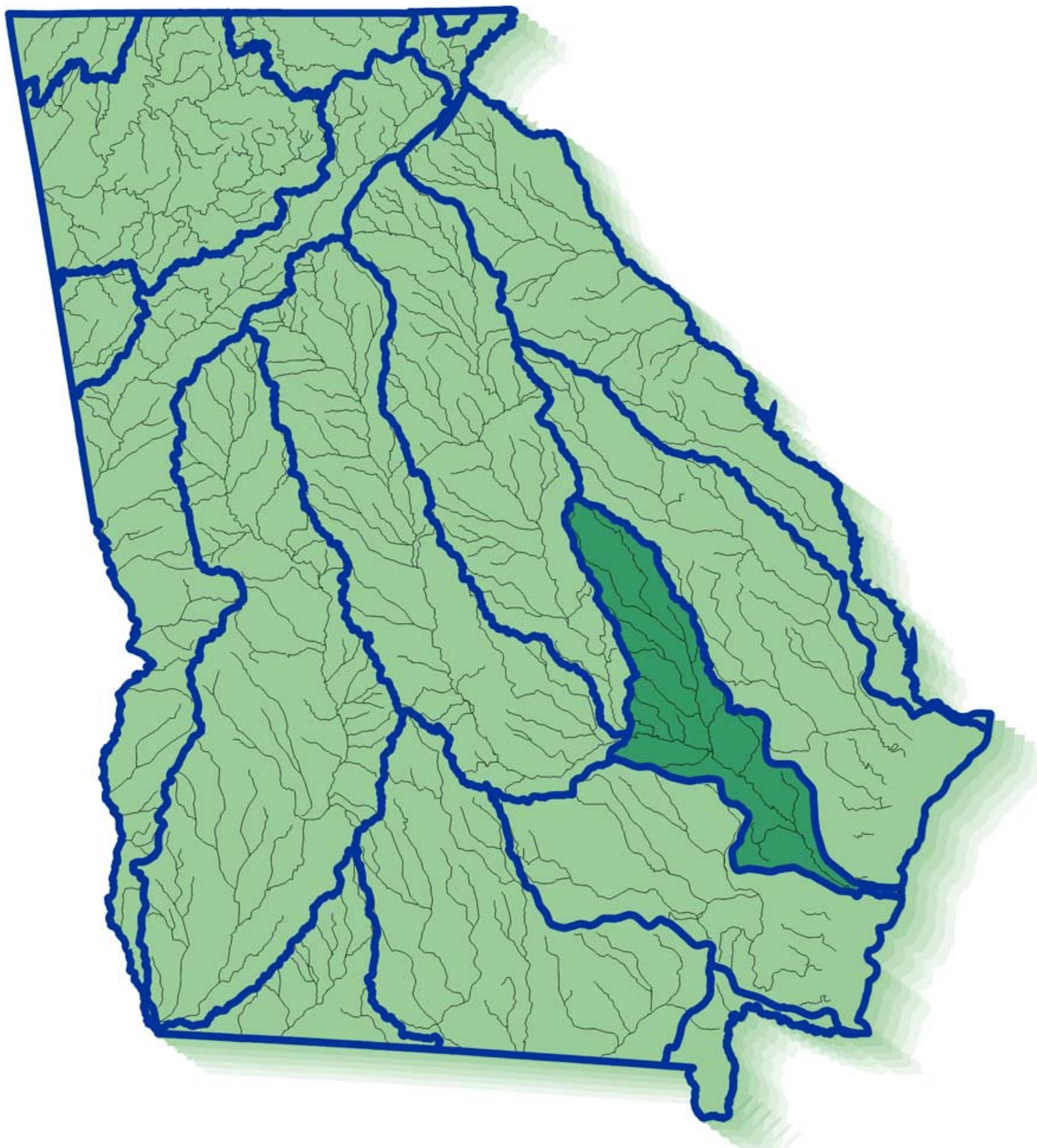
Altamaha River Basin Management Plan 2003



Georgia Department of Natural Resources
Environmental Protection Division

Georgia River Basin Management Planning Vision, Mission, and Goals

What is the VISION for the Georgia RBMP Approach?

Clean water to drink, clean water for aquatic life, and clean water for recreation, in adequate amounts to support all these uses in all river basins in the State of Georgia.

What is the RBMP MISSION?

To develop and implement a river basin planning program to protect, enhance, and restore the waters of the State of Georgia, that will provide for effective monitoring, allocation, use, regulation, and management of water resources.

[Established January 1994 by a joint basin advisory committee workgroup.]

What are the GOALS to Guide RBMP?

1) To meet or exceed local, state, and federal laws, rules, and regulations, and be consistent with other applicable plans.
2) To identify existing and future water quality issues, emphasizing nonpoint sources of pollution.
3) To propose water quality improvement practices encouraging local involvement to reduce pollution, and monitor and protect water quality.
4) To involve all interested citizens and appropriate organizations in plan development and implementation.
5) To coordinate with other river plans and regional planning.
6) To facilitate local, state, and federal activities to monitor and protect water quality.
7) To identify existing and potential water availability problems and to coordinate development of alternatives.
8) To provide for education of the general public on matters involving the environment and ecological concerns specific to each river basin.
9) To provide for improving aquatic habitat and exploring the feasibility of re-establishing native species of fish.
10) To provide for restoring and protecting wildlife habitat.
11) To provide for recreational benefits.
12) To identify and protect flood prone areas within each river basin, and encourage local and state compliance with federal flood plain management guidelines.

[Established January 1994 by a joint basin advisory committee workgroup.]

Altamaha River Basin Management Plan 2003

Preface

This report was prepared by the Environmental Protection Division (EPD), Georgia Department Natural Resources (EPD), as required by O.C.G.A. 12-5-520 and as a public information document. It represents a synoptic extraction of the EPD files and, in certain cases, information has been presented in summary form from those files. The reader is therefore advised to use this condensed information with the knowledge that it is a summary document and more detailed information is available in the EPD files.

Comments or questions related to the content of this report are invited and should be addressed to:

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List of Acronyms and Abbreviations

Ac	acre
Ac-ft	acre-feet
ACCG	Association of County Commissioners of Georgia
ACF	Apalachicola-Chattahoochee-Flint Basin
ACT/ACF	Alabama-Coosa-Tallapoosa/Apalachicola-Chattahoochee Flint Basin
ADEM	Alabama Department of Environmental Management
ARC	Atlanta Regional Commission
ARS	USDA Agricultural Research Service
ASR	aquifer storage and recovery
BMPs	best management practices
BOD	biochemical oxygen demand
CAES	University of Georgia College of Agricultural and Environmental Sciences
Cd	cadmium
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
CPUE	catch per unit effort (fishing)
CRMP	Chattahoochee River Modeling Project
CRP	Conservation Reserve Program
CSGWPP	Comprehensive State Ground Water Protection Plan
CSMTF	Community Stream Management Task Force
CSO	Combined Sewer Overflow
Cu	copper
CWA	U.S. Clean Water Act
DCA	Georgia Department of Community Affairs
DNR	Georgia Department of Natural Resources
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
EPD	Georgia Environmental Protection Division
EQIP	Environmental Quality Incentives Program
E&SC	Erosion and Sedimentation Control Act
FEMA	Federal Emergency Management Agency
FFY	Federal fiscal year
FIP	Forestry Incentives Program
FSA	Farm Service Agency
ft	feet
ft^2/d	square feet per day
ft^3/s	cubic feet per second
gal/m	gallons per minute
GDA	Georgia Department of Agriculture
GEMA	Georgia Emergency Management Agency
GFA	Georgia Forestry Association
GFC	Georgia Forestry Commission
GMA	Georgia Municipal Association
GPC	Georgia Power Company
GPD	gallons per day
GPM	gallons per minute
GSWCC	Georgia Soil and Water Conservation Commission
Hg	mercury
HUC	Hydrologic unit code (USGS)
IBI	Index of Biotic Integrity
kg	kilogram

km^2	square kilometer
kW	kilowatt
LAS	land application system for wastewater
LUST	leaking undeground storage tank
MCL	Maximum Contaminant Level for drinking water
meq/l	milliequivalent
mg/l	milligrams per liter
MG	million gallons
MGD	million gallons per day
mi^2	square miles
ml	milliliter
MLMP	Major Lakes Monitoring Project
MLRA	major land resource area
MOU	memorandum of understanding
MPN	most probable number (for quantification of fecal coliform bacteria)
MSA	Atlanta Metropolitan Statistic Area
MS4	municipal separate stormwater system
M&I	municipal and industrial
NFIP	National Flood Insurance Program
ng/L	nanograms per liter
NOI	notice of intent
NPDES	National Pollution Discharge Elimination System
NPS	nonpoint source
NRCS	Natural Resources Conservation Service of USDA
NSSP	National Shellfish Sanitation Program
NURE	National Uranium Resource Evaluation
NWI	National Wetlands Inventory (USF&WS)
Pb	lead
PCB	polychlorinated biphenyl
PFA	public fishing area
ppm	parts per million; equivalent to mg/l
RBMP	River Basin Management Planning
RBP	Rapid Bioassessment Protocol
RC&D	Resource Conservation and Development Council
RDC	Regional Development Center
RM	river mile
SCS	Soil Conservation Service (now NRCS)
SMZs	Streamside Management Zones
SOCs	Synthetic Organic Chemicals
STATSGO	State Soil Geographic Database (USDA)
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load, as specified in the CWA
TTSI	Georgia combined lake trophic state index
UGA	University of Georgia
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USF&WS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WET	whole effluent toxicity
WHIP	Wildlife Habitat Incentives Program
WPCP	water pollution control plant
WRD	Georgia Wildlife Resources Division
WRP	Wetland Reserve Program
WWTP	wastewater treatment plant
Zn	zinc
µg/l	micrograms per liter
7Q10	7-day average low flow with a once-in-ten-year recurrence interval

Executive Summary

This document presents Georgia's management plan for the Altamaha River basin, which is being produced as a part of Georgia's River Basin Management Planning (RBMP) approach. The Georgia Environmental Protection Division (EPD) has developed this plan in cooperation with several other agency partners including the USDA Natural Resources Conservation Commission, Georgia Soil and Water Conservation Commission, Georgia Forestry Commission, U.S. Geological Survey, Georgia Geological Survey, and Georgia Wildlife Resources Division. The RBMP approach provides the framework for identifying, assessing, and prioritizing water resources issues, developing management strategies, and providing opportunities for targeted, cooperative actions to reduce pollution, enhance aquatic habitat, and provide a dependable water supply.

Purpose of the Basin Plan

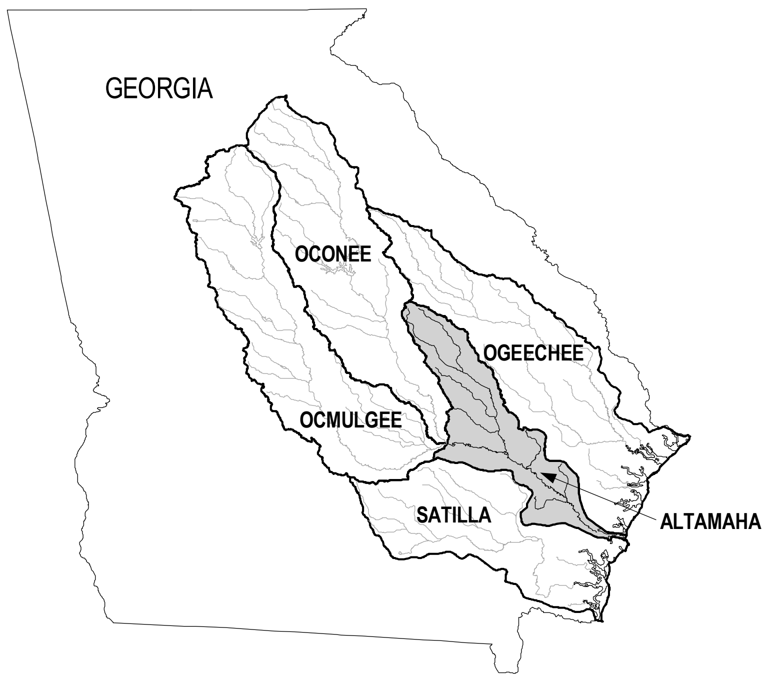
The purpose of this plan is to provide relevant information on the characteristics of the Altamaha River basin, describe the status of water quality and quantity in the Altamaha River basin, identify present and future water resource demands, present and facilitate the implementation of water quality protection efforts, and enhance stakeholder understanding and involvement in basin planning.

This Altamaha River Basin Management Plan includes strategies to address a number of different basinwide objectives. These include:

- Protecting water quality in lakes, rivers, streams, estuaries, and coastal waters through attainment of water quality standards and support for designated uses;
- Providing adequate, high quality water supply for municipal, agricultural, industrial, environmental, and other human activities;
- Preserving habitat suitable for the support of healthy aquatic and riparian ecosystems;
- Protecting human health and welfare through prevention of water-borne disease; minimization of risk from contaminated fish tissue, and reduction of risks from flooding; and
- Ensuring opportunities for economic growth, development, and recreation in the region.

Achieving these objectives is the responsibility of a variety of state and federal agencies, local governments, business, industry, and individual citizens. Coordination among these many partners can be challenging, and impacts of actions in one locale by one partner on conditions elsewhere in the basin are not always understood or considered. River Basin Management Planning is an attempt to bring together stakeholders in the basin to increase coordination and to provide a mechanism for communication and consideration of actions on a broad scale to support water resource objectives for the entire basin. RBMP provides the framework to begin to understand the consequences of local decisions on basinwide water resources.

This river basin plan will serve as the road map for managing the water resources in the Altamaha River basin over the next five years. It contains useful information on the health of the Altamaha River basin and recommended strategies to protect the basin now and into the future.



Altamaha River Basin Characteristics

The Altamaha River basin is located in the southeast part of Georgia, occupying an area of approximately 2,850 square miles. The basin lies within the Coastal Plain physiographic province, which extends throughout the southeastern United States. The Altamaha River drains into the Atlantic Ocean.

Water Resources

The surface water resources of the basin are divided into two major watersheds or hydrologic units: the Altamaha River subbasin and the Ohoopee River subbasin.

Biological Resources

The basin encompasses parts of two major land resource areas (Southern Coastal Plains and Atlantic Coast Flatwoods) providing many different ecosystem types. These ecosystems provide habitat for diverse species of aquatic and terrestrial wildlife. Several of the species are currently threatened or endangered.

Population and Land Use Characteristics

The major population centers in the Altamaha River basin include the cities of Wrightsville, Lyons, Reidsville, Hazlehurst, Jesup and Darien. The population is expected to increase at an average growth rate through 2050.

More than 44 percent of the basin is covered by forests and forestry-related activities account for a major part of the basin's economy. Agriculture is also a significant land use activity supporting a variety of animal operations and commodity production.

Local Governments and Planning Authorities

The local governments in the basin consist of counties and incorporated municipalities. The Altamaha basin includes part or all of 14 Georgia counties. These counties are members of three different Regional Development Centers.

Water Quantity Conditions

Surface water supplies in the basin include water in rivers, ponds, and reservoirs. Groundwater is the primary water source in the Altamaha River basin. In the Coastal Plain Province, aquifer yields are higher and groundwater withdrawals make up the majority of the total water budget.

The primary demands for water supply in the basin include municipal and industrial use, agricultural use, and recreation. The demand for drinking water is expected to remain stable in the near future due to average population growth rates. Agricultural water demand in the Altamaha River basin has increased over the last three decades and is expected to increase in the future.

Water Quality Conditions

The major environmental stressors that impair or threaten water quality in the Altamaha River basin include traditional chemical stressors, such as oxygen demanding substances, metals, and bacterial contamination, as well as less traditional stressors, such as stream channel modifications and alteration of physical habitat.

Significant potential sources of environmental stressors in the basin include point source discharges such as municipal and industrial wastewater and storm sewers; and nonpoint sources that result from diffuse runoff from urban and rural land uses. Based on EPD's 2000-2001 water quality assessment, urban runoff and rural nonpoint sources are now the major sources of failure to support designated uses of water bodies in the Altamaha basin.

Point Sources

Point sources are defined as the permitted discharges of treated wastewater to rivers and tributaries that are regulated under the National Pollutant Discharge Elimination System (NPDES). These permits are issued by EPD for wastewater discharges and storm water discharges.

Municipal discharges. There are currently four permitted major municipal treated wastewater discharges with flows greater than 1 MGD in the Altamaha River basin. There are also14 minor public discharges. EPD monitors compliance of these permits and takes appropriate enforcement action for violations. As of the 2000-2001 water quality assessment, three stream segments (19 miles) were identified in which municipal discharges contributed to a failure to support designated uses. Total maximum daily loads (TMDLs) and implementation plans were finalized for these segments in 2002.

Industrial discharges. There are a number of industrial wastewater dischargers in the basin including one major and six minor facilities. As of the 2000-2001 water quality assessment, there were no stream segments identified in which industrial discharges contributed to a failure to support designated uses.

Permitted stormwater discharges. Urban stormwater runoff in the Altamaha basin has been identified as a source of water quality impairment. Urban runoff which is collected by storm sewers is now subject to NPDES permitting and control.

Nonpoint Sources

Nonpoint sources of pollution include a variety of pollutants that are carried across the ground with rainwater or snowmelt and are deposited in water bodies. The 2000-2001water quality assessment results for the Altamaha basin indicate that urban and rural nonpoint sources contribute significantly to failure to support designated uses of water bodies. The major categories of nonpoint source pollution in the basin include the following:

- Urban, industrial, and residential sources, which may contribute stormwater runoff, unauthorized discharges, oxygen-demanding waste, oil and grease, nutrients, metals, bacteria, and sediments.
- Agricultural sources, which may contribute nutrients from animal wastes and fertilizers, sediment, herbicides/pesticides, and bacteria and pathogens.
- Forestry activities, which may contribute sediments and herbicides/pesticides.

Support of Designated Uses

Under Georgia regulations, designated uses and associated water quality standards provide goals for water quality protection. EPD assessed waters in the Altamaha basin and reported the results in the *Georgia 2002 305(b)/303(d) List*. The criteria listed most frequently in the 2002 list as contributing to not supporting or partially supporting status was dissolved oxygen, followed by fecal coliform bacteria and fish consumption issues.

Key Environmental Stressors

The major threats to water quality in the Altamaha River basin are summarized below.

Dissolved oxygen. The 2000-2001 water quality assessments indicated low dissolved oxygen was one of the most commonly listed causes of failure to fully support designated uses. Oxygen consuming substances may be discharged to streams from point and nonpoint sources. In general, nonpoint sources are the most significant sources at this time. Severe drought conditions across Georgia during the 1999-2002 period were a significant contributing factor to the low dissolved oxygen concentrations documented in the Altamaha River and its tributaries.

Fecal coliform bacteria. The 2000-2001 water quality assessments indicated that fecal coliform bacteria was commonly listed as a cause of failure to support designated uses. Fecal coliform bacteria may arise from point and nonpoint sources, such as wastewater treatment plants, agricultural nonpoint sources, leaking septic systems, and stormwater runoff. As point sources have been brought under control in the basin, nonpoint sources have become increasingly important as potential sources of fecal coliform bacteria.

Fish tissue contamination. Fish consumption issues for individual fish species are also a concern in the Altamaha River basin and contributed to the listing of a number of waters as not fully supporting designated uses. The fish consumption issues are associated with mercury primarily from air deposition.

Sediment loading and habitat degradation. A healthy aquatic ecosystem requires a healthy physical habitat. One major cause of disturbance to stream habitats is erosion and sedimentation. As sediment is carried into the stream, it can change the stream bottom, and may smother sensitive organisms. Turbidity associated with sediment loading also may potentially impair recreational and drinking water uses. Sediment loading is of greatest concern in developing areas and major transportation corridors. The rural areas of the basin are of lesser concern with the exception of rural unpaved road systems, areas where cultivated cropland exceeds 20 percent of the total land cover, and areas in which foresters are not following appropriate management practices.

Strategies for Water Supply

At this time, water quantity appears to be adequate for all uses in the Altamaha River basin. There are, however, several water quantity concerns in the Altamaha basin, including drought response planning and strategies for protection of the Floridan aquifer, which are of significance to decision makers.

Strategies for Water Quality

Water quality in the Altamaha River basin is generally good at this time, although problems remain to be addressed and proactive planning is needed to protect water quality into the future. Many actions have already been taken to protect water quality. Programs implemented by federal, state, and local governments, farmers, foresters, and other individuals have greatly helped to protect and improve water quality in the basin over the past 20 years.

The primary source of pollution that continues to affect waters of the Altamaha River basin results from nonpoint sources. These problems result from the cumulative effect of activities of many individual landowners or managers. Population is growing every year, increasing the potential risks from nonpoint source pollution. Growth is essential to the economic health of the Altamaha River basin, yet growth without proper land use planning and implementation of best management practices to protect streams and rivers can create harmful impacts on the environment.

Because there are many small sources of nonpoint loading spread throughout the watershed, nonpoint sources of pollution cannot effectively be controlled by state agency permitting and enforcement, even where regulatory authority exists. Rather, control of nonpoint loading will require the cooperative efforts of many partners, including state and federal agencies, individual landowners, agricultural and forestry interests, local county and municipal governments, and Regional Development Centers. A combination of regulatory and voluntary land management practices will be necessary to maintain and improve the water quality of rivers, streams, and lakes in the Altamaha River basin.

Key Actions by EPD. The Georgia EPD Water Protection Branch has responsibility for establishing water quality standards, monitoring water quality, river basin planning, water quality modeling, permitting and enforcement of point source NPDES permits, and developing Total Maximum Daily Loads (TMDLs) and implementation plans where ongoing actions are not sufficient to achieve water quality standards. Much of this work is regulatory. EPD is also one of several agencies responsible for facilitating, planning, and educating the public about management of nonpoint source pollution. Nonpoint source programs implemented by Georgia and by other states across the nation are voluntary in nature. The Georgia EPD Water Resources Branch regulates the use of Georgia's surface and groundwater resources for municipal and agricultural uses, which includes source water assessment and protection activities in compliance with the Safe Drinking Water Act.

Actions being taken by EPD at the state level to address water quality problems in the Altamaha River basin include the following:

- **Watershed Assessments and Watershed Protection Implementation Plans.** When local governments propose to expand an existing wastewater facility, or propose a new facility, EPD requires a comprehensive watershed assessment and development of a watershed protection implementation plan.
- **Total Maximum Daily Loads (TMDLs).** Where water quality sampling has documented standards violations and ongoing actions are not sufficient to achieve water quality standards, a TMDL will be established for a specific pollutant on the specific stream segment in accordance with EPA guidance. TMDLs were established for 303(d) listed waters in the Altamaha River basin in 2002. Implementation plans were also finalized in 2002. This work represents a significant step in advancing the watershed approach in Georgia. Work was done to develop a TMDL for each individual pollutant not achieving water quality standards. The TMDL was public noticed and comments were considered prior to finalizing the TMDL. In those situations where point sources caused the water quality problem, the results of the TMDL will be implemented through the NPDES permitting program. NPDES permit conditions will be modified to support the implementation of the TMDL. Where nonpoint sources were the cause of the problem, in many cases the EPD contracted with the local Regional Development Center (RDC) to develop an implementation plan to address the problem. Each RDC brought together local stakeholder groups familiar with the individual watersheds to provide input and insight in developing each TMDL implementation plan. In this manner the development of the plans can be locally led and implemented.
- **Source Water Protection.** Most of the public water supply in the Altamaha basin is drawn from groundwater. To provide for the protection of public water supplies, Georgia EPD is developing a Source Water Assessment Program in alignment with the 1996 amendments to the Safe Drinking Water Act and corresponding EPA guidelines.
- **Fish Consumption Guidelines.** EPD and the Wildlife Resources Division work to protect public health by testing fish tissue and issuing fish consumption guidelines as needed, indicating the recommended rates of consumption of fish from specific waters. The guidelines are based on conservative assumptions and provide the public with factual information for use in making rational decisions regarding fish consumption.

Key Actions by Resource Management Agencies. Nonpoint source pollution from agriculture and forestry activities in Georgia is managed and controlled with a statewide non-regulatory approach. This approach is based on cooperative partnerships with various agencies and a variety of programs. Agriculture in the Altamaha River basin is a mixture of livestock and poultry operations and commodity production. Key partners for controlling agricultural nonpoint source pollution are the Soil and Water Conservation Districts, Georgia Soil and Water Conservation Commission, and the USDA Natural Resources Conservation Service. These partners promote the use of environmentally-sound Best Management Practices (BMPs) through education, demonstration projects, and financial assistance.

One program, the Environmental Quality Incentive Program (EQUIP), authorized by the Farm Bill provides incentive payments and cost-sharing for conservation projects through 5- to 10-year contracts. An individual producer can receive as much as $450,000 (federal cost share up to 50 percent) in EQUIP funds over 10 years for contracts initiated between FY 2002 and FY 2007.

Forestry is a major part of the economy in the Altamaha basin and commercial forestlands represent over 69 percent of the total basin land area. The Georgia Forestry Commission (GFC) is the lead agency for controlling silvicultural nonpoint source pollution. The GFC develops forestry practice guidelines, encourages BMP implementation, conducts education, investigates and mediates complaints involving forestry operations, and conducts BMP compliance surveys.

Key Actions by Local Governments. Addressing water quality problems resulting from nonpoint source pollution will primarily depend on actions taken at the local level. Particularly for nonpoint sources associated with urban and residential development, it is only at the local level that regulatory authority exists for zoning and land use planning, control of erosion and sedimentation from construction activities, and regulation of septic systems.

Local governments are increasingly focusing on water resource issues. In many cases, the existence of high quality water has not been recognized and managed as an economic resource by local governments. That situation is now changing due to a variety of factors, including increased public awareness, high levels of population growth in many areas resulting in a need for comprehensive planning, recognition that high quality water supplies are limited, and new state-level actions and requirements. The latter include:

- Requirements for Watershed Assessments and Watershed Protection Implementation Plans when permits for expanded or new municipal wastewater discharges are requested;
- Development of Source Water Protection Plans to protect public drinking water supplies;
- Requirements for local comprehensive planning, including protection of natural and water resources, as promulgated by the Georgia Department of Community Affairs.
- Development of TMDLs and the development of implementation plans by RDCs and local stakeholder groups.

In sum, it is the responsibility of local governments to implement planning for future development which takes into account management and protection of the water quality of rivers, streams, and lakes within their jurisdiction. One of the most important actions that local governments should take to ensure recognition of local needs while protecting water resources is to participate in the basin planning process, either directly or through Regional Development Centers.

Continuing RBMP in the Altamaha River Basin

This basin plan represents one step in managing the water resources in the Altamaha basin. EPD, its resource management agency partners, local governments, and basin stakeholders will need to work together to implement the plan in the coming months and years. Additionally, the basin planning cycle provides the opportunity to update management priorities and strategies every five years. Agencies and organizations with technical expertise, available resources, and potential implementation responsibilities are encouraged to continue to contribute to the planning and implementation processes. Other stakeholders can stay involved through working with state and local agencies, and participating in locally initiated watershed planning and TMDL implementation activities. An update of the Altamaha River basin plan is planned for 2007.

In This Section

- What Is the Purpose of This Plan?
- What's Inside?
- How Do I Use This Plan?
- What Is the Schedule of Activities for the Altamaha River Basin?
- How Do Stakeholders Get Involved in the Basin Planning Process?
- What's Next?

Section 1

Introduction

What Is the Purpose of This Plan?

This document presents Georgia's river basin management plan for the Altamaha River, which is being produced as a part of Georgia's River Basin Management Planning (RBMP) approach. The purpose of this plan is to provide relevant information on the Altamaha River basin characteristics, describe the status of water quality and quantity in the Altamaha River basin, identify present and future water resource demands, present and facilitate the implementation of water protection efforts, and enhance stakeholder understanding and involvement in basin planning.

This plan has been produced by the Georgia Department of Natural Resources Environmental Protection Division (EPD), based on data and information gathered by EPD, other state and federal agencies, universities, utilities, consultants, and environmental groups. A basin team made up of representatives from the Georgia Soil and Water Conservation Commission (GSWCC), the Natural Resources Conservation Service (NRCS), Georgia Department of Natural Resources Wildlife Resources Division (WRD), Georgia Forestry Commission (GFC), and EPD's Water Resources Branch, Water Protection Branch, and Geologic Survey Branch compiled the information to generate the plan. The U.S. Geological Survey (USGS) and the EPD Geologic Survey Branch created the majority of the figures in this report using geographic information system technologies.

River Basin Management Planning

RBMP is designed to coordinate management of water quantity and quality within river basins by integrating activities across regulatory and non-regulatory programs (Appendix A). The RBMP approach provides the framework for identifying, assessing, and prioritizing water resources issues, developing management strategies, and providing opportunities for targeted, cooperative actions to reduce pollution, enhance aquatic habitat, and provide a dependable water supply. RBMP includes opportunities for stakeholders in the state's river basins to participate in developing and implementing river basin management plans. These plans will benefit from the collective experience and combined resources of a variety of stakeholders.

Initial Efforts for the Altamaha River Basin

Begun in 1993, RBMP is a new approach to the management of Georgia's water resources. This is the first river basin management plan produced under RBMP for the Altamaha River (Figure 1-1).

What's Inside?

This plan is organized into the following sections:

Executive Summary

The executive summary provides a broad perspective on the condition of the basin and the management strategies recommended to protect and enhance the Altamaha River basin's water resources.

1.0 Introduction

The introduction provides a brief description of Georgia's River Basin Management Planning approach, the planning cycle for the Altamaha River basin, opportunities for stakeholder involvement, and a description of how to use this document.

2.0 River Basin Characteristics

This chapter provides a description of the basin and its important characteristics, including boundaries, climate, physiography and geology, geochemistry, soils, surface water resources, groundwater resources, biological resources, population and land use, local government and jurisdictions, and water use classifications.

3.0 Water Quantity

This chapter describes current surface and groundwater availability, as well as forecasts for future demand. This chapter also includes sections on historic, present and possible proposed permitting activities pertaining to water availability.

4.0 Environmental Stressors

This chapter describes the major stressors in the basin that may impair water or habitat quality. The stressors are divided into point sources (i.e., NPDES permitted discharges) and nonpoint sources.

5.0 Assessment

This chapter provides an assessment of water quality and quantity in the streams, lakes, estuaries, and groundwater along with an assessment of the basin's biological integrity. The data sources and analysis techniques for these assessments are also discussed.

6.0 Concerns and Priority Issues

This chapter summarizes and prioritizes the issues of concern that were identified through the assessment in Chapter 5.

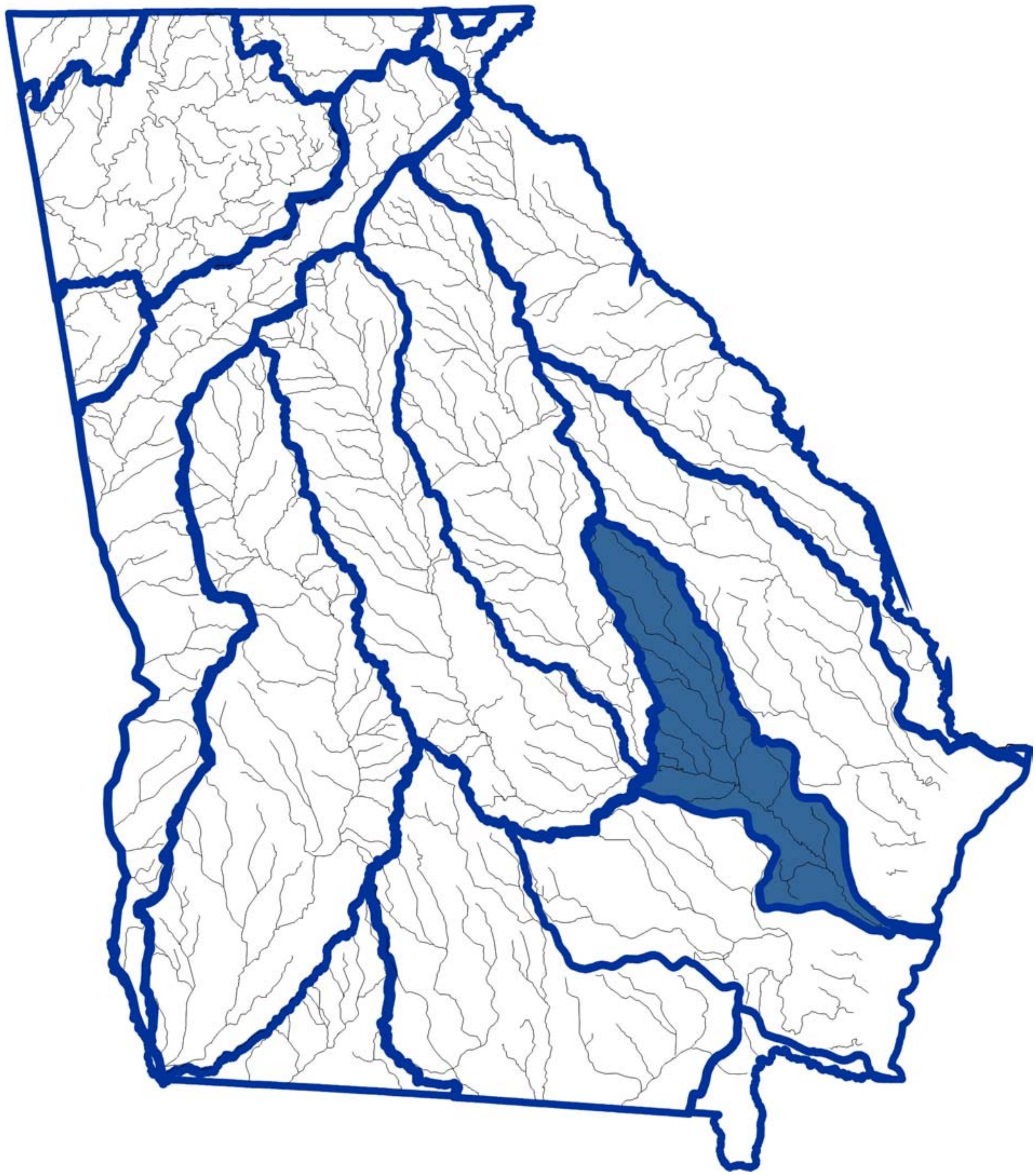


Figure I-I. The Altamaha River Basin

7.0 Implementation Strategies

This chapter presents strategies for addressing the issues of concern in the order that they appear on the priority list in Chapter 6 with a description of each issue, goals and objectives of management, overview of alternatives considered, and descriptions of recommended options for implementation.

8.0 Future Issues and Challenges

This chapter discusses long-range goals to set the stage for further improvements in managing water resources and water quality. Due to limited resources (data, time, funding, etc.), some issues will be addressed in future iterations of each basin planning cycle.

Appendices

The appendices contain technical information for those interested in specific details involved in the planning process.

How Do I Use This Plan?

This river basin plan will serve as the road map for managing the water resources in the Altamaha River basin. It contains useful information on the health of the Altamaha River basin and recommended strategies to protect the basin now and in the future. The document can be used as a reference tool for watershed conditions in the basin, as well as a planning guide for implementing key guide actions throughout the basin cycle.

Chapter 7 contains the key management strategies that have been identified to address the priority issues and concerns in the basin. The earlier chapters show the reader how the issues were identified and where the specific stressors in the basin occur. Each chapter in this river basin plan builds upon the previous ones. For example, the recommended management strategies in Chapter 7 were formulated based on the priority concerns identified in Chapter 6. Similarly, the priority issues in Chapter 6 were derived as a result of the assessment in Chapter 5.

Links to Other Chapters

Because issues are discussed across several chapters, an explanatory paragraph at the beginning of chapters 4, 5, 6, and 7 will alert the reader that an issue may be discussed elsewhere. For example, Chapter 4 discusses stressors to the water body from various point and nonpoint sources. Chapter 5 provides an assessment summary of water quality and water quantity based on the sources of environmental stressors. Next, Chapter 6 combines the assessment information from Chapter 5 to identify priority issues for the development of management strategies. Finally, Chapter 7 provides general goals and strategies to address the most significant existing and future water quality and quantity issues within the Altamaha basin.

What Is the Schedule of Activities for the Altamaha River Basin?

The schedules of activities for the first two Altamaha River basin cycles, i.e., 1998-2003 and 2003-2008, are provided in Figures 1-2 and 1-3.

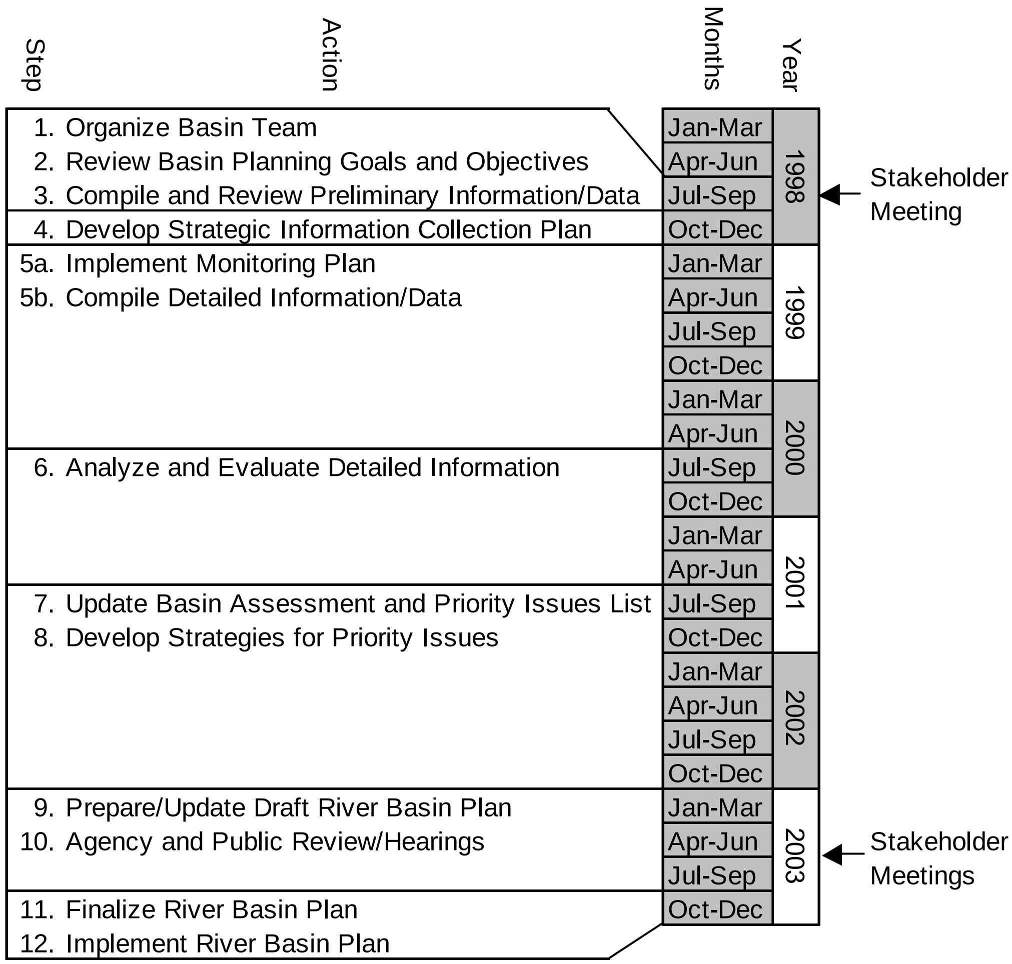


Figure 1-2. Altamaha River Basin Planning Schedule, 1st Cycle, 1998-2003

Step	Action	Months	Year
1.	Organize Basin Team		
2.	Review Basin Planning Goals and Objectives	Jan-Mar	2003
3a.	Compile Preliminary Information/Data	Apr-Jun	2003
3b.	Review Preliminary Information/Data	Jul-Sep	2003
4.	Develop Strategic Information Collection Plan	Oct-Dec	2003
5a.	Implement Monitoring Plan	Jan-Mar	2004
5b.	Compile Detailed Information/Data	Apr-Jun	2004
		Jul-Sep	2004
		Oct-Dec	2004
6.	Analyze and Evaluate Detailed Information	Jan-Mar	2005
		Apr-Jun	2005
7.	Update Basin Assessment and Priority Issues List	Jul-Sep	2005
8.	Develop Strategies for Priority Issues	Oct-Dec	2005
		Jan-Mar	2006
		Apr-Jun	2006
		Jul-Sep	2006
9.	Prepare/Update Draft River Basin Plan	Oct-Dec	2006
10.	Agency and Basin Team Review	Jan-Mar	2007
		Apr-Jun	2007
11.	Finalize River Basin Plan	Jul-Sep	2007
12.	Implement River Basin Plan	Oct-Dec	2007
		Jan-Mar	2008
		Apr-Jun	2008
		Jul-Sep	2008
		Oct-Dec	2008

Figure I-3. Altamaha River Basin Planning Schedule, 2nd Cycle, 2003-2008

How Do Stakeholders Get Involved in the Basin Planning Process?

A major goal of RBMP is to involve interested citizens and organizations in plan development and implementation. This is intended to improve the identification and prioritization of water quality and quantity problems, maximize the efficient use of resources and expertise, create better and more cost-effective management strategies, and be responsive to stakeholder perceptions and needs. The opportunities for stakeholders to get involved in river basin management planning include the following:

Support the Basin Team

Every basin planning cycle begins with the organization of the basin team. Members of the basin team are from EPD programs and branches and other interested governmental partners (e.g., the Department of Community Affairs, GFC, GSWCC, NRCS, and WRD). Emphasis is placed on technical knowledge, available resources, and potential implementation responsibilities. Other agencies may act as partners in the RBMP process, contributing resources and expertise, while not being directly involved in Basin Team activities. Support and provide input to the agency that represents your interests.

Support the Local Advisory Committee

The local advisory committees provide advice and counsel to EPD during river basin management plan development, representing a forum for involving local stakeholders. These local advisory committees form a link between EPD and the regulated community and local watershed interests.

The committees consist of local people representing a variety of stakeholder interests including local governments, agriculture, industry, forestry, environmental groups, landowners, and citizens. Committee members and chairs are appointed by the EPD Director following a nomination process at the beginning of the initial river basin planning cycle. The committees meet periodically during the planning cycle, and provide input to EPD in the creation of river basin management plans. Meetings are called at the discretion of the chairman of the local advisory committee, and all meetings are open to the public. Table 1-1 lists the members of the Altamaha River Basin Local Advisory Committee serving for the first planning cycle.

Participate in Stakeholder Forums

While River Basin Advisory Committees operate at the major basin level, there is an opportunity under RBMP for more localized stakeholder forums to play an important role in the creation and implementation of water resources management strategies. Some strategies, such as best management practices (BMPs) to control pollutant runoff from urban, agricultural or forestry areas, are best managed at the city, county, or subwatershed level. These local forums might already exist in the form of conservation districts or watershed associations, be associated with watershed groups convened by a Regional Development Center to develop TMDL implementation plans or may be created as an outgrowth of RBMP.

Attend a Stakeholder Meeting

The RBMP approach includes stakeholder meetings, which provide the opportunity for the general public to learn about the status of water-related issues and management activities in their river basin, as well as contribute input that can influence basin management planning.

Figure 1-2 shows the timing of stakeholder meetings that have been held as part of the Altamaha basin RBMP cycle. EPD hosted an initial stakeholder meeting in Jesup, Georgia in late 1998 to invite and encourage stakeholder input early in the planning process for the Altamaha River basin. Focused monitoring in the Altamaha River basin was conducted in 1999. The data was assessed in 2000 and waters not meeting water quality standards were identified. Total maximum daily loads (TMDLs) were drafted and public noticed for waters not meeting water quality standards in June 2001. Input was considered, changes made as appropriate, and the TMDLs were finalized and approved by the U.S. Environmental Protection Agency in early 2002. The Regional Development Commissions (RDCs) in the Altamaha River basin initiated the development of TMDL Implementation Plans. Stakeholder meetings were coordinated by the RDCs to solicit input on the problem areas and support in completing the implementation plans. The plans are scheduled for completion in August 2003.

Table 1-1. Altamaha River Basin Local Advisory Committee Members

Mr. Jack Amason Sea Garden Seafoods, Inc. P.O. Box 181 Meridan, Georgia 31319	Mr. Jenson Folsen Route 3, Box 5080 Glenville, Georgia 30427	Commissioner Gerald DeWitt City of Jesup P.O. Box 427 Jesup, Georgia 31598
Mr. Collie W. Williams Georgia Power P.O. Box 387 Jesup, Georgia 31598	Ms. Christi Lambert The Nature Conservancy Altamaha River Bioreserve P.O. Box 484 Darien, Georgia 31305	Mr. Carlton L. Windsor Superintendent Georgia Region Southeast Forest Resources Rayonier P.O. Box 528 198 South Macon Street Jesup, Georgia 31598
Mr. Bill Warthen 1204 Loop Road Vidalia, Georgia 30474	Heart of Georgia —Altamaha RDC 5405 Oak Street Eastman, Georgia 31023	Coastal Georgia RDC P.O. Drawer 1917 Brunswick, GA 31521

What's Next?

This draft plan will be reviewed by governmental partners, the Altamaha River Basin Advisory Committee, and the public. Public meetings will be held to solicit comments and recommendations regarding the river basin management plan. Following the review, appropriate modifications will be made to the plan, and the final plan will be submitted for review and acceptance by the Board of the Georgia Department of Natural Resources. After approval and an initial implementation period, partners will enter into the next 5-year cycle iteration to evaluate and update the plan as necessary.

In This Section

- River Basin Description
- Population and Land Use
- Local Governments and Planning Authorities
- Water Use Classifications

Section 2

River Basin Characteristics

This section describes the following major characteristics of the Altamaha River basin:

- *River basin description (Section 2.1): the physical features and natural processes of the basin.*
- *Population and land use (Section 2.2): the sociological features of the basin, including the types of human activities that might affect water quality and water resource use.*
- *Local governments and planning authorities (Section 2.3): identification and roles of the local authorities within the basin.*
- *Water use classifications (Section 2.4): description of water use classifications and baseline goals for management of waters within the basin as defined in the state regulatory framework.*

2.1 River Basin Description

This section describes the important geographical, geological, hydrological, and biological characteristics of the Altamaha River basin.

The physical characteristics of the Altamaha River basin include its location, physiography, soils, climate, surface water and groundwater resources, and natural water quality. These physical characteristics influence the basin's biological habitats and the ways people use the basin's land and water resources.

2.1.1 River Basin Boundaries

The Altamaha River basin is located in the Vidalia Upland and Barrier Island Sequence Districts of Georgia's Coastal Plain Province. The Altamaha River basin is flanked by the Ocmulgee and Oconee River Basins to the west, the Satilla River Basin to the south, and the Ogeechee River Basin to the east (Figure 2-1). The Altamaha River begins at the confluence of the Oconee and Ocmulgee Rivers. The Altamaha Basin extends eastward to include the drainage area of the south-flowing Ohoopee River. From that point, the basin extends in a southeasterly direction and is joined by several smaller

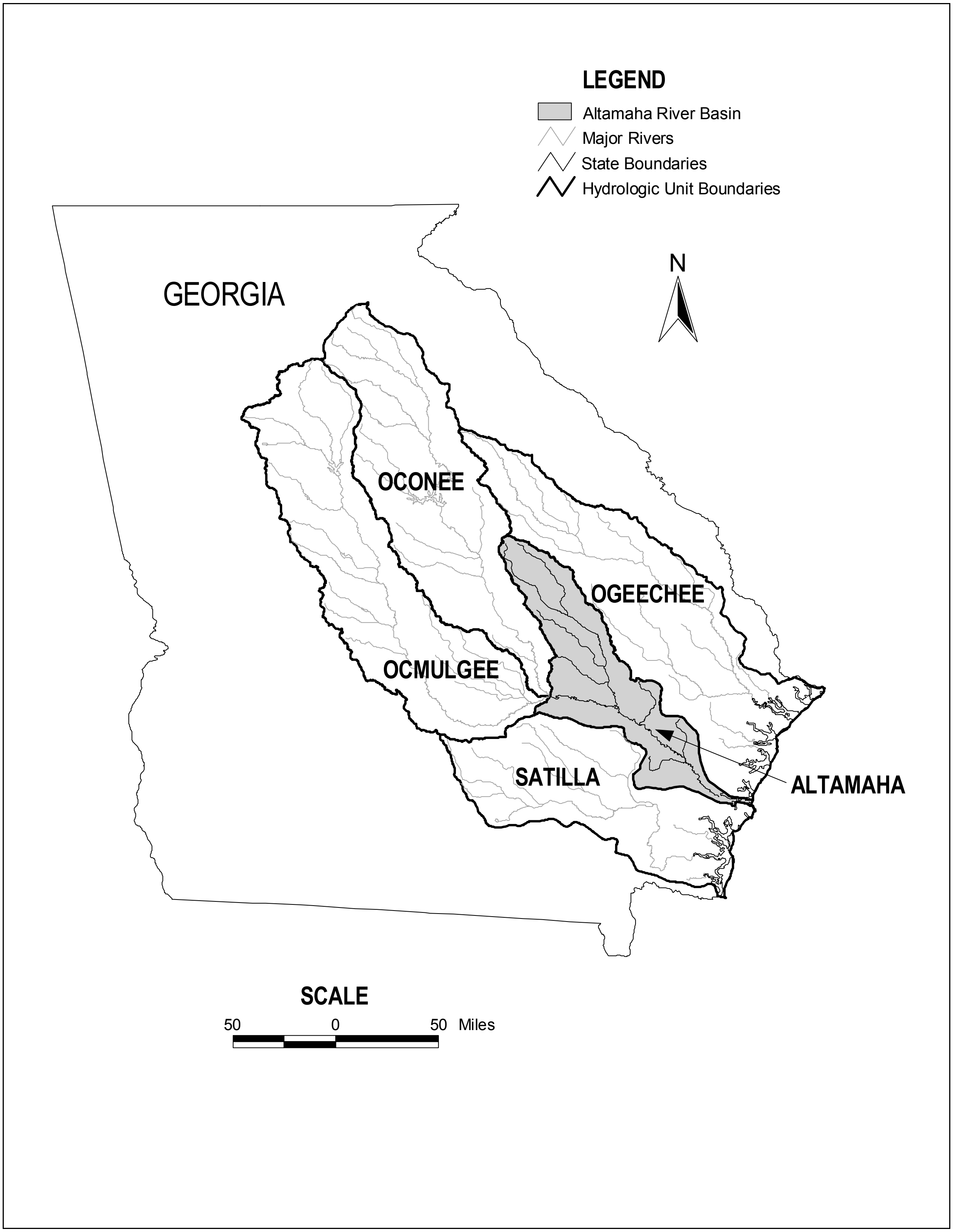


Figure 2-1. Location of the Altamaha River Basin

streams, including Mushmellon, Penholoway, and Doctors Creeks. Along the Glynn County-McIntosh County line west of the Georgia coast, the Altamaha River floodplain widens to form Penholoway River, and Clayhole Swamps. The river then diverges into two channels at the western end of Cambers Island and the waters pass eastward through tidal marshland until they enter the Atlantic Ocean at Altamaha Sound. The Altamaha River basin is located entirely in the State of Georgia and drains approximately 2,850 square miles.

The U.S. Geological Survey (USGS) has divided the Altamaha River basin into two subbasins, or Hydrologic Unit Codes (HUCs; see Table 2-1). These HUCs are referred to repeatedly in this report to distinguish conditions in different parts of the Altamaha River basin. Figure 2-2 shows the location of these subbasins and the associated counties within each subbasin.

Table 2-1. Hydrologic Unit Codes (HUCs) of the Altamaha River Basin in Georgia

03070106	Altamaha River Subbasin
03070107	Ohoopee River Subbasin

2.1.2 Climate

Mild winters and hot summers characterize the Altamaha River basin climate. Mean annual precipitation ranges from 40 to 52 inches per year. Precipitation occurs chiefly as rainfall, and only rarely in the upper portion of the basin, as snowfall. Rainfall is evenly distributed throughout the year, but a distinct dry season generally occurs from mid-summer to late fall. Rainfall is usually greatest in March and least in October. The mean annual temperature is about 60 degrees Fahrenheit (Journey and Atkins, 1996; citing Peck et al., 1992; Schneider et al., 1965; and Carter and Stiles, 1983).

2.1.3 Physiography, Geology, and Soils

Physiography

The Altamaha River basin is contained entirely within the Coastal Plain Physiographic Province, which extends throughout the southeastern United States. Waters from the Ocmulgee and Oconee Rivers, whose confluence forms the westernmost part of the Altamaha River basin, however, originate in the Georgia Piedmont and flow southward across the northern and central parts of the Georgia Coastal Plain.

The gently sloped physiography of the Altamaha basin reflects a geologic history of repeated periods of Tertiary and Quaternary marine transgressions and regressions across the southeastern Coastal Plain Province. Glaciers, which influenced the physiography of much of North America, never extended to the southeastern United States, but climatic effects associated with Pleistocene continental glaciation probably influenced regional ecological settings and erosion rates.

Coastal Plain streams typically meander across wide floodplains, and they exhibit extreme sinuosity, particularly near the Atlantic coast. Several Georgia Coastal Plain streams, including the Altamaha exhibit asymmetrical floodplain profiles. These rivers are contained within floodplains that have steep bluff-like features resembling cut banks along their southern and western edges and wide low-lying, swampy floodplain regions with oxbow lakes and stranded meanders along the northern and eastern sides of the rivers.

