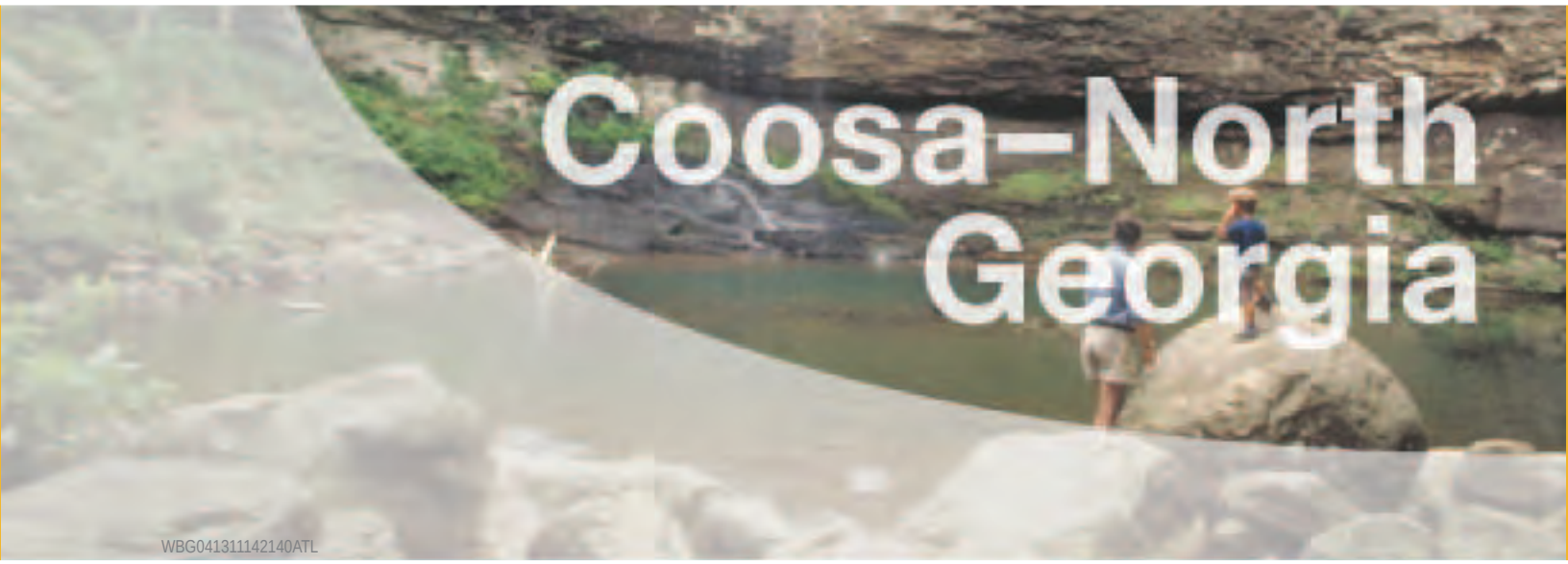

Regional Water Plan

September 2011

Table of Contents

TABLES

FIGURES

Table of Contents

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AAD-MGD	annual average demand in million gallons per day
AAF-MGD	annual average flow in million gallons per day
ACCG	Association of County Commissioners of Georgia
ACF	Apalachicola-Chattahoochee-Flint
ACT	Alabama-Coosa-Tallapoosa
AE	Adverse Effects
ASR	aquifer storage and recovery
AT	Alternative Technologies
BMPs	best management practices
cfs	cubic feet per second
CNG	Coosa-North Georgia
DCA	Department of Community Affairs
DCH	Department of Community Health
DO	dissolved oxygen
EA	Environmental Assessment
ED	Economic Development
EPA	Environmental Protection Agency
ES	Educate Stakeholders
FERC	Federal Energy Regulatory Commission
FOG	fats, oils, and grease
GADNR	Georgia Department of Natural Resources
GAEPD	Georgia Environmental Protection Division
GAP	Gap Analysis Program
GAWP	Georgia Association of Water Professionals
GEFA	Georgia Environmental Finance Authority
GEMA	Georgia Emergency Management Agency
GGCSA	Georgia Golf Course Superintendents Association
GGIA	Georgia Green Industry Association
GLUT	Georgia Land Use Trends
GMA	Georgia Municipal Association
gpf	gallons per flush
gpm	gallons per minute
GRWA	Georgia Rural Water Association
GSWCC	Georgia Soil and Water Conservation Commission
HCP	Habitat Conservation Plan
HUC	hydrologic unit code
I/I	inflow and infiltration
ITP	Incidental Take Permits

LAS	land application system
lb/yr	pounds per year
MGD	million gallons per day
mg/L	milligrams per liter
MS4	Municipal Separate Storm Sewer System
MSL	mean sea level
NARSAL	Natural Resources Spatial Analysis Laboratory
NESPAL	National Environmentally Sound Production Agriculture Laboratory
NNC	Numerical Nutrient Criteria
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O&M	operation and maintenance
O.C.G.A.	Official Code of Georgia Annotated
PVEPC	Part V Environmental Planning Criteria
RC	Regional Commission
SB	Senate Bill
SOP	standard operating procedure
SPLCP	Standards and Procedures for Local Comprehensive Planning
SSO	sanitary sewer system overflow
SWMP	Stormwater Management Program
TMDL	total maximum daily load
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish & Wildlife Service
WC	water conservation
WCIP	Water Conservation Implementation Plan
WQ	water quality
WRD	Wildlife Resources Division
WS	water supply
WTP	water treatment plant
WW	wastewater

Acknowledgements

The authors gratefully acknowledge the cooperation, courtesy, and contributions of the following members of the Coosa-North Georgia Regional Water Planning Council.

Name	City	County
Doug Anderton	Lookout Mtn.	Dade
David Ashburn	LaFayette	Walker
Irwin Bagwell	Cave Springs	Floyd
J. Tim Banks	Rome	Floyd
Kenneth Beasley	Dahlonega	Lumpkin
John Bennett	Rome	Floyd
Mike Berg	Dawsonville	Dawson
Charles J. Bethel	Dalton	Whitfield
Tim Bowden	Dahlonega	Lumpkin
Keith Coffey	Ringgold	Catoosa (Alternate)
James Donald Cope	Dalton	Whitfield
Kelly E. Cornwell	Fairmount	Gordon
Gerald R. Dunham	Cornelia	Habersham
Pat Gober	Dawsonville	Dawson
Stephen Gray	Clarkesville	Habersham
Jerry Jennings	Rome	Floyd
Haynes Johnson	Jasper	Pickens (Alternate)
Sherry Loudermilk	Epworth	Fannin
Richard H. Martin	Cedartown	Polk
William T. Mercier	Blue Ridge	Fannin
Tom O'Bryant	Cleveland	White
Lamar Paris	Blairsville	Union
Sam Payne	Calhoun	Gordon
Todd Pealock	Clarkesville	Habersham
David E. Pennington, III	Dalton	Whitfield
Jimmy F. Petty	Crandall	Murray
Frank M. Riley	Hiawassee	Towns
David Westmoreland	Ellijay	Gilmer
Representative Katie Dempsey	(Ex-Officio)	
Senator Chip Pearson	(Ex-Officio)	

Acknowledgements

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Executive Summary

This Regional Water Plan lays out a roadmap for implementing specific measures designed to ensure wise use and management of the Region's water over the next 50 years. It focuses on four areas:

Water Conservation—Responsible use of a public resource.

Water Supply—Optimal management of water supplies and systems.

Wastewater—Reliable means for wastewater treatment and reuse.

Water Quality—Environmental improvements through reduced pollution.

This Plan assesses the Region's current and future water and wastewater needs and describes 42 management practices that can be implemented through collaboration between local, regional, and state entities. It also presents realistic and measurable benchmarks to track short-term and long-term progress toward implementing the management practices.

Introduction

The Georgia Environmental Protection Division (GAEPD), with oversight from the Georgia Water Council, developed the first Comprehensive State-wide Water Management Plan (State Water Plan), which 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 region and council, covering the Atlanta metro area, already existed). Part of the mission of each council was to create a Regional Water Plan in final form by September 2011.

Figure ES-1: Location Map of Coosa-North Georgia Water Planning Region

The Coosa-North Georgia Regional Water Planning Council (the Council) prepared this Regional Water Plan for the Coosa-North Georgia Water Planning Region (the Region) which includes 18 counties and 52 municipalities. See Figure ES-1. The Region contains portions of the Coosa, Conasauga, Coosawattee, Etowah, and Oostanaula

river basins and includes various groundwater aquifer systems, particularly the Crystalline rock and Paleozoic rock aquifer systems.

Process

The Council is comprised of 30 individuals who represent a cross-section of public and private stakeholders within the Region's 18 counties: Catoosa, Chattooga, Dade, Dawson, Fannin, Floyd, Gilmer, Gordon, Habersham, Lumpkin, Murray, Pickens, Polk, Towns, Union, Walker, White, and Whitfield. The Council adopted the following vision and goals (Table ES-1) to guide the development of this Regional Water Plan:

Vision: Enhance the potential and quality of life for all communities through sustainable use of water resources in the region and state with partnerships among a broad spectrum of stakeholders.

Table ES-1: Goals for the Regional Water Plan

Number	Goal
1	Plan for appropriate levels of water storage, water sources, and long-term supply to meet anticipated need for local communities.
2	Minimize adverse effects to local communities and adjacent regions, and, when possible, enhance natural systems.
3	Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.
4	Promote alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the Region.
5	Promote properly managed wastewater discharges.
6	Educate stakeholders in the Region on the importance of water resources, including water conservation, efficiency, and pollution prevention.
7	Identify practices that reduce nonpoint source pollution and control stormwater to protect and enhance water quality and ecosystems in lakes and streams, particularly those in priority watersheds and listed streams.
8	Develop an ongoing adaptive management approach to measure, share, and evaluate water use data and information.

Nine full council meetings were held to develop the Regional Water Plan over a 24-month period. The meetings included representation from state agency staff, local government and utility staff, and interested stakeholders. Additional subcommittee meetings were held to address specific topics including the water and wastewater per capita demands and the selection of management practices. Results and

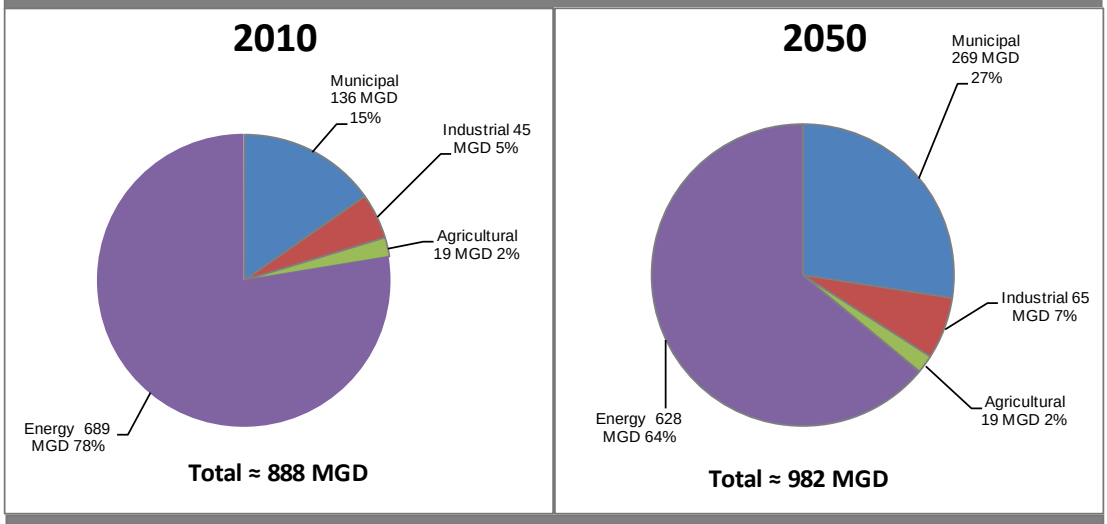
recommendations from subcommittee meetings were discussed and approved during full council meetings.

Water and Wastewater Demands

As shown in Figure ES-2, major water uses, based on 2010 water withdrawal totals, are for energy generation (78 percent), municipal water supply (12 percent), industrial use (8 percent), and agricultural use (2 percent). Virtually all of the water withdrawn for energy generation is used for cooling and then returned to its original source. Thus, consumptive water use for this purpose is negligible.

Energy water demands are expected to decrease throughout the planning horizon (i.e., through 2050); however, energy use will remain the largest demand in the Region in 2050, comprising 64 percent of the total. Other uses forecast for 2050 include municipal water supply (21 percent), industrial use (13 percent), and agricultural use (2 percent). Agricultural water demands are expected to remain relatively constant between 2010 and 2050. Municipal and industrial water demands are projected to increase steadily from approximately 181 million gallons per day (MGD) in 2010 to 334 MGD in 2050.

Figure ES-2: Water Demand Forecast for 2010 and 2050 (AAD-MGD)



Notes:
Energy water demand is the Alternative Energy Forecast (CDM, 2010).

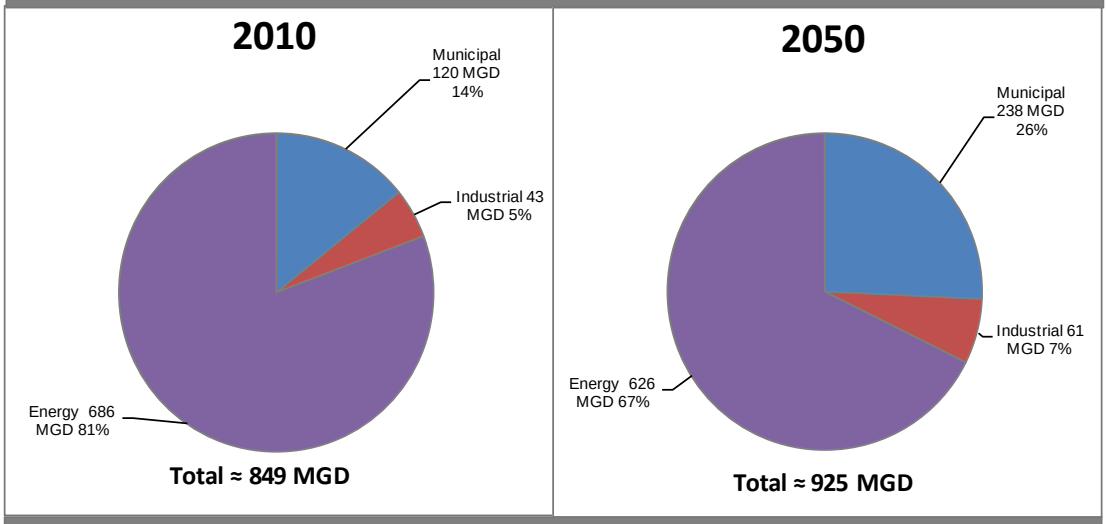
Data Sources: Coosa-North Georgia Municipal and Industrial Forecasts (CH2M HILL, 2010), Energy Forecasts (CDM, 2010), and Agricultural Forecasts (UGA, 2010).

Figure ES-3 shows the results of the wastewater flow forecast for 2010 and 2050 by sector. Water returns from thermoelectric energy production make up 81 and 67

percent of the total in 2010 and 2050, respectively. However, these flows are generally for permitted cooling water returns and do not represent future needs for wastewater treatment.

The total wastewater flow for municipal and industrial uses is projected to be 299 MGD in 2050.

Figure ES-3: Wastewater Flow Forecast for 2010 and 2050 (AAF-MGD)



Notes:
Energy water return is the Alternative Energy Forecast (CDM, 2010). Consumptive use was estimated to be 2-3 MGD for the Alternative Energy Forecast.

Municipal wastewater flow forecast includes point source discharges (NPDES), land application systems (LAS), and septic systems.

Data Sources: Coosa-North Georgia Municipal and Industrial Forecasts (CH2M HILL, 2010) and Energy Forecasts (CDM, 2010).

Major Findings

The GAEPD developed Resource Assessments of the State's river basins and aquifers that examine three resource conditions:

Surface Water Quality (Assimilative Capacity)—The capacity of Georgia's surface waters to accommodate pollutants without unacceptable degradation of water quality, i.e., without exceeding State water quality standards or harming aquatic life.

Surface Water Quantity—The ability of surface water resources to meet current municipal, industrial, agricultural, and thermoelectric power water needs, as well as the needs of in-stream and downstream users.

Groundwater Quantity—The sustainable yield or volume of water that can be withdrawn without causing adverse effects in prioritized groundwater resources.

The Resource Assessments identify potential shortcomings in these resources and classify them as "gaps." A gap means that the existing or future conditions exceed the Resource Assessment metric, e.g., if the sustainable yield of a specific groundwater aquifer is exceeded, then a potential "gap" exists in groundwater availability in that area.

In addition, an analysis of existing permitted capacity (for water and wastewater facilities) versus future demands was conducted to identify potential water infrastructure "needs" and any potential wastewater infrastructure "shortages." A need or shortage means that the current permitted capacity of water or wastewater treatment facilities, respectively, is less than the future forecast demands, e.g., a potential "need" would occur if the permitted capacity of a water treatment plant in 2050 is less than the forecast demand for that year.

Table ES-2 summarizes the potential gaps, needs, and/or shortages identified for each county within the Region. Based on the Resource Assessments, there were limited gaps in meeting future water availability in Catoosa, Chattooga, Dade, and Walker counties in 2050. There were estimated gaps in meeting assimilative capacity in the future that will require improvements in wastewater treatment and non-point source controls, primarily for nutrient removal. Needs and shortages in permitted water and wastewater capacity, respectively, also occur by 2050 and will require development of additional facilities.

Table ES-2: Summary of Potential Gaps, Needs, or Shortages by CNG County

County	Surface Water Availability Gaps	Municipal Water Needs	Municipal Wastewater Shortages	Agricultural Water Shortages	Water Quality – Assimilative Capacity Gaps	Water Quality 303(d) Issues
See	*Table 5-1*	*Table 5-2*	*Table 5-4*	*Table 5-5*	*Figure 5-2*	*Sections 3.3.2 and 5.3*
Catoosa	Yes	Yes	Yes			Yes
Chattooga	Yes	Yes			Yes	Yes
Dade	Yes			Yes	Yes	Yes
Dawson		Yes	Yes			Yes
Fannin		Yes	Yes			Yes
Floyd						Yes
Gilmer		Yes			Yes	Yes
Gordon					Yes	Yes
Habersham		Yes				Yes
Lumpkin		Yes	Yes			Yes
Murray		Yes			Yes	Yes
Pickens		Yes	Yes		Yes	Yes
Polk					Yes	Yes
Towns		Yes	Yes		Yes	Yes
Union		Yes	Yes			Yes
Walker	Yes					Yes
White		Yes	Yes			Yes
Whitfield		Yes	Yes		Yes	Yes
Total Counties	4	13	9	1	9	18

Notes:

"Yes" indicates that there is a potential gap or need/shortage in the indicated county.

"Gap" is defined as a condition where the existing or future water withdrawal or return conditions exceed the Resource Assessment metric within a portion of the county.

"Need" and "Shortage" are defined as a condition where the current permitted capacity of water and wastewater treatment facilities, respectively, is less than the future forecast demands.

Recommended Management Practices

The State Water Plan defines Management Practices as reasonable methods, considering available technology and economic factors, for managing water demand, water supply, return of water to water sources, and prevention and control of pollution of the waters of the State. The Council ultimately selected 42 management practices within the following categories: Water Conservation (14 management practices), Water Supply (8 management practices), Wastewater (8 management practices), and Water Quality (12 management practices). In counties with no identified potential gaps/needs/shortages within a particular category, the management practices were selected to align with the Region's visions and goals.

Due to the diversity of land use and anticipated growth across the basin, the Council recognized that a "one size fits all" approach to management practices was not appropriate. Therefore, the Council developed a diverse set of management practices that may be applied to address more localized sub-regional water supply, wastewater, or water quality issues.

The Council used a prioritization process to assign a benefit ranking to each management practice. The top two management practices in each category are as follows:

Water Conservation: (1) Implement education and public awareness programs and (2) Develop water conservation goals.

Water Supply: (1) Encourage development of water master plans and (2) Consider expansion of existing reservoirs.

Wastewater: (1) Consider development of local wastewater master plans to evaluate wastewater treatment and disposal options to meet future demands and (2) Consider development and implementation of a local wastewater education and public awareness program.

Water Quality: (1) Encourage implementation of nutrient management programs and (2) Promote use of forestry best management practices.

The Council also developed short-term and long-term actions for implementing all management practices; and identified the parties responsible for implementation. The bulk of implementation actions fall to local governments and utilities and their respective Regional Commissions; however, extensive support for short-term activities, in particular, will be needed from State entities, such as the GAEPD. Cost estimates are presented that specify the capital or programmatic costs and funding sources and options for each management practice. In addition, the Council compiled a list of recommendations to the State for actions that will support implementation of the Plan. It also established measurable, achievable, realistic, and

time-phased benchmarks for implementing this Regional Water Plan. For example, it is recommended that progress in implementation of the short-term actions be measured using an annual survey, and improvements in water quality monitoring results will be measured using the GAEPD water quality database.

Overview of Plan Sections

Table ES-3 presents an overview of the Sections of this Regional Water Plan.

Table ES-3: Overview of the Regional Water Plan

Section	Title	Overview
1	Introduction	Introduction of Regional Water Planning process and the Council.
2	Coosa-North Georgia Water Planning Region	Characteristics of the Region, including geography and watersheds, aquifers, population, and land cover.
3	Water Resources of the Coosa-North Georgia Region	Major water uses and baseline water resource capacities.
4	Forecasting Future Water Resource Needs	Municipal, industrial, agricultural, and energy water use forecasts through 2050.
5	Comparison of Water Resource Capacities and Future Needs	Groundwater and surface water (quantity and quality) comparisons and identification of future gaps, needs, or shortages.
6	Addressing Water Needs and Regional Goals	Identified Management Practices to address future goals, shortfalls, needs, and gaps.
7	Implementing Water Management Practices	Management Practice implementation schedules, roles of responsible parties, and cost estimates. Recommendations to the State.
8	Monitoring and Reporting Progress	Benchmarks and measurement tools to track progress toward meeting goals and addressing shortfalls.
9	Bibliography	Supporting and referenced materials list.

Section 1. Introduction

Section Summary

Georgia is developing Regional Water Plans for 10 planning regions across the state to define sustainable practices to meet regional water resource needs through 2050.

*The Coosa-North Georgia Council developed a vision to "**Enhance the potential and quality of life for all communities through sustainable use of water resources in the region and state with partnerships among a broad spectrum of stakeholders**" and adopted the 8 goals listed in Section 1.3.*

The 2004 Comprehensive State-wide Water Management Planning Act mandated the development of a state-wide water plan that supports a far-reaching vision for water resource management: "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" (Official Code of Georgia Annotated [O.C.G.A.] §12-5-522(a)).

The Georgia Environmental Protection Division (GAEPD), with oversight from the Georgia Water Council, was charged with developing the first Comprehensive State-wide Water Management Plan (State Water Plan) which 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. Figure 1-1 illustrates the location of these regions relative to Georgia's river basins and counties. The preexisting Metropolitan North Georgia Water Planning Region (Metro North Georgia Region) was established in May 2001. In February 2009 the Governor, Lieutenant Governor, and Speaker of the House appointed the members of the regional water planning councils. Part of the mission of each council is to create a regional water development and conservation plan in final form by September 2011.

Therefore, the State Water Plan calls for the preparation of ten regional water development and conservation plans (Regional Water Plans). This Regional Water Plan prepared for the Coosa-North Georgia Water Planning Region (the Region) by the Coosa-North Georgia (CNG) Regional Water Planning Council (the Council) describes the regionally appropriate water management practices to be employed in the Region

Each Regional Water Plan recommends sustainable management practices designed to meet each region's needs through the year 2050 while coordinating with the Regional Water Plans of adjoining regional water planning councils for consistency across the state. As such, this CNG Regional Water Plan:

Figure 1-1: Georgia Regional Water Planning Councils

Source: Georgia Environmental Protection Division, 2009.

- Provides an overview of the Region's population, land use, and municipalities in Section 2.
- Describes the Region's existing water resources and unique characteristics in Section 3.
- Forecasts the Region's future water resources needs in Section 4.
- Compares the Region's future needs with existing capacities to identify potential water resource issues, particularly any water gaps or shortages, in Section 5.
- Reviews existing local and regional plans as part of an effort to select management practices to address gaps and shortages while still meeting the Region's goals in Section 6.
- Establishes a roadmap for implementing the selected management practices in Section 7.
- Establishes benchmarks for measuring and reporting progress toward implementation in Section 8.

This CNG Regional Water Plan is an important first step toward achieving the vision and goals of the Region while recognizing the need for an adaptive management approach of revisiting the Regional Water Plan on a regular, 5-year cycle.

1.1 The Significance of Water Resources in Georgia

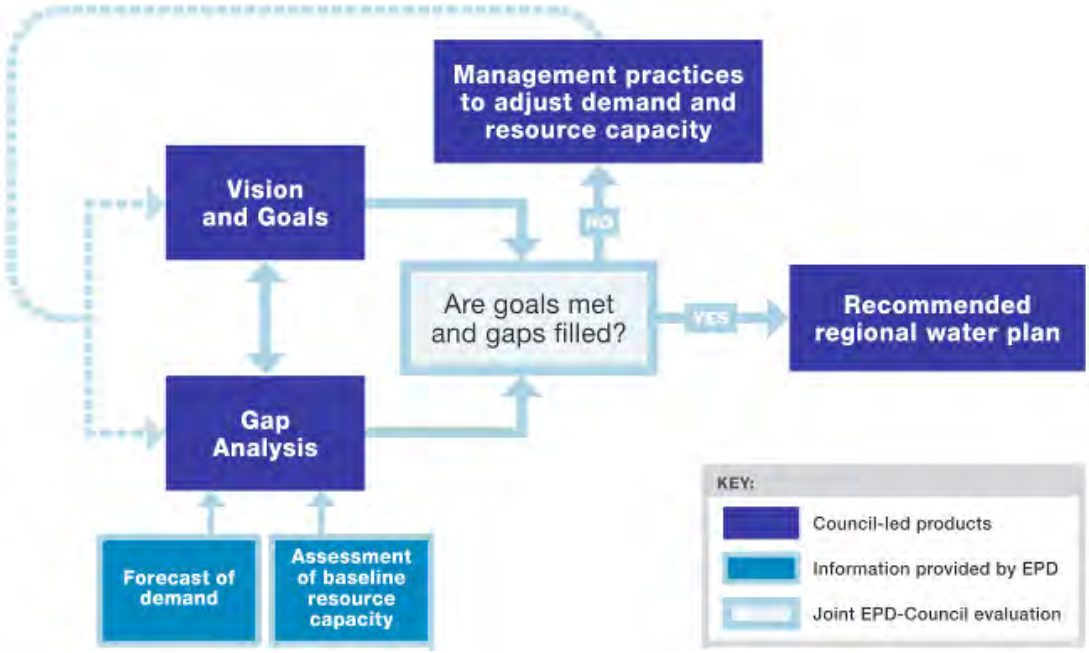
Of all of Georgia's natural resources, none is more important to the future of the state than water. The wise use and management of water is critical to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens. Georgia has abundant water resources, with 14 major river systems and multiple groundwater aquifer systems. But, while water in Georgia is abundant, it is not an unlimited resource and must be carefully and sustainably managed to meet long-term water needs. This CNG Regional Water Plan moves the Region toward managing its water resources in a proactive, sustainable manner.

1.2 State and Regional Water Planning Process

The State Water Plan established the 10 regional water planning councils illustrated in Figure 1-1, including the CNG Council, and provided a framework for regional planning. The Regional Water Plans are being prepared following the consensus-based planning process outlined in Figure 1-2, which requires the input of regional water planning councils, local governments, and the public. GAEPD is overseeing

the planning process and, along with partner agencies, providing support to the councils. The primary role of each council is to develop a Regional Water Plan and submit it to GAEPD for approval. The CNG Council has coordinated its efforts with councils adjacent to the CNG Region, including the Middle Chattahoochee, Metropolitan North Georgia, and Savannah-Upper Ogeechee councils. Specific roles and responsibilities for regional water planning councils are outlined in a Memorandum of Agreement between each council, GAEPD, and the Georgia Department of Community Affairs (DCA).

Figure 1-2: State Water Planning Process



Source: Georgia Environmental Protection Division, 2009.

1.3 CNG Regional Water Planning Council Vision and Goals

This Regional Water Plan reflects extensive efforts on the part of the 30 participants of the Council; these efforts are described in detail in the supplemental document titled *Summary of Public Outreach and Coordination Activities*, which is available on the CNG website.[1]

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

One of the Council's first tasks was to create a vision and a set of goals to guide water management in the Region. The vision and goals have guided the evaluation and selection of management practices that will best meet the Region's needs, as illustrated in Figure 1-2.

The Council adopted the following vision:

Enhance the potential and quality of life for all communities through sustainable use of water resources in the region and state with partnerships among a broad spectrum of stakeholders.

The Council adopted the following goals, which include both water quantity and quality management objectives:

Plan for appropriate levels of water storage, water sources, and long-term supply to meet anticipated need for local communities.

Minimize adverse effects to local communities and adjacent regions, and, when possible, enhance natural systems.

Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.

Promote alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the Region.

Promote properly managed wastewater discharges.

Educate stakeholders in the Region on the importance of water resources, including water conservation, efficiency, and pollution prevention.

Identify practices that reduce nonpoint source pollution and control stormwater to protect and enhance water quality and ecosystems in lakes and streams, particularly those in priority watersheds and listed streams.

Develop an ongoing adaptive management approach to measure, share, and evaluate water use data and information.

These goals will lead the Region toward sustainable growth in the future while maintaining its existing excellent quality of life. The Council recognizes that the fish, wildlife, streams, rivers, and lakes in the Coosa, Chattahoochee, and Tennessee watersheds are vitally important to the people living in this Region and the entire state. These resources provide numerous people with the opportunity to fish, hunt, and otherwise enjoy areas of unspoiled green space. This public use and the existing

natural resources provide significant economic benefits to the Region with minimal outlay of public funds or services. The high quality of the water resources within the Region allows, in many cases, water utilities to operate at lower costs than in areas with more heavily impacted water quality. As a result, the Council places a very high priority on the protection, maintenance, enhancement, and restoration of the natural resources located within the Region.

Section 2. Coosa-North Georgia Water Planning Region

The CNG Region encompasses the northern extent of the State of Georgia, with portions bordering South Carolina, North Carolina, Tennessee, and Alabama. The Region covers 5,500 square miles and includes 18 counties and 52 municipalities (see Figure 2-1). Its population was an estimated 755,255 in 2010 and is projected to reach 1,551,894 in 2050 (Georgia Office of Planning and Budget, 2010a). Figure 2-1 illustrates that the Region has a large amount of land dedicated for conservation purposes; approximately 20 percent is conserved as part of the National Forest or as part of a State Forest, Wildlife Management Area, or Historic Area.

Section Summary

The 5,500 square mile Region includes 18 counties and contains portions of the Savannah, Chattahoochee, Tennessee, and Coosa River Basins. Local governments in the Region are supported by two regional planning entities: the Northwest Georgia Regional Commission and the Georgia Mountains Regional Commission.

The total population of the Region was estimated at 755,255 in 2010 and is projected to grow to 1.15 million in 2050. Approximately 63 percent of the total region was forested in 2005, 16 percent was being used for low or high intensity urban purposes, and an additional 15 percent was being used for pasture or row crops.

2.1 History, Climate and Physiography

The Region has an extensive history of Native American habitation.

The Region is characterized by a moist and temperate climate with mean annual precipitation ranging from 52-64 inches. Rainfall is fairly evenly distributed throughout the year, but a distinct dry season usually occurs from mid-summer to late fall. Winter is the wettest season and March the wettest month, on average (Robinson et al, 1996).

The Coosa River Basin Management Plan describes in detail the physiography, geology, and soils in the Region (GAEPD, 1998). The Region encompasses parts of four distinct physiographic provinces: the Cumberland Plateau, the Valley and Ridge, the Blue Ridge, and the Piedmont. Only a small segment of the Appalachian Plateau physiographic province lies in Georgia, encompassing Cloudland Canyon State Park in Dade County (Chowns, 2006). As a result, the Region's geography is diverse.

