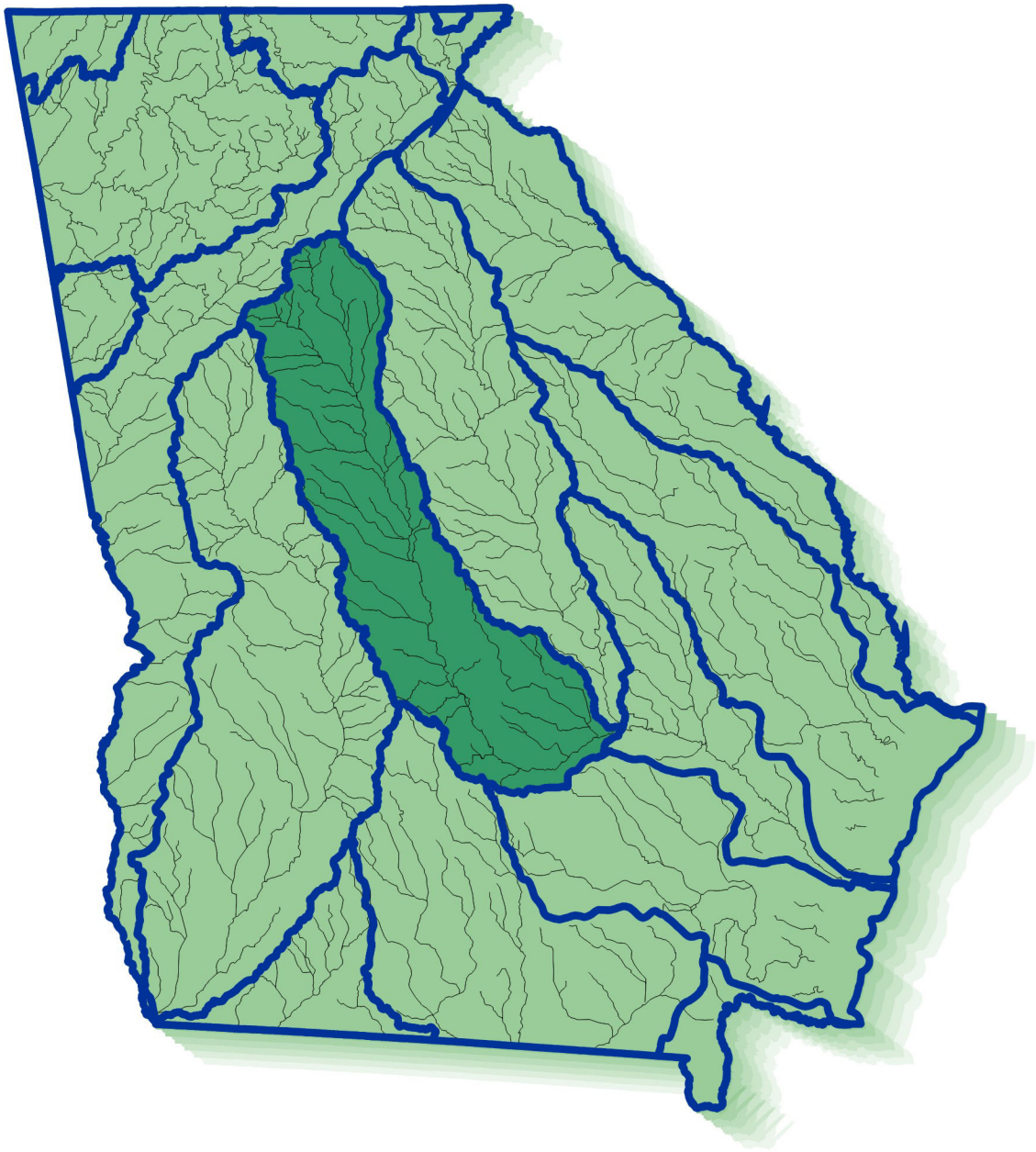
Ocmulgee River Basin Management Plan 2003



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.]

Ocmulgee 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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205 Butler Street, S.E.
Atlanta, Georgia 30334

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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 Ocmulgee 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 Ocmulgee River basin, describe the status of water quality and quantity in the Ocmulgee 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.

