region, including local governments and others with the capacity to develop water infrastructure and apply for the required permits, grants and loans.

8.1 Benchmarks

The benchmarks prepared by the Middle Chattahoochee Council and listed in Table 8-1 below will be used to assess the effectiveness of this plan's implementation and identify any required revisions. As detailed below, the Council selected both qualitative and quantitative benchmarks that will be used to assess whether the water management practices are closing gaps over time and allowing the water planning region to meet its vision and goals. The benchmarks will be used to evaluate the Regional Water Plan effectiveness at the next 5-year plan review.

Table 8-1: Benchmarks for Water Management Practices

Action Needed (Management Practice)	Benchmark	Measurement Tools	Time Period
All Management Practices	Revised resource assessments	Quantify the impacts of implemented management practices on the gaps observed in the Tallapoosa and Flint basins and the Claiborne aquifer	Data to be gathered and compiled at the 5 year update to this plan
WATER QUANTITY			
DEMAND MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 6, 7, 8*			
All Demand Management Practices (WC-1 through WC-3)	Maintain or reduce residential per capita water use	Update of Water Development and Conservation Plan per capita water use estimates	Every 5 years

Table 8-1: Benchmarks for Water Management Practices

Action Needed (Management Practice)	Benchmark	Measurement Tools	Time Period
	Consumptive use audits by permitted municipal, industrial, and thermoelectric water users	Each water withdrawal permittee within the region to report the quantity of water withdrawn from a given source, the quantity of that water discharged back to the source, and the quantity of that water transferred via interbasin transfer on a monthly average basis.	Data to be gathered and compiled at the 5 year update to this plan
WC-2 and WC-3	Implementation of recommended practices	Perform regional survey to quantify implementation	Data to be gathered and compiled at the 5 year update to this plan
RETURNS MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 5, 6, 7*			
WW-1: Encourage use of point source discharges for wastewater treatment effluent disposal for major facilities (greater than one million gallons per day)	Regional wastewater treatment capacity changes	Perform regional survey identifying all new or expanded wastewater treatment facilities by type	Data to be gathered and compiled at the 5 year update to this plan
WW-2: Encourage studies to determine the appropriate water returns ratios for land application and septic systems	Funding	Identify any new data, reports or other literature published	Data to be gathered and compiled at the 5 year update to this plan
SUPPLY MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA → *GAPS ADDRESSED: SURFACE WATER AVAILABILITY* → *COUNCIL GOALS ADDRESSED: 2, 5, 7*			
All Water Supply Management Practices (WS-1 through WS-6)	Implementation of recommended practices	Perform regional survey to quantify implementation; surveys to gather details regarding implementation challenges/roadblocks where applicable	Data to be gathered and compiled at the 5 year update to this plan

Table 8-1: Benchmarks for Water Management Practices

Action Needed (Management Practice)	Benchmark	Measurement Tools	Time Period
INSTREAM USE			
INSTREAM USE MANAGEMENT TO ADDRESS COUNCIL-DEFINED GAPS IN FEDERAL OPERATION OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT (ACF) BASIN → *GAPS ADDRESSED: INSTREAM USE* → *COUNCIL GOALS ADDRESSED: 1, 2, 3*			
IU-1 and IU-2	Submit comments and recommendations to the Corps of Engineers during the public comment period for the Water Control Manual citing the discrepancies and uncertainties identified in this plan and constraints and results from the Georgia Tech model	Published Revised Water Control Manual for the ACF Basin for Public Comment	July 2011
IU-3: Study modeling scenarios under extreme conditions	Funding	Identify any new data, reports or other literature published	Data to be gathered and compiled at the 5 year update to this plan
WATER QUALITY			
ENHANCED POLLUTION MANAGEMENT PRACTICES → *GAPS ADDRESSED: WATER QUALITY VIOLATIONS* → *COUNCIL GOALS ADDRESSED: 4, 7, 8*			
WQ-1 through WQ-4	Implementation of recommended practices	Perform regional survey to determine the level of implementation; surveys to gather details regarding implementation challenges/roadblocks where applicable	Data to be gathered and compiled at the 5 year update to this plan
ENHANCED WATER QUALITY STANDARDS AND MONITORING → *GAPS ADDRESSED: WATER QUALITY VIOLATIONS* → *COUNCIL GOALS ADDRESSED: 1, 7*			

Table 8-1: Benchmarks for Water Management Practices			
Action Needed (Management Practice)	**Benchmark**	**Measurement Tools**	**Time Period**
WQ-5: Improved water quality monitoring to provide the data for water quality improvements in the future	Observed improvements in water quality monitoring results	EPD Online Water Quality Database [1]	Annual
WQ-6 through WQ-8	Funding	Identify any new data, reports or other literature published	Data to be gathered and compiled at the 5 year update to this plan

8.2 Plan Updates

Meeting current and future water needs will require periodic review and revision of Regional Water Plans. 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 this guidance provided by the Director, 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 EPD's adoption of these plans. These benchmarks will guide EPD in the review of the Regional Water Plan.

8.3 Plan Extension Request

The Middle Chattahoochee Water Council requested an extension in the time allocated for completion of this plan from the Georgia EPD and Georgia State legislators to allow for the proper completion of this planning document. While the completion schedule was extended by approximately three months, there was much information that was still not available for the completion of this plan, including the Master Water Control Manual update by the U.S. Army Corps of Engineers.

8.4 Plan Amendments

The Middle Chattahoochee Council requests that amendments to this plan prior to the five-year update schedule as required by the State-wide Water Plan be expressly permitted. Plan amendments would need to be considered and approved by the Middle Chattahoochee Council in a similar manner as the development of this Water Development and Conservation 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.

[1] http://www.gaepd.org/Documents/EPDOnlineWaterQualityData.html