The Cumberland Plateau province is dominated by relatively flat plateaus ranging in altitude from 1,500 to 1,800 feet above mean sea level (MSL) that are bounded by narrow, northeast-southwest-trending linear valleys. In contrast, the Valley and Ridge

and the Piedmont provinces range from approximately 600 feet to 1,600 feet above MSL, while the Blue Ridge province is dominated by mountains as high as about 4,100 feet above MSL. The Valley and Ridge province extends northeast to southwest through the western portion of the region, connecting portions of Georgia and Tennessee with eastern Alabama. This province consists of numerous northeast-to-southwest-trending ridges with associated valleys; it has historically been the source of mining activity with some farming in the valley floors. The Blue Ridge province includes most of the eastern portion of the Region and is dominated by mountains with fast-flowing streams, rapids, and steep slopes in the foothills of the Appalachian Mountains. Additionally, the southeastern borders of Habersham and Polk Counties straddle the Piedmont province, which is characterized by low hills and narrow valleys.

2.1.1 Local Governments

The Region includes 18 counties and 52 municipalities, as illustrated in Figure 2-1 and listed in Table 2-1; these local governments are responsible for land use and zoning decisions that affect water resources management. While many local governments are also responsible for planning, operating, and managing water and wastewater infrastructure, in some cases local or regional water authorities, or private companies manage local infrastructure separately from local governments, as described in Section 4.

Table 2-1: CNG Counties and Municipalities

County	Municipalities
Catoosa County	Ringgold[a], Fort Oglethorpe
Chattooga County	Lyerly, Menlo, Summerville[a], Trion
Dade County	Trenton[a]
Dawson County	Dawsonville[a]
Fannin County	Blue Ridge[a], McCaysville, Morganton
Floyd County	Cave Spring, Rome[a]
Gilmer County	Ellijay[a], East Ellijay
Gordon County	Calhoun[a], Fairmount, Plainville, Ranger, Resaca
Habersham County	Alto, Baldwin, Clarkesville[a], Cornelia, Demorest, Mount Airy, Tallulah Falls
Lumpkin County	Dahlonega[a]
Murray County	Chatsworth[a], Eton
Pickens County	Jasper[a], Nelson, Talking Rock
Polk County	Aragon, Braswell, Cedartown[a], Rockmart, Taylorsville

Table 2-1: CNG Counties and Municipalities (Continued)	
County	**Municipalities**
Towns County	Hiawassee[a], Young Harris
Union County	Blairsville[a]
Walker County	LaFayette[a], Chickamauga, Fort Oglethorpe, Lookout Mountain, Rossville
White County	Cleveland[a], Helen
Whitfield County	Cohutta, Dalton[a], Tunnel Hill, Varnell
[a] Indicates County Seat	

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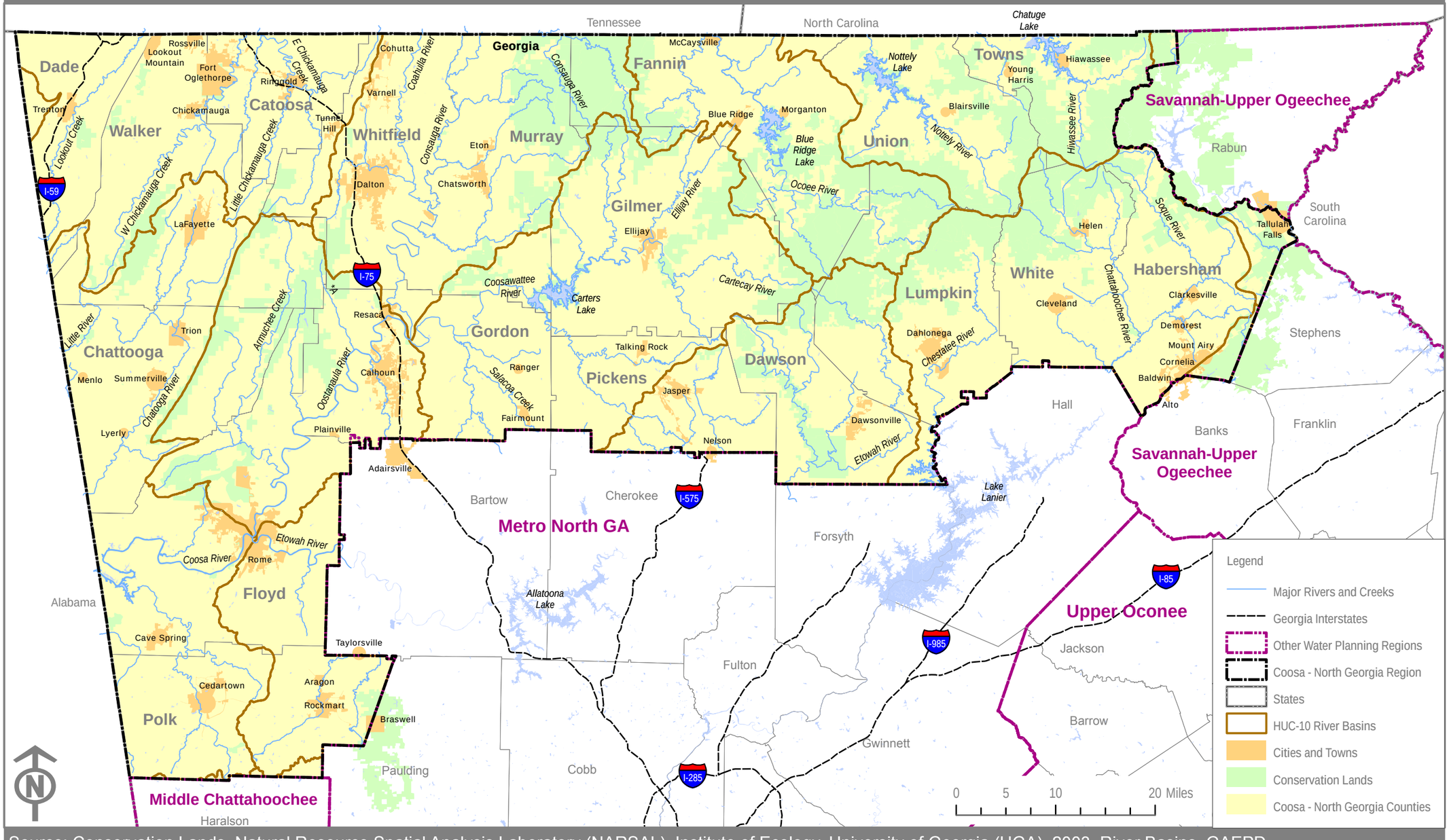
Figure 2-1. Counties and Cities in the CNG Region



Source: Conservation Lands, Natural Resource Spatial Analysis Laboratory (NARSAL), Institute of Ecology, University of Georgia (UGA), 2003. River Basins, GAEPD, Watershed Protection Branch, Drinking Water Compliance Program, 2003.

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2.1.2 Watersheds and Water Bodies

The U.S. Geological Survey (USGS) has divided and sub-divided the U.S. into successively smaller hydrologic units, which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system (USGS, 2011). Within the Region, there are portions of five river basins: Savannah, Chattahoochee, Coosa, Tallapoosa, and Tennessee, as shown in Figure 2-1 and summarized in Table 2-2. Table 2-2 provides the 8-digit HUCs for the river basins and the area and proportion of the Region each HUC represents. The vast majority, almost 99 percent, of the Region drains to the Chattahoochee, Coosa, or Tennessee River Basins. Section 3 describes the Region's water use classifications and impaired waters.

The headwaters of the Chattahoochee River originate in the southeastern corner of the Region and drain approximately 12 percent of the total Region, including portions of Dawson, Lumpkin, White, and Habersham Counties. Major tributaries of the upper Chattahoochee River include the Chestatee River and Soque River. These waterways drain southwest to Lake Lanier, a multi-purpose reservoir constructed and operated by the U.S. Army Corps of Engineers (USACE), located primarily within the Metro North Georgia Region.

As shown in Table 2-2, the Coosa River Basin encompasses 60 percent of the Region and includes the following major rivers: Conasauga, Coosawattee, Etowah, and Oostanaula. The largest water body is 3,200-acre Carters Lake on the Coosawattee River in Gilmer, Gordon, and Murray Counties. Major tributaries to Carters Lake include Talking Rock Creek, the Cartecay River, the Ellijay River, and Mountaintown Creek. Carters Lake is operated by the USACE and, unlike many reservoirs, has no private docks or development along its 62 miles of shoreline (USACE, 2011a). The Coosa River at the Alabama/Georgia state line in Floyd County also starts to form the upper impoundment of Lake Weiss, an Alabama Power reservoir.

Approximately 26 percent of the Region drains north to tributaries of the Tennessee River. In the northeastern portion of the Region, these tributaries include the Hiwassee River (Chatuge Lake), Nottely River (Nottely Lake), and the Ocoee River (Blue Ridge Lake). In the northwestern corner of the state and Region, Lookout Creek, West Chickamauga Creek, Peavine Creek, Little Chickamauga Creek, East Chickamauga Creek, and Tiger Creek drain portions of Dade, Walker, Catoosa, and Whitfield Counties to the north into Tennessee and ultimately to the Tennessee River (see Figure 2-1).

Table 2-2: River Basin Characteristics within Region				
River Basin	**Watershed Name**	**HUC-8 Code**	**Square Miles in Region**	**Percent of Region**
Savannah	Tugaloo	03060102	46	1%
Savannah	Broad	03060104	18	Less than 1%
Chattahoochee	Upper Chattahoochee	03130001	676	12%
Coosa	Conasauga	03150101	600	11%
Coosa	Coosawattee	03150102	758	14%
Coosa	Oostanaula	03150103	523	10%
Coosa	Etowah	03150104	677	12%
Coosa	Upper Coosa	03150105	742	13%
Tallapoosa	Upper Tallapoosa	03150108	9	Less than 1%
Tennessee	Middle Tennessee – Chickamauga	06020001	598	11%
Tennessee	Hiwassee	06020002	425	8%
Tennessee	Ocoee	06020003	418	8%
Tennessee	Guntersville Lake	06030001	12	Less than 1%
	Total Region		5,502	

Source: Georgia Department of Natural Resources (GADNR) Basins at 1:24,000 scale, http://www.gaepd.org/Documents/dnr_basins_metadata.html.

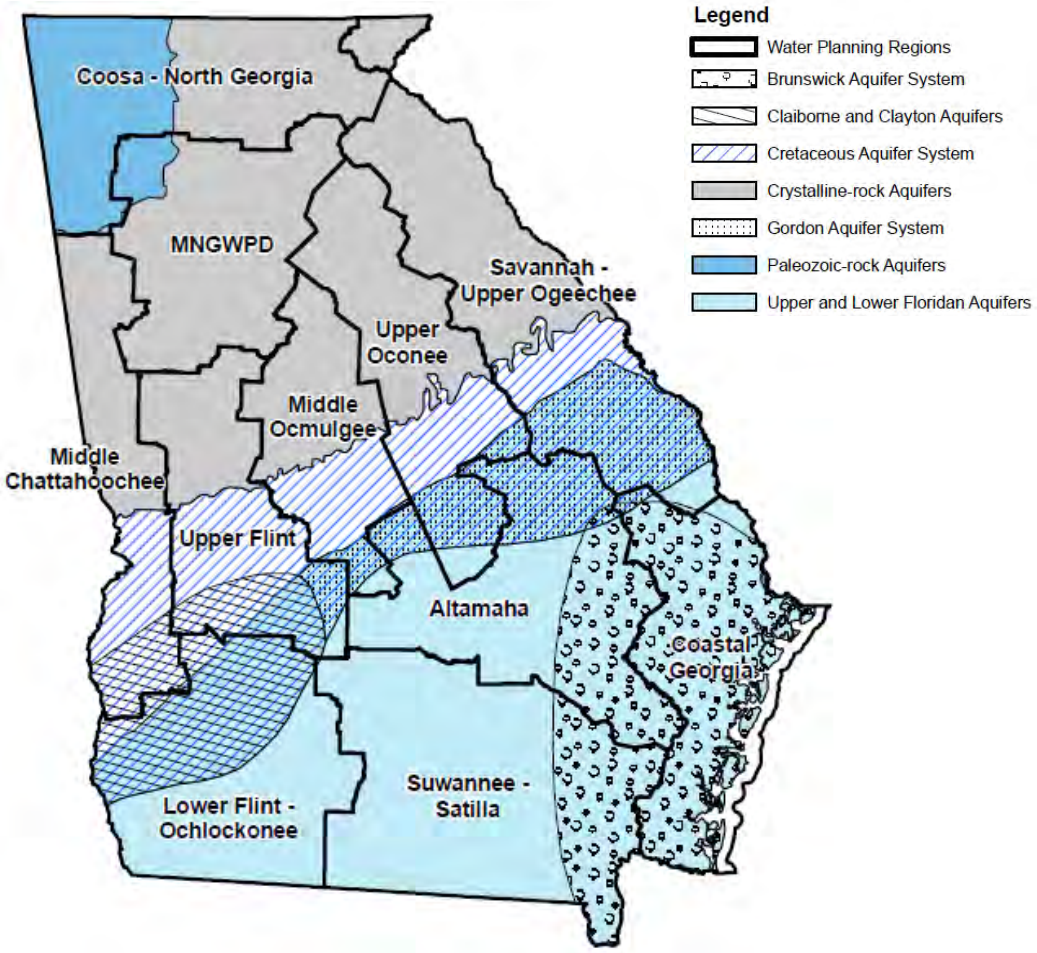
2.1.3 Groundwater Aquifers

The Region includes portions of two principal aquifer systems: the Crystalline rock and Paleozoic rock. See Figure 2-2. The eastern half of the Region includes Crystalline rock aquifer systems of the Piedmont and Blue Ridge physiographic provinces. The aquifer systems in the Crystalline rock aquifer occur in metamorphic and igneous rocks where secondary porosity and permeability has developed as a function of differential weathering along discontinuities. Enlargement of discontinuities, such as joints, faults, compositional layering/bedding, and foliation/cleavage, provides discreet pathways for groundwater storage and flow. The intersection and interconnection of these features creates localized aquifer systems within the bedrock that are dependent on many variables of each rock unit. Although these aquifer systems do not typically provide significant quantities of groundwater over the Region, local topographic and geologic conditions are conducive to development of discreet aquifer systems with sufficient sustainable yield to supplement water supply. These aquifer systems are typically local in extent, and the yield and groundwater chemistry can be affected by localized water use and climate. However, these aquifer systems, if properly managed, provide drought resistant sources of water to supplement surface water supplies.

The western half of the Region includes Paleozoic rock aquifers within the Valley and Ridge physiographic province. The principal aquifer systems in the Valley and Ridge occur in the carbonate sedimentary rocks where chemical solutioning has enlarged discontinuities (such as joints, faults, compositional layering and/or bedding planes) within the rock mass. Groundwater in these aquifer systems generally occurs under confined and semi-confined conditions with recharge principally generated from precipitation and surface water percolating downward through the overburden into the underlying carbonate rocks and leakage from other aquifer systems. Karst topography commonly develops in valley floors underlain by carbonate rocks in this physiographic province, especially where the cover of residuum and/or alluvium is thin. Fluctuation of the groundwater table resulting from natural (e.g., drought) or anthropogenic (e.g., pumping) processes can accelerate the development of karstic features such as sinkholes, swallets, and sinking streams. While solution-enlarged discontinuities form conduits which can yield several thousand gallons of water per minute (gpm), the water may have high levels of calcium and bicarbonate; in addition, well yields outside these conduits are low (10 gpm or less). Within the Coosa River Basin, wells in these karst aquifers yield an average of 350 to 700 gpm (GAEPD, 1998) with some well yields exceeding 2,000 gpm in Gordon County (GAEPD, 2005).

The water system is dynamic, with groundwater and surface water interacting with each other differently depending on geologic and climatic conditions; for example, groundwater may provide a large percentage of stream baseflow during extended dry periods. The USGS has estimated that approximately 60 percent of the average annual flow in the Coosa River is supplied by groundwater (Robinson et al, 1996). However, in the Crystalline rock aquifers, well yields are typically less than 1 cubic feet per second (cfs) and have minor, if any, impact on measured baseflow (Williams, 2004; Williams et al, 2005).

Figure 2-2: Groundwater Aquifers



Source: GAEPD, 2009.

2.2 Characteristics of the Region

The characteristics of the region are briefly discussed in the following sub-sections.

2.2.1 Population

The total population of the 18-county Region was estimated at 755,255 in 2010 (Georgia Office of Planning and Budget, 2010b). Floyd and Whitfield Counties are the two most populated counties in the Region, each with approximately 97,000 residents. Walker, Catoosa, and Gordon Counties also have populations greater than 50,000; however, the remaining 13 counties have populations below 50,000. The five most populous counties represent just over half, 51 percent, of the total population in the region.

2.2.2 Employment

Based on the U.S. Department of Labor and U.S. Census Bureau estimates, the Region's employment is largely dominated by the textile manufacturing sector, mainly the carpet industry, followed by the food sector. The estimated total employment in the Region increased slightly from an estimated 217,859 jobs in 2000 to 255,238 jobs in 2005 based on U. S. Census Bureau data.

The principal components of the manufacturing sector are textiles and apparel; paper and allied products; chemicals; transportation equipment; stone, clay, and glass products; food products; furniture; and lumber and wood products. Most of the manufacturing facilities are located in modern industrial parks and/or in close proximity to water and the surface transportation network. The Region has 10 of Georgia's higher learning institutions that contribute significantly to the economy of the communities where they are located.

2.2.3 Land Cover

Table 2-3 and Figure 2-3 illustrate land cover distribution across the major river basins in the Region in 2005. Table 2-3 summarizes acres by major river basin, including upstream and downstream areas outside of the Region, e.g., in Tennessee.

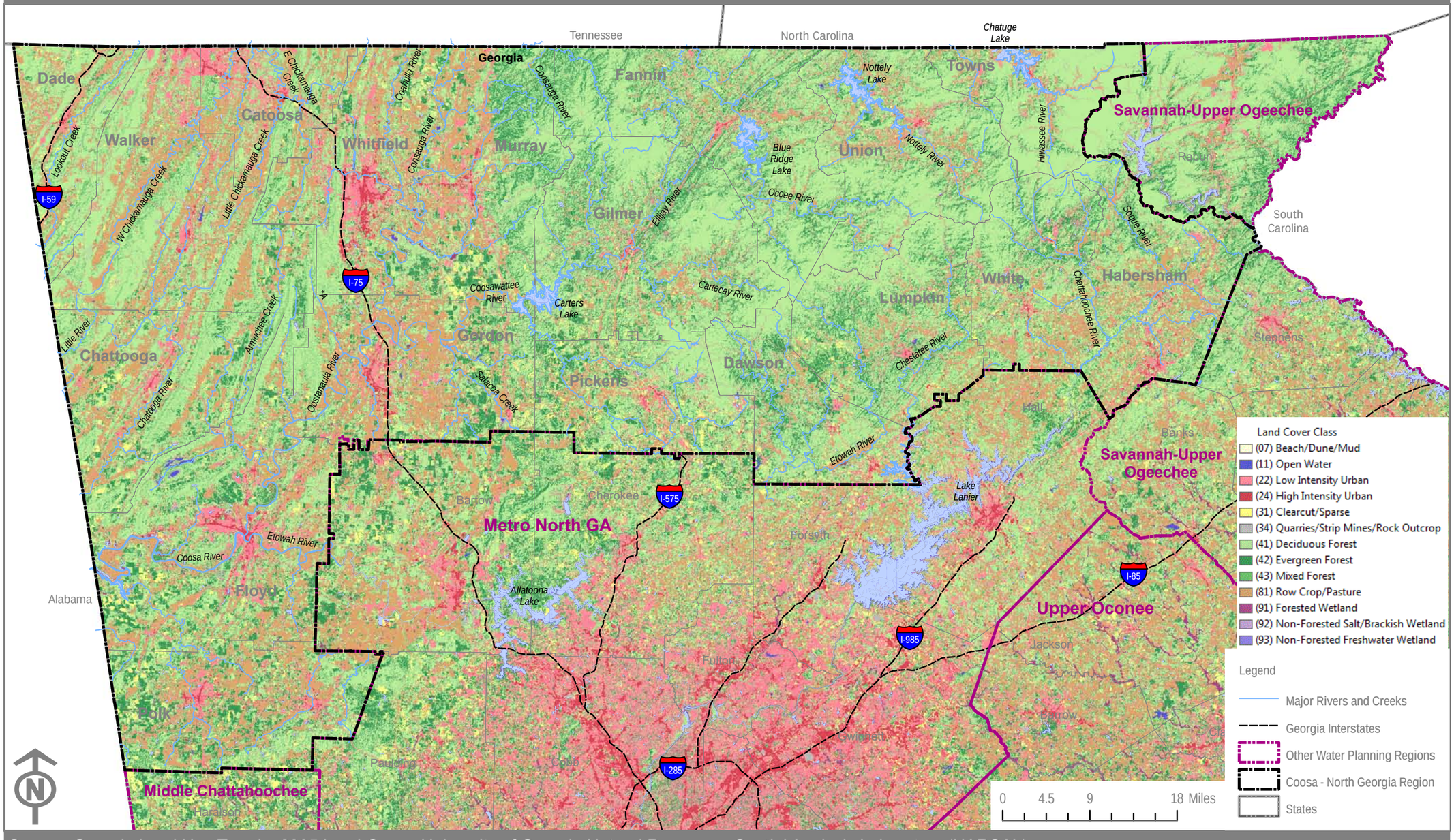
According to the UGA's Georgia Land Use Trends (GLUT) project approximately 63 percent of the total Region was forested in 2005, with almost half, 47 percent, as deciduous forests. Sixteen percent of the land was being used for low or high intensity urban development purposes, while another 15 percent was being used for pasture or row crops. This land cover information provides a relatively complete and consistent source for characterizing land cover conditions, and therefore potential nonpoint pollutant sources across the region. The data show that the majority of the low and high intensity urban lands are clustered around the incorporated areas in the western third of the Region, while agricultural corridors are found in the western valleys. With the exception of limited pockets of urban land around Blairsville and Dahlonega, most of the lands to the northeast of the Region are forested.

Table 2-3: 2005 Land Cover Distribution

Land Cover Category	Coosa Basin	Upper Chattahoochee Basin	Tennessee Basin	Total Acres	Percent of Total
Open Water	35,858	46,253	12,282	94,393	2%
Low Intensity Urban	333,915	235,986	77,906	647,807	13%
High Intensity Urban	45,853	68,702	5,312	119,867	2%
Clearcut, Sparse	139,041	42,771	11,802	193,614	4%
Quarries, Strip Mines, Rocks	3,294	1,585	1,219	6,098	0%
Deciduous Forest	1,357,781	356,497	578,386	2,292,664	47%
Evergreen Forest	459,407	94,905	79,400	633,712	13%
Mixed Forest	100,851	45,282	39,786	185,919	4%
Row Crops and Pasture	478,329	112,977	123,852	715,158	15%
Forested Wetland	17,553	6,358	1,384	25,295	1%
Non-forested Wetland-Fresh	10	84	10	104	0%
Total	2,971,893	1,011,400	931,339	4,914,632	

Source: Georgia Land Use Trends, 2005 Land Cover, UGA NARSAL

Figure 2-3. 2005 Land Cover in the CNG Region



Source: Georgia Land Use Trends, 2005 Land Cover, University of Georgia Natural Resources Spatial Analysis Laboratory (NARSAL).

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2.2.4 Local Policy Context

The CNG Region includes portions of two regional planning entities: the Northwest Georgia Regional Commission (RC) and the Georgia Mountains RC (Table 2-4). Table 2-4 indicates the other counties that fall within these two RCs as well as those counties' corresponding Water Planning Region. Georgia's 12 RCs are quasi-governmental regional planning organizations created and managed under Georgia law by their member local governments to serve regions that share similar economic, physical, and social characteristics. The RCs, working with the DCA, assist communities with a variety of planning issues, including local government planning, economic development, sustainable growth planning, and grant preparation and administration. The RCs also review local comprehensive land use plans and can help coordinate the connections between growth and water planning.

Table 2-4: CNG Counties by RC

RC	CNG Counties	Other Counties in this RC / Water Planning Region
Northwest Georgia	Dade, Walker, Catoosa, Chattooga, Gordon, Floyd, Polk, Whitfield, Murray, Gilmer, Pickens, Fannin	Haralson / Middle Chattahoochee Paulding and Bartow/Metro North Georgia
Georgia Mountains	Dawson, Lumpkin, Union, Towns, White, Habersham	Forsyth and Hall / Metro North Georgia Hart, Franklin, Banks, Stephens, Rabun / Savannah – Upper Ogeechee

Source: DCA, 2009

Local governments develop ordinances, policies, and plans to meet the requirements of State regulations. For example, communities with existing stormwater permits within the Region have developed local requirements for erosion and sediment control, post-construction runoff, and other programs required by the Federal and State stormwater programs. Local government and utility plans considered during the development of this Regional Water Plan are summarized in the Summary of Local Plans supplemental document available on the CNG website.[2] There are also multiple regional water resource planning efforts ongoing within the Region, such as the Lake Allatoona Upper Etowah Partnership and the Northwest Georgia Regional Water Resources Partnership.

Section 7.3 provides a summary of the other water resource planning efforts in the Region.

[2] http://www.coosanorthgeorgia.org/pages/our_plan/index.php

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Section 3. Water Resources of the Coosa-North Georgia Region

Water uses in the CNG Region are summarized in this Section based on data developed by the USGS in 2005 regarding county-wide water use across the entire state (Fanning and Trent, 2009). The USGS examined both primary water users and water sources. This Section incorporates this information and provides an overview of the Resource Assessments of current conditions for surface water and groundwater availability and surface water assimilative capacity (water quality).

Section Summary

Approximately 92 percent of the Region's water is supplied by surface waters with the other 8 percent coming from groundwater.

Resource Assessments for current conditions indicated that 67 miles of the Region's waterways have limited assimilative capacity remaining, i.e., the ability to receive wastewater discharges and still meet water quality standards for dissolved oxygen.

Resource Assessments for current conditions also indicated that two of the six modeled nodes in the Tennessee Study Basin are predicted to have water availability gaps 6-7 percent of the time. The Alabama-Coosa-Tallapoosa Basin included five nodes, and only one had a gap in water availability 7 percent of the time. Flows at each of the nodes with gaps are unregulated (i.e., no reservoirs are located upstream).

3.1 Major Water Use in Region

For planning purposes, water "withdrawal" is defined as the removal of water from a water source for a specific use. Depending on the kind of use, a portion of the withdrawn water is not returned to a water source as a measurable discharge. Water consumption (or consumptive use) is the difference between the amount of water withdrawn from a water source and the amount returned.

Current water withdrawal information for this Region was compiled for the development of the water use forecasts for four major categories:

- **Municipal**—water withdrawn by public and private water suppliers and delivered for a variety of uses (such as residential, commercial, and light industrial).
- **Industrial**—water withdrawn for fabrication, processing, washing, and cooling at facilities that manufacture products, including steel, chemical and allied products, paper, and mining. These industries utilize the largest amount of water among industrial classifications in Georgia.
- **Energy**—water withdrawn to generate electricity, mainly for cooling purposes at thermoelectric plants. Water returns after use may vary depending on the cooling technology used by each plant.

- **Agriculture**—water withdrawn for crop irrigation, which covers more than 95 percent of Georgia's irrigated land. Nursery water withdrawal estimates are also included in this category. Animal operations and golf courses with agricultural water withdrawal permits are not included in the forecasts, but estimates of current withdrawals are available and provided in the supplemental document titled *Agricultural Water Use Forecast for the Coosa-North Georgia Region*.[3]

As shown in Figure 3-1, in 2005 surface water was the predominant source of water in the Region. Surface water and groundwater withdrawals that supplied the four major water use categories totaled approximately 744 million gallons per day (MGD) on an annual average (Fanning and Trent, 2009).

Figure 3-2 shows the surface water withdrawals by major water withdrawal category. Thermoelectric energy production was, by far, the largest water withdrawal category (78 percent) for surface water, followed by municipal use (12 percent). Even though the majority of the water withdrawn in this region is used for energy production, nearly 100 percent return is expected for this use, because the cooling technology used by the only thermoelectric facility permitted within the region (Plant Hammond, Floyd County) has a negligible water consumption rate.

Figure 3-3 shows groundwater withdrawals by major water withdrawal category. The leading groundwater withdrawal is municipal (67 percent), followed by industrial (28 percent). The main groundwater supply sources for the region are the Crystalline rock and Paleozoic rock aquifers. However, the Crystalline rock aquifers provide very limited amounts of water because of geologic limitations.

Figure 3-4 summarizes wastewater treatment categories for the Region. Figure 3-4 shows that the leading method for treating wastewater in 2005 was treatment facilities with point source discharges. In addition, a significant amount of the municipal wastewater generated in the Region was treated by private onsite treatment systems (50 MGD), such as septic tanks, in areas where public collection systems are unavailable. In 2009 the GAEPD listed 110 municipal and industrial discharge permits in the Region comprised of 91 point source facilities and 19 land application systems (LASs).

Throughout the planning process, existing agricultural water use, onsite sewage treatment, and LASs were considered to be consumptive. Although water returns to its source from these applications, it was assumed in the Resource Assessments to not be returned within a time frame that allows for it to offset the impact of related withdrawals. Additional study of this issue in future updates of this Regional Water Plan and related resource assessments will more accurately represent the percent of this water that should be considered as a return flow.

[3] http://www.georgiawaterplanning.org/pages/forecasting/agricultural_water_use.php

Figure 3-1: 2005 Water Supply by Source Type (AAD)[a]

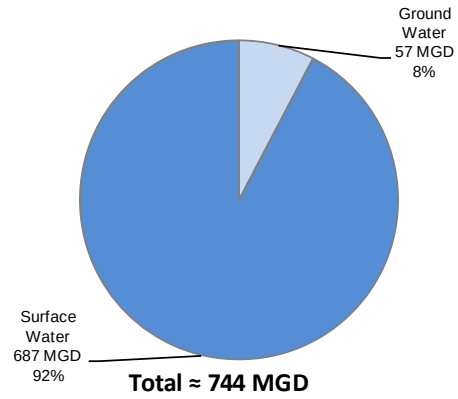


Figure 3-2: 2005 Surface Water Withdrawal by Category (AAD)[a,b,d]

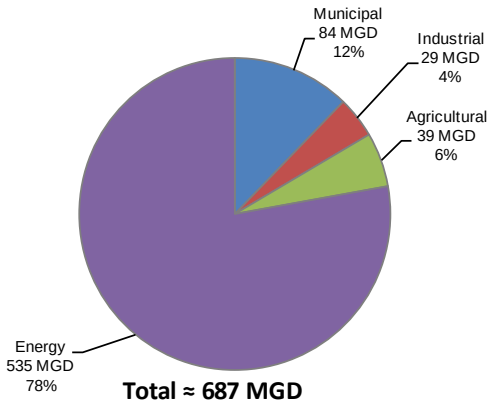


Figure 3-3: 2005 Groundwater Withdrawal by Category (AAD)[a,d]

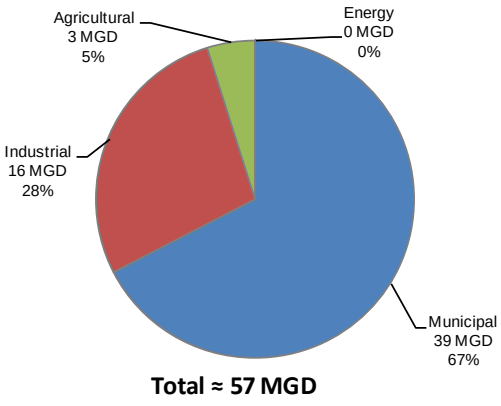
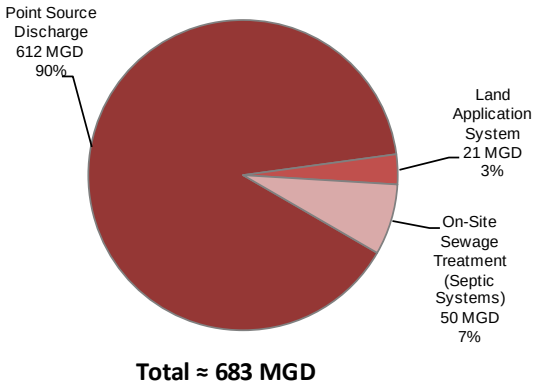


Figure 3-4: 2005 Wastewater Treatment by Category (AAF)[c,e]



Notes:

[a] Surface water value includes water withdrawals associated with thermoelectric power production from Plant Hammond.