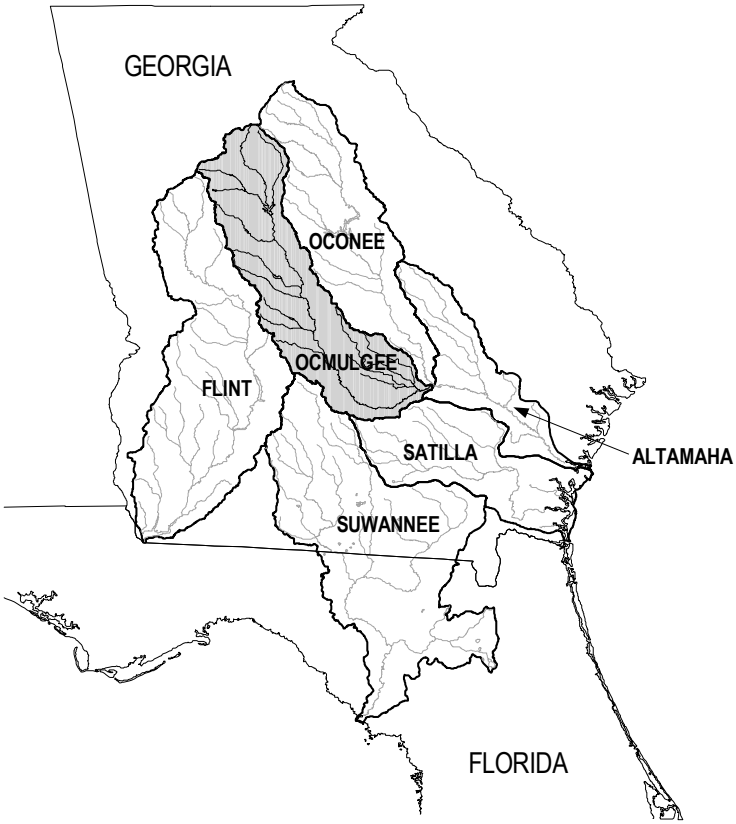
This Ocmulgee River Basin Management Plan includes strategies to address a number of different basinwide objectives. These include:

- 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 Ocmulgee River basin over the next five years. It contains useful information on the health of the Ocmulgee River basin and recommended strategies to protect the basin now and into the future.



Ocmulgee River Basin Characteristics

The Ocmulgee River basin is located in the central part of Georgia, occupying an area of approximately 6,085 square miles. The basin occupies parts of the Piedmont and Coastal Plain physiographic provinces, which extend throughout the southeastern United States. The Ocmulgee River joins the Oconee River to form the Altamaha River, which drains into the Atlantic Ocean.

Water Resources

The surface water resources of the basin are divided into three major watersheds or hydrologic units: the upper Ocmulgee River subbasin, the lower Ocmulgee River subbasin and the Little Ocmulgee River subbasin.

Biological Resources

The Ocmulgee River watershed crosses four major land resource areas including the Southern Piedmont, the Southern Coastal Plain, the Carolina and Georgia Sand Hills and the Black Lands 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 Ocmulgee River basin include portions of metropolitan Atlanta in the upper portion of the basin and Macon in the central portion of the basin. The population is expected to increase at an average growth rate through 2050.

More than 54 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 Ocmulgee basin includes part or all of 30 Georgia counties. These counties are members of seven different Regional Development Centers.

Water Quantity Conditions

Surface water supplies in the basin include water in rivers, ponds, and reservoirs. Surface water is the primary source in the Piedmont province, while within 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 Ocmulgee River basin has increased over the last two decades and is expected to increase significantly in the future.

Water Quality Conditions

The major environmental stressors that impair or threaten water quality in the Ocmulgee 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 Ocmulgee basin.

Point Sources

Point sources are defined as the permitted discharges of treated wastewater to river 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 26 permitted major municipal treated wastewater discharges with flows greater than 1 MGD in the Ocmulgee River basin. There are also 37 minor public discharges. EPD monitors compliance of these permits and takes appropriate enforcement action for violations. As of the 2000-2001 water quality assessment, there were no stream segments identified in which municipal discharges contributed to a failure to support designated uses.

Industrial and federal discharges. There are a number of industrial and federal treated wastewater dischargers in the basin including 4 major and 44 minor facilities. As of the 2000-2001 water quality assessment, there were two stream segments (18 miles) identified in which industrial discharges contributed to a failure to support designated uses.

Permitted stormwater discharges. Urban stormwater runoff in the Ocmulgee 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 Ocmulgee 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 Ocmulgee 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 fecal coliform bacteria followed by biota impacts, dissolved oxygen and fish consumption issues.

Key Environmental Stressors

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

Fecal coliform bacteria. The 2000-2001 water quality assessments indicated that fecal coliform bacteria was the most commonly listed 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.

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.

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 Ocmulgee River and its tributaries.

Fish tissue contamination. Fish consumption issues for individual fish species are also a concern in the Ocmulgee 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, or PCBs from legacy sources.