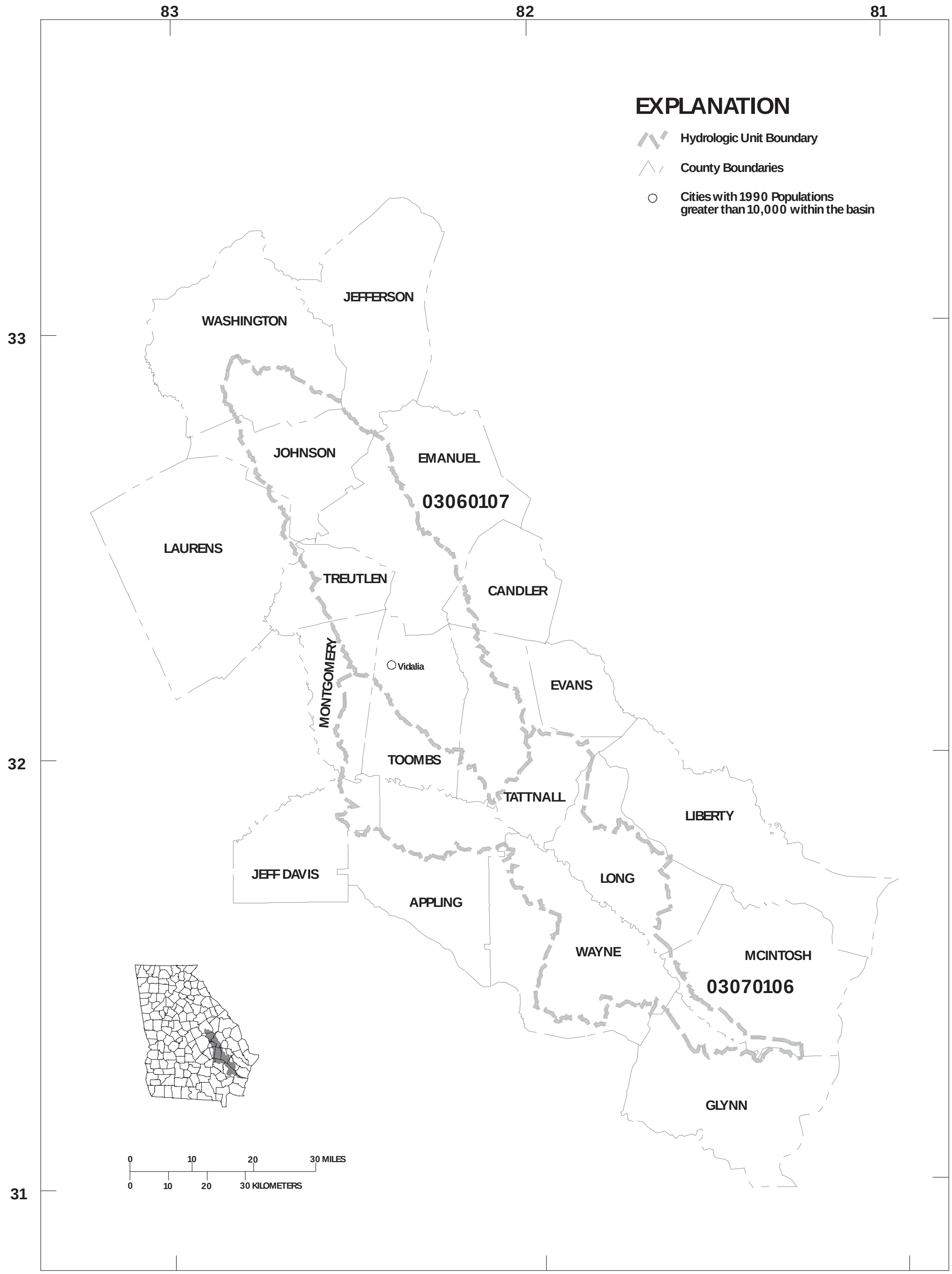


Figure 2-2. Hydrologic Units and Counties of the Altamaha River Basin

Geology

The following is a summary of the general geologic factors that appear to influence the background stream sediment geochemistry and stream hydrogeochemistry.

The Altamaha River basin is located entirely within the Coastal Plain Physiographic Province. Tertiary and Quaternary sedimentary deposits underlie the basin. Approximately 90 percent of the Coastal Plain sediments exposed in the basin are sands and clays. The rest consists of Quaternary alluvium.

Because of significant differences in chemical composition, porosity, permeability, and origin of the different rock units within the Coastal Plain, these rock units and the stream sediments derived from these rock units can significantly influence differences in the stream hydrogeochemistry. Although each rock unit may exert an effect on stream sediment geochemistry and stream hydrogeochemistry, of greater importance is the regional geologic grouping of rocks of similar compositions, porosity, permeability, and origin.

The younger Eocene and Oligocene sediments in parts of the Oconee and Ocmulgee basins upstream from the Altamaha River basin are calcareous, and can have a greater effect on surface and groundwaters than the older Coastal Plain sediments to the north. The entire Altamaha River basin is underlain by poorly sorted, pebbly, argillaceous, micaceous sands, and sandy clays that are Miocene and younger in age. These sediments appear to have little effect on the quality of surface and groundwaters, but the generally acidic waters derived from “black water” tributaries and swampy regions of the Altamaha floodplain can influence surface water chemistry.

Extensive erosion of Piedmont soil and saprolite and Coastal Plain soil and unconsolidated sedimentary materials caused by unsophisticated agricultural practices during the 1800s and early 1900s contributed a vast quantity of sediment into stream valleys, choking the streams and raising the streams’ base level. As modern conservation practices stabilized erosion, streams began to reestablish grade and cut into the thick accumulations of sediments, remobilizing them into the major rivers. In the Piedmont regions of the Ocmulgee and Oconee River Basins that lie north of the Altamaha River basin, much of the remobilized sediment was re-deposited into man-made reservoirs. The Altamaha River basin, however, contains no impoundments, so these materials are currently being transported downstream to the Atlantic coast.

Soils within the Altamaha River basin are common to the lower Coastal Plain Province of Georgia. They range from well-drained to poorly drained. Physical composition, porosity, and permeability are the primary factors related to water retention, although local relief and the depth of the water table are also important considerations. In the upper part of the Altamaha Basin, the soils are primarily poorly sorted, locally pebbly and gravel-bearing sands with a minor clay component that are interlayered with discontinuous lenses of clay. These materials are weathering products derived from Piedmont igneous and metamorphic rocks to the north that were transported in an extensive fluvial system that occupied south Georgia during Miocene time. In the lower regions of the Altamaha Basin, the soils are derived from a coastal terrestrial and marine geologic environment made up of alternating bands of beach and lagoon deposits that parallel the modern Georgia coast. The beach deposits are sand dominant and well-drained, whereas the lagoon materials are clay, silt, and fine sand dominant with a rich organic component.

Well-drained soils in the Altamaha River basin generally occupy the higher ground. These soils include Norfolk, Lakeland, and Lynchburg Series materials that produce good crops of tobacco, corn, peanuts, and soybeans. Poorly drained soils typically lie in the lowlands, and are dark colored with a sandy top layer. These soils include the Bladen, Leon, and Rains series that are best suited for pasture land and timber production.

Soils

The Altamaha River watershed crosses two Major Land Resource Areas (MLRAs) (Figure 2-3). Soils vary widely within the watershed, and even within each of the MLRAs in the watershed. Some general trends in landscapes and soil properties can be recognized as the watershed is traversed from northwest to southeast: (1) clay content of the soils decreases, (2) sand content increases, (3) slope gradient decreases, (4) depth to water table decreases (soils become wetter), and (5) floodplains become more prominent.

About 70 percent of the watershed is in the Southern Coastal Plain MLRA. The north end of the Coastal Plain section of the watershed is characterized by mostly red, well-drained soils that have a sandy surface layer and a loamy or clayey subsoil. Water tables are not evident in most of these soils, except in depressions and along flood plains. The major part of the Coastal Plain section of the watershed is dominated by yellow and brown, well-drained soils that have sandy surface and subsurface layers and a loamy or clayey subsoil. Many of these soils have a perched water table at various depths during wet seasons. Areas of wetter soils are scattered throughout this area. Significant areas of sandier soils occur near the rivers and larger streams, especially along the eastern side of the flood plain. The southernmost end of the Coastal Plain section of the watershed is less dissected, with gentler slopes than the northern section. Soils in this area are mostly moderately well-drained to poorly drained and generally have thick sandy surface and subsurface layers overlying a loamy subsoil. Flood plain soils are mostly sandy, but range from sandy to clayey. These soils are predominantly poorly drained.

About 30 percent of the watershed is in the Atlantic Coast Flatwoods MLRA. The landscapes in this area are generally much less sloping than in the Coastal Plain MLRA. Most soils are nearly level. Seasonal high water tables are much higher in the soil profile during wet seasons of the year in most areas. This section of the watershed is dominated by sandy soils that have a characteristic layer in which organic materials have accumulated in a complex with iron and aluminum. Some of these soils are underlain by a loamy subsoil. Drier, sandy ridges are found along the eastern side of the Altamaha River. A few small areas are more dissected by streams than is typical for the MLRA. These areas have better drained soils with perched water tables, similar to soils found in the Coastal Plain MLRA. Flood plain soils range from sandy to clayey, and are poorly or very poorly drained, often having significant accumulations or organic materials near the surface. The southeastern end of the watershed has soils that formed in tidal influenced marine deposits. These soils have high contents of silt and clay, are continuously saturated with water, and have a high salt content.

2.1.4 Surface Water Resources

The major surface water resources of the Altamaha River basin are the Altamaha and Ohoopee Rivers. The Altamaha River is formed by the confluence of the Ocmulgee and Oconee Rivers 137 miles above the mouth and flows in a southeasterly direction across the Coastal Plain until it empties into the Atlantic Ocean near Darien, Georgia. Several smaller streams, including Bullards, Cobb, Tenmile, Mushmellon, Goose, Penholoway, and Doctors Creeks contribute to the flow, but the major volume of water entering the Altamaha basin is via the Oconee and Ocmulgee River basins. Stream networks within each HUC are shown in Figures 2-4 and 2-5.

River slopes of less than 1.5 feet per mile are not observed on the Altamaha River until it reaches the final 130 miles of its length, all of which is below the 100-foot elevation. Above the limit of tidal action, the river has an average slope of 0.7 foot per

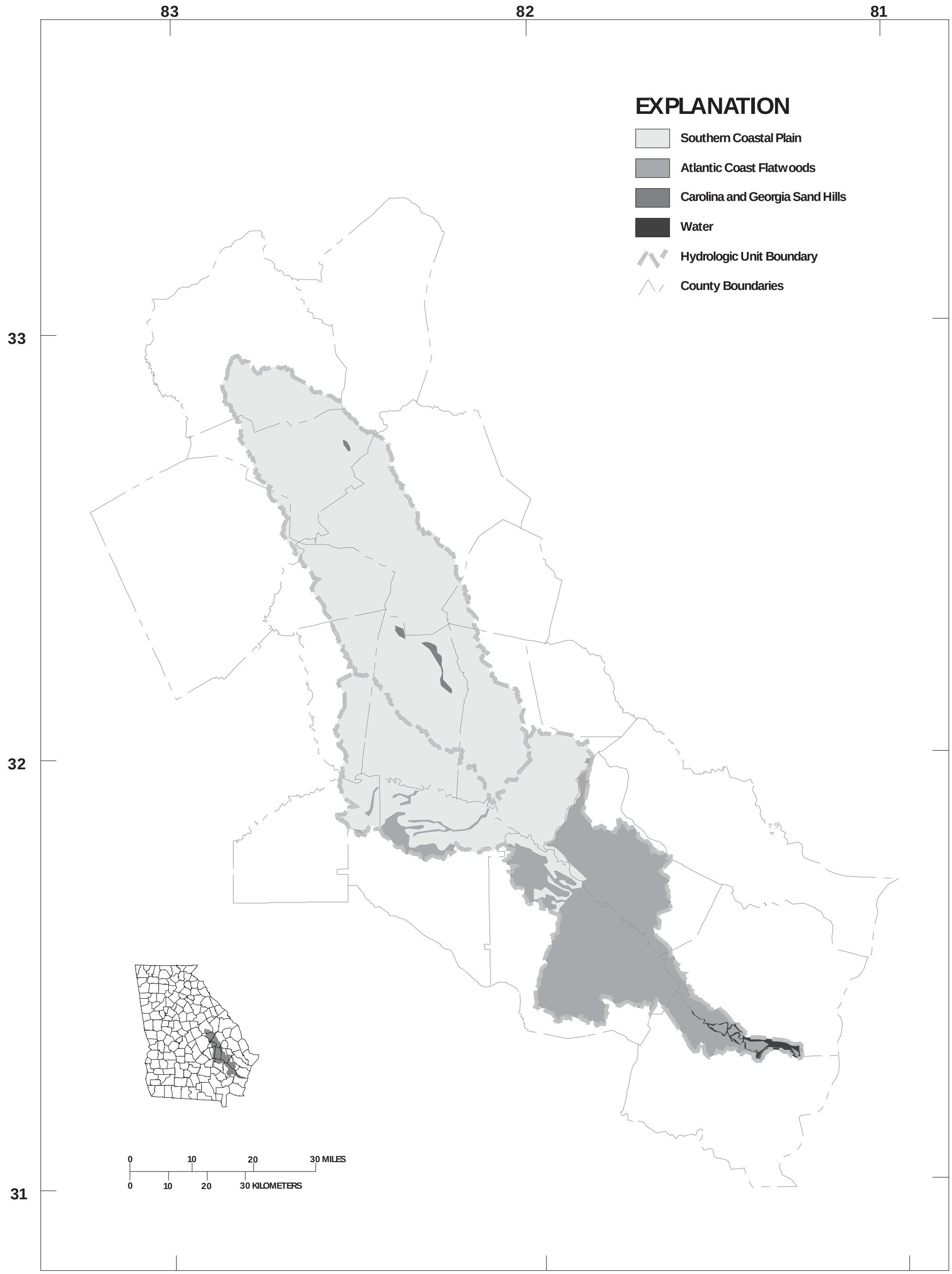


Figure 2-3. Major Land Resource Areas in the Altamaha River Basin

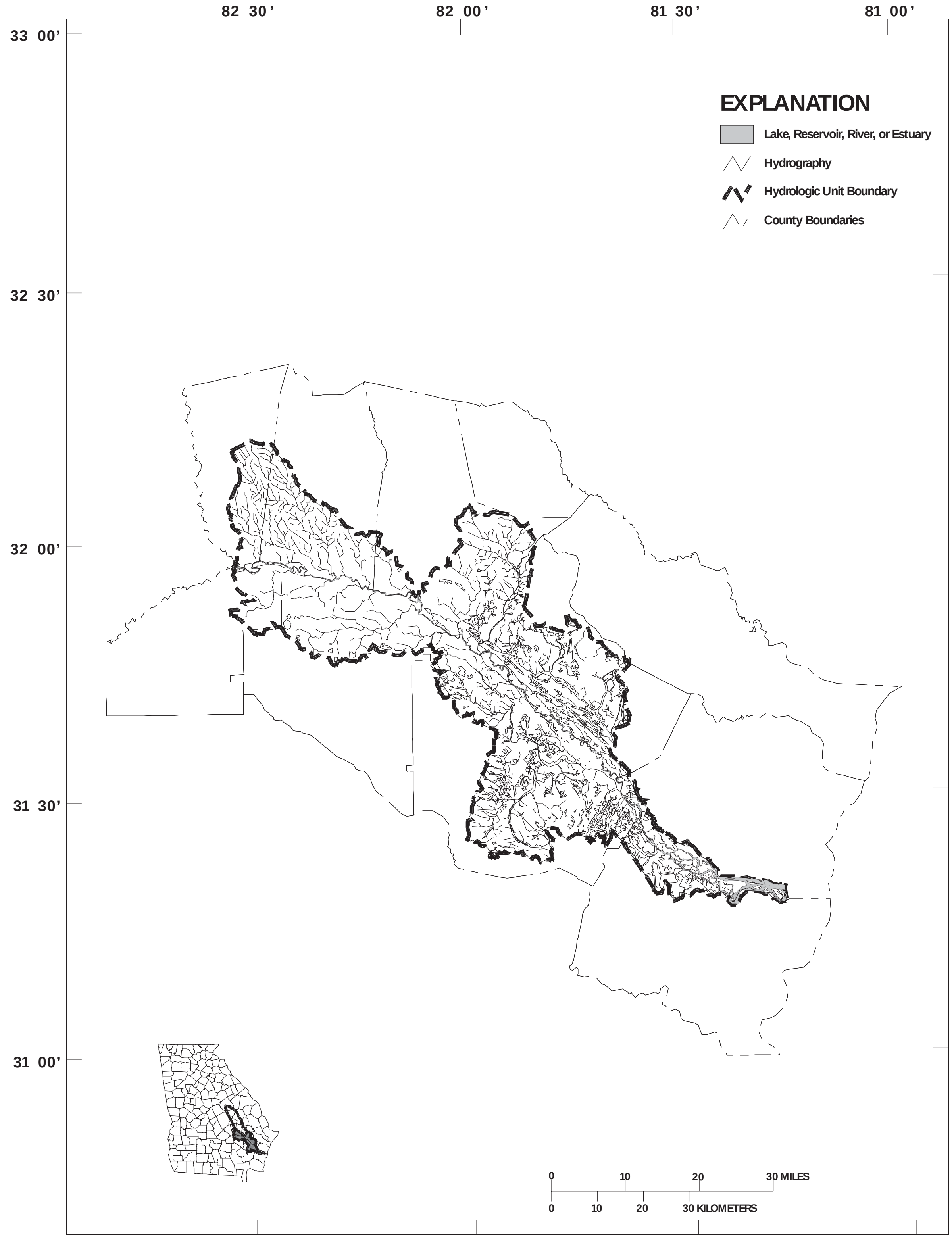


Figure 2-4. Hydrography, Altamaha River Basin, HUC 03070106

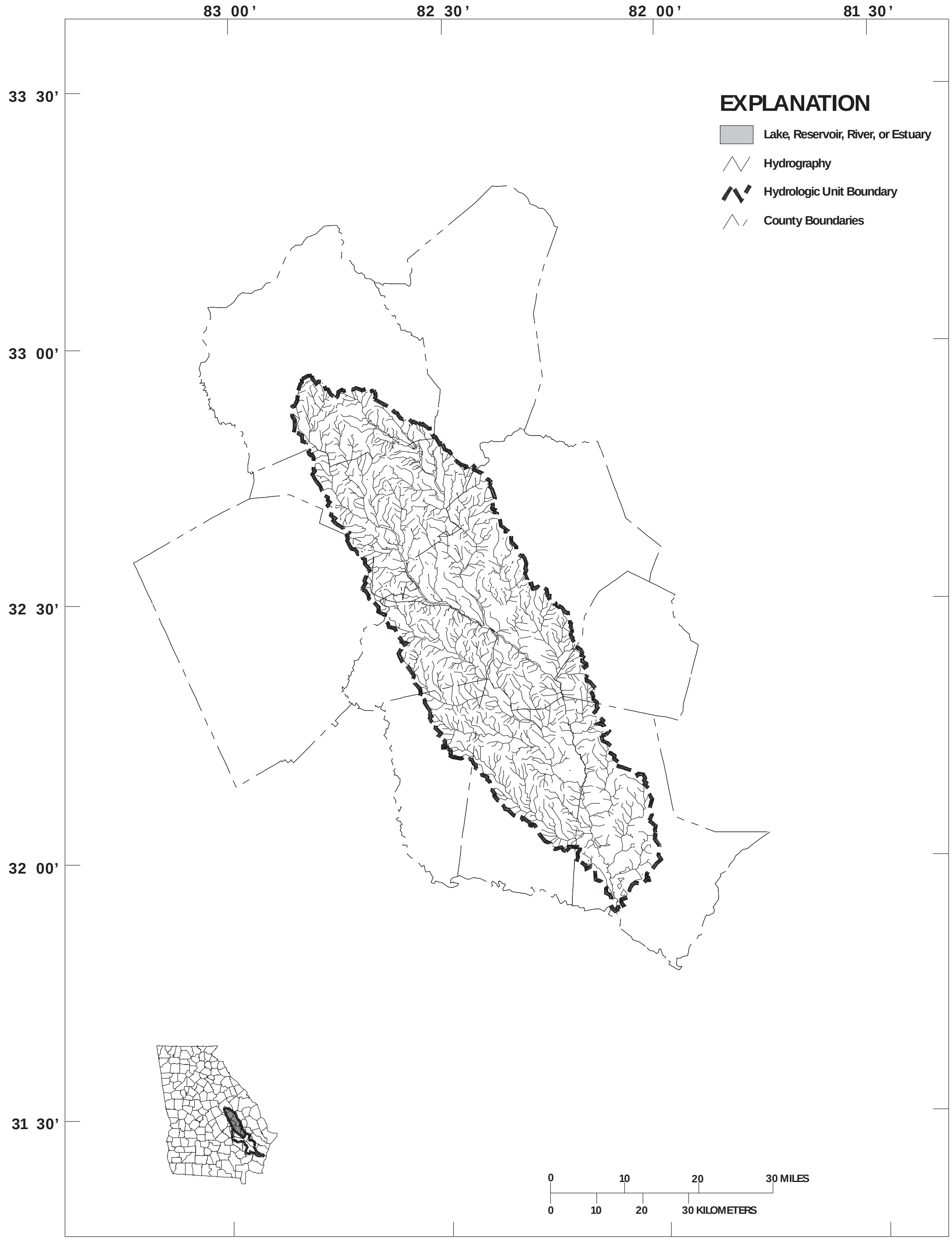


Figure 2-5. Hydrography, Altamaha River Basin, HUC 03070107

mile and the flood plain is about 89 miles long and varies in width from one to four and one-half miles. On the coast, saltwater wedges can be detected upstream nearly as far as tidal influences. The latter extend some 30 to 35 miles up the river under low flow conditions.

2.1.5 Groundwater Resources

Groundwater resources in the Altamaha River basin are supplied by the Floridan aquifer system, one of the most productive groundwater reservoirs in the United States. The system supplies about 50 percent of the groundwater used in the state. It is used as a major water source throughout most of South Georgia. A more detailed description of the Floridan aquifer system is provided below.

Floridan Aquifer

The Floridan aquifer system consists primarily of limestone, dolostone, and calcareous sand. It is generally confined, but is semi-confined to unconfined near its northern limit. Wells in this aquifer are generally high yielding (typically 1,000 to 5,000 gallons per minute) and are extensively used for irrigation, municipal supplies, industry, and private domestic supply.

The Floridan aquifer underlies most of the Altamaha River basin. The thickness of the Floridan aquifer in the Altamaha basin increases toward the Atlantic Coast where, in Glynn County, it is 400 feet thick. Throughout most of the Altamaha basin, the Floridan aquifer consists of the Eocene Ocala Limestone and the Oligocene Suwannee Limestone.

2.1.6 Biological Resources

The Altamaha River basin supports a diverse and rich mix of terrestrial and aquatic habitats and is home to several federally and state-protected species. Some of the biological resources of the basin are summarized below.

Terrestrial Habitats

The Altamaha River is one of Georgia's few remaining free flowing streams and contains excellent habitat for numerous freshwater fish species. The river traverses portions of two physiographic regions on its journey to the ocean. The headwaters begin in the Piedmont Region, but the majority (95 percent) of the Altamaha River basin lies in the Lower Coastal Plain Mixed Forest Province. The Outer Coastal Plain is a temperate rainforest (or temperate evergreen forest or laurel forest) ecoregion characterized by lower species diversity, but a greater abundance of individuals than equatorial or tropical rainforests.

Common species of trees include evergreen oaks and species of the laurel and magnolia families. Typically these habitats include a well-developed lower stratum of vegetation consisting of tree ferns, small palms, shrubs, and herbaceous plants. At the higher elevations, the trunks and branches of trees are often covered in moss. At the lower elevations, trees such as Evangeline oaks, baldcypress and others are covered by the epiphyte commonly known as Spanish moss.

The lower reaches of the Altamaha River basin flow through the extensive coastal marshes and interior swamps of Georgia's coastal region and are dominated by gum and cypress. The upland areas are covered by subclimax pine forests, which have an understory of grasses and sedges referred to as savannas. Undrained shallow depressions in savannas form upland bogs or pocosins, in which evergreen shrubs predominate.

Fauna

Terrestrial Fauna

The habitat diversity in this region supports a wide variety of wildlife. Although small numbers of black bears may be found in isolated areas, the white-tailed deer is the only large indigenous mammal in this region. Populations of feral hogs have become quite prevalent and their destructive foraging habits have made them a nuisance species in agricultural locales. Small mammals that are common to the basin include raccoons, opossums, flying squirrels, rabbits and numerous species of ground-dwelling rodents.

The bobwhite quail, eastern wild turkey and mourning dove are the primary game birds. Migratory non-game bird species, as well as waterfowl are numerous in this region. The red-cockaded woodpecker, which inhabits mature longleaf pine stands, is a federally-listed endangered species.

Fish Fauna

The diverse fish fauna of the Altamaha River basin includes 74 species representing 25 different families. The largest group of species in the Altamaha River basin belongs to the sunfish family, Centrarchidae. Other families with large numbers of species are the sucker family (Cyprinidae) and the catfish family (Ictaluridae). In a 1983 survey conducted by the Fisheries Section of the Georgia Department of Natural Resources on the Altamaha River, channel catfish comprised 26 percent of the total sample by number. The Altamaha River offers excellent fishing for redbreast sunfish, largemouth bass, bluegill, redear sunfish, black crappie, flathead catfish, and channel catfish.

Flathead catfish are an exotic species, which was introduced into the Altamaha River system in the late 1970s. During the late 1980s and early 1990s the abundance of flathead catfish increased dramatically. Current fisheries data obtained from annual electrofishing efforts indicate that the dominant catfish species has switched from the channel catfish to the flathead catfish. The large increase in the abundance of flatheads resulted in a significant decline in the abundance of some native species, such as the bullhead catfishes and redbreast sunfish.

Several anadromous fish species are found within the Altamaha River. American shad, hickory shad, blueback herring, Atlantic sturgeon and shortnose sturgeon all ascend the river in the spring to spawn. American shad are commercially important species and the Altamaha River supports the largest commercial shad harvest of Georgia’s rivers. Historically, Atlantic and shortnose sturgeon were also harvested commercially from the Altamaha River. However, the decline in abundance of these two species has led to the listing of the shortnose sturgeon as an endangered species and the closure of the commercial fishery for both species.

2.2 Population and Land Use

2.2.1 Population

Since 1975, the population of the Altamaha River basin has risen from 77,000 to 88,200. Population distribution in the basin at the time of the 1990 census is shown by census blocks in Figure 2-6. The region’s population growth has been slow by state standards, which has resulted in Altamaha’s share of Georgia’s population dropping from 1.5 percent in 1975 to 1.3 percent in 1995. This downward trend is expected to continue to the end of this decade, after which the Altamaha’s share of Georgia’s population is expected to stabilize. As with most of the country, the fastest growing portion of the population in the basin over the next 25 years will be the over-55-year-old category

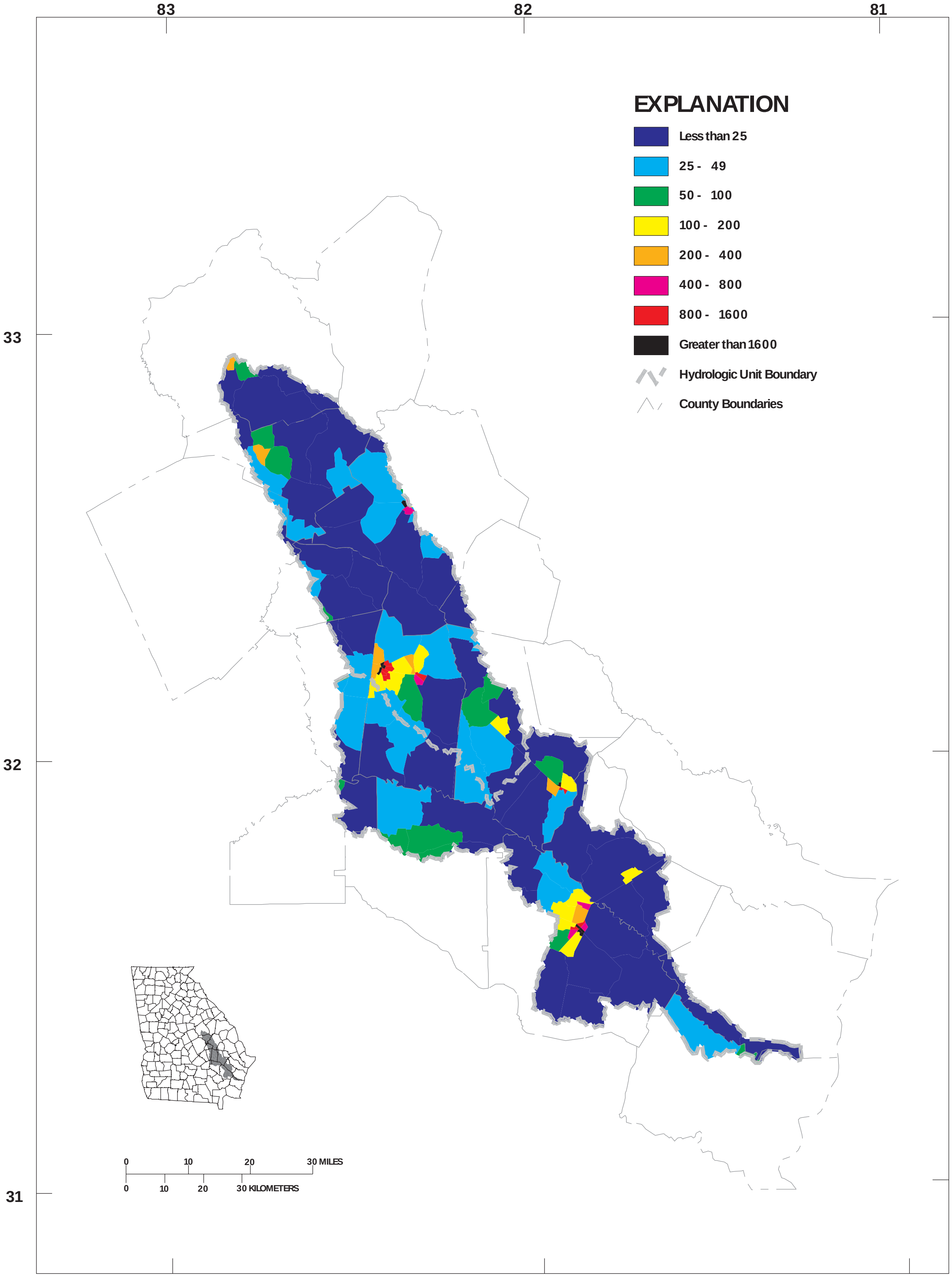


Figure 2-6. Population Density in the Altamaha River Basin

(DRI/McGraw-Hill, 1996). Population centers in the Altamaha watershed include the development surrounding Vidalia, Reidsville, Jesup and Darien.

2.2.2 Employment

In 1975, the Altamaha River basin employed 19,000 people and accounted for only 1.1 percent of Georgia's non-farm employment. Over the last two decades, the Altamaha basin has watched its employment rise at an average annual rate of 2.3 percent to take 1995's employment level to 29,100. (DRI/McGraw-Hill, 1996).

2.2.3 Land Cover and Use

Land use/land cover classification was determined for the Altamaha River basin based on high-altitude aerial photography for 1972-76 from the U.S. Geological Survey. Subsequently in 1991 land cover data were developed based on interpretation of Landsat TM satellite image data obtained during 1988-90, leaf-off conditions. These two coverages differ significantly. Aerial photography allows identification of both land cover and land uses. Satellite imagery, however, detects primarily land cover, and not land use, such that a forest and a wooded subdivision may, for instance, appear similar. Satellite interpretation also tends to be less accurate than aerial photography.

The 1972-76 classification (Figures 2-7 and 2-8) indicates that 58 percent of the basin land area was forest, 0.6 percent wetlands, and 1 percent urban.

The 1988-90 land cover interpretation showed 44 percent of the basin in forest cover, 17 percent in wetlands, 1.4 percent in urban land cover, and 19 percent in agriculture (Figures 2-9 and 2-10). Statistics for 15 landcover classes in the Georgia portion of the Altamaha River basin for the 1988-90 coverage are presented in Table 2-2 (GA DNR, 1996).

Table 2-2. Land Cover Statistics for the Altamaha Basin

Class Name	Percent	Acres
Open Water	1.0	18,605
Clear Cut/Young Pine	18.1	329,044
Pasture	7.3	133,458
Cultivated/Exposed Earth	11.4	207,073
Low Density Urban	1.1	19,900
High Density Urban	0.3	5,619
Emergent Wetland	1.2	22,634
Scrub/Scrub Wetland	0.8	13,870
Forested Wetland	14.5	264,477
Coniferous Forest	17.0	309,748
Mixed Forest	13.2	239,700
Hardwood Forest	13.5	245,226
Salt Marsh	0.2	2,751
Brackish Marsh	0.4	6613
Tidal Flats/Beaches	0.0	248
Total	*100.0*	*1,819,966*

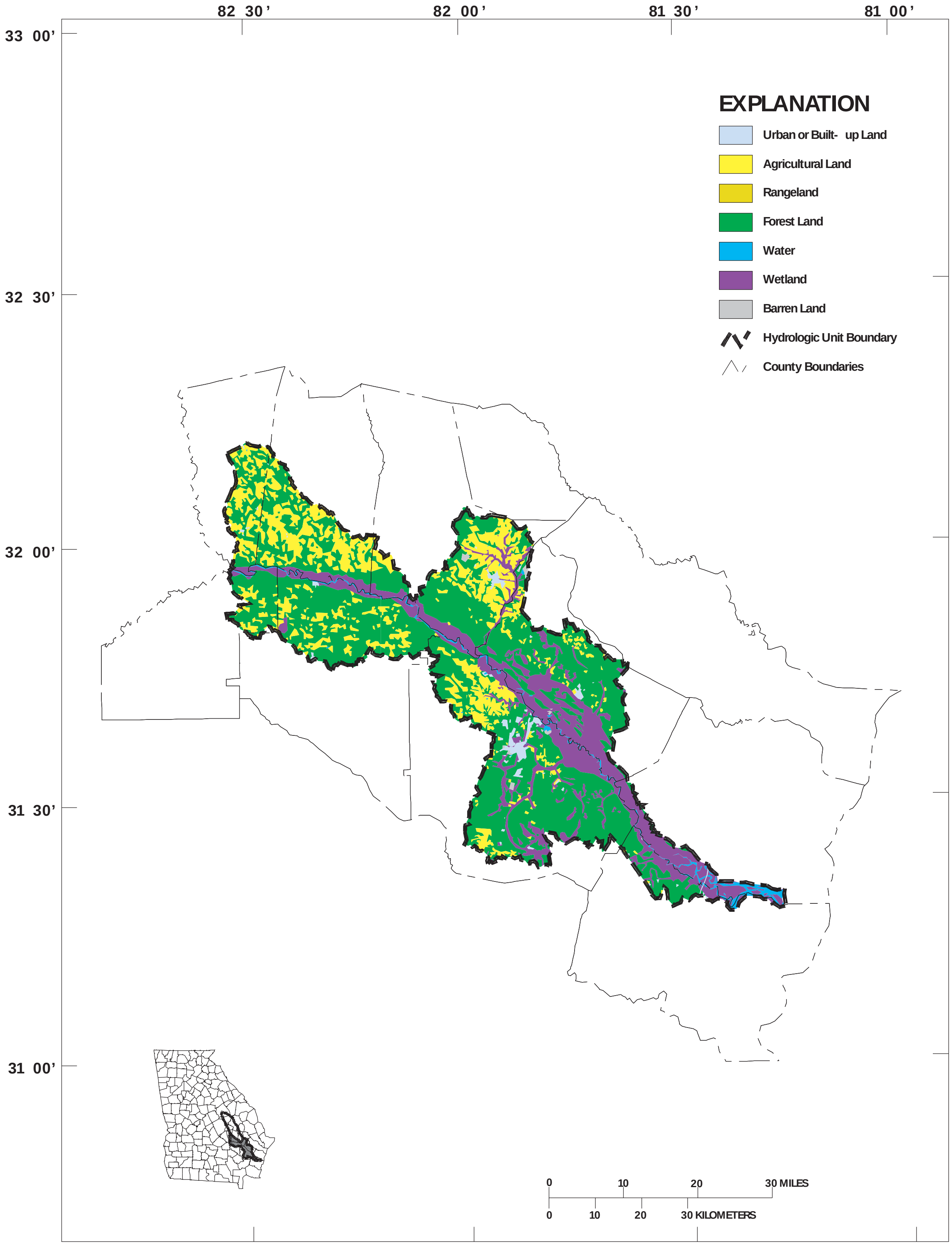


Figure 2-7. Land Use, Altamaha River Basin, HUC 03070106, USGS 1972-76 Classification Updated with 1990 Urban Areas

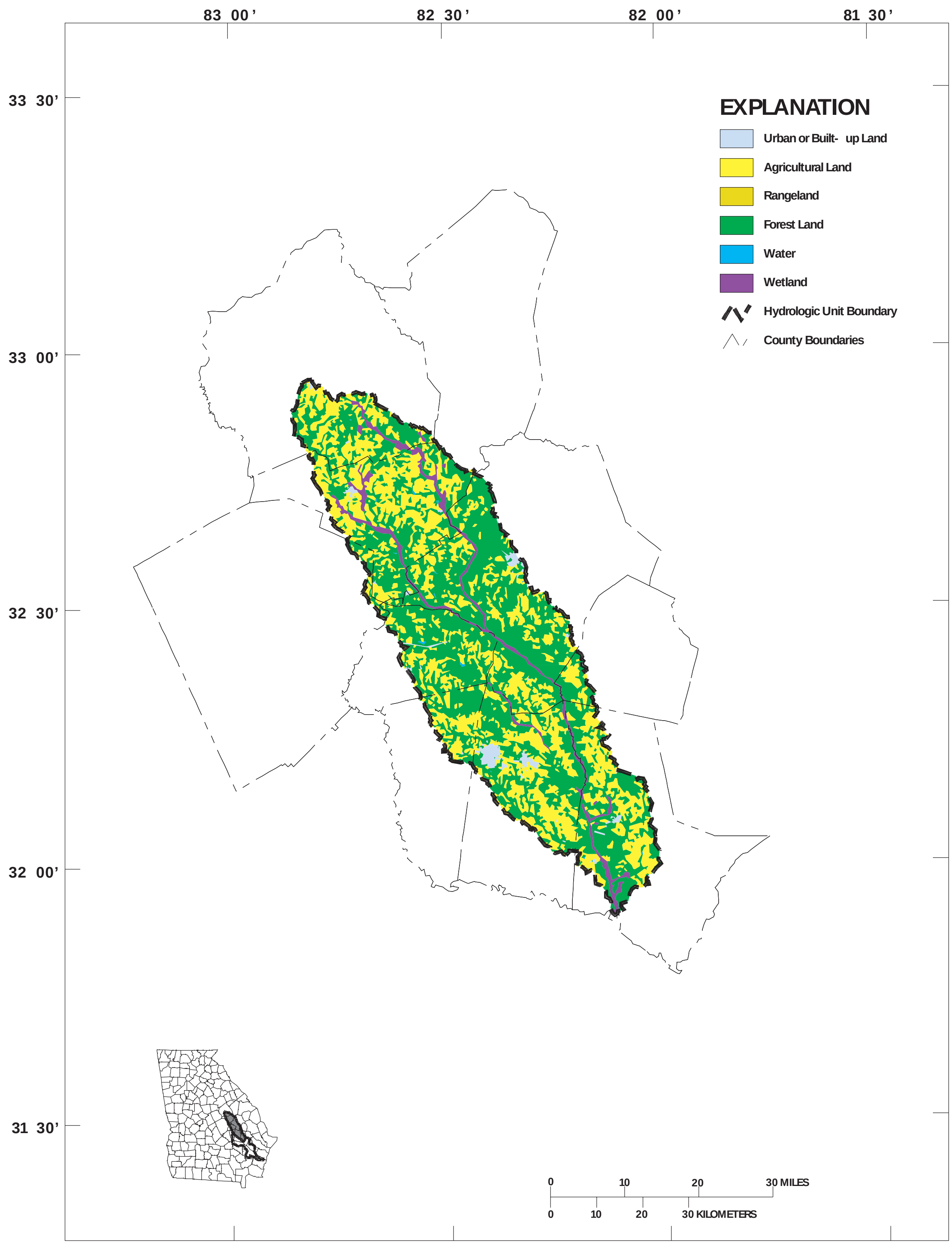


Figure 2-8. Land Use, Altamaha River Basin, HUC 03070107, USGS 1972-76 Classification Updated with 1990 Urban Areas

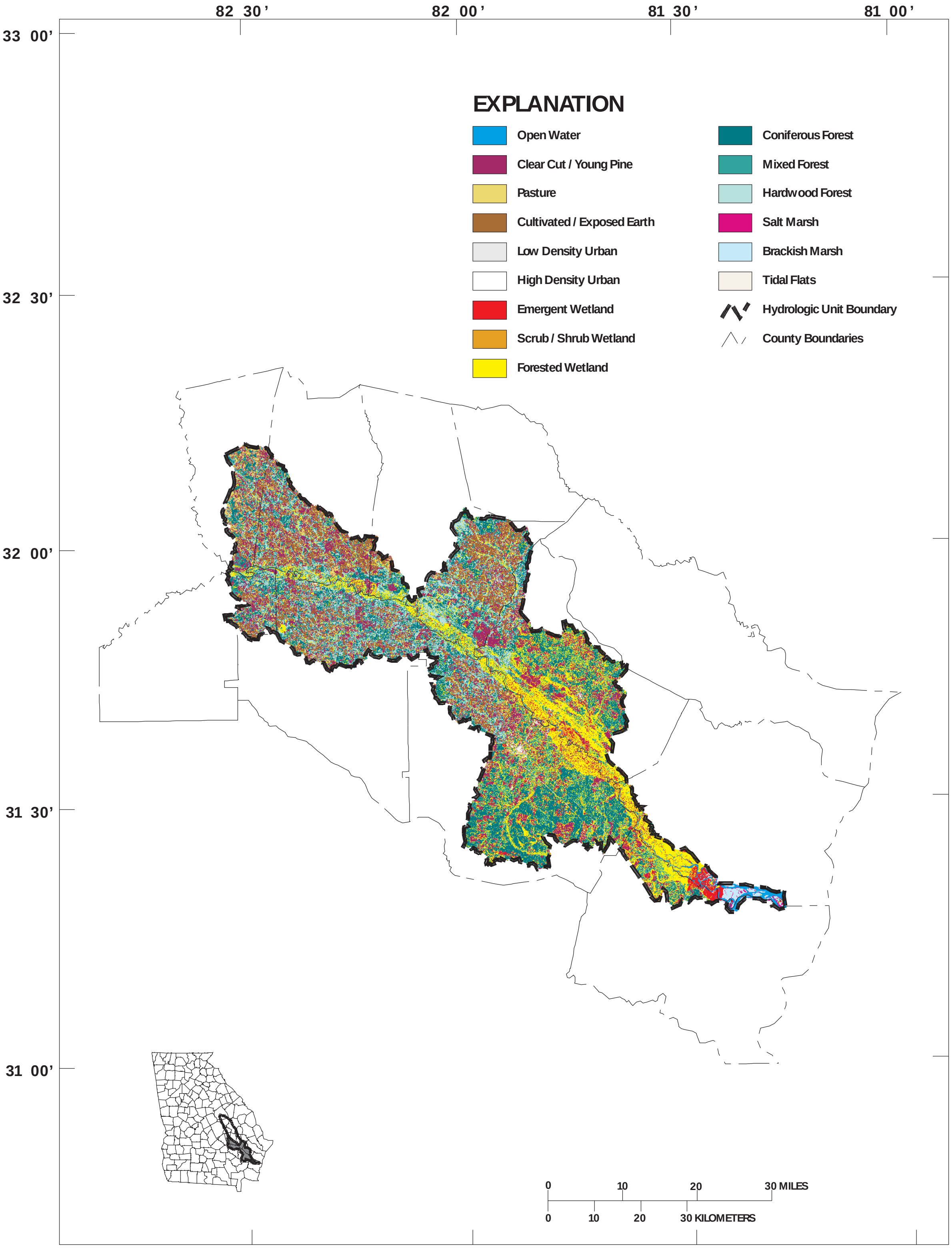


Figure 2-9. Land Cover 1990, Altamaha River Basin HUC 03070106

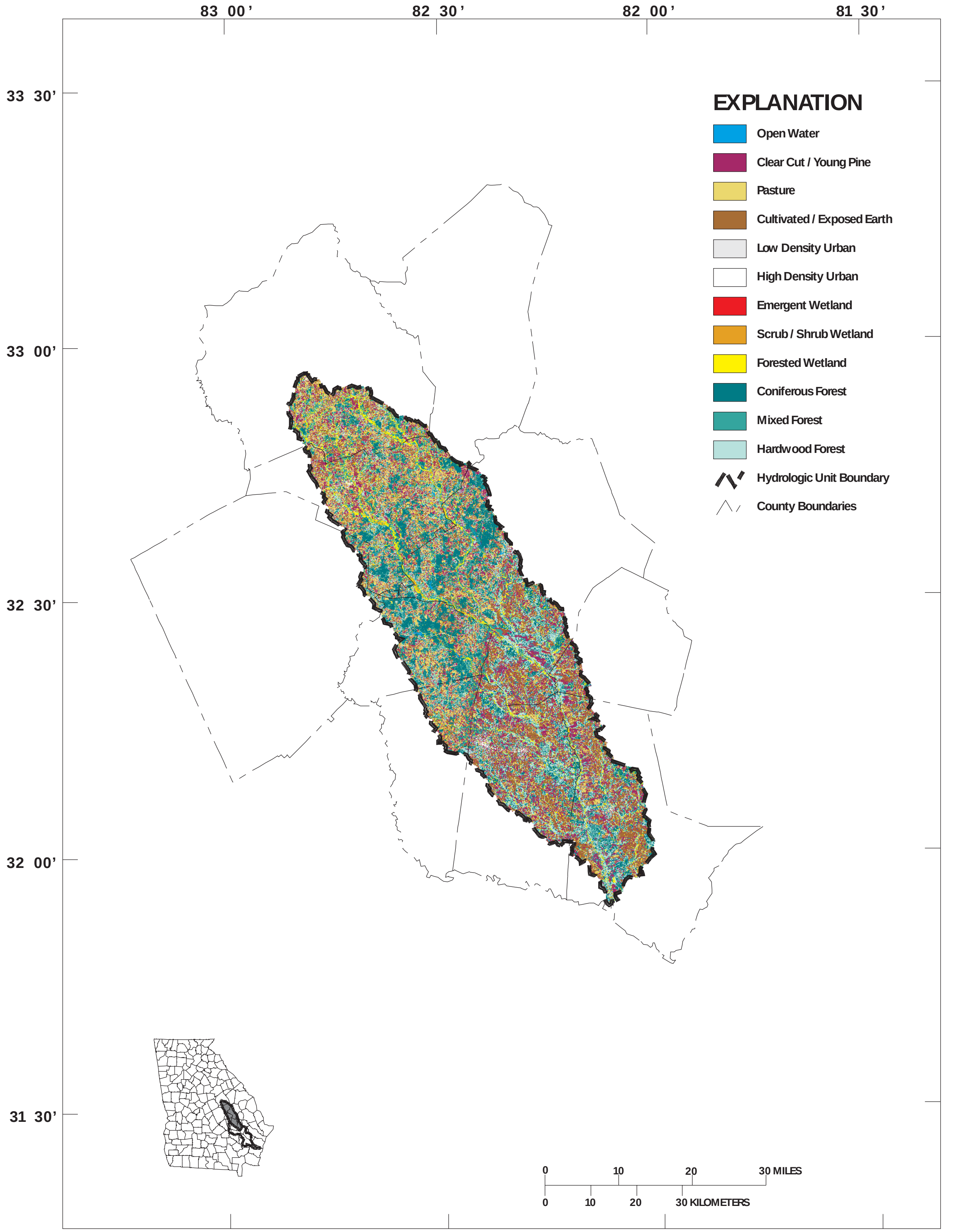


Figure 2-10. Land Cover 1990, Altamaha River Basin HUC 03070107

Forestry

Forestry is a major part of the economy within the basin. Markets for forest products afford landowners excellent investment opportunities to manage and sell their timber, pine straw, naval stores, etc., products. Statewide, the forest industry output for 2002 grew to approximately $30.5 billion. The value added by this production, which includes wages, profits, interest, rent, depreciation and taxes paid into the economy reached a record high $19.5 billion. The manufacture of paper, lumber and various other wood products provides 177,000 job opportunities for Georgians, as well as benefiting them as consumers of wood products. Other benefits of the forest include hunting, fishing, aesthetics, wildlife watching, hiking, camping and other recreational opportunities as well as providing important environmental benefits such as clean air and water and wildlife habitat.

According to the US Forest Service's Forest Statistics for Georgia, 1997 report (Thompson, 1997), there are approximately 2,951,800 acres of commercial forest land contained in the entire counties that are within the basin, representing approximately 68 percent of the total land area in the basin. Private landowners account for 66 percent of the commercial forest ownership while the forest industry companies account for 31 percent. Governmental entities account for about 3 percent of the forestland. Figure 2-11 depicts silvicultural land use in the Altamaha basin. Forestry acreage in the Altamaha River basin is summarized in Table 2-3.

Table 2-3. Forestry Acreage in the Altamaha River Basin

County	Commercial Forest	Pine	Oak-pine	Upland Hardwood	Lowland Hardwood
Appling	222,000	145,800	23,800	5,800	40,100
Candler	91,800	27,600	13,800	21,100	22,800
Emanuel	312,300	155,000	54,000	39,800	57,400
Glynn	147,400	88,400	10,700	5,200	31,400
Jeff Davis	151,600	101,100	20,400	4,900	20,300
Johnson	138,800	75,600	18,300	13,800	29,600
Laurens	312,200	153,400	20,000	62,500	74,300
Long	232,500	121,300	10,900	11,200	89,100
McIntosh	150,700	73,700	17,300	16,800	40,600
Montgomery	113,400	49,500	24,700	11,700	26,600
Tattnall	198,400	86,400	24,400	26,200	60,100
Toombs	139,600	68,000	22,000	15,500	34,100
Treutlen	103,400	77,000	5,500	5,500	15,400
Washington	315,400	144,600	59,500	74,000	37,300
Wayne	322,300	197,100	32,600	25,100	54,000
Total	*2,951,800*	*1,564,500*	*357,900*	*339,100*	*633,100*

For the period from 1982 to 1989, for the entire counties within the basin, the area classified as commercial forestland increased approximately 3.5 percent. The area classified as pine type increased 4 percent. The area classified as oak-pine type increased 4 percent. The area classified as upland hardwood decreased 11 percent, and the area classified as bottomland hardwood increased 1.6 percent.

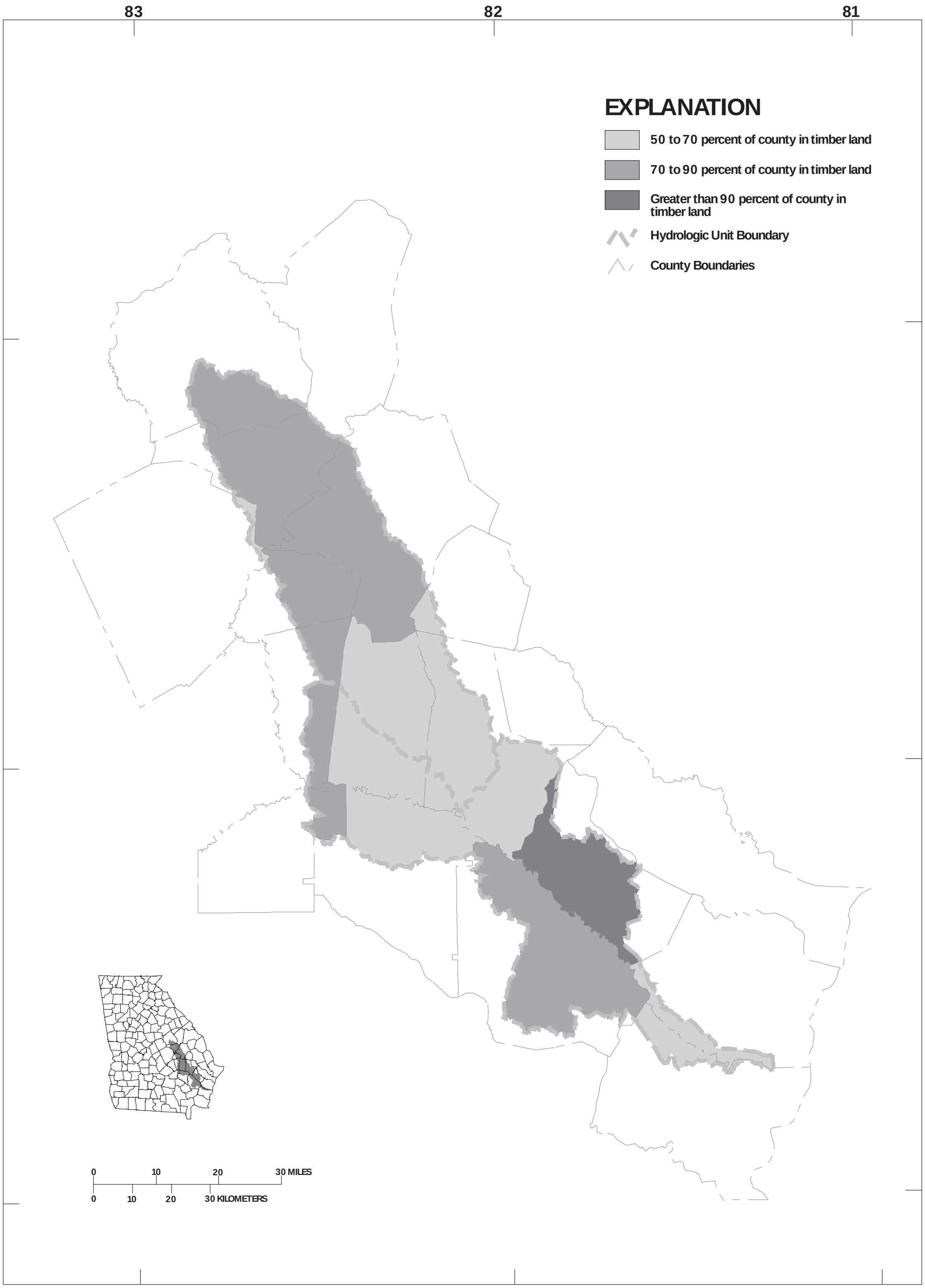


Figure 2-11. Silvicultural Land in the Altamaha River Basin

Agriculture

Agriculture in the Altamaha River basin is a varied mixture of animal operations and commodity production. Agricultural land comprises some 9 percent of the land use within the basin.