[b] Point Source Discharge includes 535 MGD total returns from Plant Hammond (thermoelectric energy production facility).

[c] Some industrial categories are supplied by municipal suppliers and are included in the municipal category.

[d] Data Sources: "Water Use in Georgia by County for 2005; and Water-Use Trends, 1980-2005" (USGS)

[e] Data Source: Georgia EPD approved permit database.

3.2 Resource Assessments

GAEPD developed three Resource Assessments: (1) surface water quality, also known as assimilative capacity, (2) surface water availability, also known as surface

water quantity, and (3) groundwater availability. These Resource Assessments estimate the capacity of streams and aquifers to meet water consumption demands and the capability of streams to meet wastewater discharge demands based on sustainability metrics established by GAEPD. The Resource Assessments were completed on a resource basis (river basins and aquifers), but are summarized here as they relate to the Region. Full details of each Resource Assessment are presented on the GAEPD Water Planning website[4]. Section 5 of this Regional Water Plan compares the Resource Assessments to water demand and wastewater flow forecasts.

In the context of the Resource Assessments a potential "gap" is defined as a condition where the existing or future conditions exceed the Resource Assessment metric. For example, if the sustainable yield of a specific groundwater aquifer is exceeded then there would be a potential "gap" in groundwater availablity in that area. Similarly, if an existing water quality standard for nutrient loadings to a lake is exceeded, then there would be a water quality "gap" for that location. By contrast a potential "need" or a potential "shortage" (discussed in Section 5) is defined as a condition where the current permitted capacity of water or wastewater treatment facilities, respectively, is less than the future forecast demands. For example, a potential "shortage" would occur if the permitted capacity of a water treatment plant in 2020 is 10 MGD and the forecast demand is 20 MGD.These gaps, needs, or shortages are addressed through water quantity and water quality management practices in Section 7.

3.2.1 Surface Water Quality (Assimilative Capacity)

The assimilative capacity Resource Assessment estimated the capacity of Georgia's surface waters to accommodate pollutants without unacceptable degradation of water quality, i.e., without exceeding State water quality standards or harming aquatic life. The assimilative capacity results focus on dissolved oxygen (DO), nutrients (specifically nitrogen and phosphorus), and chlorophyll a (the green pigment found in algae that serves as an indicator of lake water quality). Fish and other aquatic organisms need oxygen to survive, and the DO standards have been established to protect aquatic life. Although nutrients support food production for aquatic organisms, high concentrations of nutrients can result in algal blooms, negatively affecting DO concentrations that may result in fish kills and potentially impacting taste and odor in watre supplies. The assimilative capacity Resource Assessment included an evaluation of the impact of current wastewater and stormwater discharges, combined with current withdrawals, land use, and meteorological conditions, on DO, nutrients, and chlorophyll a.

The Region includes both trout streams and warm water fishery streams that have daily average DO standards of ≥6 milligrams per liter (mg/L) and ≥5 mg/L, respectively. DO was modeled for each of the region's major rivers. The results

[4] http://www.georgiawaterplanning.org/pages/forecasting/energy_water_use.php

indicated 1,019 river miles with “Very Good” assimilative capacity (≥1.0 mg/L of available DO), 289 river miles with “Good” or “Moderate” capacity (>0.2 to 1.0 mg/L of available DO), and 67 river miles rated “Limited” or “None/Exceeded” (≤0.2 mg/L of available DO) capacity.

Lake Allatoona must meet the State standards outlined in Chapter 391-3-6-.03(17)(d) including chlorophyll a, pH, total nitrogen, total phosphorus, fecal coliform, dissolved oxygen, and temperature. The standards for chlorophyll a and total phosphorus vary by lake location. GAEPD is developing a total maximum daily load (TMDL) for Lake Allatoona in response to water quality problems caused by high nutrient levels. As part of the TMDL process, modeling was completed for Lake Allatoona for 2001 through 2007, a period that included both wet and dry years. The model results indicated that most predicted exceedances of the chlorophyll a standard were observed in 2002 and 2007, which were drought years. Similarly, there were predicted violations of the TN standard along the Little River lake arm during a drought year. The total phosphorus standard was predicted to be exceeded in both wet and dry years.

The U.S. Environmental Protection Agency (EPA) has established a TMDL for total phosphorus for Lake Weiss in Alabama which allocates a 30 percent aggregate pollutant load reduction to upstream Georgia sources from the Coosa River and Chattooga River at the Georgia / Alabama state line (EPA, 2008). Chapter 391-3-6-.03(14) of Georgia’s Rules and Regulations for Water Quality Control specify that the Coosa River support recreational water uses at the state line while the Chattooga River is targeted to support fishing. Modeling of the Coosa River indicated that the aggregate pollutant load reductions in total phosphorus would not be met under current loading conditions in both wet and dry years.

GAEPD is developing a TMDL for Carters Lake in response to water quality issues caused by high nutrient loadings, which have resulted in exceedances of the chlorophyll a and total phosphorus standards. Based on direction from EPA, new nutrient standards will be developed across the state for all water bodies which may require future additional reductions in nutrient loadings.

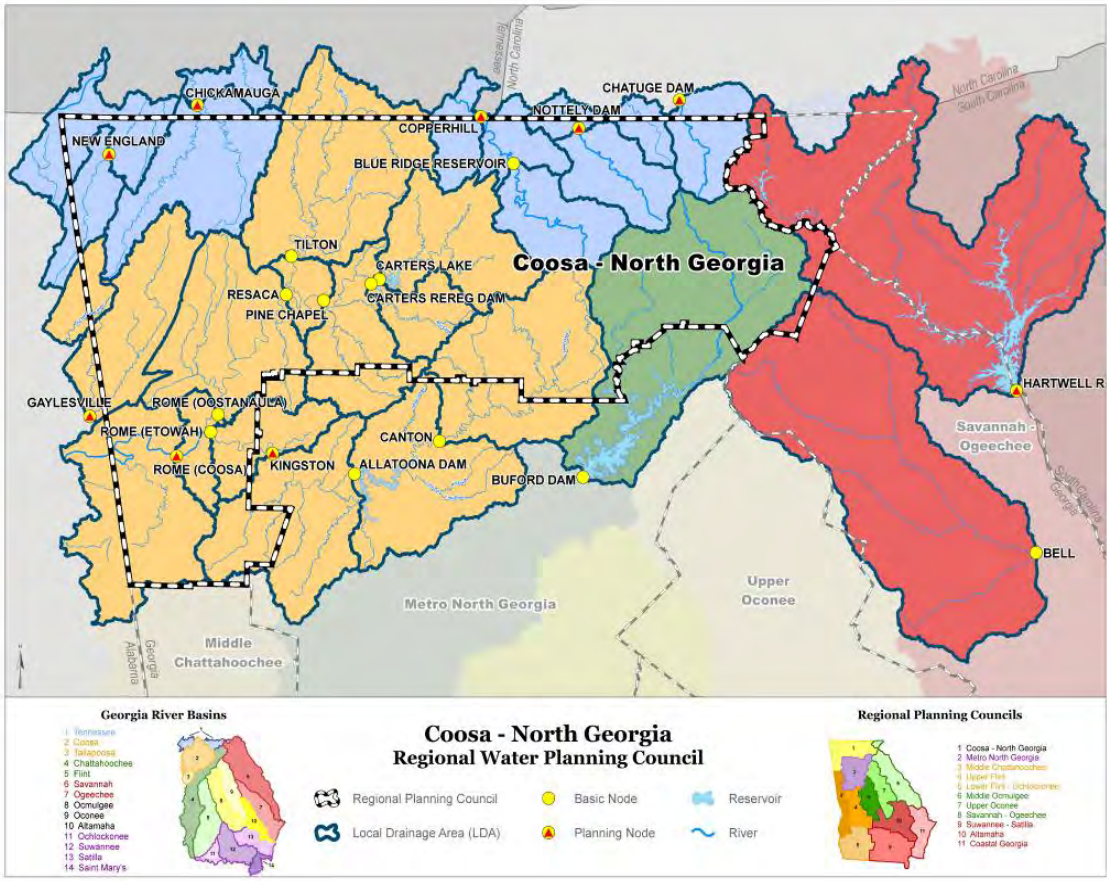
3.2.2 Surface Water Quantity

The surface water availability Resource Assessment determined the flow response at various planning nodes within the region based on current municipal, industrial, agricultural, and thermal power water consumptive uses within the basins above the planning nodes. The flow responses at the planning nodes were evaluated to determine the frequency with which the resulting stream flows fell below the stream flow metrics established by GAEPD, and the magnitude of those deviations. Minimum in-stream flows are based on GAEPD policy, existing Federal policy, or existing Federal Energy Regulatory Commission (FERC) license requirements. The Resource Assessment determined the reliability of the surface water to meet demands in terms of both magnitude (the magnitude of the flow drop below minimum

in-stream requirements) and duration (number of days below minimum in-stream requirements).

Figure 3-5 illustrates the local drainage areas and planning nodes used in developing the surface water Resource Assessments. Planning nodes are stream gages at selected points along streams in a watershed. These gaging stations are used to evaluate the impact of cumulative upstream consumptive uses of water (i.e., withdrawals minus returns) and authorized reservoir operations on stream flows.

Figure 3-5: Local Drainage Areas and Planning Nodes in the CNG Region



Source: GAEPD, 2009

The Region is part of three hydrologic modeling areas: the Tennessee Study Basin, the Alabama-Coosa-Tallapoosa (ACT) Study Basin, and the Apalachicola-Chattahoochee-Flint (ACF) Study Basin. The Tennessee Study Basin included six modeling nodes, or points where in-stream flow was estimated (see Figure 3-5). Two

of these nodes were predicted to have a water gap 6 percent (Chickamauga) and 7 percent (England) of the time (gap of 3-7 cfs under current conditions; flows at both nodes are unregulated (i.e., no reservoirs are located upstream). The ACT Basin included 5 nodes, and only one that is unregulated (Gaylesville) was predicted to have a gap 7 percent of the time (average gap of 4 cfs) under current condtions. Although gaps were predicted in the ACF Basin, no gaps were predicted in the Chattahoochee portion of the CNG Region. The gaps indicate that the natural streamflow is insufficient to meet the in-stream and off-stream uses at all times.

3.2.3 Groundwater Quantity/Quality

The groundwater availability Resource Assessment estimates the sustainable yield for prioritized groundwater resources based on existing data. GAEPD prioritized the aquifers based on the aquifer characteristics, evidence of negative effects, anticipated negative impacts, and other considerations.

Two prioritized aquifer systems were evaluated in the Region: the Crystalline rock and the Paleozoic rock. The Crystalline rock aquifer system lies within the Chattahoochee and Tennessee River watersheds; the Paleozoic rock aquifer system lies within the Etowah and Oostanaula River watersheds.

GAEPD developed a numerical groundwater model to estimate sustainable yield for a study basin selected within the Paleozoic rock aquifer system; a water budget approach developed for a basin within the Crystalline rock aquifer system was used to estimate sutainable yield in this part of the Region. No groundwater sustainable yield issues were identified within the Region based on current demands and conditions. Although most wells produce less than 200 gpm in the Crystaline rock aquifers, in local geologically unique settings, several wells exist with production rates between 200 and 500 gpm (Georgia Geologic Survey, 2006). Furthermore, within the Paleozoic rock aquifers, carbonate aquifers can produce over 2,000 gpm with little or no impact to the local water table.

Typical water quality issues known to be associated with the Crystalline rock aquifer systems include elevated iron/manganese levels and local concentration of radionuclides. Water quality issues known to be associated with the Paleozoic rock aquifers include turbidity, pH, hardness and iron.

3.3 Ecosystem Conditions and In-Stream Use

This section includes information on stream classifications, impaired waters, priority watersheds, and fish and wildlife.

3.3.1 Water Use Classifications (Designated Uses)

In accordance with the Federal Clean Water Act, GAEPD classifies each of the State's surface waters according to its uses. At a minimum, all waters are classified as fishable and swimmable. Water quality standards or criteria have been developed

for each water use classification to assist GAEPD with making water use regulatory decisions; Table 3-1 summarizes the streams in the Region that are classified by the State for uses other than fishing and swimming as referenced in Chapter 391-3-6-.03(14) of Georgia's Rules and Regulations for Water Quality Control.

Jacks River and the headwaters of the Conasauga River are designated as Wild and Scenic for which no alteration of natural water quality from any source is allowed. Portions of 10 other waterways in the Region are designated as Recreation or Drinking Water which also have additional water quality criteria. In addition to a water's designated use, standards apply to two levels of trout stream designations: "Primary," which support self-sustaining populations of wild trout, and "Secondary," which provide habitat suitable for stocking trout. Eleven of the Region's 18 counties contain a primary or secondary trout steam. There is to be no elevation of natural stream temperatures for a primary trout stream. A secondary trout stream must have no temperature elevation exceeding 2°F of natural stream temperatures.

Table 3-1: Special Stream Classifications		
Stream	**Reach**	**Classification**
Cartecay River	Headwaters to Ellijay Water Intake	Drinking Water
Chattahoochee River	Headwaters to Buford Dam	Recreation[a]
Conasauga River	Georgia Hwy. 2 to Dalton Water Intake	Drinking Water
Conasauga River	Waters Within the Cohutta Wilderness Area	Wild & Scenic[b]
Coosawattee River	Confluence of Mountaintown Creek to Carters Dam	Recreation
Coosawattee River	U.S. Hwy. 411 to confluence of Conasauga River	Drinking Water
Coosa River	At the Alabama State Line	Recreation
Ellijay River	Headwaters to Ellijay Water Intake	Drinking Water
Hiawassee River	Headwaters to Georgia – North Carolina State Line (including Lake Chatuge)	Recreation
Jacks River	Waters Within the Cohutta Wilderness Area	Wild & Scenic
Mill Creek	Headwaters to Dalton Water Supply	Drinking Water
Nottely River	Headwaters to Georgia – North Carolina State Line	Recreation
Oostanaula River	Confluence of Armuchee Creek to Rome Water Intake	Drinking Water
Oostanaula River	Confluence of Conasauga and Coosawattee Rivers to Calhoun Water Intake	Drinking Water
Tallapoosa River	Headwaters to Georgia Hwy. 100	Drinking Water
Toccoa River	Headwaters to Georgia - Tennessee State Line (including Lake Blue Ridge)	Recreation

Source: GAEPD Rule 391-3-6-.03 Water Use Classifications and Water Quality Standards, August 2011.
[a] All waters classified to support recreational contact; these waters are used for activities such as water skiing, boating, swimming where risk of contact is greater than in most waters.
[b] No alteration of natural water quality allowed; no wastewater and stormwater discharges permitted.

3.3.2 Monitored and Impaired Waters

GAEPD publishes a list of streams that do not meet the water quality standards associated with each designated use category. GAEPD monitors streams throughout the State and publishes the list, known as the 303(d) list, every other year. Of the 2,302 stream miles assessed in the Region, 54 percent were not supporting their designated use. Most of these waters were rated as impaired based on biological monitoring (i.e., fish or macroinvertebrate data indicated reduced organism numbers or diversity) and/or high levels of fecal coliform. Fecal coliform bacteria are an

indicator of the presence of human waste; high levels indicate potential health risks in waters used for swimming and other recreational activities. Figure 3-6 shows the locations of the impaired stream segments within the Region based on the 2008 listings, the most recent year for which mapping data were available.

Lakes are also monitored as part of the 303(d) process and are listed as "not supporting" their uses if sampling results indicate they do not meet State water quality standards. Carters Lake, designated for Recreation, in Gilmer County, was not supporting recreational use due to a violation of the chlorophyll a standard caused by urban runoff and nonpoint source pollution.

GAEPD recently released the 2010 303(d) list, which includes the following general changes from the 2008 list for waterbodies within the Region (GAEPD, 2010a):

- Bio (Fish) was added to 56 waters based on Fish Index of Biotic Integrity studies in the Blue Ridge of Georgia (which includes the Coosa and Tennessee River Basins).
- Phosphorus was added as an impairment to Carters Lake based on an exceedance of the average annual phosphorus load.

3.3.3 Conservation Areas

GADNR's Wildlife Resources Division (WRD) identifies waters and watersheds it believes should be given high conservation priority to protect important populations of high priority species and to protect or restore representative aquatic systems throughout Georgia (GADNR, 2011). The entire list of high priority waters is available at the WRD website.[5] Figure 3-7 shows the high priority waters within the Region.

The streams included on the final priority list are those that are a high priority for restoration, preservation, or other conservation activity; streams that were too degraded were not included in the final list. The streams on the list contain anadromous fish (fish that return to the river where they were born to breed), include rare natural systems, or represent the least disturbed aquatic systems within the Region. Although the individual stream reaches were the basis for the selection process, Figure 3-7 identifies the entire watershed as a high priority watershed since protecting the entire watershed is the only way to protect these high priority waters. The list of high priority waters is scheduled to be updated by 2013; therefore, the Council may consider providing input to GADNR by recommending streams/watersheds for inclusion or removal from this list.

The Georgia Conservation Lands Database, a product of the Georgia Gap Analysis Program (GAP), was compiled to aid a state-wide evaluation of how the distribution of lands managed to protect biodiversity compares with potential natural vertebrate systems in the State. The Region contains more than 808,000 acres of protected

[5] http://www.georgiawildlife.com/node/1377

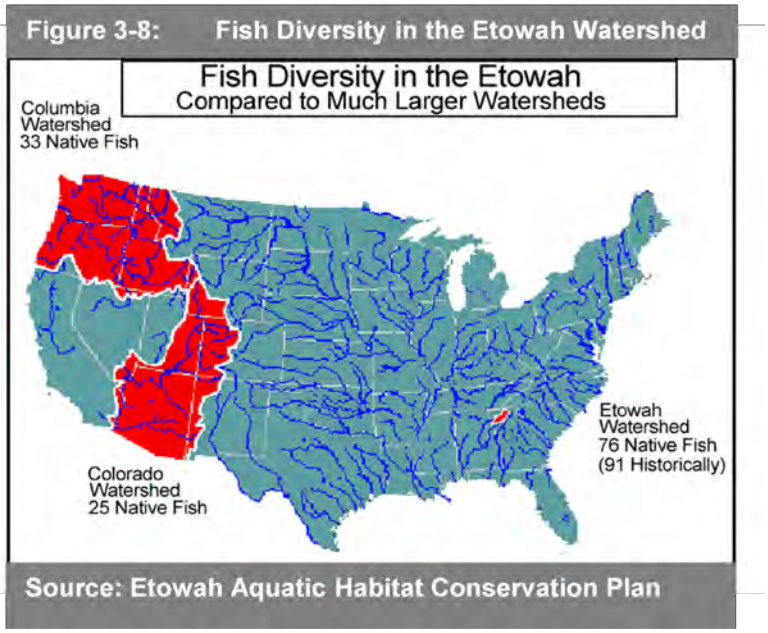
land managed for conservation purposes, representing 23 percent of the Region's total area. Of the total, 665,354 acres are located in the Chattahoochee National Forest.

The rivers within the CNG Region include some of the most pristine streams and unique aquatic habitats in Georgia, and as a result, this area includes several rare, threatened, and endangered aquatic species. These include 2 State threatened amphibians, 9 federally listed fish, 37 State rare or State threatened or endangered fish species, 9 State threatened or endangered crayfish species, 11 federally listed mussels, and 13 State threatened or endangered mussel species. The Georgia Nongame Conservation Section maintains an active list of these imperiled species and can be contacted for more information.[6]

3.3.4 Fisheries Resources

The Etowah River watershed is nationally recognized for its fish diversity. Figure 3-8 shows that in comparison to much larger watersheds, such as the Columbia and Colorado River watersheds, its fish diversity is significantly higher with 76 native fish species.

Figure 3-8: Fish Diversity in the Etowah Watershed



Source: Etowah Aquatic Habitat Conservation Plan

Extensive research has been conducted on imperiled fish species in the Coosa River Basin. The Coosa River system in Georgia and Alabama once contained the southernmost population of lake sturgeon in North America. However, after biologists found no substantiated evidence that the fish remained in the Coosa River system after the middle 1960s, GADNR began a reintroduction program in 2002. It will take 15-20 years of stocking to reestablish the lake sturgeon, primarily because the fish is slow-growing, reaching reproductive age much later than other local species. Angler reports, however, are becoming more common as the fish continue to grow larger and increase in abundance.

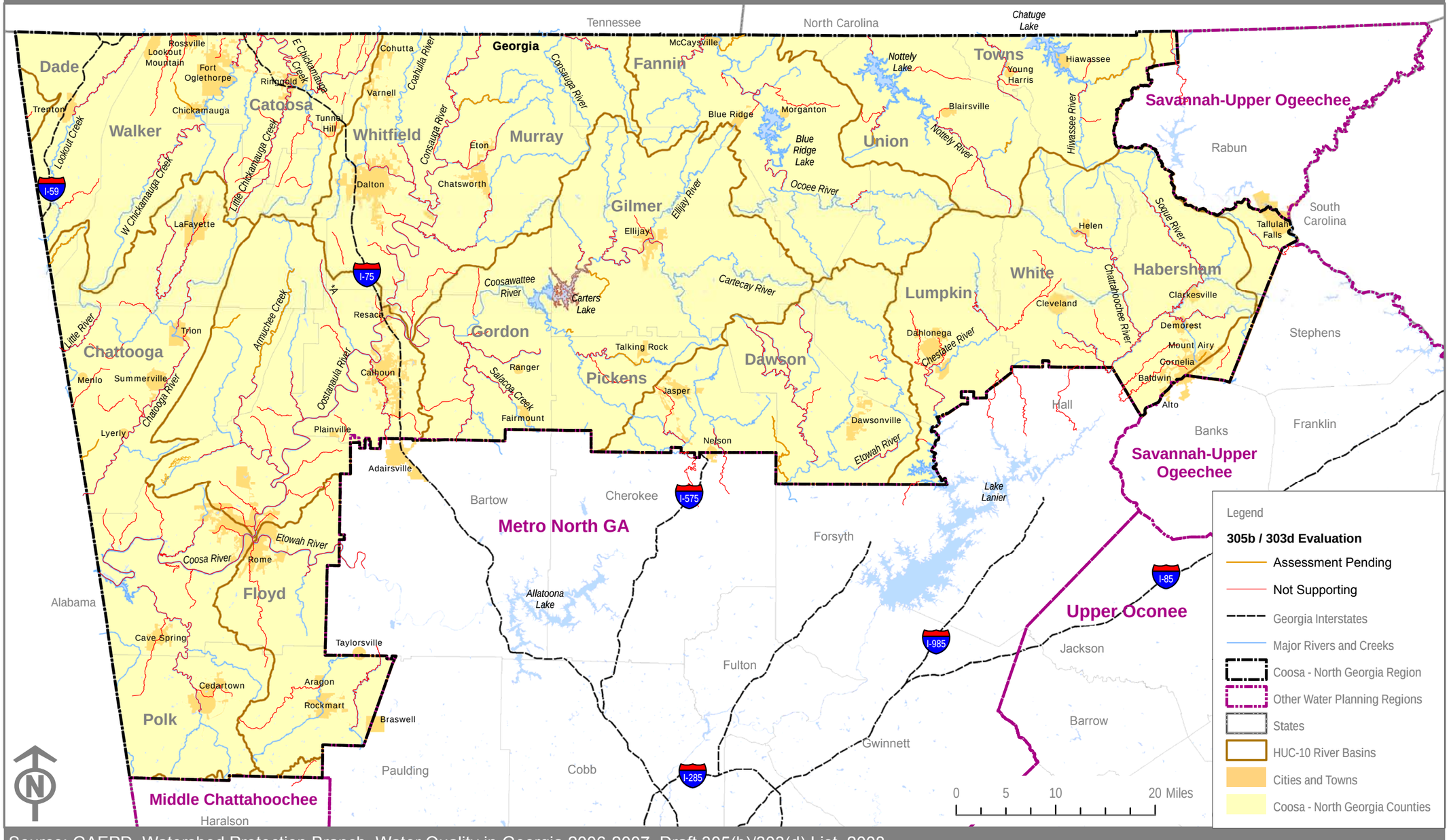
Discussion of the draft Habitat Conservation Plan developed for the Etowah River can be found in Section 7.3.

[6] http://www.georgiawildlife.org/conservation/species-of-concern?cat=6

Sport fishing is very popular in the CNG Region's rivers, lakes, and streams. Important recreational gamefish include striped bass, hybrid bass, and smallmouth bass. In addition, hybrid bass from the Region are used to stock rivers, lakes, and streams throughout Georgia. Other important game species include spotted bass, largemouth bass, smallmouth bass, redeye bass, black crappie, blue catfish, channel catfish, walleye, bluegill, and redear sunfish. Future changes in water use or water quality could affect all of these fisheries and the economic benefits provided by these resources.

Each year, trout fishing is enjoyed in Georgia by over 100,000 anglers on approximately 4,000 miles of trout streams (almost entirely in the CNG Region), and generates more than $172,000,000 in economic benefits. Due partially to naturally low productivity in some of these streams, GADNR WRD and the U.S. Fish and Wildlife Service (USFWS) stock over 1.1 million trout annually in Georgia streams and impose special regulations on some streams to help meet demands for trout fishing.

Figure 3-6. Impaired Waters in the CNG Region



Source: GAEPD, Watershed Protection Branch, Water Quality in Georgia 2006-2007, Draft 305(b)/303(d) List, 2008.

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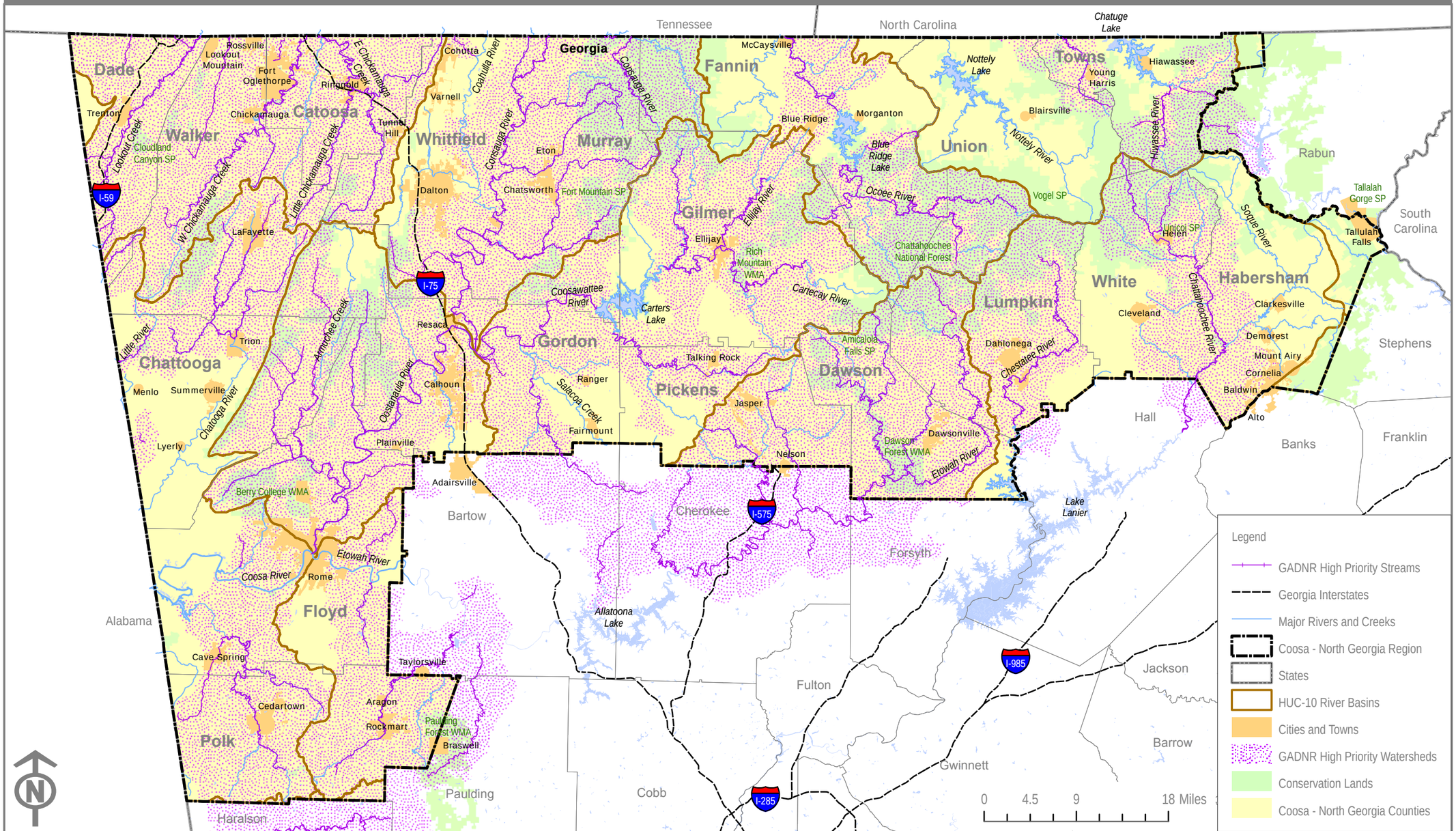
Figure 3-7. Conservation Areas and GADNR High Priority Waters (As Delineated in the State Wildlife Plan) in the CNG Region



Source: High Priority Streams and Watersheds, GADNR Nongame Conservation Section, http://www.georgiawildlife.com/node/1377.

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Section 4. Forecasting Future Water Resource Needs

Water demand and wastewater flow forecasts and the Resource Assessments described in Section 3 form the foundation for water planning in the CNG Region and serve as the basis for the selection of the management practices discussed in Section 7. Any differences between the 2005 USGS Report numbers presented in Section 3 and those in this Section are due to variations in data sources and methodologies.

This Section presents the regional water demand and wastewater flow forecasts for 10-year intervals from 2010 through 2050 for the 4 major water use categories: municipal, industrial, agricultural, and energy. These forecasts will continue to be refined and updated as part of the continuing regional water planning process.

Two supplemental documents are available on the CNG website that detail the agricultural and municipal and industrial forecasts. They are titled *Agriculture Water Use Forecast for the Coosa-North Georgia Region* and *Municipal and Industrial Water and Wastewater Forecasting for the Coosa-North Georgia Region*.[7] The document titled *State-wide Energy Sector Water Demand Forecast* is available on the GAEPD Water Planning website.[8]

Section Summary

Total water demand in the Region for municipal, industrial, agriculture, and energy use is expected to increase from 888 MGD in 2010 to 982 MGD in 2050. Similarly, wastewater flows are expected to increase from 849 MGD in 2010 to 927 MGD in 2050.

Energy generation is forecast to continue to make up the largest portion of future water withdrawals; however, the majority of this water is not consumptive, i.e., it is returned to its source. Agricultural water demands are also expected to remain relatively constant, while municipal and industrial water demands are projected to increase by 85 percent from 181 MGD in 2010 to 334 MGD in 2050.

4.1 Municipal Forecasts

Municipal water demand and wastewater flow forecasts include water supplied to residences, commercial businesses, small industries, institutions, and military bases. The municipal forecasts are based on county population projections developed by the Governor's Office of Planning and Budget in accordance with State law (O.C.G.A. 45-12-171) and are summarized in Table 4-1.

[7] http://www.coosanorthgeorgia.org/pages/our_plan/index.php
[8] http://www.georgiawaterplanning.org/pages/forecasting/energy_water_use.php

The population in the Region is projected to increase from 755,255 in 2010 to 1,551,894 in 2050, a growth rate of 105 percent over this 40-year period.