Strategies for Water Supply

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

Strategies for Water Quality

Water quality in the Ocmulgee 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 Ocmulgee 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 Ocmulgee 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 Ocmulgee 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 Ocmulgee 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 Ocmulgee 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 Ocmulgee 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 Ocmulgee 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 Ocmulgee basin and commercial forestlands represent over 54 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 Total Maximum Daily Loads (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 Ocmulgee River Basin

This basin plan represents one step in managing the water resources in the Ocmulgee 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 Ocmulgee River basin plan is planned for 2007.

In This Section

Introduction

What Is the Purpose of This Plan?

This document presents Georgia's river basin management plan for the Ocmulgee 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 Ocmulgee River basin characteristics, describe the status of water quality and quantity in the Ocmulgee 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 Ocmulgee 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 Ocmulgee River (Figure 1-1). Under the RBMP approach, the Ocmulgee River plan will be updated every five years.

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 Ocmulgee 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 Ocmulgee River basin, opportunities for stakeholder involvement, and a description on 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, current, 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., National Pollutant Discharge System (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.

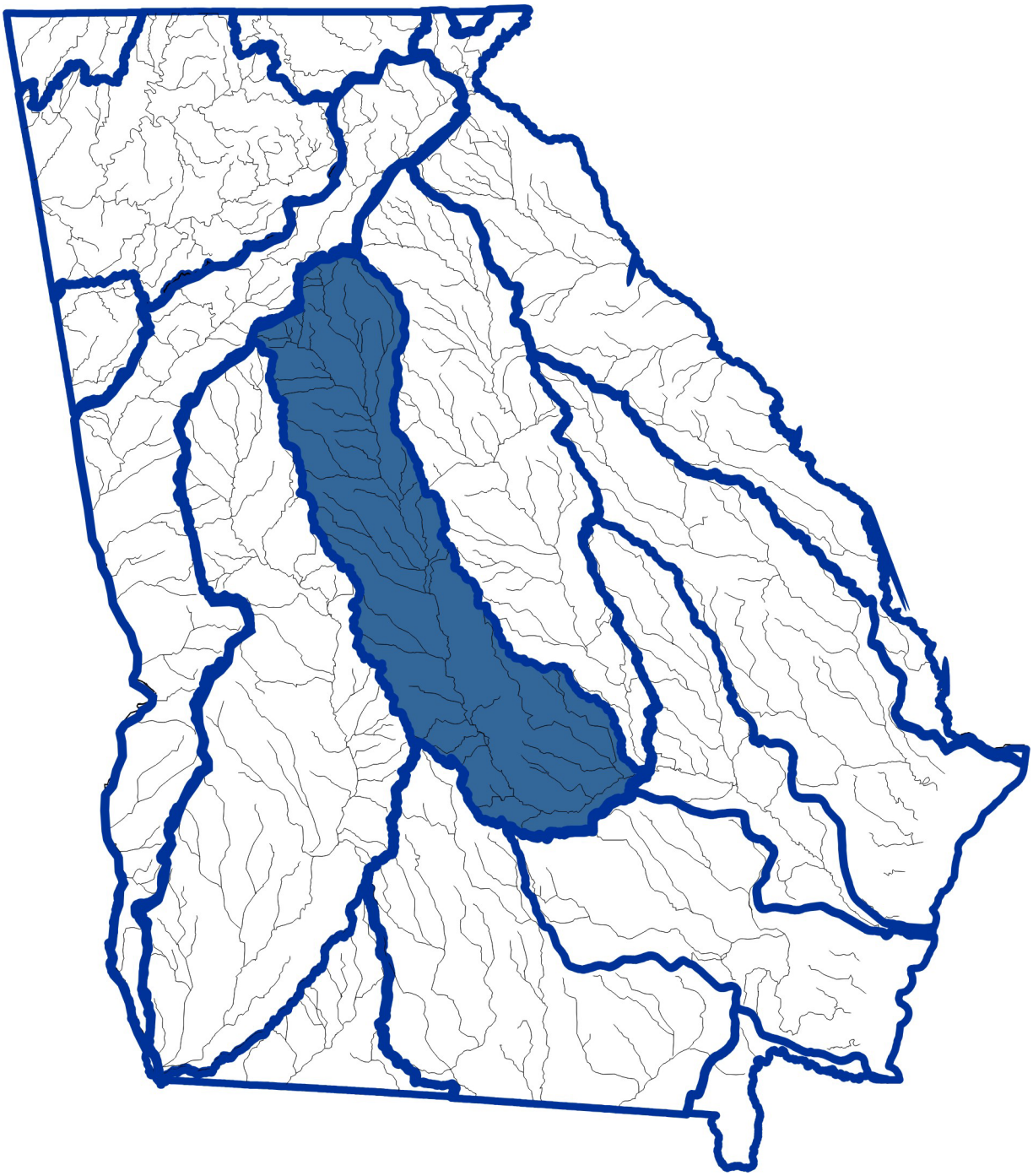


Figure I-1. The Ocmulgee River Basin

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 Ocmulgee River basin. It contains useful information on the health of the Ocmulgee 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 Ocmulgee basin.