Total farmland in the basin, approximately 288,000 acres (Figure 2-12), has declined steadily since 1982. Almost 40 percent of this farmland is in pasture. The remaining 60 percent is dedicated to growing cotton, peanuts, tobacco, and small grain (wheat, sorghum, soybean, millet). Commodity producers applied an average of 25 million gallons per day of supplemental irrigation to over 48,000 acres during 2000. Jefferson, Emmanuel, and Laurens Counties contain the largest number of irrigated acreage in the basin. Irrigation application, along with the number of acres actually harvested among these crops, varies from year to year in response to market conditions, government subsidy and conservation programs, and weather.

Livestock and poultry production is relatively less intense in the Altamaha River basin than other river basins across Georgia. Approximately 46,000 head of cattle, 8,700 head of swine, and 9,500,000 broilers and layers are raised on animal operations in the basin (Table 2-4).

Table 2-4. Agricultural Operations in the Altamaha River Basin (data supplied by NRCS)

Element	HUC 03070106	HUC 03070107	Altamaha Basin Total
Number of Farms (1997)	954	1,167	2,121
Dairy Cattle (Head 2000)	1,896	118	2,014
Beef Cattle (Head 2000)	16,404	27,350	43,754
Hogs and Pigs (Head 2000)	3,831	4,897	8,728
Boilers (Thousands, 1997)	6,076,367	3,088,256	9,164,623
Layers (Thousands, 1997)	199,334	132,677	332,010
Irrigated Acres (1998)	24,309	24,310	48,619
Irrigated Water Use (MGD 2000)	10.46	14.85	25.31
Harvested Cropland (Acres 1997)	79,084	93,844	172,927
Total Agriculture Acres (1997)	129,682	158,058	287,740

2.3 Local Governments and Planning Authorities

Many aspects of basin management and water quality protection depend on decisions regarding zoning, land use, and land management practices. These are particularly important for the control of nonpoint pollution – pollution that arises in stormwater runoff from agriculture, urban or residential development, and other land uses. The authority and responsibility for planning and control of these factors lies with local governments, making local governments and jurisdictions important partners in basin management.

The Department of Community Affairs (DCA) is the state's principal department with responsibilities for implementing the coordinated planning process established by the Georgia Planning Act. Its responsibilities include promulgation of minimum standards for preparation and implementation of plans by local governments, review of local and regional plans, certification of qualified local governments, development of a state plan, and provision of technical assistance to local governments. Activities under the Planning Act are coordinated with the Environmental Protection Division (EPD), Regional Development Centers (RDCs), and local governments.

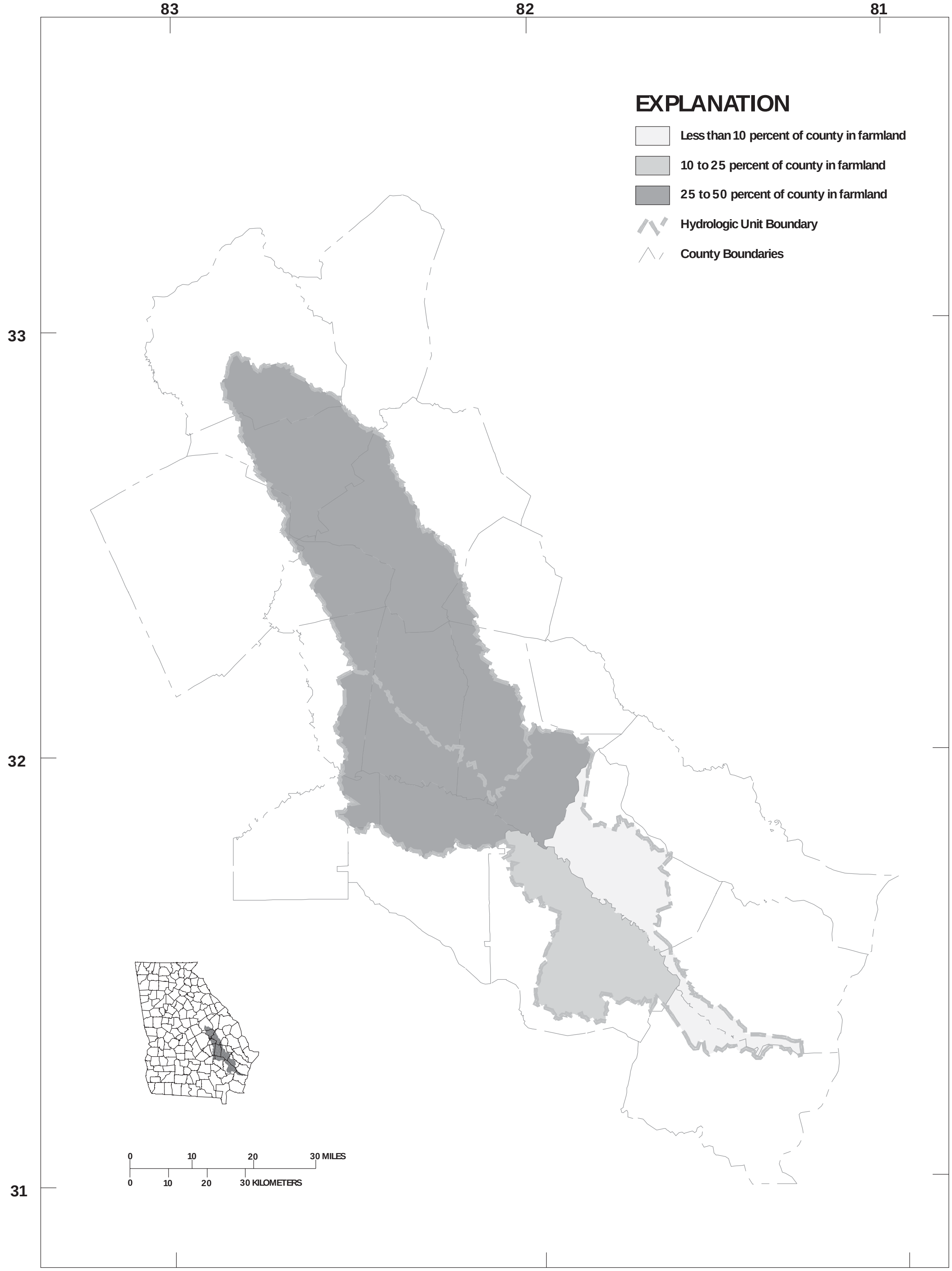


Figure 2-12. Agricultural Land in the Altamaha River Basin

2.3.1 Counties and Municipalities

Local governments in Georgia consist of counties and incorporated municipalities. As entities with constitutional responsibility for land management, local governments have a significant role in the management and protection of water quality. The role of local governments includes enacting and enforcing zoning, stormwater and development ordinances; undertaking water supply and wastewater treatment planning; and participating in programs to protect wellheads and significant groundwater recharge areas. Many local governments are also responsible for operation of water supply and wastewater treatment facilities.

The Altamaha River basin includes all or part of 14 Georgia counties (Table 2-5 and Figure 2-2); however, only one is entirely within the basin, and one county has a small fraction (<20 percent) of its land area within the basin. Municipalities or cities are communities officially incorporated by the General Assembly. Georgia has more than 530 municipalities. Table 2-6 lists the municipalities in the Altamaha River basin.

Table 2-5. Georgia Counties in the Altamaha River Basin

Counties Entirely within the Altamaha River Basin	Counties Partially within the Altamaha River Basin		Counties with Less Than 20% Area within the Basin
Toombs	Appling	Candler	McIntosh
	Emanual	Glynn	
	Jeff Davis	Johnson	
	Long	Montgomery	
	Tattnall	Treutlen	
	Washington	Wayne	

2.3.2 Regional Development Centers

Regional Development Centers (RDCs) are agencies of local governments, with memberships consisting of all the cities and counties within each RDC's territorial area. There are currently 17 RDCs in Georgia. RDCs facilitate coordinated and comprehensive planning at local and regional levels, assist their member governments with conformity to minimum standards and procedures, and can have a key role in promoting and supporting management of urban runoff, including watershed management initiatives. RDCs also serve as liaisons with state and federal agencies for local governments in each region and are working with the EPD to coordinate development of TMDL implementation plans.

Funding sources include members' dues and funds available through DCA. Table 2-7 summarizes the RDCs and the associated counties within the Altamaha River basin.

Table 2-6. Georgia Municipalities in the Altamaha River Basin

HUC 03070106 – Altamaha River Subbasin				
Adrian	Johnson Corner	Meeks	Pringle	Vidalia
Collins	Kibbee	Normantown	Reidsville	Wesley
Covena	Kite	Norristown	Santa Claus	Wrightsville
Donovan	Lexsy	Nunez	Scott	Zaidee
Harrison	Lyons	Oak Park	Stillmore	
Higgston	McGregor	Ohoopee	Tarrytown	
HUC 03070107 – Ohoopee River Subbasin				
Alston	Doctortown	Graham	Madray Springs	Sharps Spur
Broadhurst	Donald	Grangerville	McKinnon	St. Simons
Cedar Crossing	Everett	Hazlehurst	Mendes	Uvalda
Charlotteville	Gardi	Jesyp	Midway	
Darien	Glennville	Ludowici	Mount Pleasant	

Table 2-7. Regional Development Centers in the Altamaha River Basin

Regional Development Center	Member Counties with Land Area in the Altamaha Basin
Heart of Georgia-Altamaha	Appling, Candler, Emanuel, Jeff Davis, Johnson, Long, Montgomery, Tattnall, Toombs, Treutlen, Wayne
Central Savannah River Area	Washington
Coastal Georgia	Glynn, Long, McIntosh

2.4 Water Use Classifications

2.4.1 Georgia's Water Use Classification System

The Board of Natural Resources was authorized through the Rules and Regulations for Water Quality Control promulgated under the Georgia Water Quality Control Act of 1964, as amended, to establish water use classifications and water quality standards for the surface waters of the state.

The water use classifications and standards were first established by the Georgia Water Quality Control Board in 1966. Georgia was the second state in the nation to have its water use classifications and standards for intrastate waters approved by the federal government in 1967. For each water use classification, water quality standards or criteria were developed which established a framework to be used by the Water Quality Control Board and later the Environmental Protection Division in making water use regulatory decisions.

The water use classification system was applied to interstate waters in 1972 by the EPD. Georgia was again one of the first states to receive federal approval of a statewide system of water use classifications and standards. Table 2-8 provides a summary of water use classifications and criteria for each use.

Congress made changes in the CWA in 1987 that required each state to adopt numeric limits for toxic substances for the protection of aquatic life and human health. To comply with these requirements, the Board of Natural Resources adopted 31 numeric standards for protection of aquatic life and 90 numeric standards for the protection of human health. Appendix B provides a summary of toxic substance standards that apply to all waters in Georgia. Water quality standards are discussed in more detail in Section 5.2.1.

Table 2-8. Georgia Water Use Classifications and Instream Water Quality Standards for Each Use

	Bacteria (fecal coliform)		Dissolved Oxygen (other than trout streams)[2]		pH	Temperature (other than trout streams)[2]	
Use Classification[1]	30-Day Geometric Mean[3] (#/100 mL)	Maximum (#/100 mL)	Daily Average (mg/L)	Minimum (mg/L)	Std. Units	Maximum Rise (°F)	Maximum (°F)
Drinking Water Requiring Treatment	1,000 (Nov-Apr) 200 (May-Oct)	4,000 (Nov-Apr)	5.0	4.0	6.0-8.5	5	90
Recreation	200 (Freshwater) 100 (Coastal)	--	5.0	4.0	6.0-8.5	5	90
Fishing Coastal Fishing[4]	1,000 (Nov-Apr) 200 (May-Oct)	4,000 (Nov-Apr)	5.0	4.0	6.0-8.5	5	90
Wild River Scenic River	No alteration of natural water quality No alteration of natural water quality						

1. Improvements in water quality since the water use classifications and standards were originally adopted in 1972 provided the opportunity for Georgia to upgrade all stream classifications and eliminate separate use designations for “Agriculture,” “Industrial,” “Navigation,” and “Urban Stream” in 1993.
2. Standards for Trout Streams for dissolved oxygen are an average of 6.0 mg/L and a minimum of 5.0 mg/L. No temperature alteration is allowed in Primary Trout Streams and a temperature change of 2 deg. F is allowed in Secondary Trout Streams.
3. Geometric means should be “based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours.” The geometric mean of a series of N terms is the Nth root of their product. Example: the geometric mean of 2 and 18 is the square root of 36.
4. Standards are the same as fishing with the exception of dissolved oxygen, which is site specific.

In the latter 1960s through the mid-1970s there were many water quality problems in Georgia. Many stream segments were classified for the uses of navigation, industrial, or urban stream. Major improvements in wastewater treatment over the years have allowed the stream segments to be raised to the uses of fishing or coastal fishing which include more stringent water quality standards. The final two segments in Georgia were upgraded as a part of the triennial review of standards completed in 1989. All of Georgia’s waters are currently classified as either fishing, recreation, drinking water, wild river, scenic river, or coastal fishing.

2.4.2 Water Use Classifications for the Altamaha River Basin

Waters in the Altamaha River basin are classified as fishing, recreation, drinking water, or wild and scenic. Most of the waters are classified as fishing. Those waters explicitly classified in Georgia regulations are shown in Table 2-9; all waters not explicitly classified are classified as fishing.

Table 2-9. Altamaha River Basin Waters Classified in Georgia Regulations[1]

Waterbody	Segment Description	Use Classification
Altamaha River	All littoral waters on the ocean side of St. Simons, Sea, and Sapelo Islands	Recreation

[1] Rules and Regulations for Water Quality Control, Chapter 391-3-6(13). Waters within the Altamaha River basin not explicitly classified and listed above are classified as Fishing.

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In This Section

- Drinking Water Supply
- Surface Water Quantity
- Groundwater Quantity

Section 3

Water Quantity

This section addresses water quantity issues (availability and use), while water quality in the Altamaha basin is the subject of Section 4. Water use in the Altamaha River basin is measured by estimates of freshwater withdrawn from groundwater and surface water. Uses of water include both consumptive and nonconsumptive uses.

Groundwater is the primary water source in the Coastal Plain Province of the Altamaha River basin. Principal aquifers of the Coastal Plain include the Upper Brunswick and Lower Brunswick aquifers, the Floridan aquifer system, the Claiborne and Clayton aquifers, and the Cretaceous aquifer system.

The Floridan aquifer system supplies most of the groundwater used in the Altamaha basin. This system consists primarily of limestone, dolostone and calcareous sand. It is generally confined, but is semiconfined to unconfined near its northern limit. Wells in this aquifer system are generally high-yielding and are extensively used for irrigation, municipal supplies, industry, and private domestic supply.

Water use in the Altamaha River basin is expected to increase in the future due to average population growth and farming.

In the following sections, water availability is discussed from a number of viewpoints. First, the important topic of drinking water is presented, which includes both surface and groundwater supplies. Then, general surface water availability is presented, followed by groundwater availability.

3.1 Drinking Water Supply

3.1.1 Drinking Water Supplies in the Altamaha River Basin

A public water system pipes water for human consumption and has at least 15 service connections or regularly serves at least 25 individuals 60 or more days out of the year. Public water system sources include surface water pumped from rivers and creeks or groundwater pumped to the surface from wells or naturally flowing from springs. Unlike other basins in Georgia, the main source of drinking water in the Altamaha basin is provided by groundwater. There are three different types of public water systems: community, non-community non-transient, and non-community transient.

Types of Public Water Systems

A community public water system serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. Examples of community water systems are municipalities, such as cities, counties, and authorities which serve residential homes and businesses located in the areas. Other types of community public water systems include rural subdivisions or mobile home parks which have a large number of homes connected to a private public water system, usually a small number of wells.

A non-community non-transient public water system serves at least 25 of the same persons over six months per year. Examples of non-community non-transient systems are schools, office buildings, and factories which are served by a well.

A non-community transient public water system does not meet the definition of a non-community non-transient system. A non-community transient public water system provides piped water for human consumption to at least 15 service connections or which regularly serves at least 25 persons at least 60 days a year. Examples of a non-community transient are highway rest stops, restaurants, motels, and golf courses.

Private domestic wells serving individual houses are not covered by the state's public water system regulations. However, the regulations for drilling domestic wells are set by the Water Well Standards Act and the local health department is responsible for insuring water quality.

In the Altamaha River basin there are no community public water systems utilizing surface water and groundwater.

3.1.2 Drinking Water Demands

Over the next few years it is estimated that there will be an increase in the use of groundwater from the Altamaha River basin.

3.1.3 Drinking Water Permitting

The Rules for Safe Drinking Water (391-3-5) adopted under the Georgia Safe Drinking Water Act of 1997, require any person who owns and/or operates a public water system to obtain a permit to operate a public water system from the Environmental Protection Division. The permitting process has three phases: Inquiry and Discovery, Technical Review, and Permitting. During these phases the owners must provide a detailed description of the project; demonstrate the reliability of the water source; render engineering plans and specifications prepared by a professional engineer demonstrating the construction integrity of wells, treatment and distribution; conduct preliminary water sample testing; and provide legal documentation including an application to operate a public water system. Permits contain specific conditions the owner must meet for different types of public water systems, including a list of approved water sources, filter rates, disinfection and treatment requirements, compliance with sample testing schedule, and number of allowed service connections. Permits are issued for 10 years and are renewable.

3.2 Surface Water Quantity

3.2.1 Surface Water Supply Sources

The Altamaha River basin encompasses 2,870 square-miles in southeast Georgia. Formed by the confluence of the Ocmulgee and Oconee Rivers near Lumber City in

Telfair County, the Altamaha River flows southeasterly 125 miles emptying into the Atlantic Ocean near Darien.

The principal surface water resources are the Altamaha River and the Ohoopee River. The lower portion of the basin contains the Altamaha River (average annual flow 14,300 cfs). The upper portion is drained by the Ohoopee River (average annual flow 1,200 cfs), which flows southeast joining the Altamaha River about 12 miles below Reidsville. Some of the other larger tributaries across the basin include Penholoway Creek, Beards Creek, Pendleton Creek, and the Little Ohoopee River.

3.2.2 Surface Water Supply Demands and Uses

Municipal and Industrial Demand

Municipal and Industrial (M&I) water demands include public supplied needs such as residential, commercial, and industrial, and other demands such as distribution system losses.

Currently, the Altamaha River basin has one surface water withdrawal permit. Surface water withdrawal permits are for users equal to or greater than 100,000 gallons per day. Users below this amount of surface water are not required to have a permit for their withdrawals.

Agricultural Water Demand

Agricultural surface water demand in the Altamaha River Basin is considerable. Irrigated crops are grown throughout Emmanuel, Johnson, and Tattnall Counties. Other counties in the basin also contain lesser amounts of irrigated acreage.

The demands on surface water resources for agricultural activities include irrigation for crops, nursery, and turf; drinking water for livestock and poultry; and to a much lesser extent, water for aquacultural purposes.

Irrigated Acreage

The total water demand from agriculture, including both surface water and groundwater demand, may be estimated using a variety of agricultural data collected by multiple sources. NRCS has attempted to combine this information for the purpose of estimating current and future agricultural water use in the basin. Table 3-1 shows historical irrigated acreage in the basin from 1974 to 1998.

Irrigated acres in the Altamaha River basin grew from 3,756 in 1974 to a maximum for the basin of 48,551 in 1998. Assuming growth rates continue as observed in the Altamaha River basin between 1982 and 1998, there will be approximately 69,000 acres under irrigation by 2020.

Table 3-1. Irrigated Acres in the Altamaha River Basin, 1974-1998

Year	HUC 03070106	HUC 03070107	Basin Total
1974	1,906	1,850	3,756
1978	7,928	9,865	17,793
1979	9,503	14,431	23,934
1980	12,006	13,291	25,298
1981	14,283	16,273	30,556
1982	15,209	21,529	36,738
1984	16,845	23,513	40,358
1986	15,829	25,094	40,923
1989	16,822	25,442	42,264
1992	20,166	27,691	47,857
1995	22,204	26,000	48,204
1998	24,241	24,310	48,551

USDA-NRCS estimates based on county level data extrapolated to the basin.

Water Demand

Agricultural water demand is dependent upon a number of variables that include, but are not limited to, irrigated acreage, cropping mix and patterns, soil characteristics, climatic conditions, type of animal operation, best management practices, and market conditions. Water use in the Altamaha River basin reflects the influence of these variables (Table 3-2). No distinct trend can be observed; however, from 1980 to 2000 there was a increase of 12 MGD from 14.12 MGD in 1980 to 26.77 MGD in 2000.

Table 3-2. Historical Agricultural Water Use (MGD) in the Altamaha River Basin, 1980-2000

Year	HUC 03070106	HUC 03070107	Basin Total
1980	6.02	8.09	14.12
1985	6.10	9.13	15.23
1987	7.10	9.98	17.08
1990	5.49	6.39	11.89
1995	11.90	13.68	25.57
2000	11.56	15.21	26.77

USDA-NRCS estimates based on county level data extrapolated to the basin.

Approximately 97.5 percent of the agricultural water used in 2000 was for irrigation purposes (26.10 MGD). The remaining 2.5 percent (.67 MGD) was used for animal operations.

Future agricultural water demand is expected to increase slightly within the basin to 36.7 MGD by the year 2020 on a projected 69,000 acres under irrigation by that time. Table 3-3 shows the projected increase in agricultural water demand in the basin through the year 2020. The reader should note that significant increases in irrigated acreage will have the potential to result in a much higher demand.

Table 3-3. Projected Water Use in the Altamaha River Basin, 2005-2020

Year	Projected Water Use (MGD)
2005	29.2
2010	31.7
2015	34.2
2020	36.7

Power Generation Water Demand

There are no hydropower facilities in the Altamaha basin.

Navigational Water Demand

There is some commercial navigation in the lower portion of the Altamaha River, particularly in the intracoastal waterway.

Recreation

Recreation activities in the Altamaha River basin include fishing, camping, boating, swimming, picnicking, and other activities.

Waste Assimilation Water Demand

Water quantity, wastewater treatment, and wastewater discharge permitting are addressed in Section 4. However, it should be noted that the guidelines for discharge of treated effluent into the rivers and streams of the Altamaha River basin assume that sufficient surface water flow will be available to assimilate waste and ensure that water quality criteria will be met.

Environmental Water Demands

EPD recognizes the importance of maintaining suitable aquatic habitat in Georgia's lakes and streams to support viable communities of fish and other aquatic organisms.

A significant issue that is receiving increasing attention from EPD is the minimum stream flow policy. EPD's current minimum stream flow policy is to protect the lowest 7-day average flow, which would have occurred during any 10-year period for a stream (commonly called the 7Q10). EPD is considering increasing the minimum flow requirement under recommendations of the Wildlife Resources Division.

3.2.3 Surface Water Withdrawal Permitting

The 1977 Surface Water Amendments to the Georgia Water Quality Control Act of 1964 require all non-agricultural users of more than 100,000 GPD on a monthly average (from any Georgia surface water body) to obtain a permit for this withdrawal from EPD. These users include municipalities, industries, military installations, and all other non-agricultural users. The statute stipulates that all pre-1977 users who could establish the quantity of their use prior to 1977 would be "grandfathered" for that amount of withdrawal. There is only one surface water withdrawal permit in the Altamaha River basin – a permit for the Southern Nuclear Operating Company Plant Hatch in Appling County for a withdrawal from the Altamaha River of 103.6 mgd (24-hour maximum) and 85.0 mgd (monthly average).

Applicants are required to submit details relating to the source of withdrawals, demand projections, water conservation measures, low flow protection measures (for non-grandfathered withdrawals), and raw water storage capacities. EPD issued permit identifies the source of withdrawal, the monthly average and maximum 24-hour withdrawal, the standard and special conditions under which the permit is valid, and the expiration date of the permit. The standard conditions section of the permit generally defines the reporting requirements (usually annual submission of monthly average withdrawals); the special conditions section of the permit usually specifies measures the permittee is required to undertake so as to protect downstream users and instream uses (e.g., waste assimilation, aquatic habitat). The objective of these permits is to manage and allocate water resources in a manner that both efficiently and equitably meets the needs of all the users.

Farm Irrigation Permits

The 1988 Amendments to the Water Quality Control Act establish the permitting authority within EPD to issue farm irrigation water use permits. As with the previously mentioned surface water permitting statute, the lower threshold is 100,000 GPD; however users of less water may apply for and be granted a permit. With two exceptions, farm use is defined as irrigation of any land used for general farming, aquaculture, pasture, turf production, orchards, nurseries, watering for farm animals and poultry, and related farm activities. One relevant exception is that the processing of perishable agricultural products is not considered a farm use.

Applicants for these permits who can establish that their use existed prior to July 1, 1988, and when these applications are received prior to July 1, 1991, are “grandfathered” for the operating capacity in place prior to July 1, 1988. Other applications are reviewed and granted with an eye towards protection of grandfathered users and the integrity of the resource. Generally, agricultural users are not required to submit any water use reports.

In the Altamaha River basin, a total of 1,079 surface and/or groundwater permits have been issued.

3.2.4 Flooding and Floodplain Management

The Altamaha River basin was unaffected by the massive flooding that occurred in parts of Georgia in 1994, however, many counties within the Altamaha, Ocmulgee, and Oconee basins were included in Federal Disaster Declaration #1209 as a result of the 1998 floods.

Floodplain development is a constant concern, because development within floodplain areas can increase flood levels, thereby increasing the number of people and the amount of property at risk. The term “floodplain management” is often used as a synonym for program or agency-specific projects and regulations. It is in fact quite a broad concept. Floodplain management is a continuous process of making decisions about whether flood plains are to be used for development and how they are to be developed.

Floodplain Management Activities

To increase understanding and maintain a working knowledge of floodplain management, Georgia’s Floodplain Management Office periodically conducts training workshops throughout the state for local officials. The workshops cover the related aspects of the National Flood Insurance Program (NFIP), administration and enforcement of local flood ordinance, the effects of floodplain management on flood insurance rates and flood hazard mitigation.

The Floodplain Management Office also participates in the annual Governor’s Severe Weather conference. The purpose of this conference is to increase awareness and preparedness regarding all types of severe weather—flooding, hurricanes, tornadoes, thunderstorms and ice storms. Flooding is the number one natural disaster in Georgia according to the Georgia Emergency Management Agency (GEMA), coordinator of the conference. The conference is an opportunity for emergency managers, public safety personnel, medical professionals, elected officials and other interested persons to gather and discuss means to better protect against loss of lives and property.

EPD is also working with a new initiative called "Project Impact." Project Impact works with state and local governments across the country to build communities that are more likely to withstand the ravages of natural disasters. Project Impact's goal is to erase the ceaseless damage-repair-damage cycle by implementing preventive measures before disaster occurs.

3.3 Groundwater Quantity

3.3.1 Groundwater Sources

The Altamaha River basin is in the Coastal Plain physiographic province. The Coastal plain area lies south of the fall line and is a region underlain by alternating layers of sand, clay and limestone that generally deepen and thicken to the southeast. The main groundwater source in most of the basin is the Floridan aquifer system. This aquifer system delivers tremendous amounts of water quickly, leading to very heavy municipal, industrial and agricultural usage from this source.

3.3.2 Groundwater Supply Demands

Municipal and Industrial Uses

Municipal and Industrial (M&I) water demands include public supplied and private supplied residential, commercial, governmental, institutional, manufacturing and other demands such as distribution system losses.

Municipal and Industrial groundwater users equal to or greater than 100,000 gallons per day are required to obtain permits from the Georgia EPD. Users below this amount of groundwater are not required to have a permit for their withdrawals.

Agricultural Water Demand

Agricultural surface water demand in the Altamaha River Basin is considerable. Irrigated crops are grown throughout Emmanuel, Johnson, and Tattnall Counties. Other counties in the basin also contain lesser amounts of irrigated acreage.

The demands on surface water resources for agricultural activities include irrigation for crops, nursery, and turf; drinking water for livestock and poultry; and, to a much lesser extent, water for aquacultural purposes.

3.3.3 Groundwater Supply Permitting

Nonagricultural Permits

The Georgia Ground Water Use Act of 1972 requires permits from EPD for all non-agricultural users of groundwater of more than 100,000 GPD. General information required of the applicant includes location (latitude and longitude), past, present, and expected water demand, expected unreasonable adverse effects on other users, the aquifer system from which the water is to be withdrawn, and well construction data. The permits issued by EPD stipulate both the allowable monthly average and annual average withdrawal rates, standard and special conditions under which the permit is valid, and the expiration date of the permit. Groundwater use reports are generally required of the applicant on a semi-annual basis. The objective here is the same as with surface water permits.

Farm Irrigation Permits

The 1988 Amendments to the Ground Water Use Act establishes the permitting authority within EPD to issue farm irrigation water use permits. As with the previously mentioned groundwater permitting statute, the lower threshold is 100,000 GPD; however users of less water may apply and be granted a permit. A total of 1,079 surface and/or groundwater agricultural withdrawal permits have been issued.

Applicants for these permits who could establish that their use existed prior to July 1, 1988, and when their applications were received prior to July 1, 1991, were "grandfathered" for the operating capacity in place prior to July 1, 1988. Other applications are reviewed and granted with an eye towards protection of grandfathered users and the integrity of the resource. Presently, agricultural users are not required to submit any water use reports; however, recent legislation will institute a metering and reporting program.

Excessive Groundwater Withdrawals

Excessive groundwater withdrawal can lead to lowering or drawdown of the water table. Localized groundwater drawdowns are generally discovered only after the fact of permitting has occurred and withdrawal operations begun. To avoid such a possibility, if an application for a very large use of groundwater is received, the Water Resources Management Program of the Georgia EPD can take certain steps to possibly contain drawdown effects. Modeling the hydrogeologic impact of such a large user may be required of the potential permittee. If this computer analysis indicates no unreasonable impact on existing users, such a water use permit may be approved. Another recommended possibility is a negotiated reduction in permit amounts to a more moderate amount of withdrawal, with lessened impacts. Prior to full scale production of a well field, well pumping tests run at or near actual production rates can be required. These may give the permittee and the EPD some real idea of the amount of water that may be pumped safely, without endangering other users or drawing down the aquifer too greatly. Permit withdrawal limits may then be set at some safer yield which is determined by these pumping tests. These tests may also indicate that proposed pumping amounts may require more wells drilled to spread out the ultimate production impact on the aquifer.

References

Georgia Environmental Protection Division. March 1986. Water Availability and Use Report, Altamaha River Basin.

DRI/McGraw-Hill.1996. The Regional Economic Forecast of Population and Employment Comprehensive Study Volume 1. Prepared for: The Georgia Department of Natural Resources Environmental Protection Division. DRI/McGraw-Hill, Lexington, MA.

In This Section

- Sources and Types of Environmental Stressors
- Summary of Stressors Affecting Water Quality

Section 4

Water Quality: Environmental Stressors

Sections 4, 5, 6, and 7 are closely linked, providing the foundation for the water quality concerns in the basin, identifying the priority issues based on these concerns, and finally, recommending management strategies to address these concerns. Therefore, the reader will probably want to flip back and forth between sections to track specific issues.

This section describes the important environmental stressors that impair or threaten water quality in the Altamaha River basin. Section 4.1 first discusses the major sources of environmental stressors. Section 4.2 then provides a summary of individual stressor types as they relate to all sources. These include both traditional chemical stressors, such as metals or oxygen demanding waste, and less traditional stressors, such as modification of the flow regime (hydromodification) and alteration of physical habitat.

4.1 Sources and Types of Environmental Stressors

Environmental stressors are first catalogued by type of source in this section. This is the traditional programmatic approach, and it provides a match to regulatory lines of authority for permitting and management. Assessment requires an integration of stressor loads across all sources, as described in Section 4.2.

4.1.1 Point Sources and Non-discharging Waste Disposal Facilities

Point sources are defined as discharges of treated wastewater to the river and its tributaries regulated under the National Pollutant Discharge Elimination System (NPDES). These are divided into two main types – permitted wastewater discharges, which tend to be discharged at relatively stable rates, and permitted stormwater discharges, which tend to be discharged at highly irregular, intermittent rates, depending on precipitation. Nondischarging waste disposal facilities, including land application systems and landfills, which are not intended to discharge treated effluent to surface waters, are also discussed in this section.

NPDES Permitted Wastewater Discharges

The EPD NPDES permit program regulates municipal and industrial waste discharges, monitors compliance with limitations, and takes appropriate enforcement action for violations. For point source discharges, the permit establishes specific effluent limitations and specifies compliance schedules that must be met by the discharger. Effluent limitations are designed to achieve water quality standards in the receiving water and are reevaluated periodically (at least every 5 years).

Municipal Wastewater Discharges

Municipal wastewater treatment plants are among the most significant point sources regulated under the NPDES program in the Altamaha River basin, accounting for the majority of the total point source effluent flow (exclusive of cooling water). These plants collect, treat, and release large volumes of treated wastewater. Pollutants associated with treated wastewater include pathogens, nutrients, oxygen-demanding waste, metals, and chlorine residuals. Over the past several decades, Georgia has invested more than $96.0 million in construction and upgrade of municipal water pollution control plants in the Altamaha River basin. These upgrades have resulted in significant reductions in pollutant loading and consequent improvements in water quality below wastewater treatment plant outfalls. As of the 1999-2001 water quality assessment, 14 miles of rivers/streams were identified in which municipal discharges contributed to not fully supporting designated uses, all of which are being addressed through the NPDES permitting process.

Table 4-1 displays the major municipal wastewater treatment plants with permitted discharges of 1 million gallons per day (MGD) or greater in the Altamaha River basin. Major and minor municipal wastewater treatment plans are shown geographically in Figure 4-1. In addition, there are discharges from a variety of smaller wastewater treatment plants, including both public facilities (small public water pollution control plants, schools, marinas, etc.) and private facilities (package plants associated with non-sewered developments and mobile home parks) with less than a 1 MGD flow. These minor discharges might have the potential to cause localized stream impacts, but they are relatively insignificant from a basin perspective. A complete list of permitted dischargers in the Altamaha River basin is presented in Appendix C.

Table 4-1. Major Municipal Wastewater Treatment Plant Discharges with Permitted Monthly Flow Greater than 1 MGD in the Altamaha River Basin

NPDES Permit No.	Facility Name	County	Receiving Stream	Permitted Monthly Avg. Flow
HUC 03070106				
GA0037982	Glennville	Tattnall	Brickyard Br	2.0
GA0026000	Jesup WPCP	Wayne	Altamaha River	2.5
HUC 03070107				
GA0020346	Swainsboro WPCP	Emanuel	Crooked Creek	3.0
GA0025488	Vidalia WPCP	Toombs	Swift Creek	1.88

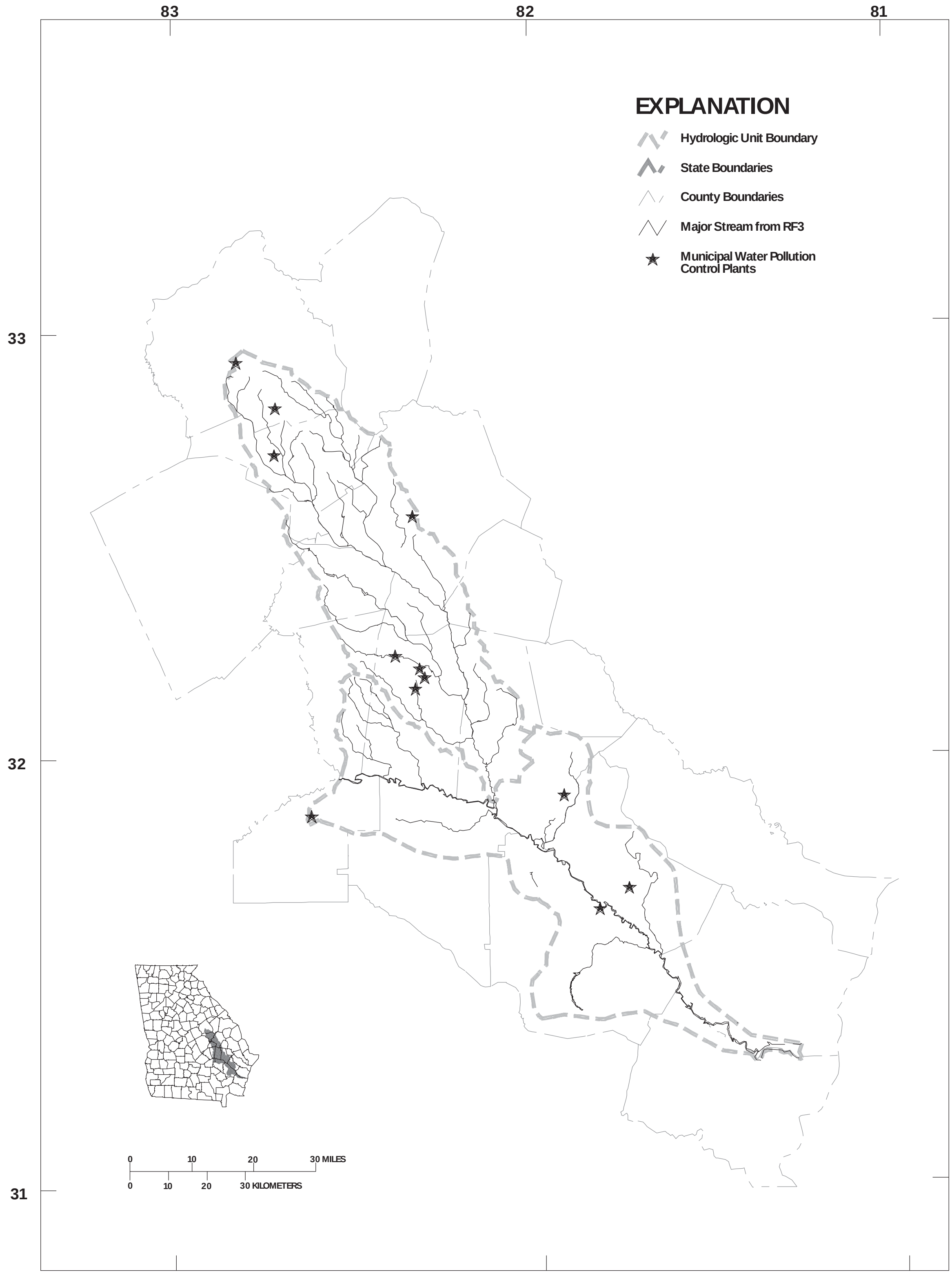

Figure 4-I. Location of Municipal Wastewater Treatment Plants in the Altamaha River Basin

Most urban wastewater treatment plants also receive industrial process and non-process wastewater, which can contain a variety of conventional and toxic pollutants. The control of industrial pollutants in municipal wastewater is addressed through pretreatment programs. The major publicly owned wastewater treatment plants in this basin have developed and implemented approved local industrial pretreatment programs. Through these programs, the wastewater treatment plants are required to establish effluent limitations for their significant industrial dischargers (those which discharge in excess of 25,000 gallons per day of process wastewater or are regulated by a Federal Categorical Standard) and to monitor the industrial user's compliance with those limits. The treatment plants are able to control the discharge of organics and metals into their sewerage system through the controls placed on their industrial users.

Industrial Wastewater Discharges

Industrial and federal wastewater discharges are also significant point sources regulated under the NPDES program. There are a total of 19 permitted municipal, state, federal, private, and industrial wastewater and process water discharges in the Altamaha River basin, as summarized in Table 4-2 and shown in Figures 4-2 and 4-3. The complete permit list is summarized in Appendix C.

Table 4-2. Summary of NPDES Permits in the Altamaha River Basin

HUC	Major Municipal Facilities	Major Industrial and Federal Facilities	Minor Public Facilities	Minor Private and Industrial Facilities	Total
03070106	2	1	2	6	11
03070107	2	0	6	0	8
Total	*4*	*1*	*8*	*6*	*19*

The nature of industrial discharges varies widely compared to discharges from municipal plants. Effluent flow is not usually a good measure of the significance of an industrial discharge. Industrial discharges can consist of organic, heavy oxygen-demanding waste loads from facilities such as pulp and paper mills; large quantities of noncontact cooling water from facilities such as power plants; pit pumpout and surface runoff from mining and quarrying operations, where the principal source of pollutants is the land-disturbing activity rather than the addition of any chemicals or organic material; or complex mixtures of organic and inorganic pollutants from chemical manufacturing, textile processing, metal finishing, etc. Pathogens and chlorine residuals are rarely of concern with industrial discharges, but other conventional and toxic pollutants must be addressed on a case-by-case basis through the NPDES permitting process. Table 4-3 lists the major industrial and federal wastewater treatment plants with discharges into the Altamaha River basin in Georgia.

Table 4-3. Major Industrial and Federal Wastewater Treatment Facilities in the Altamaha River Basin

NPDES Permit No.	Facility Name	County	Description	Flow (Mgd)	Receiving Stream
HUC 03070106					
GA0003620	Rayonier Inc. Jesup	Wayne	Industry	67	Altamaha River

There are also minor industrial discharges that may have the potential to cause localized stream impacts, but are relatively insignificant from a basin perspective.

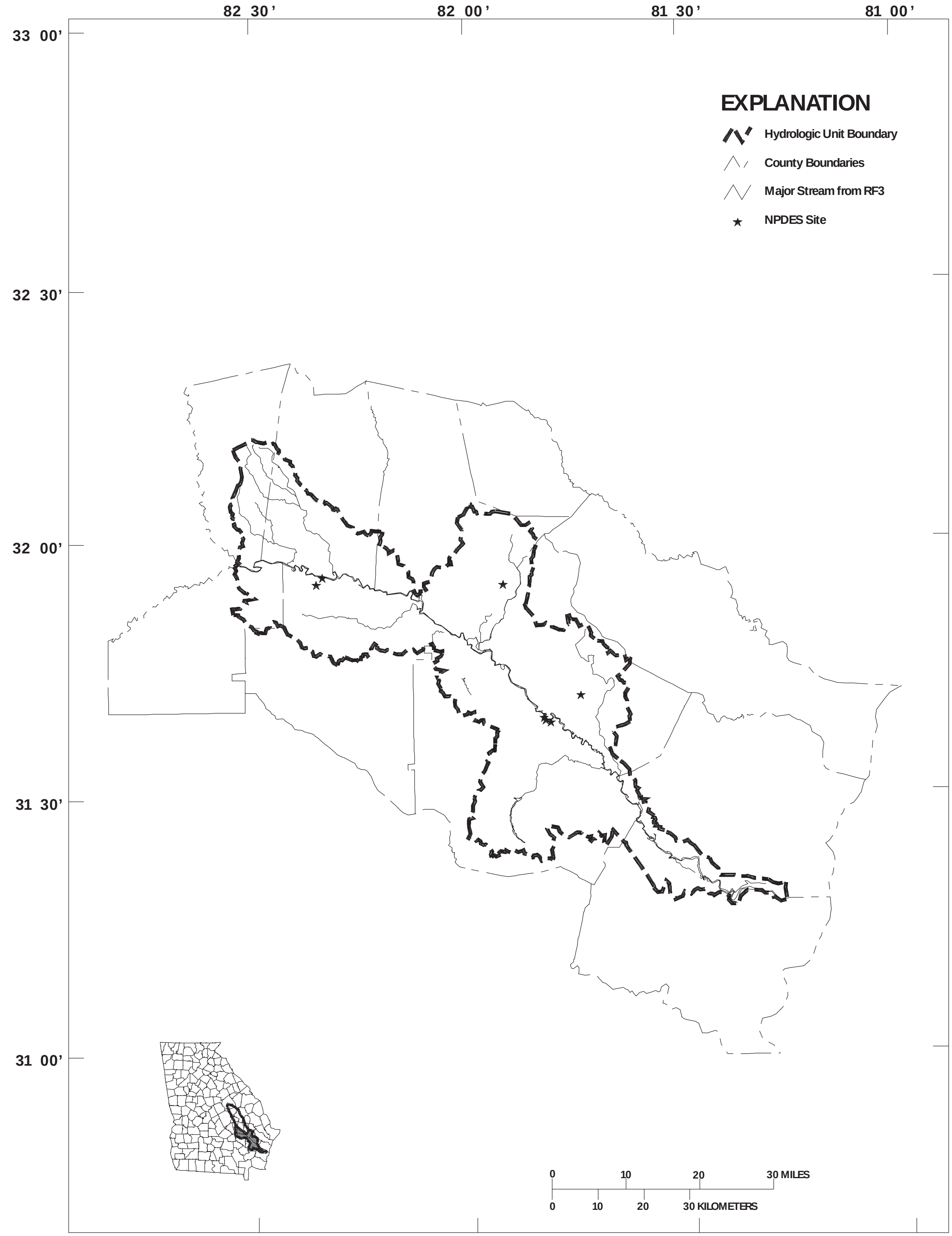

Figure 4-2. NPDES Sites Permitted by GAEPD, Altamaha River Basin, HUC 03070106

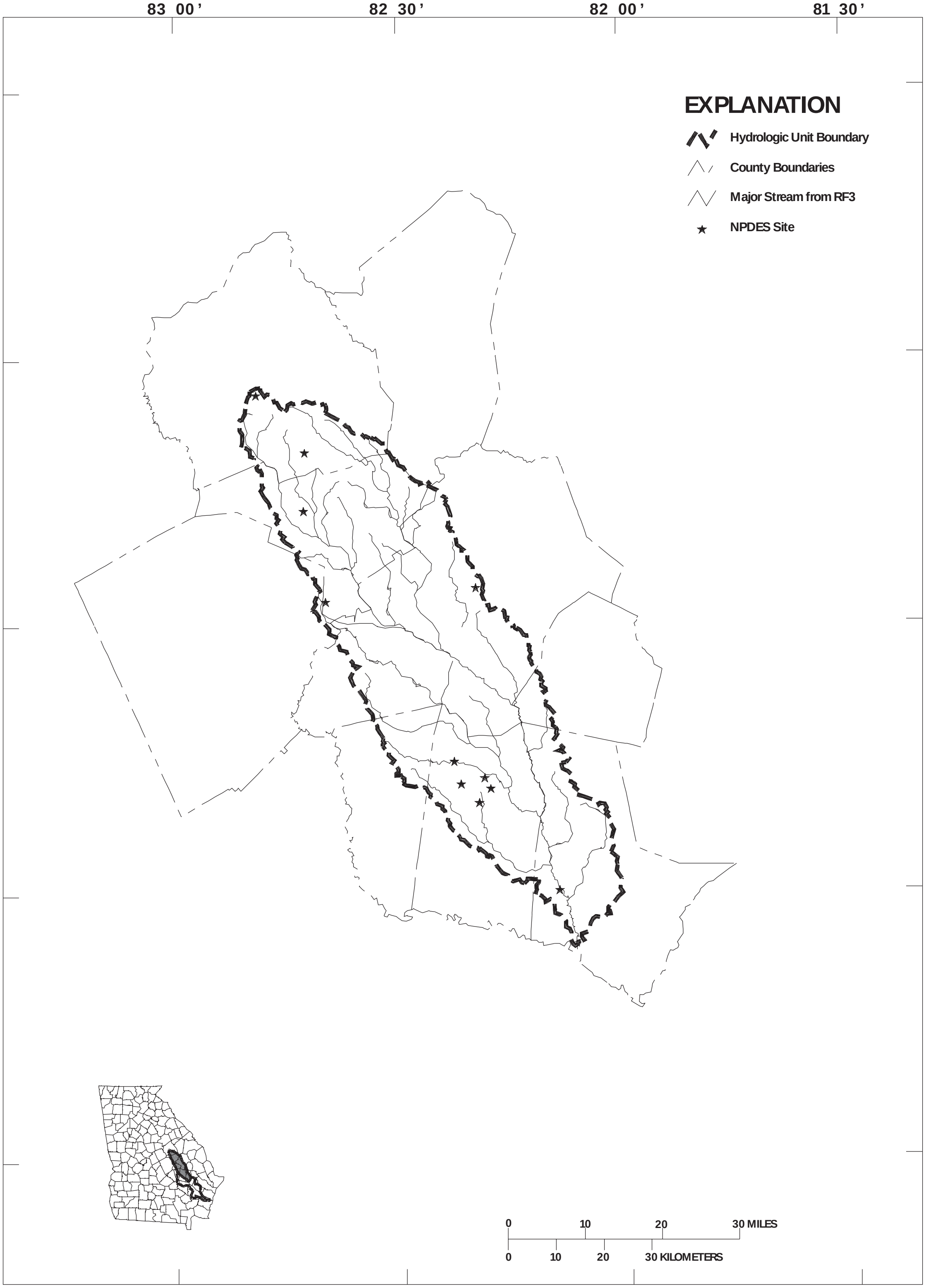

Figure 4-3. NPDES Sites Permitted by GAEPD, Altamaha River Basin, HUC 03070107

Combined Sewer Overflows

Combined sewers are sewers that carry both stormwater runoff and sanitary sewage in the same pipe. Most of these combined sewers were built at the turn of the century and were present in most large cities. At that time both sewage and stormwater runoff were piped from the buildings and streets to the small streams that originated in the heart of the city. When these streams were enclosed in pipes, they became today's combined sewer systems. As the cities grew, their combined sewer systems expanded. Often new combined sewers were laid to move the untreated wastewater discharge to the outskirts of the town or to the nearest waterbody.

In later years wastewater treatment facilities were built and smaller sanitary sewers were constructed to carry the sewage (dry weather flows) from the termination of the combined sewers to these facilities for treatment. However, during wet weather, when significant stormwater is carried in the combined system, the sanitary sewer capacity is exceeded and a combined sewer overflow (CSO) occurs. The surface discharge is a mixture of stormwater and sanitary waste. Uncontrolled CSOs thus discharge raw diluted sewage and can introduce elevated concentrations of bacteria, BOD, and solids into a receiving water body. In some cases, CSOs discharge into relatively small creeks.

CSOs are considered a point source of pollution and are subject to the requirements of the Clean Water Act. Although CSOs are not required to meet secondary treatment effluent limits, sufficient controls are required to protect water quality standards for the designated use of the receiving stream. In its 1990 session, the Georgia Legislature passed a CSO law requiring all Georgia cities to eliminate or treat CSOs.

There are no known combined sewer overflows in the Altamaha River basin.

NPDES Permitted Stormwater Discharges

Urban stormwater runoff in the Altamaha basin has been identified as a source of stressors from pollutants such as oxygen-demanding waste (BOD) and fecal coliform bacteria. Stormwater may flow directly to streams as a diffuse, nonpoint process, or may be collected and discharged through a storm sewer system. Some storm sewer systems are now subject to NPDES permitting and are discussed in this section. Contributions from nonpoint stormwater are discussed in later sections.

Pollutants typically found in urban stormwater runoff include pathogens (such as bacteria and viruses from human and animal waste), heavy metals, debris, oil and grease, petroleum hydrocarbons and a variety of compounds toxic to aquatic life. In addition, the runoff often contains sediment, excess organic material, fertilizers (particularly nitrogen and phosphorus compounds), herbicides, and pesticides which can upset the natural balance of aquatic life in lakes and streams. Stormwater runoff may also increase the temperature of a receiving stream during warm weather, which potentially threatens valuable trout fisheries in the Altamaha River basin. All of these pollutants, and many others, influence the quality of stormwater runoff. There are also many potential problems related to the quantity of urban runoff, which can contribute to flooding and erosion in the immediate drainage area and downstream.

Municipal Stormwater Discharges

In accordance with Federal Phase I stormwater regulations, the state of Georgia has issued individual area wide NPDES municipal separate storm sewer system (MS4) permits to 58 cities and counties in municipal areas with populations greater than 100,000 persons. No Phase I municipalities drain to the Altamaha River basin. Of the 86 cities and counties affected by the Phase II stormwater regulations, none are in the Altamaha River Basin.

Industrial Stormwater Discharges

Industrial sites often have their own stormwater conveyance systems. The volume and quality of stormwater discharges associated with industrial activity is dependent on a number of factors, such as the industrial activities occurring at the facility, the nature of the precipitation, and the degree of surface imperviousness (hard surfaces). These discharges are of intermittent duration with short-term pollutant loadings that can be high enough to have shock loading effects on the receiving waters. The types of pollutants from industrial facilities are generally similar to those found in stormwater discharges from commercial and residential sites; however, industrial facilities have a significant potential for discharging at higher pollutant concentrations, and may include specific types of pollutants associated with a given industrial activity.

EPD has issued one general permit regulating stormwater discharges for 10 of 11 federally regulated industrial subcategories. The general permit for industrial activities requires the submission of a Notice of Intent (NOI) for coverage under the general permit; the preparation and implementation of a stormwater pollution prevention plan; and, in some cases, analytical testing of stormwater discharges from the facility. As with the municipal stormwater permits, implementation of site-specific best management practices is the preferred method for controlling stormwater runoff. As of May 2003, approximately 41 NOIs had been filed for the Altamaha River basin.

The 11th federally regulated industrial subcategory (construction activities) is covered under NPDES General Permit No. GAR100000. This general permit regulates stormwater discharges associated with construction activity at sites and common developments disturbing more than five acres. The general permit requires the submission of a Notice of Intent (NOI) to obtain coverage under the permit, the preparation and implementation of an Erosion, Sedimentation, and Pollution Control Plan, and the preparation and implementation of a Comprehensive Monitoring Program which provides for monitoring of turbidity levels in the receiving stream(s) and/or stormwater outfalls(s) during certain rain events. The general permit became effective on August 1, 2000 and will be renewed in 2003 to include construction sites between one and five acres.

Nondischarging Waste Disposal Facilities

Land Application Systems (LASs)

In addition to permits for point source discharges, EPD has developed and implemented a permit system for land application systems (LASs). LASs for final disposal of treated wastewaters have been encouraged in Georgia and are designed to eliminate surface discharges of effluent to waterbodies. LASs are used as an alternative to advanced levels of treatment or as the only alternative in some environmentally sensitive areas.