Table 4-1: Population Projections by County provided by Office of Planning and Budget[a]

County	2010 [a]	2020 [a]	2030 [a]	2040 [b]	2050 [b]	Difference[b] (2010 - 2050)	% Increase (2010 – 2050)
Catoosa	65,773	83,222	104,242	130,665	164,188	98,415	150%
Chattooga	27,335	30,773	34,557	38,401	42,503	15,168	55%
Dade	16,587	19,234	21,836	23,434	24,679	8,092	49%
Dawson	23,673	33,359	45,368	57,787	71,408	47,735	202%
Fannin	23,490	28,189	33,134	38,300	43,713	20,223	86%
Floyd	97,696	107,598	118,161	129,236	140,995	43,299	44%
Gilmer	30,095	39,743	52,242	68,395	89,491	59,396	197%
Gordon	54,925	66,191	79,377	94,798	112,970	58,045	106%
Habersham	44,553	51,850	60,261	67,226	73,581	29,028	65%
Lumpkin	28,463	36,132	45,482	56,291	68,390	39,927	140%
Murray	42,243	55,671	72,794	96,344	122,868	80,625	191%
Pickens	33,000	43,200	55,669	68,003	80,347	47,347	143%
Polk	43,228	49,787	57,178	65,378	74,443	31,215	72%
Towns	11,386	13,088	15,066	17,146	19,279	7,893	69%
Union	23,014	34,207	49,269	65,134	83,642	60,628	263%
Walker	66,190	73,835	81,254	85,939	88,747	22,557	34%
White	26,704	34,900	44,854	54,831	64,593	37,889	142%
Whitfield	96,900	114,157	134,561	158,137	186,057	89,157	92%
Total	**755,255**	**915,136**	**1,105,305**	**1,315,445**	**1,551,894**	**796,639**	**105%**

Notes:
[a] Population projections provided by the Governor's Office of Planning and Budget, 2010 and do not include 2010 census results.
[b] Population projections for 2040 and 2050 were based on the Governor's Office of Planning and Budget 2010 – 2030 projections and provided for State water planning purposes.

4.1.1 Municipal Water Demand Forecasts

Regional municipal water demand forecasts are calculated by multiplying the estimated per person (capita) water use for each county by its population. Typically, per capita water use rates differ for public water systems and self-supplied private wells; therefore, the demands are calculated separately and then added together for each county.

Per capita water use rates were initially developed using reported withdrawal data from GAEPD and USGS from 2005 (Fanning and Trent, 2009). With feedback from water providers, adjustments were made to subtract wholesale and industrial water uses where necessary, although uses for small commercial and transient populations are included. Self-supplied water users were assumed to use a standard 75 gallons per capita per day, unless stakeholder feedback indicated otherwise. Adjustments also were made to both public and self-supplied water use rates to account for changes in plumbing codes and to reflect water savings over time from the transition to high efficiency flow toilets (1.28 gallons per flush [gpf] maximum), required by Federal and State laws. These adjustments were based on U.S. Census housing information and an assumed 2 percent annual replacement rate for plumbing fixtures (older fixtures replaced with new, more efficient ones). Although the assumed plumbing improvements lowered future per capita water use rates, the total municipal water demand increases significantly from 2010 to 2050 as a result of population growth. Table 4-2 summarizes municipal water demand forecasts by county for the Region over the planning period

Table 4-2: Municipal Water Demand Forecasts by County (AAD-MGD)[a]

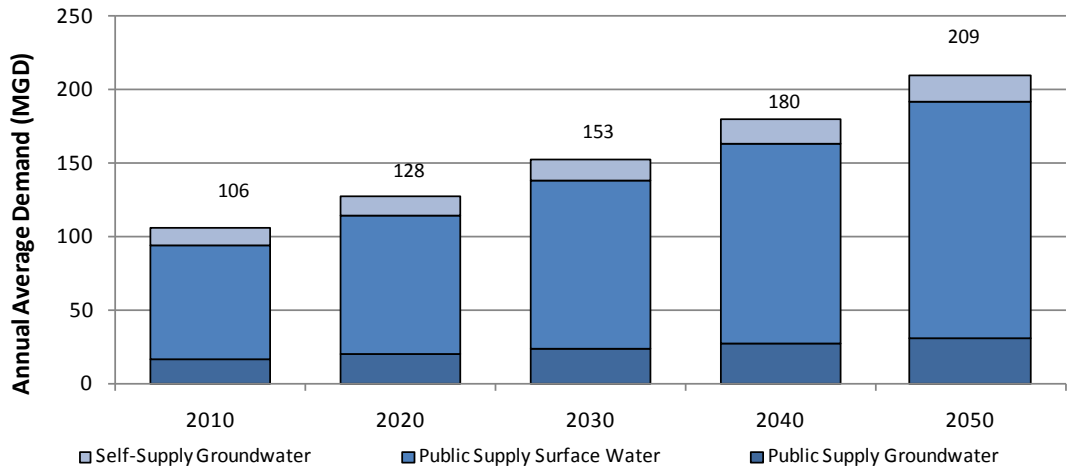
County	2010	2020	2030	2040	2050
Catoosa	7.46	9.26	11.36	13.96	17.17
Chattooga	4.12	4.56	5.02	5.47	5.93
Dade	2.23	2.54	2.82	2.97	3.07
Dawson	3.23	4.89	6.89	8.93	11.12
Fannin	2.73	3.22	3.73	4.25	4.77
Floyd	12.98	14.00	15.05	16.11	17.19
Gilmer	3.14	4.09	5.29	6.81	8.77
Gordon	7.61	9.04	10.67	12.54	14.71
Habersham	5.75	7.01	8.61	9.84	10.95
Lumpkin	2.64	3.85	5.30	6.96	8.78
Murray	4.83	6.67	8.97	12.09	15.52
Pickens	3.89	5.18	6.72	8.19	9.63
Polk	6.75	7.65	8.64	9.71	10.86
Towns	1.55	1.76	1.99	2.24	2.48
Union	2.83	4.14	5.89	7.67	9.71
Walker	9.56	10.47	11.30	11.72	11.86
White	3.05	3.93	4.97	5.97	6.92
Whitfield	21.59	25.16	29.33	34.09	39.66
Total	**105.94**	**127.50**	**152.56**	**179.53**	**209.11**

Notes:
[a] Municipal water demand forecasts include publicly supplied and self supplied demands from surface water and groundwater sources. Major publicly supplied industries are not included.

Additional details regarding development of the municipal water demand forecasts, including the per capita rate and plumbing code adjustment for each county, are provided in the supplemental document titled *Municipal and Industrial Water and Wastewater Forecasting for the Coosa-North Georgia Region,* which is available on the CNG website.

The demand for municipal water is forecasted to increase from 106 MGD in 2010 to 209 MGD in 2050 in the Region. Based on existing uses, approximately 75 percent of forecasted future water demand will be obtained from surface water sources and 25 percent from groundwater sources; the latter includes private wells (self-supply). Figure 4-1 shows the municipal demand forecasts for the Region; the demands do not include major publicly supplied industries.

Figure 4-1: Municipal Water Demand Forecast (AAD-MGD)



Notes:
Municipal water demands include residential, commercial, and small industry.
Values represent forecasted annual average.

4.1.2 Municipal Wastewater Flow Forecasts

Municipal wastewater flow forecasts were developed to determine the amount of treated wastewater generated and returned to the watershed. These forecasts were calculated based on the forecasted municipal water demand and adjusted for outdoor water use (which does not require wastewater treatment), and inflow and infiltration (I/I).

All privately supplied customers on wells are assumed to use septic systems for wastewater management. The percentage of publicly supplied water customers who are on sewer and centralized treatment systems was estimated based on available data; the remaining users were assumed to be on septic systems. These percentages were calculated using reported GAEPD and other State of Georgia data and feedback from cities, counties, and water systems. Estimated flows into

centralized treatment were modified to include an estimated 20 percent I/I. The I/I estimate was kept constant throughout the planning period, unless specified differently through feedback from individual water systems. Table 4-3 summarizes municipal wastewater flows forecasts for the Region over the planning period.

Table 4-3: Municipal Wastewater Flow Forecasts by County (AAF-MGD)[a]

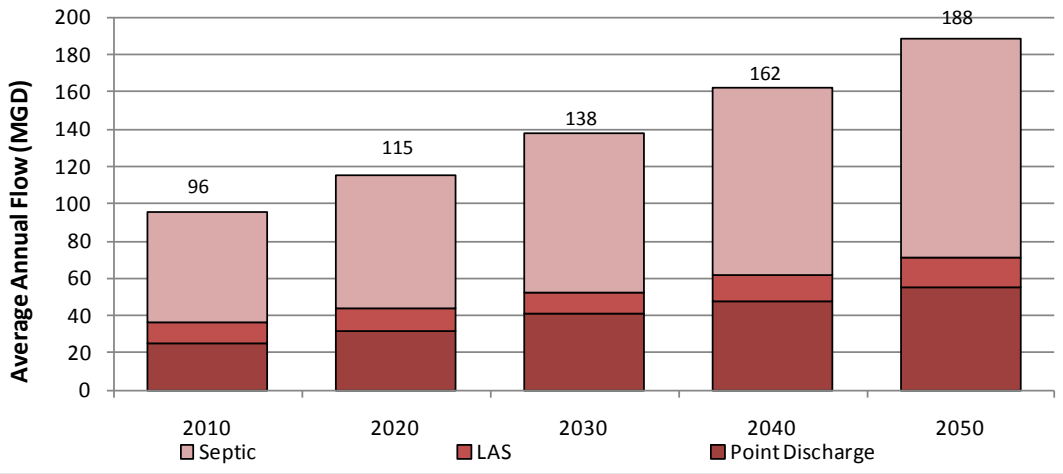
County	2010	2020	2030	2040	2050
Catoosa	6.20	7.70	9.45	11.60	14.27
Chattooga	3.50	3.86	4.26	4.64	5.03
Dade	1.97	2.24	2.50	2.63	2.71
Dawson	3.10	4.71	6.67	8.65	10.79
Fannin	2.37	2.80	3.24	3.69	4.15
Floyd	12.02	12.97	13.94	14.92	15.92
Gilmer	2.70	3.52	4.55	5.86	7.54
Gordon	7.50	8.90	10.51	12.35	14.49
Habersham	5.61	7.01	8.56	9.83	10.97
Lumpkin	2.32	3.45	4.81	6.36	8.07
Murray	3.84	5.32	7.17	9.68	12.44
Pickens	3.17	4.23	5.50	6.72	7.90
Polk	6.34	7.18	8.10	9.11	10.19
Towns	1.40	1.58	1.80	2.02	2.24
Union	2.52	3.70	5.25	6.85	8.67
Walker	8.63	9.45	10.20	10.58	10.71
White	2.70	3.48	4.40	5.30	6.14
Whitfield	19.70	22.96	26.77	31.11	36.20
Total	**95.59**	**115.06**	**137.68**	**161.90**	**188.43**

Notes:
[a] Municipal wastewater flows do not include major industrial sources that treat their water in municipal facilities.

Treated wastewater may undergo one of three disposal methods: point source discharge, LAS, or septic systems. For forecasting purposes, the current mix of discharge to point source facilities versus LASs was held proportionate to current conditions, and adjustments were made based on feedback provided by local water systems or utilities.

Further details regarding development of the municipal wastewater forecasts and county-specific results are presented in the supplemental document titled *Municipal and Industrial Water and Wastewater Forecasting for the Coosa-North Georgia Region*, which is available on the CNG website. Figure 4-2 shows the municipal wastewater flow forecasts by disposal type.

Figure 4-2: Municipal Wastewater Flow Forecast (AAD-MGD)



Notes: Values represent forecasted annual average.

In summary, the demand for municipal wastewater treatment is forecasted to increase from 96 MGD in 2010 to 188 MGD in 2050 in the Region. Of either amount, 11 percent will be treated by LASs and 27 percent by systems with point source discharges. Septic systems currently treat approximately 62 percent of the municipal wastewater generated in the Region. The percentage of wastewater treated via septic systems is expected to remain relatively steady in the future for counties with lower population density.

4.2 Industrial Forecasts

Industrial water demand and wastewater flow forecasts anticipate future needs among industries that were identified as major water users through 2050. Industries require water for use in their production processes, sanitation, and cooling, as well as for employee use and consumption. The industrial forecasts presented in this section are based upon the rate of growth in employment for specific industrial sectors, the rate of growth in units of production for specific industrial sectors, or other relevant information and data provided by specific industrial water users. The industrial demands forecasted in this section include major industrial water users and wastewater generators, many of which supply their own water and/or treat their own wastewater. Many industrial users with very small demands are serviced by municipal water and wastewater systems. These demands are included in the municipal forecasts provided on the CNG website.

4.2.1 Industrial Water Demand Forecasts

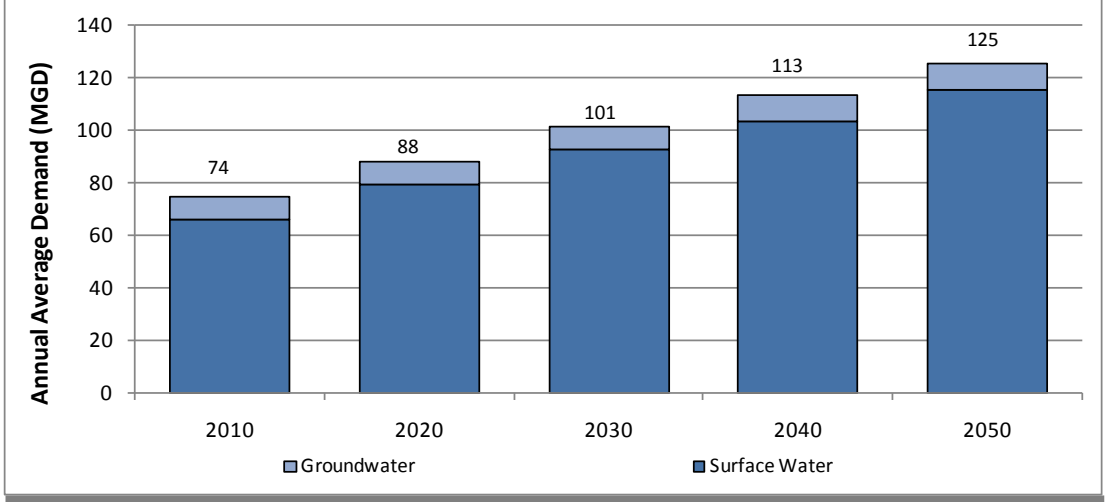
Industrial water demand forecasts were calculated using information and data specific to each major water-using industry. For industries where information was available on water use per unit of production, water forecasts were based on

production. For industries where product-based forecasts were not available, industry-specific workforce projections were assumed to reflect the anticipated growth in water use within the industry. UGA produced industry-specific workforce projections, which were used to calculate future water needs for the major water-using industries within the Region. A summary of the employment projections is included in the supplemental document titled *Municipal and Industrial Water and Wastewater Forecasting for the Coosa-North Georgia Region,* which is available at the CNG website. The employment projections for the Region indicate that overall employment among major industrial water-using industries is forecasted to increase over the 2010-2050 planning horizon.

For the Region, a decrease in employment is forecasted for the textile and apparel industries, in keeping with trends over the past several decades. For the carpet industry; however, this does not appear to be the case, and employment is not a good indicator of water use. Therefore, in calculating the forecasts, water demands for these industries were not reduced to reflect the decrease in employment because their water use has shown to be independent of employment projections and still provide conservative results. The carpet and paper industries will continue to be the most significant water-using industries for this region. Both industries use surface water; typically the textile industry, particularly the carpet industry, obtains its supply primarily from municipal suppliers, whereas the paper industry has its own permits for withdrawals.

Industrial demand for water is forecasted to increase from 74 MGD in 2010 to 125 MGD in 2050 in the Region. Based on current proportions, in the future approximately 92 percent will come from surface water and 8 percent from groundwater sources. The results of the industrial water demand forecast for the Region are provided in the supplemental document titled *Municipal and Industrial Water and Wastewater Forecasting for the Coosa-North Georgia Region*, which is available at the CNG website. Figure 4-3 shows the steady increase of industrial water demand through the planning period.

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

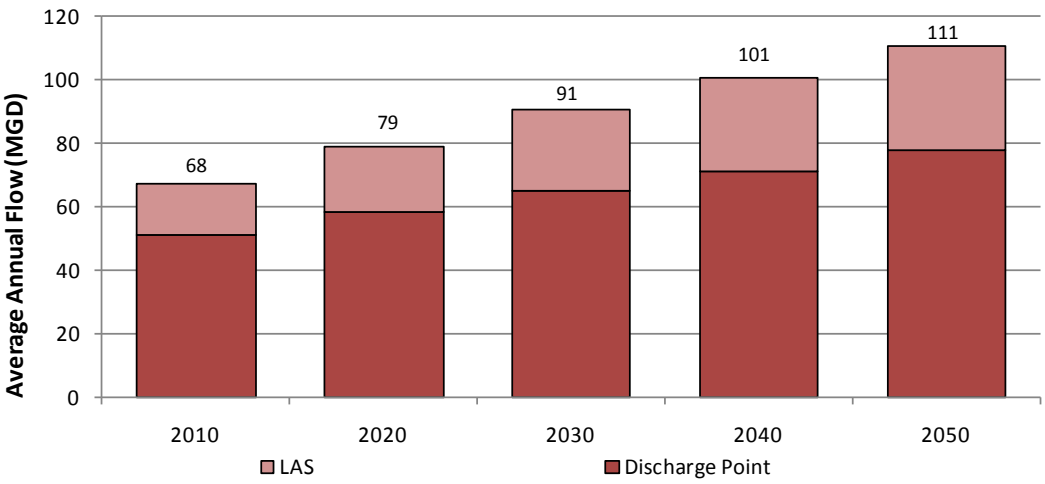


4.2.2 Industrial Wastewater Flow Forecasts

Industrial wastewater flow forecasts were calculated for each sector by multiplying the industrial water demand forecast by the ratio of wastewater generated to water used for that particular industrial sector. Wastewater to water ratios per industry were derived through a state-wide analysis of multiple years of actual annual average water return and withdrawal data for permitted users and information provided by industrial stakeholder groups within a region or industry, as appropriate.

Figure 4-4 shows the industrial wastewater flow forecast, which is projected to increase from 68 MGD in 2010 to 111 MGD in 2050 in the Region. According to current proportions, in the future approximately 30 percent will be treated by LASs and 70 percent will be treated by systems with point source discharges. The results of the forecasting exercise for industrial wastewater flows are provided in the supplemental document titled *Municipal and Industrial Water and Wastewater Forecasting for the Coosa-North Georgia Region*, which is available at the CNG website.

Figure 4-4: Industrial Wastewater Flow Forecast (AAD-MGD)



Notes: Values represent forecasted annual average.

4.3 Agricultural Forecasts

Agricultural water use includes irrigation for both crop production and non-crop agricultural water users. The future irrigation needs for crop production were developed by UGA's National Environmentally Sound Production Agriculture Laboratory (NESPAL). Based on the acres irrigated for each crop, these forecasts provide a range of irrigation water use under dry, medium, and wet climate conditions. Current non-crop (including non-permitted) agricultural water uses, such as water use for nurseries/greenhouses, golf courses, and livestock production, have been compiled by respective industry associations; however, water forecasts for future non-crop agricultural use were not developed for this first round of regional water planning because of the lack of available data. For this planning effort, the non-crop water uses are assumed to remain at current levels throughout the planning period. The bulk of agricultural water needs are located in Floyd and Gordon Counties. Table 4-4 summarizes agricultural water demands for the Region over the planning period. A more detailed description of the agricultural forecasts is provided in the supplemental document titled *Agriculture Water Use Forecast for the Coosa-North Georgia Region*, which is provided on the CNG website.

Table 4-4: Agricultural Water Demand Forecasts by County (AAD-MGD)						
County	Crop Demand					Non-Crop Demand
	2010	2020	2030	2040	2050	2010-2050
Catoosa	0.33	0.34	0.36	0.37	0.38	1.16
Chattooga	-----	-----	-----	-----	-----	0.22
Dade	-----	-----	-----	-----	-----	0.14
Dawson	0.13	0.14	0.14	0.15	0.15	0.61
Fannin	0.02	0.02	0.03	0.03	0.03	0.11
Floyd	1.45	1.49	1.53	1.56	1.60	2.99
Gilmer	-----	-----	-----	-----	-----	1.46
Gordon	1.60	1.63	1.66	1.69	1.72	1.09
Habersham	0.34	0.35	0.37	0.38	0.39	1.24
Lumpkin	0.13	0.14	0.14	0.15	0.15	0.49
Murray	0.28	0.29	0.31	0.32	0.33	0.31
Pickens	0.01	0.01	0.01	0.01	0.01	0.43
Polk	0.01	0.01	0.02	0.02	0.02	0.60
Towns	0.02	0.02	0.03	0.03	0.03	0.31
Union	0.11	0.12	0.13	0.14	0.15	0.74
Walker	0.01	0.01	0.01	0.01	0.01	0.55
White	0.05	0.05	0.06	0.06	0.06	0.37
Whitfield	0.07	0.07	0.08	0.08	0.08	1.26
Total	**4.56**	**4.70**	**4.84**	**4.97**	**5.11**	**14.08**

Notes:
Forecasted Agricultural Water Demand based on P75 scenario (in MGD). This demand is comprised of crop irrigation, golf courses, livestock watering, and nurseries. The crop irrigation is the only demand with a forecasted value.
It should be noted that the water demand for chicken processing facilities is included in the industrial forecast.
----- indicates information not available.

4.4 Water for Thermoelectric Power Forecasts

Forecasts for future water needs for thermoelectric power production were developed by GAEPD and an ad-hoc group representing Georgia's power industry. Future energy needs are based on projected population. The ad-hoc group helped identify the mix of future fuel sources and potential water needs from various energy generation processes.

Certain types of power plants consume water and others do not. "Waterless" power plants include wind turbine and most solar photovoltaic systems. These plants made up about 1 percent of the total energy generated in 2001 in the U.S. (EPA, 2001). The two major types of power plants that consume water for cooling are hydroelectric and thermoelectric (powered by fossil fuels, nuclear, or geothermal energy).

Thermoelectric facilities use a significant amount of water, but their water consumption may vary depending on the type of cooling used for power generation. The two major types are once-through cooling and closed-loop cooling.

Once-through cooling systems use water to cool the condenser water. River or lake water is passed through a heat exchanger to condense steam, exiting condenser water is pumped back through the cycle, and the cooling water is returned to its source. Water consumption at the power plant is minimal, if not zero, because the cooling water does not directly contact the air. Although the consumptive water use is minimal, the amount of water withdrawn from the river or lake is significant because the water is only used for a short time before being returned to the source.

Closed-loop cooling systems were designed to minimize the amount of water withdrawn. The condenser water also exchanges heat with the cooling water in a heat exchanger but it is then recycled between a cooling tower and a heat exchanger. During the recycling process, the cooling water evaporates and there has to be a constant water supply to account for the consumed water. This system consumes much more water than the once-through system because the entire energy exchange is through evaporation of the water. These systems withdraw less water because the only water used is to make up the evaporated portion; however, they consume more water.

There is only one thermoelectric facility in the Region, Plant Hammond, located in Floyd County. This facility withdrew approximately 535 MGD in 2005. It has a once-through cooling system; therefore, it is estimated that 100 percent of the water withdrawn is returned to its source. Plant Bowen is also located in the Coosa River Basin but is outside the CNG planning region. This thermoelectric power plant is located in Bartow County and circulates more than 360 MGD in a continuous closed-loop cooling system (cooling towers) (Southern Company, 2011). This may result in a minor impact on the Region's water resources.

Two other facilities in the Region generate power, but do not have the same impact on water resources as do thermoelectric generating facilities. First, there is a 1,240-megawatt combined cycle electrical generating plant which utilizes natural gas and steam, currently owned by KGEN, that uses 100% treated wastewater from Dalton Utilities. The other facility is Oglethorpe Power's Rocky Mountain pumped-storage hydroelectric generation facility with a capacity of 1,046 megawatt.

The process of generating the forecasted water demands and wastewater returns for thermoelectric power generation is documented in the supplemental document titled Statewide Energy Sector Water Demand Forecast, which is available on the CNG website.

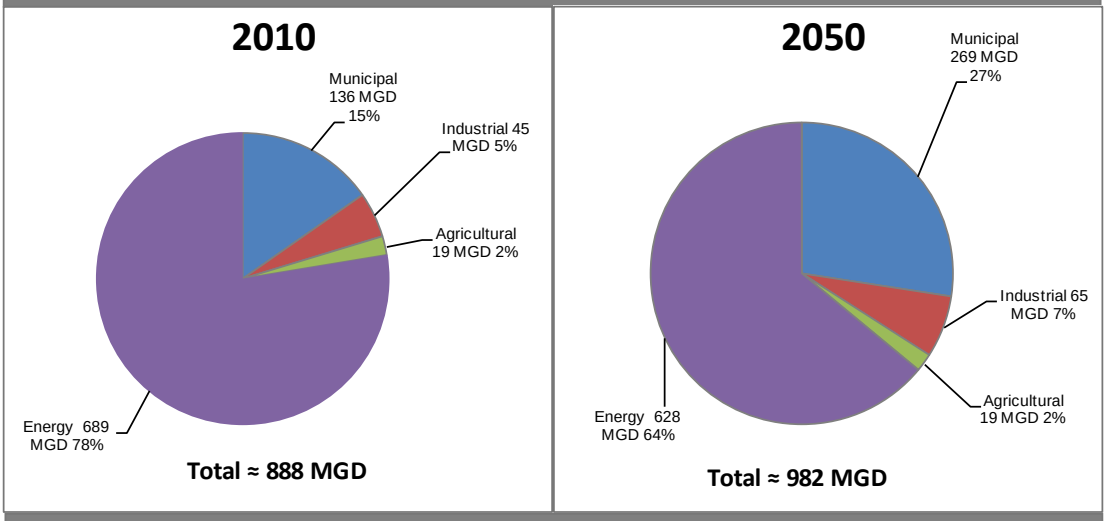
It should be noted that the future water demands and returns provided in the Energy Forecasting TM show a decrease in 2030, which is attributed to the increase in available capacity of less water-withdrawal-intensive power generation and relatively

stable capacity factors. Energy forecasts were provided only up to 2030 and were kept constant.

4.5 Total Water Demand Forecasts

In the Region, energy generation makes up the largest portion (78 percent in 2010) of water withdrawals, as shown in Figure 4-5. Although energy water demands are expected to increase throughout the planning horizon and are forecasted to remain the largest demands in the region in 2050, consumptive use by these facilities is expected to have minimum impact on the Region's water resources. Agricultural water demands are also expected to remain relatively constant, while municipal and industrial water demands are projected to increase steadily from approximately 181 MGD in 2010 to 334 MGD in 2050 (Figure 4-5).

Figure 4-5: Water Demand Forecast for 2010 and 2050 (AAD-MGD)

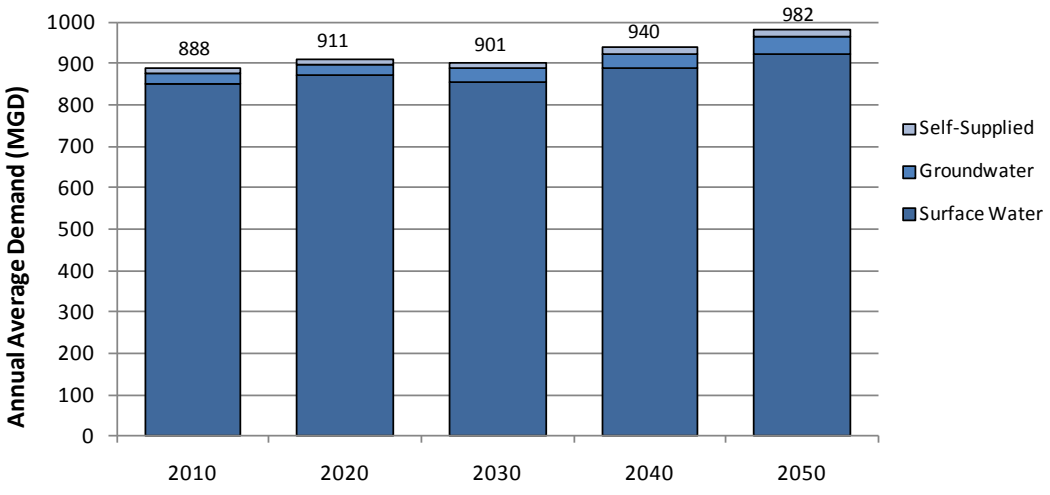


Notes:
Energy water demand is the Alternative Energy Forecast (CDM, 2010).

Data Sources: Coosa-North Georgia Municipal and Industrial Forecasts (CH2M HILL, 2010), Energy Forecasts (CDM, 2010), and Agricultural Forecasts (UGA, 2010).

Figure 4-6 shows the total water demand forecast by source. The main water source for this region is surface water, a large portion of which is used as cooling water for thermoelectric power generation.

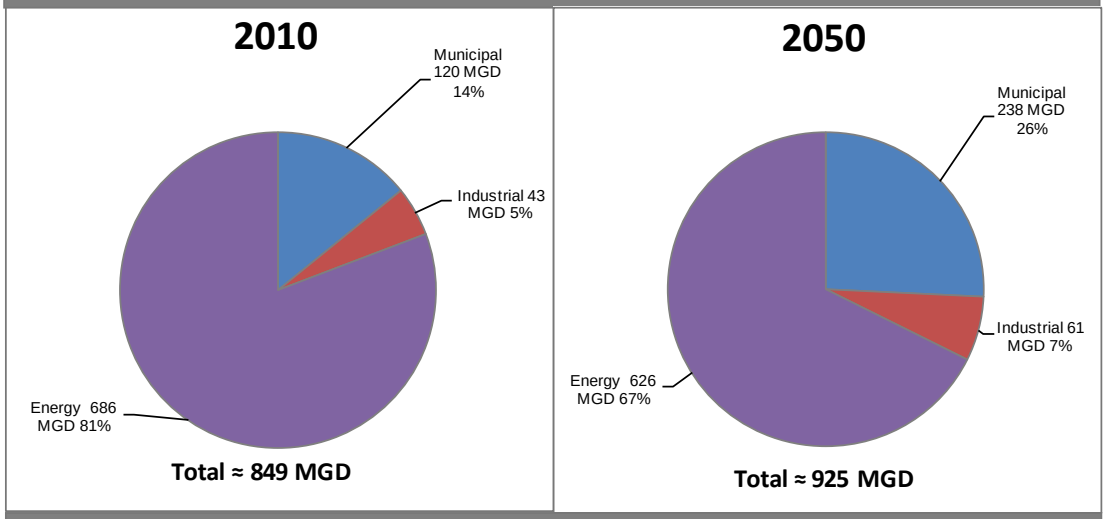
Figure 4-6:Total Water Demand Forecast (AAD-MGD)



Notes: Values represent forecasted annual average.

Figure 4-7 shows the total wastewater flow forecast by sector (energy, municipal, and industrial) for the Region in 2010 and 2050. Energy demands make up 81 percent of the total in 2010, however, these demands are generally for permitted cooling water returns and do not represent future needs for wastewater treatment.

Figure 4-7: Wastewater Flow Forecast for 2010 and 2050 (AAD-MGD)



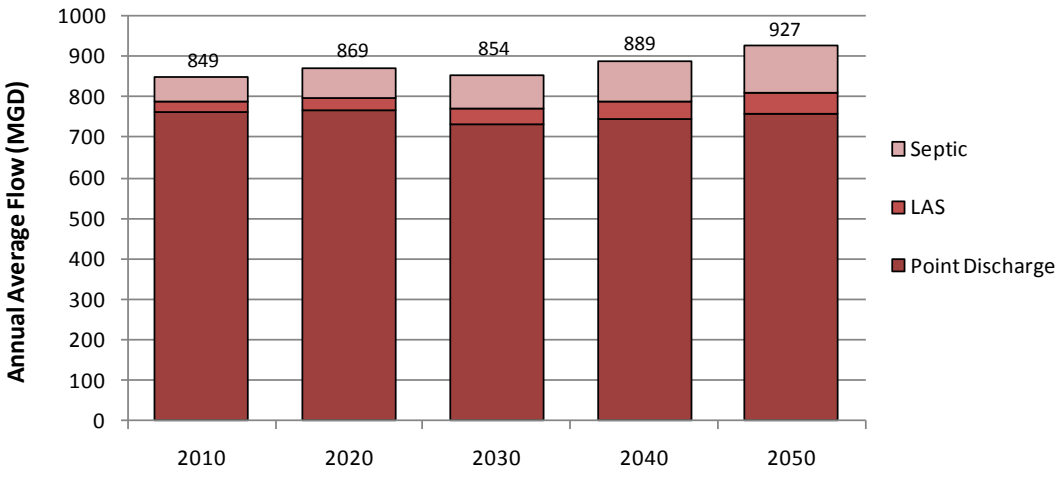
Notes:
Energy water return is the Alternative Energy Forecast (CDM, 2010). Consumptive use was estimated to be 2-3 MGD for the Alternative Energy Forecast.