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

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

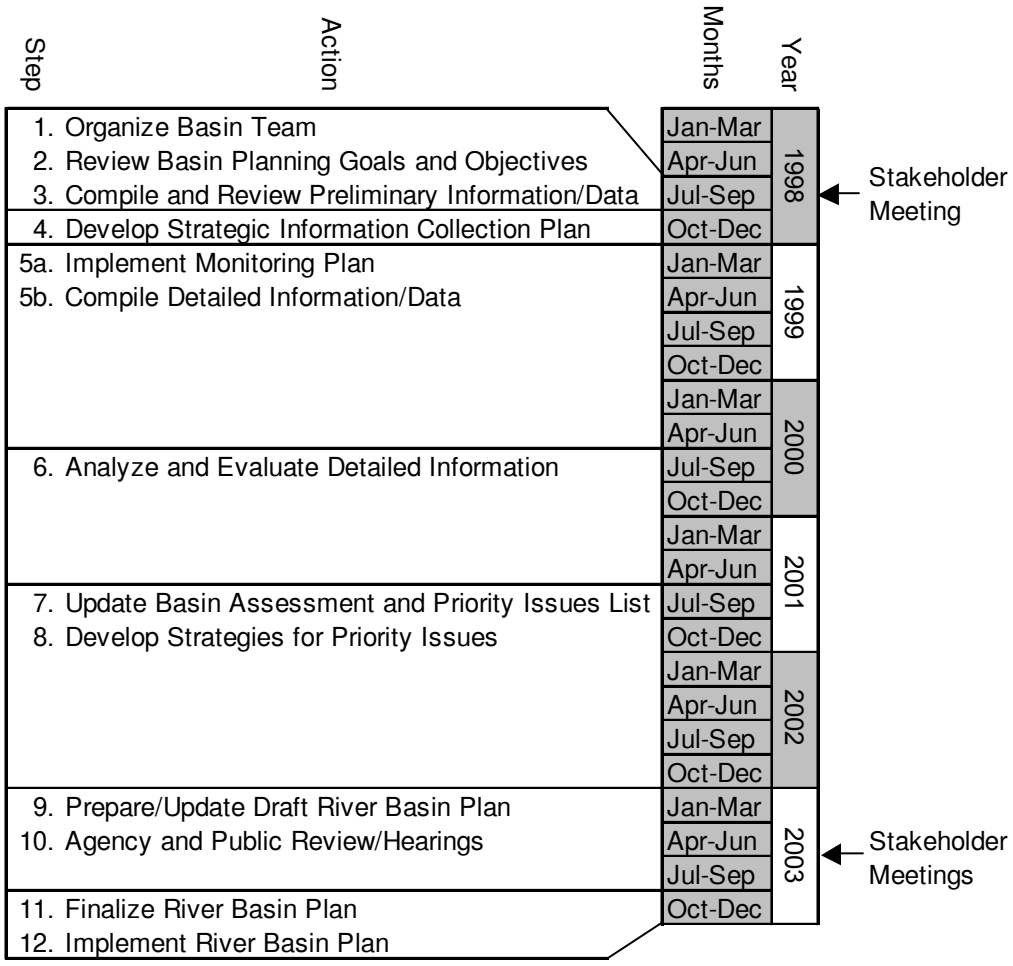


Figure I-2. Ocmulgee River Basin Planning Schedule, Ist Cycle, 1998-2003

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

Figure I-3. Ocmulgee 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. Stakeholders are encouraged to support and provide input to the agency that represents their 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 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, land-owners, 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 Ocmulgee 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 Ocmulgee basin RBMP cycle. EPD hosted an initial stakeholder meeting in Macon, Georgia in late 1998 to invite and encourage stakeholder input early in the planning process for the Ocmulgee River basin. Focused monitoring in the Ocmulgee 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 Ocmulgee 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 I-I. Ocmulgee River Basin Local Advisory Committee Members