When properly operated, an LAS should not be a source of stressors to surface waters. The locations of LASs are, however, worth noting because of the (small) possibility that a LAS could malfunction and become a source of stressor loading. Also, it is possible that contaminants, such as nutrients, could be transported offsite via groundwater and this potential source should be considered in watershed assessments where nutrient sensitive waters are located downstream.

A total of 171 municipal and 54 industrial permits for land application systems were in effect in Georgia in 2003. Municipal and other wastewater land application systems within the Altamaha Basin are listed in Table 4-4. The locations of all LASs within the basin are shown in Figures 4-4 and 4-5. Also, it is possible that contaminants, such as nutrients, could be transported offsite via groundwater and this potential source should be considered in watershed assessments where nutrient sensitive waters are located downstream.

Table 4-4. Wastewater Land Application Systems in the Altamaha River Basin

Facility Name	County	Permit No.	Permitted Flow (Mgd)
Crider Poultry Emanuel	Emanuel	GA01-300	1
Reidsville LAS	Tattnall	GA02-255	0.18
Reidsville Sherwood Forest	Tattnall	GA02-058	0.5
Screven LAS	Wayne	GA02-140	0.1
Stillmore LAS	Emanuel	GA02-075	0.05
Swainsboro LAS	Emanuel	GA02-257	1.86
Uvalda LAS	Montgomery	GA02-040	0.15
Vidalia LAS	Toombs	GA02-100	1.8

Landfills

Permitted landfills are required to contain and treat any leachate or contaminated runoff prior to discharge to any surface water. The permitting process encourages either direct connection to a publicly owned treatment works (although vehicular transportation is allowed in certain cases) or treatment and recirculation on-site to achieve a no-discharge system. Direct discharge in compliance with NPDES requirements is allowed but is not currently practiced at any landfills in Georgia. Groundwater contaminated by landfill leachate from older, unlined landfills represents a potential threat to waters of the state. Groundwater and surface water monitoring and corrective action requirements are in place for all landfills operated after 1988 to identify and rededicate potential threats. The provisions of the Hazardous Sites Response Act address threats posed by older landfills as releases of hazardous constituents are identified. All new municipal solid waste landfills are required to be lined and to have a leachate collection system installed.

EPD's Land Protection Branch is responsible for permitting and compliance of municipal and industrial Subtitle D landfills. The location of permitted landfills within the basin is shown in Figures 4-6 and 4-7.

4.1.2 Nonpoint Sources

The pollution impact on Georgia's streams has radically shifted over the last two decades. Streams are no longer dominated by untreated or partially treated sewage discharges, which had resulted in little or no oxygen and little or no aquatic life. The sewage is now treated, oxygen levels have recovered, and healthy fisheries have followed. Industrial discharges have also been placed under strict regulation. However, other sources of pollution are still affecting Georgia's streams. These sources are referred to as *nonpoint sources*. Nonpoint sources are diffuse in nature. Nonpoint source pollution can generally be defined as the pollution caused by rainfall or snowmelt moving over and through the ground. As water moves over and through the soil, it picks up and carries away natural pollutants and pollutants resulting from human activities, finally depositing them in lakes, rivers, wetlands, coastal waters, or groundwater. Habitat alteration (e.g., removal of riparian vegetation) and hydrological modification (e.g., channelization, bridge construction) can also cause adverse effects on the biological integrity of surface waters and are also treated as nonpoint sources of pollution.

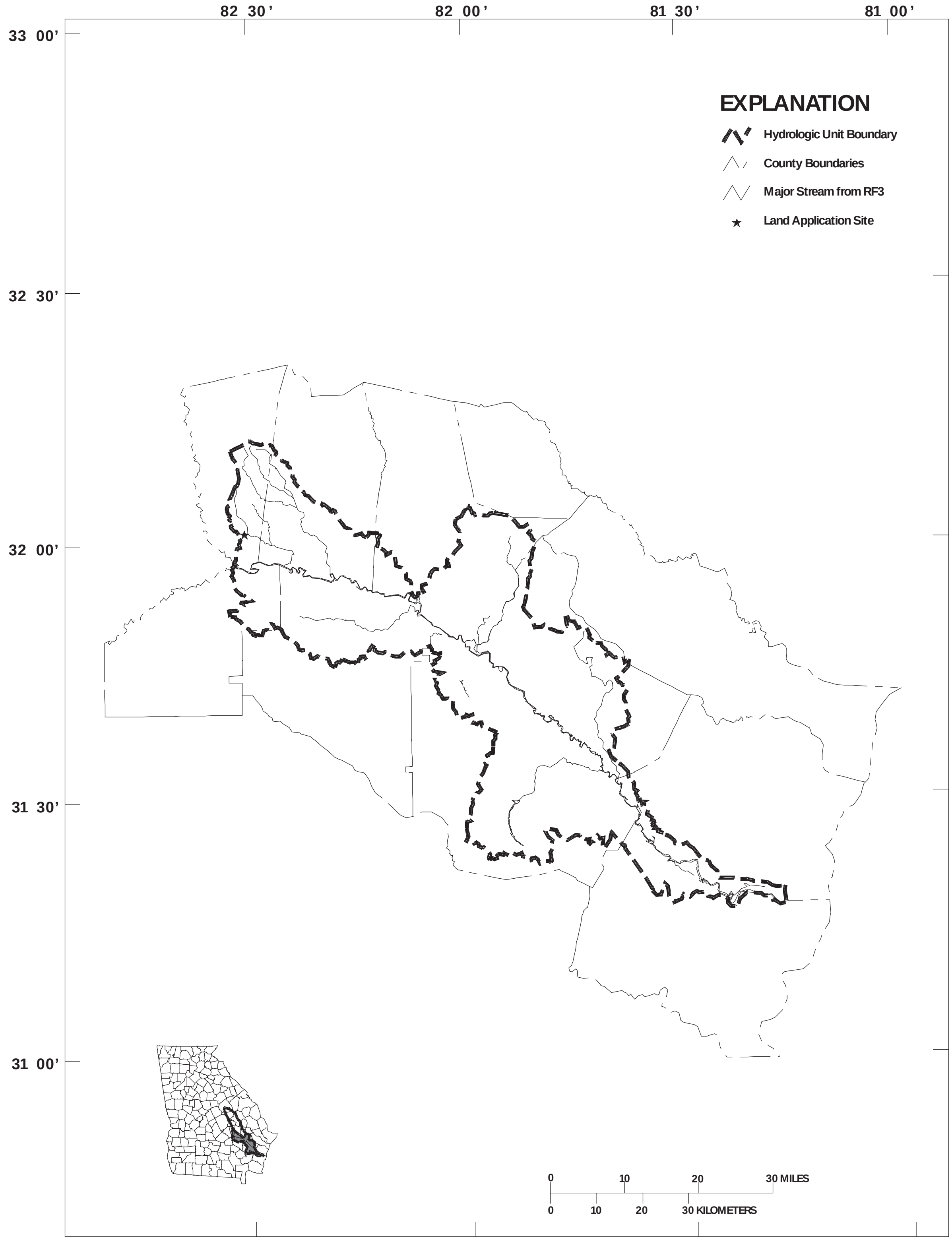

Figure 4-4. Land Application Systems, Altamaha River Basin, HUC 03070106

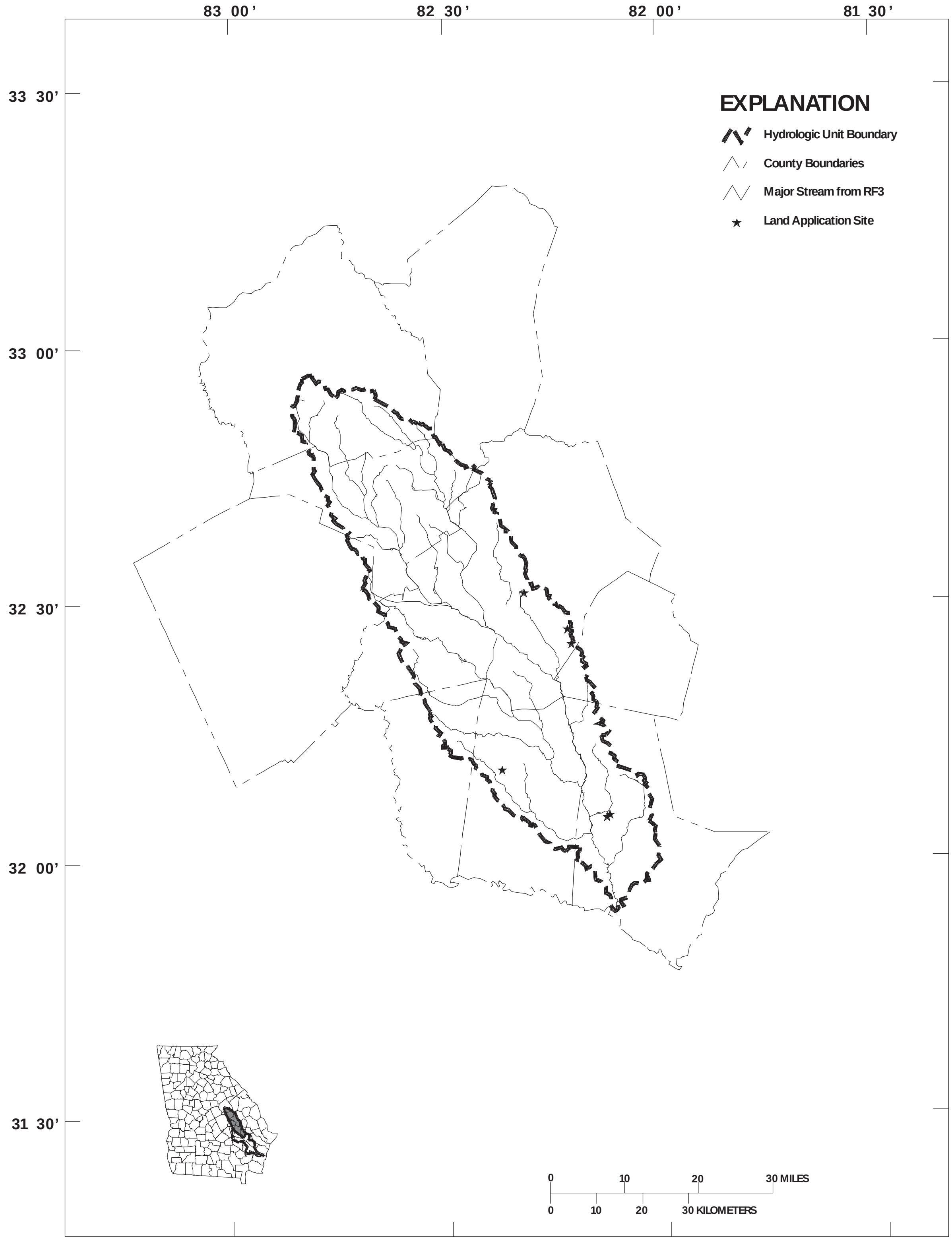

Figure 4-5. Land Application Systems, Altamaha River Basin, HUC 03070107

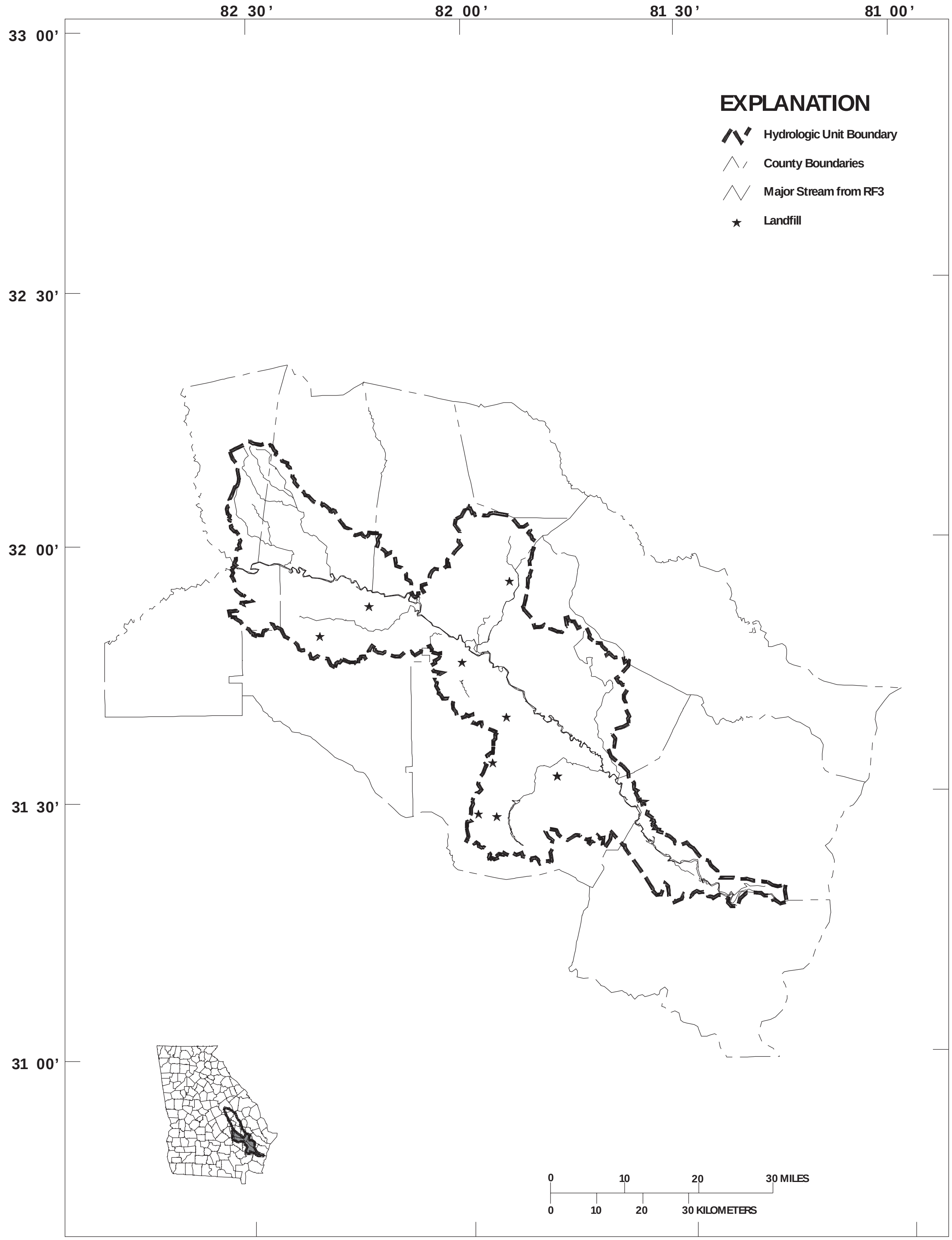

Figure 4-6. Landfills, Altamaha River Basin, HUC 03070106

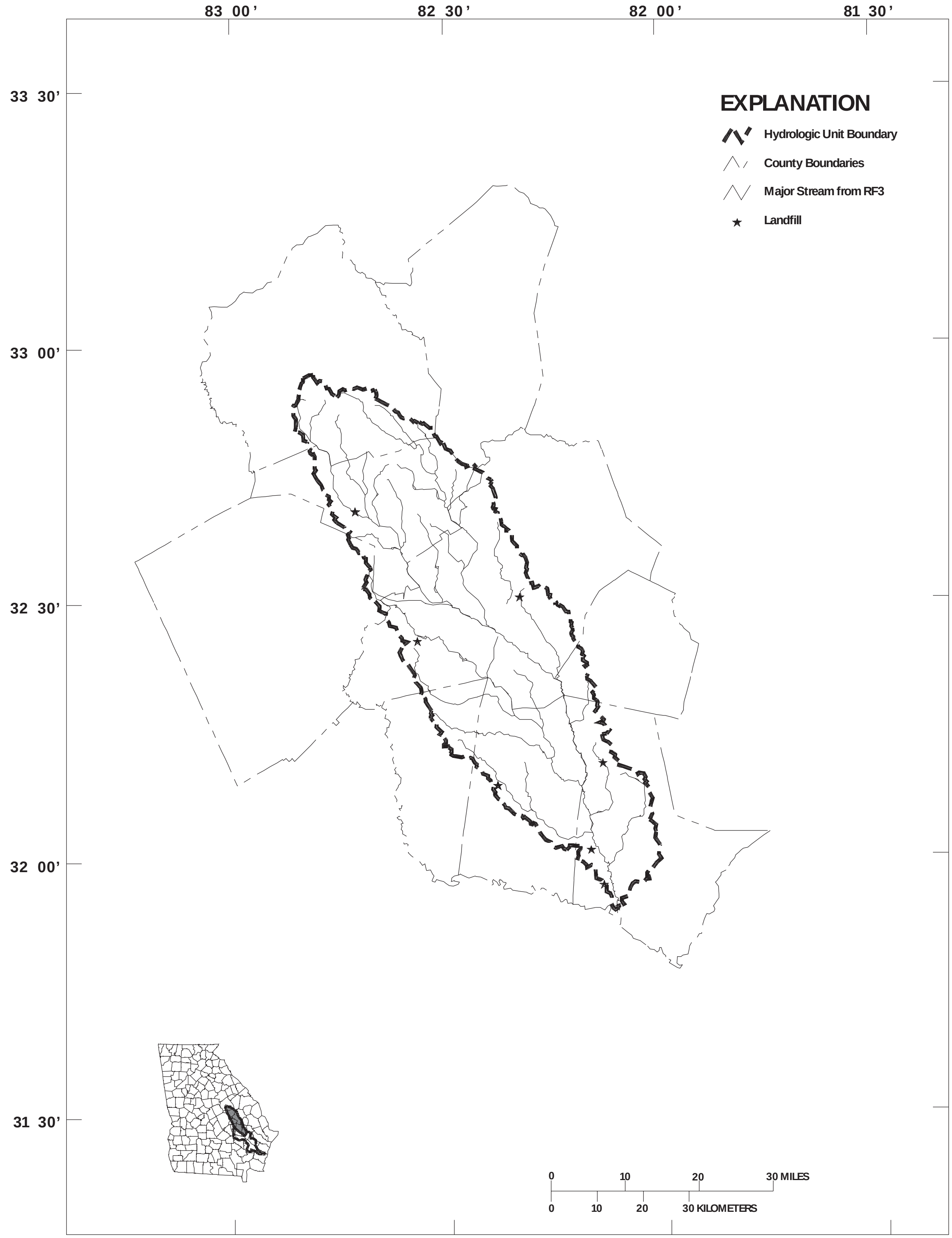

Figure 4-7. Landfills, Altamaha River Basin, HUC 03070107

Nonpoint pollutant loading comprises a wide variety of sources not subject to point source control through NPDES permits. The most significant nonpoint sources are those associated with precipitation, washoff, and erosion, which can move pollutants from the land surface to water bodies. Both rural and urban land uses can contribute significant amounts of nonpoint pollution. A review of the 2000-2001 (EPD, 2002) water quality assessment results for the Altamaha basin indicates that urban runoff and rural nonpoint sources contribute significantly to lack of full support for designated uses. The major categories of stressors for nonpoint sources are discussed below.

Nonpoint Sources from Agriculture

Agricultural operations can contribute stressors to water bodies in a variety of ways. Tillage and other soil-disturbing activities can promote erosion and loading of sediment to water bodies unless controlled by management practices. Nutrients contained in fertilizers, animal wastes, or natural soils may be transported from agricultural land to streams in either sediment-attached or dissolved forms. Loading of pesticides and pathogens is also of concern for various agricultural operations.

Sediment and Nutrients

Sediment is the most common pollutant resulting from agricultural operations. It consists mainly of mineral fragments resulting from the erosion of soils, but it can also include crop debris and animal wastes. Excess sediment loads can damage aquatic habitat by smothering and shading food organisms, altering natural substrate, and destroying spawning areas. Runoff with elevated sediment concentrations can also scour aquatic habitat, causing significant impacts on the biological community. Excess sediment can also increase water treatment costs, interfere with recreational uses of water bodies, create navigation problems, and increase flooding damage. In addition, a high percentage of nutrients lost from agricultural lands, particularly phosphorus, are transported attached to sediment. Many organic chemicals used as pesticides or herbicides are also transported predominantly attached to sediment.

Agriculture can be a significant source of nutrients, which can lead to excess or nuisance growth of aquatic plants and depletion of dissolved oxygen. The nutrients of most concern from agricultural land uses are nitrogen (N) and phosphorus (P), which may come from commercial fertilizer or land application of animal wastes. Both nutrients assume a variety of chemical forms, including soluble ionic forms (nitrate and phosphate) and less-soluble organic forms. Less soluble forms tend to travel with sediment, whereas more soluble forms move with water. Nitrate-nitrogen is very weakly adsorbed by soil and sediment and is therefore transported entirely in water. Because of the mobility of nitrate-nitrogen, the major route of nitrate loss is to streams by interflow or groundwater in deep seepage.

Phosphorus transport is a complex process that involves different components of phosphorus. Soil and sediment contain a pool of adsorbed phosphorus, which tends to be in equilibrium with the phosphorus in solution (phosphate) as water flows over the soil surface. The concentrations established in solution are determined by soil properties and fertility status. Adsorbed phosphorus attached to soil particles suspended in runoff also equilibrates with phosphorus in solution.

In 1993, the Soil Conservation Service (SCS, now NRCS) completed a study to identify hydrologic units in Georgia with a high potential for nonpoint source pollution problems resulting from agricultural land uses (SCS, 1993). This study concluded that there is not a major statewide agricultural pollution problem in Georgia. However, the assessment shows that some watersheds have sufficient agricultural loading to potentially impair their designated uses, based on estimates of transported sediments, nutrients, and animal wastes from agricultural lands (Table 4-5).

Table 4-5. Estimated Loads from Agricultural Lands by County (SCS, 1993)

County	Percent of Area in Basin	Sediment (tons)	Sediment (ppm)	Nitrogen (tons)	Nitrogen (ppm)	Phosphorus (tons)	Phosphorus (ppm)
Appling	37%	49,984	14.1	174	0.05	60	0.019
Candler	9%	45,074	31.1	141	0.14	51	0.051
Emaneul	48%	91,292	31.1	247	0.12	95	0.047
Glynn	11%	359	1.2	8	0.03	3	0.009
Jeff Davis	23%	16,706	7.4	112	0.06	30	0.016
Johnson	83%	52,700	26.9	202	0.16	64	0.051
Laurens	2%	100,069	26.8	296	0.12	108	0.044
Long	68%	2,351	6.9	36	0.11	9	0.027
Mcintosh	13%	211	2.0	33	0.25	13	0.102
Montgomery	51%	32,710	25.4	92	0.14	36	0.040
Tattnall	81%	57,928	26.7	311	0.17	85	0.047
Toombs	100%	55,174	27.5	217	0.19	68	0.059
Treutlen	62%	16,644	21.6	46	0.10	18	0.039
Washington	20%	94,776	35.3	265	0.12	101	0.046
Wayne	65%	13,973	7.9	51	0.03	18	0.012

Note: Mass estimates are based on the whole county. Concentration estimates are average event runoff concentration from agricultural lands.

Animal Waste

In addition to contributing to nutrient loads, animal waste may contribute high loads of oxygen-demanding chemicals and bacterial and microbial pathogens. The waste may reach surface waters through direct runoff as solids or in its soluble form. Soluble forms may reach groundwater through runoff, seepage, or percolation and reach surface waters as return flow. As the organic materials decompose, they place an oxygen demand on the receiving waters, which may adversely affect fisheries, and cause other problems with taste, odor, and color. When waters are contaminated by waste from mammals, the possible presence of pathogens that affect human health is of concern. In addition to being a source of bacteria, cattle waste might be an important source of the infectious oocysts of the protozoan parasite *Cryptosporidium parvum*.

Pesticides

Pesticides applied in agricultural production can be insoluble or soluble and include herbicides, insecticides, miticides, and fungicides. They are primarily transported directly through surface runoff, either in dissolved forms or attached to sediment particles. Some pesticides can cause acute and chronic toxicity problems in the water or throughout the entire food chain. Others are suspected human carcinogens, although the use of such pesticides has generally been discouraged in recent years.

The major agricultural pesticides/herbicides use within the basin include 2,4-d, Prowl, Blazer/Basagran/Trifluralin/Treflan/Trilin, Aatrex/Atizine, Gramoxone, Classic, Lexone/Sencor, and Lasso (alachlor) (compiled from the Georgia Herbicide Use Survey summary (Monks and Brown, 1991)). Since 1990, the use of alachlor in Georgia has decreased dramatically because peanut wholesalers no longer buy peanuts with alachlor.

Nonherbicide pesticide use is difficult to estimate. According to Stell et al. (1995), pesticides other than herbicides are currently used only when necessary to control some type of infestation (nematodes, fungi, and insects). Other common non-herbicide pesticides include chlorothalonil, aldicarb, chlorpyifos, methomyl, thiodicarb, carbaryl, acephate, fonofos, methyl parathion, terbufos, disulfoton, phorate, triphenyltin hydroxide

(TPTH), and synthetic pyrethroids/pyrethrins. Application periods of principal agricultural pesticides span the calendar year in the basin. However, agricultural pesticides are applied most intensively and on a broader range of crops from March 1 to September 30 in any given year.

It should be noted that past uses of persistent agricultural pesticides that are now banned might continue to affect water quality within the basin, particularly through residual concentrations present in bottom sediments. A survey of pesticide concentration data by Stell et al. (1995) found that two groups of compounds had concentrations at or above minimum reporting levels in 56 percent of the water and sediment analyses. The first group included DDT and metabolites, and the second group included chlordane and related compounds (heptachlor, heptachlor epoxide) – while dieldrin was also frequently detected. The USEPA now bans all of these pesticides for use in the United States, but they might persist in the environment for long periods of time.

Nonpoint Sources from Urban, Industrial, and Residential Lands

Water quality in urban waterbodies is affected by both point source discharges and diverse land use activities in the drainage basin (i.e., nonpoint sources). One of the most important sources of environmental stressors in the Altamaha River basin, particularly in the developed and rapidly growing areas is diffuse runoff from urban, industrial, and residential land uses (jointly referred to as “urban runoff”). Nonpoint source contamination can impair streams that drain extensive commercial and industrial areas due to inputs of stormwater runoff, unauthorized discharges, and accidental spills. Wet weather urban runoff can carry high concentrations of many of the same pollutants found in point source discharges, such as oxygen-demanding waste, suspended solids, synthetic organic chemicals, oil and grease, nutrients, lead and other metals, and bacteria. The major difference is that urban runoff occurs only intermittently, in response to precipitation events.

The characteristics of nonpoint urban sources of pollution are generally similar to those of NPDES permitted stormwater discharges (these are discussed in the previous section). Nonpoint urban sources of pollution include drainage from areas with impervious surfaces, but also include less highly developed areas with greater amounts of pervious surfaces such as lawns, gardens, and septic tanks, all of which may be sources of nutrient loading.

There is little site-specific data available to quantify loading in nonpoint urban runoff in the Altamaha River basin, although estimates of loading rates by land use types have been widely applied in other areas.

Pesticides and Herbicides from Urban and Residential Lands

Urban and suburban land uses are also a potential source of pesticides and herbicides through application to lawns and turf, roadsides, and gardens and beds. Stell et al. (1995) provide a summary of usage in the Atlanta Metropolitan Statistic Area (MSA). The herbicides most commonly used by the lawn-care industry are combinations of dicamba, 2,4-D, mecoprop (MCPP), 2,4-DP, and MCPA, or other phenoxy-acid herbicides, while most commercially available weed control products contain one or more of the following compounds: glyphosphate, methyl sulfometuron, benefin (benfluralin), bensulide, acifluorfen, 2,4-D, 2,4-DP, or dicamba. Atrazine was also available for purchase until it was restricted by the State of Georgia on January 1, 1993. The main herbicides used by local and state governments are glyphosphate, methyl sulfometuron, MSMA, 2,4-D, 2,4-DP, dicamba, and chlorsulforon. Herbicides are used for pre-emergent control of crabgrass in February and October, and in the summer for post-emergent control. Data from the 1991 Georgia Pest Control Handbook (Delaplane, 1991) and a survey of CES and SCS personnel conducted by Stell et al. indicate that several insecticides could be considered ubiquitous in urban/suburban use, including chlorpyrifos, diazinon, malathion, acephate, carbaryl, lindane, and dimethoate. Chlorothalonil, a fungicide, is also widely used in urban and suburban areas.

Other Urban/Residential Sources

Urban and residential stormwater also potentially includes pollutant loads from a number of other terrestrial sources:

Septic Systems. Poorly sited and improperly operating septic systems can contribute to the discharge of pathogens and oxygen-demanding pollutants to receiving streams. This problem is addressed through septic system inspections by the appropriate County Health Department, extension of sanitary sewer service and local regulations governing minimum lot sizes and required pump-out schedules for septic systems.

Leaking Underground Storage Tanks. The identification and remediation of leaking underground storage tanks (LUSTs) is the responsibility of the EPD Land Protection Branch. Petroleum hydrocarbons and lead are typically the pollutants associated with LUSTs.

Nonpoint Sources from Forestry

According to the US Forest Service's Forest Statistics for Georgia, 1997 report (Thompson, 1997) there are approximately 1,370,600 acres subject to silvicultural activities on an annual basis in Georgia (Table 4-6). This does not include natural disturbances such as weather, insects, animals, wildfire, or disease. According to this same report, there are approximately 66,340 acres undergoing a final harvest annually within the Altamaha Basin.

Table 4-6. Silvicultural Activities in Georgia

Treatment Type	Total Acres	Public	Forest Industry	Private
Final Harvest	445,600	8,000	133,200	304,400
Partial Harvest	97,200	3,500	9,200	84,500
Thinning	87,600	2,600	33,600	51,400
Stand Improvement	22,600	4,400	4,600	13,600
Site Preparation	230,800	2,600	115,600	112,700
Artificial Regeneration	308,300	3,100	116,400	188,800
Other	178,500	7,000	18,300	153,200
Total	*1,370,600*	*31,200*	*430,900*	*908,600*

Silvicultural operations may serve as sources of stressors, particularly excess sediment loads to streams, when Best Management Practices (BMPs) are not followed. From a water quality standpoint, forest roads pose the greatest potential threat of any of the typical forest practices. It has been documented that 90 percent of the sediment that entered streams from a forestry operation was directly related to either poorly located or poorly constructed roads and stream crossings. If BMPs are not adhered to, the potential impact to water quality from erosion and sedimentation is increased.

Silviculture is also a potential source of pesticides/herbicides. According to Stell et al. (1995), pesticides are mainly applied during site preparation after clear-cutting and during the first few years of new forest growth. Site preparation occurs on a 25-year cycle on most pine plantation land, so the area of commercial forest with pesticide application in a given year is relatively small. The herbicides glyphosate (Accord), sulfometuron methyl (Oust), hexazinone (Velpar), imazapyr (Arsenal), and metsulfuron methyl (Escort) account for 95 percent of the herbicides used for site preparation to control grasses, weeds, and broadleaves in pine stands. Dicamba, 2,4-D, 2,4,-DP (Banvel), triclopyr (Garlon), and picloram (Tordon) are minor use chemicals used to control hard to kill hardwoods and kudzu. The use of triclopyr and picloram has decreased since the early 1970s.

Most herbicides are not mobile in the soil and are targeted to plants, not animals. Applications made following the label and in conjunction with BMPs should pose little threat to water quality.

Chemical control of insects and diseases is not widely practiced except in forest tree nurseries, which is a very minor land use. Insects in pine stands are controlled by chlorpyrifos, diazinon, malathion, acephate, carbaryl, lindane, and dimethoate. Diseases are controlled using chlorothalonil, dichloropropene, and mancozeb. There are 10 commercial forest tree nurseries within the basin. Seven are located in Wayne County, two are in Tattnall County and one is in Johnson County.

According to the Georgia 1998-1999 water quality assessment, no streams were identified in the basin as impacted due to commercial forestry activities. However there are three stream segments listed for poor fish communities because of sedimentation from possible nonpoint sources that could include forestry operations.

Atmospheric Deposition

Atmospheric deposition can be a significant source of nitrogen and acidity in watersheds. Nutrients from atmospheric deposition, primarily nitrogen, are distributed throughout the entire basin in precipitation. The primary source of nitrogen in atmospheric deposition is nitrogen oxide emissions from combustion of fossil fuels. The rate of atmospheric deposition is a function of topography, nutrient sources, and spatial and temporal variations in climatic conditions.

Atmospheric deposition can also be a source of certain mobile toxic pollutants, including mercury, PCBs, and other organic chemicals.

4.1.3 Flow and Temperature Modification

Many species of aquatic life are adapted to specific flow and temperature regimes. In addition, both flow and temperature affect the dissolved oxygen balance in water, and changes in flow regime can have important impacts on physical habitat.

Thus, flow and temperature modifications can be important environmental stressors. They also interact with one another to affect the oxygen balance: flow energy helps control re-aeration rate, while water temperature controls the solubility of dissolved oxygen, and higher water temperatures reduce oxygen solubility and thus tend to reduce dissolved oxygen concentrations. Further, increased water temperature increases the rate of metabolic activity in natural waters, which in turn may increase oxygen consumption by aquatic species.

4.1.4 Physical Habitat Alteration

Many forms of aquatic life are sensitive to physical habitat disturbances. Probably the major disturbing factor is erosion and loading of excess sediment, which changes the nature of the stream substrate. Thus, any land use practices that cause excess sediment input can have significant impacts.

Physical habitat disturbance is also evident in many urban streams. Increased impervious cover in urban areas can result in high flow peaks, which increase bank erosion. In addition, construction and other land-disturbing activities in these areas often provide an excess sediment load, resulting in a smothering of the natural substrate and physical form of streams with banks of sand and silt.

4.2 Summary of Stressors Affecting Water Quality

Section 4.1 described the major sources of loads of pollutants (and other types of stressors) to the Altamaha basin. What happens in a river is often the result of the combined impact of many different types of loading, including point and nonpoint sources. For instance, excess concentrations of nutrients may result from the combined loads of wastewater treatment plant discharges, runoff from agriculture, runoff from residential lots, and other sources. Accordingly, Section 4.2 brings together the information contained in Section 4.1 to focus on individual stressor types, as derived from all sources.

4.2.1 Nutrients

All plants require certain nutrients for growth, including the algae and rooted plants found in lakes, rivers, and streams. Nutrients required in the greatest amounts include nitrogen and phosphorus. Some loading of these nutrients is needed to support normal growth of aquatic plants, an important part of the food chain. Too much loading of nutrients can, however, result in an overabundance of algal growth with a variety of undesirable impacts. The condition of excessive nutrient-induced plant production is known as eutrophication, and waters affected by this condition are said to be eutrophic. Eutrophic waters often experience dense blooms of algae, which can lead to unaesthetic scums and odors and interfere with recreation. In addition, overnight respiration of living algae, and decay of dead algae and other plant material, can deplete oxygen from the water, stressing or killing fish. Eutrophication of lakes typically results in a shift in fish populations to less desirable, pollution-tolerant species. Finally, eutrophication may result in blooms of certain species of blue-green algae which have the capability of producing toxins.

For freshwater aquatic systems, the nutrient in the shortest supply relative to plant demands is usually phosphorus. Phosphorus is then said to be the “limiting nutrient” because the concentration of phosphorus limits potential plant growth. Control of nutrient loading to reduce eutrophication thus focuses on phosphorus control.

Point and nonpoint sources to the Altamaha also discharge large quantities of nitrogen, but nitrogen is usually present in excess of amounts required to match the available phosphorus. Nitrogen (unlike phosphorus) is also readily available in the atmosphere and groundwater, so it is not usually the target of management to control eutrophication in freshwater. The bulk of the nitrogen in fresh-water systems is found in three ionic forms – ammonium (NH_4^+), nitrite (NO_2^-), or nitrate (NO_3^-). Nitrite and nitrate are more readily taken up by most algae, but ammonia is of particular concern because it can be toxic to fish and other aquatic life. Accordingly, wastewater treatment plant upgrades have focused on reducing the toxic ammonia component of nitrogen discharges, with corresponding increase in the nitrate fraction.

Sources of Nutrient Loading

The major sources of nutrient loading in the Altamaha basin are wastewater treatment facilities, urban runoff and stormwater, and agricultural runoff. Concentrations found in the streams and rivers of the Altamaha basin represent a combination of a variety of point and nonpoint source contributions.

Point source loads can be quantified from permit and effluent monitoring data, but nonpoint loads are difficult to quantify. Rough estimates of average nutrient loading rates from agriculture are available; however, nonpoint loads from urban/residential sources in the basin have not yet been quantified. The long-term trends in phosphorus within the Altamaha River basin can be obtained by examining results from EPD long-term trend monitoring stations. The trend in instream total phosphorus concentrations at one site in the Altamaha River are shown in Figure 4-8. In general, phosphorus concentrations have declined over time as a result of improvements in wastewater treatment technology.

4.2.2 Oxygen Depletion

Oxygen is required to support aquatic life, and Georgia water quality standards specify minimum and daily average dissolved oxygen concentration standards for all waters. Violations of water quality standards for dissolved oxygen were the most commonly listed cause of nonsupport of designated uses in Georgia's 2002 303(d) list based primarily on water quality data collected as part of the focused monitoring in the Altamaha River basin in 1999. The data identified dissolved oxygen impairments for 23 stream segments and indicated that these impairments occurred during, and were limited to, summer months, low flow and high temperature conditions. Stream flows during the periods of impairment were at, or below, 7Q10 (the minimum 7-day average flow that occurs once in 10 years on the average), which is consistent with the 3-year drought experienced in Georgia during 1998-2000. All of the impairments occurred in small, headwater streams where the drainage areas are relatively small and dry weather flows are low, or zero. TMDLs finalized for each stream segment in 2002 concluded that the main influence on dissolved oxygen was natural conditions with point sources affecting a small number of the segments. Trends in instream dissolved oxygen concentrations at one site in the Altamaha River basin are shown in Figure 4-9. All waters in the Altamaha basin have a state water quality standard of 4.0 mg/L. As shown in Figure 4-9, dissolved oxygen concentrations are usually above this standard.

4.2.3 Metals

No violations of water quality standards for metals were detected in the Altamaha River basin during the 1999 sampling.

4.2.4 Fecal Coliform Bacteria

Violations of the standard for fecal coliform bacteria were the second most commonly listed cause of nonsupport of designated uses in the Georgia 2002 303(d) list. Fecal coliform bacteria are monitored as an indicator of fecal contamination and the possible presence of human bacterial and protozoan pathogens in water. Fecal coliform bacteria may arise from many of the different point and nonpoint sources discussed in Section 4.1.

Human waste is of greatest concern as a potential source of bacteria and other pathogens. One primary function of wastewater treatment plants is to reduce this risk through disinfection.

Trends in instream fecal coliform concentrations at one site in the Altamaha River basin are shown in Figure 4-10.

As point sources have been brought under control, nonpoint sources have become increasingly important as potential sources of fecal coliform bacteria. Nonpoint sources may include:

- Agricultural nonpoint sources, including concentrated animal operations and spreading and/or disposal of animal wastes.
- Runoff from urban areas transporting surface dirt and litter, which may include both human and animal fecal matter, as well as a fecal component derived from sanitary sewer overflows.
- Urban and rural input from failed or ponding septic systems.
- Wildlife.

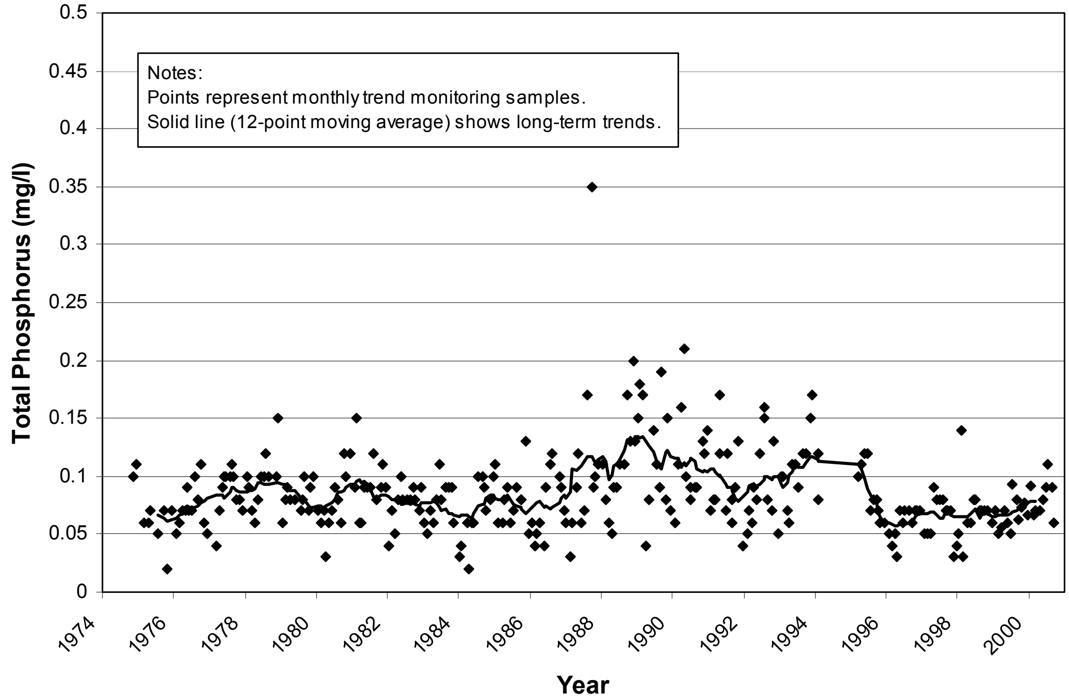

Figure 4-8. Total Phosphorus Concentrations, Altamaha River Six Miles Downstream from Doctortown, GA

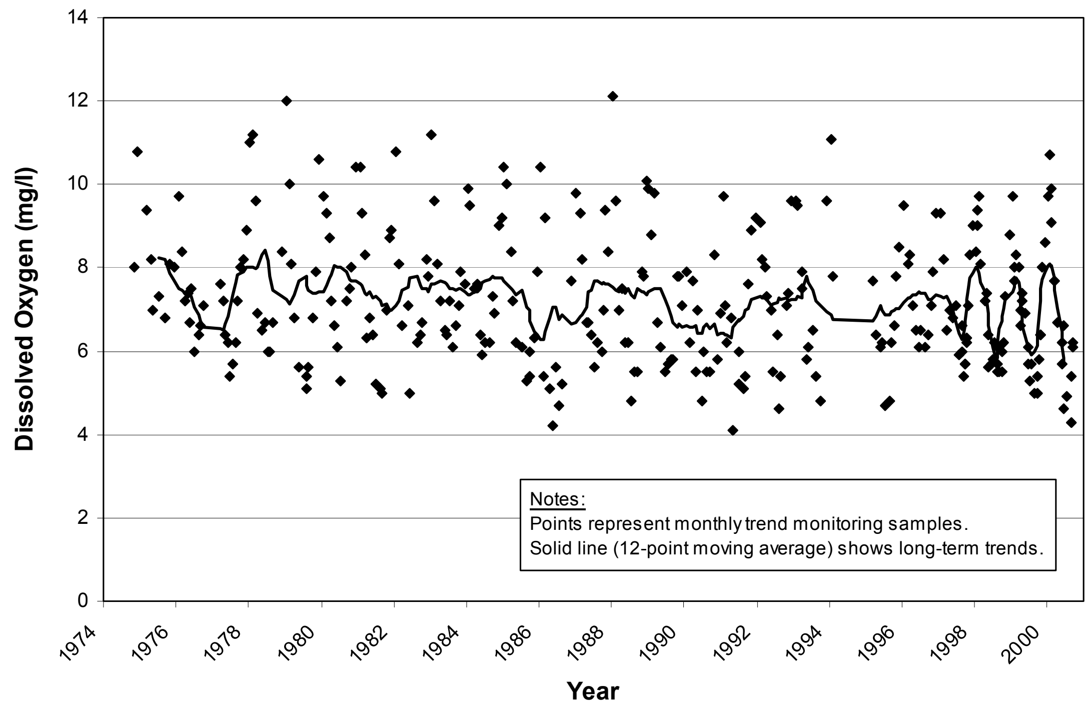

Figure 4-9. Dissolved Oxygen Concentrations, Altamaha River Six Miles Downstream from Doctortown, GA

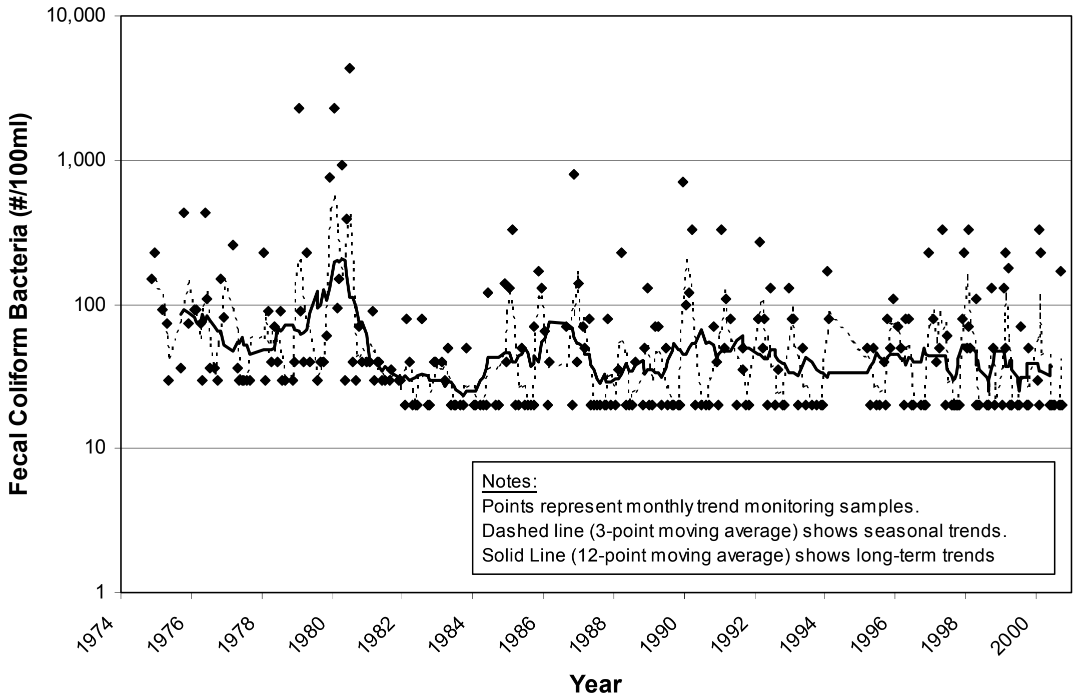

Figure 4-10. Fecal Coliform Bacteria Concentrations, Altamaha River Six Miles Downstream from Doctortown, GA

4.2.5 Synthetic Organic Chemicals

Synthetic organic chemicals (SOCs) include pesticides, herbicides, and other man-made toxic chemicals. SOCs may be discharged to waterbodies in a variety of ways, including:

- Industrial point source discharges.
- Wastewater treatment plant point source discharges, which often include industrial effluent as well as SOCs from household disposal of products such as cleaning agents and insecticides.
- Nonpoint runoff from agricultural and silvicultural land with pesticide and herbicide applications.
- Nonpoint runoff from urban areas, which may load a variety of SOCs such as horticultural chemicals and termiticides.

Illegal disposal and dumping of wastes.

SOCs were not detected in the surface waters of the Altamaha River basin in problem concentrations. It should be noted, however, that most monitoring has been targeted to waters located below point sources where potential problems were suspected. Agricultural sources were potentially important in the past, particularly from cotton production in the Coastal Plain, but the risk has apparently greatly declined with a switch to less persistent pesticides. Recent research by the USGS (Hippe et al., 1994; Stell et al., 1995) suggests pesticide/herbicide loading in urban runoff and stormwater may be of greater concern than agricultural loading, particularly in streams of the metropolitan Atlanta area.

4.2.6 Stressors from Flow Modification

Stress from flow modification is primarily associated with stormflow in smaller streams associated with development and increased impervious area.

4.2.7 Sediment

Erosion and discharge of sediment can have a number of adverse impacts on water quality. First, sediment can carry attached nutrients, pesticides, and metals into streams. Second, sediment is itself a stressor. Excess sediment loads can alter habitat, destroy spawning substrate, and choke aquatic life, while high turbidity also impairs recreational and drinking water uses. Sediment loading is of concern throughout the basin, but is of greatest concern in the developing urban areas and major transportation corridors. The rural areas are of lesser concern with the exception of rural unpaved road systems and areas where cultivated cropland exceeds 20 percent of the total land cover. It should also be noted that much of the sediment may be legacy sediment from farm practices in the past.

4.2.8 Habitat Degradation and Loss

In many parts of the Altamaha basin, support for native aquatic life is potentially threatened by degradation of aquatic habitat. Habitat degradation is closely tied to sediment loading, and excess sediment is the main threat to habitat in rural areas with extensive land-disturbing activities, as well as in urban areas where increased flow peaks and construction can choke and alter stream bottom substrates. A second important type of habitat degradation in the Altamaha basin is loss of riparian tree cover, which can lead to increased water temperatures.

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In This Section

- Assessment of Water Quantity
- Assessment of Water Quality

Section 5

Assessments of Water Quantity and Quality

This section provides an evaluation of the current conditions in the Altamaha River basin, in terms of both water quantity (Section 5.1) and water quality (Section 5.2) issues. The assessment results are then combined with the evaluation of environmental stressors from Section 4 to produce a listing of Concerns and Priority Issues in Section 6.

5.1 Assessment of Water Quantity

General information about water quantity issues in the Altamaha basin is taken from the "Georgia Environmental Protection Water Availability and Use Report, Altamaha River Basin," "The Regional Economic Forecast of Population and Employment Comprehensive Study, Volume 1," and updated from other Georgia Environmental Protection Division sources where available.

5.1.1 Municipal and Industrial Water Uses

Water use in the basin is almost exclusively groundwater for municipal and industrial supplies.

Overview of Surface Public Water Systems

Most surface water system plants in the State of Georgia are facilities that utilize conventional treatment which includes coagulation, flocculation, sedimentation, filtration, and disinfection. There are a number of small package plants which use the same treatment but on a smaller scale. Intakes located in urban areas with upstream development or in rural areas with large amounts of agriculture upstream have higher amounts of sediments (turbidity) in the rivers, streams and creeks that provide the raw surface water. These waters are prone to sudden erosion and sedimentation problems, also known as flashing, during hard rain storms which increases the amount of sediment (dirt, mud, and sand) in the water. Water with excess sediment or turbidity can clog intakes (also known as muddying) and filters requiring more sophisticated treatment and higher cost. Many plants have reservoirs to store large amounts of water and to settle out excess sediment (turbidity). Often taste and odor problems come from natural sources of iron and manganese or algae blooms in shallow surface water. However, algae blooms can also indicate an increase in the level of nutrients in the water.

5.1.2 Agriculture

As stated in Section 3.2.2, water demand for agricultural use in the Altamaha River basin is considerable. Irrigated crops are grown in Emmanual, Johnson, Tattnall and other counties of the basin. In 2000, approximately 97 percent of the agricultural water used was for irrigation purposes (24.26 MGD). The remaining 3 percent was used for animal operations. Future agricultural water demand is expected to increase slightly within the basin to 32.19 MGD by the year 2020.

5.1.3 Recreation

Recreation activities in this basin include boating, swimming, fishing and picnicking.

5.1.4 Hydropower

There are no hydropower facilities in the Altamaha basin.

5.1.5 Navigation

There is some limited commercial navigation in the Altamaha basin.

5.1.6 Waste Assimilation Capacity

Water quality, wastewater treatment, and wastewater discharge permitting are addressed in Section 4. However, it should be noted that the guidelines for discharge of treated effluent into the rivers and streams of the Altamaha River basin assume that sufficient surface water flow will be available to assimilate waste and ensure that water quality criteria will be met.

5.1.7 Assessment of Ground Water

At present, sufficient quantities of groundwater remain available for users in the Altamaha basin in Georgia. There are no general policy limits on new groundwater permits throughout the basin, even though most users are withdrawing water from the Floridan aquifer. Agricultural irrigation withdrawals are the main use of groundwater.

Problems have been noted with the Floridan aquifer in the Flint River basin to the west and in the entire coastal area to the east. EPD has had to implement severe policy restrictions on Floridan aquifer users in both these contiguous areas. Such limiting policies are not soon anticipated for the Altamaha River basin, though groundwater studies are being planned.

5.2 Assessment of Water Quality

This assessment of water quality is generally consistent with Georgia's water quality assessments for CWA Section 305(b) reporting to EPA. It begins with a discussion of (1) water quality standards, (2) monitoring programs, and (3) data analyses to assess compliance with water quality standards and determine use support. Following this introductory material, detailed assessment results by subbasin are presented in Section 5.2.4.

5.2.1 Water Quality Standards

Assessment of water quality requires a baseline for comparison. A statewide baseline is provided by Georgia's water quality standards, which contain water use classifications, numeric standards for chemical concentrations, and narrative requirements for water quality.

Georgia's water use classifications and standards were first established by the Georgia Water Quality Control Board in 1966. The water use classification system was applied to interstate waters in 1972 by EPD. Table 5-1 provides a summary of water use classifications and basic water quality criteria for each water use. Georgia also has general narrative water quality standards, which apply to all waters. These narrative standards are summarized in Table 5-2.

In addition to the basic water quality standards shown above, Congress made changes in the Clean Water Act in 1987 that required each state to adopt numeric limits for toxic substances for the protection of aquatic life and human health. In order to comply with these requirements, in 1989 the Board of Natural Resources adopted 31 numeric standards for protection of aquatic life and 90 numeric standards for the protection of human health. Appendix B provides a complete list of the toxic substance standards that apply to all waters in Georgia. Georgia has adopted all numeric standards for toxic substances promulgated by the USEPA. Georgia is also developing site-specific standards for major lakes where control of nutrient loading is required to prevent problems associated with eutrophication.