Municipal wastewater flow forecast includes point source discharges (NPDES), land application systems (LAS), and septic systems.

Data Sources: Coosa-North Georgia Municipal and Industrial Forecasts (CH2M HILL, 2010) and Energy Forecasts (CDM, 2010).

The total wastewater flow forecast for municipal and industrial uses will be 299 MGD in 2050. Wastewater demands by treatment and disposal type (point discharge, LAS, or on-site septic) are illustrated for 2010 through 2050 in Figure 4-8. Removing the thermal power (energy) discharges from the total, direct discharges of municipal and industrial wastewater will make up 45 percent, LAS 16 percent, and septic systems 39 percent of the future wastewater flow forecast.

Figure 4-8:Total Wastewater Flow Forecast (AAD-MGD)



Notes: Values represent forecasted annual average.

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Section 5. Comparison of Water Resource Capacities and Future Needs

Section Summary

Initial future assessment results for the groundwater aquifers indicate that there is adequate yield to meet future demands; from the modeled portion of the Paleozoic rock aquifers.

A potential gap in water supply, in both duration and volume, is observed at nodes such as the Gaylesville (9 percent of the time under 2050 conditions over the period of record; average gap is 9 MGD), New England (7 percent and 1.9 MGD), and Chickamauga (10 percent and 11 MGD).

Available assimilative capacity is good, but future nutrient loadings will need to be reduced from point and non point sources to meet existing standards at the Georgia border on the Coosa River, and in Carters Lake.

Potential needs were identified in permitted water infrastructure availability; only Chattooga, Dade, Floyd, Gilmer, Gordon, Habersham, Murray, Polk, and Walker Counties would meet 2050 demands with their currently permitted waste-water facilities.

This Section compares the water demand and wastewater flow forecasts (Section 4), along with the Resource Assessments (Section 3), providing the basis for selecting management practices (Section 7) in the CNG Region. Areas where future demands exceed the capacity of the resource for groundwater, surface water availability, or surface water quality (assimilative capacity) have a gap, need, or shortage that will be addressed through the management practices described in Section 6. This Section summarizes the potential gaps, needs, or shortages, also referred to as water resource management issues, for the Region.

5.1 Groundwater Availability Comparisons

Groundwater sources within the Region include (1) the Crystalline rock aquifer systems in the eastern half of the basin, including Towns, Habersham, Lumpkin, Dawson, Union, Fannin, Gilmer, White, and Pickens Counties, and portions of Murray, Polk, and Gordon Counties; and (2) the Paleozoic rock aquifer systems in the western half of the basin, including Floyd, Chattooga, Walker, Catoosa, and Whitfield Counties, and portions of Polk, Murray, Gordon, and Dade Counties.

The Resource Assessment for groundwater sustainability in the Crystalline rock aquifers, based on a water budget approach and described further in Section 3.2, was developed for the Chattahoochee River-Chickamauga Creek and Soque River basins, which cover 315 square miles in portions of Habersham, Towns, Union, and White Counties of the Blue Ridge physiographic province. The Resource Assessment for sustainable yield in the Paleozoic rock aquifers covered an area in the Valley and Ridge physiographic province that included portions of Floyd, Polk,

Bartow, and Paulding Counties. This area was selected based on the large spatial extent of carbonate rocks of the Knox Group, a geologic formation known to contain prolific karstic aquifer systems. For information on the groundwater Resource Assessment see the GAEPD website.[9]

An initial future assessment of groundwater availability was conducted for the Paleozoic rock aquifers, but not the Crystalline rock aquifers, by comparing forecast groundwater demands with currently modeled ranges of aquifer sustainable yields for the years 2010, 2020, 2030, 2040, and 2050. Each comparison included:

- Range of sustainable yield in MGD
- Forecasted agricultural groundwater demands for normal and dry years (defined as the 50th and 75th percentile irrigation requirements in MGD)
- Forecasted municipal, industrial, and self-supplied groundwater demands

The results indicate that there is 28-70 MGD yield to meet future demands (based on current projections) from the modeled portion of the Paleozoic rock aquifers. The existing groundwater Resource Assessment (see Section 3.2) for the Crystalline rock aquifers indicates that there is additional groundwater available within this system. It is more difficult, however, to find sufficient water-bearing fractures in the Crystalline rock aquifers to develop the entire estimated sustainable yield. To take advantage of these resources additional analysis, careful geologic mapping, and well siting by experienced geologists will be necessary.

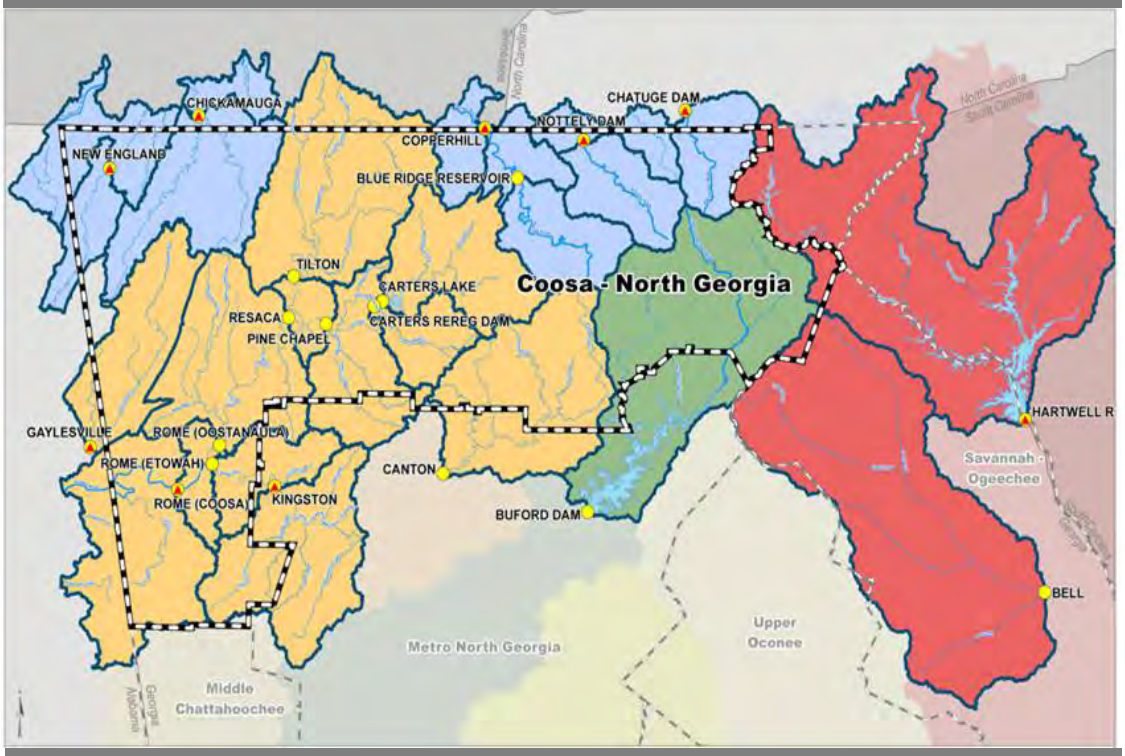
5.2 Surface Water Availability Comparisons

The comparisons of surface water availability are based on the results of the surface water quantity Resource Assessment described in Section 3.2 (and detailed at http://www.georgiawaterplanning.org/) and the projected surface water demands in 2050. For modeling purposes, the Region was divided into the following local drainage areas, which drain to the planning nodes illustrated in Figure 5-1:

- "New England" and "Chickamauga" planning nodes in the northwest portion of the region draining the Tennessee River Basin
- "Copperhill," "Nottely Dam," and "Chatuge Dam" planning nodes in the northeast portion of the region draining the Tennessee River Basin
- "Kingston," "Rome," and "Gaylesville" planning nodes in the southwest portion of the region draining the Coosa River Basin

[9] http://www.georgiawaterplanning.org

Figure 5-1: Surface Water Modeling Nodes



Source: GAEPD, 2009.

The water quantity Resource Assessment described in Section 3.2 is based on the ability to meet and sustain a flow regime that will support water quality and downstream aquatic resources. In unregulated portions of the basin, the 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 7Q10 flow is the seven-day, consecutive low flow with a 10-year return frequency; the lowest stream flow for 7 consecutive days that would be expected to occur once in 10 years.) In the ACT Basin, this applies to the Gaylesville Node. In the regulated portion of the basins, the flow regime is limited to locations where an explicit flow requirement is specified by the USACE, Tennessee Valley Authority (TVA), or FERC. In the ACT Basin, this applies to the Kingston and Rome-C Nodes. The Resource Assessment results provide an estimate of whether a potential gap in stream flow or storage exists with future demands to indicate potential future shortages by planning node.

Table 5-1 provides a summary of the future (2050) demands by regulated or unregulated planning node and indicates whether there will be a potential gap in flow or storage in the future.

Table 5-1: Future Surface Water Gaps in 2050 by Node

Unregulated Nodes	Counties	Length of Gap (% of Time Target Flow not Met)	Average Gap (MGD)	Long-term Average Flow (MGD)	Maximum Gap (MGD)	Corresponding Flow Regime (MGD)
Gaylesville	Chattooga, Walker	9	9	414	12.9	44.6
New England	Dade	7	1.9	161	2.6	7.8
Chickamauga	Catoosa, Walker	10	11	437	17	31
Regulated Nodes	**Counties**	**Demand Gap (MGD)**	**At-site Flow Requirement Shortage (MGD)**	**Minimum Conservation Storage Left (acre-feet)**	**Minimum % Conservation Storage Left (%)**	**Basin-Wide Flow Requirement Gap (MGD)**
Copperhill	Fannin	0	0	73,792 At Blue Ridge	98% at Blue Ridge	None
Chatuge Dam	Towns	0	0	70,032 At Chatuge	95% at Chatuge	None
Nottely Dam	Union	0	0	70,888 At Nottely	92% At Nottely	None
Kingston	Dawson, Pickens	0	7.8 to 150.5 for 30 days	0	0%	N/A
Rome	Catoosa, Fannin, Floyd, Gilmer, Gordon, Murray, Pickens, Polk	0	7.8 to 150.5 for 30 days	117,446 for Carters 0 for Allatoona	83% for Carters 0% for Allatoona	N/A

Source: GAEPD, 2010.

An increased potential gap, in both duration and volume, is observed at nodes such as the Gaylesville (9 percent of the time under 2050 conditions over the period of record; average gap is 9 MGD), New England (7 percent and 1.9 MGD), and Chickamauga (10 percent and 11 MGD). These shortfalls are primarily the result of the consumption during dry periods of the year and increased demand in the future.

For example, at the Chickamauga node the demand increases 9.7 MGD by 2050. Reservoir storage modeled in the Tennessee Basin shows additional available capacity. However, this storage may not be readily available for municipal or industrial demands and would require coordination with the owners and operators of the projects (including TVA, FERC, or USACE). In the Tennessee Basin, there are headwater communities that may have localized water availability gaps that are not captured in the Resource Assessment modeling. These gaps will need to be addressed at the local community and facility level.

For the Coosa River Basin, the future Resource Assessment modeling indicates that there will be gaps in meeting the downstream flow regime based on the future 2050 demands at the Kingston and Rome nodes (Table 5-1). The flow regime could be met in the future with a combination of existing storage in Lake Allatoona or Carters Lake; however, it would require additional negotiation with and approval from the USACE. While water supply demands could be met at Kingston and Rome, these future water supply demands would result in flows less than the established target flows, as illustrated in Table 5-1. Additionally, the ACT/ACF Basins are the subject of protracted litigation over the management and allocation of water resources among Florida, Georgia, Alabama, and other interested parties. Parts of this litigation are currently the subject of a 2009 ruling that gave the states until 2012 to resolve water sharing disputes or revert to 1970s allocations for water withdrawals from Lake Lanier. Because the litigants have not resolved these issues, this Regional Water Plan is based on current conditions and will be revised as appropriate in the future to reflect any final agreements reached by the States.

In addition to the potential gaps in water availability in 2050 in the CNG Region, the existing permitted water withdrawals (surface and groundwater) and future demands were compared to identify potential needs, shortages, or surpluses in available facilities or infrastructure. Needs in permitted water availability were identified in all counties except Dade, Floyd, Gordon, Polk, and Walker (Table 5-2). It should be noted that need estimates were calculated by comparing the permitted monthly average withdrawal limit with the forecast annual average demands. Therefore, these estimates are only an indicator of potential future needs in permitted capacity and indicate areas where continued localized facility planning will be needed, but are useful for regional planning.

Table 5-2: Permitted Municipal Water Withdrawal Limits versus Forecasted Municipal Water Demands (MGD)

County	Permitted Municipal Water Withdrawal Limits [a,b,e]	2010 Forecasted Municipal Water Demand [a,c]	2050 Forecasted Municipal Water Demand [a,c]	Potential 2050 Need [a,d]	Additional Capacity Available in 2050 [a,d]
Catoosa [f]	9.80	6.94	15.98	(6.18)	None
Chattooga	4.18	3.83	5.54	(1.36)	None
Dade	4.23	2.22	3.07	None	1.17

Table 5-2: Permitted Municipal Water Withdrawal Limits versus Forecasted Municipal Water Demands (MGD) (Continued)

Dawson [g]	3.62	2.66	10.87	(7.25)	None
Fannin	2.30	1.91	3.39	(1.09)	None
Floyd [h]	24.55	15.94	24.02	None	0.53
Gilmer [i]	4.45	3.41	7.42	(2.97)	None
Gordon [j]	30.80	11.78	23.45	None	7.35
Habersham	9.24	4.32	10.31	(1.07)	None
Lumpkin	6.80	0.92	7.22	(0.42)	None
Murray [k]	9.56	3.44	14.28	(4.72)	None
Pickens [l]	7.24	3.25	9.05	(1.81)	None
Polk	11.79	6.36	10.28	None	1.51
Towns	2.00	1.49	2.39	(0.39)	None
Union	3.43	2.22	7.71	(4.28)	None
Walker [m]	18.74	9.54	11.84	None	6.90
White	3.04	2.10	4.84	(1.80)	None
Whitfield [n]	56.30	41.21	79.77	(23.47)	None

[a] Water withdrawal values includes surface water and groundwater withdrawals and purchases from outside the County. The purchases from outside each County are detailed below, when applicable.

[b] Surface water and groundwater permitted withdrawal limits are based on the current Monthly Average Limit (in MGD) of each permit. Purchases from outside the County reflect the Average Annual Demand for 2005 (in MGD).

[c] Forecasted Municipal Water Demands include water demands from major industrial sectors when supplied by municipal sources but they do not include self-supplied water demands. Forecasted Municipal Water Demands were calculated applying the new plumbing code (1.28 gpf toilets) mandated by the Water Stewardship Act passed in 2010. Values based on Annual Average Demand (in MGD).

[d] Based on differences between Permitted Withdrawal Limit and 2050 forecasted demand (in MGD). Values are estimates for future needs or additional capacity available.

[e] Includes the municipal withdrawal permit holders listed in the GAEPD database for each county.

[f] Includes purchase of 1.80 MGD from Tennessee. Municipal sources supplied approximately 0.23 MGD (2005) to major industries.

[g] Includes purchases of 0.24 MGD from Pickens County, 0.30 MGD from Forsyth County, and 0.08 MGD from Cherokee County.

[h] Includes purchase of 0.65 MGD from Bartow County. Municipal sources supplied approximately 2.15 MGD (2005) to major industries.

[i] Municipal sources supplied approximately 1.50 MGD (2005) to major industries.

[j] Municipal sources supplied approximately 4.54 MGD (2005) to major industries.

[k] Includes purchase of 0.50 MGD from Gordon County.

[l] Includes purchases of 0.50 MGD from Gordon County and 0.21 MGD from Cherokee County.

[m] Includes purchase of 0.08 MGD from Catoosa County.

[n] Includes purchase of 2.00 MGD from Tennessee. Municipal sources supplied approximately 17.2 MGD (2005) to major industries.

Sources: Forecasted water demands and GAEPD approved permit database.

Reference Supplemental Document: "Coosa-North Georgia Supplemental Document: Comparison of Water and Wastewater Forecasts to Existing Permits and Planned Projects"

5.3 Surface Water Quality Comparisons (Assimilative Capacity)

The assimilative capacity of a watershed is the amount of a given pollutant that can be discharged to the watershed while maintaining water quality standards. The evaluation of water quality was based on modeling both DO conditions and nutrient loadings, as described in Section 3.2. Instream DO conditions were modeled for streams and tributaries currently receiving major NPDES treated wastewater discharges with 0.1 MGD or greater permitted flows at critical instream low flow conditions**.** For purposes of this modeling effort and the identification of potential gaps, future wastewater flows for municipal and industrial facilities were assumed to be the current permitted treatment capacity and limits unless planned facility expansions were identified in existing permits.

Overall, the current permitted assimilative capacity in the major tributaries in the Region remains moderate to very good (Figure 5-2). There are specific stream segments that would exceed or be at their assimilative capacity for pollutants which deplete oxygen based on permitted conditions and the predicted DO levels. These waterbodies include segments in the Chattooga River (in Chattooga County), Alpine Creek, Salacoa Creek, Holly Creek, Brasstown Creek, and Lookout Creek.

Figure 5-2: Permitted Surface Water Quality (Assimilative Capacity)

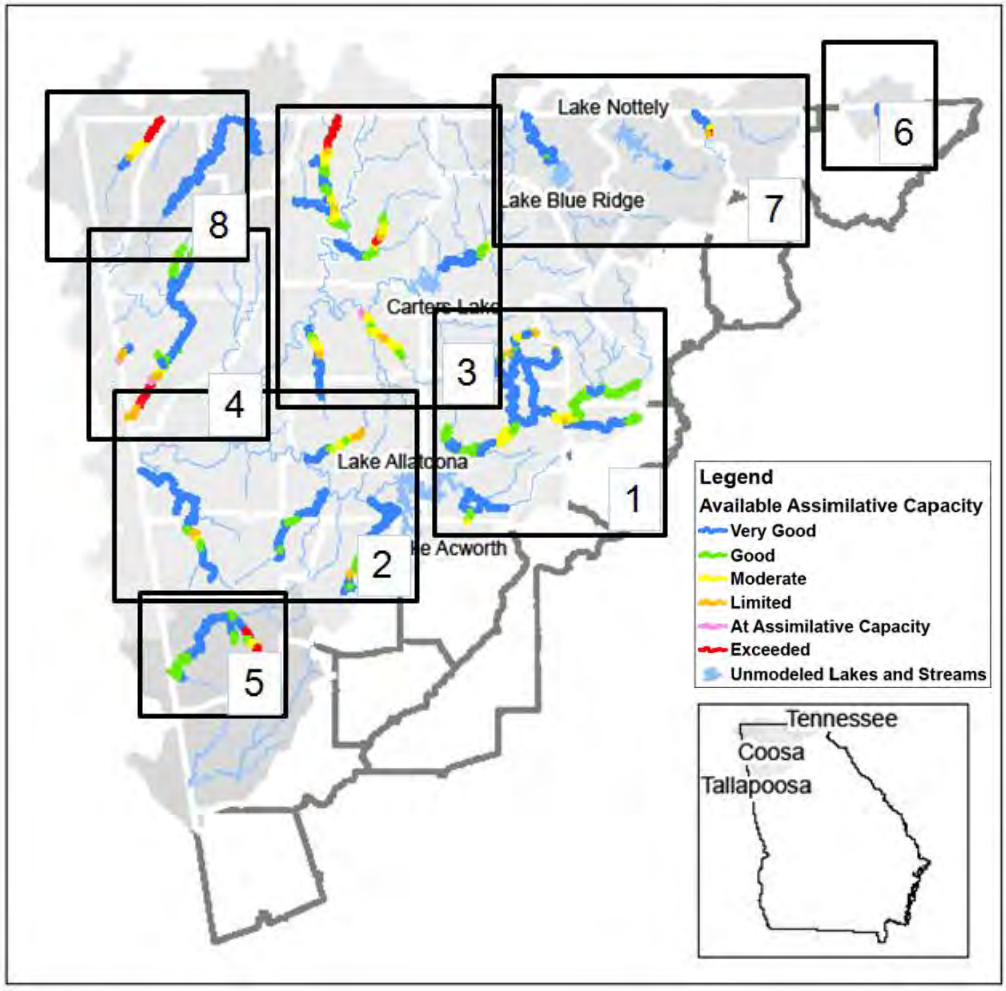


Figure 5-2: Permitted Surface Water Quality (Assimilative Capacity) (Continued)

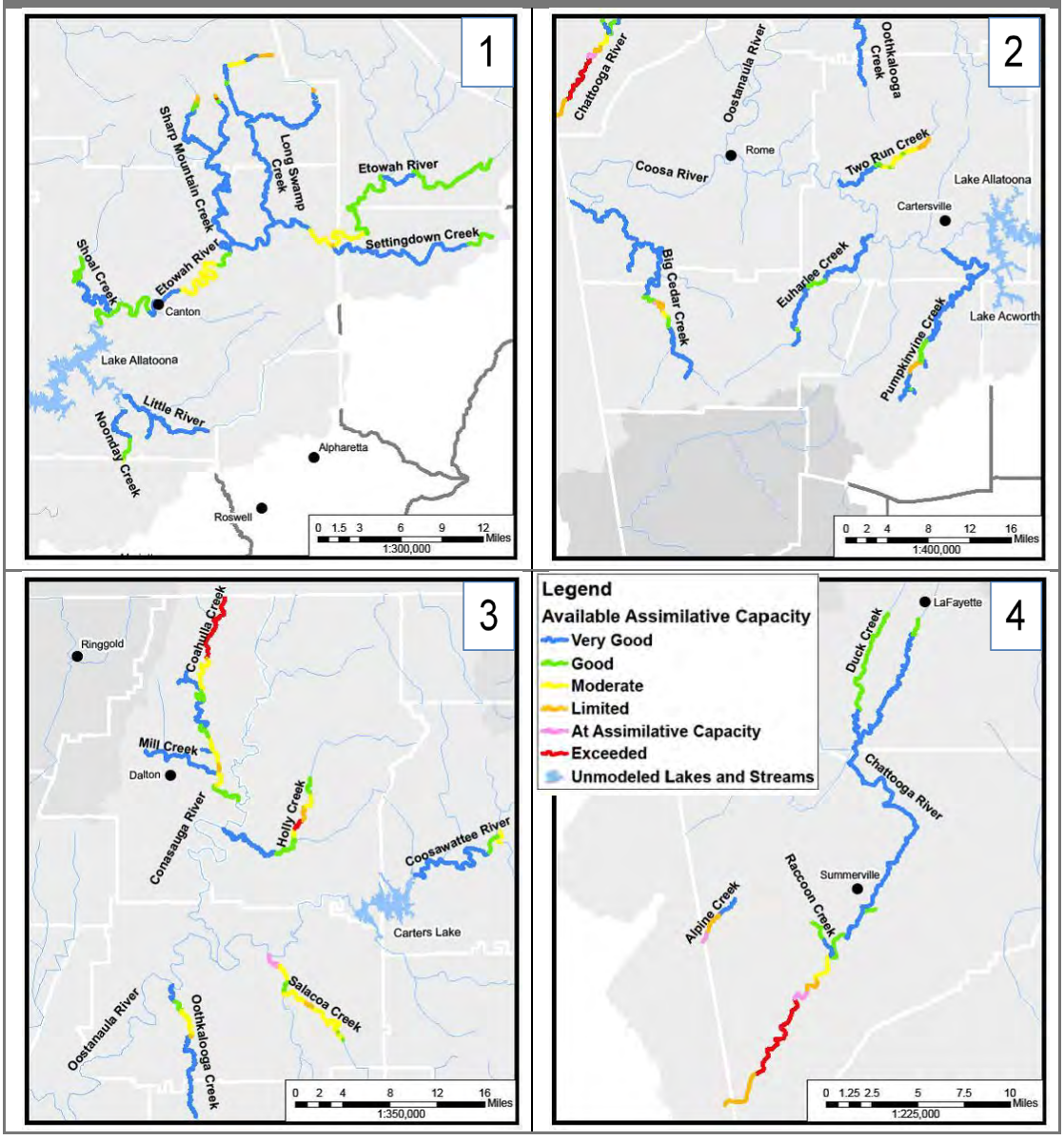
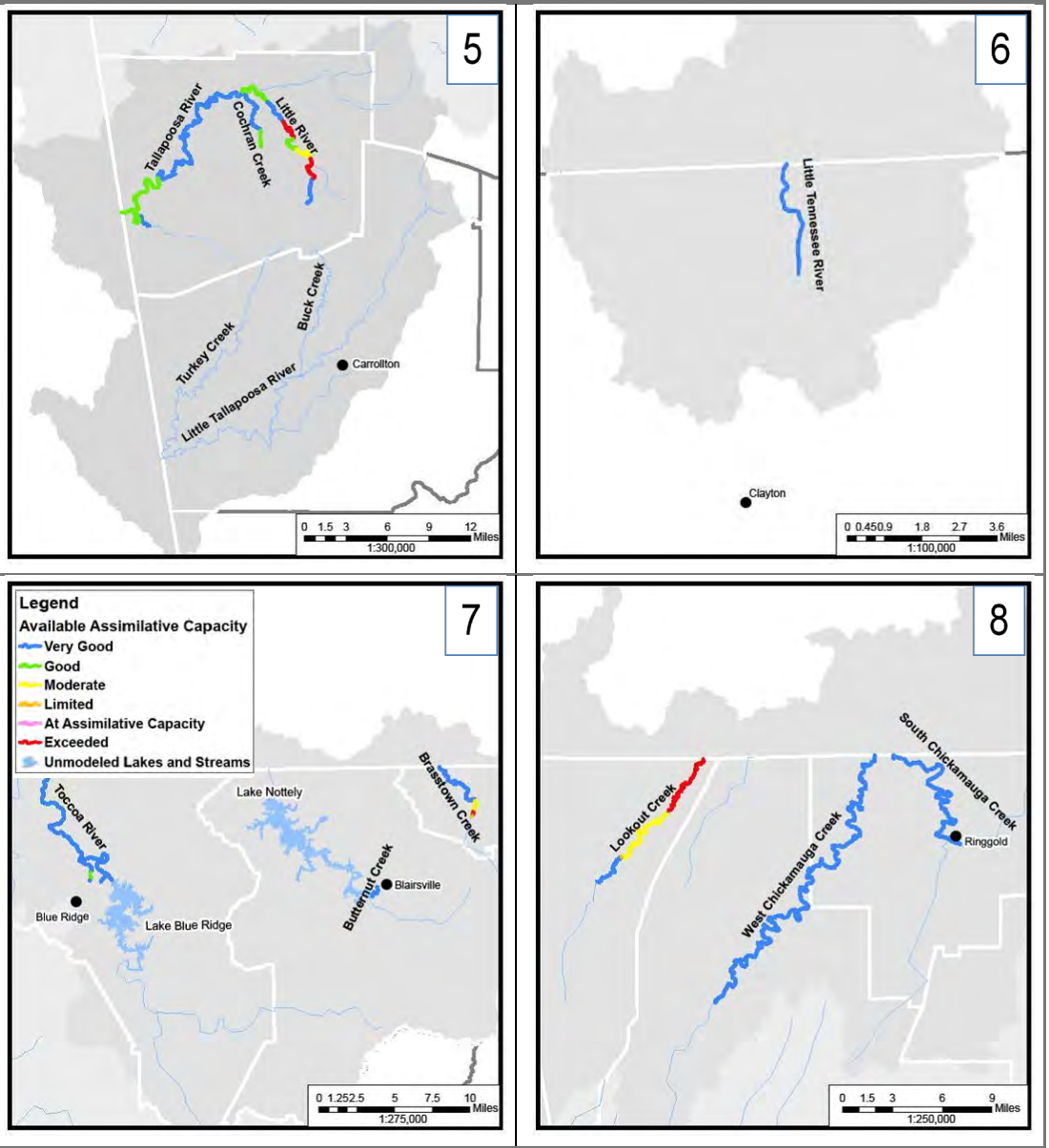


Figure 5-2: Permitted Surface Water Quality (Assimilative Capacity) (Continued)



Note: The results shown are based on municipal and industrial facilities at their full permitted levels.

Very good: ≥ 1 mg/L available DO (that is, above DO standards)
Good: < 1.0 and ≥ 0.5 mg/L available DO
Moderate: < 0.5 and ≥ 0.2 mg/L available DO
Limited: < 0.2 and ≥ 0 mg/L available DO
No assimilative capacity: < 0 mg/L available DO

Source: Georgia Environmental Protection Division, 2009.

Additional data need to be collected to verify the modeling results before making any permitting decisions. GAEPD could modify the permits for facilities in these creeks to protect water quality. Adiditional or higher levels of wastewater treatment would be requiredin these reaches to improve DO levels and accomodate additional wastewter inputs, except for the Coahulla Creek. There are no NPDES facilities discharging to the “exceeded “ segment in the Coahulla Creek. Watershed-based modeling to evaluate nutrient loadings under 2050 conditions was also completed for those watersheds contributing to the Coosa River at the Georgia-Alabama state line and Lake Allatoona on the Etowah River. As described in Section 3.2.1, there is a total phosphorus standard for the Coosa River and the Chatooga River at the Georgia–Alabama boundary.

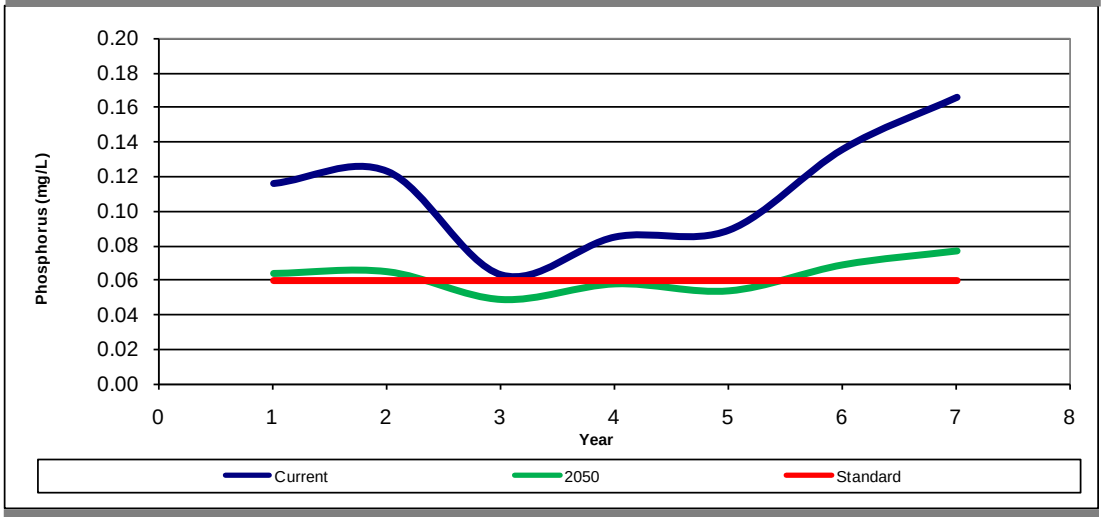
Watershed-based modeling to evaluate nutrient loadings under 2050 conditions was also completed for those watersheds contributing to the Coosa River at the Georgia-Alabama state line and Lake Allatoona on the Etowah River. As described in Section 3.2.1, there is a total phosphorus standard of 0.06 mg/L for the Coosa River at the Georgia-Alabama boundary.

Figure 5-3 illustrates the modeling results for a 7-year period (including the rainfall conditions for 2001-2007) comparing phosphorus concentrations at the State line under future conditions with point and nonpoint source loadings. These results show that under current conditions the standard of 0.06 mg/L would not be met during most years; however, with the recommended TMDL point and nonpoint source load reductions in place, the standard could be met in most years (Figure 5-3). This suggests that there will be a potential gap in meeting the nutrient (phosphorus) standards at the State line in the future, even with the proposed TMDL limitation in place.