Ms. Linda Castleberry Georgia Power Company Bin 10221 241 Ralph McGill Boulevard, N.E. Atlanta, Georgia 30308	Ms. Margo Howse DeKalb County Public Works Department Water and Sewer Division 1580 Roadhaven Drive Stone Mountain, Georgia 30083	Mr. Humber Ingram P.O. Box 4201 Eatonton, Georgia 31024
Mr. Robin W. Morton Dry Branch Kaolin Company Route 1, Box 468D Dry Branch, Georgia 31020	Mr. David P. Muse P.O. Box 35 2128 Hwy 341 North Perry, Georgia 31069	Mr. John Thomas Rocker Middle Georgia Timber P.O. Box 4030 Eatonton, Georgia 31024
Mr. Tony Rojas Executive Director Macon Water Authority P.O. Box 108 Macon, Georgia 31202	Atlanta Regional Commission 40 Courtland Avenue Atlanta, Georgia 30303	McIntosh Trail RDC Post Office Box 818 120 North Hill Street Griffin, Georgia 30224-0801
Heart of Georgia-Altamaha RDC 5405 Oak Street Eastman, Georgia 31023	Northeast Georgia RDC 305 Research Drive Athens, Georgia 30605	Middle Georgia RDC 175-C Emery Highway Macon, Georgia 31201

What's Next?

This draft plan will be reviewed by governmental partners, the Ocmulgee 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

River Basin Characteristics

This section describes the following major characteristics of the Ocmulgee 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 Ocmulgee River basin.

The physical characteristics of the Ocmulgee 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 Ocmulgee River basin is located in the Piedmont and Coastal Plain physiographic provinces of central Georgia. The Ocmulgee basin is flanked by the Flint River basin to the west, the Suwannee and Satilla River basins to the south, and the Oconee River basin to the east (Figure 2-1). The headwaters of the basin are located in DeKalb and Gwinnett Counties and consist of the Alcovy, Yellow, and South Rivers that drain the eastern and southeastern Metropolitan Atlanta area. These rivers, which join at Jackson Lake west of Monticello, Georgia, form the present-day Ocmulgee River. The Ocmulgee River continues in a generally southerly direction until it swings eastward north of Ben Hill

County, converges with the Little Ocmulgee River at Lumber City in Telfair County, and about eight miles farther downstream joins the Oconee River to form the Altamaha River. South of Jackson Lake, the Towaliga River and several large creeks including Tobesofkee, Echeconnee, and Big Indian Creeks join the Ocmulgee River. The Ocmulgee River basin is located entirely in the State of Georgia and drains approximately 6,085 square miles.

The U.S. Geological Survey (USGS) has divided the Ocmulgee River basin into three 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 Ocmulgee River basin. Figure 2-2 shows the location of these subbasins and the associated counties within each subbasin.

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

03070103	Upper Ocmulgee River Subbasin
03070104	Lower Ocmulgee River Subbasin
03070105	Little Ocmulgee River Subbasin

2.1.2 Climate

Mild winters and hot summers characterize the Ocmulgee River basin. Mean annual precipitation ranges from 40 to 52 inches per year. Precipitation occurs chiefly as rainfall, and to a much lesser extent in the upper portion of the basin, as occasional snowfall. Rainfall is fairly evenly distributed throughout the year, but a distinct dry season 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 Ocmulgee River basin occupies parts of the Piedmont and Coastal Plain physiographic provinces, which extend throughout most of the southeastern United States. Similar to much of the Southeast, the basin's physiography reflects a geologic history of mountain building in the Appalachian Mountains and long periods of repeated land submergence and emergence in the 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. The northernmost part of the Ocmulgee River basin is within the Piedmont Province where the headwaters arise. The Piedmont province is underlain by local Precambrian and abundant Paleozoic crystalline rocks that include metamorphosed sedimentary and volcanic rocks (e.g., mica schist, felsic and mafic gneiss and schist, quartzite and marble), metamorphosed igneous rocks such as granite gneiss and metagabbro and post-tectonic igneous plutons of granitic composition. Mesozoic diabase dikes that crosscut the older crystalline Piedmont rocks are the youngest crystalline component of the province. The Piedmont contains numerous inactive fault zones and joint patterns within the rocks. These structures locally dictate the surface stream patterns and groundwater resources. The crystalline rocks typically are overlain by a generally porous, residual material known as saprolite. Saprolite is produced by the *in situ* chemical weathering of bedrock.