Table 5-1. Georgia Water Use Classifications and Instream Water Quality Standards for Each Use

	Bacteria (fecal coliform)		Dissolved Oxygen (other than trout streams)[2]		pH	Temperature (other than trout streams)[2]	
Use Classification[1]	30-Day Geometric Mean[3] (#/100 mL)	Maximum (#/100 mL)	Daily Average (mg/L)	Minimum (mg/L)	Std. Units	Maximum Rise (°F)	Maximum (°F)
Drinking Water Requiring Treatment	1,000 (Nov-Apr) 200 (May-Oct)	4,000 (Nov-Apr)	5.0	4.0	6.0-8.5	5	90
Recreation	200 (Freshwater) 100 (Coastal)	--	5.0	4.0	6.0-8.5	5	90
Fishing Coastal Fishing[4]	1,000 (Nov-Apr) 200 (May-Oct)	4,000 (Nov-Apr)	5.0	4.0	6.0-8.5	5	90
Wild River	No alteration of natural water quality						
Scenic River	No alteration of natural water quality						

1. Improvements in water quality since the water use classifications and standards were originally adopted in 1972 provided the opportunity for Georgia to upgrade all stream classifications and eliminate separate use designations for "Agriculture," "Industrial," "Navigation," and "Urban Stream" in 1993.
2. Standards for Trout Streams for dissolved oxygen are an average of 6.0 mg/L and a minimum of 5.0 mg/L. No temperature alteration is allowed in Primary Trout Streams and a temperature change of 2 deg. F is allowed in Secondary Trout Streams.
3. Geometric means should be "based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours." The geometric mean of a series of N terms is the Nth root of their product. Example: the geometric mean of 2 and 18 is the square root of 36.
4. Standards are the same as fishing with the exception of dissolved oxygen, which is site specific.

Table 5-2. Georgia Narrative Water Quality Standards for All Waters (Excerpt from Georgia Rules and Regulations for Water Quality Control Chapter 391-3-6-.03 - Water Use Classifications and Water Quality Standards)

(5) General Criteria for All Waters. The following criteria are deemed to be necessary and applicable to all waters of the State:

(a) All waters shall be free from materials associated with municipal or domestic sewage, industrial waste or any other waste which will settle to form sludge deposits that become putrescent, unsightly or otherwise objectionable.

(b) All waters shall be free from oil, scum and floating debris associated with municipal or domestic sewage, industrial waste or other discharges in amounts sufficient to be unsightly or to interfere with legitimate water uses.

(c) All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

(d) All waters shall be free from toxic, corrosive, acidic and caustic substances discharged from municipalities, industries or other sources, such as nonpoint sources, in amounts, concentrations or combinations which are harmful to humans, animals or aquatic life.

(e) All waters shall be free from turbidity which results in a substantial visual contrast in a waterbody due to man-made activity. The upstream appearance of a body of water shall be observed at a point immediately upstream of a turbidity-causing man-made activity. The upstream appearance shall be compared to a point which is located sufficiently downstream from the activity so as to provide an appropriate mixing zone. For land disturbing activities, proper design, installation and maintenance of best management practices and compliance with issued permits shall constitute compliance with [this] Paragraph...

5.2.2 Surface Water Quality Monitoring

EPD's monitoring program integrates physical, chemical, and biological monitoring to provide information for water quality and use attainment assessments and for basin planning. EPD monitors the surface waters of the state to:

- collect baseline and trend data,
- document existing conditions,
- study impacts of specific discharges,
- determine improvements resulting from upgraded water pollution control plants,
- support enforcement actions,
- establish wasteload allocations for new and existing facilities,
- verify water pollution control plant compliance,
- document water use impairment and reasons for problems causing less than full support of designated water uses, and
- develop Total Maximum Daily Loads.

EPD used a variety of monitoring tools to collect information for water quality assessments and basin planning. These tools include trend/basin/TMDL monitoring, intensive surveys, lake, coastal, biological, fish tissue, toxic substance monitoring, and facility compliance sampling. Each of these is briefly described in the following sections.

Trend/Basin/TMDL Monitoring

Long term monitoring of streams at strategic locations throughout Georgia, trend or ambient monitoring, was initiated by EPD during the late 1960s. This work was and continues to be accomplished to a large extent through cooperative agreements with federal, state, and local agencies that collect samples from groups of stations at specific, fixed locations throughout the year. The cooperating agencies conduct certain tests in the field and send stream samples to EPD for additional laboratory analyses. Although there have been a number of changes over the years, much of the routine chemical trend monitoring is still accomplished through similar cooperative agreements.

Today EPD contracts with the United States Geological Survey (USGS) for the statewide trend sampling work and with the Columbus Water Works for samples on the Chattahoochee below Columbus. In addition to monthly stream sampling, a portion of the work with the USGS involves continuous monitoring at several locations across the state. EPD associates also collect water samples for toxic substance analyses, as well as macroinvertebrate samples to characterize the biological community at selected locations as a part of the trend monitoring effort. In 2000 EPD added two sampling teams, one stationed in Brunswick and one in Atlanta. The Brunswick sampling team conducts sampling at locations across south Georgia in the Ochlockonee, Suwannee, Satilla, Altamaha, Savannah and Ogeechee River basins. The Atlanta sampling team conducts monthly sampling across the Coosa, Tallapoosa, Chattahoochee, Flint, Oconee and Ocmulgee River basins. The work of the two sampling teams adds significantly to the number of locations sampled each year which compliments the rotating basin monitoring program. WRD associates assess fish communities as a part of the monitoring effort. Additional samples used in the assessment were collected by other federal, state and local governments, universities, contracted Clean Lakes projects and utility companies.

Focused Monitoring in the Altamaha River Basin

In 1995, EPD adopted and implemented significant changes to the strategy for trend monitoring in Georgia. The changes were implemented to support the River Basin Management Planning program. The number of fixed stations statewide was reduced in order to focus resources for sampling and analysis in a particular group of basins in any one year in accordance with the basin planning schedule. Sampling focus was placed on the Altamaha, Ocmulgee, and Oconee River basins during 1999.

Figure 5-1 shows the focused monitoring network for the Altamaha River basin used in 1999. During this period, statewide trend monitoring was continued at a number of station locations statewide and at continuous monitoring locations. The remainder of the trend monitoring resources were devoted to the Altamaha, Ocmulgee, and Oconee River basins. As a result, more sampling was conducted in the focus river basins. Increasing the resolution of the water quality monitoring improves the opportunity to identify impaired waters, as well as the causes of impairment.

Intensive Surveys

Intensive surveys complement long-term fixed station monitoring to focus on a particular issue or problem over a shorter period of time. Several basic types of intensive surveys are conducted, including model calibration surveys and impact studies. The purpose of a model calibration survey is to collect data to calibrate a mathematical water quality mode. Models are used for wasteload allocations and/or TMDLs and as tools for use in making regulatory decisions. Impact studies are conducted when information on the cause-and-effect relationships between pollutant sources and receiving waters is needed. In many cases biological information is collected along with chemical data for use in assessing environmental impacts.

Lake Monitoring

EPD has maintained monitoring programs for Georgia’s public access lakes for many years. In the late 1960s, a comprehensive statewide study was conducted to assess fecal coliform levels at public beaches on major lakes in Georgia as the basis for water use

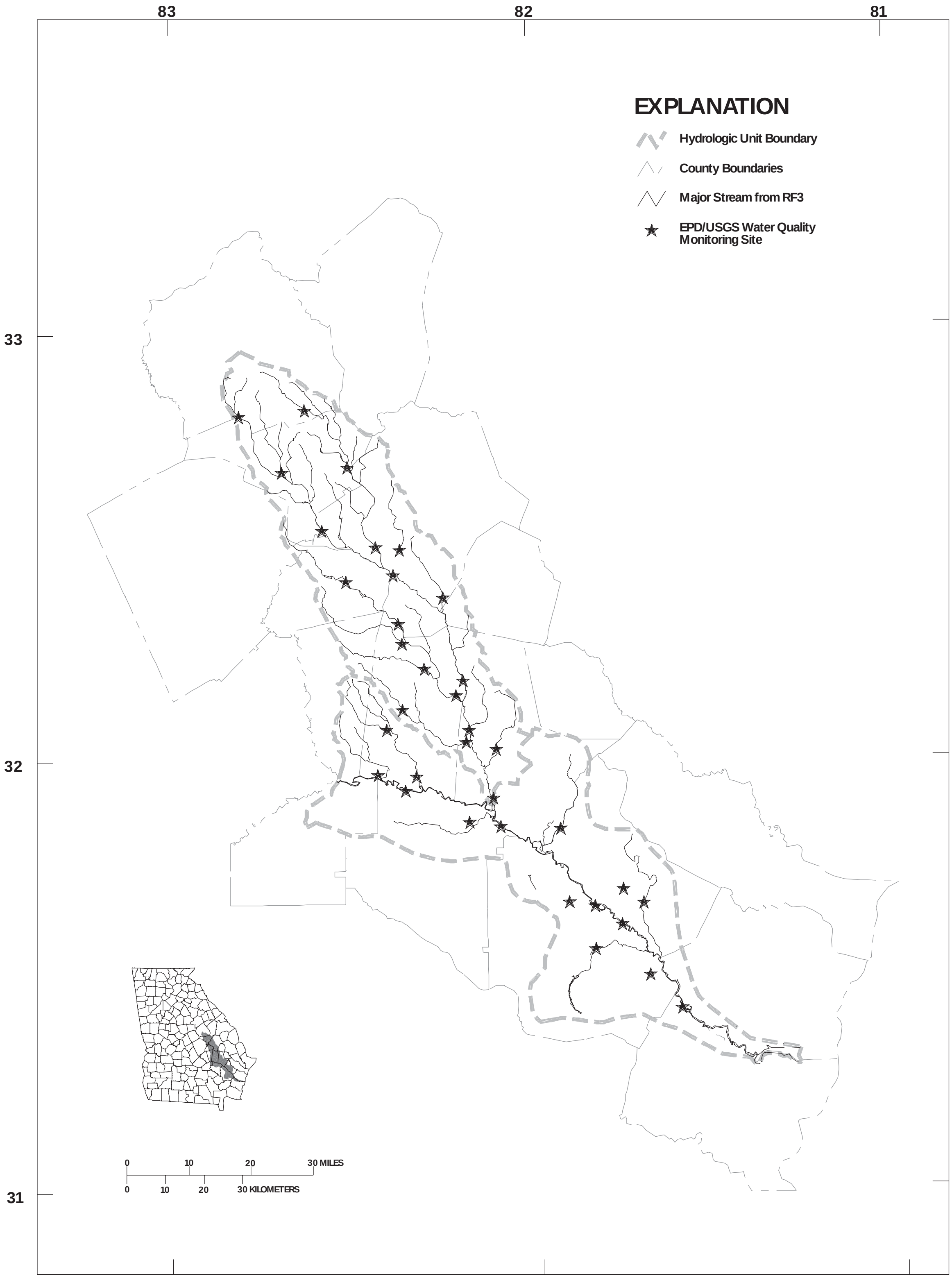

Figure 5-l. Altamaha River Basin Trend Monitoring Network Station Locations

classifications and establishment of water quality standards for recreational waters. In 1972, EPD staff participated in the USEPA National Eutrophication Survey, which included 14 lakes in Georgia. A post-impoundment study was conducted for West Point Lake in 1974. Additional lake monitoring continued through the 1970s. The focus of these studies was primarily problem/solution-oriented and served as the basis for regulatory decisions. In the 1990s, EPD conducted Clean Lakes Phase I Diagnostic – Feasibility studies on several major lakes. The study results were used as the basis for establishing lake-specific water quality standards.

Trophic Condition Monitoring

In 1980-1981, EPD conducted a statewide survey of public access freshwater lakes. The study was funded in part by USEPA Clean Lakes Program funds. The survey objectives were to identify freshwater lakes with public access, assess each lake's trophic condition, and develop a priority listing of lakes as to need for restoration and/or protection. In the course of the survey, data and information were collected on 175 identified lakes in 340 sampling trips. The data collected included depth profiles for dissolved oxygen, temperature, pH, specific conductance, and Secchi disk transparency and chemical analyses for chlorophyll *a*, total phosphorus, nitrogen compounds, and turbidity.

Fish Tissue Monitoring

The DNR conducts fish tissue monitoring for toxic chemicals and issues fish consumption guidelines as needed to protect human health. It is not possible for the DNR to sample fish from every stream and lake in the state. However, high priority has been placed on the 26 major reservoirs that make up more than 90 percent of the total lake acreage. These lakes will continue to be sampled as part of the River Basin Management Planning 5-year rotating schedule to track trends in fish contaminant levels. The DNR has also made sampling fish in rivers and streams downstream of urban and/or industrial areas a high priority. In addition, DNR will focus attention on areas that are frequented by a large number of anglers.

The program includes testing of fish tissue samples for the 43 substances listed in Table 5-3. The test results have been used to develop consumption guidelines, which are updated annually and provided to fishermen when they purchase fishing licenses. As of 2003, PCBs, mercury, dieldrin, and DDT residues (DDD and DDE) have been found in fish at concentrations that could create risk to human health from fish consumption. Guidelines are listed in one location each for dieldrin and DDD/DDE; however there are guidelines for PCBs and mercury throughout Georgia. In the Altamaha River basin, there are guidelines for mercury only.

In general, levels of PCBs are decreasing as time passes. PCBs are no longer produced in the U.S., but they do not break down easily and remain in aquatic sediments for years. Mercury is a naturally occurring metal that does not break down. While low background levels are normal, concentrations of mercury have increased since the late 1800s. It is not known whether the increase is due to municipal and industrial sources, fossil fuel use, or nonpoint sources. There is evidence that mercury is transported great distances in the upper atmosphere, and the pool of airborne mercury is both a byproduct of waste incineration and some industrial processes, and natural sources such as volcanoes.

In 1994, EPD began utilizing a "risk-based" approach to develop fish consumption guidelines for the state's waters. The EPD's guidelines are based on the use of USEPA potency factors for carcinogenicity and reference doses for noncancer toxicity, whichever is most protective. Inputs used in the derivation of guidelines include a 1×10^{-4} risk level for cancer, a 30-year exposure duration, 70 kg as body weight for an adult, and 70 years as the lifetime duration. A range of possible intakes from a low of 3g/day to a high of

30 g/day is evaluated and one of four different recommendations made: no restriction, limit consumption to one meal per week, limit consumption to one meal per month, or do not eat. Recommendations are made specific to fish species and size classes.

Table 5-3. Parameters for Fish Tissue Testing

Antimony	a-BHC	Heptachlor
Arsenic	b-BHC	Heptachlor Epoxide
Beryllium	d-BHC	Toxaphene
Cadmium	g-BHC (Lindane)	PCB-1016
Chromium, Total	Chlordane	PCB-1221
Copper	4,4-DDD	PCB-1232
Lead	4,4-DDE	PCB-1242
Mercury	4,4-DDT	PCB-1248
Nickel	Dieldrin	PCB-1254
Selenium	Endosulfan I	PCB-1260
Silver	Endosulfan II	Methoxychlor
Thallium	Endosulfan Sulfate	HCB
Zinc	Endrin	Mirex
Aldrin	Endrin Aldehyde	Pentachloroanisole
		Chlorpyrifos

Toxic Substance Stream Monitoring

EPD has focused resources on the management and control of toxic substances in the state's waters for many years. In the 1970s and 1980s wherever discharges were found to have toxic impacts or to include toxic pollutants, EPD incorporated specific limitations on toxic pollutants in NPDES discharge permits.

In 1983 EPD intensified toxic substance stream monitoring efforts. This expanded toxic substance stream monitoring project included facility effluent, stream, sediment, and fish sampling at specific sites downstream of selected industrial and municipal discharges. From 1983 through 1991, 10 to 20 sites per year were sampled as part of this project. This work was used as the foundation for additional limitations in NPDES permits designed to implement the toxic substance standards adopted in the late 1980s. Monitoring for toxic substances in now accomplished as needed as a part of the river basin monitoring programs.

Facility Compliance Sampling

In addition to surface water quality monitoring, EPD conducts evaluations and compliance sampling inspections of municipal and industrial water pollution control plants. Compliance sampling inspections include the collection of 24-hour composite samples, as well as evaluation of the permittee's sampling and flow monitoring requirements.

EPD staff conducted more than 350 sampling inspections statewide in 1999. The results were used, in part, to verify the validity of permittee self-monitoring data and as supporting evidence, as applicable, in enforcement actions. Also, sampling inspections can lead to identification of illegal discharges. In 1999, this work was focused on facilities in the Altamaha, Ocmulgee, and Oconee River basins in support of the basin planning process.

Aquatic Toxicity Testing

In 1982, EPD incorporated aquatic toxicity testing into selected industrial NPDES permits. In January 1995, EPD issued approved NPDES Reasonable Potential Procedures, which further delineated required conditions for conducting whole effluent toxicity (WET) testing for municipal and industrial discharges. All major permitted discharges (flow greater than 1 MGD) are required to have WET tests run with each permit reissuance. Certain minor dischargers are also subject to this requirement if EPD determines that aquatic toxicity is a potential issue.

5.2.3 Data Analysis

Assessment of Use Support – General Procedures

EPD assesses water quality data to determine if water quality standards are met and if the waterbody supports its classified use. Depending on the frequency with which standards are not met, the waterbody is said to be supporting, partially supporting, or not supporting the designated use (see Box 5-1).

Appendix D includes lists of streams and rivers in the basin for which data have been collected and assessed. The lists include information on the location, data source, designated water use classification, and where standards are exceeded, additional information is provided on the criterion violated, potential cause, actions planned to alleviate the problem, and estimates of stream miles affected. The lists are further coded to indicate status of each waterbody under several sections of the CWA. Different sections of the CWA require states to assess water quality (Section 305(b)), to list waters still requiring TMDLs (Section 303(d)), and to document waters with nonpoint source problems (Section 319).

The assessed waters are described in three categories: waters supporting designated uses, waters partially supporting designated uses, and waters not supporting designated uses. Waters were placed on the partially supporting list if:

- The chemical data (dissolved oxygen, pH, temperature) indicated an excursion of a water quality standard in 11 percent to 25 percent of the samples collected.
- Fish consumption:
  - (a) For all contaminants other than mercury, a fish consumption guideline for limited fish consumption was in place for the waterbody.
  - (b) (b) For mercury, the Trophic-Weighted Residue Value was greater than 0.3 mg/kg but less than 2 mg/kg (see Box 5-2).

Generally, a stream reach was placed on the not supporting list if:

- The chemical data (dissolved oxygen, pH, temperature) indicated an excursion of a water quality standard in greater than 25 percent of the samples collected.
- Acute or chronic toxicity tests documented or predicted toxicity at low stream flow (7Q10) due to a municipal or industrial discharge to the waterbody.
- Fish consumption:
  - (a) For all contaminants other than mercury, a fish consumption guideline for no consumption or a commercial fishing ban was in place for the waterbody.
  - (b) (b) For mercury, the Trophic-Weighted Residue Value was greater than or equal to 2 mg/kg (see Box 5-2).

Additional specific detail is provided in Box 5-1 on analysis of data for fecal coliform bacteria, metals, toxicity, dissolved oxygen, pH, temperature, fish/shellfish consumption guidelines, and biotic data.

Box 5-1: Analysis of Data for Fecal Coliform Bacteria, Metals, Toxicity, Dissolved Oxygen, pH, Temperature, Fish/Shellfish Consumption Guidelines, and Biotic Data

Fecal Coliform Bacteria

Georgia water quality standards establish a fecal coliform criterion of a geometric mean (four samples collected over a 30-day period) of 200 MPN/100 mL for all waters in Georgia during the recreational season of May through October. This is the year-round standard for waters with the water use classification of recreation. For waters classified as drinking water, fishing, or coastal fishing, for the period of November through April, the fecal coliform criterion is a geometric mean (four samples collected over a 30-day period) of 1000 per 100 mL and not to exceed 4000 per 100 mL for any one sample. The goal of fecal coliform sampling in the Altamaha River basin focused monitoring in 1999 was to collect four samples in a 30-day period in each of four quarters. If one geometric was in excess of the standard then the stream segment was placed on the partial support list. If more than one geometric mean was in excess of the standard the stream segment was placed on the not support list.

In come cases the number of samples was not adequate to calculate geometric means. In these cases, the USEPA recommends the use of a review criterion of 400 per 100 mL to evaluate sample results. This bacterial density was used to evaluate data for the months of May through October and the maximum criterion of 4000 per 100 mL was used in assessing the data from the months of November through April. Thus, where geometric mean data was not available, waters were deemed not supporting uses when 26 percent of the samples had fecal coliform bacteria densities greater than the applicable review criteria (400 or 4000 MPN/100 mL) and partially supporting when 11 to 25 percent of the samples were in excess of the review criterion.

Metals

Since data on metals from any one given site are typically infrequent, using the general evaluation technique of 26 percent excursion to indicate nonsupport and 11 to 25 percent excursion to indicate partial support was not meaningful. Streams were placed in the nonsupporting category if multiple excursions of state criteria occurred and the data were based on more than four samples per year. With less frequent sampling, streams with excursions were placed on the partially supporting list. In addition, an asterisk appears beside metals data in those cases where there is a minimal database. Data were collected in the winter and the summer seasons in 1999 for comparison to water quality standards. Clean techniques were used. If one of the samples was in excess of the standard, the stream segment was placed on the partial support list. This approach is in accordance with US EPA guidance, which suggests any single excursion of a metals criterion be listed.

Toxicity Testing/Toxic Substances

Data from EPD toxicity testing of water pollution control plant effluents were used to predict toxicity in the receiving waterbody at critical, 7Q10 low flows. Effluent data for metals were used to designate either partial support or nonsupport based on whether instream corroborating metals data were available. When instream metals data were available, the stream was determined to be not supporting if a metal concentration exceeded stream standards; when instream data were not available, the stream was listed as partially supporting.

Dissolved Oxygen, pH, Temperature

When available data indicated that these parameters were out of compliance with state standards more than 25 percent of the time, the waters were evaluated as not supporting the designated use. Between 11 percent and 25 percent noncompliance resulted in a partially supporting evaluation.

Fish/Shellfish Consumption Guidelines – Mercury

Risk to human health from consuming fish with mercury residues was assessed using a protocol that evaluates species and size classes in different trophic levels that are sought by fishermen. Mercury concentrations in fish tissue were used to calculate the Trophic-Weighted Residue Value for each waterbody. If the Value is greater than 0.3 mg/kg (mg of mercury per kilogram of fish tissue, wet weight) but less than 2.0 mg/kg, a waterbody was placed in the partially supporting category. If the Value is greater than or equal to 2.0 mg/kg, a waterbody was placed in the not supporting category. See Box 5-2 for more details.

Fish/Shellfish Consumption Guidelines – Contaminants Other than Mercury

A waterbody was included in the not supporting category when a recommendation for "no consumption" of fish, a commercial fishing ban, or a shell fishing ban based on actual data was in effect. A waterbody was placed in the partially supporting category if a guideline for restricted consumption of fish had been issued for the waters.

Biotic Data

A "Biota Impacted" designation for "Criterion Violated" indicates that studies showed a modification of the biotic community. Communities used were fish. Studies of fish populations by the DNR Wildlife Resources Division used the Index of Biotic Integrity (IBI) to identify affected fish populations. The IBI values were used to classify the population as Excellent, Good, Fair, Poor, or Very Poor. Stream segments with fish populations rated as "Poor" or "Very Poor" were included in the partially supporting list.

Box 5-2: Mercury in Fish Tissue – New Method for Assessment of Impairment

Fish consumption guidelines provide site-specific information on safe consumption levels to sport anglers and their families, and have an important role in educating the public about concepts of environmental science and toxicology. They have also been used as a basis for assessing the impairment of rivers and lakes under Section 305(b) of the Federal Clean Water Act (CWA). Until 2002, all bodies of water with fish consumption guidelines were also included in the 305(b) list of impaired waters. EPD developed fish consumption guidelines based on a risk-based method, using USEPA potency factors and reference doses, and methodology consistent with that developed by the USEPA. Under this approach, guidelines are determined for individual fish species and for size classes of fish within a species. If a reduced consumption or do not eat guideline, or commercial fishing ban existed for a fish species in a waterbody, that waterbody was also assessed as not fully supporting its designated use, and therefore was placed on the 305(b)/303(d) list.

In 2001, USEPA promulgated a new human health criterion for methylmercury in fish tissue (USEPA, 2001). Methylmercury accounts for the majority of mercury in fish tissue, and is the most toxic form. The criterion was developed using new information in the USEPA 1997 Mercury Study Report to Congress and the 2000 Human Health Methodology (USEPA, 2000), and incorporated national dietary patterns of consumption across different fish trophic levels into the risk assessment. EPD developed a protocol based on the USEPA criterion, and used it to assess mercury levels in fish tissue. In December 2002, EPD adopted as a human health standard for total mercury in fish tissue, 0.3 mg/kg wet weight as a waterbody Trophic-Weighted Residue Value.

The protocol method considers trophic levels of fish instead of individual species. Trophic level is a term used by environmental scientists to assign an animal's place in the food chain. Animals that consume plants (called herbivores) have a low trophic level, while animals that consume other animals (carnivores) have a higher trophic level. The largest predatory animals in the food chain occupy the highest trophic level. Trophic levels are important for assessing exposure to contaminants because of a process known as bioaccumulation. Bioaccumulation occurs as animals consume food containing contaminants, and results in higher concentrations of contaminants at higher trophic levels. For instance, very small fish consume plants and plankton that have absorbed mercury from the water. The mercury accumulates in tissue throughout their lives. Larger fish eat small fish, and the mercury in the small fish is absorbed in the tissue of the larger fish. The end result is that very low concentrations of mercury in the environment get magnified in the largest animals in a food chain. The protocol summarizes data across trophic levels weighted by averages of public consumption to arrive at a number called the Trophic-Weighted Residue Value.

By assessing concentrations of mercury in fish tissue by trophic level, and by accounting for the percentage of fish from each trophic level that people typically eat, a measure of risk can be calculated for an entire water body at one time. The new protocol for evaluating mercury in fish tissue has been applied only to assessment of use support under the Clean Water Act. Georgia continues to publish fish consumption guidelines to the general public using the previous method for mercury – in other words, the guidelines are developed for individual species and size classes as they have been in the past.

At first this might seem contradictory, but the public fish consumption guidelines given to fishermen have a different purpose than the method used to assess whether a water body is impaired. The public fish consumption guidelines give people specific information for species and sizes, and meal frequencies for each. On the other hand, the assessment protocol for mercury is designed to inform regulatory decision-making for water bodies as a whole, using a water quality standard based on bioaccumulation. As an example, one lake had ten guidelines, nine of which were "no restriction." The restriction was for the largest size class of largemouth bass, and for the least restrictive meal limit (one meal per week). The majority of fish had no contaminant concentrations above any level of concern. Overall, the risk of eating fish from this lake was lower than the threshold value, so it was no longer listed as being impaired on the 305(b)/303(d) list (which would have resulted in the long term commitment of significant resources). However, the guideline remained on the public fish consumption guidelines based on data for that one size class of largemouth bass.

5.2.4 Assessment of Water Quality and Use Support

This section provides a summary of the assessment of water quality and support of designated uses for streams and major lakes in the Altamaha River basin. Most of these results were previously summarized in the Georgia 2002 305(b)/303(d) listing (Georgia DNR, 2003). Results are presented by HUC. A geographic summary of assessment results is provided by HUC in Figures 5-2 and 5-3.

Altamaha River Subbasin (HUC 03070106)

Appendix D summarizes the determination of support for designated uses of all assessed rivers and streams within this hydrologic unit (GA DNR, 2002).

Monitoring data was collected from 15 stations located within this subbasin during 1999. Of those, one is sampled monthly each year and the remaining were sampled only during 1999 as part of the focused trend monitoring strategy described in Section 5.2.2. The following assessment is based on data primarily from 1999.

Two mainstem segments of the Altamaha River were assessed as fully supporting the water use classification of fishing. Criteria affecting use support are discussed in the following subsections for this HUC.

Erosion and Sedimentation

The water use classifications of fishing, recreation, and drinking water are potentially threatened in waterbodies by erosion and loading of sediment, which can alter stream morphology, impact habitat, and reduce water clarity. Potential sources include urban runoff and development (particularly construction), unpaved rural roads, forestry practices, and agriculture. There are two stream segments listed in this subbasin as not fully supporting designated water uses due to poor fish communities likely due to sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in one Altamaha River segment and five tributary stream segments due to exceedances of the water quality standard for fecal coliform bacteria. The exceedances may be attributed to a combination of urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources and/or animal wastes. The source of fecal coliform bacteria on one tributary segment was attributed to a municipal water pollution control plant.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in eight tributaries due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations coincided primarily with low or zero flows, slow stream velocities, shallow water depths and high temperatures. Natural conditions may contribute to or be the cause of low dissolved oxygen in many streams in the Altamaha River basin.

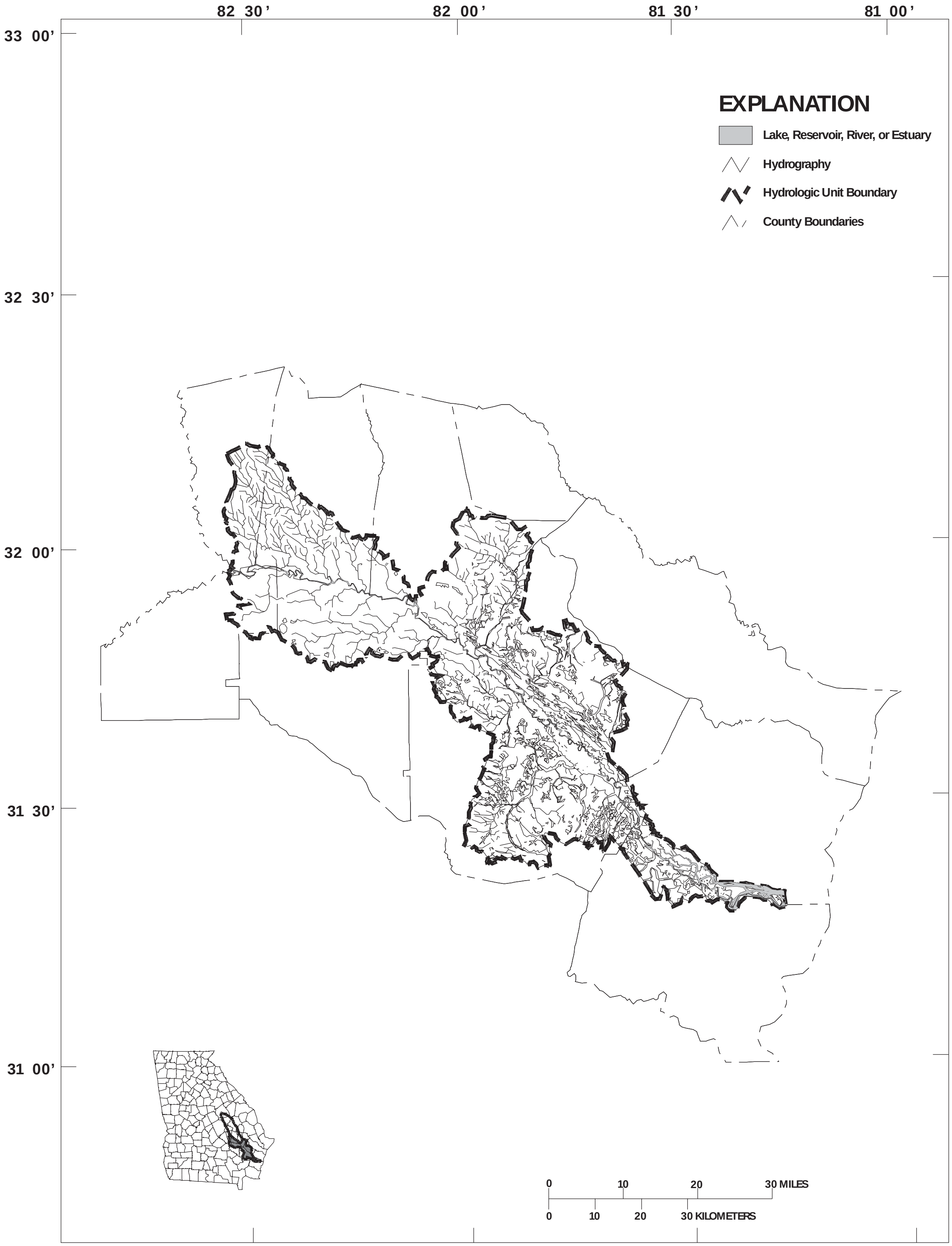

Figure 5-2. Assessment of Water Quality Use Support in the Altamaha River Basin, HUC 03070106

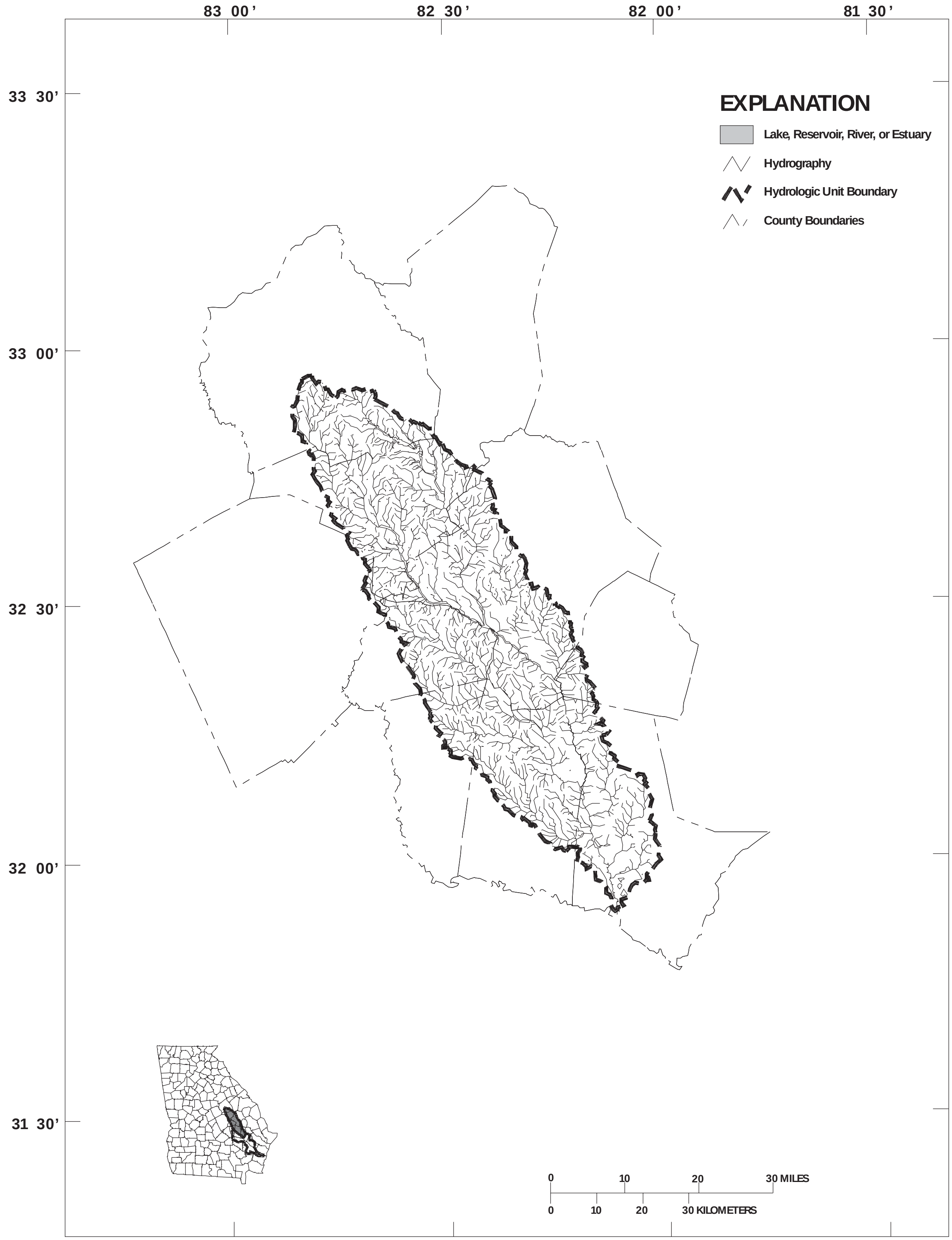

Figure 5-3. Assessment of Water Quality Use Support in the Altamaha River Basin, HUC 03070107

Ohoopee River Subbasin (HUC 03070107)

Appendix D summarizes the determination of support for designated uses of all assessed rivers and streams within this hydrologic unit (GA DNR, 2002).

Monitoring data was collected from 20 stations located within this subbasin during 1999. All were sampled only during 1999 as part of the focused trend monitoring strategy described in Section 5.2.2. The following assessment is based on data primarily from 1999.

One tributary segment (9 miles in length) was assessed as fully supporting the water use classification of fishing. Criteria affecting use support are discussed in the following subsections for this HUC.

Erosion and Sedimentation

The water use classifications of fishing, recreation, and drinking water are potentially threatened in waterbodies by erosion and loading of sediment, which can alter stream morphology, impact habitat, and reduce water clarity. Potential sources include urban runoff and development (particularly construction), unpaved rural roads, forestry practices, and agriculture. There is one stream segment listed in this subbasin as not fully supporting designated water uses due to poor fish communities likely due to sedimentation

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in three Ohoopee River segments and nine tributary stream segments due to exceedances of the water quality standard for fecal coliform bacteria. These may be attributed to a combination of urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources and/or animal wastes.

Fish Consumption Guidelines

The water use classification of fishing was not fully supported in four Ohoopee River segments and one lake based on fish consumption issues related to mercury residues in fish tissue. The assessment is based on the Trophic-Weighted Residue Value being in excess of 0.3 mg of mercury per kilogram of fish tissue (see Box 5-2 in Section 5 for details).

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in two Ohoopee River segments and thirteen tributary segments due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations coincided primarily with low or zero flows, slow stream velocities, shallow water depths and high temperatures.

References

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In This Section

- Identified Basin Planning and Management Concerns
- Priorities for Water Quality Concerns
- Priorities for Water Quantity Concerns

Section 6

Concerns and Priority Issues

The assessments in Section 5 present a number of water quality and quantity concerns within the Altamaha River basin. This section aggregates the assessment data to identify priority issues for development of management strategies.

6.1 Identified Basin Planning and Management Concerns

Sections 4 and 5 identified both site-specific and generalized sources of water quality stressors. Some issues are limited to specific segments, but a number of water quality concerns apply throughout the basin. The criterion listed most frequently in the Georgia 2002 305(b)/303(d) List as contributor to not supporting or partial supporting status in streams and rivers was dissolved oxygen, followed by fecal coliform bacteria and fish consumption issues. One lake was listed as not fully supporting due to fish consumption issues. Low dissolved oxygen conditions coincided primarily with low or zero flows, slow stream velocities, shallow water depths and high temperatures. Fecal coliform bacteria are attributed to nonpoint sources or urban runoff and fish consumption issues are primarily associated with mercury as a result of air deposition and possibly naturally occurring sources. Three segments were also listed for biota impacts, which are due primarily to nonpoint sources such as urban runoff, development, and/or agriculture.

Within some individual stream reaches, other sources may be of greater importance (e.g., WPCP effluent); however, urban runoff and general nonpoint sources represent a basinwide concern. Population growth and development pressure in parts of the basin will tend to increase the importance of urban runoff as a stressor of concern. For such widespread concerns, basinwide management strategies will be needed.

Major water quality and quantity concerns for the Altamaha River basin are summarized by geographic area in terms of the concerns and sources of these concerns in Table 6-1. Table 6-2 summarizes the pollutants identified as causing impairment of designated uses in the basin; however, not all identified concerns are related to pollutant loads. Ongoing control strategies are expected to result in support of designated uses in a number of waters. In other waters, however, the development of additional management strategies may be required or implemented in order to achieve water quality standards.

Table 6-1. Summary of Concerns in the Altamaha River Basin

Stressors of Concern	Potential Source of the Stressor by HUC	
	HUC 03070106	HUC 03070107
Dissolved Oxygen	Natural Inputs, Urban and Rural NPS	Natural Inputs, Urban and Rural NPS, WPCP Effluent
Fecal Coliform Bacteria	Multiple Source Potential	Multiple Source Potential
Fish Consumption Guidelines		Nonpoint Mercury
Erosion and Sedimentation	Urban and Rural NPS	Urban and Rural NPS
Drought Conditions	Lack of Rainfall	Lack of Rainfall

Table 6-2. Summary of Pollutants Causing Water Quality Impairment in the Altamaha River Basin

Use Classification of Waterbody Segments	Pollutants Causing Impairment by HUC	
	HUC 03070106	HUC 03070107
Fishing (Support for Aquatic Life)	Low DO, Sediment	Low DO, Sediment
Fishing (Fish Consumption)		Mercury
Fishing (Secondary Contact Recreation)	Fecal Coliform	Fecal Coliform

In the following pages, priority water quality and quantity concerns are presented by Hydrologic Unit. For some water quality and quantity concerns, problem statements are identical for each HUC, while others differ between HUCs. Detailed strategies for addressing these concerns are then supplied in Section 7.

Each concern is listed in the form of a "Problem Statement" which summarizes the linkage between stressor sources and water quality impacts. The order in which concerns are listed for each HUC should not be considered to be significant. Prioritization of basin concerns requires consensus among all stakeholders, and has not been finalized; however, short-term water quality action priorities for EPD are summarized in Section 6.2.

6.1.1 Problem Statements

Altamaha River Subbasin (HUC 03070106)

Erosion and Sedimentation

The water use classifications of fishing, recreation, and drinking water are potentially threatened in waterbodies by erosion and loading of sediment, which can alter stream morphology, impact habitat, and reduce water clarity. Potential sources include urban runoff and development (particularly construction), unpaved rural roads, forestry practices, and agriculture. There are two stream segments listed in this subbasin as not fully supporting designated water uses due to poor fish communities likely due to sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in one Altamaha River segment and five tributary stream segments due to exceedances of the water quality standard for fecal coliform bacteria. In general, the exceedances may be attributed to a combination of urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources and/or animal wastes. The source of fecal coliform bacteria on one tributary segment was attributed to a municipal water pollution control plant.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in eight tributary stream segments due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations coincided primarily with low or zero flows, slow stream velocities, shallow water depths and high temperatures. Natural conditions may contribute to or be the cause of low dissolved oxygen in many streams in the Altamaha River basin.

Ohoopee River Subbasin (HUC 03070107)

Erosion and Sedimentation

The water use classifications of fishing, recreation, and drinking water are potentially threatened in waterbodies by erosion and loading of sediment, which can alter stream morphology, impact habitat, and reduce water clarity. Potential sources include urban runoff and development (particularly construction), unpaved rural roads, forestry practices, and agriculture. There is one stream segment listed in this subbasin as not fully supporting designated water uses due to poor fish communities likely due to sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in three Ohoopee River segments and nine tributary stream segments due to exceedances of the water quality standard for fecal coliform bacteria. These may be attributed to a combination of urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources and/or animal wastes.

Fish Consumption Guidelines

The water use classification of fishing was not fully supported in four Ohoopee River segments and one lake based on fish consumption issues related to mercury residues in fish tissue. The assessment is based on the Trophic-Weighted Residue Value being in excess of 0.3 mg of mercury per kilogram of fish tissue (see Box 5-2 in Section 5 for details).

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in two Ohoopee River segments and thirteen tributary segments due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations coincided primarily with low or zero flows, slow stream velocities, shallow water depths and high temperatures. Natural conditions may contribute to or be the cause of low dissolved oxygen in many streams in the Altamaha River basin.

6.2 Priorities for Water Quality Concerns

6.2.1 Short-Term Water Quality Action Priorities for EPD

Section 6.1 identifies known priority concerns for which management and planning are needed in the Altamaha River basin. Because of limited resources, and, in some cases, limitations to technical knowledge, not all of these concerns can be addressed at the same level of detail within the current 5-year cycle of basin management. It is therefore necessary to assign action priorities for the short-term based on where the greatest return for available effort can be expected.

Current priorities for action by EPD (2002) are summarized in Table 6-3 and discussed below. These reflect EPD's assessment of where the greatest short-term return can be obtained from available resources. The priorities were public noticed and approved by the USEPA as part of the Georgia CWA 303(d) listing process in 2001-2002 and discussed in the report, *Water Quality in Georgia, 2000-2001.*

Table 6-3. EPD's Short-Term Priorities for Addressing Waters Not Fully Supporting Designated Use

Priority	Type
1	Segments where ongoing pollution control strategies are expected to result in achieving support of designated uses; active special projects.
2	Segments with multiple data points that showed metals or other toxic substances in excess of water quality standards and segments in which dissolved oxygen is an issue.
3	Waters for which urban runoff and generalized nonpoint sources have resulted in violations of standards for fecal coliform bacteria, pH, and/or impairment of biological resources, and waters for which fish consumption guidelines are in place due to air deposition of mercury.

Assigning Priorities for Stream Segments

For several waters in the Altamaha River basin and other river basins around the state, currently planned control strategies are expected to result in attainment of designated uses. EPD resources will be directed to ensure that the ongoing pollution control strategies are implemented as planned and water quality improvements are achieved. These waters on the Georgia 2002 305(b)/303(d) List are identified as active 305(b) waters, and are the highest priority waters, as these segments will continue to require resources to complete actions and ensure standards are achieved. These stream segments have been assigned priority one (see Appendix D).

Second priority was allocated to segments in which dissolved oxygen concentration was an issue.

Third priority was assigned to waters where air deposition, urban runoff or general nonpoint sources caused issues with fish consumption, biota, and/or fecal coliform bacteria standards violations. Waters added to the Georgia 303(d) list by EPA were also assigned to third priority. Several issues helped forge the rationale for priorities. First, strategies are currently in place to address the significant water quality problems in the Altamaha River basin and significant resources will be required to ensure that these actions are completed. Second, many of the waters for which no control strategy is currently in place are listed due to fish consumption issues or as a result of exceedance of fecal coliform bacteria due to urban runoff or nonpoint sources. At the present time, the efficacy of the standards for fecal coliform bacteria is in question in the scientific community, as described in Section 4.2. Also, there is no national strategy in place to address air deposition of mercury, thought to be the source of mercury that contributes to the fish tissue issues.

The EPD finalized total maximum daily loads (TMDLs) for waters on the 2002 303(d) list in the Altamaha River basin in 2003. The waters with final TMDLs are identified in Appendix D with a "3" in the column labeled 303(d). Implementation plans for each of the TMDLs are to be completed in 2003.

6.2.2 General Long-Term Priorities for Water Quality Concerns

Long-term priorities for water quality management in the Altamaha River basin will need to be developed by EPD and all other stakeholders during the next iteration of the basin management cycle. Long-term priorities must seek a balance between a number of different basinwide objectives. These objectives include:

- Protecting water quality in lakes, rivers, streams, and estuaries through attainment of water quality standards and support for designated uses;
- Providing adequate, high quality water supply for municipal, agricultural, industrial, and other human activities;
- Preserving habitat suitable for the support of healthy aquatic and riparian ecosystems;
- Protecting human health and welfare through prevention of water-borne disease; minimization of risk from contaminated fish tissue, and reduction of risks from flooding; and
- Ensuring opportunities for economic growth, development, and recreation in the region.

6.3 Priorities for Water Quantity Concerns

Drought conditions during the 1998-2000 period impacted the southeast region of the state which includes the Altamaha River basin. According to EPD's 1998-2000 Georgia Drought Report, rainfall shortages in this region amounted to almost 23 inches. The report summarizes the environmental, economic, and social impacts of the drought; evaluates the management actions implemented by state and local authorities during the drought; and presents a clear set of recommendations for improving drought preparedness and response.

The recommendations include the following:

1. Emergency Relief: The State of Georgia should provide emergency grants and loans to assist local governments with critical or threatened water supplies.
2. Water Conservation: The State of Georgia must develop a comprehensive water conservation plan to address a wide range of water conserving measures that can be implemented to reduce water demand in Georgia.
3. Agricultural Water Use: The State of Georgia must develop an effective method to evaluate consumptive use of water for agricultural irrigation and implement programs for reducing water use while protecting the prosperity of farmers and agricultural communities. (Note: Starting in FY04 the GSWCC will embark on a program to provide irrigation audits and a follow-up metering program of Georgia's 21,000 agricultural permit holders, of which about 1,079 permits are in the Altamaha River basin.)
4. State Water Plan: The State of Georgia must perform a detailed review of existing water policy and laws and develop a comprehensive state water plan that will provide the framework and support for effective management of Georgia's water resources.
5. State Drought Plan: The State of Georgia must continue developing a comprehensive drought plan and drought management process in order to implement appropriate drought response, preparedness and mitigation measures in future droughts. (Note: A State Drought Plan was adopted on March 26, 2003.)

In addition to the drought concern, the Altamaha River basin counties of Emanuel, Toombs and Appling down to the coast are part of the area implementing the Interim Strategy for the Floridan aquifer. While the basin is not directly impacted with salt water intrusion (which threatens Brunswick and Savannah), the Rayonier Mill near Jesup in Wayne County is the largest permitted groundwater use in Georgia.

6.3.1 Priorities for Competing Demands

With regard to the priority to be placed on meeting competing demands for future water use, the EPD (in conjunction with a broad group of stakeholders from north, central, and southwest Georgia) has established a set of "guiding principles" which will be followed in developing the state's position regarding the allocation of water. These principles are partially based upon the prioritization given to meeting categories of water needs under Georgia law (i.e., municipal needs are the first priority, and agricultural water needs are second; all other water needs follow these two). The principles are summarized below:

1. Municipal (M&I) demands have the highest priority.
2. Agriculture needs must be satisfied.
3. Minimum instream flow rates must be met in order to preserve water quality.
4. If other demands (e.g., industrial, recreation, hydropower, navigation, and environment) can not be met under conditions of water shortage, efforts will be made to optimize the mix of economic and environmental values.

References

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Georgia Environmental Protection Division. 2000. 1998-2000 Georgia Drought Report.

In This Section

- "Big Picture" Overview for the Altamaha River Basin
- General Basinwide Management Strategies
- Targeted Management Strategies

Section 7

Implementation Strategies

This section builds on the priority issues identified in Section 6 and proposes strategies to address the major water quality problems in the Altamaha River basin.

Georgia's Mission Statement for river basin management planning is "to develop and implement a river basin planning program to protect, enhance, and restore the waters of the state of Georgia that will provide for effective monitoring, allocation, use, regulation, and management of water resources." Associated with this mission are a variety of goals which emphasize the coordinated planning necessary to meet all applicable local, state, and federal laws, rules, and regulations, and provide for water quality, habitat, and recreation. For the Altamaha basin, these goals will be implemented through a combination of a variety of general strategies, which apply across the basin and across the state, and targeted or site-specific strategies. Section 7.1 describes the big-picture management goals for the Altamaha River basin. Section 7.2 describes the general and basinwide implementation strategies most relevant to the Altamaha River. Targeted strategies for specific priority concerns within each subbasin, as identified in Section 6, are then presented in 7.3.

7.1 "Big Picture" Overview for the Altamaha River Basin

This Altamaha River basin Management Plan includes strategies to address a number of different basinwide objectives. These include:

- Protecting water quality in lakes, rivers, streams, estuaries, and coastal waters through attainment of water quality standards and support for designated uses.

- Providing an adequate, high quality water supply for municipal, agricultural, industrial, and other human activities.
- Preserving a habitat suitable for the support of healthy aquatic and riparian ecosystems.
- Protecting human health and welfare through prevention of water-borne disease; minimization of risk from contaminated fish tissue, and reduction of risks from flooding.
- Ensuring opportunities for economic growth, development, and recreation in the region.

Achieving these objectives is the responsibility of a variety of state and federal agencies, local governments, business, industry, and individual citizens. Coordination between partners is difficult, and impacts of actions in one locale by one partner on conditions elsewhere in the basin are not always understood or considered. River Basin Management Planning (RBMP) is an attempt to bring together stakeholders in the basin to increase coordination and to provide a mechanism for communication and consideration of actions on a broad scale to support water resource objectives for the entire basin. RBMP provides the framework to begin to understand the consequences of local decisions on basinwide water resources.

RBMP, begun in 1993, is changing the way EPD and other state agencies coordinate business. At the same time, local government comprehensive planning requirements require a higher degree of effort and awareness by local governments to address resource protection and planning for the future.

This plan presents general broad-scale goals and strategies for addressing the most significant existing and future water quality and quantity issues within the Altamaha basin. The basin plan provides a whole-basin framework for appropriate local initiatives and controls, but cannot specify all the individual local efforts which will be required. The basin plan will, however, provide a context and general management goals for the local-scale plans needed to address local-scale nonpoint loads in detail. EPD expects local governments and agencies to take the initiative to develop local strategies consistent with the basin-scale strategies presented in this plan.

A number of concerns identified in this plan will affect planning and decision-making by local governments, state agencies, and business interests. Detailed strategies for addressing identified concerns are presented in Section 7.4. This section provides an overview of the key “big picture” issues and planning opportunities in the Altamaha River basin.

7.1.1 Water Quality Overview

As discussed in Section 5, water quality in the Altamaha River basin is generally good at this time, although problems remain to be addressed and proactive planning is needed to protect water quality into the future. Many actions have already been taken to protect water quality. Programs implemented by federal, state, and local governments, farmers, foresters, and other individuals have greatly helped to protect and improve water quality in the basin over the past 20 years. Streams are no longer dominated by untreated or partially treated sewage or industrial discharges, which resulted in little oxygen and impaired aquatic life. For the most part, local government and industrial wastewaters are properly treated, oxygen levels have returned, and fish have followed.