Under the anticipated future conditions and wastewater demands, the nutrient contributions in pounds per year (lb/yr) during dry years are approximately 60 percent point sources and 40 percent nonpoint sources (Figure 5-4 and Figure 5-5). In a wet year, on the other hand, nonpoint sources contribute roughly 70 percent of the total loadings.

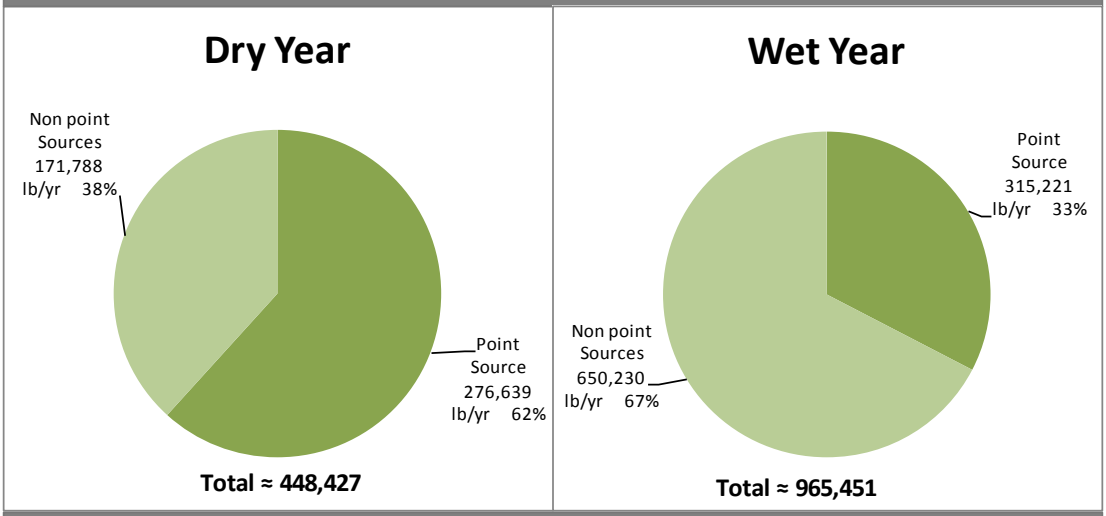
In addition, GAEPD is considering new water quality numerical nutrient criteria (NNC) for streams that will likely require additional reductions in nutrient loadings to maintain or meet the new standards.

Figure 5-3: Growing Season Median Phosphorus Concentration- Coosa River at Georgia-Alabama State Line



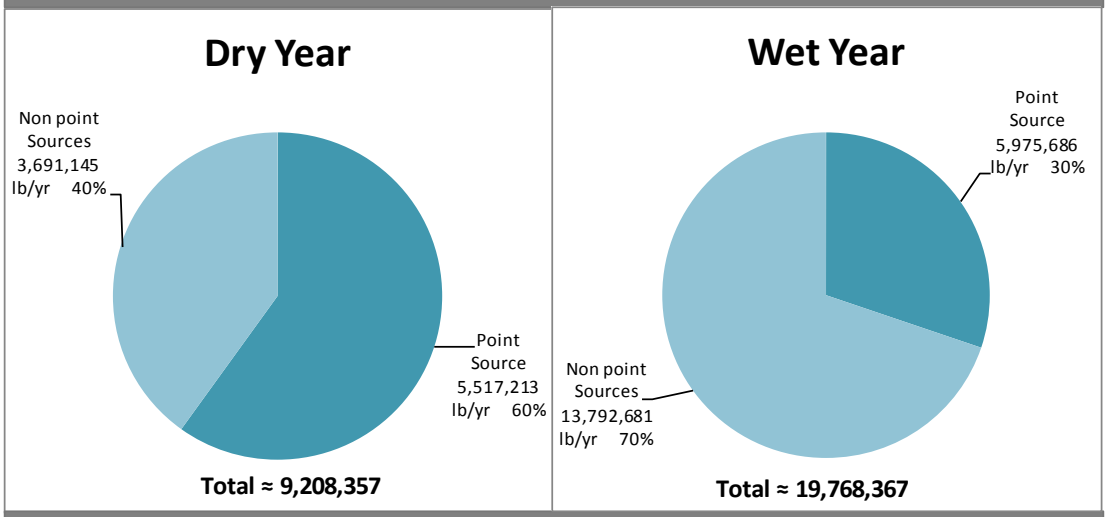
Note: 2050 model results assume future wastewater loadings based on 1.0 mg/L total phosphorous limit

Figure 5-4: Coosa Watershed- Tributary Phosphorus Loading (lb/yr)



Notes: Based on 2050 demands.

Figure 5-5: Coosa Watershed- Tributary Nitrogen Loading (lb/yr)



Notes: Based on 2050 demands

As described in Section 3.2.1 and listed in Table 5-3, Lake Allatoona has different chlorophyll a standards depending on the location within the lake. Again, the modeling was completed over a 7-year period to capture a range of annual rainfall conditions. The results presented in Table 5-3 are for a wet (2003) and dry (2007) year with the proposed reductions in the draft TMDL. These requirements include significant nonpoint source reductions: an 85 percent reduction in urban nutrient loads and a 40 percent reduction in agricultural nutrient loads (GAEPD, 2010b). The modeling results indicate that with the proposed reductions required in the TMDL, the chlorophyll a standard will be met in all lake segments in 2050 except in Allatoona Creek upstream from I-75 (Table 5-3). It should be noted that the modeling was based on the assumption that nonpoint sources will be significantly reduced (40-85 percent) in the future, which will require aggressive implementation of stormwater best management practices (BMPs).

Table 5-3: Comparison of Lake Allatoona Watershed Chlorophyll a (mg/L) Standards with Future (2050) Modeled Conditions

Station	Standard	Wet Year	Dry Year
Upstream from the Dam (Station 14309001)	10	6.8	6.5
Allatoona Creek upstream from I-75 (Station 14307501)	10	10.1	6.4
Mid-Lake downstream from Kellogg Creek (Station 14305801)	10	8.3	8.2
Little River upstream from Highway 205	15	4.9	14.4

Table 5-3: Comparison of Lake Allatoona Watershed Chlorophyll a (mg/L) Standards with Future (2050) Modeled Conditions (Continued)			
Station	**Standard**	**Wet Year**	**Dry Year**
(Station 14304801)			
Etowah River upstream from Sweetwater Creek (Station 14302001)	12	7.3	11.0
Note: Based on future conditions with the proposed Draft TMDL BMPs in Place; See Resource Assessment Results at http://www.georgiawaterplanning.org			

5.4 Future Treatment Capacity Comparison

Based on a comparison of the future wastewater capacity needs with existing permitted capacity, many municipal facilities will need to increase their permitted capacity (See Table 5-4). Only Chattooga, Dade, Floyd, Gilmer, Gordon, Habersham, Murray, Polk, and Walker Counties would meet 2050 demands with their currently permitted facilities. Shortages range from approximately 0.2 MGD in White and Towns Counties to more than 7 MGD in Dawson and Whitfield Counties in 2050. This suggests that additional wastewater facility expansions or development of new facilities will be required to meet the projected future wastewater demands.

It should be noted that the shortage or surplus estimates were calculated by comparing the current permitted maximum monthly average discharge with the forecasted annual average wastewater flow. Therefore, these estimates are only an indicator of potential future shortages/surpluses in permitted treatment capacity and indicate areas where continued localized facility planning will be needed.

Table 5-4: Permitted Municipal Wastewater Discharge Limits versus Forecasted Municipal Wastewater Flows (MGD)				
County	**Permitted Municipal Wastewater Discharge Limit [a,b]**	**2010 Forecasted Municipal Wastewater Flows [a,c]**	**2050 Forecasted Municipal Wastewater Flows [a,c]**	**2050 Shortage or Surplus [a,d]**
Catoosa[e]	0.10	0.54	1.19	(1.09)
Chattooga	7.15	1.93	2.79	4.36
Dade	1.01	0.45	0.63	0.39
Dawson[f]	1.21	2.10	8.61	(7.40)
Fannin	1.12	0.83	1.47	(0.35)
Floyd[g]	20.22	10.53	16.05	4.17
Gilmer[h]	4.00	1.55	2.36	1.64
Gordon[i]	16.24	5.72	11.60	4.63
Habersham	5.07	1.56	3.73	1.34

Table 5-4: Permitted Municipal Wastewater Discharge Limits versus Forecasted Municipal Wastewater Flows (MGD) (Continued)

County	Permitted Municipal Wastewater Discharge Limit [a,b]	2010 Forecasted Municipal Wastewater Flows [a,c]	2050 Forecasted Municipal Wastewater Flows [a,c]	2050 Shortage or Surplus [a,d]
Lumpkin	1.58	0.46	3.62	(2.04)
Murray	3.05	0.71	2.96	0.09
Pickens	1.08	1.05	2.92	(1.84)
Polk	6.67	3.57	5.77	0.90
Towns	0.54	0.48	0.76	(0.22)
Union[f]	0.47	0.71	2.46	(2.00)
Walker[j]	8.84	3.53	4.79	4.05
White	1.37	0.67	1.54	(0.17)
Whitfield[k]	40.38	24.25	47.87	(7.49)
Total	**120.1**	**60.64**	**121.12**	**NA[l]**

[a] Includes centralized systems such as LASs and point source discharges but not septic system.

[b] Permitted Discharge Limits based on the current Maximum Monthly Average Permit Limit (in MGD) of each permit.

[c] Forecasted Municipal Wastewater Flows include flow from industries that are served by municipal facilities. Values based on Annual Average Flow (in MGD).

[d] Based on difference between Permitted Treatment Limit and 2050 Forecasted Flows (in MGD). Red values in parentheses are shortages and values in black are surpluses.

[e] Catoosa County is estimated to provide 0.21 MGD of treatment capacity to textile industries (2010). Wastewater from Catoosa County is treated at the Moccasin Bend Plant in Chattanooga, TN.

[f] Permitted limit increases for Dawson and Union have been applied for to accommodate higher 2010 forecasted flows

[g] Floyd County is estimated to provide 2.28 MGD of treatment capacity to textile and automotive industries(2010).

[h] Gilmer County is estimated to provide 1.36 MGD of treatment capacity to food and textile industries(2010).

[i] Gordon County is estimated to provide 4.14 MGD of treatment capacity to textile industries(2010).

[j] Walker County is estimated to provide 0.48 MGD of treatment capacity to textile industries(2010). The Moccasin Bend Plant in Chattanooga, TN, serves portions of Walker County.

[k] Whitfield County is estimated to provide 16.13 MGD of treatment capacity to textile industries(2010).

[l] NA means Not Applicable

Sources: Forecasted wastewater flows and GAEPD approved permit database.

Reference Supplemental Document: "Coosa-North Georgia Supplemental Document: Comparison of Water and Wastewater Forecasts to Existing Permits and Planned Projects

Table 5-5 lists the number of agricultural permits, the permitted agricultural acreage per crop, and the 2050 forecasted agricultural water demand. The 2050 agricultural water demands will be refined in the future when more information regarding usage becomes available. The complete list of the agricultural demands and permits for this region is included in the supplemental document titled *Agriculture Water Forecast for the Coosa-North Georgia Region,* which is available at the CNG website.

Table 5-5: Number of Permits, Permitted Agricultural Acreage and 2050 Forecasted Agricultural Water Demand (MGD)

County	Number of Permits [a]	Permitted Agricultural Acreage [a]	2050 Forecasted Agricultural Water Demand [b,c]
Catoosa	10	945	1.54
Chattooga	5	285	0.22
Dade	0	0	0.14
Dawson	8	343	0.76
Fannin	21	559	0.14
Floyd	43	4,487	4.59
Gilmer	9	816	1.46
Gordon	18	2,602	2.80
Habersham	20	1,497	1.62
Lumpkin	19	1,033	0.64
Murray	16	1,760	0.64
Pickens	4	185	0.44
Polk	8	395	0.61
Towns	1	90	0.33
Union	18	548	0.89
Walker	5	200	0.56
White	7	234	0.42
Whitfield	15	1,611	1.34
Total	**227**	**17,590**	**19.14**

[a] Includes surface and ground water permits greater than 100,000 gallons/day. Permits listed include crop irrigation, golf courses, livestock watering, and nurseries. Note that permits issued before the early 1990s do not list acreage.

[b] 2050 Forecasted Agricultural Water Demand based on P75 scenario (in MGD). This demand is comprised of crop irrigation, golf courses, livestock watering, and nurseries. Note that the crop irrigation is the only demand that has a forecasted value. The other demands were not forecasted, so the current values for those demands are used for 2050 forecast.

[c] Peak demand could exceed 19.14 MGD during the growing season and under critical drought conditions.

Sources: Georgia EPD and UGA.

Reference Supplemental Document: "Agriculture Water Use Forecast for the Coosa-North Georgia Region"

5.5 Summary of Potential Water Resource Gaps or Shortages

Table 5-6 summarizes the potential water resource gaps or infrastructure needs/shortages. The basis for each potential gap or need/shortage is noted so the reader can return to the source of the gap or need/shortage for further explanation. In addition to the watershed-based nutrient modeling for those watersheds contributing to the Coosa River at the Georgia-Alabama boundary and Lake Allatoona on the Etowah River, the water quality 303(d) issues column also integrates the widespread 303(d) stream listings in the Region (see Section 3.3.2).

Infrastructure shortages may have multiple solutions such as municipal facility expansions and/or the construction of new local or regional facilities. The intent of this document is to provide a global overview of the region but is not intended to replace or undermine local capital improvement planning.

Table 5-6: Summary of Potential Gaps, Needs, or Shortages by CNG County

County	Surface Water Availability Gaps	Municipal Water Needs	Municipal Wastewater Shortages	Agricultural Water Shortages	Water Quality – Assimilative Capacity Gaps	Water Quality 303(d) Issues
Source	*Table 5-1*	*Table 5-2*	*Table 5-4*	*Table 5-5*	*Figure 5-2*	*Sections 3.3.2 & 5.3*
Catoosa	Yes	Yes	Yes			Yes
Chattooga	Yes	Yes			Yes	Yes
Dade	Yes			Yes	Yes	Yes
Dawson		Yes	Yes			Yes
Fannin		Yes	Yes			Yes
Floyd						Yes
Gilmer		Yes			Yes	Yes
Gordon					Yes	Yes
Habersham		Yes				Yes
Lumpkin		Yes	Yes			Yes
Murray		Yes			Yes	Yes
Pickens		Yes	Yes		Yes	Yes
Polk					Yes	Yes
Towns		Yes	Yes		Yes	Yes
Union		Yes	Yes			Yes
Walker	Yes					Yes
White		Yes	Yes			Yes
Whitfield		Yes	Yes		Yes	Yes
Total	**4**	**13**	**9**	**1**	**9**	**18**

Notes:

"Yes" indicates that there is a potential gap or need/shortage in the indicated county.

"Gap" is defined as a condition where the existing or future water withdrawal or return conditions exceed the Resource Assessment metric within a portion of the county.

"Need" and "Shortage" are defined as a condition where the current permitted capacity of water and wastewater treatment facilities, respectively, is less than the future forecast demands.

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Section 6. Addressing Water Needs and Regional Goals

Section Summary

Management Practices were selected to meet the Council's vision and goals and to address the resource gaps and shortages identified and described in Section 5.

A prioritization and ranking process resulted in the selection of 14 Water Conservation, 8 Water Supply, 8 Wastewater, and 12 Water Quality Management Practices.

This Section presents the management practices selected by the CNG Council to address the resource gaps, needs, or shortages identified and described in Section 5, and/or to meet the Council's vision (*Enhance the potential and quality of life for all communities through sustainable use of water resources in the Region and State with partnerships among a broad spectrum of stakeholders*) and the goals for the Region described in Section 1.3.

6.1 Identifying Water Management Practices

Section 5 identifies the CNG Region's likely resource gaps, needs, and shortages, based on a comparison of the Resource Assessments and forecasted demands, and demonstrates the need for Region- and resource-specific management practices. In cases where gaps, needs, and shortages appear unlikely, the management practices were selected to meet the needs specified by the Council (e.g., facility and infrastructure needs and practices, programmatic practices, etc.,) that are aligned with the Region's vision and goals. In selecting the management practices, the Council considered its vision and goals and the practices identified in existing plans and coordinated management practice selection with local governments, water providers, and neighboring councils that share the water resources.

6.1.1 Review of Existing Plans and Practices

The Council conducted a comprehensive review of existing local and regional water management plans and relevant related documents to frame management practice selection. Where possible, management practices already planned for use or successfully in use in the Region formed the basis for the management practices selected by the Council. A summary of the local and regional plans reviewed is provided as a supplemental document on the CNG website.[10]

6.2 Selected Water Management Practices for the Region

Management practices are grouped by primary water resource area addressed, such as Water Quality or Water Conservation. They are generally listed in order of the total benefit ranking assigned by the Council. The prioritization and ranking process

[10] http://www.coosanorthgeorgia.org/pages/our_plan/index.php

is described in the supplemental document titled *Summary of Management Practice Process,* which is available on the CNG website.

6.2.1 Water Conservation Management Practices

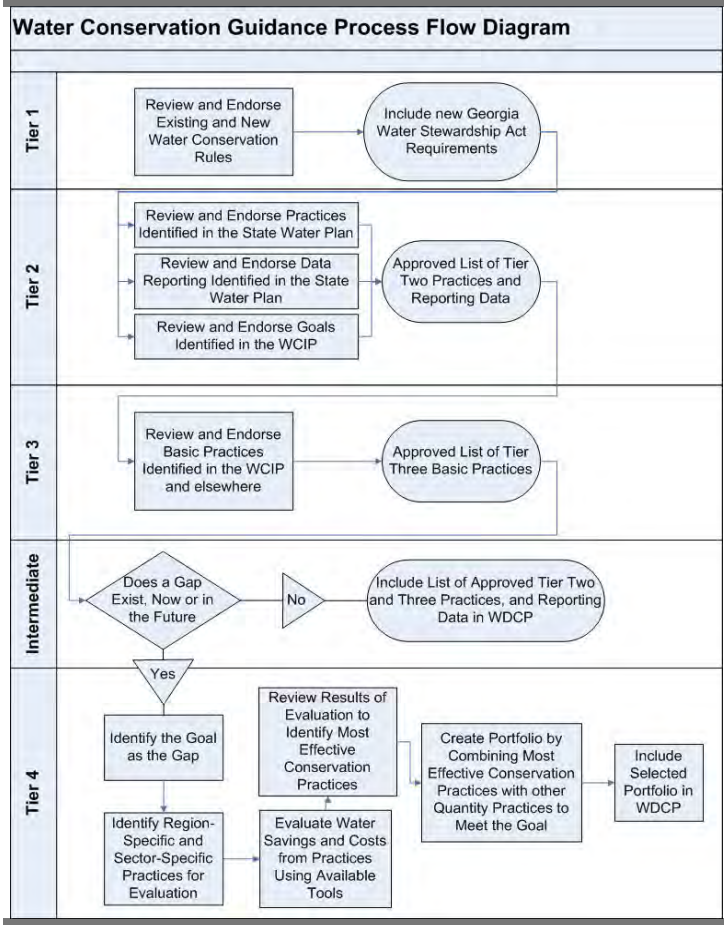
The State will need to practice water conservation in order to meet its long-term water needs. Conservation also helps ensure responsible use of a public resource.

Water conservation is a priority management practice in Section 7, Policy 3 of the State Water Plan and the State Water Conservation Implementation Plan (WCIP). The latter, published in March 2010, identified water conservation goals, bench marks, and BMPs for the State's diverse water users (GAEPD, 2010c). The WCIP framed the following conservation tiers for each Council to use during management practice selection:

- Tier 1: Basic water conservation activities and practices that are currently required by statute or will soon be required in EPD's upcoming amended rules.
- Tier 2: Basic water conservation activities and practices that will be addressed in upcoming amended rules but not required of all permit applicants.
- Tier 3: Basic water conservation practices (for all water use sectors) that will not be addressed in current or upcoming amended rules.
- Tier 4: "Beyond basic" water conservation practices to be considered if a gap exists between current or future water supplies and demands for the region.

Figure 6-1 illustrates the process used to consider the tiers during selection of the CNG Water Conservation Management Practices, listed in Table 6-1(a). Three of the Council's goals specifically address conservation or the optimization of water infrastructure:

Figure 6-1



Source: Georgia Environmental Protection Division, 2009.

Goal #3: Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.

Goal #4: Promote alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the CNG Region.

Goal #6: Educate stakeholders in the Region on the importance of water resources, including water conservation, efficiency, and pollution prevention.

Through the prioritization and ranking process described in the *Summary of Management Practice Process* supplemental document, the Council originally selected 17 water conservation management practices. The Council later combined four of these practices into one management practice reflecting implementation of Stewardship Act-related requirements. (The Stewardship Act, passed in 2010, includes incentives for increasing water stewardship and new conservation requirements). The final 14 management practices listed in Table 6-1(a) meet the goals noted above and address potential gaps at the Gaylesville, New England, and Chickamauga nodes and in localized areas in the Tennessee Basin headwater communities; these potential gaps are discussed further in Section 5 and summarized in Table 5-5.

Table 6-1(a): Water Conservation Management Practices Selected for the CNG Water Planning Region

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WC-1. Implement education and public awareness programs	• Develop and implement local public education programs. • Perform public education and outreach activities. • Perform public participation and involvement activities.	Supports ES, ED, WQ, and WS goals[1].
WC-2. Develop water conservation goals	Set region-wide goals to encourage reductions in water usage by consumers.	Supports ES, WQ, and WS goals[1].
WC-3. Stewardship Act Practices	• Assess and reduce water system leakage • Adopt Stewardship Act outdoor watering restrictions • Install high-efficiency cooling towers in new construction • Adopt new agricultural permit requirements	Supports AT, ES, ED, WQ, and WS goals[1].

Table 6-1(a): Water Conservation Management Practices Selected for the CNG Water Planning Region (Continued)

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WC-4. Consider installation of 1.28-gpf toilets & low flow urinals in government buildings	• Develop a list of eligible government buildings. • Develop a retrofit schedule and program. • Retrofit fixtures according to the schedule and program developed. • Promote use of tax incentives to encourage retrofits.	Supports ES, AT, and WS goals[1].
WC-5. Encourage non-potable reuse	• Identify areas with potential for reuse applications. • Promote irrigation with high quality treated effluent in areas such as golf courses, parks, and residences. Encourage industries to use reclaimed water for processes such as cooling when feasible.	Supports ES, ED, WQ, and WS goals[1].
WC-6. Encourage conservation pricing for residential urban irrigation (sprinkler systems)	Implement conservation pricing for residential customers to provide economic incentive for people to use less water in the region. Activities to implement include: • Eliminate declining block rate structures. • Perform a rate and revenue analysis. • Use irrigation meter pricing (non-punitive). • Ensure adequate billing system functionality. • Review and update pricing.	Supports ES, WQ, and WS goals[1].
WC-7. Encourage voluntary residential water audits	• Develop a water audit program. • Distribute water audit guidelines. • Encourage voluntary audits.	Supports ES, WQ, and WS goals[1].
WC-8. Consider distribution of low-flow retrofit kits to residential users	• Purchase low flow retrofit kits to implement this practice to address potential gaps where they exist. • Distribute low flow retrofit kits.	Supports ES, WQ, and WS goals[1].
WC-9. Encourage installation of rain sensor shut-off switches on new irrigation systems	• Encourage installation or retrofitting of irrigation systems that automatically shut off during rain events or moist soil conditions. • Update building inspection checklists.	Supports ES, WQ, and WS goals[1].
WC-10. Provide incentives for waterwise landscaping	Encourage the use of landscaping practices that minimize water usage and prevent runoff, such as native vegetation that requires less water than non-native vegetation.	Supports ES, ED, WQ, and WS goals[1].

Table 6-1(a): Water Conservation Management Practices Selected for the CNG Water Planning Region (Continued)

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WC-11. Encourage variable rate agricultural irrigation systems	• Continue implementation of the Mobile Irrigation Lab Program to provide free irrigation system performance audits • Offer financial incentives to install water-saving technologies, based on audit efficiency results.	Supports ES, ED, AT, WQ, and WT goals[1].
WC-12. Encourage conservation tillage	Encourage the use of conservation tillage for row crops to reduce evaporation and runoff and increase infiltration.	Supports ES, WQ, and WS goals[1].
WC-13. Encourage development of course-specific water conservation plans	• Implement the GAEPD standard water conservation plan template for self-supplied golf courses. • Consider adoption of provisions from the Georgia WCIP.	Supports ES, ED, WQ, and WS goals[1].
WC-14. Encourage use of certified irrigation professionals	Encourage use of trained irrigation specialists who understand irrigation application timing, levels of water needed by vegetation, as well as technologies and installation practices that increase water use efficiency of irrigation systems.	Supports ES, ED, and WS goals[1].

[1] Goals were given the following acronyms during the management practice ranking and selection process:

WS: Water Supply/Quantity – Plan for appropriate levels of water storage, water sources, and long-term supply to meet anticipated needs of local communities.

WQ: Water Quality – Protect and enhance water quality and ecosystems in lakes and streams, particularly those in priority listed watersheds.

AT: Alternative Technologies – Promote alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the CNG Region.

ED: Economic Development – Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.

AE: Adverse Effects – Minimize adverse effects to local communities and adjacent regions, and when possible, enhance natural systems.

ES: Educate Stakeholders – Educate stakeholders in the Region on the importance of water resources, including water conservation, efficiency, and pollution prevention.

6.2.2 Water Supply Management Practices

Management practices that supplement water supply are an important part of addressing the potential water resource gaps for the Region, as summarized in Table 5-5. Of the 18 counties in the region, 13 have future needs in their water supply infrastructure as described in Section 5.2. Gaps due to increased future demands, in both duration and volume, were also observed at the Gaylesville, New England and Chickamauga nodes in 2050, primarily affecting Catoosa, Chattooga, Dade and Walker counties. Table 6-1(b) outlines the 8 Water Supply Management Practices targeted for implementation in the Region to address these potential gaps and needs. Three of the Council's goals specifically address water supplies or the optimization of water infrastructure:

Goal #1: Plan for appropriate levels of water storage, water sources, and long-term supply to meet anticipated need for local communities.

Goal #3: Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.

Goal #4: Promote alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the Region.

Table 6-1(b): Water Supply Management Practices Selected for the CNG Water Planning Region

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WS-1. Encourage development of water master plans	Create and utilize a local water master plan with a 30-year planning horizon that includes, as appropriate: • Evaluate potential for partnerships in meeting future water supply needs, including sources such as the Tennessee River, which receives a significant flow originating in Georgia. • Evaluate cost-benefits of various water resources options and use Integrated Natural Resource Management Plan approach to assess relationships between water, wastewater, stormwater, and energy. • Adopt a written emergency water supply plan and assess the need for interconnections to meet reliability targets. • Evaluate potential to purchase from other water systems for short term. Update local water master plan as needed.	Supports ED, WQ, and WS goals[1].

Table 6-1(b): Water Supply Management Practices Selected for the CNG Water Planning Region (Continued)

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WS-2. Consider expansion of existing reservoirs	• Evaluate potential expansion of existing facilities. • Evaluate potential for Natural Resources Conservation Service (NRCS) impoundments to serve as water supply sources.	Supports ES, ED, WQ, and WS goals[1].
WS-3. Consider construction of new reservoirs to meet multiple purposes	• Regional water planning councils or local entities and GAEPD identify the safe yield of current sources. • Identify where gap(s) between available supply and demand will occur. • Begin process to permit new water supplies for both off-stream (water supply) and in-stream (water quality protection) purposes.	Supports ES, ED, WS goals[1].
WS-4. Consider development of new groundwater wells	• Evaluate potential for groundwater (often as supplemental supply). • Permit/implement as needed and practicable. • Evaluate feasibility of aquifer storage and recovery (ASR).	Supports WQ and WS goals[1].
WS-5. Encourage indirect potable reuse	Return highly treated wastewater to water supply reservoirs and/or streams.	Supports WQ and WS goals[1].
WS-6. Consider construction of new water treatment plants (WTPs) or expansion of existing WTPs	• Evaluate when and where new WTPs are needed to meet demands. • Begin process to permit new WTPs.	Supports AT, WQ, and WS goals[1].

Table 6-1(b): Water Supply Management Practices Selected for the CNG Water Planning Region (Continued)

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WS-7. Encourage water system asset management	• Map water system. • Develop a water system rehabilitation and replacement program (asset management program). • Coordinate asset management and leak detection programs. • Implement based on local government and utility needs. • Establish and implement inspection and maintenance program. • Review existing staff certifications and secure additional training as needed. • Prioritize rehabilitation projects and develop schedules and budgets. • Implement rehabilitation program and document rehabilitation projects. • Conduct annual planning and budgeting.	Supports ED, WQ, and WS goals[1].
WS-8. Encourage source water protection	• Identify water supply watersheds. • Recommend adoption of Environmental Planning Criteria. • Coordinate with local governments on watershed protection. • Emphasize "non-intrusive" environmental criteria and alternative ways to protect watersheds.	Supports ES, ED, WQ and WS goals[1].

[1] Goals were given the following acronyms during the management practice ranking and selection process:

WS: Water Supply/Quantity – Plan for appropriate levels of water storage, water sources, and long-term supply to meet anticipated needs of local communities.

WQ: Water Quality – Protect and enhance water quality and ecosystems in lakes and streams, particularly those in priority listed watersheds.

AT: Alternative Technologies – Use alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the CNG Region.

ED: Economic Development – Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.

AE: Adverse Effects – Minimize adverse effects to local communities and adjacent regions, and when possible, enhance natural systems.

ES: Educate Stakeholders – Educate stakeholders in the Region on the importance of water resources, including water conservation, efficiency, and pollution prevention.

6.2.3 Wastewater Management Practices

The surface water quality Resource Assessments described in Section 5.3 were performed to measure the assimilative capacity, or the ability of Georgia's surface waters to absorb pollutants from treated wastewater and stormwater without unacceptable degradation of water quality. The Resource Assessments also highlighted the need for nutrient load reductions to Lake Allatoona, Carters Lake, and Lake Weiss to address expected future water quality issues. Table 5-4 and Table 5-6 summarize the Resource Assessment results and potential wastewater infrastructure shortages. Half of the 18 counties in the Region have wastewater infrastructure shortages which necessitate added emphasis for implementation of the Wastewater Management Practices listed in Table 6-1(c). Table 5-6 also notes the 9 counties (which do not necessarily correspond with the WW infrastructure shortage counties) with gaps in wastewater demand and in the assimilative capacity of surface waters. These counties should consider the Wastewater Management Practices and a more rigorous implementation of the Water Quality Management Practices described in Section 6.2.4 to improve the quality of surface waters.

Two of the Council's goals specifically address wastewater infrastructure:

Goal #3: Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.

Goal #5: Promote properly managed wastewater discharges.

Table 6-1(c): Wastewater Management Practices Selected for the CNG Water Planning Region

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WW-1. Consider development of local wastewater treatment master plans to evaluate wastewater treatment and disposal options to meet future demands	• Evaluate future wastewater capacity needs. • Identify and evaluate options to treat and dispose of wastewater. • Consider opportunities for reuse (indirect potable, non-potable, etc.).	Supports ES, ED, WQ, and WS goals[1].
WW-2. Consider development and implementation of a local wastewater education and public awareness program	• Develop and implement local public education programs. • Perform public education and outreach activities. • Perform public participation and involvement activities.	Supports ES, ED, WQ, and WS goals[1].

Table 6-1(c): Wastewater Management Practices Selected for the CNG Water Planning Region (Continued)

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WW-3. Promote septic system management	• Conduct an analysis of existing septic systems, including identifying systems on plats and implementing a tracking system. • When upgrading or designing a wastewater treatment facility, develop a plan and acceptable parameters for septage disposal to include future septic system areas, local requirements, critical areas, and overall septage disposal needs. • Develop short- and long-term policies for transitioning unsewered areas to sewered areas. • Conduct additional management of septic systems in those critical areas. • Implement a septic system homeowner education program and provide information, including pumping history, at closings.	Supports ES and WQ goals[1].
WW-4. Encourage sewer system inventory and mapping	• Review existing information and select sewer mapping strategy appropriate to local government or utility. • Implement sewer system mapping strategy on an incremental basis. • Use mapping to prioritize capital improvements and operation and maintenance (O&M), as well as during emergency response. • Upon completion of mapping, keep current via ongoing updates as conditions change.	Supports ES, ED, and WQ goals[1].
WW-5. Consider implementation of sewer system inspection, maintenance, and rehabilitation program	• Implement based on local government and utility needs. • Establish and implement inspection and maintenance program. • Review existing staff certifications and secure additional training as needed. • Prioritize rehabilitation projects and develop schedules and budgets. • Implement rehabilitation program. • Conduct annual planning and budgeting. • Document rehabilitation projects.	Supports ES, ED, and WQ goals[1].