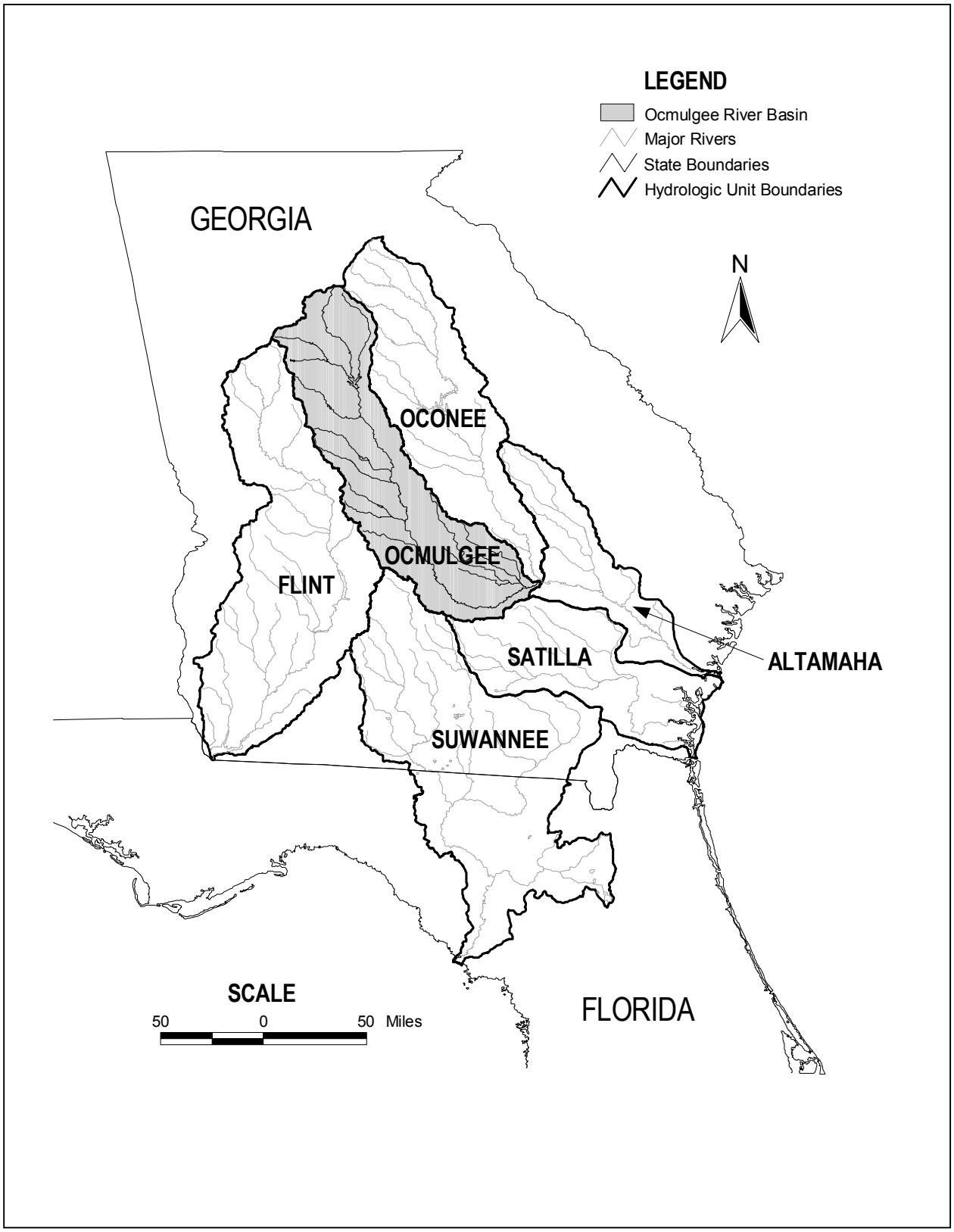


Figure 2-I. Location of the Ocmulgee River Basin

Saprolite retains the original texture of the parent rock although many of the constituent minerals (e.g., feldspars and amphiboles) are altered to clays thus destroying the original integrity of the rock.

The Fall Line unconformity is the boundary between the Piedmont and Coastal Plain provinces. This boundary is the contact between older crystalline metamorphic and igneous rocks of the Piedmont Province and the younger unconsolidated Cretaceous and Tertiary sediments of the Coastal Plain Province. As implied by the name, streams flowing across the Fall Line can undergo abrupt changes in gradient, which are marked by the presence of falls, rapids, and shoals. Geomorphic characteristics of streams differ between the Piedmont and Coastal Plain provinces. Coastal Plain streams typically lack the riffles and shoals common to Piedmont streams, and they exhibit greater floodplain development and increased sinuosity.