The primary source of pollution that continues to affect waters of the Altamaha River basin results from nonpoint sources. Key types of nonpoint source pollution impairing or potentially threatening water quality in the Altamaha River basin include sediment, bacteria and oxygen demanding substances from urban and rural nonpoint sources, and nonpoint sources of mercury (particularly air deposition) which accumulates in fish tissue. These problems result from the cumulative effect of activities of many individual landowners or managers. Population is growing every year, increasing the potential risks from nonpoint source pollution. Growth is essential to the economic health of the Altamaha River basin, yet growth without proper land use planning and implementation of best management practices to protect streams and rivers can create harmful impacts on the environment.

Because there are so many small sources of nonpoint loading spread throughout the watershed, nonpoint sources of pollution cannot effectively be controlled by state agency permitting and enforcement, even where regulatory authority exists. Rather, control of nonpoint loading will require the cooperative efforts of many partners, including state and federal agencies, individual landowners, agricultural and forestry interests, local county and municipal governments, and Regional Development Centers. A combination of regulatory and voluntary land management practices will be necessary to maintain and improve the water quality of rivers, streams, and lakes in the Altamaha River basin.

Key Actions by EPD

The Georgia EPD Water Protection Branch has responsibility for establishing water quality standards, monitoring water quality, river basin planning, water quality modeling, permitting and enforcement of point source NPDES permits, and developing Total Maximum Daily Loads (TMDLs), where ongoing actions are not sufficient to achieve water quality standards. Much of this work is regulatory. EPD is also one of several agencies responsible for facilitating, planning, and educating the public about management of nonpoint source pollution. Nonpoint source programs implemented by Georgia and by other states across the nation are voluntary in nature. The Georgia EPD Water Resources Branch regulates the use of Georgia's surface and groundwater resources for municipal and agricultural uses, which includes source water assessment and protection activities in compliance with the Safe Drinking Water Act.

Actions being taken by EPD at the state level to address water quality problems in the Altamaha River basin include the following:

- **Watershed Assessments and Watershed Protection Implementation Plans**. When local governments propose to expand an existing wastewater facility or propose a new facility, EPD requires a comprehensive watershed assessment and development of a watershed protection plan. The watershed assessment includes monitoring and assessment of current water quality and land use in the watershed and evaluation of the impacts of future land use changes. A watershed protection plan includes specific strategies such as land use plans and local actions designed to ensure that existing problems are being addressed and that future development will be conducted in a way to prevent water quality standards violations.
- **Total Maximum Daily Loads (TMDLs)**. Where water quality sampling has documented standards violations and ongoing actions are not sufficient to achieve water quality standards, a TMDL will be established for a specific pollutant on the specific stream segment in accordance with EPA guidance. The TMDL will specify the allowable loading of a pollutant from both point and nonpoint sources. The EPD will coordinate the development of TMDL implementation plans with local RDCs and other stakeholders, particularly in those situations where the source of the pollutant is a nonpoint source. In those cases where the cause of the problem is a municipal or industrial water pollution control plant discharge, the EPD will coordinate needed improvements directly with the owner of the treatment facility through the NPDES permitting process.
- **Source Water Protection**. The public water supply in the Altamaha basin is drawn from surface and groundwater. To provide for the protection of public water supplies, Georgia EPD developed a Source Water Assessment Program in

alignment with the 1996 amendments to the Safe Drinking Water Act and corresponding recent EPA initiatives. This new initiative will result in assessments of threats to drinking water supplies and, ultimately, local Source Water Protection Plans. Recent "Criteria for Watershed Protection" (a subsection of the Rules for Environmental Planning Criteria) produced by the Department of Community Affairs set minimum guidelines for protection of watersheds above "governmentally owned" water supply intakes.

- **Fish Consumption Guidelines**. EPD and the Wildlife Resources Division work to protect public human health by testing fish tissue and issuing fish consumption guidelines as needed, indicating the recommended rates of consumption of fish from specific waters. The guidelines are based on conservative assumptions and provide the public with factual information for use in making rational decisions regarding fish consumption.

Key Actions by Resource Management Agencies

Nonpoint source pollution from agriculture and forestry activities in Georgia is managed and controlled with a statewide non-regulatory approach. This approach is based on cooperative partnerships with various agencies and a variety of programs.

Agriculture in the Altamaha River basin is primarily restricted to livestock and poultry operations. Key partners for controlling agricultural nonpoint source pollution are the Soil and Water Conservation Districts, the Georgia Soil and Water Conservation Commission, and the USDA Natural Resources Conservation Service. These partners promote the use of environmentally sound best management practices (BMPs) through education, demonstration projects, and financial assistance. In addition to incentive payments and cost-sharing for BMPs, three major conservation programs from USDA will be available to producers and rural landowners. These are the Conservation Reserve Program, which protects highly erodible and environmentally sensitive land; the Wetland Reserve Program, designed to protect, restore, and enhance wetlands with cost-share incentives; and the Wildlife Habitat Incentives Program, which will help landowners develop and improve wildlife habitat.

Forestry is a major part of the economy in the Altamaha basin. The Georgia Forestry Commission (GFC) is the lead agency for controlling silvicultural nonpoint source pollution. The GFC develops forestry practice guidelines, encourages BMP implementation via University of Georgia sponsored educational workshops and demonstrations, conducts education, investigates and mediates complaints involving forestry operations, and conducts biennial statewide BMP compliance surveys. The State Board of Registration for Foresters adopted procedures to sanction or revoke the licenses of foresters involved in unresolved complaints where the lack of BMP implementation has resulted in water quality violations.

Key Actions by Local Governments

Addressing water quality problems resulting from nonpoint source pollution will primarily depend on actions taken at the local level. Particularly for nonpoint sources associated with urban and residential development, it is only at the local level that regulatory authority exists for zoning and land use planning, control of erosion and sedimentation from construction activities, and regulation of septic systems.

Local governments are increasingly focusing on water resource issues. In many cases, the existence of high quality water has not been recognized and managed as an economic resource by local governments. That situation is now changing due to a variety of factors, including increased public awareness, high levels of population growth in many areas resulting in a need for comprehensive planning, recognition that high quality water supplies are limited, and new state-level actions and requirements. The latter include:

- Requirements for Watershed Assessments and Watershed Protection Implementation Plans when permits for expanded or new municipal wastewater discharges are requested.
- Development of Source Water Protection Plans to protect public drinking water supplies.
- Requirements for local comprehensive planning, including protection of natural and water resources, as promulgated by the Georgia Department of Community Affairs.

In sum, it is the responsibility of local governments to implement planning for future development that takes into account management and protection of the water quality of rivers, streams, and lakes within their jurisdiction.

7.1.2 Water Quantity Overview

In addition to protecting water quality, it is essential to plan for water supply in the Altamaha River basin. The Georgia EPD Water Resources Branch regulates the use of Georgia's surface and groundwater resources for municipal and agricultural uses, and is responsible for ensuring sufficient instream flows are available during a critical drought condition to meet permitted withdrawal requirements without significant impact to the environment. The withdrawal permit process must not overuse the available resources. The Water Resources Branch is also responsible for regulation of public water systems for compliance with the Safe Drinking Water Act, and regulation of dams for compliance with the Safe Dams Act.

In response to the severe drought conditions in Georgia during the 1998-2000 period, EPD developed the 1998-2000 Georgia Drought Report (GAEPD, 2000) that summarizes the drought impacts and provides an objective assessment of the state's vulnerability and mitigation efforts; evaluates the management actions implemented by state and local authorities during the drought of 1998-2000; and presents a set of recommendations for improving drought preparedness and response. Among the recommendations included in the report are for the state to develop an effective method to evaluate consumptive use of water for agricultural irrigation, and implement programs for reducing water use while protecting the prosperity of farmers and agricultural communities. Starting in FY04 the GSWCC will embark on a program to provide irrigation audits and a follow-up metering program of Georgia's 21,000 agricultural permit holders, of which about 1,079 permits are in the Altamaha River basin.

The coastal counties of Emanuel, Toombs and Appling down to the coast are part of the area implementing the Interim Strategy for Managing Salt Water Intrusion in the Upper Floridan Aquifer of Southeast Georgia. Regionally, too much groundwater is being withdrawn and aquifer levels are decreasing. While the Altamaha River basin was not directly impacted with salt water intrusion (which threatens Brunswick and Savannah), the largest permitted groundwater user in the state is in Wayne County.

7.2 General Basinwide Management Strategies

There are many statewide programs and strategies that play an important role in the maintenance and protection of water quality in the Altamaha basin. These general strategies are applicable throughout the basin to address both point and nonpoint source controls.

7.2.1 General Surface Water Protection Strategies

Antidegradation

The State of Georgia considers all waters of the state as high quality and applies a stringent level of protection for each waterbody. Georgia Rules and Regulations for

Water Quality Control, Chapter 391-3-6-03(2)(b) contains specific antidegradation provisions as follows:

> (b) Those waters in the State whose existing quality is better than the minimum levels established in standards on the date standards become effective will be maintained at high quality; with the State having the power to authorize new developments, when it has been affirmatively demonstrated to the State that a change is justifiable to provide necessary social or economic development and provided further that the level of treatment required is the highest and best practicable under existing technology to protect existing beneficial water uses. Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. All requirements in the Federal Regulations, 40 C.F.R. 131.12, will be achieved before lowering of water quality is allowed for high quality water.

The antidegradation review process is triggered at such time as a new or expanded point source discharge is proposed that may have some effect on surface water quality. Such proposals are reviewed to determine if the new discharge is justifiable to provide necessary social or economic development and that the level of treatment required is the highest and best practicable under existing technology to protect existing beneficial water uses.

Applicants for new or expanded point source discharges into any surface water must perform an alternative analysis comparing the proposed discharge alternative to a "no-discharge" land application or urban reuse alternative. The application for discharge to surface waters will only be considered if the less degrading alternatives are determined to be economically or technically infeasible. In all cases, existing instream water uses and the level of water quality necessary to protect the existing use shall be maintained and protected.

Water Supply Watershed Protection Strategy

As population continues to increase within the Altamaha River basin, it will become ever more important to protect the water quality of already developed raw water sources. EPD is acting in concert with the Department of Community Affairs to produce a set of guidelines which define, among other things, measures that local governments are encouraged to take to protect drinking water sources. The guidelines are entitled Rules for Environmental Planning Criteria, and establish environmental protection criteria for five environmental categories: water supply watersheds, groundwater recharge areas, mountains, river corridors and wetlands. The *Criteria for Watershed Protection* (a sub-section of the Rules for Environmental Planning Criteria) set minimum guidelines for protection of watersheds above "governmentally owned" water supply intakes. The degree of protection depends upon the size of the watershed; watersheds with drainage areas of less than 100 square miles are subject to more strict criteria as summarized below:

- Impervious surface densities limited to 25 percent over the entire watershed.
- Buffer/setback requirements equal to 100/150 feet within a 7 mile radius of the intake and 50/75 feet outside the 7 mile radius.
- A reservoir management plan (including 150 foot buffer around the perimeter of the reservoir).

Watersheds with drainage areas of 100 square miles or more are subject to less strict criteria as summarized below:

- An intake on a flowing stream (as opposed to being located within a reservoir) shall have no specified minimum criteria.

- An intake with a water supply reservoir shall have a minimum of 100 feet natural buffer within a 7 mile radius of the reservoir, and no impervious cover constructed within a 150 foot setback area on both banks of the stream.

EPD is also actively working toward meeting the national goal that, by the year 2005, 60 percent of the population served by community water systems will receive their water from systems with source water protection programs (SWPP) in place under both wellhead protection and watershed protection programs. EPD intends to accomplish this goal by developing and implementing a source water assessment program (SWAP) in alignment with EPA's initiatives.

EPA approved EPD's Source Water Assessment and Protection Implementation Plan for Public Drinking Water Sources on April 24, 2000. The Plan specifies how source water assessment areas are to be delineated, lists potential contaminants of concern needing to be identified in the delineated areas, provides methodology for determining the susceptibility of a public water supply source and provides the basis for preparing local individual source water protection plans for public water supply systems. EPA has given the Drinking Water Program (DWP) the flexibility to help complete the local source water protection plans for contracted public water systems and provide financial and technical assistance to help develop long range source water protection strategies for the public water system. The Source Water Assessment program builds upon EPD's other assessment and prevention programs, including the Well Head Protection Program, the Vulnerability Assessment and Waiver Program and the River Basin Management Plans, by soliciting active public participation from the local communities and assisting in the preparation of the local water system's protection plan.

Total Maximum Daily Loads

Section 303(d) of the Clean Water Act (CWA) establishes the TMDL, or total maximum daily load, process as a tool to implement water quality standards. Georgia is required by the CWA to identify and list waterbodies where water quality standards are not met following the application of technology based controls, and to establish TMDLs for the listed stream segments. The USEPA is required to approve or disapprove Georgia's 303(d) list of waters and TMDLs.

The most recent requirement for 303(d) list submittal occurred in 2002. Georgia public noticed and submitted a draft 303(d) list package to the EPA in November 2001. The public and EPA reviewed the draft 303(d) list package and provided comments. Georgia reviewed the input, made appropriate changes and submitted a final 303(d) listing package to the EPA in March 2002. EPA approved the Georgia list in April 2002.

Georgia's 2002 303(d) listing is based on the Georgia 305(b) water quality assessments. The 305(b) assessment is presented in the report *Water Quality in Georgia, 2000-2001*. The 305(b) assessment tables for the Altamaha River basin are reorganized by HUC and presented in Appendix D of this report. The tables provide a code indicating the 303(d) listing status of assessed segments within the Altamaha River basin. An "X" in the 303(d) column indicates the segment is on the Georgia 2002 303(d) list. A complete explanation of the codes in the 303(d) column is given below:

1 Segments identified as not supporting or partially supporting designated uses where actions have been taken and compliance with water quality standards achieved. These segments are not part of the Georgia 303(d) list.

2 Segments identified as not supporting or partially supporting designated uses where existing enforceable state, local, or federal requirements are expected to lead to attainment of water quality standards within two years without additional control strategies. These segments are not part of the Georgia 303(d) list.

3 Segments where TMDLs have been completed and approved by EPA. These waters are not part of the Georgia 303(d) list.

X Waters on the Georgia 303(d) list. These segments are assessed as not supporting or partially supporting designated uses, and may require additional controls to achieve designated uses. These segments make up the Georgia 303(d) list.

TMDLs were written for nearly all of the listed segments during the current cycle of basin planning. Coordination and development of TMDL implementation plans is scheduled for 2003.

7.2.2 Management of Permitted Point Sources

The strategies in this section strive to minimize adverse effects from municipal, industrial, and concentrated discharges. Permitted discharges of treated wastewater are managed via the National Pollutant Discharge Elimination system (NPDES) permit program. The NPDES permit program provides a basis for regulating municipal and industrial discharges, monitoring compliance with effluent limitations, and initiating appropriate enforcement action for violations. EPD has formulated general strategies for a number of types of environmental stressors under the NPDES program.

Analysis of Alternatives

Applicants for new or expanded point source discharges into any surface water must perform an alternative analysis comparing the proposed discharge alternative to a "no discharge," land application or urban reuse alternative. The application for discharge to surface waters will only be considered if the less degrading alternatives are determined to be economically or technically infeasible. In all cases, existing instream water uses and the level of water quality necessary to protect the existing use shall be maintained and protected.

Permit Issuance/Reissuance Strategies

During the basin plan implementation phase, issues identified in the written basin plan pertaining to point source discharges will be assessed. The assessment will include such things as 1) identified point source discharge problem areas, 2) data evaluations, 3) wasteload allocations and/or TMDLs with identified problem point sources, and 4) toxic pollutants identified with point source discharges. Permits associated with identified problems will be evaluated to determine if a reopening of the permit is appropriate to adequately address the problem.

Watershed Assessment Requirements

A watershed assessment is generally initiated when, due to growth and development, a local government sees a need to increase the hydraulic capacity of an existing wastewater treatment facility (or propose a new facility) and contacts EPD for a NPDES permit modification. If an antidegradation review demonstrates that it is not feasible to handle the additional capacity needs with a land treatment or other no discharge system, the community may pursue an increase in its surface water discharge. The initial step in this

Box 7-1: A Guide to Understanding TMDLs

A Total Maximum Daily Load, or TMDL, is a regulatory tool that provides a framework for helping stakeholders resolve water quality issues in waterbodies with persistent problems. Literally, it is a calculation of the maximum amount of a pollutant that a waterbody can receive and still comply with standards and attain its designated use. However, it is used only under certain circumstances, and has implications far beyond the arithmetic of the numbers that go into it. This guide will provide a brief history of TMDLs, an explanation of the technical aspects, and information regarding implementation.

Background

Section 303(d) of the Clean Water Act provides a mechanism for achieving water quality standards where technology-based controls alone are insufficient. It requires states to identify waterbodies that do not achieve designated uses after application of technology to point sources, and put the waterbodies on a list (which has come to be called the 303(d) list). States then develop TMDLs, and allocate the pollutant load to point sources and nonpoint sources. These sources would then be required to reduce their loads to the specified target, either through new permit limits for point sources or best management practices for nonpoint sources.

Technical Aspects

TMDLs are often difficult to understand at first. Even so, the components and methodology can be unraveled, explained, and understood.

The terms of the TMDL equation and definitions are as follows (EPA, 1991):

TMDL = sum of WLA + sum of LA + MOS

Term	Definition	Description
WLA	Wasteload Allocation	A portion of the TMDL allocated to a point source.
LA	Load Allocation	A portion of the TMDL assigned to a nonpoint source or natural background sources in the present or future.
MOS	Margin of Safety	TMDLs are required to contain an appropriate margin of safety. The margin of safety is a way to account for the uncertainty inherent in the calculations and modeling that went into developing the loading capacity and the allocations. This may be an explicit portion of the TMDL or it may be incorporated implicitly through use of conservative assumptions.

Note: WLA and LA are expressed as “sum of WLA” and “sum of LA.” As an example, if there were three point source dischargers, “sum of WLA” would be the sum of all three wasteload allocations, one for each discharger.

While the literal definition of TMDL is “total maximum daily load,” the regulations allow it to be expressed in other forms. For instance, it may not be a daily load; fecal coliform bacteria TMDLs are generally expressed in monthly or annual terms. The guiding requirements are that the TMDL must be quantifiable, and it must be designed to achieve water quality standards. It must also have a margin of safety (implicit or explicit), and account for seasonal variation.

Box 7-1 Continued on Next Page

Box 7-1 Continued…

Implementation

While a TMDL is essentially just a set of numbers, the conditions under which it is invoked and the requirements it produces make it a tool for water quality regulation. TMDLs directly limit the allocations that can be made to point source dischargers requiring NPDES permits, such as wastewater treatment plants. This might limit future expansion of industry or wastewater treatment in a region. Most TMDLs, however, are needed because the waterbody has nonpoint sources of pollution that contribute to the failure to support a designated use. Agricultural operations, forestry operations, construction sites, suburban housing developments, and urban centers are all potential sources of various kinds of nonpoint source pollution. Pollutants are even transmitted long distances in the air and are deposited and washed off of land surfaces. In many cases, these sources must be addressed through urban land use planning efforts and/or voluntary actions (often supported by the directed use of funding, such as agricultural cost-share programs) to implement best management practices.

TMDL implementation plans will be produced and then acted upon. As the science used to create TMDLs improves, TMDLs may be revised. It will be a dynamic process, both for determining load allocations and for finding the actions needed to meet them and achieve the overarching goal of having clean water that achieves compliance with water quality standards and supports designated uses.

process is the completion of a watershed assessment, which is the first step towards assuring that all water quality standards will be maintained throughout a watershed during both critical dry and wet weather conditions in response to both point and nonpoint source loads.

The watershed assessment is actually a study, an assessment, and a plan. It is about collecting data and learning relationships between what is going on in a watershed and how these activities (land uses, etc.) impact water quality, then using this knowledge to develop both short and long term plans designed to ensure the attainment of water quality standards. The assessment should address current conditions and consider projected land use changes. Only when it can be demonstrated that water quality standards will be maintained, can EPD prepare a defensible permit for a proposed new or expanded wastewater treatment facility in accordance with the EPD 303(d) permitting strategy. The assessment should include a detailed plan to address both current water quality and biological problems and any predicted future water quality and biological problems. Key components of such a plan may be adopted by EPD as “special conditions” of the pertinent new or modified NPDES permit.

Facility Construction/Improvements

EPD has promoted continuing improvement in the quality of return flows from permitted point sources in the basin. Upgrading wastewater treatment facilities is a significant strategy to meet effluent limits from discharges. In the past 10 years, various upgrades and improvements have been made to industrial and municipal treatment systems throughout the Altamaha River basin. The funding for these projects has come from state and federal construction grants and loans and the citizens of local municipalities.

Domestic Wastewater Systems

The collecting, treating and disposing of wastewater in Georgia is regulated by a number of environmental laws that are administered by various agencies in local and state government. When a local government or private concern (owner) identifies a need for a wastewater treatment and disposal system it is imperative that thorough and adequate planning takes place.

Wastewater systems that discharge treated wastewater to a surface stream must be permitted through the Georgia National Pollution Discharge Elimination System (NPDES) and meet all the requirements of that system. In Georgia, with very few exceptions, surface discharge permits will only be issued to publicly owned systems.

Wastewater systems that do not result in a discharge to surface waters, such as slow rate land treatment systems and urban reuse systems (no discharge), are permitted through the State of Georgia's land application system (LAS) permitting process. Both publicly and privately owned systems can apply for and receive LAS permits.

Chlorine

If a chlorine limit is not already required in an NPDES permit, all major municipal wastewater facilities (i.e., those with design flows greater than or equal to 1.0 million gallons per day [MGD]) are required to meet a chronic toxicity-based chlorine limitation when the permit comes up for routine reissuance. The limitation is calculated based on a maximum instream concentration of 0.011 mg/l, the facility's design flow, and the 7Q10 low flow of the receiving stream. No facilities are given a limitation higher than 0.5 mg/l as this is deemed to be an operationally achievable number even if a facility does not have dechlorination equipment installed. Facilities which are given a limitation more stringent than 0.5 mg/l which do not already have dechlorination equipment installed, are given up to a 2-year schedule in which to meet the limitation. All discharging facilities that are upgrading are required to meet a chlorine limitation as part of the upgrade, based on the same criteria noted above.

Ammonia

Ammonia in effluents poses a problem both as a source of toxicity to aquatic life and as an oxygen-demanding waste. New facilities and facilities proposed for upgrade are required to meet ammonia limits for toxicity if those limits are more stringent than instream dissolved oxygen based limits. Existing facilities are not required to meet ammonia limits based on calculated toxicity unless instream toxicity has been identified through toxicity testing.

Metals/Priority Pollutants/Aquatic Toxicity

Major municipal and industrial facilities are required to conduct and submit results of periodic priority pollutant scans and aquatic toxicity tests to EPD as part of their permit monitoring requirements or upon submittal of a permit application for permit reissuance. The data are assessed in accordance with the Georgia Rules and Regulations for Water Quality Control. The results of the assessments can be used to trigger either additional priority pollutant monitoring, a toxicity reduction evaluation or permit limits for certain parameters.

Color

The state's narrative water quality standard for color requires that all waters shall be free from material related to discharges that produce color that interferes with legitimate water uses. EPD's color strategy will address this standard for industrial and municipal discharges by implementing permit limits and/or color removal requirements. EPD requires new facilities or discharges to prevent any noticeable color effect on the receiving stream. EPD requires existing facilities with color in their effluent to collect upstream and downstream color samples when their NPDES permit is reissued. The facility must conduct an assessment of the sources of color. Also, a color removal evaluation may be required at permit reissuance. EPD will also target facilities for color removal requirements based on significant citizen complaints of discoloration in streams.

Phosphorus

EPD establishes phosphorus control strategies where needed to address water bodies where water quality is limited by excess phosphorus loading. At the present time, there are no data to suggest phosphorus loading problems in the Altamaha River basin.

Temperature

Permits issued for facilities which discharge to primary trout streams are required to have no elevation of natural stream temperatures. Permits issued for facilities which discharge to secondary trout streams are required not to elevate the receiving stream more than 2 degrees Fahrenheit. There are no trout streams in the Altamaha River basin.

Storm Water Permitting

The Water Quality Act of 1987 requires permits to be issued for certain types of stormwater discharges, with primary focus on stormwater runoff from industrial operations and large urban areas. The USEPA promulgated Storm Water Regulations on November 16, 1990. The GAEPD subsequently received delegation from the USEPA in January 1991 to issue NPDES Permits for regulating stormwater in Georgia. GAEPD has developed and implemented a stormwater strategy that assures compliance with the federal regulations.

Phase I of the federal regulations set specific application submittal requirements for large (population 250,000 or more) and medium (population 100,000 to 250,000) municipal separate storm sewer systems (MS4). The GAEPD has determined that the metropolitan Atlanta area is a large municipal system as defined in the regulations. Clayton, Cobb, DeKalb, Fulton, and Gwinnett Counties and all interlaying incorporated cities were required to comply with the application submittal target dates for a large municipal area. Forty-six stormwater permits have been issued to the Atlanta area municipalities.

Augusta, Macon, Savannah, Columbus and the counties surrounding these cities were identified as medium municipal systems as defined in the stormwater regulations. Twelve stormwater permits have been issued to the medium municipal systems in Georgia. The stormwater permits for large and medium municipal systems require the submittal of annual reports to GAEPD. Each year, the GAEPD reviews the annual reports from the large and medium municipalities. Among other things, the annual report includes a detailed description of the municipality's implementation of its Storm Water Management Program. The GAEPD provides comments on the annual reports to the MS4 permittees, noting areas of noncompliance and recommending improvements to the local Storm Water Management Programs.

On December 8, 1999 USEPA promulgated the Phase II Rules for Storm Water. Phase II requires NPDES permitting and the development of Storm Water Management Programs for a large number of smaller cities and counties. Construction sites from 1-5 acres and municipally-owned industrial facilities will also be regulated.

Significant progress has been made in the implementation of the Phase II Storm Water Rule concerning small municipal separate storm sewer systems (MS4s). GAEPD has evaluated the 2000 census data and determined a list of local governments whose jurisdictions resided within the Urbanized Areas in the state. As required by federal regulations, GAEPD also determined a waiver process, and a process to designate additional MS4s based on designation criteria. The total number of Phase II MS4s in Georgia is 86.

The General NPDES Storm Water Permit for Small MS4s was issued in December 2002. The small MS4s submitted their Notice of Intent forms in March 2003 to apply for coverage under the general permit.

The GAEPD has issued general permits for the 11 industrial subcategories defined in the Phase I Federal Storm Water Regulations. During 1993, the GAEPD issued a general NPDES permit that regulates the discharge of stormwater from 10 categories of industrial activity. This permit was reissued in 1998 and will be reissued again in 2003. As of May 2003, approximately 41 NOIs had been filed for the Altamaha River basin.

A second general NPDES permit that would regulate stormwater discharges from construction activities was issued by GAEPD and subsequently appealed in 1992, 1994, 1995, 1996 and 1999. Settlement negotiations involving the regulated community who filed the three petitions, several environmental organizations, GAEPD, and a professional facilitator began in October 1999. After months of negotiation, GAEPD issued a revised general NPDES permit GAR 100000 for construction activities on June 12, 2000. The permit became effective on August 1, 2000. This permit currently regulates construction activity which results in land disturbances of five acres or greater. The construction permit requires permittees to implement best management practices, conduct inspections and sample stormwater leaving their site after certain rainfall events. There is a three-tiered permitting structure to differentiate between permittees' responsibilities which allows for easier enforcement. Georgia EPD has received approximately 20,000 Notice of Intent applications since the permit issuance in 2000. The construction general permit will be reissued in July 2003 to include construction sites between one and five acres.

The GAEPD will continue to regulate stormwater runoff from industrial and urban areas as a part of the point-source permitting process to protect water quality.

7.2.3 Nonpoint Source Management

The strategies in this section address sources of environmental stressors which are not subject to NPDES permitting and typically originate from diffuse or nonpoint sources associated with land uses. Most strategies that address nonpoint source concerns are not regulatory in nature, but involve a variety of approaches such as technical assistance and education to prevent and reduce nonpoint source pollution in the basin. Strong stakeholder involvement will be essential to effectively implement many of these strategies.

Georgia Nonpoint Source Management Program

Georgia's initial *Nonpoint Source Assessment Report* and *Nonpoint Source Management Program* were completed in compliance with the Clean Water Act of 1987 and approved by the U.S. Environmental Protection Agency in January 1990. The biennial report, *Water Quality in Georgia*, as required by Section 305(b) of Public Law 92-500, serve as the current process for updating the *Nonpoint Source Assessment Report*.

The state's *Nonpoint Source Management Program* combines regulatory and non-regulatory approaches, in cooperation with other state and federal agencies, local and regional governments, state colleges and universities, businesses and industries, nonprofit organizations and individual citizens. The state's *Nonpoint Source Management Program* was updated and approved by the U.S. Environmental Protection Agency in September 2000. This revision was intended to satisfy the requirements for funding under Section 319(b) of the Clean Water Act of 1987 and to delineate short- and long-term goals and implementation strategies. Just as important, it was designed to be an information resource for the wide range of stakeholders across the state who are involved in the prevention, control and abatement of nonpoint sources of pollution. It has been developed as an inventory of the full breadth of nonpoint source management (regulatory and non-regulatory) in Georgia, including activities which are currently underway or planned for in the time period FFY 2000 through FFY 2004.

The state's *Nonpoint Source Management Program* focuses on the comprehensive categories of nonpoint sources of pollution identified by the U.S. Environmental Protection Agency: Agriculture, Silviculture, Construction, Urban Runoff, Resource Extraction, Land Disposal, Hydrologic/Habitat Modification and Other Nonpoint Sources. The Georgia Environmental Protection Division solicited participation from state and federal agencies, local and regional governments, state colleges and universities, businesses and industries, and nonprofit organizations with significant programs directed towards nonpoint source management. The state's *Nonpoint Source Management*

Program comprehensively describes a framework for stakeholder coordination and cooperation and serves to implement a strategy for employing effective management measures and programs to control nonpoint source pollution statewide.

Agricultural Nonpoint Source Control Strategies

Agricultural nonpoint source pollution continues to be managed and controlled with a statewide non-regulatory approach. This approach uses cooperative partnerships with various agencies and a variety of programs. A brief description of these agencies and outline of their functions and programs is provided below.

Soil and Water Conservation Districts (SWCDs)

Georgia's SWCDs were formed by Act No. 339 of the Georgia General Assembly on March 26, 1937. Their role is to provide leadership in the protection, conservation, and improvement of Georgia's soil, water, and related resources. This is accomplished through promotion efforts related to the voluntary adoption of agricultural best management practices (BMPs).

Georgia Soil and Water Conservation Commission (GSWCC)

Georgia's SWCDs receive no annual appropriations and are not regulatory or enforcement agencies. Therefore, the GSWCC was also formed in 1937 to support the SWCDs. GSWCC has been designated as the administering or lead agency for agricultural nonpoint source (NPS) pollution prevention in the state. The GSWCC develops NPS water quality programs and conducts educational activities to promote conservation and protection of land and water resources devoted to agricultural uses. Primary functions of the GSWCC are to provide guidance and assistance to the Soil and Water Conservation Districts and provide education and oversight for the Georgia Erosion and Sedimentation Act.

There are a number of other agricultural agencies administering programs to address water quality and natural resource management issues. Resource Conservation and Development (RC&D) Councils are organized groups of local citizens supported by the USDA involved in a program to encourage economic development, as well as the wise conservation of natural and human resources. The University of Georgia College of Agricultural and Environmental Sciences (CAES) conducts an education and outreach campaign that encourages producers to increase productivity using environmentally sound techniques. This is accomplished through a number of programs like Farm-A-Syst, Well Water Testing, Nutrient Management, Soil and Water Laboratory Analysis, and informational material on a wide range of subjects. Georgia's Department of Agriculture (GDA) administers a wide variety of insect and plant disease control programs to help regulate the use of pesticides. GDA also inspects irrigation system requirements, such as check valves and back flow prevention devices, for protection of groundwater. The Agricultural Research Service (ARS) conducts research designed to improve the effectiveness of agricultural conservation techniques and promote sustainability. The Natural Resources Conservation Service (NRCS), along with the Farm Services Agency (FSA) and through local Soil and Water Conservation Districts, administers Farm Bill Programs that provide technical and financial incentives to producers to implement agricultural BMPs. The Agricultural Water Use Coordinating Committee, through individual members, regularly applies for, and receives, funds under section 319(h) of the Clean Water Act to perform best management practices and demonstration projects throughout the state. The Georgia Soil and Water Conservation Commission has provided state leadership with many of these efforts.

Collectively, these programs will serve to address resource concerns related to agricultural land uses in a coordinated fashion over the next five years until the second iteration of the River Basin Management Planning Cycle. Much of the information regarding opportunities to participate under this voluntary approach to complying with water quality standards is disseminated through commodity commissions and organizations such as the Farm Bureau Federation, Agribusiness Council, Cattlemen's Association, Milk Producers Association, Pork Producers Association, Poultry Federation, and other agricultural support industries.

Prioritization Activities under the Farm Bill

The 1996 Farm Bill provides a number of programs, and processes, designed to address those environmental stressors related to nonpoint sources from Agriculture which were identified in section 4.1.2. A new flagship conservation program, the Environmental Quality Incentives Program (EQIP), will provide the lion's share of funding for technical, educational, and financial assistance. The USDA Natural Resources Conservation Service (NRCS) has leadership for EQIP and works with the USDA Farm Service Agency (FSA) to set policies, priorities, and guidelines. These two agencies take recommendations from local work groups and a State Technical Committee, comprised of resource professionals from a variety of disciplines, when addressing actual and potential resource impairments associated with agricultural land uses.

EQIP provides incentive payments and cost-sharing for conservation practices through 5- to10-year contracts. Producers may receive federal cost-sharing up to 50 percent of the average cost of certain conservation practices such as terraces, grassed waterways, filter strips, buffer strips, manure management facilities, animal waste utilization, and 46 other conservation practices important to improving and maintaining the health of natural resources in an area. An individual producer can receive as much as $450,000 in EQIP funds over 10 years for contracts initiated between FY 2002 and FY 2007 to implement needed conservation practices.

A majority of funds allocated to Georgia (65 percent) will be spent in priority areas where there are serious and critical environmental needs and concerns. High priority is given to areas where state and local governments offer financial and technical assistance, and where agricultural improvements will help meet water quality and other environmental objectives.

The remaining 35 percent of funds allocated to Georgia can be extended outside priority areas to other parts of the state. Eligibility is limited to persons who are engaged in agricultural productions. Eligible land includes cropland, pastureland, forestland, and other farm lands.

In addition to EQIP there are three major conservation programs from USDA that will be available to producers, and rural landowners. The first is the Conservation Reserve Program (CRP), which protects highly erodible and environmentally sensitive land with grass, trees, and other long-term cover. The Wetland Reserve Program (WRP) is a voluntary program designed to protect, restore, and enhance wetlands with cost-share incentives. Also, the Wildlife Habitat Incentives Program (WHIP) will help landowners develop and improve habitats for upland wildlife, wetland wildlife, endangered species, fisheries, and other wildlife.

Forestry Nonpoint Source Control Strategies

In 1977, the Governor's Silviculture Task Force was convened to develop a forestry Water Quality program that included the development of silvicultural Best Management Practices (BMPs). Spearheaded by the Georgia Forestry Commission (GFC), this Task Force was composed of 14 conservation and environmental representatives, University of Georgia professionals, and USFS personnel. As a result, BMPs were developed in 1981. The Task Force also prepared a report that recommended a voluntary (exempt from state and local Erosion & Sediment Control permitting) approach to the implementation of BMPs and the designation of the GFC as the lead agency for implementing the Silviculture portion of the State Water Quality Management Plan. Their main roles are BMP education, forestry complaint investigation, and BMP implementation monitoring.

In January 1999, the BMPs were revised to reflect changes in new laws and advances in technology.

The GFC Forestry Nonpoint Source Control Program is managed by a statewide coordinator and appointed foresters serving as district coordinators from each of the 12 GFC districts. The statewide and district coordinators conduct educational workshops, training programs and field demonstrations for the forest community (i.e., landowners, land management and procurement foresters, consulting foresters, timber buyers, loggers, site preparation contractors). From 1981 through June 2002, GFC foresters have conducted 1,580 BMP programs for 54,134 people in the forestry community. They have provided BMP advice in 67,678 plans covering over 4 million acres statewide. Over 75,000 BMP manuals have been distributed.

Working with the University of Georgia School of Forest Resources, the Georgia Forestry Association, member companies of the American Forest & Paper Association (AF&PA), and the Southeastern Wood Producers Association (SWPA), the GFC provides BMP education for the AF&PA's Sustainable Forestry Initiative (SFI) that provides education to the 1,500 loggers in the state. The initial course, started in December 1995, is a three-day workshop in which the participants are provided instruction on forest soils, wetlands, wildlife impacts, endangered species, BMPs, OSHA, and business management. Loggers are required to complete this course in order to deliver their products to participating mills and wood yards. In addition they are required to obtain 12 hours of continuing logger education every 2 years.

The GFC investigates and mediates complaints involving forestry operations. Since 1981, the GFC has investigated 1,304 complaints statewide. Non-compliance cases are turned over to the GAEPD for enforcement under the Georgia Water Quality Control Act. Fines and penalties can range up to $50,000 per day. The State Board of Registration for Foresters adopted procedures to sanction or revoke the licenses of professional foresters involved in unresolved complaints where the lack of BMP implementation has resulted in state water quality or federal wetlands requirement violations.

In addition, the GFC conducts BMP implementation and compliance surveys to assess the implementation rates and effectiveness of BMPs. Statewide BMP surveys were conducted in 1991, 1992, 1998, and in 2002. Another survey is planned for 2004 and every two years after.

The GFC has established procedures for installing water control structures in the 25,000 miles of annual firebreaks to reduce soil erosion and sedimentation.

As a result of the federal Total Maximum Daily Load (TMDL) program, the GFC began a monthly BMP Assurance Examination Program in January 2003. The GFC will identify active forestry operations and conduct at least one examination per field once a month resulting in approximately 45 sites per month. The purpose is to get on the site early enough to provide BMP information to landowners and to provide advice to loggers or forest operators in order to prevent potential problems from occurring. The GFA, SWPA, and AF&PA member companies, who are now tracking wood compliance on private landowners, support this program.

Additional requirements are imposed within the National Forest areas of Georgia. Each National Forest produces and regularly updates a Land and Resource Management Plan to guide timber harvest and other activities. These plans establish long-range goals and objectives; specific management prescriptions and the vicinity in which they will occur; standards and guidelines on how management prescriptions will be applied; and monitoring procedures to assure the Plan is followed. There are no National Forests in the Altamaha Basin.

There are eight Georgia DNR Wildlife Management areas in the basin encompassing approximately 85,500 acres. These areas are managed for timber and wildlife and are under the supervision of a DNR or forest industry forester.

Urban Nonpoint Source Control Strategies

The 1990 report of the Community Stream Management Task Force, *We All Live Downstream*, established a road map for urban nonpoint source management in Georgia. The Task Force recognized two major impediments to effectively managing the quality of urban water bodies. The first is the division between 1) statutory responsibilities for management of water quality, granted to EPD, and 2) local government's Constitutional responsibility for management of the land activities which affect urban water bodies. The second impediment is the widespread nature of the nonpoint sources and the variety of activities which may contribute to impacts from urban runoff. They concluded that management of urban nonpoint source pollution would require "…a cooperative partnership between layers of government, the private sector, and the general public. The development of such a partnership will require a strong impetus to accept new institutional roles and make the structural changes necessary to support and sustain the stream management process."

EPD has a primary role in facilitating the management of urban runoff, and is responsible for administering and enforcing a variety of permit programs, including permitting of discharges. In addition to these regulatory activities, EPD seeks to assist in development of local solutions to water quality problems; provides technical information on the water resources of the state; and administers grant programs, with funds from various sources to support nonpoint source planning and assessment, implementation of BMPs, and regional or local watershed management initiatives. EPD also conducts a variety of outreach and educational activities addressing urban runoff in general, regulatory requirements, and cooperative or non-regulatory approaches.

For urban runoff, activities of the Nonpoint Source Management Program interact strongly with point source controls for combined sewers and storm sewers, both of which discharge urban runoff through point conveyances. While the state continues to have an important regulatory role, aspects of the cooperative intergovernmental partnerships envisioned by the Task Force have emerged and are being strengthened. EPD is implementing programs which go beyond traditional regulation, providing the regulated community with greater flexibility and responsibility for determining management practices. Current activities for urban surface runoff control include the following:

- Implement local nonpoint source (NPS) management programs, streambank and stream restoration activities.
- Develop and disseminate local watershed planning and management procedures.
- Implement state and local Erosion and Sedimentation Control Programs.
- Prepare and disseminate technical information on best management practices and nonpoint source monitoring and assessment.
- Implement NPS education programs for grades K through 12 through Project WET (Water Education for Teachers), as described in Section 7.2.6.
- Implement the Georgia Adopt-A-Stream Program, as described below in Section 7.2.6.
- Identify and evaluate resources to support urban watershed planning and management.

Erosion and Sediment Control

The Georgia Erosion and Sedimentation Act was signed into law in 1975 and has been amended several times since that date, most recently 2001. The legislative intent of the Act was to establish a comprehensive and statewide soil, erosion and sedimentation control program to protect and conserve air, land and water resources through the adoption and implementation of local ordinances and programs which regulate certain land disturbing activities generally associated with urban development. EPD implements the program where there is no local ordinance. The Act requires an erosion and sedimentation control plan and a land disturbing activity permit for sites greater than 1.1 acres. Erosion and Sedimentation control plans must be reviewed and approved by the Soil and Water Conservation District or by the local issuing authority before the land disturbing activity permit can be issued. Buffers of 25 feet for warm water streams and 50 feet for trout streams are required by the Act for the protection of water quality. The Act provides for a variance from these buffers under certain circumstances. Variances can only be issued by EPD. Procedures and criteria for obtaining a stream buffer variance are outlined in DNR's Erosion and Sedimentation Control Rules and Regulations and become part of the Land Disturbing Activity Permit. The Act provides for monetary penalties of up to $2,500 per day, enforced by EPD or by the local issuing authority.

7.2.4 Floodplain Management

Floodplain Management Strategies

Floodplain Management in the State of Georgia is administered under federal regulations and local ordinances. The federal statutes are found in Title 44 of the Code of Federal Regulations Parts 59-79. As a condition of participation in the National Flood Insurance Program (NFIP), local political jurisdictions voluntarily adopt Flood Damage Prevention Ordinances, which are based on federal regulations, to enforce and administer floodplain development. Georgia's Floodplain Management Office does not issue permits for floodplain development.

Georgia's Floodplain Management Office, located within the Department of Natural Resources, Environmental Protection Division, serves as liaison between the Federal Emergency Management Agency (FEMA) and local communities participating in the NFIP. However, Georgia's Floodplain Management Office has no regulatory authority. Participation by the local communities in the NFIP is a requirement for the federal government to make flood insurance available to all property owners. Through workshops, newsletters, technical assistance and community visits, the Floodplain Management Office assists local governments to maintain compliance with NFIP requirements. The Floodplain Management Office also provides technical data, floodplain maps, and training workshops to various public and private entities involved in floodplain management and floodplain determinations. In addition, the Floodplain Management Office reviews all state-funded and federal-funded projects for development in designated Special Flood Hazard Areas. A major thrust of the Floodplain Management Office is to increase the number of political jurisdictions participating in the NFIP, thereby increasing the number of flood insured structures in Georgia.

River Care 2000 Program

Georgia also has strategies to protect and manage riparian floodplain areas. Of particular relevance is River Care 2000, a conservation program which Governor Miller established in September 1995. One key objective of this program is acquisition of river-corridor lands for purposes of protection and to forestall unwise development in flood-prone areas. The Coordinating Committee has approved procedures for three types of projects: Riverway Demonstration Projects, which improve public access to a river with scenic and recreation uses, and protect natural and historic resources by acquiring and managing land in the river corridor; Significant Sites, which are tracts of land which DNR will acquire and operate as a traditional state public-use facility: wildlife management or public fishing area, park or historic site, natural area, or greenway; and Restoration Sites, which are tracts of land on which the state will identify, acquire, and manage to reduce nonpoint source water pollution.

The River Care 2000 program is also charged with assessing important river resources throughout the state and identifying more effective management tools for river corridors. The program recently released a statewide assessment of resources associated with rivers throughout the state (GA DNR, 1998).

7.2.5 Wetland Management Strategies

The loss of wetlands, because of the associated adverse impacts to flood control, water quality, aquatic wildlife habitat, rare and endangered species habitat, aesthetics, and recreational benefits, has become an issue of increasing concern to the general public as they become better informed of the values and functions of wetlands. There is a lack of accurate assessments for current and historic wetland acreage, but, regardless of the method used to measure total acreage or wetland losses, Georgia still retains the highest percentage of pre-colonial wetland acreage of any southeastern state.

Efforts to Track No Net Loss of Wetlands

While the 1993 Federal Administration Wetlands Plan calls for a concerted effort by EPA and other federal agencies to work cooperatively toward achieving a no overall net loss of wetlands in the short term and a net increase in the quantity of the nation's wetlands in the long run, there have been no statutory or executive level directives to carry out this policy. Achievement of the goal of no net loss is dependent upon limited changes to regulations, memoranda of understanding, cooperative agreements, and other partnerships between federal, state, and local governments, conservation organizations, and private citizens.

All dredge and fill activities in freshwater wetlands are regulated in Georgia by the U.S. Army Corps of Engineers (COE) under Section 404 of the Clean Water Act. The majority of wetland alterations occur under nationwide or general permits, which include permits for bridge building, minor road crossing fills, and fills of less than 10 acres above the "headwaters" point of non-tidal streams where the annual average flow is less than 5 cubic feet per second. The COE and EPA carry out enforcement in freshwater wetlands. Normal, established, ongoing agricultural and silvicultural operations are exempted from permitting under Section 404 regulations. However, agriculture is regulated by the Swampbuster provisions under the Farm Bill and Section 404 and landowners cannot convert forested wetlands to agricultural uses (including ponds) without first securing a COE permit. Silvicultural operations cannot convert wetlands to non-wetlands via major ditching nor convert certain bottomland hardwood wetlands to pine stands via mechanical site preparation without first securing a COE permit.

The COE may require wetland mitigation activities in association with permitting, including creation, restoration, and protection of wetlands. COE may also require wetland restoration in case of violations.

Land Acquisition

The Department of Natural Resources (DNR), Wildlife Resources Division (WRD), began a land acquisition program in 1987 to acquire 60,000 acres of additional lands for Wildlife Management Areas (WMAs) and Public Fishing Areas (PFAs). This initiative was funded by $30 million of 20-year obligation bonds to be paid off by hunting and fishing license increases and WMA permit fees.

Beginning in 1990 Governor Zell Miller initiated Preservation 2000, a $60 million program to acquire 100,000 acres of lands to be used for wildlife and fisheries management, parks and recreation, natural area preservation, and general conservation. Additional wetlands acquisition occurs as part of the River Care 2000 initiative discussed above.

7.2.6 Stakeholder Involvement/Stewardship Strategies

Effective nonpoint source management must address the numerous activities of individuals, businesses, industries, and governments which can adversely affect urban and rural waters. In many cases, these groups are unaware of the potential impacts of their activities or corrective actions which may be taken. Stakeholder involvement and stewardship are essential to address these major challenges.

Georgia has chosen a two-pronged approach to encourage stewardship via education and citizen monitoring. EPD is the lead agency in these education and citizen monitoring programs, but, like other aspects of the state's nonpoint source management effort, cooperative efforts with local governments and community-based groups are critical to their implementation. Outreach and education, including citizen monitoring, lays the groundwork for behavior change and is often an important pre-requisite for effective implementation of BMPs and comprehensive watershed management programs.

General goals for stakeholder involvement and stewardship strategies are:

- Generate local support for nonpoint source management through public involvement and monitoring of streams and other water bodies and of results of management actions.
- Increase individuals' awareness of how they contribute to nonpoint source pollution problems and implement appropriate strategies to motivate behavior change and actions to address those problems.
- Provide the educational tools, assistance, and support for addressing NPS problems to target audiences across the state.

Georgia Adopt-A-Stream

The *Georgia Adopt-A-Stream Program* is a citizen monitoring and stream protection program with two staff positions in the Georgia EPD and five Regional Training Centers, a network of college-based training centers located statewide. This network of training centers allows the Georgia Adopt-A-Stream Program to be accessible to all areas of the state. The Regional Training Centers ensure that volunteers are trained consistently and that the monitoring data is professionally assessed for quality assurance and quality control.

Stakeholder involvement and stewardship are essential to implementing Georgia's River Basin Management Planning (RBMP) approach to water resource management. The Georgia Adopt-A-Stream Program objectives support the RBMP strategies for stakeholder involvement and stewardship in the following ways: (1) increase individual's awareness of how they contribute to nonpoint source pollution problems, (2) generate local support for nonpoint source management through public involvement and monitoring of waterbodies, and (3) provide educational resources and technical assistance for addressing nonpoint source pollution problems statewide.

Currently, more than 10,000 volunteers participate in 200 individual and 40 community-sponsored Adopt-A-Stream Programs. Volunteers conduct cleanups, stabilize streambanks, monitor waterbodies using biological and chemical methods, and evaluate habitats and watersheds at over 260 sites throughout the state. These activities lead to a greater awareness of water quality and nonpoint source pollution, active cooperation between the public and local governments in protecting water resources, and the collection of basic water quality data. The Georgia Adopt-A-Stream Program focuses on what individuals and communities can do to protect from nonpoint sources of pollution.

Volunteers are offered different levels of involvement. Each level involves an education and action component on a local waterbody. The introductory level consists of setting up a project (i.e., identifying a stream segment, lake, estuary or wetland, identifying partners, registering with the Georgia Adopt-A-Stream Program), evaluating land use and stream conditions during a watershed walk, conducting quarterly visual operations and cleanups, and public outreach activities. Volunteers create a "Who to Call for Questions or Problems" list so that if something unusual is noted, immediate professional attention can be obtained. Advanced levels of involvement include biological monitoring, chemical monitoring, habitat improvement or riparian restoration projects.

In addition, the *Georgia Adopt-A-Stream Program* and *Keep Georgia Beautiful Program* coordinate *Rivers Alive*, Georgia's annual volunteer river clean up event held throughout the month of October that targets cleanups of streams, rivers, lakes and wetlands statewide. The mission of *Rivers Alive* is to create awareness of and involvement in the preservation of Georgia's water resources.

Rivers Alive 2002 included 120 local cleanup events and attracted more than 17,000 volunteers statewide. During October 2002, volunteers removed more than 300,000 pounds of trash and garbage from 780 miles of the state's waterways. Previous river clean up events in Georgia have been successful but pale in comparison to the success that has been achieved by *Rivers Alive 2002*. Organizers and volunteers receive free t-shirts, watershed posters and signs, press releases and public service announcements. Additional information about *Rivers Alive* is available on the website, http://www.riversalive.org.

The Georgia Adopt-A-Stream Program provides volunteers with additional resources such as the *Getting to Know Your Watershed and Visual Stream Survey*, *Biological and Chemical Stream Monitoring*, *Adopt-A-Wetland*, *Adopt-A-Lake*, and *Adopt-A-Stream Teacher's Guide* manuals, PowerPoint presentations, and promotional and instructional training videos. In addition, a bi-monthly newsletter is published and distributed to over 3,000 volunteers statewide with program updates, workshop schedules, and information about available resources. Additional information about the Georgia Adopt-A-Stream Program is available on the *Rivers Alive* website, http://www.riversalive.org/aas.htm.

In addition, the Georgia Adopt-A-Stream Program activities have been correlated to the Georgia Quality Core Curriculum (QCC) Science Standards for grades K-12 and certified teachers in Georgia participating in Georgia Adopt-A-Stream Program training workshops will receive Staff Development Unit (SDU) credits. Additional information about the QCC correlations and SDU credits and the Georgia Adopt-A-Stream QuickTime Training Videos are available on the National Science Center's website, http://tech.nscdiscovery.org/ee/aas.htm.

The Georgia Adopt-A-Stream Program has partnered with the Environmental Education Alliance of Georgia to conduct an annual conference and awards ceremony. The 2003 conference, *Environmental Education - Connecting Communities and Classrooms*, was held in Savannah, Georgia with over 250 participants. Additional information about the annual conference and awards ceremony are available on the website, http://www.eealliance.org.

Georgia Project WET (Water Education for Teachers) Program

A report outlining a plan for nonpoint source education in Georgia was completed in 1994. The Georgia Urban Waterbody Education Plan and Program delineated nonpoint source education strategies for seven target audiences: general public, environmental interest organizations, civic associations, educators, business associations, local government officials and state government officials. In October 1996, the Project WET (Water Education for Teachers) curriculum was selected as the most appropriate water science and nonpoint source education curriculum for the state. The Project WET curriculum is an interdisciplinary water science and education curriculum that can be easily integrated into the existing curriculum of a school, museum, university pre-service class, or a community organization. The goals of the Georgia Project WET Program are to facilitate and to promote awareness, appreciation, knowledge and stewardship of water resources through the development and dissemination of classroom ready (K-12) teaching aids.

The success of the Georgia Project WET Program has been phenomenal. Since 1997, over 200 Project WET facilitators have been trained in Georgia with more than 4,500 formal and non-formal educators implementing the Project WET curriculum statewide with a substantial number of students – over 675,000 students annually!

The Georgia Project WET Program continues to be nationally recognized as a model program for its training strengths and techniques – specifically, the use of the arts in environmental education. The Georgia Project WET Program and the Georgia Center for the Book offer educators in Georgia the opportunity to participate in the *River of Words*, an international poetry and art contest for students (K-12). This contest provides students with the opportunity to explore their own watersheds and to learn their “ecological” addresses through poetry and art. National winners are selected by the former U.S. Poet Laureate, Robert Hass, and the International Children’s Art Museum. Annually, only eight students are selected as National Grand Prize Winners to be honored at the Library of Congress in Washington, DC. Additional information about *River of Words* is available on the website, http://www.riverofwords.org.

Over 30,000 entries were submitted to the *River of Words 2003* contest and one of the eight National Grand Prize Winners was from Georgia! Since 1997, 11 students from Georgia have been recognized as National Grand Prize Winners and an additional 81 students have been selected as National Finalists and Merit Winners.