Table 6-1(c): Wastewater Management Practices Selected for the CNG Water Planning Region (Continued)

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WW-6. Consider developing a capacity certification program	• Implement based on local entity needs. • Maintain a flow and rainfall monitoring program. • Maintain a hydraulic model or use manual calculation approach. • Determine system capacity and maintain procedures for certifying available capacity. • Certify availability of capacity for proposed developments.	Supports ES, ED, and WQ goals[1].
WW-7. Consider implementation of a grease management program	• Implement based on local entity needs. • Develop procedures for grease control and enforcement. • Implement fats, oils, and grease (FOG) education efforts.	Supports ES, ED, and WQ goals[1].
WW-8. Consider development of sanitary sewer system overflow (SSO) emergency response program	• Implement based on local entity needs. • Review overflow response program. • Add Standard Operating Procedures (SOPs) to ensure proper response to overflows.	Supports ES, ED, and WQ goals[1].

[1] Goals were given the following acronyms during the management practice ranking and selection process:

WS: Water Supply/Quantity – Plan for appropriate levels of water storage, water sources, and long-term supply to meet anticipated needs of local communities.

WQ: Water Quality – Protect and enhance water quality and ecosystems in lakes and streams, particularly those in priority listed watersheds.

AT: Alternative Technologies – Use alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the CNG Region.

ED: Economic Development – Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.

AE: Adverse Effects – Minimize adverse effects to local communities and adjacent regions, and when possible, enhance natural systems.

ES: Educate Stakeholders – Educate stakeholders in the Region on the importance of water resources, including water conservation, efficiency, and pollution prevention.

6.2.4 Water Quality Management Practices

While significant progress has been made in managing pollution from point sources, Georgia's future growth will continue to be accompanied by conversion of land cover, more intensive land uses, and significant increases in the volume of pollutants discharged to waters from both point and non-point sources. Table 5-6 notes the 9 CNG counties with assimilative capacity water quality issues and illustrates that the entire Region needs to focus on implementing Water Quality Management Practices to address the 303(d) listings in each County and the nutrient load reductions needed for those watersheds contributing to the Coosa River, Lake Allatoona, Weiss Lake and Carters Lake. Implementation of the Water Quality Management Practices noted in Table 6-1(d) builds on the existing TMDL and stormwater management activities already being performed by the Municipal Separate Stormwater Sewer System (MS4) or NPDES permittees within the Region.

Two of the Council's goals specifically address water quality:

Goal #4: Promote alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the CNG Region.

Goal #6: Educate stakeholders in the Region on the importance of water resources, including water conservation, efficiency, and pollution prevention.

Table 6-1(d): Water Quality Management Practices Selected for the CNG Water Planning Region

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WQ-1. Encourage implementation of nutrient management programs	As recommended by NRCS: • Apply fertilizer at rates that are used by plants to avoid excessive nutrient runoff. • Use cropland management practices such as conservation tillage, cover crops, field buffers, riparian forested buffers, land conversion (crop to forest), strip cropping, and nutrient management. • Use practices to reduce runoff carrying pollutants from animal waste; include practices to store/cover and compost manure.	Supports ES, WQ, and WS goals[1].
WQ-2. Promote use of forestry best management practices	Use BMPs to minimize runoff from silviculture operations such as streamside management zones, mechanical site preparation, and main haul roads (as adopted and enforced by the Georgia Forestry Commission).	Supports ES, AT, and WQ goals[1].

Table 6-1(d): Water Quality Management Practices Selected for the CNG Water Planning Region (Continued)

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WQ-3. Encourage local government participation in erosion and sediment control	• Continue to implement existing construction NPDES Program. • Revisit practices to reduce runoff from construction sites when a given threshold of land is disturbed, if needed. • Consider the implementation of guidelines in the Georgia Backroads Program.	Supports ES, ED, AT, and WQ goals[1].
WQ-4. Consider development of post-development stormwater management and site design practices	• Manage runoff from new development and redevelopment areas so that post-development runoff volume is no greater than pre-development runoff volume. • Encourage site design practices that minimize environmental impacts, such as conservation subdivisions.	Supports ES, AT, WQ, and WS goals[1].
WQ-5. Encourage pollution prevention/good housekeeping practices for local operations and implementation of an illicit discharge detection and elimination program	• Local governments develop practices to prevent pollutant runoff from their land. • Identify illicit discharges to stormwater system and develop a program to eliminate them.	Supports ES, WQ, and WS goals[1].
WQ-6. Encourage implementation of local stormwater education and public awareness program	• Develop a program to educate public about measures they can take to minimize their impacts (nonpoint source) on water resources. • Develop and implement local public education programs. • Perform public education and outreach activities. • Perform public participation and involvement activities.	Supports ES, ED, WQ, and WS goals[1].
WQ-7. Encourage consideration of regional BMPs such as regional ponds and natural protection systems	• Encourage local governments to work together to develop regional BMP plans. • Construct regional BMP facilities such as stormwater ponds and greenway networks for buffer restoration and protection.	Supports ED, AT, WQ, and WS goals[1].

Table 6-1(d): Water Quality Management Practices Selected for the CNG Water Planning Region (Continued)

Action Needed (Management Practice)	Description of Activities	Relationship of Action or Issue to Goals (Section 1.3)
WQ-8. Encourage stream buffer protection measures and stream restoration	Preserve and develop vegetated (often forested) corridors along streams to filter pollutants.	Supports ES, ED, WQ and WS goals[1].
WQ-9. Encourage floodplain management/flood damage prevention practices	• Adopt site plan review practices to prohibit or minimize development in the floodplain. • Develop future flood maps based on future land use and refer to maps during the development review process.	Supports ES, AT, WQ, and WS goals[1].
WQ-10. Continue implementation of comprehensive land use planning and environmental planning criteria	• Develop plans to recommend development in certain areas and discourage development in environmentally sensitive areas, including protecting open space along riparian corridors, wetlands, and groundwater recharge areas to protect water resources. • Include protection of endangered species, wetlands, aquifer recharge areas, and drinking water supplies.	Supports ED, WQ, and WS goals[1].
WQ-11. Support TMDL implementation	Evaluate existing impaired waters, investigate potential pollutant sources, and participate in the TMDL development and implementation planning process.	Supports ES, WQ, and WS goals[1].
WQ-12. Consider water quality credit trading	Evaluate the feasibility of point-to-point trading and nonpoint–to-point trading.	Supports ES, ED, and WQ goals[1].

[1] Goals were given the following acronyms during the management practice ranking and selection process:

WS: Water Supply/Quantity – Plan for appropriate levels of water storage, water sources, and long-term supply to meet anticipated needs of local communities.

WQ: Water Quality – Protect and enhance water quality and ecosystems in lakes and streams, particularly those in priority listed watersheds.

AT: Alternative Technologies – Use alternative technologies that conserve, return, and recycle water; protect water quality; and ensure adequate capacity for water storage within the CNG Region.

ED: Economic Development – Ensure that management practices support economic development and optimize existing water and wastewater infrastructure.

AE: Adverse Effects – Minimize adverse effects to local communities and adjacent regions, and when possible, enhance natural systems.

ES: Educate Stakeholders – Educate stakeholders in the Region on the importance of water resources, including water conservation, efficiency, and pollution prevention.

Section 7. Implementing Water Management Practices

Section Summary

The Council has developed a roadmap for implementing the Management Practices identified in Section 6.

It identifies the short-term (2013-2016) and long-term (beyond 2017) actions and the applicable corresponding responsible parties. The responsibility for most of the implementation actions falls to local governments and utilities and their corresponding Regional Commissions; however, extensive support for short-term activities, in particular, will be needed from various State entities.

This Section presents the CNG Council's roadmap for implementing the water management practices identified in Section 6. As the State Water Plan provides, this Regional Water Plan will be primarily implemented by the various water users in the CNG Region along with the other responsible parties described below.

Once adopted, this Regional Water Plan will be used to:

Guide permitting decisions by GAEPD.

Guide the awarding of Section 319(h) Nonpoint Source Implementation Grant funds from GAEPD.

Guide the awarding of State grants and loans for water-related projects.

7.1 Implementation Schedule and Roles of Responsible Parties

Tables 7-1(a) through 7-1(d) identify the short- and long-term actions needed to implement the management practices detailed in Tables 6-1(a) through 6-1(d) and the corresponding responsible parties for each series of actions. The Council has defined short-term as occurring between 2013 and 2016 and long-term as year 2017 and beyond. It is assumed that all long-term activities would occur after the 5-year Regional Water Plan update, allowing the Council to revisit these actions using an adaptive management approach. Based on Council feedback the RCs will take the lead role in coordinating and assisting local governments and utilities in implementing the management practices.

While the bulk of implementation actions noted in this Section fall to local governments and utilities and their corresponding RCs, extensive support for short-term activities, in particular, will be needed from State entities such as GAEPD, DCA, Georgia Department of Community Health (DCH), Division of Public Health, Environmental Health Section, and GEFA. This Regional Water Plan also assumes continued support from the Council in some capacity beyond its current 3-year appointment. Support from other organizations, such as the Association of County Commissioners of Georgia (ACCG), Georgia Green Industry (GGIA), Georgia

Municipal Association (GMA), Georgia Rural Water Association (GRWA), and Georgia Association of Water Professionals (GAWP) will also be needed to implement the management practices in an efficient, cost-effective manner.

Tables 7-1(a) through 7-1(d) indicate the permit category of the responsible parties for each management practice including the following mechanisms for tracking implementation; the agency responsible for enforcement is in parenthesis:

Municipal, Golf Course and Agricultural Water Withdrawal (GAEPD)

Municipal Wastewater Discharge (GAEPD)

Municipal and Construction Stormwater (GAEPD)

Safe Dams Program (GAEPD)

7.1.1 Implementation of Water Conservation Management Practices

Table 7-1(a) lists implementation details for the 14 Water Conservation Management Practices selected by the Council. The list includes a wide variety of practices, such as: (1) practices that are required by state law (WC-3, Stewardship Act practices), (2) practices that are beneficial for all communities (WC-1, Implement education and public awareness programs) and (3) practices that may be appropriate for some communities but not others (WC-5, Encourage non-potable reuse). Each community will need to evaluate the practices to determine which are appropriate for implementation in their community and are encouraged to adopt all management practices or other equally effective measures. Communities with Resource Assessment gaps or infrastructure needs or shortages are strongly encouraged to implement these management practices to address their gaps, needs, or shortages. All communities will need to report on their implementation activities to the Council and to the GAEPD to help determine the effectiveness of the Regional Water Plan. Finally, it is important to seek out opportunities for implementation across state lines with partners to address impairments and improvements to inter-state waters.

The industrial sector continually strides to implement water conservation practices that increase productivity while decreasing water use. Particularly in the CNG region, the carpet industry has significantly reduced water usage per unit of carpet manufactured due to industry process improvements, increased efficiencies, and conservations efforts (GTMA, 2009).

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-1. Implement education and public awareness programs	Municipal Water Withdrawal and Municipal Stormwater	• Review existing education programs and build on readily available examples from within Georgia to develop either a region-wide public education program or template for local implementation. • Implement the Education and Public Awareness Program	• Administer survey to gauge effectiveness of program after implementation of short-term actions. • Revise Education and Public Awareness Program during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: GAEPD and councils working with the RCs noted in Section 2.2 with support from organizations such as the ACCG, GMA, GRWA, and GAWP. Local governments noted in Section 2.1.1. Long-term Actions: GAEPD and councils working with the RCs.
WC-2. Develop water conservation goals	Municipal Water Withdrawal	• Identify achievable, measurable goals (and benchmarks) based on those in the WCIP to help local governments evaluate progress and success in reducing water supply gaps through conservation. • Develop ways to track progress in meeting conservation goals and reporting progress.	• Administer survey to gauge effectiveness of program after implementation of short-term actions. • Revise program during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	GAEPD and councils working with the RCs noted in Section 2.2 with support from organizations such as the ACCG, GMA, GRWA, and GAWP.

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-3. Stewardship Act Practices	Municipal Water Withdrawal and Agricultural Water Withdrawal	Assess and reduce water system leakage: • Using standards and practices established by GAEPD, including an infrastructure leakage index and annual water loss audit, work to meet the Stewardship Act 1/1/2012 deadline for systems serving more than 10,000 people. • Small systems (between 3,300 and 10,000 customers) can consider applying for funding from GEFA to assist with implementing short-term actions. • Work to meet the Stewardship Act 1/1/2013 deadline for systems serving more than 3,300 people. • Assess water losses annually. • Develop and implement a leak response plan with training materials on pipe and fixture inspection, lining, cleaning, and basic preventative maintenance.	Assess and reduce water system leakage: Administer survey to identify water saved by identifying and repairing leaks. Continue annual assessments.	Assess and reduce water system leakage: Short-term Actions: Local governments and utilities coordinated by the RCs noted in Section 2.3 with support from organizations such as GRWA and GAWP. Long-term Actions: Local governments and utilities, GAEPD, and councils working with the RCs.

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-3. Stewardship Act Practices (cont'd)		Adopt outdoor watering restrictions: • Update outdoor water use (for landscaping purposes) ordinance to allow use between the hours of 4:00 PM and 10:00 AM only, with certain exemptions, as outlined in SB 370, Section 3. • Implement ordinance and educate public about changes to outdoor watering schedule (see WC-1).	Adopt outdoor watering restrictions: Continue to implement ordinance and educate public.	Adopt outdoor watering restrictions: Local governments and utilities.
WC-3. Stewardship Act Practices (cont'd)		Adopt new agricultural permit requirements: • Revise agriculture water permitting requirements to reclassify permits according to the Water Stewardship Act. • Implement permit requirements.	Adopt new agricultural permit requirements: Implement permit requirements.	Adopt new agricultural permit requirements: <u>Short-term Actions:</u> GAEPD Agriculture Water Permitting Unit working with Georgia Soil and Water Conservation Commission. <u>Long-term Actions:</u> GAEPD and GSWCC

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-3. Stewardship Act Practices (cont'd)		Install high-efficiency cooling towers in new construction: • Amend State minimum standard codes to require installation of high-efficiency cooling towers permitted on or after July 1, 2012. • Enforce the State minimum standard codes.	Install high-efficiency cooling towers in new construction: Continue to enforce State codes.	Install high-efficiency cooling towers in new construction: <u>Short-term and Long-term Actions:</u> Local governments
WC-4. Consider installation of 1.28-gpf toilets & low-flow / waterless urinals in government buildings	Municipal Water Withdrawal	• Develop a list of eligible government buildings, including the number and age of current fixtures. • Identify potential funding sources for government retrofits. • Develop preliminary cost estimates, prioritize buildings for retrofit, and develop schedule. • Retrofit fixtures according to schedule as funding allows.	Administer survey to track number of fixtures installed and replaced.	<u>Short-term Actions:</u> Georgia Building Authority and GEFA, which, pursuant to SB 194, have responsibility for overseeing State Energy Performance Contracts that include water conservation measures. <u>Long-term Actions:</u> GAEPD and councils working with the RCs.

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-5. Encourage non-potable reuse	Municipal Wastewater and Municipal Water Withdrawal	• Identify areas with potential for reuse application such as golf courses and parks. Identify industries that may use reclaimed water. • Consider applying for State Revolving Fund low-interest loans from GEFA which can fund priority green projects, including water reuse and recycling programs. • Develop implementation costs and assess feasibility of providing non-potable reuse water.	Encourage industries to use reclaimed water for processes, such as cooling, when technically and economically feasible.	Industry, local governments, and utilities.
WC-6. Encourage conservation pricing for residential and urban irrigation (sprinkler systems)	Municipal Water Withdrawal	• Review existing rate structure and perform a rate study, if needed, to eliminate declining block rate structure. • Implement conservation-oriented rate structure.	Revise rate study and rate structure, as needed.	Local governments and utilities.

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-7. Encourage voluntary residential water audits	Municipal Water Withdrawal	• Develop regional water audit program materials or templates for local implementation. • Implement regional program via Public Education and Awareness Program (see WC-1) to encourage voluntary audits and educate public about water audit guidelines.	• Administer survey to gauge effectiveness of program after implementation of short-term actions. • Revise program during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: GAEPD and councils working with the RCs noted in Section 2.3 with support from organizations such as the ACCG, GMA, GRWA, and GAWP. Local governments and utilities. Long-term Actions: GAEPD and councils working with the RCs.

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-8. Consider distribution of low-flow retrofit kits to residential users	Municipal Water Withdrawal	• Through the WaterFirst Program, work with public water suppliers to set up retrofit or rebate programs for water-efficient fixtures and equipment. • Identify funding sources to purchase low-flow retrofit kits. • Access free training and technical assistance to identify water conservation opportunities through retrofitting or replacing fixtures and equipment. • Purchase low-flow retrofit kits for distribution • Include message about residential retrofits in Public Education and Awareness Program (see WC-1). • Distribute low-flow retrofit kits, prioritizing areas with a water supply gap.	Administer survey to gauge potential water savings via the number of retrofit kits distributed.	Short-term Actions: DCA and GEFA working with local governments and utilities. Local governments and utilities with support from the Georgia Sustainability Division. Long-term Actions: GAEPD and councils working with the RCs.

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-9. Encourage installation of rain sensor shut-off switches on new irrigation systems	Municipal Water Withdrawal	• Develop regional guidelines / educational materials for local implementation. • Encourage voluntary installation or retrofitting to utilize irrigation systems that automatically shut off during rain events or moist soil conditions.	• Evaluate requiring switches in water-limited areas and revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness. • Develop maintenance program to ensure long-term effectiveness of sensors.	Short-term Actions: GAEPD and councils working with DCA and the RCs with support from organizations such as the ACCG, GMA and GAWP. Local governments and utilities. Long-term Actions: GAEPD and councils working with the RCs.

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-10. Provide incentives for water-wise landscaping	Municipal Water Withdrawal	• Identify incentives, such as recognition, awards, and networking opportunities, for high-performance landscape irrigation projects and for BMPs in landscaping. • Provide technical assistance to WaterFirst communities on proper landscape irrigation systems and encourage the adoption of local ordinances requiring the use of drought-tolerant plants and rain sensors in new construction. • Distribute existing educational materials on available incentives and water wise landscaping (see WC-1).	• Continue implementation of incentive and educational programs. • Administer survey to evaluate effectiveness and determine if education program needs modification (see WC-1).	Short-term Actions: GADNR Sustainability Division. DCA, Local governments and utilities. Long-term Actions: Local governments and utilities, GAEPD and councils working with the RCs.

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-11. Encourage variable rate agricultural irrigation systems	Agricultural Water Withdrawal	• Continue implementation of the GSWCC Mobile Irrigation Lab Program to provide free irrigation system performance audits and then offer financial incentives to install water-saving technologies, based on audit efficiency results. • Implement with the support of the GSWCC. • Integrate message into Public Education and Awareness Program (see WC-1).	• Evaluate requiring variable rate irrigation systems in water-limited areas. • Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	University of Georgia College of Agriculture and Environmental Sciences and the Cooperative Extension Service Short-term Actions: GAEPD Agriculture Water Permitting Unit and councils working with GSWCC. Long-term Actions: GAEPD, councils and GSWCC
WC-12. Encourage conservation tillage	Agricultural Water Withdrawal	• Identify incentives to encourage conservation tillage, including cost-share programs. • Implement with the support of the GSWCC. • Integrate message into Public Education and Awareness Program (see WC-1).	Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: GSWCC and GADNR Sustainability Division. Long-term Actions: GAEPD, councils and GSWCC

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-13. Encourage development of course-specific water conservation plans	Golf Course Water Withdrawal	• Educate Golf Course Superintendents about availability of GAEPD standard water conservation plan template for self-supplied golf courses. • Identify incentives or recognition program to encourage development of course-specific water conservation plans • Continue outreach to encourage development of course-specific water conservation plans. • Implement recognition program.	• Administer survey to gauge effectiveness of program after implementation of short-term actions. • Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: Georgia Golf Course Superintendents Association (GGCSA) and GAEPD. Long-term Actions: GGCSA with GAEPD and councils

Table 7-1(a): Implementation Schedule for Water Conservation Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WC-14. Encourage use of certified irrigation professionals	Agricultural Water Withdrawal and Municipal Water Withdrawal	• Develop regional educational materials regarding the value of using a trained, certified irrigation specialist to increase water use efficiency within the agricultural and green industry. • Encourage certification of irrigation specialists via Public Education and Awareness Program (see WC-1).	Evaluate whether requirement for certified irrigation specialists should be considered in Regional Water Plan update.	Short-term Actions: GAEPD and councils working with DCA and the RCs working with the GSWCC and the GGIA. Long-term Actions: GAEPD and councils

[a] Assumes continued support from the CNG Council in some capacity beyond its current 3-year appointment.

7.1.2 Implementation of Water Supply Management Practices

Table 7-1(b) lists implementation details for the 8 Water Supply Management Practices selected by the Council. The list includes a wide variety of practices, such as practices that are beneficial for all communities (WS-1, Encourage development of water master plans) and practices that may be appropriate for some communities but not others (WS-2, Consider expansion of existing reservoirs). Each community will need to evaluate the management practices to determine which are appropriate for implementation in their community. Communities with Resource Assessment gaps or infrastructure needs or shortages are strongly encouraged to implement these management practices to address their gaps, needs, or shortages. All communities will need to report on their implementation activities to the Council and to the GAEPD to help determine the effectiveness of the plan.

Table 7-1(b): Implementation Schedule for Water Supply Management Practices

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties [a]
WS-1. Encourage development of water master plans	Municipal Water Withdrawal	• Develop or revise local water master plan to: • Include a 40-year planning horizon • Include an emergency water plan. • Assess need for interconnections and their reliability targets. • Implement local water master plan.	Revise local water master plan based on 5-year Regional Water Plan update.	Local governments and utilities with support from GAEPD.
WS-2. Consider expansion of existing reservoirs	Municipal Water Withdrawal and Safe Dams Program	• In areas with potential future gaps, identify and evaluate potential for cost-effectively retrofitting existing reservoirs to provide additional storage, including retrofit of NRCS impoundments for water supply use. • Identify potential funding sources and cost-share partners for retrofits.	• Begin process of expanding existing reservoirs. • Integrate plans for reservoir expansions in 5-year Regional Water Plan update, if necessary.	Short-term Actions: GAEPD and councils working with DCA and the RCs with support from the NRCS. GEFA, local governments and utilities. Long-term Actions: Local governments and utilities with support from GAEPD and the CNG council
WS-3. Consider construction of new reservoirs to meet multiple purposes	Municipal Water Withdrawal	• Identify site-specific needs for new water supply reservoirs over next 40 years via local water master planning process and Regional Water Plan. • Begin permitting process for new water supplies.	• Continue permitting process for new water supplies and construct as needed and as funding allows. • Revise local water master plan based on 5-year Regional Water Plan update, if necessary.	Local governments and utilities with support from GAEPD.

Table 7-1(b): Implementation Schedule for Water Supply Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties [a]
WS-4. Consider development of new groundwater wells	Industrial Water Withdrawal and Municipal Water Withdrawal	• As part of local water master planning process, identify site-specific needs for new groundwater wells over next 40 years. • Begin permitting process for new wells and construct as needed and as funding allows.	• Continue permitting process for new wells and construct as needed and as funding allows. • Revise local water master plan based on 5-year Regional Water Plan update, if necessary.	Industry, local governments and utilities with support from GAEPD.
WS-5. Encourage indirect potable reuse	Municipal Wastewater and Municipal Water Withdrawal	• Identify opportuni-ties to augment water supplies with highly treated wastewater via local water master planning process. • Identify incentives to encourage indirect potable reuse. • Implement via local water master plan.	• Revise local water master plan based on 5-year Regional Water Plan update, if necessary.	Local governments and utilities with support from GAEPD and GEFA.
WS-6. Consider construction of new WTPs or expansion of existing WTPs	Industrial Water Withdrawal and Municipal Water Withdrawal	• Evaluate need for new/expanded WTPs as part of local water supply planning process. • If needed, begin permitting process for the WTPs.	• Complete permitting process, obtain funding and construct WTPs, as necessary. • Revise local water master plan and Regional Water Plan to reflect infrastructure changes.	Industry, local governments and utilities with support from GAEPD and GEFA.

Table 7-1(b): Implementation Schedule for Water Supply Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties [a]
WS-7. Encourage water system asset management	Municipal Water Withdrawal	• Develop a water system asset management program, if one does not already exist. • Begin mapping of water system assets, if needed. • Develop targeted asset replacement/ rehabilitation program to prevent catastrophic failures. • Continue mapping of water system assets. • Coordinate asset management and leak detection programs.	• Continue asset management and leak detection programs. • Revise programs based on 5-year Regional Water Plan update, if necessary.	Local governments and utilities with support from GAEPD.
WS-8. Encourage source water protection	Municipal Water Withdrawal	• Continue implementation of Chapter 391-3-16, Rules for Environmental Planning Criteria, which provide criteria for water supply watersheds and for protection of groundwater recharge areas. • Update water supply reservoir protection plans or source water protection plans, as needed.	Implement source water protection plans.	Local governments and utilities with support from GAEPD and DCA.

[a] Assumes continued support from the CNG Council in some capacity beyond its current 3-year appointment.

7.1.3 Implementation of Wastewater Management Practices

Table 7-1(c) lists implementation details for the 8 Wastewater Management Practices selected by the Council. The list includes a wide variety of practices, such as practices that are beneficial for all communities (WW-1, Consider development of local wastewater master plans to evaluate wastewater treatment and disposal options to meet future demands) and practices that may be appropriate for some communities but not others (WW-6, Consider developing a capacity certification program). Each community will need to evaluate the practices to determine which are appropriate for implementation in their community. Communities with Resource Assessment gaps or infrastructure needs or shortages are strongly encouraged to implement these management practices to address their gaps, needs, or shortages. All communities will need to report on their implementation activities to the Council and to the GAEPD to help determine the effectiveness of the plan.

Table 7-1(c): Implementation Schedule for Wastewater Management Practices

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties [a]
WW-1. Consider development of local wastewater master plans to evaluate wastewater treatment and disposal options to meet future demands.	Municipal Wastewater	• Consider developing (or revising) local wastewater master plan that: evaluates local, future wastewater capacity needs; identifies and evaluates options to treat and dispose of wastewater; and considers opportunities for reuse (indirect potable, non-potable, etc.). • If needed, implement local wastewater master plan.	Revise local wastewater master plan based on 5-year Regional Water Plan update.	Local governments and utilities with support from GAEPD.

Table 7-1(c): Implementation Schedule for Wastewater Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties [a]
WW-2. Consider development and implementation of a local wastewater education and public awareness program	Municipal Wastewater	• Develop template materials for local wastewater education from readily available sources. • Adapt template materials for local use and distribute with water bills and septic tank applications as funding allows.	• Administer survey to gauge effectiveness of program after implementation of short-term actions. • Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: RCs with support from DCH. Local governments and utilities and local public health departments. Long-term Actions: RCs with support from GAEPD and CNG council.
WW-3. Promote septic system management	Municipal Wastewater	As part of local wastewater planning efforts: • Develop policies for transitioning to sewer in areas where feasible. • Identify grant funds or other sources to develop and implement Septic System Homeowner Education program. • Implement policies for transitioning to sewer in areas where feasible. • Integrate Septic System Homeowner Education component into Public Education and Awareness Program (see WC-1).	• Administer survey to gauge effectiveness of program after implementation of short-term actions. • Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: Local governments and utilities with support from DCA and the RCs and GEFA. Long-term Actions: GAEPD and councils working with State and Local Public Health Department

Table 7-1(c): Implementation Schedule for Wastewater Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties [a]
WW-4. Encourage sewer system inventory and mapping	Municipal Wastewater	• Develop sewer system mapping strategy and identify potential funding sources. • As funding allows: o Generate sewer inventory and perform condition assessment. o Create sewer system map for emergency response and planning purposes.	Update sewer system inventory map as needed.	Short-term Actions: Local governments and utilities with support from GEFA, GRWA and GAWP Long-term Actions: Local governments and utilities with GAEPD
WW-5. Consider implementation of sewer system inspection, maintenance, and rehabilitation program	Municipal Wastewater	• Develop local inspection, maintenance, and rehabilitation program. • Review existing staff certifications and identify needed training. • Prioritize rehabilitation projects and develop schedule and budget for implementation. • Secure funding for training and implement training program.	• Implement rehabilitation program. • Conduct annual planning and budgeting. • Document rehabilitation projects.	Short-term Actions: Local governments and utilities with support from GRWA, GAWP, and GEFA. Long-term Actions: Local governments and utilities

Table 7-1(c): Implementation Schedule for Wastewater Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties [a]
WW-6. Consider developing a capacity certification program	Municipal Wastewater	• Consider developing a capacity certification program as part of local wastewater master planning efforts. • Implement capacity certification program by monitoring flow and rainfall and use resulting data to develop a local hydraulic model.	• Determine system capacity and maintain procedures for certifying available capacity. • Certify availability of capacity for proposed developments.	Short-term Actions: Local governments and utilities with support from GAWP and GRWA. Long-term Actions: Local governments and utilities
WW-7. Consider implementation of a grease management program	Municipal Wastewater	• Develop regional Grease Management Program guidelines or templates for local government and utility implementation. • Consider implementing local Grease Management Program. • Integrate FOG reduction message into Public Education and Awareness Program (see WC-1).	Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: RCs with support from GRWA and GAWP. Local governments and utilities. Long-term Actions: GAEPD and councils.

Table 7-1(c): Implementation Schedule for Wastewater Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties [a]
WW-8. Consider development of sanitary sewer system overflow (SSO) emergency response program	Municipal Wastewater	• Develop regional SSO emergency response guidelines or templates for local government and utility implementation. • Provide local staff with appropriate SSO emergency response training. • Implement SSO emergency response guidelines.	Review SOPs as part of 5-year wastewater master plan update.	Short-term Actions: RCs with support from GAEPD, GRWA. and GAWP. Local governments and utilities with support from GRWA and GAWP Long-term Actions: Local governments and utilities

[a] Assumes continued support from the CNG Council in some capacity beyond its current 3-year appointment.

7.1.4 Implementation of Water Quality Management Practices

Table 7-1(d) lists implementation details for the 12 Water Quality Management Practices selected by the Council. The list includes a wide variety of practices, such as: (1) practices that are required by state law (WQ-3, Encourage local government participation in erosion and sediment control), (2) practices that are beneficial for all communities (WQ-6, Encourage implementation of local stormwater education and public awareness program) and (3) practices that may be appropriate for some communities but not others (WQ-12, Consider water quality credit trading). Each community will need to evaluate the management practices to determine which are appropriate for implementation in their community. Communities with Resource Assessment gaps or infrastructure needs or shortages are strongly encouraged to implement these management practices to address their gaps, needs, or shortages. All communities will need to report on their implementation activities to the Council and to the GAEPD to help determine the effectiveness of the plan.

Table 7-1(d): Implementation Schedule for Water Quality Management Practices

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-1. Encourage implementation of nutrient management programs	Agricultural Water Withdrawal	• Ensure input of farmers when developing regional nutrient management guidelines addressing fertilizer/nutrient management, cropland management, and animal waste management for major agricultural sectors in CNG region. • Identify incentives to encourage local implementation of nutrient management guidelines. • Implement program based on nutrient management guidelines with support of GSWCC. • Integrate message into Public Education and Awareness Program (see WC-1).	Review implementation progress results during 5-year Regional Water Plan update to evaluate whether changes to guidelines are needed.	Short-term Actions: GAEPD working with GSWCC and NRCS RC&D. Agricultural Water Users and Council. Long-term Actions: GAEPD, councils, GSWCC, and NRCS.