Geology

The northernmost part of the basin is within the Piedmont Province. This province constitutes almost 49 percent of the Ocmulgee River basin and is underlain by crystalline metamorphic and igneous rocks. The metamorphic rocks originally were sedimentary, volcanic, and plutonic igneous rocks that have been altered by several stages of regional metamorphism as well as several episodes of granite intrusion. A large portion of the exposed rocks of the Ocmulgee River basin consists of several types of gneisses and granites. The gneisses include several varieties of biotite gneiss, felsic gneiss, granite gneiss, and amphibolite gneiss. Granites include medium-grained to coarse, porphyritic varieties. Other rock types found in the basin include metasedimentary schists and phyllites.

Coastal Plain sedimentary strata underlie approximately 51 percent of the Ocmulgee River basin. Approximately 80 percent of the Coastal Plain sediments in the basin are sands and clays derived from Upper Cretaceous to Miocene strata. The rest include calcareous sediments and Quaternary alluvium. Coastal Plain sediments overlap the igneous and metamorphic rocks of the southern edge of the Piedmont Province at the Fall Line. Coastal Plain sediments nearest to the Fall Line are Cretaceous to Eocene in age. These sediments are dominantly terrestrial to shallow marine in origin and consist of sand, kaolinitic sand, kaolin, and pebbly sand. They host the major kaolin deposits in Georgia, and some of these deposits are found within the Ocmulgee River basin.

Much of the southeastern Piedmont is covered by chemically weathered bedrock called saprolite. Saprolite retains the original texture of the parent rock although many of the constituent minerals (e.g., feldspars and amphiboles) are altered to clays thus destroying the original integrity of the rock. Average saprolite thickness in the Piedmont rarely exceeds 20 meters, but the thickness can vary widely within a short distance. A considerable amount of groundwater flows through the saprolite and recharges streams in the Piedmont. Saprolite is easily eroded when covering vegetation and soil are removed. Predominant soil types in the Piedmont are sandy loam clay to fine sandy loam. South of the Fall Line, soils are loamy sand, sandy loam, and sand. Sandy loam and clay to sand soils cover the rest of the Coastal Plain sediments within the Ocmulgee River basin. Extensive erosion of soil and saprolite caused by 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 conservation practices stabilized erosion, streams began to reestablish grade and cut into the thick accumulations of sediments, remobilizing them into the major rivers and eventually redepositing them into man-made reservoirs.