The students’ original poetry and art are returned from the international competition and are on display in the *Georgia River of Words Exhibition* statewide. The Georgia Project WET Program offers a guidebook for educators with specific information about Georgia’s watersheds and several nature centers throughout Georgia offer *River of Words* field trips and workshops for students and educators.

The Georgia Project WET Program provides educators with additional resources such as the Enviroscape Nonpoint Source, Wetlands and Groundwater Flow Models – demonstration tools used to emphasize the impacts of nonpoint source pollution to surface and groundwaters, scripted theatrical performances and costumes, and promotional and instructional training videos. In addition, the newsletter, *Dragonfly Gazette*, and the *Georgia River of Words Art and Poetry Journal* are published and distributed to over 4,500 educators statewide and nationally.

The Georgia Project WET Program has partnered with the Environmental Education Alliance of Georgia to conduct an annual conference and awards ceremony. The 2003 conference, *Environmental Education – Connecting Communities and Classrooms*, was held in Savannah, Georgia with over 250 participants. Additional information about the Georgia Project WET Program and the annual conference and awards ceremony are available on the website, http://www.eealliance.org.

7.2.7 Groundwater Protection Strategies

In 1984, EPD developed its first management plan to guide the management and protection of Georgia’s groundwater quantity and quality. The current version, Georgia Geologic Survey Circular 11, published in 1996, is the basis of Georgia’s application to be certified by U.S. EPA for a Comprehensive State Ground Water Protection Plan (CSGWPP). The goal of Georgia’s groundwater management plan is:

> … to protect human health and environmental health by preventing and mitigating significant groundwater pollution. To do this, Georgia will assess, protect, and, where practical, enhance the quality of groundwaters to levels

necessary for current and projected future uses for public health and significant ecological systems.

The goal recognizes that not all groundwater is of the same value. The division's goal is primarily preventive, rather than curative; but it recognizes that nearly all groundwater in the state is usable for drinking water purposes and should remain so. EPD pursues this goal through a policy of anti-degradation by which groundwater resources are prevented from deteriorating significantly, preserving them for present and future generations. Selection of this goal means that aquifers are protected to varying degrees according to their value and vulnerability, as well as their existing quality, current use, and potential for future use.

EPD has adequate legal authority to prevent groundwater from being significantly polluted and to cleanup groundwater in the unlikely event pollution were to occur. Extensive monitoring has shown that incidents of groundwater pollution or contamination are uncommon in Georgia; no part of the population is known to be at risk.

In general, the prevention of groundwater pollution includes: (1) the proper siting, construction, and operation of environmental facilities and activities through a permitting system; (2) implementation of environmental planning criteria by incorporation in land use planning by local government; (3) implementation of a Wellhead Protection Program for municipal drinking water wells; (4) detection and mitigation of existing problems; (5) development of other protective standards, as appropriate, where permits are not required; and (6) education of the public to the consequences of groundwater contamination and the need for groundwater protection.

Ground water pollution is prevented in Georgia through various regulatory programs (administered by the state's Department of Natural Resources) which regulate the proper siting, construction, and operation of the following:

- Public water supply wells, large irrigation wells and industrial wells withdrawing more than 100,000 gallons per day.
- Injection wells of all types.
- Oil and gas wells (including oil and gas production).
- Solid waste handling facilities.
- Hazardous waste treatment/storage/disposal facilities.
- Municipal and industrial land treatment facilities for waste and wastewater sludge.
- Municipal and industrial discharges to rivers and streams.
- Storage/concentration/burial of radioactive wastes.
- Underground storage tanks.

EPD prevents the contamination of groundwater used for municipal drinking water through an EPA-approved Wellhead Protection Program. As a result of this program, certain new potentially polluting facilities or operations are restricted from wellhead protection areas, or are subject to higher standards of operation and/or construction. EPD also encourages local governments to adhere to the *Criteria for the Protection of Groundwater Recharge Areas* (a section of the Rules for Environmental Planning Criteria), which define higher standards for facility siting, operation, and cleanup in significant groundwater recharge areas. The most stringent guidelines of these criteria pertain to those recharge areas with above average groundwater pollution susceptibility indexes.

Moreover, EPD has legal authority under the Georgia Water Quality Control Act to clean up groundwater pollution incidents. Additional cleanup authority occurs as special trust funds established to clean up leaking underground storage tanks, abandoned hazardous waste sites, and scrap tire dumps.

Most laws providing for protection and management of groundwater are administered by EPD. Laws regulating pesticides are administered by the Department of Agriculture, environmental planning by the Department of Community Affairs; and on-site sewage disposal, by the Department of Human Resources. EPD has established formal Memoranda of Understanding (MOU) with these agencies. The Georgia Groundwater Protection Coordinating Committee was established in 1992 to coordinate groundwater management activities between the various departments of state government and the several branches of EPD.

7.3 Targeted Management Strategies

This section describes specific management strategies that are targeted to address concerns and priority issues for the Altamaha River basin which were described in Section 6. Strategies are presented for each issue of concern, with divisions by geographic area and/or HUC Unit as appropriate. For each of the identified concerns, the management strategy consists of five components: a problem statement (identical to that given in Section 6), general goals, ongoing efforts, identified gaps and needs, and strategies for action. The purpose of these statements is to provide a starting point for key participants in the subbasin to work together and implement strategies to address each priority concern. In some cases, a strategy may simply consist of increased monitoring; in other situations, the stakeholders in the subbasin will need to develop innovative solutions to these water quality issues. While EPD will continue to provide technical oversight, conduct monitoring surveys as needed, and evaluate data on a basinwide scale, locally-led efforts in the subbasins will be required to help to monitor, assess, restore, and maintain water quality throughout the Altamaha River basin.

7.3.1 Low Dissolved Oxygen

Problem Statement

Water use classification for fishing was not fully supported in 23 water body segments due to excursions of the water quality standards for dissolved oxygen. These excursions are primarily attributed to nonpoint sources and to natural conditions.

Altamaha River Subbasin (HUC 03070106)

The water use classification of fishing was not fully supported in eight tributary stream segments due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations coincided primarily with low or zero flows, slow stream velocities, shallow water depths and high temperatures. Natural conditions may contribute to or be the cause of low dissolved oxygen in many streams in the Altamaha River basin.

Ohoopee River Subbasin (HUC 03070107)

The water use classification of fishing was not fully supported in two Ohoopee River segments and thirteen tributary segments due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations coincided primarily with low or zero flows, slow stream velocities, shallow water depths and high temperatures. Natural conditions may contribute to or be the cause of low dissolved oxygen in many streams in the Altamaha River basin.

General Goals

Meet water quality standards to support designated water uses.

Ongoing Efforts

General ongoing efforts as well as a summary of the dissolved oxygen TMDLs in the Altamaha River basin are discussed.

A. General Efforts

TMDLs have been completed for the stream segments on the Georgia 2002 303(d) list. TMDL implementation plans will be developed in 2003.

Local Soil and Water Conservation Districts and RC&D Councils are working with producers to utilize animal waste according to Nutrient Management Plans through their Lagoon Pumpout Program.

B. Dissolved Oxygen TMDLs

EPD established TMDLs for 23 stream segments (Table 7-1) that did not meet the dissolved oxygen (DO) criteria for their designated uses (see Box 7-1 for background information about TMDLs). These streams are all designated “Fishing” and are regulated by the following DO water quality standards:

> A daily average of 5.0 mg/l and no less than 4.0 mg/l at all times for water supporting warm water species of fish. 391-3-6-0.03 (c) (1) (GAEPD, 2002).

If natural, background DO concentrations occur below this standard, a stream reach is required to be at or above 90 percent of the background DO concentrations, based on the EPA natural water quality standard (USEPA, 1986). Modeling was used to estimate the amount of daily loading that can occur without violating the Georgia DO standards.

Sources Considered in TMDLs

Nine point sources were identified in seven of the twenty-three segments. These sources included several ponds and wastewater treatment facilities, and four of these sources contributed significantly to low DO concentrations. Nonpoint sources included mixed land use, forests, and wetlands. Leaf litter decomposition and wetlands with naturally low DO concentrations were considered significant nonpoint sources. Runoff from mixed land uses, including agriculture, had a minor effect on DO in the Altamaha basin.

TMDL Methods and Results

GAEPD developed the TMDLs with the steady state Georgia DOSag model. EPD chose a low flow, high temperature steady state because all measured DO standard violations occurred during low flow, high temperature conditions. The models were calibrated with 1999 water quality data for the Altamaha Basin (supplemented with 2000 sediment oxygen demand measurements from other streams in southern Georgia). Since natural DO concentrations were consistently below the numeric standard, GAEPD designed the TMDLs to achieve at least 90 percent of natural DO concentrations during the 7Q10 flow. Several conservative modeling assumptions were used for an implicit margin of safety. Seasonality was not a factor since DO violations occurred only during summer months.

A TMDL was reported for each listed stream segment (Table 7-1). Load reductions were recommended for four point sources, and no load reductions were recommended for nonpoint sources. These load reductions will ensure compliance with water quality standards even during periods of very low flows.

TMDL Implementation

Point sources will be regulated through the NPDES permitting system. GAEPD will continue to work with local governments, agricultural, and forestry agencies (e.g. Natural Resources Conservation Service, the Regional Development Councils, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission) to educate public and encourage the use of best management practices for improving DO concentrations. GAEPD will work with local RDCs to develop TMDL Implementation Plans in 2003.

Identified Gaps and Needs

Low dissolved oxygen concentrations in this part of the state are often due to natural environmental conditions. Work is needed to continue to identify and characterize natural background dissolved oxygen concentrations in this area.

General Strategies for Action

Low dissolved oxygen concentrations in the streams in the Altamaha River basin coincided primarily with low or zero flows, slow stream velocities, shallow water depths and high temperatures. EPD will address point and nonpoint sources as appropriate in TMDL implementation plans.

Specific Management Objectives

Maintain dissolved oxygen concentrations adequate to support aquatic life and meet water quality standards.

Action Plan

- EPD will assess use support in the listed waters and develop TMDL implementation plans to address point source issues.
- Local governments will implement stormwater management strategies, manage operations of water pollution control plants and participate in development of TMDL implementation plans.
- WRD will continue work to study habitat requirements for fish populations.
- NRCS will continue BMP implementation.
- Local S&WC Districts and RC&D Councils will continue Lagoon Pumpout Program.
- RDCs will help coordinate development of TMDL implementation plans.

Method for Tracking Performance

A re-evaluation of the status of the listed waterbodies will be made coincident with the next iteration of the RBMP management cycle for the Altamaha River basin in 2003-2007.

7.3.2 Fecal Coliform Bacteria

Problem Statement

The water use classification of fishing was not fully supported in 18 stream segments due to exceedances of the water quality standards for fecal coliform bacteria. These water quality exceedances are found throughout the Altamaha River basin and are primarily attributed to urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources, and/or animal wastes. A common strategy is proposed for addressing fecal coliform bacteria throughout the basin. However, achieving standards in individual stream segments will depend on the development of site specific local management plans.

Altamaha River Subbasin (HUC 03070106)

The water use classification of fishing was not fully supported in one Altamaha segment and five tributary stream segments due to exceedances of the water quality standard for fecal coliform bacteria. These may be attributed to a combination of WPCP effluent, urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources and/or animal wastes. The source of fecal coliform bacteria in one tributary segment was attributed to a municipal water pollution control plant.

Ohoopee River Subbasin (HUC 03070107)

The water use classification of fishing was not fully supported in three Ohoopee River segments and nine tributary stream segments due to exceedances of the water quality standard for fecal coliform bacteria. These may be attributed to a combination of urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources and/or animal wastes.

General Goals

Meet water quality standards to support designated water uses. Increase public awareness of fecal coliform bacteria pollution through coordinated education and outreach efforts.

Ongoing Efforts

General ongoing efforts as well as a summary of the fecal coliform bacteria TMDLs in the Altamaha River basin are discussed.

A. General Efforts

EPD administers and enforces a variety of permit programs designed to facilitate the management of urban runoff, including both point and nonpoint source controls. EPD's Nonpoint Source Program regulates municipal and industrial stormwater discharges through the National Pollutant Discharge Elimination System (NPDES) permitting process. Sanitary sewer overflows are managed through EPD's Permitting Compliance and Enforcement Program. Animal wastes in Georgia are addressed through the Memorandum of Agreement (MOA) with NRCS and SWCC and through recently adopted rules designed to regulate Concentrated Animal Feeding Operations (CAFOs) for swine. This includes a requirement for certain operations to obtain individual NPDES permits. TMDLs have been completed for all stream segments on the Georgia 2002 303(d) list except for one segment of the Altamaha River. TMDL implementation plans will be developed in 2003.

Table 7-1. Dissolved Oxygen TMDLs in the Altamaha River Basin

Stream Name	Segment Description[1]	Hydrologic Unit	Length (miles)	Use Support[2]	TMDL (lbs/day)[3]
Alex Creek	Mason Cowpen Branch to Altamaha River	03070106	3	NS	34
Big Cedar Creek	Little Cedar Creek to Ohoopee River	03070107	3	NS	29
Cobb Creek	Oconee Creek to Altamaha River	03070106	13	NS	160
Doctors Creek	U/S Jones Creek	03070106	5	NS	85
Jacks Creek	U.S. Hwy. 1 to Ohoopee River	03070107	9	NS	63
Jones Creek	Still Creek to Doctors Creek	03070106	11	NS	131
Little Ohoopee River (upper)	Gully Branch to Neeley Creek	03070107	14	NS	58
Little Ohoopee River (middle)	Neeley Creek to Sardis Creek	03070107	15	NS	122
Little Ohoopee River (lower)	Sardis Creek to Ohoopee River	03070107	18	PS	177
Milligan Creek	Uvalda to Altamaha River	03070106	11	NS	172
Oconee Creek	Headwaters to Cobb Creek	03070106	11	NS	81
Ohoopee River (upper)	Neels Creek to Little Ohoopee River	03070107	18	PS	213
Ohoopee River (lower)	Little Ohoopee River to U.S. Highway 292	03070107	23	PS	496
Pendleton Creek (upper)	Sand Hill Lake to Reedy Creek	03070107	7	PS	71
Pendleton Creek (lower)	Wildwood Lake to Tiger Creek	03070107	12	PS	78
Penholoway River	Little Creek to Altamaha River	03070106	13	NS	141
Rocky Creek (lower)	Little Rocky Creek to Ohoopee River	03070107	11	NS	87
Rocky Creek (upper)	Ga. Hwy. 130 to Little Rocky Creek	03070107	10	NS	36
Swift Creek	Old Normantown Rd. to Pendleton Creek	03070107	5	NS	413
Ten Mile Creek	Little Ten Mile Creek to Altamaha River	03070106	13	NS	93
Thomas Creek	D/S CR203 to Ohoopee River	03070107	12	PS	37
Tiger Creek	Little Creek to Pendleton Creek	03070107	16	NS	54
Yam Grandy Creek	D/S Crooked Creek	03070107	3	NS	27

1. See Appendix D for designated uses.
2. NS = Not supporting designated use; PS = Partially supporting designated use
3. Refers to lbs/day of oxygen demanding material

In addition to regulatory activities, EPD assists in the development of local solutions to water quality problems by administering grant programs and providing technical assistance to various regional and local watershed management initiatives. EPD also conducts a variety of outreach and public education programs addressing urban runoff in general, point and nonpoint source pollution, BMP implementation, regulatory requirements, and cooperative or non-regulatory approaches.

The Georgia Department of Human Resources (DHR) Division of Public Health - Environmental Services has promulgated new rules (O.C.G.A Chapter 290.5.26) developed to regulate the design, operation, and maintenance of on-site sewage management systems. DHR subsequently formed the Onsite Sewage Management Systems Technical Review Committee in 1999. The Committee's function is to make recommendations to the department regarding the approval of new systems, assist the Department with the development and revision of standards and guidelines for new technology, assist with the adoption of periodic updates to the Manual for On-Site Sewage Management Systems, and serve as the final authority in contested interpretation issues regarding the Rules and the Manual for On-site Sewage Management Systems.

Agriculture is making progress in controlling bacterial loads. Considerable effort has been directed toward animal confinement areas. Georgia universities and agricultural agencies or groups are conducting several agricultural efforts with statewide implementations. Sustainable Agriculture and Farm-A-Syst Training will be scheduled within the basin. The University of Georgia and ARS have proposals for assessing nutrient and fecal coliform bacteria reducing BMPs on 10 farms that will have statewide implications. Soil and Water Conservation Districts annually convene Local Work Groups (LWGs), which are comprised of resource professionals from a variety of disciplines and interested stakeholders at the local level, to identify resource concerns in their areas. The LWGs develop proposals for the USDA or other funding sources to address identified resource concerns.

The University of Georgia College of Agriculture and Environmental Sciences' Animal Waste Awareness in Research & Extension (AWARE) program conducts research on animal waste management and provides public education through Southeast Sustainable Animal Waste Workshops and a variety of Internet publications.

Local Soil and Water Conservation Districts (SWCDs) and Resource Conservation and Development (RC&D) Councils are working with producers to utilize animal waste according to Nutrient Management Plans through their Lagoon Pumpout Program.

B. Fecal Coliform Bacteria TMDLs

TMDLs were established for stream segments (Table 7-2) on the 303(d) list impacted by fecal coliform bacteria (see Box 7-1 for background information about TMDLs).

Sources Considered in TMDLs

Nonpoint sources had the greatest impact on fecal coliform bacteria loading in the Altamaha River basin, while most point sources did not significantly impact fecal coliform bacteria loading. Point sources were identified in three listed segments: Big Cedar Creek, Ohoopee River, and Swift Creek; nonpoint sources occurred in all 16 segments. Leaking sewer collection systems were considered a major urban nonpoint source. Most rural nonpoint sources involved wash off of fecal coliform bacteria from land surfaces during storm events, including the following:

- Wildlife feces deposition.
- Livestock feces deposition during grazing.
- Manure application to land surfaces.

- Livestock feces deposition directly in streams.
- Septic tank failure.

TMDL Modeling Methods and Results

The TMDLs were developed with the Hydrologic Simulation Program FORTRAN (HSPF) watershed model. This model simulated the seasonal and geographic variation of FC loading and stream concentrations over 10 years. A 30-day critical period was determined during which the highest simulated violation of the standard occurred (geometric mean of at least four samples in a 30-day period no greater than 200 counts/ 100 mL from May through October). Calculating the TMDLs with a critical period ensured that each stream would meet this standard during any month over the simulated 10-year period.

Simulated loading over the 30-day critical period was adjusted so that the geometric mean of the concentrations (the n^{th} root of the product of n concentrations) at each segment's outlet was less than or equal to 180 counts/100mL (i.e., a 10 percent margin of safety). The TMDLs were calculated as the sum of point and nonpoint source loads over the 30-day critical period. A TMDL was reported for each listed stream segment (Table 7-2).

TMDL Implementation

EPD will work with the Regional Development Centers (RDCs) on the development of TMDL Implementation Plans in 2003.

Table 7-2. Fecal Coliform Bacteria TMDLs in the Altamaha River Basin

Stream Name	Segment Description[1]	Hydrologic Unit	Length (miles)	Use Support[2]	TMDL (#/30 days)
Big Cedar Creek	Little Cedar Creek to Ohoopee River	03070107	3	NS	2.36E+11
Doctors Creek	Upstream of Jones Creek	03070106	5	NS	2.08E+11
Goose Creek	U/S Rd. S1922 to Little Goose Creek	03070106	8	PS	1.61E+11
Jacks Creek	U.S. Highway 1 to Ohoopee River	03070107	9	NS	3.61E+11
Little Ohoopee River	Sardis Creek to Ohoopee River	03070107	18	PS	1.16E+13
Milligan Creek	Uvalda to Altamaha River	03070106	11	NS	1.63E+11
Oconee Creek	Headwaters to Cobb Creek	03070106	11	NS	1.01E+11
Ohoopee River	Dyers Creek to Big Cedar Creek	03070107	15	NS	3.56E+11
Ohoopee River	Little Ohoopee River to US Highway 292	03070107	23	PS	4.11E+14
Ohoopee River	Neels Creek to Little Ohoopee River	03070107	18	PS	5.92E+10
Pendleton Creek	Sand Hill Lake to Reedy Creek	03070107	7	PS	1.97E+12
Pendleton Creek	Wildwood Lake to Tiger Creek	03070107	12	PS	2.05E+12
Rocky Creek	Ga. Hwy. 130 to Little Rocky Creek	03070107	10	NS	1.17E+12
Swift Creek	Old Normantown Rd. to Pendelton Creek	03070107	5	NS	7.12E+11
Tiger Creek	Little Creek to Pendleton Creek	03070107	16	NS	7.63E+10
Yam Grandy Creek	D/S of Crooked Creek	03070107	3	NS	1.66E+12

1. See Appendix D for designated uses.
2. NS = Not supporting designated use; PS = Partially supporting designated use

Identified Gaps and Needs

Sources of fecal coliform bacteria in many stream segments are not clearly defined. In some cases, fecal bacterial loads may be attributable to natural sources (e.g., wildlife); alternative bacteriological sampling methods may be useful to distinguish between human, other mammalian, and avian fecal coliform bacteria sources. Sanitary sewer leaks and overflows may be a source of fecal coliform bacteria as well.

Many fecal coliform bacteria reducing practices are relatively expensive and the percentage of reduction is often unknown. Many landowners are reluctant to spend today's dollars for long term amortization in uncertain future markets. Agricultural BMPs, cost share dollars (Farm Bill), and grants (Section 319) should be concentrated in priority watersheds with sufficient technical workforce to implement BMPs through long term agreements or contracts to reduce fecal coliform loading. Additional efforts should be directed toward increasing public awareness of fecal coliform bacteria pollution, with an emphasis on potential sources and BMPs. State and basinwide coordination between agencies and organizations providing public education and technical assistance may help to extend outreach efforts.

Strategies for Action

Separate strategies are needed to address nonpoint fecal coliform bacteria loadings for urban and rural sources.

A. General Strategies for Urban Sources

Addressing urban runoff will be a complex task, and will require implementation of watershed pollution control programs by local governments. Management of urban runoff is needed to address a variety of water quality problems, including metals, fecal coliform bacteria, nutrients, and habitat degradation. For this five-year phase of the basin management cycle, management will concentrate on source control and planning. Evaluation of the efficacy of this approach will be made during the basin strategy reevaluation scheduled for 2007 in accordance with the statewide RBMP management cycle. In addition, TMDLs have been developed for all stream segments on the 303(d) list except for one segment of the Altamaha River. EPD will be coordinating the development of TMDL implementation plans with RDCs in 2003.

Specific Management Objectives

Stakeholders should work together to encourage and facilitate local watershed planning and management to ensure that designated water uses are supported.

Agricultural agencies will provide technical and educational assistance to producers for the purpose of facilitating agricultural BMP implementation.

Management Option Evaluation

Integrated management options will be proposed, implemented, and evaluated by local governments.

Action Plan

TMDLs have been completed for 16 stream segments on the Georgia 2002 303(d) list. TMDL implementation plans will be completed in 2003.

EPD assesses use support in listed stream segments and encourages local efforts to address nonpoint source pollution. EPD will continue to ensure that all permitted sources remain in compliance with permitted effluent limitations for fecal coliform bacteria. EPD will also request a comprehensive watershed assessment, focusing on both point and nonpoint sources, from localities applying for new or expanded NPDES point source discharge permits. The intent is to direct localities' attention toward current and future nonpoint source issues in their watersheds and to have them consider ways to prevent or control water quality impacts due to growth. Approved watershed management steps will be included as a condition for expansion of existing water pollution control plants or construction of new plants.

EPD will continue to administer the NPDES and Permitting and Compliance and Enforcement (PCEP) Programs and encourage local planning to address management on a basinwide scale. Local governments will continue to operate and maintain their sewer systems and wastewater treatment plants, monitor land application systems, develop and implement regulations, zoning and land use planning, and implement local watershed initiatives and monitoring programs. EPD will encourage local authorities to institute programs to identify and address illicit sewage discharges, leaks and overflows of sanitary sewers, and failing septic tanks within their jurisdiction.

DHR will continue to regulate on-site sewage management systems and will work to educate local governments and citizen groups about the need for proper design, construction, and maintenance of septic systems to protect water quality. DHR will also utilize the criteria presented in the Growth Planning Act for septic system setbacks from high value waters. Local municipalities should work with the local health departments to identify locations of septic systems and educate owners about the proper care and maintenance of septic systems.

EPD will encourage citizen involvement through Adopt-A-Stream groups to address restoration of urban streams. Citizen groups will implement Adopt-A-Stream programs, and work with local governments in implementing watershed initiatives.

Method for Tracking Performance

EPD tracks point source discharges through inspections and evaluations of self-monitoring data. An evaluation of the status of listed water bodies will be made coincident with the next iteration of the RBMP cycle for the Altamaha River basin in 2007.

B. General Strategies for Rural Sources

Agricultural cost share dollars (Farm Bill), grants (Section 319), and loans (Clean Water Act State Revolving Fund) need to be concentrated in priority watersheds with sufficient technical workforce to implement BMPs through long-term agreements or contracts.

Specific Management Objectives

Stakeholders should work together to encourage and facilitate local watershed planning and management to ensure that designated water uses are supported.

Agricultural agencies will provide technical and educational assistance to producers for the purpose of facilitating agricultural BMP implementation.

Management Option Evaluation

Evaluation will be on a site-by-site basis. For agricultural BMP support, existing prioritization methods will be used.

Action Plan

EPD will assess use support in listed streams, encourage local planning efforts, and regulate point sources under the NPDES program. EPD will continue to ensure that all permitted sources remain in compliance with fecal coliform bacteria limits. EPD will also continue assessment of Land Application Systems. TMDLs have been completed for 16 stream segments on the Georgia 2002 303(d) list. EPD will be coordinating the development of TMDL implementation plans with RDCs in 2003. GSWCC and local SWCDs and RC&D councils, with assistance from NRCS, will continue to support adoption of BMPs for animal waste handling and will follow up on complaints related to fecal coliform bacteria associated with agriculture. Methods for prioritization and implementation of cost-share incentives under the 1996 Farm Bill will be targeted to areas of apparent water quality impact, including rural streams which may contain excessive fecal coliform loads from animal and cropland operations.

Local SWCDs will convene Local Work Groups to identify resource concerns and develop proposals for funding to address these concerns.

The DHR will continue to regulate on-site sewage management systems and will work to educate local governments and citizen groups about the need for proper design, construction, and maintenance of septic systems to protect water quality. The DHR will also utilize the criteria presented in the Growth Planning Act for septic system setbacks from high value waters. Local municipalities should work with the local health departments to identify locations of septic systems and educate owners about the proper care and maintenance of septic systems.

The University of Georgia will provide on-farm assistance to local producers through their Farm-A-Syst Program.

EPD will encourage citizen involvement through Adopt-A-Stream groups to address restoration of urban streams. Citizen groups will implement Adopt-A-Stream programs and work with local governments in implementing watershed initiatives.

Method for Tracking Performance

Agricultural agencies will track rates of BMP implementation for cropland and animal operations. An evaluation of the status of listed water bodies will be made coincident with the next iteration of the RBMP cycle for the Altamaha River basin in 2007.

7.3.3 Fish Consumption Guidelines

Problem Statement

The water use classifications were not fully supported in several water body segments and one lake due to fish consumption guidelines for mercury. There are no known point source discharges or other identifiable anthropogenic sources of mercury in these watersheds. Mercury may be present in fish due to mercury content in the natural soils, from municipal or industrial sources, or from fossil fuel use. It is also possible that the elevated mercury level is related to global atmospheric transport and deposition.

Ohoopee River Subbasin (HUC 03070107)

The water use classification of fishing was not fully supported in four Ohoopee River segments and one lake based on fish consumption issues related to mercury residues in fish tissue. The assessment was based on the Trophic-Weighted Residue Value being in excess of 0.3 mg of mercury per kilogram of fish tissue. See Box 5-2 in Section 5 for details regarding assessment of mercury in fish tissue.

General Goals

Work to protect human health by providing guidelines for consumption of fish.

Ongoing Efforts

General ongoing efforts as well as a summary of the mercury TMDLs in the Altamaha River basin are discussed.

A. General Efforts

DNR has monitored fish and issued fish consumption guidelines. There are no known point source discharges or other identifiable anthropogenic sources of mercury in the Altamaha River basin watersheds. Ongoing efforts will focus on continued monitoring of residue levels and issuance of updated consumption guidelines. Phase 1 TMDLs for mercury have been completed for the Ohoopee River and Sand Hill Lake. A TMDL implementation plan will be developed in 2003.

The Altamaha River is a coastal plain blackwater swamp system. This system is characterized by a high content of organic carbon (organic ligand humic substances), low alkalinity and pH, and naturally lower dissolved oxygen content. Blackwater systems have been found to have physico-chemical characteristics that provide both a sink for the accumulation of mercury from atmospheric deposition or other sources, and an environment conducive to the methylation of mercury. As a result, baseline mercury residues found in fish tissues are higher than that found in other waterbodies having a different chemistry.

B. Mercury TMDLs

EPA established mercury TMDLs for Sand Hill Lake and four segments of the Ohoopee River in February 2002 (Table 7-3; see Box 7-1 for background information about TMDLs). Georgia requires that fish tissue concentrations remain at or below 0.3 mg of mercury per kg of tissue (GAEPD, 2002). USEPA converted this tissue standard to an ambient water quality standard specific to the Ohoopee River using measured mercury concentrations, fish consumption rates, and related factors.

Table 7-3. Mercury TMDLs in the Altamaha River Basin

Stream Name	Segment Description	Hydrologic Unit	Extent	Use Support	TMDL
Ohoopee River	GA Hwy 147 to confluence with Altamaha River	3070107	13 mi	PS	3.77 kg/yr
Ohoopee River	Hwy 292 to Hwy 147	3070107	12 mi	PS	3.77 kg/yr
Ohoopee River	Little Ohoopee River to US Highway 292	3070107	23 mi	PS	3.77 kg/yr
Ohoopee River	Neels Creek to Little Ohoopee	3070107	18 mi	PS	3.77 kg/yr
Sand Hill Lake	Treutlen County	3070107	650 ac	PS	3.77 kg/yr

Sources Considered in TMDLs

USEPA estimated that air deposition causes 99 percent of mercury contamination in the Ohoopee River and Sand Hill Lake. Air deposition is caused by widespread air point sources both within and outside the United States. Examples of air point sources include incinerators and electrical power plants. USEPA identified seven potential water point sources of mercury in the Ohoopee River and Sand Hill Lake, and estimated that these sources contribute less than 1 percent of mercury contamination.

TMDL Modeling Methods and Results

When simulating mercury loading, USEPA accounted for nonpoint loading from runoff, erosion, and air deposition as well as the instream processes of mercury cycling and bioaccumulation. Nonpoint source runoff was modeled with the Watershed Characterization System (WCS), and instream processes were modeled with SWAT5. Wet and dry deposition rates were acquired from the Mercury Report to Congress (USEPA, 1997) and the Mercury Deposition Network sample collection site in the Okefenokee Swamp. These air deposition rates were entered into the WCS as yearly averages. The WCS calculated the total mercury load entering the Ohoopee mainstem from the subbasins, and the subbasin load was entered into SWAT5 to simulate mercury concentrations throughout the mainstem. Simulated total mercury concentrations ranged from 3.4 to 4.5 ng/L.

USEPA included critical conditions and implicit margins of safety in the TMDL calculation. Average annual flow and average annual loading were used as the critical conditions because mercury in fish tissue accumulates over time and does not depend on season. To ensure protection from mercury toxicity, USEPA based the load reduction on the highest simulated water column concentration (4.5 ng/L). USEPA was also conservative in estimating the future reduction in air deposition; for example, voluntary control measures and new regulations were not considered.

The relationship between loading and water column concentration was linear, so a proportion was developed relating the highest simulated concentration (4.5 ng/L), the current annual average load (4.99 kg/yr), and the water quality target (3.5 ng/L). In this way, USEPA calculated an allowable mercury load of 3.77 kg/yr.

TMDL Implementation

In this TMDL, USEPA is using a phased-approach, which outlines steps that need to be taken to better characterize the pollutant allocation. USEPA is using the phased-approach because very little data exists on sources of mercury contamination. During Phase 1, mercury loading will be monitored to provide additional data for analysis.

USEPA will use the information collected in Phase 1 to better understand air deposition and point source loading. In Phase 2, USEPA may reevaluate the load allocations based on this information.

Identified Gaps and Needs

The source of mercury in the basin is not well quantified. Mercury within these watersheds is likely derived from natural sources or from atmospheric deposition.

General Strategies for Action

Because mercury is not originating from any known point or other identifiable anthropogenic sources, the strategy is to keep the fishing public notified of risks associated with fish consumption.

EPD and WRD will work to protect public human health by issuing fish consumption guidelines as needed, indicating the recommended rates of consumption of fish from specific waters. The guidelines are based on conservative assumptions and provide the public with factual information for use in making rational decisions regarding fish consumption.

Action Plan

- WRD and EPD will continue to sample and analyze fish tissue and issue fish consumption guidelines as needed. EPD will evaluate the need for additional sampling of different media (fish tissue, water and/or sediment), if localized anthropogenic sources are indicated.
- EPA will implement reductions in air mercury sources over time that will achieve load reductions required in the TMDL.

Method of Tracking Performance

Trends in fish tissue concentration of mercury.

7.3.4 Erosion and Sedimentation

Problem Statement

Water use classifications are potentially threatened in many water body segments by erosion and loading of sediment, which can alter stream morphology, impact habitat, and reduce water clarity. Potential sources include urban runoff and development (particularly construction), unpaved rural roads, stream erosion (including head cutting, bank erosion, and shifting of the bedload), forestry practices, and agriculture. A common strategy is proposed for addressing erosion and sedimentation throughout the basin. However, achieving standards in individual stream segments will depend on the development of site-specific local management plans.

Altamaha River Subbasin (HUC 03070106)

There are two stream segments listed in this subbasin as not fully supporting the designated water use of fishing due to poor fish communities likely due to sedimentation.

Ohoopee River Subbasin (HUC 03070107)

There is one stream segment listed in this subbasin as not fully supporting the designated water use of fishing due to poor fish communities likely due to sedimentation.

General Goals

Control erosion and sedimentation from land disturbing activities in order to meet narrative turbidity water quality standards and support designated uses. Increase public awareness of erosion and sedimentation through coordinated education and outreach efforts.

Ongoing Efforts

Forestry and Agriculture both have voluntary E&SC programs built around implementation of BMPs and water complaint resolution procedures in place. GSWCC recently updated and is distributing the Manual for Erosion and Sediment Control in Georgia and the Field Manual for Erosion and Sediment Control in Georgia. The GSWCC, with its agricultural partners, has produced and distributed three E&SC pamphlets: “Guidelines for Streambank Restoration,” “A Guide to Controlling Erosion with Vegetation,” and “Agricultural Management Practices.” These, along with a number of E&SC related pamphlets and other informational materials are available in agricultural offices throughout the state. Soil and Water Conservation Districts annually convene Local Work Groups (LWGs) which are comprised of resource professionals from a variety of disciplines and interested stakeholders at the local level to identify resource concerns in their areas. These LWGs develop proposals for USDA or other funding to address identified resource concerns.

Forestry has made significant E&SC progress. GFC has been and is specifically targeting those landowner groups and regions with low compliance that were identified in their statewide surveys for increased BMP education throughout local talks, workshops, etc. The Georgia Forestry Association, UGA, the American Forest and Paper Association (AF&PA), and Southeastern Wood Producers Association sponsor Master Timber Harvesters Workshops with the goal of training every logger in the state on BMPs. In addition, the Georgia State Board of Registration for Foresters requires every licensed forester to implement BMPs as a minimum standard of practice. The Forestry BMPs, printed in January 1999, will result in additional sedimentation reductions with more riparian tree cover left over perennial and intermittent streams.

EPD currently serves as the “Issuing Authority” providing permitting, inspection, and compliance enforcement services in those localities across the state where local Erosion and Sedimentation Control Ordinances or Programs are not yet established. A general NPDES permit that would regulate stormwater discharges from construction activities was issued by GAEPD and subsequently appealed in 1992, 1994, 1995, 1996 and 1999. Settlement negotiations involving the regulated community who filed the three petitions, several environmental organizations, GAEPD, and a professional facilitator began in October, 1999. After months of negotiation, GAEPD issued a revised general NPDES permit GAR 100000 for construction activities on June 12, 2000. The permit became effective on August 1, 2000. This permit currently regulates construction activity which results in land disturbances of five acres or greater. The construction permit requires permittees to implement best management practices, conduct inspections and sample stormwater leaving their site after certain rainfall events. There is a three-tiered permitting structure to differentiate between permittees' responsibilities, which allows for easier enforcement. Georgia EPD has received approximately 20,000 "Notice of Intent" applications since the permit issuance in 2000.

In an effort to determine compliance with the construction general permit, Georgia EPD and the USEPA partnered to form the Stormwater Taskforce which conducted over 200 inspections between May and September 2001. The Taskforce adopted a "zero tolerance" enforcement position with regard to violations of the permit. Substantial fines were levied on permittees found to be in violation.

Looking ahead to the construction permit re-issuance in July 2003, a group of stakeholders, the Stormwater General Permit Advisory Committee (GPAC), has been holding regular meetings to discuss permit issues. GPAC is comprised of those parties who were involved in the settlement negotiations of 1999, with the addition of Georgia DOT. GPAC is a forum for these groups and the general public to discuss issues related to the construction permit. GPAC is currently tasked with recommending appropriate changes to the current permit and examining how Phase II NPDES permitting, which will require permit coverage for sites disturbing between one acre and five acres, can be incorporated into the permit. Input has also been received from the Erosion and Sediment Control Overview Council.

An Erosion and Sedimentation Control (E&SC) Advisory Committee developed an Erosion and Sediment Control Complaint Resolution Procedure by which concerned citizens or other parties may register E&SC complaints. The procedure is a three-step process with Local Issuing Authorities serving as the primary contact, followed by the local Soil and Water Conservation District, and finally EPD in some cases. The purpose of the procedure is to provide timely and workable solutions to E&SC control complaints through local Soil and Water Conservation Districts.

There are several erosion educational initiatives underway which have an urban focus. Each year GSWCC and EPD conduct five formal E&SC courses to provide training to the regulated community, regulators, consultants, and interested citizens. GSWCC also provides detailed E&SC training for 8 to 11 units of government each year. A task force established by the Sediment Control Technical Study Committee, known as DIRT II, has completed its assessment of the economic and environmental impacts of erosion prevention and sediment control BMPs for urban construction sites. Another urban initiative is the U.S. Forest Service's Planting Along Stream Sides (PASS) which deals with vegetative plantings to reduce erosion from streambanks.

In 1997, EPD, in cooperation with the University of Georgia, prepared and distributed the Land Development Provisions to Protect Georgia Water Quality report. The report describes provisions which may be modified or added to local development programs to better protect water quality. Portions of the report address water quality impacts from stormwater runoff and its relationship to urban development.

Local Soil and Water Conservation Districts and Resource Conservation and Development (RC&D) Councils are working with crop producers to reduce erosion and sedimentation through their No-Till Drill Program in the Altamaha River basin.

Forestry BMP Education and Implementation

From 1995 through 2003, the GFC provided BMP training at the 3-day Master Timber Harvester Workshops. During this period, the workshops were attended by the following number of personnel affiliated with timber buyers and loggers in the two subbasins:

- Altamaha River Subbasin (Hydrologic Unit 03070106) – 182 personnel
- Ohoopee River Subbasin (Hydrologic Unit 03070107) – 134 personnel

Altamaha River Subbasin (HUC 03070106)

The GFC conducted BMP Implementation and Compliance Surveys in 1991, 1992, 1998, and in 2002. No data was extracted specifically for the Altamaha River basin during the 1991 survey. However the data for the Altamaha River Subbasin should be similar to the statewide data for the Lower Coastal Plain region. There, the GFC evaluated approximately 23,987 acres on 202 sites. The sites were distributed such that 132 occurred on the non-industrial private forest (NIPF) owner, 68 occurred on forest industry land, and 2 were on public lands. The results indicate that the overall percentage of acres in compliance with BMPs was 93.3 percent. The percentage of streambanks or channels in compliance with BMPs was 95.1 percent. By ownership, 89.8 percent of the acres evaluated on NIPF lands were in compliance with BMPs. On forest industry lands, 95.8 percent of the acres were in compliance. On public lands, 98.4 percent of the acres were in compliance.

The 1992 Georgia Forestry Commission (GFC) compliance survey examined approximately 882 acres on 12 sites in the Altamaha River subbasin. Six sites were evaluated on NIPF lands and 6 were on forest industry lands. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 98.3 percent of the harvested acres were in compliance with BMPs. By ownership, compliance was 99.2 percent on NIPF owners and 97.9 percent on forest industry land.
- Overall, 97.1 percent of main haul road miles were in compliance with BMPs. By ownership, compliance was 94.4 percent on NIPF owners and 97.6 percent on forest industry lands.
- Three mechanical site-preparation tracts totaling 312 acres were evaluated. Overall, 98.7 percent of the acres were in compliance with BMPs. By ownership, compliance was 100 percent on NIPF owners and 98 percent on forest industry.
- No sites were evaluated for regeneration or burning.
- Overall 97.9 percent of the acres were in compliance with BMPs. By ownership, compliance was 98.8 percent on NIPF and 97.7 percent on forest industry lands.
- There were 4.0 miles of stream evaluated with 97.5 percent being in compliance with BMPs.

During the 1998 survey, the GFC examined approximately 2,188 acres on 12 sites in the Altamaha Subbasin. Six sites were on NIPF landowners and six sites were on forest industry lands. According to the Southern Group of State Foresters recommended protocol, adopted in 1997, two scores will now be reported. Compliance is the measure of units (acres, miles of road, number of stream crossings, etc.) in compliance with BMPs. Implementation rate is the percentage of applicable BMPs that are implemented in their entirety over the tract. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 96.5 percent of the streamside management zone (SMZ) acres evaluated on 10 sites were in compliance with BMPs with only one water quality risk identified. The percentage of applicable BMPs implemented was 91.4 percent. The main problem was logging debris left in stream channels on 20 percent of the sites. Aerial application of herbicides occurred on one site. Burning and firebreaks occurred within the SMZ on one site. By ownership, overall compliance was 88.4 percent and implementation was 85.7 percent on NIPF lands resulting in one water quality risk that was associated with firebreaks. On forest industry lands, compliance and implementation were both 100 percent.

- Overall, 28 stream crossings were evaluated, 6 sites with 23 crossings occurring on 3 NIPF sites and 5 crossings on 3 forest industry sites. Overall only 17.9 percent were in full compliance with BMPs. The percentage of applicable BMP implementation was 72.7 percent resulting in seven water quality risks identified. By ownership, overall compliance was 4.4 percent and implementation was 52.2 percent on NIPF lands resulting in the seven water quality risks. Problems were found regarding random crossings, stabilization of exposed fill over culverts, the use of skidder fords and debris and dirt type crossings and their removal. On forest industry lands, compliance was 80 percent with implementation at 95.2 percent and no water quality risks.
- Overall, 95.8 percent of the forest road miles evaluated on nine sites were in compliance with BMPs. The percentage of applicable BMPs implemented was 87.5 percent with no water quality risks identified. The main problem was inadequate or lack of installation of water diversion measures in roads on 25 percent of the sites. By ownership, on NIPF lands, overall compliance was 91.5 percent with 77.8 percent of the BMPs implemented with no water quality risks identified. On forest industry lands, compliance was 97.9 percent with 95.4 percent of the applicable BMPs being implemented and no water quality risks.
- Overall, 99.8 percent of the harvested acres on eight sites were in compliance with BMPs. The percentage of BMP Implementation was 97.1 percent with no water quality risks. By ownership, on four sites that were located on NIPF lands and overall compliance was 100 percent with 100 percent of the applicable BMPs implemented. On four forest industry sites, compliance was 99.8 percent with 94.1 percent of the applicable BMPs implemented. Trash and garbage were not removed from one site.
- Overall, 100 percent of the mechanical site preparation acres on five sites were in compliance with BMPs. The percentage of BMP implementation was 100 percent with no water quality risks identified. Three sites were on NIPF lands and two were on forest industry lands.
- Overall, 100 percent of the chemical site preparation acres on three sites were in compliance with BMPs. The percentage of BMP implementation was 100 percent and no water quality risks were identified. One site was on NIPF lands and two were on forest industry lands.
- Controlled burning was evaluated on two NIPF sites. Overall 100 percent of the acres were in compliance with BMPs. The percentage of BMP implementation was 66.7 percent but no water quality risks were found. The only problem was inadequate water diversion measures installed in firebreaks.
- Overall, 99.8 percent of the artificial regeneration acres on five sites were in compliance with BMPs. The percentage of BMP implementation was 90.9 percent with no water quality risks identified. No bottomland hardwood wetlands identified in the 1995 EPA/COE memo were planted to pine on these sites. By ownership, three sites were located on NIPF lands and two were on forest industry lands. Compliance on NIPF lands was 99.4 percent, with BMP implementation at

83.3 percent. Trash was not removed from one site. On forest industry land, compliance and implementation were both 100 percent.

- There were no perennial and eight intermittent streams evaluated accounting for approximately 3.75 miles of stream of which 94.4 percent of those miles were in compliance with BMPs. By ownership, compliance was 86.9 percent on NIPF lands and 100 percent on forest industry lands.
- Overall, 99.9 percent of the acres evaluated in the Altamaha River subbasin during the 1998 survey were in compliance with BMPs. The percentage of applicable BMPs implemented was 88.7 percent resulting in eight water quality risks. By ownership, compliance on NIPF lands was 99.7 percent with 81.2 percent of the applicable BMPs implemented resulting in all eight water quality risks. On forest industry lands, BMP compliance was 99.9 percent with 97.1 percent of the applicable BMPs implemented resulting in no water quality risks identified.

During the 2002 survey, the GFC evaluated approximately 2,036 acres on 12 sites in the Altamaha Subbasin. Seven sites were on NIPF landowners and five sites were on forest industry lands. This is the first survey to evaluate the revised BMPs adopted in 1999. As with the 1998 survey, two scores will now be reported according to the Southern Group of State Foresters' recommended protocol. Compliance is the measure of units (acres, miles of road, number of stream crossings, etc.) in compliance with BMPs. Implementation rate is the percentage of applicable BMPs that are implemented in their entirety over the tract. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 97.0 percent of the streamside management zone (SMZ) acres on seven sites were in compliance with BMPs. The percentage of applicable BMPs implemented was 88.9 percent resulting in no water quality risks identified. By ownership, overall compliance was 95.3 percent and implementation was 84.2 percent on NIPF lands resulting in no water quality risks. The main problem was that inadequate widths were maintained on one site resulting in insufficient tree canopy left along the stream, logging debris was left in stream channel, mechanical site preparation and mechanical tree planting within the SMZ. On forest industry lands, compliance and implementation were both 100 percent.
- Overall, eight stream crossings were evaluated on four sites. Three of these crossings occurred on the NIPF owner and the remaining five occurred on forest industry lands. On NIPF lands, all three of the crossings were new and associated with the forest operation. None were in full compliance. Overall, on NIPF lands, the percentage of applicable BMP implementation was 33.3 percent resulting in no water quality risks identified. Problems were found regarding the use of debris and dirt type crossings and their removal. On forest industry lands, there were five pre-existing culverted crossings with only three or 60 percent in compliance. The percentage of BMP implementation was 90.6 percent. Problems involved undersized permanent culverts and stabilization of exposed soil over the fill resulting in one water quality risk identified.
- Overall, 93.6 percent of the 8.54 forest road miles evaluated on six sites were in compliance with BMPs. There were 7.5 miles of pre-existing road of which 97.3 percent were in compliance with BMPs. Of the 1.01 miles of newly constructed roads, 66.4 percent were in compliance with BMPs. The overall percentage of applicable BMPs implemented was 93.6 percent resulting in no water quality risks identified. The main problem was inadequate or lack of installation of surface drainage measures in roads as this was done on only 60 percent of the sites. By ownership, on NIPF lands, overall compliance was 87.5 percent with 57.1 percent of the BMPs implemented. On forest industry lands, overall compliance was 98.0 percent with 90.5 percent of the applicable BMPs being implemented.

- Overall, 100 percent of the harvested acres on eight sites were in compliance with BMPs. The percentage of BMP Implementation was 97.9 percent with no water quality risks. By ownership, on five NIPF sites, overall compliance was 100 percent with 96.6 percent of the applicable BMPs implemented. On three forest industry sites, compliance was 100 percent with 100 percent of the applicable BMPs implemented.
- Overall, 99.9 percent of the mechanical site preparation acres on four sites were in compliance with BMPs. The percentage of BMP implementation was 92.9 percent with no water quality risks identified. Two sites each were on NIPF lands and forest industry lands. By ownership, 100 percent of the acres were in compliance on NIPF sites with the percentage of BMP implementation at 100 percent. On forest industry lands, compliance was 99.9 percent and implementation was 88.9 percent. Bedding directed surface drainage into roadside ditches on one site.
- There were no chemical site preparation, controlled burning, or forest fertilization sites evaluated.
- Overall, 100 percent of the artificial regeneration acres on two sites were in compliance with BMPs. The percentage of BMP implementation was 100 percent with no water quality risks identified. By ownership, one site each was located on NIPF and forest industry lands. No bottomland hardwood wetlands identified in the 1995 EPA/COE memo were planted to pine on these two sites.
- Twelve sites were evaluated for equipment servicing. Seven sites were on NIPF lands and five sites were on forest industry lands. Overall implementation was 100 percent and no water quality risks.
- There were three perennial and five intermittent streams evaluated accounting for approximately 6.62 miles of stream of which 96.2 percent of those miles were in compliance with BMPs. By ownership, compliance was 94.6 percent on NIPF lands and 100 percent on forest industry lands.
- Overall, 99.9 percent of the acres evaluated in the Altamaha River Subbasin during the 2002 survey were in compliance with BMPs. The percentage of applicable BMPs implemented was 89.8 percent resulting in one water quality risk. By ownership, compliance on NIPF lands was 99.9 percent with 84.6 percent of the applicable BMPs implemented resulting in no water quality risks. On forest industry lands, BMP compliance was 99.9 percent with 94.9 percent of the applicable BMPs implemented resulting in the one water quality risk identified.

Ohoopee River Subbasin (HUC 03070107)

The GFC conducted BMP Implementation and Compliance Surveys in 1991, 1992, 1998, and 2002. No data was extracted specifically for the Altamaha River basin during the 1991 survey. However the data for the Altamaha River Subbasin should be similar to the statewide data for the Lower Coastal Plain region. There, the GFC evaluated approximately 23,987 acres on 202 sites. The sites were distributed such that 132 occurred on non-industrial private forest (NIPF) lands, 68 occurred on forest industry land, and 2 were on public lands. The results indicate that the overall percentage of acres in compliance with BMPs was 93.3 percent. The percentage of streambanks or channels in compliance with BMPs was 95.1 percent. By ownership, 89.8 percent of the acres evaluated on NIPF lands were in compliance with BMPs. On forest industry lands, 95.8 percent of the acres were in compliance. On public lands, 98.4 percent of the acres were in compliance.

The 1992 Georgia Forestry Commission (GFC) compliance survey examined approximately 1,260 acres on nine sites in the Ohoopee River subbasin. Five sites were evaluated on NIPF lands and four were on forest industry lands. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 97 percent of the harvested acres were in compliance with BMPs. By ownership, compliance was 99.7 percent on NIPF owners and 94.4 percent on forest industry land.
- Overall, 95.1 percent of main haul road miles were in compliance with BMPs. By ownership, compliance was 95.6 percent on NIPF owners and 94.4 percent on forest industry lands.
- One mechanical site-preparation and one chemical site preparation tract totaling 75 acres were evaluated. Overall, 98.7 percent of the acres were in compliance with BMPs. By ownership, compliance was 98 percent on NIPF owners and 100 percent on forest industry.
- No sites were evaluated for regeneration or burning.
- Overall 96.9 percent of the acres were in compliance with BMPs. By ownership, compliance was 99.7 percent on NIPF and 94.4 percent on forest industry lands.
- There were 5.1 miles of stream evaluated with 100 percent being in compliance with BMPs.

During the 1998 survey, the GFC examined approximately 1,211 acres on 10 sites in the Ohoopee River Subbasin. Eight sites were on NIPF landowners and two sites were on forest industry lands. According to the Southern Group of State Foresters recommended protocol, adopted in 1997, two scores will now be reported. Compliance is the measure of units (acres, miles of road, number of stream crossings, etc.) in compliance with BMPs. Implementation rate is the percentage of applicable BMPs that are implemented in their entirety over the tract. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 89.4 percent of the streamside management zone (SMZ) acres were in compliance with BMPs with only one water quality risk was identified. The percentage of applicable BMPs implemented was 87.0 percent. By ownership, overall compliance was 87.0 percent and implementation was 84.2 percent on NIPF lands resulting in one water quality risk that was associated with herbicide application. The main problem was logging debris left in stream channels on 38 percent of the sites. Rutting occurred on one site. Aerial application of herbicides occurred on one site. On forest industry lands, compliance was 98.4 percent and implementation was 100 percent with no water quality risks identified.
- Overall, only one stream crossing was evaluated and that occurred on forest industry land. That crossing was in full compliance. The percentage of applicable BMP implementation was 87.5 percent resulting in no water quality risks identified. The only problem found was lack of stabilization of exposed fill over a culvert.
- Overall, 87.8 percent of the forest road miles evaluated on nine sites were in compliance with BMPs. The percentage of applicable BMPs implemented was 87.0 percent with no water quality risks identified. The main problem was inadequate or lack of installation of water diversion measures in roads on 43 percent of the sites. By ownership, on NIPF lands, overall compliance was 86.6 percent, with 88.2 percent of the BMPs implemented with no water quality risks identified. On forest industry lands, compliance was 90.9 percent with 83.3 percent of the applicable BMPs being implemented and no water quality risks.
- Overall, 100 percent of the harvested acres on 10 sites were in compliance with BMPs. The percentage of BMP implementation was 97.7 percent with one water quality risk. By ownership, on eight NIPF sites, overall compliance was 100

percent with 97.1 percent of the applicable BMPs implemented resulting in the one water quality risk. The main problem found was associated with inadequate water bars and stabilization of main skid trails on one site. On two forest industry sites, compliance was 100 percent with 100 percent of the applicable BMPs implemented with no water quality risks identified.