Table 7-1(d): Implementation Schedule for Water Quality Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-2 Promote use of forestry best management practices	None	• Continue to implement measures and practices outlined in Georgia Forestry Commission BMP manual. • Expand education and enforcement of measures and practices outlined in Georgia Forestry Commission BMP manual.	Review implementation and compliance during 5-year Regional Water Plan update to evaluate whether changes to Georgia Forestry Commission BMP manual are needed.	Short-term Actions: Private foresters and the Georgia Forestry Commission Long-term Actions: GAEPD, RCs, and the Georgia Forestry Commission
WQ-3. Encourage local government participation in erosion and sediment control	Construction Stormwater	• Continue to implement existing Construction NPDES Program. • Encourage local government participation in erosion and sediment control as Local Issuing Authority. • Integrate construction erosion and sedimentation component into Public Education and Awareness Program (see WC-1).	Assess erosion and sedimentation compliance and enforcement in conjunction with Resource Assessment results during 5-year Regional Water Plan update to evaluate whether changes to existing Construction NPDES Program are needed.	Short-term Actions: GAEPD, NRCS, GSWCC and local governments, utilities and RCs Long-term Actions: GAEPD and councils

Table 7-1(d): Implementation Schedule for Water Quality Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-4. Consider development of post-development stormwater management and site design practices	Municipal Stormwater	• Consider development of guidelines and model ordinance, building on existing examples from within Georgia, to maintain pre- and post-development runoff volume consistently across CNG region. • Identify site design practices which minimize environmental impacts while still being cost-effective. • Develop educational materials and training program for local government staff and developers to assist with post-development stormwater control review process. • Integrate message into Public Education and Awareness Program (see WC-1).	• Consider adopting model ordinance and establishing development review process. • If adopted, implement educational materials and a training program for local developers. • Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: DCA and RCs with support from organizations such as the ACCG, GMA, GRWA and GAWP. Local governments with support from their corresponding RC. Long-term Actions: GAEPD and councils working with the RCs.

Table 7-1(d): Implementation Schedule for Water Quality Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-5. Encourage pollution prevention/ good housekeeping practices for local operations and implementation of a illicit discharge detection and elimination program	Municipal Stormwater	• Continue to implement current components of Stormwater Management Program (SWMP) if already an MS4 community. • Develop regional, minimum guidelines for pollution prevention/good housekeeping for local operations and illicit discharge detection and elimination programs for local governments not operating under MS4 NPDES permit. • Develop educational materials and training program for non-MS4 local government staff based on existing materials. • Identify incentives and potential funding sources to encourage local implementation.	Implement pollution prevention/good housekeeping for local operations and illicit discharge detection and elimination programs for local governments not operating under MS4 NPDES permit.	Short-term Actions: Local governments and RCs with support from GAWP. RCs with support from GAWP and GEFA. Long-term Actions: Local governments

Table 7-1(d): Implementation Schedule for Water Quality Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-6. Encourage implementation of local stormwater education and public awareness program	Municipal Stormwater	• Continue to implement current components of SWMP if already an MS4 community. • Develop regional, minimum guidelines for local education and public awareness programs building on existing programs from within Georgia, for local governments not operating under MS4 NPDES permit. • Identify incentives and potential funding sources to encourage local implementation. • Continue to implement current components of SWMP if already an MS4 community. • Implement stormwater component as part of Public Education and Awareness Program (see WC-1) for local governments not operating under MS4 NPDES permit.	• Administer survey to gauge effectiveness of program after implementation of short-term actions. • Revise Education and Public Awareness Program during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: Local Governments, DCA and RCs with support from GEFA and GADNR Sustainability Division. Long-term Actions: GAEPD and councils working with RCs.

Table 7-1(d): Implementation Schedule for Water Quality Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-7. Encourage consideration of regional BMPs such as regional ponds and natural protection systems	Municipal Stormwater	• Establish mechanism to evaluate and consider implementation of regional BMPs such as stormwater ponds, stream buffer protection and restoration. • Identify incentives and potential funding sources to encourage local participation in regional planning. • Develop regional BMP plans including construction, and O&M plan(s).	• Permit and construct regional BMP facilities. • Implement regional BMP plan(s).	Short-term Actions: Local governments and RCs. GEFA and GADNR Sustainability Division. Long-term Action: Local governments and RCs.
WQ-8. Encourage stream buffer protection measures and stream restoration	MS4	• Develop regional recommendations and consider adoption of a stream buffer ordinance that goes beyond current minimum State standards. • Consider stream restoration as funding allows • Identify incentives and potential funding sources to encourage local implementation. • Integrate messages about the importance of stream buffer protection into Public Education and Awareness Program (see WC-1).	Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: Local governments and RCs. Long-term Actions: GAEPD and councils working with the RCs.

Table 7-1(d): Implementation Schedule for Water Quality Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-9. Encourage floodplain management/ flood damage prevention practices	MS4	• Coordinate with Georgia Emergency Management Agency (GEMA) on development of a model flood damage prevention ordinance. • Develop regional recommendations and a model flood damage prevention ordinance. • Develop educational materials emphasizing the importance of preventing flood damage. • Identify incentives and potential funding sources to encourage local implementation.	• Integrate message into Public Education and Awareness Program (see WC-1). • Consider adoption of flood damage prevention ordinance. • Revise development review process, if needed. • Begin mapping location of future floodplains. • Revise guidelines during 5-year Regional Water Plan update, if necessary, to improve effectiveness.	Short-term Actions: GAEPD and GEMA. RCs with support from GEFA. Long-term Actions: RCs and local governments.

Table 7-1(d): Implementation Schedule for Water Quality Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-10. Continue implementation of comprehensive land use planning and environmental planning criteria	MS4	• Continue implementation of Comprehensive Plan and Part V Environmental Planning Criteria (PVEPC). • Assess need for revisions to Chapter 110-12-1, Standards and Procedures for Local Comprehensive Planning (SPLCP), and the PVEPC to facilitate implementation of the State Water Plan water management practices. • Recommend revisions to SPLCP and the PVEPC to State Legislature. • Integrate any needed revisions into local comprehensive plans during the next, regular 10-year update or 5-year updates to the Short-Term Work Program portion of the Community Agenda.	• Continue implementation of current [State Water Plan and PVEPC.	Short-term Actions: Local governments, DCA, and local governments. Long-term Actions: Local governments.
WQ-11. Support TMDL Implementation	Municipal Wastewater and Municipal Stormwater	• Continue to follow TMDL implementation plans and to participate in GAEPD updates. • Continue to follow TMDL implementation plans and to participate in GAEPD updates.	Update TMDL implementation plans, as needed, based on water quality and biological monitoring data as well as Resource Assessment results.	Short-term Actions: GAEPD, industry, local governments and utilities. Long-term Actions: GAEPD and councils working with the RCs.

Table 7-1(d): Implementation Schedule for Water Quality Management Practices (Continued)

Management Practice	Permit Category of Responsible Parties and Other States	Short-term Implementation Actions: 2012 to 2016	Long-term Actions: 2017, i.e. after 5-year Regional Water Plan update.	Responsible Parties[a]
WQ-12. Consider water quality credit trading	Municipal Wastewater, Industrial Wastewater, Municipal Stormwater, and Industrial Stormwater	• Perform feasibility study to assess the development of a regulatory framework, including the need for legislation, and guidelines for water quality credit trading in Georgia. • Propose legislative changes to allow for water quality credit trading, if needed. • Consider implementation framework and initiate pilot study. • Utilize results of pilot study to implement broader water quality trading program state-wide.	Pending the results of the feasibility and pilot studies, implement water quality credit trading program state-wide.	Short-term Actions: State legislature, GAEPD, industry, local governments and utilities. Long-term Actions: GAEPD

[a] Assumes continued support from the CNG Council in some capacity beyond its current 3-year appointment.

7.2 Fiscal Implications of Selected Water Management Practices

This Section outlines the general planning level costs and potential funding sources and options for implementation of the management practices selected by the CNG Council.

Table 7-2: Cost Estimates for the Water Conservation Management Practices Implementation Responsibilities

Management Practice	Capital / Programmatic Costs	Funding Sources and Options	Notes and Sources
WC-1. Implement education and public awareness programs	$0.10-2.25 /capita	State, Local, Utilities	GAEPD Cost Guidance E-2
WC-2. Develop water conservation goals	$0-0.50 /capita	State, Local, Utilities	GAEPD Cost Guidance – various Ordinance and Policy management practices
WC-3. Stewardship Act Practices	See WC-STEW below	See WC-STEW below	See WC-STEW below
WC-3 (STEW). Assess and reduce water system leakage	$0-0.50 /capita	Local, Utilities	GAEPD Cost Guidance – various Ordinance and Policy Management Practices
WC-3 (STEW). Adopt Stewardship outdoor watering restrictions	$0-0.50 /capita	Local, Utilities	GAEPD Cost Guidance – various Ordinance and Policy Management Practices
WC-3 (STEW). Adopt new agricultural permit requirements	$0-0.50 /capita	Local, Utilities	GAEPD Cost Guidance – various Ordinance and Policy Management Practices
WC-3 (STEW). Install high-efficiency cooling towers in new construction	$0-0.50 /capita	Local, Utilities	GAEPD Cost Guidance – various Ordinance and Policy Management Practices
WC-4. Consider installation of 1.28-gpf toilets & low flow/ waterless urinals in government buildings	$150-$450 /fixture	State, Local, Utilities	Does not include cost to install

Table 7-2: Cost Estimates for the Water Conservation Management Practices Implementation Responsibilities (Continued)

Management Practice	Capital / Programmatic Costs	Funding Sources and Options	Notes and Sources
WC-5. Encourage non-potable reuse	$0-0.50 /capita	State, Local, Utilities	GAEPD Cost Guidance OP-9
WC-6. Encourage conservation pricing for residential and urban irrigation (sprinkler systems)	$0-500 /MG	Utilities	GAEPD Cost Guidance WD-5
WC-7. Encourage voluntary residential water audits	$0.10-2.25 /capita	State, Local, Utilities	GAEPD Cost Guidance E-2
WC-8. Consider distribution of low-flow retrofit kits to residential users	$1,000-$2,500 /MG	Local, Utilities	GAEPD Cost Guidance WD-1
WC-9. Encourage installation of rain sensor shut-off switches on new irrigation systems	$25-1000 /MG	Local, Utilities	GAEPD Cost Guidance WD-6
WC-10. Provide incentives for waterwise landscaping	$250-1,500 /MG	Local, Utilities	GAEPD Cost Guidance WD-6
WC-11. Encourage variable rate agricultural irrigation systems	$2,000-4,000 /MG	State	GAEPD Cost Guidance WD-3
WC-12. Encourage conservation tillage	$0.10-2.00 /capita	State	GAEPD Cost Guidance E-2
WC-13. Encourage development of course-specific water conservation plans	$500-2,000 /MG	State, Local, Utilities	GAEPD Cost Guidance WD-7
WC-14. Encourage use of certified irrigation professionals	$0-0.50 /capita	State	GAEPD Cost Guidance – various Ordinance and Policy Management Practices

Table 7-3: Cost Estimates for the Water Supply Management Practice Implementation Responsibilities

Management Practice	Capital / Programmatic Costs	Funding Sources and Options	Notes and Sources
WS-1. Encourage development of water master plans.	$1,000-2,000 /MG	Utilities	GAEPD Cost Guidance – various Ordinance and Policy Management Practices
WS-2. Consider expansion of existing reservoirs	$300,000-700,000 /MG	State, Local, Utilities	GAEPD Cost Guidance WS-2
WS-3. Consider construction of new reservoirs to meet multiple purposes	$300,000-800,000 /MG	State, Local, Utilities	GAEPD Cost Guidance WS-1
WS-4. Consider development of new groundwater wells	$40,000-300,000 /MG	State, Local, Utilities	GAEPD Cost Guidance WS-3
WS-5. Encourage indirect potable reuse	$0-0.50 /capita	State, Local, Utilities	GAEPD Cost Guidance OP-9
WS-6. Consider construction of new WTPs or expansion of existing WTPs	$1.5 million-8 million /MG	State, Local, Utilities	GAEPD Cost Guidance WT-1 and WT-2
WS-7. Encourage water system asset management	$1,000-3,000 /MG	Utilities	GAEPD Cost Guidance WD-4
WS-8. Encourage source water protection	$0-0.50 /capita	State, Local, Utilities	GAEPD Cost Guidance OP-2

Table 7-4: Cost Estimates for the Wastewater Management Practice Implementation Responsibilities

Management Practice	Capital / Programmatic Costs	Funding Sources and Options	Notes and Sources
WW-1. Consider development of local wastewater master plans to evaluate wastewater treatment and disposal options to meet future demands.	$1,000-2,000 /MG	Utilities	GAEPD Cost Guidance – various Ordinance and Policy Management Practices
WW-2. Develop and implement a local wastewater education and public awareness program	$0-0.50 /capita	State, Local, Utilities	GAEPD Cost Guidance OP-10
WW-3. Promote septic system management	$0-0.50 /capita	State, Local, Utilities	GAEPD Cost Guidance OP-9
WW-4. Encourage sewer system inventory and mapping	$0.50 per linear foot	Utilities	Rough order of magnitude supplied by local GIS/GPS contractor.
WW-5. Implement sewer system inspection, maintenance, and rehabilitation program	$0-1 million /MGD	State, Local, Utilities	GAEPD Cost Guidance WW-6
WW-6. Consider developing a capacity certification program	$0-1 million /MGD	State, Local, Utilities	GAEPD Cost Guidance WW-6
WW-7. Consider implementation of a grease management program	$0.10-2.25 /capita	State, Local, Utilities	GAEPD Cost Guidance E-2
WW-8. Consider development of sanitary sewer system overflow (SSO) emergency response program	$0-1 million /MGD	State, Local, Utilities	GAEPD Cost Guidance WW-6

Table 7-5: Cost Estimates for the Water Quality Management Practice Implementation Responsibilities

Management Practice	Capital / Programmatic Costs	Funding Sources and Options	Notes and Sources
WQ-1. Encourage implementation of nutrient management programs	$5,000-7,000 /Farm	State	NRCS, 2003
WQ-2 Promote use of forestry management practices	$5-100 /acre	State	Costs vary by region, slope, and practice
WQ-3. Encourage local government participation in erosion and sediment control	$1-3 /capita	State, Local	GAEPD Cost Guidance E-1
WQ-4. Consider development of post-development stormwater management and site design practices	$0-0.50 /capita	State, Local	GAEPD Cost Guidance OP-1; const to develop ordinance which would probably be similar to developing educational materials; costs do not include staff to review stormwater plans or any increased development costs
WQ-5. Encourage pollution prevention/good housekeeping practices for local operations and implementation of a illicit discharge detection and elimination program	$1.50-3.00 /capita	State, Local	GAEPD Cost Guidance OP-8
WQ-6. Encourage implementation of local stormwater education and public awareness program	$0.10-2.50 /capita	State, Local	GAEPD Cost Guidance E-1

Table 7-5: Cost Estimates for the Water Quality Management Practice Implementation Responsibilities (Continued)

Management Practice	Capital / Programmatic Costs	Funding Sources and Options	Notes and Sources
WQ-7. Encourage consideration of regional BMPs such as regional ponds and natural protection systems	$35,000-$75,000 per acre of pond	State, Local	(Cubbage et al, Undated)
WQ-8. Encourage stream buffer protection measures and stream restoration	$0-0.50 /capita	Local	GAEPD Cost Guidance OP-7
WQ-9. Encourage floodplain management/ flood damage prevention practices	$0-0.50 /capita	Local	GAEPD Cost Guidance OP-7
WQ-10. Continue implementation of comprehensive land use planning and environmental planning criteria	$0-0.50 /capita	State, Local	GAEPD Cost Guidance OP-7 and OP-9
WQ-11. Support TMDL Implementation	$0-2 /capita	Federal, State, Local, Utilities	GAEPD Cost Guidance for Education; assume would be similar level of effort and would vary depending on the complexity and cost of TMDL implementation
WQ-12. Consider water quality credit trading	$0-0.50 /capita	Federal, State	GAEPD Cost Guidance for Ordinance and Policy; includes only feasibility and not actual trading program

7.3 Alignment with Other Plans

As discussed in Section 6, a review of regional and local plans served as the basis for the development of the Region's selected management practices; a summary of the local and regional plans reviewed is provided as a supplemental document on the CNG website.[11] As a result, this Regional Water Plan is generally aligned and consistent with these efforts; however, the following sections describe ongoing efforts and/or differences that are worth noting and revisiting during future Regional Water Plan updates.

Alabama-Coosa-Tallapoosa (ACT) Basin Master Water Control Manual

The ACT Basin Master Water Control Manual is composed of a series of documents, a Master Water Control Manual and 9 individual reservoir manuals. The USACE is in the process of updating these documents for the first time in decades, and the revised Water Control Manual will capture the following (USACE, 2011b):

Project/system operations refined over the years because of changes in basin hydrology and withdrawals/consumption that resulted from years of growth/development

Drought contingency requirements to account for new data and operational changes

Updated data reflecting current basin conditions

New/rehabilitated project structural features

Environmental requirements for endangered species and fish spawns

Procedures for capturing/using real-time data provided by additional gages and monitoring devices installed since last manual updates

Latest computer models and techniques to evaluate and establish guidelines for project operations

Improved and streamlined methods for data exchange between the USACE and other agencies.

The USACE completed the Scoping Report in March 2010 and is in the process of updating the Master Water Control Manual. The hydrologic modeling used for the manual updates differed from the Resource Assessment water quantity model used for the current Regional Water Plan primarily in the way the USACE reservoirs (Carters and Allatoona) in the CNG Region would be operated in the future. These differences, and future policy decisions on the allocation of storage in the reservoirs, may affect the future availability of water for water supply purposes. The final ACT

[11] http://www.coosanorthgeorgia.org/pages/our_plan/index.php

Basin Master Water Control Manual will be integrated into the 5-year CNG Regional Water Plan update.

Etowah Aquatic Habitat Conservation Plan (HCP)

In response to the number of imperiled aquatic species found in the Etowah watershed, the USFWS initiated development of the Etowah Aquatic Habitat Conservation Plan (HCP)[12]. The draft Etowah Aquatic HCP is currently working its way through the USFWS review process. Once that is complete, each local government that submitted an application for an Incidental Take Permit (ITP) will determine whether it wants to move forward with acceptance of the ITP, which includes formal adoption of the HCP. All the provisions of the final HCP, including the policies and ordinances contained therein, must be adopted in order for the local government to receive the ITP.

Due to the substantial volume of public comments received by USFWS on the draft HCP and uncertainty regarding how those comments will be resolved, the Council considered the HCP policies during the development of its management practices but did not directly integrate them into this Regional Water Plan. The policies incorporated into the final, adopted Etowah Aquatic HCP can be revisited during the 5-year Regional Water Plan update.

Metropolitan North Georgia Water Planning District Plans

The Metropolitan North Georgia Water Planning District (Metro Water District) was created by the Georgia General Assembly in 2001 to establish policy, create plans, and promote intergovernmental coordination within the 15-county metro Atlanta region, which includes more than 90 cities. The Metro Water District is therefore governed by a separate authorizing legislation than the CNG Water Planning Region, though the two are similar in some respects. For example, the Metro Water District is funded by State appropriations and per capita local government dues; it is governed by an elected/appointed Governing Board, which sets policy and direction. Metro Water District staffing is provided by the Atlanta Regional Commission Environmental Planning Division, while plans and policies are guided by the Board Executive and Finance Committees, the Technical Coordinating Committee, and the Basin Advisory Councils (Metro Water District, 2011).

Similar to the CNG Regional Water Plan, local governments and utilities are responsible for implementing the plans at the local level, and compliance with the plans is directly enforced through the GAEPD's permitting process. However, while the CNG Regional Water Plan will guide GAEPD's future permitting decisions, local governments must be in compliance with the District plans to receive a permit for an increased water withdrawal, a new or increased discharge, or for an MS4 permit, with GAEPD being responsible for auditing local governments to determine compliance with the plans, including audit checklists and site visits.

[12] http://www.etowahhcp.org/

In May 2009, the Metro Water District adopted comprehensive updates to the plans the District first adopted in 2003; these long-term WMPs address water supply and water conservation, wastewater management, and watershed management. The Metro Water District plans were referenced extensively during development of the CNG management practices; however, substantial differences remain between the District plans and the CNG Regional Water Plan due to data availability and resolution, resources, and legislative mandate.

Other Regional Planning Considerations

Water Supply Planning Considerations

Future development of water supplies in the CNG region should take into consideration the availability of water from the Tennessee River basin. A significant portion of the Region is included in the Tennessee River watershed, and local entities should have access to water contributed to the river from watersheds within north Georgia. The CNG Council recognizes there are potential legal issues that would have to be addressed between Georgia and Tennessee to facilitate usage of the Tennessee River; however, the Council would like future planning efforts to address this alternative water source in more detail.

Additionally, regional reservoir projects should be evaluated to meet both in-stream and off-stream needs within and outside of the CNG region. Portions of the CNG region, specifically in the Coosa basin, have the potential for development of new water supply reservoirs that may provide sufficient yield to supply water to areas outside of the CNG planning area. The CNG Council is not opposed to considering these options for meeting future water supply needs in Georgia; however, the Council would like to ensure that a complete and thorough evaluation is completed to ensure that the CNG basin water resource needs (both in-stream and off-stream) are met.

Total Maximum Daily Load Implementation

The State's TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a water body based on the relationship between pollutant sources and in-stream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality (GAEPD, 2011). Integration of the CNG Region's existing TMDL Implementation Plans was an important component considered during the development and selection of the management practices.

There are approximately 200 stream segments in the Coosa, Tallapoosa or Tennessee River basins covered by a TMDL Implementation Plan, primarily for fecal coliform, impaired biota or fish consumption guidelines/commercial fishing ban due to legacy pollutants such as PCBs or metals. TMDLs for DO have been developed for multiple stream segments in the CNG region, including the Coosa River in Floyd County, the Toccoa and Nottely Rivers, and McFarland Branch in the Tennessee River basin. The DO TMDLs recommend management practices to help reduce

and/or maintain the Ultimate Oxygen Demand loads including water quality monitoring, compliance with the requirements of the NPDES permit program and the application of nonpoint source BMPs.

There are three Chlorophyll a TMDLs for embayments of Lake Allatoona in the Coosa River Basin (Etowah River, Allatoona Creek and Little River). Studies are also currently under way related to Carters Lake and Lake Lanier. Chlorophyll a is a pigment in algae and is used as an indicator of the potential presence of nutrients in a waterbody that cause excess algal growth. A lake segment is placed on the "not support" list if during the last five-year assessment period, the chlorophyll a growing season (April through October) average exceeds the site-specific criteria two or more times (GAEPD, 2009). The Chlorophyll a TMDL Implementation Plan for the Little River embayment provides an extensive list of regulatory and voluntary practices/control actions (management measures) to reduce pollutants, milestone schedules to show the development of the management measures (measurable milestones), and a monitoring plan to determine the efficiency of the management measures (Atlanta Regional Commission, 2006). In addition, the 2008 nutrient TMDL for Lake Weiss requires a 30 percent reduction in total phosphorus loadings at the state border from the Coosa River basin to meet the 20 ug/L chlorophyll-a standard in the lake. This will require additional point and non point source nutrient loading reductions in the lower Coosa River basin. Implementation of the management practices will assist many CNG local governments and utilities with meeting their TMDL obligations while the Resource Assessments developed for this Regional Water Plan can help inform adaptive management updates to the TMDL Implementation Plans in the future.

Northwest Georgia Regional Water Resources Partnership

The Northwest Georgia Regional Water Resources Partnership was formed and endorsed by the Board of Directors of both the Coosa Valley and North Georgia Regional Commissions (known as RDCs at the time) in 2001 in recognition of the importance of watershed planning. Water withdrawal and discharge permit holders (government, water authority, industrial and private communities) and interested entities not holding water permits (governments, quasi governmental agencies, environmental organizations, advocacy groups, and other interested entities) were invited to participate, and an executive committee of 12 members was elected from the membership. Many of the local governments, utilities and industries in the CNG region are full participating members of the Partnership. The goals of the Partnership include:

Goal 1: Organize and increase our collective political influence on local, state and national levels.

Goal 2: Combine our resources to develop and implement watershed assessments, water supply studies, and storm water management initiatives within the region including the Coosa, Tallapoosa, and Tennessee River Basins.

Goal 3: Educate legislators, citizens, and ourselves on surface and ground water resources in the region.

Goal 4: Obtain funding from a variety of sources for water related activities.

Goal 5: Monitor, assess, and shape local, state, and national legislation on water related issues.

Goal 6: Monitor the proposed ACT and ACF water compact agreement.

Goal 7: Serve as a coordinating mechanism for all regional water related activities including development of the proposed State Comprehensive Water Resources Management Plan.

The Partnership completed a Regional Comprehensive Water Management Plan and an Inventory and Needs Assessment for Water and Wastewater Capacity in 2004 and a Regional Preliminary Reservoir Siting Plan in 2007 (Marlowe, 2010). It is currently preparing a Regional Watershed Assessment / Watershed Protection Plan.

Lake Allatoona/Upper Etowah River Comprehensive Watershed Study

The Etowah River watershed above Allatoona Dam includes portions of eight counties: Bartow, Cherokee, Cobb, Dawson, Forsyth, Fulton, Lumpkin, and Pickens. Dawson, Lumpkin and Pickens counties in the CNG region are participating in the Study. In response to the previously defined problems, Congress authorized the USACE to address the water resource problems within the study area. The Lake Allatoona/Upper Etowah River Watershed Study was authorized by Section 422 of the Water Resources Development Act of 2000 (Public Law 106-541) to address streambank and shoreline erosion, sedimentation, water quality, fish and wildlife habitat degradation, and other problems relating to ecosystem restoration and resource protection in the Lake Allatoona Watershed.

The Study's general Goals/Value Added include:

1. Develop and implement a technically sound approach to protecting the water resources of the basin that is irrespective of geo-political boundaries.

2. Leverage local, state, and federal funding to maximize benefits for water resources protection and restoration.

3. Build upon and link the valuable efforts of organizations such as the Metropolitan North Georgia Water Planning District, Upper Etowah River Alliance and others

4. Facilitate implementation of a true multi jurisdictional approach to protect and sustain the Lake Allatoona/Upper Etowah River watershed.

The Watershed Assessment and Watershed Protection planning effort are designed to provide the data needed to make targeted improvement in the quality and quantity of water and ecological conditions of Lake Allatoona and the Upper Etowah River Watershed. This information will help county governments as they strive to protect environmental quality and meet or exceed regulatory requirements, while managing rapid growth in North Georgia. (USACE, 2011c).

7.4 Recommendations to the State

This section provides recommendations for actions by the State (Table 7-6) that support implementation of this Regional Water Plan.

Table 7-6: Recommendations to the State

	Recommendation
Funding	Identify long-term funding mechanism, beyond grants, to assist responsible parties with implementation of water supply projects.
Coordination	Select an entity, such as GAEPD, DCA, or the RCs, to serve as the clearinghouse and coordinator for ongoing CNG Council planning activities.
	Select a mechanism to allow for ongoing CNG Council input during implementation of Regional Water Plan Management Practices and establish a process for involvement in the 5-year Regional Water Plan update.
	Work with existing organizations, such as the ACCG, GMA, GRWA, and GAWP to develop templates and materials that each council, with the assistance of DCA or the RCs noted in Section 2.3, can adapt for regional/local implementation.
	Support local monitoring and allow volunteer sampling data to be used to assess watershed conditions.
	Coordinate CNG planning efforts and ACT Basin negotiations.
Policy / Programmatic	Develop a program to consistently meter and report agricultural water withdrawals greater than 100,000 gallons per day.
	Study the effects of septic systems on water quality.
	Develop regulatory framework/guidelines for water quality credit trading.
	Develop guidelines for appropriate use of interbasin transfers of water before finalizing NNC.
	Explore opportunities for Georgia to expand use of the Tennessee River as a water supply source.
	Support efforts to develop regional reservoir projects to meet both in-stream and off-stream needs.
	Develop regulatory framework/guidelines for Aquifer Storage Recovery

Table 7-6: Recommendations to the State (Continued)

	Recommendation
Implementation	Develop BMP demonstration projects to evaluate their effectiveness in the CNG Region.
	Coordinate commercial water audits.
Next 5-Year Update	Refine Resource Assessment models to report results at a finer resolution.
	Review the technical assumption that LAS is considered to be a consumptive use so that this can be correctly accounted for in the future.
	Partner with the counties to obtain better documentation of current agriculture water demands (both crop and non-crop) and also uses less than 100,000 gallons per day
	Partner with the counties to obtain better information on future forecasts of non-crop (and less than 100,000 gallons per day) uses through planning period.

Section 8. Monitoring and Reporting Progress

Section Summary

Monitoring of the progress toward implementation of the recommendations will be based on key benchmarks identified for water conservation, water supply, wastewater, and water quality practices. Progress will be evaluated annually, biennially, or at each of the 5-year plan updates, depending on the management practice.

The selected 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.

The benchmarks prepared by the CNG Council and listed in Table 8-1 will be used to assess the effectiveness of implementation and to identify changes that need to be addressed during the 5-year Regional Water Plan update. As detailed below, the Council selected both qualitative and quantitative benchmarks that will be used to assess whether the management practices are closing gaps and eliminating shortages over time and allowing the Region to meet its vision and goals.

8.1 Benchmarks

The State Water Plan guided the Council's selection of benchmarks that are specific, measurable, achievable, realistic, and time-phased. Table 8-1 outlines the benchmarks for implementation of this Regional Water Plan; the short-term actions outlined in Tables 7-1(a) through (d) will serve as overall benchmarks, and it recommended that progress be measured via an annual survey.

While details on administration of the annual survey are pending Regional Water Plan adoption, it is assumed that GAEPD and DCA will coordinate this online measurement tool with the support of the RCs. GAEPD and DCA will track the results of these surveys for needed adaptation and adjustments to the CNG Regional Water Plan during the 5-year update.

Table 8-1 also provides resource-specific benchmarks that allow a mechanism for tracking realistic and measureable progress over the long-term in addressing the water resource gaps, or issues, described in Section 5. For example, due to the time it takes to develop or expand water and wastewater infrastructure, it is appropriate to measure overall progress during the 5-year Regional Water Plan update cycle by revisiting the infrastructure gaps summarized by County in the tables in Section 5. The resource benchmarks also build on existing measurement tools, such as the biennial update of the Clean Water Act 305(b)/303(d) list of waters not meeting their designated uses.

Table 8-1: Resource Benchmarks for Management Practices

Category of Management Practice	Benchmark	Measurement Tools	Time Period
All Practices	Implement short-term actions	Annual Survey	Annual
Water Conservation (WC)			
	Maintain or Reduce Residential Per Capita Water Use	Update of Regional Water Plan Per Capita Water Use Estimates	Every 5 years
	Implementation of Recommended Water Conservation Management Practices	Survey via Annual Water Conservation Plan Progress Report	Annual
Water Supply Practices (WS)			
	Reduction in future facility / infrastructure gaps between existing permitted water withdrawals (surface and groundwater) and future demands.	Update of Regional Water Plan Forecasts	Every 5 years
Wastewater Practices (WW)			
	Availability of permitted assimilative capacity in the major tributaries of the CNG Region.	Resource Assessments	Every 5 years
	Reduction of the future wastewater facility shortages via expansions or development of new facilities to meet projected future wastewater demands.	Update of Regional Water Plan Forecasts	Every 5 years
Water Quality Practices (WQ)			
	Support of Designated Use	305(b)/303(d) List of Waters	Biennial
	Reduction in pollutant loads observed in the watershed modeling.	Resource Assessments	Every 5 years
	Observed improvements in water quality monitoring results.	GAEPD Online Water Quality Database[13]	Annual

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

8.2 Regional Water Plan Updates

Meeting current and future water needs will require periodic review and revision of Regional Water Plans. The rules associated with the State Water Plan provide that each Regional Water Plan will be subject to review by the appropriate regional water planning council every 5 years in accordance with guidance provided by the Director, unless otherwise required by the Director for earlier review. These reviews and updates will allow an opportunity for the Regional Water Plans to be adapted based on changed circumstances and new information that becomes available in the 5 years after GAEPD's adoption of these plans. These benchmarks will guide GAEPD during Regional Water Plan review.

8.3 Plan Amendments

This Regional Water Plan has been drafted to provide flexibility to adapt to changing circumstances. This Regional Water Plan will be amended on a 5-year basis as required unless additional needs (triggering events) are identified in the interim period.

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