- Overall, 100 percent of the mechanical site preparation acres on four sites were in compliance with BMPs. The percentage of BMP implementation was also 100 percent with no water quality risks identified. Two sites were on NIPF lands and two were on forest industry lands.
- Outside the SMZ, 100 percent of the chemical site preparation acres on one NIPF site were in compliance with BMPs. The percentage of BMP implementation was 75 percent with one water quality risk.
- Overall, 100 percent of the control burning acres on three sites were in compliance with BMPs. The percentage of BMP implementation was 100 percent resulting in no water quality risks. One site was on NIPF owners and two were on forest industry lands.
- Overall, 100 percent of the artificial regeneration acres on three sites were in compliance with BMPs. The percentage of BMP implementation was 100 percent with no water quality risks identified. By ownership, one site was on NIPF land and two were on forest industry land.
- There was one perennial and seven intermittent streams evaluated accounting for approximately 4.02 miles of stream of which 99.8 percent of those miles were in compliance with BMPs. By ownership, compliance was 100 percent on NIPF lands and 98.5 percent on forest industry lands.
- Overall, 99.9 percent of the acres evaluated in the Ohoopee River Subbasin during the 1998 survey were in compliance with BMPs. The percentage of applicable BMPs implemented was 91.6 percent resulting in three water quality risks. By ownership, compliance on NIPF lands was 99.8 percent with 90.2 percent of the applicable BMPs implemented resulting in all three water quality risks. On forest industry lands, BMP compliance was 99.9 percent with 94.6 percent of the applicable BMPs implemented but no water quality risks identified.

During the 2002 survey, the GFC evaluated approximately 3,935 acres on nine sites in the Ohoopee Subbasin. Six sites were on NIPF landowners and three sites were on forest industry lands. As with the 1998 survey, two scores will now be reported according to the Southern Group of State Foresters' recommended protocol. Compliance is the measure of units (acres, miles of road, number of stream crossings, etc.) in compliance with BMPs. Implementation rate is the percentage of applicable BMPs that are implemented in their entirety over the tract. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 96.7 percent of the streamside management zone (SMZ) acres on eight sites were in compliance with BMPs. The percentage of applicable BMPs implemented was 88.2 percent resulting in six water quality risks identified. By ownership, overall compliance was 93 percent and implementation was 80 percent on NIPF lands resulting in the six water quality risks. The main problem was that inadequate widths were maintained on two sites resulting in insufficient tree canopy left along the stream. Logging debris was left in the stream channel on one site and a log deck was within the SMZ on one site. On forest industry lands, compliance and implementation were both 100 percent.
- Overall, 34 stream crossings were evaluated on seven sites. Twenty-four of these crossings occurred on the NIPF owner and the remaining 10 occurred on forest

industry lands. On NIPF lands, 10 of the crossings were pre-existing with five or 50 percent at full compliance. There were 14 new crossings associated with the forest operation. Thirteen or 93 percent were in full compliance. Overall, on NIPF lands, the percentage of applicable BMP implementation was 81.4 percent resulting in four water quality risks identified. Problems were found regarding the use of undersized and un-stabilized culverts, debris and dirt type crossings and their removal. On forest industry lands, there were five pre-existing culverted crossings and five new crossings with all ten or 100 percent in compliance. The percentage of BMP implementation was 97 percent.

- Overall, 96.8 percent of the 18.53 forest road miles evaluated on nine sites were in compliance with BMPs. There were 18.38 miles of pre-existing road, of which 97.1 percent were in compliance with BMPs. Of the 0.15 miles of newly constructed road, 66.7 percent were in compliance with BMPs. The overall percentage of applicable BMPs implemented was 78.5 percent resulting in one water quality risk identified. The main problem was inadequate or lack of installation of water diversion measures in roads, as this was done on only 40 percent of the sites. By ownership, on NIPF lands, overall compliance was 95.6 percent with 75 percent of the BMPs implemented. On forest industry lands, overall road compliance was 98.6 percent with 87 percent of the applicable BMPs being implemented resulting in the one water quality risk.
- Overall, 99.9 percent of the harvested acres on nine sites were in compliance with BMPs. The percentage of BMP Implementation was 97 percent with no water quality risks. By ownership, on six NIPF sites, overall compliance was 99.9 percent with 95.9 percent of the applicable BMPs implemented. On three forest industry sites, compliance was 100 percent with 100 percent of the applicable BMPs implemented.
- Overall, 100 percent of the mechanical site preparation acres on one site were in compliance with BMPs. The percentage of BMP implementation was 100 percent with no water quality risks identified. The site was on forest industry land.
- There were two chemical site preparation sites evaluated with both occurring on forest industry lands. Overall, the percentage of acres in compliance was 100 percent with the percentage of BMP implementation at 100 percent with no water quality risks identified.
- One site was evaluated for firebreak compliance and that occurred on NIPF land. No controlled burning had occurred. The percentage of firebreak miles in compliance was 100 percent and BMP implementation was 100 percent.
- No forest fertilization sites were evaluated.
- Overall, 100 percent of the artificial regeneration acres on one site were in compliance with BMPs. The percentage of BMP implementation was 100 percent with no water quality risks identified. The site each was located on forest industry land. No bottomland hardwood wetlands identified in the 1995 EPA/COE memo were planted to pine on this site.
- Nine sites were evaluated for equipment servicing. Six sites were on NIPF lands and three sites were on forest industry lands. Overall implementation was 96.2 percent and no water quality risks. By ownership, implementation was 100 percent on NIPF and 88.9 percent on forest industry.
- There were three perennial and eight intermittent streams evaluated accounting for approximately 18.49 miles of stream of which 94.5 percent of those miles were in compliance with BMPs. By ownership, compliance was 90.1 percent on NIPF lands and 100 percent on forest industry lands.

- Overall, 99.9 percent of the acres evaluated in the Ohoopee River Subbasin during the 2002 survey were in compliance with BMPs. The percentage of applicable BMPs implemented was 88.0 percent resulting in 12 water quality risks. By ownership, compliance on NIPF lands was 99.7 percent with 83.8 percent of the applicable BMPs implemented resulting in 10 water quality risks. On forest industry lands, BMP Compliance was 100 percent with 95.9 percent of the applicable BMPs implemented resulting in two water quality risks identified.

Identified Gaps and Needs

Adverse impacts of excess sediment loading include degradation of habitat and reduction of species diversity. These types of impacts are best evaluated through biological monitoring, for which improved capabilities are needed. EPD is developing increased capability for biomonitoring using Rapid Bioassessment Protocols (RBPs) for benthic macroinvertebrates. EPD protocols also include habitat assessment. The WRD is working with the IBI (Index of Biologic Integrity) to assess fish communities. These tools will provide methods to detect and quantify impairment of aquatic life resulting from habitat-modifying stressors such as sediment, as well as impacts from other stressors.

A key for addressing erosion, sedimentation, and habitat issues on highly impacted streams is the definition of appropriate management goals. Many highly impacted streams cannot be returned to “natural” conditions. An appropriate restoration goal needs to be established in consultation between EPD partners and other stakeholders.

Many privately owned sawmills are not members of the AF&PA. These mills and their producers are not required to attend the Master Timber Harvesters Workshops at this time. However if they do sell their chip residues to AF&PA member companies, they are required to attend. A need still exists for education of private landowners who are selling timber. Many such landowners attempt to maximize return on timber, sometimes at the expense of BMPs. The GFC, UGA, GFA, and the Southeastern Wood Producers Association are working on a solution by hosting dozens of landowner workshops each year.

Much of the sediment being produced and adversely impacting streams and lakes is associated with development and maintenance of unpaved rural roads. In many instances E&SC plans, implementation, inspection, and enforcement are not adequate on unpaved rural road projects. Without aggressive inspection and enforcement, contractors sometimes tend to allow erosion to occur and attempt mitigation after the fact. Georgia DOT and other agencies charged with E&SC need to work with county road departments in identifying road segments that are high sediment producers and recommend abatement measures. Additional monitoring may be needed to quantify the impact of unpaved rural roads as a source of sedimentation into streams.

Additional efforts should be directed toward increasing public awareness of erosion and sedimentation, with an emphasis on potential sources and controls. State and basinwide coordination between agencies and organizations providing public education and technical assistance may help extend outreach efforts.

General Strategies for Action

Many agricultural sediment reduction practices are relatively expensive and landowners are reluctant to spend today’s dollars for long term BMP amortization in uncertain future markets. Agricultural cost share dollars (Farm Bill) and perhaps low interest loans (Clean Water State Revolving Fund) should be concentrated in priority watersheds with sufficient technical workforce to implement BMPs through long-term agreements or contracts to reduce sediment loading. An understanding of the role of erosion and sedimentation in urban streams is incomplete at this time. Most of these streams are impacted by a variety of stressors. An incremental or phased approach is needed to address these issues.

Key Participants and Roles

GFC: encourage implementation of the newly revised 1999 forestry BMPs through workshops and demonstrations.

American Forest and Paper Association (AF&PA): The forest products industry has a strong record of stewardship on the land it owns and manages. Member companies have agreed to a Sustainable Forestry Initiative (SFI) program. The goal of the program is to improve the performance of member companies and licensees, and set new standards for the entire forest industry as well as for other forest landowners through implementation of the following 12 objectives:

1. Broaden the practice of sustainable forestry by employing an array of scientifically, environmentally, and economically sound forest practices in the growth, harvest, and use of forests.
2. Promptly reforest harvested acres to ensure long-term forest productivity and conservation of forest resources.
3. Protect the water quality in streams, lakes, and other water bodies by establishing riparian protection measures based on soil type, terrain, vegetation, and other applicable factors, and by using EPA approved Best Management Practices in all forest management operations.
4. Enhance the quality of wildlife habitat by developing and implementing measures that promote habitat diversity and the conservation of plant and animal populations found in forest communities.
5. Minimize the visual impact by designing harvests to blend into the terrain by restricting clear-cut size (120 acres average) and/or by using harvest methods, age classes, and judicious placement of harvest units to promote diversity in forest cover.
6. Manage company lands of ecologic, geologic, or historic significance in a manner that accounts for their special qualities.
7. Contribute to bio-diversity by enhancing landscape diversity and providing an array of habitats.
8. Continue to improve forest utilization to help ensure the most efficient use of forest resources.
9. Continue the prudent use of forest chemicals to improve forest health and growth while protecting employees, neighbors, the public, and sensitive lands.
10. Broaden the practice of sustainable forestry by further involving non-industrial landowners, loggers, consulting foresters, and company employees who are active in wood procurement and landowner assistance programs.
11. Publicly report Program Participants' progress in fulfilling their commitment to sustainable forestry.
12. Provide opportunities for the public and the forestry community to participate in the commitment to sustainable forestry.

From a water quality perspective, Objectives 3 and 10 are extremely important. Performance measures for Objective 3 state:

- Participants will meet or exceed all established BMPs, all applicable state water quality laws and regulations, and the requirements of the Clean Water Act for forestland.

- Participants will establish and implement riparian protection measures for all perennial streams and lakes and involve a panel of experts at the state level to help identify goals and objectives for riparian protection.
- Participants will individually, through cooperative efforts, or through AF&PA, provide funding for water quality research.

Performance measures for Objective 10 state:

- Participants will encourage landowners who sell timber to reforest, following harvest, and to use BMPs by providing these landowners with information on the environmental and economic advantages of these practices.
- Participants will work closely with the Southeastern Wood Producers Association, the Georgia Forestry Association, the University of Georgia School of Forest Resources, the GFC, the Georgia Wildlife Resources Division, and others in the forestry community to further improve the professionalism of loggers through the Master Timber Harvesters program by establishing and/or cooperating with existing state groups to promote the training and education of loggers in:
    1) BMPs, including road construction and retirement, site preparation, streamside management, etc.
    2) Awareness of responsibilities under the Endangered Species Act and other wildlife consideration.
    3) Regeneration and forest resource conservation.
    4) Logging safety.
    5) OSHA and wage and hour rules.
    6) Transportation.
    7) Business management including employee training, public relations, etc.

Specific Management Objectives

Control erosion and sedimentation from land disturbing activities in order to meet narrative water quality standards.

Management Option Evaluation

During this iteration of the basin cycle, management will focus on source control BMPs.

Action Plan

EPD and WRD will continue to develop biological monitoring capabilities designed to assess aquatic life. EPD will work with the issuing authority of local governments for erosion and sedimentation controls, first through education and second through enforcement, to control erosion at construction sites, and will encourage local governments to implement land use planning.

GSWCC and local SWCDs and RC&D Councils with assistance from NRCS will provide technical and educational assistance to producers to encourage the implementation of BMPs to control erosion of agricultural lands. Local SWCDs will convene local workgroups to identify resource concerns and develop proposals for funding to address these concerns. The University of Georgia will provide on-farm assessments to local producers through their Farm-A-Syst Program.

The GFC will encourage implementation of forestry BMPs through workshops and demonstrations. GFC will continue to monitor BMP implementation rates through biennial surveys and determine effectiveness of BMPs. GFC will target landowner and user groups with low implementation rates for BMP education to encourage compliance with forestry BMP guidelines. GFC will work with AF&PA and the forestry community to provide BMP training.

The GFC implemented a monthly BMP Assurance Examination program in January 2003. The objective is to identify active forestry operations, determine landowner and forestry operators, educate them on BMPs and provide recommendations to prevent problems before they happen by conducting an initial and final examination. Sites in 303(d) sediment listed watershed will be targeted for examinations.

Member companies of the American Forest and Paper Association (AF&PA) will document performance measures for each objective through annual reports to AF&PA as required for Objective 11. AF&PA will issue an annual report to the public.

EPD will encourage citizen involvement through Adopt-A-Stream groups to address restoration of streams. Citizen groups will implement Adopt-A-Stream programs and work with local governments in implementing watershed initiatives. EPD and WRD will continue to develop biological monitoring capabilities designed to assess aquatic communities.

Method for Tracking Performance

GSWCC, GFC, EPD, and issuing authorities will track BMP implementation: GSWCC by the number of E&SC plans reviewed and DAT evaluations and recommendations; GFC through its biennial and monthly surveys; and EPD through routine inspections of permitted projects, surveillance for any incidences of noncompliance, and enforcement activities. NRCS will track BMP implementation through its NIMS reporting system.

7.3.5 Drought Conditions

Problem Statement

Drought conditions in Georgia during the 1998-2000 period significantly impacted river basins throughout the state including the Altamaha, Ocmulgee, and Oconee basins. According to the National Oceanic and Atmospheric Administration and the state climate office, rainfall shortages in the state during the May 1998-August 2000 period range from just over 20 inches in North Central Georgia to just over 30 inches in West Central Georgia. Recorded rainfall shortages in the Altamaha, Ocmulgee, and Oconee regions were about 25 inches.

In 2000, EPD developed the “1998-2000 Georgia Drought Report” that documents and evaluates the management actions implemented by state and local authorities during the drought of 1998-2000; provides a summary of drought impacts and an objective assessment of the state’s vulnerability and mitigation efforts; and presents a clear set of recommendations for improving drought preparedness and response.

General Goals

Georgia’s goals are to control its level of drought preparedness, reduce its drought vulnerability and effectively manage its resources to meet the complex water demands of its natural environment, citizens and economic prosperity.

Ongoing Efforts

Comprehensive drought planning measures will be ongoing with the assistance of experts and stakeholders from within Georgia and the state has contracted with a team of experts from across the nation to guide and facilitate the process. The result of this effort will be a drought plan that provides a statewide framework, regional approach, and linkages with local drought plans.

Strategies for Action

The 1998-2000 Georgia Drought Report (GAEPD, 2000) provides recommendations that are designed to supplement actions taken by all Georgians to better manage their water resources, and can be facilitated by a number of state agencies, including EPD. The six recommendations in the report are as follows:

1. Emergency Relief: The State of Georgia should provide emergency grants and loans to assist local governments with critical or threatened water supplies.
2. Water Conservation: The State of Georgia must develop a comprehensive water conservation plan to address a wide range of water conserving measures that can be implemented to reduce water demand in Georgia.
3. Agricultural Water Use: The State of Georgia must develop an effective method to evaluate consumptive use of water for agricultural irrigation, and implement programs for reducing water use while protecting the prosperity of farmers and agricultural communities.
4. State Water Plan: The State of Georgia must perform a detailed review of existing water policy and laws and develop a comprehensive state water plan that will provide the framework and support for effective management of Georgia's water resources.
5. State Drought Plan: The State of Georgia must continue developing a comprehensive drought plan and drought management process in order to implement appropriate drought response, preparedness and mitigation measures in future droughts. The Plan was approved in March 2003.

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In This Section

Section 8

Future Issues and Challenges

8.1 Where Do We Go From Here?

The Dynamic Process of Basin Management

This plan represents another step in managing the water resources in the Altamaha River basin, but not the final step. It is important to recognize that effective basin management is ongoing and dynamic because changes in resource use and conditions occur continually, as do changes in management resources and perspectives. Therefore, management planning and implementation must remain flexible and adapt to changing needs and capabilities.

Building on Past Improvements

As discussed above in Section 7.3, there is more work to do to adequately restore and protect all of Georgia's water resources. After focusing on the implementation of this plan, the Altamaha River basin will enter into its second iteration of the basin management cycle (scheduled for 2003). The next cycle will provide an opportunity to review issues that were not fully addressed during the first cycle and to reassess or identify any new priority issues. In other words, future management efforts can and should build on the foundation created by previous, ongoing, and already planned management actions.

Participation by Many Different Stakeholders

Partners will not have to start from scratch during the next iteration of the basin planning cycle. The information in this document provides an historical account of what is known and planned to date. Stakeholders in the Altamaha basin will know what was accomplished in the first iteration, and can therefore focus on enhancing ongoing efforts or filling gaps. Data collection and public discussion activities scheduled early in the next cycle can draw on information in the plan to identify areas in need of additional monitoring, assessment, and strategy development.

Blending Regulatory and Voluntary Approaches

Although the regulatory authorities of agencies such as EPD are important for protection and restoration of Georgia's waters, RBMP partners will continue to emphasize voluntary and cooperative approaches to watershed management. This will take time and be very challenging. Long-term protection means that the people, local governments, and businesses must learn collectively what is needed for protection and adapt their lifestyle and operations accordingly. Experience indicates that we are much more likely to buy into proposed management solutions in which we have a say and control over how we spend our time and money. The challenge in the future, therefore, is to continue to "build bridges" between regulatory and voluntary efforts, using each where they best serve the people and natural resources of Georgia.

8.2 Working to Strengthen Planning and Implementation Capabilities

Understanding One Another's Roles

Increasing awareness and understanding of the roles and capabilities of local, state, and federal partners is one of the keys to future success in basin management for the Altamaha River. Lack of understanding can lead to finger pointing and frustration on the part of all involved. Increasing opportunities for stakeholders to develop this awareness and understanding should result in more effective management actions.

This basin plan provides one opportunity for stakeholders to increase their awareness of conditions in the basin and to learn about ongoing and proposed new management strategies. Within this context, stakeholders can develop a better understanding of certain roles and responsibilities. For example, this basin plan points out several areas where EPD has regulatory authority and corresponding duties, including:

- Establishing water quality use classifications and standards.
- Assessing and reporting on water quality conditions.
- Facilitating development of River Basin Management Plans.
- Developing TMDLs.
- Issuing permits for point source discharges of treated wastewater, municipal stormwater discharges as required, and land application systems.
- Issuing water supply permits.
- Enforcing compliance with permit conditions.

In many areas, however, organizations or entities other than EPD are responsible; for example:

- Septic tank permitting and inspection (County Health Departments) and maintenance (individual landowners).
- Land development (land use) and zoning ordinances (local governments).
- Sanitary sewer and stormwater ordinances (local governments).
- Water supply source water protection ordinances (local governments).
- Urban stormwater and drainage (local governments).
- Erosion and sediment control (local governments).
- Siting of industrial parks, landfills, and wastewater treatment facilities (local governments).

- Floodplain management (FEMA, local governments).
- Implementation of forestry best management practices (Georgia Forestry Commission with support from the American Forest and Paper Association, the Georgia Forestry Association, the University of Georgia School of Forest Resources, Southeastern Wood Producers Association, and the American Pulpwood Association).
- Implementation of agricultural best management practices (landowners with support from state and federal agricultural agencies).
- Proper use, handling, storage, and disposal of chemicals (businesses, landowners, municipalities, counties, etc.).

These are but a few of the areas involved, but they illustrate how responsibilities are spread across many stakeholders in each basin. Additionally, other agencies and organizations – regional development centers; federal, state, and local technical assistance programs; citizens groups; and business associations – assist in planning and implementation in many of these areas. As stakeholders become more familiar with one another's responsibilities and capabilities, they will become increasingly aware of appropriate partners to work with in addressing their issues of concern.

Using the RBMP Framework to Improve Communication

Raising awareness frequently involves two-way communication. The RBMP framework's interactive planning and outreach sessions provide additional opportunities for two-way communication. For example, Basin Technical Planning Team meetings provide opportunities for partners to share information on their responsibilities and capabilities with each other. Similarly, stakeholder meetings provide opportunities for citizens, businesses, government agencies, associations, and others to share information and learn from each other. Although these interactions often require considerable time, they are critical to the future of management in the basin because they build the working relationships and trust that are essential to carrying out effective, integrated actions.

Continuing to Streamline Our Efforts

Increased coordination will also result if partners in this approach continue to streamline their efforts. There are many laws and requirements with related and complementary goals, e.g., Georgia's Growth Strategies Act, Planning Act, River Corridor Protection Act, Comprehensive Ground Water Management Plan, and River Basin Management Planning requirements, in addition to federal Clean Water Act water quality regulations and Safe Drinking Water Act source water protection requirements. Partners should continue to find ways to make actions under these laws consistent and complementary by eliminating redundancy and leveraging efforts. Again, partners can use the forums in the RBMP framework (e.g., river basin team and advisory committees) to discuss and implement ideas to streamline roles and make the best use of their funds and staff resources.

8.3 Addressing the Impacts from Continued Population Growth and Land Development

Supporting Consistent Implementation of Protection Measures

In addressing the impacts from anticipated population growth and increased land development in the basin, future managers will need to increase their understanding of roles and use forums to coordinate and develop more specific action plans. Historically, mitigating impacts from newly developed areas has been approached mostly on a case-by-case basis. Unfortunately, this approach has resulted in inconsistent planning and implementation of water resource protection measures. River basin planning offers an opportunity for a more consistent approach by making it easier for landowners, local governments and businesses to work together at the watershed and basin levels.

One way that Georgia EPD will address this issue is by approving only new and expanding permits for water withdrawals and wastewater discharges that are consistent with the basin plan and that meet the intent of the Georgia Planning Act. Rather than waiting for the permit application process, however, local governments can work together and with EPD to work out some of these issues in advance. There are incentives for organizations such as the Georgia Water Pollution Control Association (GWPCA), the Georgia Municipal Association (GMA), the Association of County Commissioners of Georgia (ACCG), and the Regional Development Centers (RDCs) to work out consistent methods to conduct watershed assessments in developing areas and to improve the implementation of protection measures as development occurs. EPD, DCA, and other partners can coordinate by facilitating discussion at RBMP meetings and supporting local initiatives aimed at this issue.

8.4 The Next Iteration of the Basin Cycle

Building on Previous, Ongoing, Planned Efforts

As discussed above and in Section 7.3, there is more work to do to adequately restore and protect all of Georgia's water resources. After focusing on the implementation of this plan, the Altamaha River basin will enter into its second iteration of the basin management cycle (scheduled for 2003). The next cycle will provide an opportunity to review issues that were not fully addressed during the first cycle and to reassess or identify any new priority issues. In other words, future management efforts can and should build on the foundation created by previous, ongoing, and already planned management actions.

8.5 Priorities for Additional Data Collection

In 1999, monitoring efforts were focused on the Altamaha, Ocmulgee, and Oconee River basins in accordance with the EPD basin planning schedule. Intensive monitoring will return to the Altamaha basin in support of the next iteration of the basin planning cycle in 2004. Prior to this time, EPD and partners will develop a monitoring plan for the Altamaha. The monitoring plan will have two major components: general assessment of water quality status within the basin, and targeted assessment to address priority issues and concerns.

River Basin Planning Act

(O.C.G.A. 12-5-520 to 525)

92 SB637/AP

Senate Bill 637

By: Senators Johnson of the 47th, Pollard of the 24th, Edge of the 28th and Egan of the 40th.

An Act

To amend Chapter 5 of Title 12 of the Official Code of Georgia Annotated, relating to water resources, so as to define certain terms; to provide for the development of river basin management plans for certain rivers; to provide for the contents of such plans; to provide for the appointment and duties of local advisory committees; to provide for notice and public hearings; to provide for submission to and approval of plans to the Board of Natural Resources; to make certain provisions relative to issuing certain permits; to provide for the application for and use of certain funds; to provide that this Act shall not enlarge the powers of the Department of Natural Resources; to repeal conflicting laws; and for other purposes.

Be It Enacted by the General Assembly of Georgia:

Section 1. Chapter 5 of Title 12 of the Official Code of Georgia Annotated, relating to water resources, is amended by inserting at the end thereof the following:

Article 8

12-5-520. As used in this article, the term:

(1) "Board" means the Board of Natural Resources.

(2) "Director" means the director of the Environmental Protection Division of the Department of Natural Resources.

12-5-521. The director shall develop river basin management plans for the following rivers: Alapaha, Altamaha, Canoochee, Chattahoochee, Coosa, Flint, Ochlocknee, Ocmulgee, Oconee, Ogeechee, St. Marys, Satilla, Savannah, Suwanee, Tallapoosa, and Tennessee. The director shall consult the chairmen of the local advisory committees on all aspects of developing the management plans. The director shall begin development of the management plan for the Chattahoochee and Flint river basins by December 31, 1992, and for the Coosa and Oconee river basins by December 31, 1993. Beginning in 1994, the director shall begin development of one management plan per calendar year until all required management plans have been begun. All management plans shall be completed not later than five years after they were begun and shall be made available to the public within 180 days after completion.

12-5-522. The management plans provided by Code Section 12-5-521 shall include, but not be limited to, the following:

(1) A description of the watershed, including the geographic boundaries, historical, current, and projected uses, hydrology, and a description of water quality, including the current water quality conditions;

(2) An identification of all governmental units that have jurisdiction over the watershed and its drainage basin;

(3) An inventory of land uses within the drainage basin and important tributaries including point and nonpoint sources of pollution;

(4) A description of the goals of the management plan, which may include educating the general public on matters involving the environmental and ecological concerns specific to the river basin, improving water quality and reducing pollution at the source, improving aquatic habitat and reestablishing native species of fish, restoring and protecting wildlife habitat, and providing recreational benefits; and

(5) A description of the strategies and measures necessary to accomplish the goals of the management plan.

12-5-523. As an initial action in the development of a management plan, the director shall appoint local advisory committees for each river basin to consist of at least seven citizens and a chairman appointed by the director. The local advisory committees shall provide advice and counsel to the director during the development of the management plan. Each committee shall meet at the call of the chairman but not less than once every four months. The chairman and members of the local advisory committees shall serve without compensation or reimbursement of expenses.

12-5-524.

(a) Upon completion of the penultimate draft of a management plan, the director shall conduct public hearings within the river basin. At least one public hearing shall be held in each river basin named in Code Section 12-5-521. The director shall publish notice of each such public hearing in a newspaper of general circulation in the area announcing the date, time, place, and purpose of the public hearing. A draft of the management plan shall be made available to the public at least 30 days prior to the public hearing. The director shall receive public comment at the public hearing and for a period of at least ten days after the public hearing.

(b) The division shall evaluate the comments received as a result of the public hearings and shall develop the final draft of the management plan for submission to the board for consideration within 60 days of the public hearing.

(c) The board shall consider the management plan within 60 days after submission by the director. The department shall publish the management plan adopted by the board and shall make copies available to all interested local governmental officials and citizens within the river basin covered by such management plan.

(d) Upon the board's adoption of a final river basin management plan, all permitting and other activities conducted by or under the control of the Department of Natural Resources shall be consistent with such plan.

(e) No provision of this article shall constitute an enlargement of the existing statutory powers of the department.

12-5-525. The director is directed to apply for the maximum amount of available funds pursuant to Sections 106, 314, 319, and 104(b)(2) of Public Law 95-217, the federal Clean Water Act, and any other available source for the development of river basin management plans.

Section 2. All laws and parts of laws in conflict with this Act are repealed.

Georgia Instream Water Quality Standards For All Waters: Toxic Substances

(Excerpt from Georgia Rules and Regulations for Water Quality Control Chapter 391-3-6-.03 Water Use Classifications and Water Quality Standards)

(i) Instream concentrations of the following chemical constituents which are considered to be other toxic pollutants of concern in the State of Georgia shall not exceed the criteria indicated below under 7-day, 10-year minimum flow (7Q10) or higher stream flow conditions except within established mixing zones:

1. 2,4-Dichlorophenoxyacetic acid (2,4-D)	70 μg/l
2. Methoxychlor	0.03 μg/l*
3. 2,4,5-Trichlorophenoxy propionic acid (TP Silvex)	50 μg/l

(ii) Instream concentrations of the following chemical constituents listed by the U.S. Environmental Protection Agency as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed the acute criteria indicated below under 1-day, 10-year minimum flow (1Q10) or higher stream flow conditions and shall not exceed the chronic criteria indicated below under 7-day, 10-year minimum flow (7Q10) or higher stream flow conditions except within established mixing zones or in accordance with site specific effluent limitations developed in accordance with procedures presented in 391-3-6-.06. Unless otherwise specified, the criteria below are listed in their total recoverable form. Because most of the numeric criteria for the metals below are listed as the dissolved form, total recoverable concentrations of metals that are measured instream will need to be translated to the dissolved form in order to compare the instream data with the numeric criteria. This translation will be performed using guidance found in "Guidance Document of Dynamic Modeling and Translators August 1993" found in Appendix J of EPA's Water Quality Standards Handbook: Second Edition, EPA-823-B-94-005a or by using other appropriate guidance from EPA.

		Acute	Chronic
1.	Arsenic		
	(a) Freshwater	340 μg/l [1]	150 μg/l [1]
	(b) Coastal and Marine Estuarine Waters	69 μg/l [1]	36 μg/l [1]
2.	Cadmium		
	(a) Freshwater	2.0 μg/l [1, 3]	1.3 μg/l [1, 3]
	(b) Coastal and Marine Estuarine Waters	42 μg/l [1]	9.3 μg/l [1]
3.	Chromium III		
	(a) Freshwater	320 μg/l [1,3]	42 μg/l [1,3]
	(b) Coastal and Marine Estuarine Waters	--	--
4.	Chromium VI		
	(a) Freshwater	16 μg/l [1]	11 μg/l [1]
	(b) Coastal and Marine Estuarine Waters	1,100 μg/l [1]	50 μg/l [1]
5.	Copper		
	(a) Freshwater	7.0 μg/l [1,2*,3]	5.0 μg/l [1,2*,3]
	(b) Coastal and Marine Estuarine Waters	4.8 μg/l [1,2]	3.1 μg/l [1,2]
		Acute	Chronic

6.	Lead		
	(a) Freshwater	30 µg/l [1,3]	1.2 µg/l [1,2*,3]
	(b) Coastal and Marine Estuarine Waters	210 µg/l [1]	8.1 µg/l [1]
7.	Mercury		
	(a) Freshwater	1.4 µg/l	0.012 µg/l [2]
	(b) Coastal and Marine Estuarine Waters	1.8 µg/l	0.025 µg/l [2]
8.	Nickel		
	(a) Freshwater	260 µg/l [1,3]	29 µg/l [1,3]
	(b) Coastal and Marine Estuarine Waters	74 µg/l [1]	8.2 µg/l [1]
9.	Selenium		
	(a) Freshwater	--	5.0 µg/l
	(b) Coastal and Marine Estuarine Waters	290µg/l [1]	71 µg/l [1]
10.	Silver	-- [4]	-- [4]
11.	Zinc		
	(a) Freshwate	65 µg/l [1,3]	65 µg/l [1,3]
	(b) Coastal and Marine Estuarine Waters	90 µg/l [1]	81 µg/l [1]
12.	Lindane [Hexachlorocyclohexane (g-BHC-Gamma)]		
	(a) Freshwater	0.95 µg/l	
	(b) Coastal and Marine Estuarine Waters	0.16 µg/l	

[1] The in-stream criterion is expressed in terms of the dissolved fraction in the water column. Conversion factors used to calculate dissolved criteria are found in the EPA document – National Recommended Water Quality Criteria – Correction, EPA 822-Z-99-001, April 1999.
[2] The in-stream criterion is lower than the EPD laboratory detection limits. (A "*" indicates that the criterion may be higher than or lower than EPD laboratory detection limits depending upon the hardness of the water.)
[3] The aquatic life criteria for these metals are expressed as a function of total hardness (mg/l) in a water body. Values in the table above assume a hardness of 50 mg/l CaCO3. For other hardness values, the following equations from the EPA document – National Recommended Water Quality Criteria – Correction, EPA 822-Z-99-001, April 1999 should be used. The minimum hardness allowed for use in these equations shall not be less than 25 mg/l, as calcium carbonate and the maximum shall not be greater than 400 mg/l as calcium carbonate.

Cadmium
acute criteria = $(e^{(1.128[\ln(hardness)] - 3.6867)})(1.136672-[(\ln hardness)(0.041838)]$ µg/l
chronic criteria = $(e^{(0.7852[\ln(hardness)] - 2.715)})(1.101672-[(\ln hardness)(0.041838)]$ µg/l

Chromium III
acute criteria = $(e^{(0.8190[\ln(hardness)] + 3.7256)}(0.316)$ µg/l
chronic criteria = $(e^{(0.8190[\ln(hardness)] + 0.6848)})(0.860)$ µg/l

Copper
acute criteria = $(e^{(0.9422[\ln(hardness)] - 1.700)})(0.96)$ µg/l
chronic criteria = $(e^{(0.8545[\ln(hardness)] - 1.702)})(0.96)$ µg/l

Lead
acute criteria = $(e^{(1.273[\ln(hardness) - 1.460)})(1.46203 - [(\ln hardness)(0.145712)])$ µg/l
chronic criteria = $(e^{(1.273[\ln(hardness) - 4.705)})(1.46203 - [(\ln hardness)(0.145712)])$ µg/l

Nickel
acute criteria = $(e^{(0.8460[\ln(hardness)] + 2.255)})(.998)$ µg/l
chronic criteria = $(e^{(0.8460[\ln(hardness)] + 0.0584)})(.997)$ µg/l

Zinc
acute criteria = $(e^{(0.8473[\ln(hardness)] + 0.884)})(0.978)$ µg/l
chronic criteria = $(e^{(0.8473[\ln(hardness)] + 0.884)})(0.986)$ µg/l

[4] This pollutant is addressed in 391-3-6-.06.

(iii) Instream concentrations of the following chemical constituents listed by the U.S. Environmental Protection Agency as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed criteria indicated below under 7-day, 10-year minimum flow (7Q10) or higher stream flow conditions except within established mixing zones or in accordance with site specific effluent limitations developed in accordance with procedures presented in 391-3-6-.06.

1.	Chlordane	
	(a) Freshwater	0.0043 μg/l*
	(b) Coastal and Marine Estuarine Waters	0.004 μg/l*
2.	Cyanide	
	(a) Freshwater	5.2 μg/l*
	(b) Coastal and Marine Estuarine Waters	1.0 μg/l*
3.	Dieldrin	
	(a) Freshwater	0.056 μg/l*
	(b) Coastal and Marine Estuarine Waters	0.0019 μg/l*
4.	4,4'-DDT	0.001 μg/l*
5.	a-Endosulfan	
	(a) Freshwater	0.056 μg/l*
	(b) Coastal and Marine Estuarine Waters	0.0087 μg/l*
6.	b-Endosulfan	
	(a) Freshwater	0.056 μg/l*
	(b) Coastal and Marine Estuarine Waters	0.0087 μg/l*
7.	Endrin	
	(a) Freshwater	0.036 μg/l*
	(b) Coastal and Marine Estuarine Waters	0.0023 μg/l*
8.	Heptachlor	
	(a) Freshwater	0.0038 μg/l*
	(b) Coastal and Marine Estuarine Waters	0.0036μg/l*
9.	Heptachlor Epoxide	
	(a) Freshwater	0.0038 μg/l*
	(b) Coastal and Marine Estuarine Waters	0.0036 μg/l*
10	Pentachlorophenol	
	(a) Freshwater	2.1 μg/l*
	(b) Coastal and Marine Estuarine Waters	7.9 μg/l*
11.	PCBs	
	(a) Freshwater	0.014 μg/l*
	(b) Coastal and Marine Estuarine Waters	0.03 μg/l*
12.	Phenol	300 μg/l
13.	Toxaphene	0.0002 μg/l*

*The in-stream criterion is lower than the EPD laboratory detection limits.

(iv) Instream concentrations of the following chemical constituents listed by the U. S. Environmental Protection Agency as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed criteria indicated below under annual average or higher stream flow conditions:

1.	Acenaphthene	2700 μg/l
2.	Acenaphthylene	**
3.	Acrolein	780 μg/l
4.	Acrylonitrile	0.66 μg/l
5.	Aldrin	0.00014 μg/l
6.	Anthracene	110000 μg/l
7.	Antimony	4300 μg/l
8.	Arsenic	50 μg/l
9.	Benzidine	0.00054 μg/l
10.	Benzo(a)Anthracene	0.049μg/l
11.	Benzo(a)Pyrene	0.049μg/l
12.	3,4-Benzofluoranthene	0.049μg/l
13.	Benzene	71 μg/l
14.	Benzo(ghi)Perylene	**

15.	Benzo(k)Fluoranthene	0.049µg/l
16.	Beryllium	**
17.	a-BHC-Alpha	0.013 µg/l
18.	b-BHC-Beta	0.046 µg/l
19.	Bis(2-Chloroethyl)Ether	1.4 µg/l
20.	Bis(2-Chloroisopropyl)Ether	170000 µg/l
21.	Bis(2-Ethylhexyl)Phthalate	5.9 µg/l
22.	Bromoform (Tribromomethane)	360 µg/l
23.	Butylbenzyl Phthalate	5200
24.	Carbon Tetrachloride	4.4 µg/l
25.	Chlorobenzene	21000 µg/l
26.	Chlorodibromomethane	34 µg/l
27.	2-Chloroethylvinyl Ether	**
28.	Chlordane	0.0022 µg/l
29.	Chloroform (Trichloromethane)	470 µg/l
30.	2-Chloronaphthalene	4300 µg/l
31.	2-Chlorophenol	400 µg/l
32.	Chrysene	0.049 µg/l
33.	Dibenzo(a,h)Anthracene	0.049 µg/l
34.	Dichlorobromomethane	46 µg/l
35.	1,2-Dichloroethane	99 µg/l
36.	1,1-Dichloroethylene	3.2 µg/l
37	1,2 – Dichloropropane	39 µg/l
38.	1,3-Dichloropropylene	1700 µg/l
39.	2,4-Dichlorophenol	790 µg/l
40.	1,2-Dichlorobenzene	17000 µg/l
41.	1,3-Dichlorobenzene	2600 µg/l
42.	1,4-Dichlorobenzene	2600 µg/l
43.	3,3'-Dichlorobenzidine	0.077 µg/l
44.	4,4'-DDT	0.00059 µg/l
45.	4,4'-DDD	0.00084 µg/l
46.	4,4'-DDE	0.00059 µg/l
47.	Dieldrin	0.00014 µg/l
48.	Diethyl Phthalate	120000 µg/l
49.	Dimethyl Phthalate	2900000 µg/l
50.	2,4-Dimethylphenol	2300 µg/l
51.	2,4-Dinitrophenol	14000 µg/l
52.	Di-n-Butyl Phthalate	12000 µg/l
53.	2,4-Dinitrotoluene	9.1 µg/l
54.	1,2-Diphenylhydrazine	0.54 µg/l
55.	Endrin	0.81 µg/l
56.	Endrin Aldehyde	0.81 µg/l
57.	alpha – Endosulfan	240 µg/l
58.	beta – Endosulfan	240 µg/l
59.	Endosulfan Sulfate	240 µg/l
60.	Ethylbenzene	29000 µg/l
61.	Fluoranthene	370 µg/l
62.	Fluorene	14000 µg/l
63.	Heptachlor	0.00021 µg/l
64.	Heptachlor Epoxide	0.00011 µg/l
65.	Hexachlorobenzene	0.00077 µg/l
66.	Hexachlorobutadiene	50 µg/l
67.	Hexachlorocyclopentadiene	17000 µg/l
68.	Hexachloroethane	8.9 µg/l
69.	Indeno(1,2,3-cd)Pyrene	0.049 µg/l
70.	Isophorone	2600 µg/l
71.	Lindane [Hexachlorocyclohexane (g-BHC-Gamma)]	0.063 µg/l
72.	Methyl Bromide (Bromomethane)	4000 µg/l
73.	Methyl Chloride (Chloromethane)	**

74.	Methylene Chloride	1600 µg/l
75.	2-Methyl-4,6-Dinitrophenol	765 µg/l
76.	3-Methyl-4-Chlorophenol	**
77.	Nitrobenzene	1900 µg/l
78.	N-Nitrosodimethylamine	8.1 µg/l
79.	N-Nitrosodi-n-Propylamine	1.4 µg/l
80.	N-Nitrosodiphenylamine	16 µg/l
81.	PCBs	0.00017 µg/l
82.	Pentachlorophenol	8.2 µg/l
83.	Phenanthrene	**
84.	Phenol	4,600,000 µg/l
85.	Pyrene	11,000 µg/l
86.	1,1,2,2-Tetrachloroethane	11 µg/l
87.	Tetrachloroethylene	8.85 µg/l
88.	Thallium	6.3 µg/l
89.	Toluene	200000 µg/l
90.	Toxaphene	0.00075 µg/l
91.	1,2-Trans-Dichloroethylene	140000
92.	1,1,2-Trichloroethane	42 µg/l
93.	Trichloroethylene	81 µg/l
94.	2,4,6-Trichlorophenol	6.5 µg/l
95.	1,2,4-Trichlorobenzene	940 µg/l
96.	Vinyl Chloride	525 µg/l

**These pollutants are addressed in 391-3-6-.06.

(v) Site specific criteria for the following chemical constituents will be developed on an as-needed basis through toxic pollutant monitoring efforts at new or existing discharges that are suspected to be a source of the pollutant at levels sufficient to interfere with designated uses:

1. Asbestos

(vi) Instream concentrations of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) must not exceed 0.0000012 µg/l under long-term average stream flow conditions.

(f) Applicable state and federal requirements and regulations for the discharge of radioactive substances shall be met at all times.

NPDES Permits for Discharges in the Altamaha River Basin

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
ALTAMAHA MHP BAXLEY	GA0023442	0.013		APPLING	BAY CR
CATOS MHP LYONS	GAPID1000	0.013		TOOMBS	WILLIAMS CR
DOC ROGERS CORRECT INST	GA0022900	0.85		TATTNALL	OHOOPEE RV
GEORGIA POWER HATCH	GA0004120	43.4		APPLING	ALTAMAHA RV
GLENNVILLE	GA0037982	2	Y	TATTNALL	BRICKYARD BR
GLENNVILLE	GA0031836	0.88		TATTNALL	BRICKYARD BR
JESUP WPCP	GA0026000	2.5	Y	WAYNE	ALTAMAHA RV
JOHNSON COUNTY NURSING HOME	GAPID1000	0.007		JOHNSON	PENDLETON CR
LUDOWICI WPCP	GA0049166	0.24		LONG	JONES CR SWAMP TRIB
LYONS NORTH WPCP #2	GA0033391	0.67		TOOMBS	SWIFT CR
LYONS POND #1	GA0033405	0.67		TOOMBS	PENDLETON CR
RAYONIER INC JESUP	GA0003620	67	Y	WAYNE	ALTAMAHA RV
ROGERS STATE PRISON	GA0038237			TATTNALL	
SANTA CLAUS POND	GA0050059	0.01		TOOMBS	ROCKY CR-OHOOPEE RV
SWAINSBORO WPCP	GA0020346	3	Y	EMANUEL	CROOKED CR
TENNILLE POND	GA0049956	0.45		WASHINGTON	DYERS CR-OHOOPEE RV

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
THOMAS AND BETTS CORPORATION	GA0002186			TOOMBS	LITTLE ROCKY CR
VIDALIA WPCP	GA0025488	1.88	Y	TOOMBS	SWIFT CR
WRIGHTSVILLE POND	GA0032395	0.745		JOHNSON	BIG CEDAR CREEK TRIB

Support of Designated Uses for Rivers, Streams, and Lakes in the Altamaha River Basin, 2000-2002

Data Source Codes

State Agencies

1 DNR-EPD, Watershed Planning & Monitoring Program
2 DNR-EPD, Permitting Comp. & Enf. Program (Municipal)
3 DNR-EPD, Permitting Comp. & Enf. Program (Industrial)
4 DNR, Wildlife Resources Division
5 DNR, Coastal Resources Division
6 State University of West Georgia
7 Gainesville College
8 Georgia Institute of Technology

Federal Agencies

9 U.S. Environmental Protection Agency
10 U.S. Geological Survey
11 U.S. Army Corps of Engineers
12 U.S. Forest Service
13 Tennessee Valley Authority

Local Agencies

14 Cobb County
15 Dekalb County
16 Douglas County Water & Sewer Authority
17 Fulton County
18 Gwinnett County
19 City of Clayton
20 City of Gainesville
21 City of LaGrange
22 Georgia Mountains R.D.C.
23 City of Conyers

Contracted Clean Lakes Studies

24 Lake Allatoona (Kennesaw State University)
25 Lake Blackshear (Lake Blackshear Watershed Assoc.)
26 Lake Lanier (University of Georgia)
27 West Point (LaGrange College/Auburn University)

Other

28 Georgia Power Company
29 Oglethorpe Power Company
30 South Carolina Electric & Gas Company
31 South Carolina DHEC
32 Jones Ecological Research Center
33 Alabama DEM
34 City of College Park
35 Kennesaw State University
36 University of Georgia
37 Columbus Water Works
38 Columbus Unified Government
39 St. Johns River Water Mgmt. District
40 Town of Trion
41 Cherokee County
42 Clayton County Water Authority
43 City of Atlanta
44 City of Cartersville
45 Georgia Ports Authority

Criterion Violated Codes

As	Arsenic
Bio	Biota Impacted
Cd	Cadmium
CFB	Commercial Fishing Ban
CN	Cyanide
Cr	Chromium
Cu	Copper
DO	Dissolved Oxygen
FC	Fecal Coliform Bacteria
FCG	Fish Consumption Guidance
Hg	Mercury
Ni	Nickel
Pb	Lead
SB	Shellfishing Ban
Se	Selenium
Temp	Temperature
Tox	Toxicity Indicated
Zn	Zinc

Potential Cause Codes

CSO	Combined Sewer Overflow
I1	Industrial Facility
I2	Residual from Industrial Source
M	Municipal Facility
MA	Marina
NAT	Natural
NP	Nonpoint Sources/Unknown Sources
SB	Shellfish Ban
UR	Urban Runoff/Urban Effects

Rivers/Streams Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Miles
ALTAMAHA RIVER BASIN			
HUC 03070106			
Altamaha River (1,9)	Confluence of Oconee and Ocmulgee Rivers to Rayonier (Jeff Davis/Appling/Wayne Co.)	Fishing	72
Altamaha River (1,9)	Rayonier to Penholoway Creek (Wayne Co.)	Fishing	20
HUC 03070107			
Pendleton Creek (1)	Swift Creek to Ohoopee River (Toombs Co.)	Fishing	9

Rivers/Streams Partially Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Criterion Violated	Potential Cause(s)	Actions to Alleviate	Miles	305(b)	303(d)	Priority
ALTAMAHA RIVER BASIN									
HUC 03070106									
Altamaha River (1)	Penholoway Creek to Butler River (Wayne/Glynn/ McIntosh Co.)	Fishing	FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	23	X	X	3
Bullard Creek (4)	~0.25 mi u/s Altamaha Road to Altamaha River (Jeff Davis Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	8	X	X	3
Five Mile Creek (4)	Headwaters to Altamaha River (Appling/Wayne Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	9	X	X	3
Goose Creek (1)	U/S Rd. S1922 (Walton Griffis Rd.) to Little Goose Creek (Wayne Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	8	X	3	3
HUC 03070107									
Little Ohoopee River (1)	Sardis Creek to Ohoopee River (Emanuel Co.)	Fishing	FC, DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	18	X	3	2
Ohoopee River (1)	Neels Creek to Little Ohoopee River (Johnson/ Emanuel Co.)	Fishing	DO, FC, FCG	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. Fish Consumption Guidelines due to mercury in fish tissue.	18	X	3	2
Ohoopee River (1)	Little Ohoopee River to U.S. Highway 292 (Emanuel/Candler/ Tattnall Co.)	Fishing	DO, FC, FCG	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. Fish Consumption Guidelines due to mercury in fish tissue.	23	X	3	2

Rivers/Streams Partially Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Criterion Violated	Potential Cause(s)	Actions to Alleviate	Miles	305(b)	303(d)	Priority
ALTAMAHA RIVER BASIN									
Ohoopee River (1,9)	Hwy 292 to Hwy 147 (Tattnall Co.)	Fishing	FCG	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. Fish Consumption Guidelines due to mercury in fish tissue.	12	X	3	3
Ohoopee River (1,9)	Ga. Hwy 147 to Confluence with Altamaha River (Tattnall Co.)	Fishing	FCG	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. Fish Consumption Guidelines due to mercury in fish tissue.	13	X	3	3
Pendleton Creek (1)	Sand Hill Lake to Reedy Creek (Treutlen Co.)	Fishing	DO, FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	7	X	3	2
Pendleton Creek (1)	Wildwood Lake to Tiger Creek (Treutlen/ Toombs Co.)	Fishing	DO, FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	12	X	3	2
Thomas Creek (1)	D/S CR203 to Ohoopee River (Tattnall Co.)	Fishing	DO	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	12	X	3	2

Rivers/Streams Not Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Criterion Violated	Potential Cause(s)	Actions to Alleviate	Miles	305(b)	303(d)	Priority
ALTAMAHA RIVER BASIN									
HUC 03070106									
Alex Creek (1)	Mason Cowpen Branch to Altamaha River (Wayne Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	2
Beards Creek (1)	Spring Branch to Altamaha River (Tattnall Co.)	Fishing	FC	M	Glennville WPCP currently upgrading to a constructed wetlands system due to be complete by 5/02.	11	X	2	1
Cobb Creek (1)	Oconee Creek to Altamaha River (Toombs Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	13	X	3	2
Doctors Creek (1)	U/S Jones Creek (Long Co.)	Fishing	DO, FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	2
Jones Creek (1)	Still Creek to Doctors Creek (Long Co.)	Fishing	DO	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	11	X	3	2
Milligan Creek (1)	Uvalda to Altamaha River (Montgomery/ Toombs Co.)	Fishing	FC, DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	11	X	3	2
Oconee Creek (1)	Headwaters to Cobb Creek (Montgomery/ Toombs Co.)	Fishing	FC, DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	11	X	3	2
Penholoway Creek (1,10)	Little Creek to Altamaha River (Wayne Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	13	X	3	2

Rivers/Streams Not Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Criterion Violated	Potential Cause(s)	Actions to Alleviate	Miles	305(b)	303(d)	Priority
ALTAMAHA RIVER BASIN									
Ten Mile Creek (1)	Little Ten Mile Creek to Altamaha River (Appling Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	13	X	3	2
HUC 03070107									
Big Cedar Creek (1)	Little Cedar Creek to Ohoopee River (Johnson Co.)	Fishing	DO, FC	M,NP	Wrightsville Pond WPCP will be addressed through EPD's Basin Planning Permitting Strategy. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	2
Jacks Creek (1,4)	U.S. Hwy. 1 to Ohoopee River (Emanuel Co.)	Fishing	DO, FC, Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. EPD will address nonpoint sources through a watershed protection strategy.	9	X	3, 3, X	2
Little Ohoopee River (1)	Gully Branch to Neeley Creek (Washington Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	14	X	3	2
Little Ohoopee River (1)	Neeley Creek to Sardis Creek (Johnson Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	15	X	3	2
Ohoopee River (1)	Dyers Creek to Big Cedar Creek (Washington/ Johnson Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	15	X	3	3
Rocky Creek (1)	Ga. Hwy. 130 to Little Rocky Creek (Toombs Co.)	Fishing	FC, DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	10	X	3	2

Rivers/Streams Not Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Criterion Violated	Potential Cause(s)	Actions to Alleviate	Miles	305(b)	303(d)	Priority
ALTAMAHA RIVER BASIN									
Rocky Creek (1)	Little Rocky Creek to Ohoopee River (Toombs/ Tattnall Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	11	X	3	2
Swift Creek (1)	Old Normantown Rd. to Pendleton Creek (Toombs Co.)	Fishing	FC, DO	M, UR	Lyons North WPCP in compliance with NPDES permit requirements. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	2
Tiger Creek (1)	Little Creek to Pendleton Creek (Montgomery/ Toombs Co.)	Fishing	FC, DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	16	X	3	2
Yam Grandy Creek (1)	D/S Crooked Creek (Emanuel Co.)	Fishing	DO, FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	2

Lakes/Reservoirs Not Fully Supporting Designated Uses

Lake Name (Data Source)	Location	Basin	Support Category	Water Use Classification	Criterion Violated	Potential Cause(s)	Acres Affected	305(b)	303(d)	Priority
Treutlen County PFA (Sand Hill Lake) (1)	Treutlen County	Altamaha	Partial Support	Fishing	FCG (Hg)	NP	166	X	4	3

All Estuarine Waters Support Designated Uses