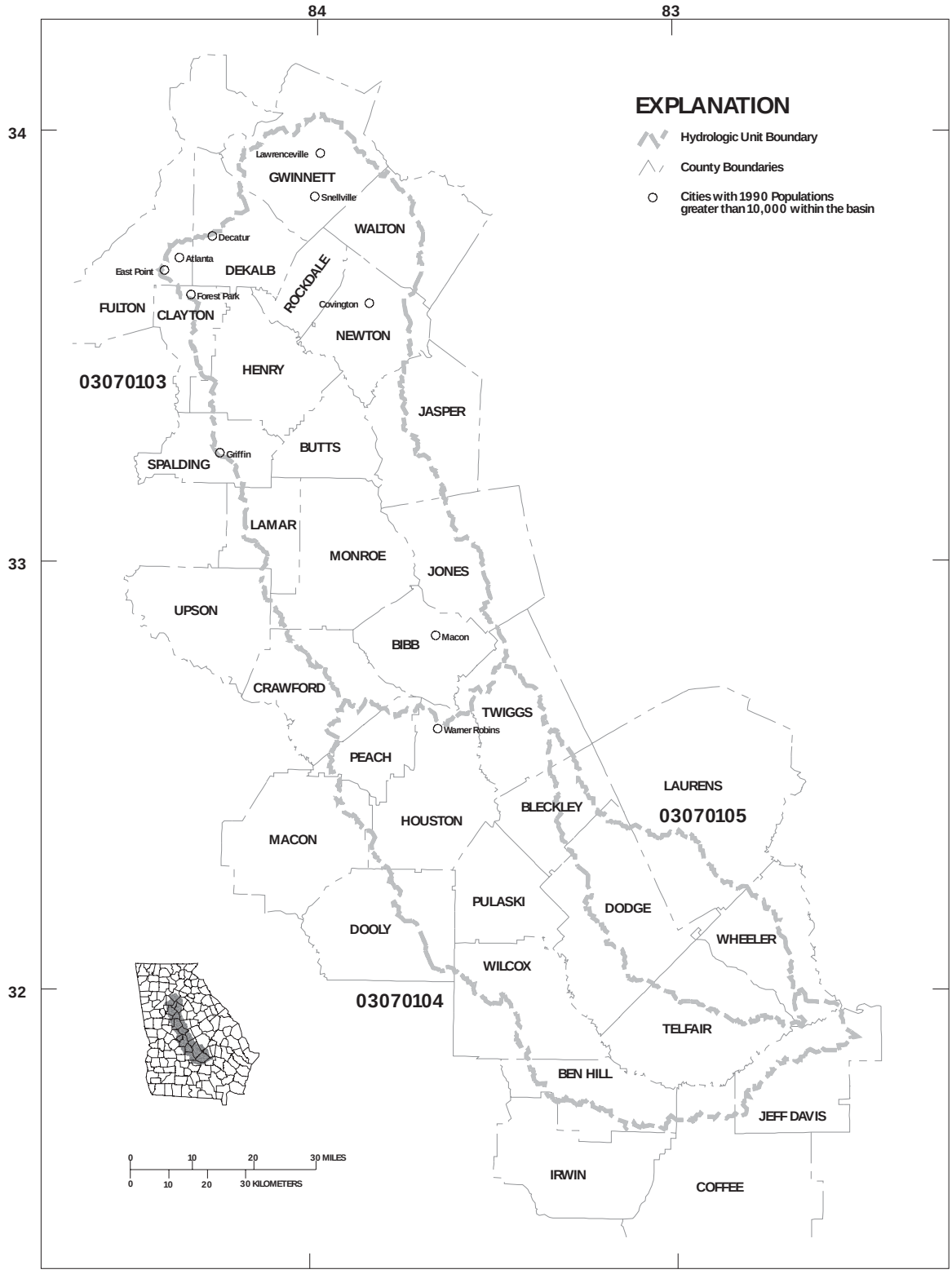


Figure 2-2. Hydrologic Units and Counties of the Ocmulgee River Basin

Soils

The Ocmulgee River watershed crosses four 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) flood plains become more prominent.

About 50 percent of the watershed is in the Southern Piedmont MLRA. Most of the soils in this region are very deep, well-drained, red, clayey soils that formed from felsic, high grade metamorphic or igneous parent materials. They are generally acidic, and the kaolinitic clays have low activity, which includes low cation exchange capacity (CEC) and low shrink-swell properties. Two groups of soils within this section of the watershed contrast with the dominant soils as just described. Near the northernmost part of the watershed is an area characterized by soils that are coarser in texture and shallower to bedrock than is typical for the Piedmont. Another group of contrasting soils is mostly in the southern end of the Piedmont region of the watershed, but smaller areas are also in the northwest area. These soils developed from mafic parent materials and consequently, are less acid and have higher activity clays than is typical for the Piedmont.

About 5 percent of the watershed is in the Carolina and Georgia Sand Hills MLRA. Soils in this area formed primarily in sandy and loamy marine sediments, which occasionally overly residual Piedmont materials. There are two major groups of soils in this area. One group consists of deep sands ranging from 40 to more than 80 inches deep. The other group consists primarily of soils that have sandy surface and subsurface layers and a loamy subsoil, often exhibiting dense and brittle properties. The dominant soils in this part of the watershed have 40 to 60 inches of sandy materials overlying a loamy subsoil.

About 45 percent of the watershed is in the Southern Coastal Plain MLRA. Soils in this part of the watershed are generally more variable than in other parts, particularly with regards to sand and clay content and wetness. The northern section of the Coastal Plain 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 soils, except in depressions and along flood plains. The southern part of the Coastal Plain is more variable. Upland areas are dominated by yellow and brown, well-drained soils that have sandy surface and subsurface layers and a loamy subsoil. Many of these soils have a perched water table at various depths during wet seasons. There are areas of wetter soils scattered throughout this area. A significant area of sandier soils occurs near the Ocmulgee River, especially along the eastern side of the flood plain.

Contained within the Southern Coastal Plain MLRA section of the Ocmulgee River watershed is a small MLRA called Black Lands. This area comprises less than 1 percent of the watershed. This area contains irregular outcroppings of marl deposits. Associated soils usually consist of acid clays overlying the calcareous marl. These soils generally have higher clay content and more active clays than is typical for the region.

2.1.4 Surface Water Resources

The major surface water resources of the Ocmulgee River basin are three major rivers and several large creeks that drain portions of the basin. The northern portion of the basin contains the Alcovy, Yellow, and South Rivers that form the headwaters for the Ocmulgee River basin. The confluence of these streams occurs at Jackson Lake west of Monticello, Georgia. About 13 miles below the confluence, the Towaliga River joins the Ocmulgee River. The southern portion of the basin includes the Little Ocmulgee River

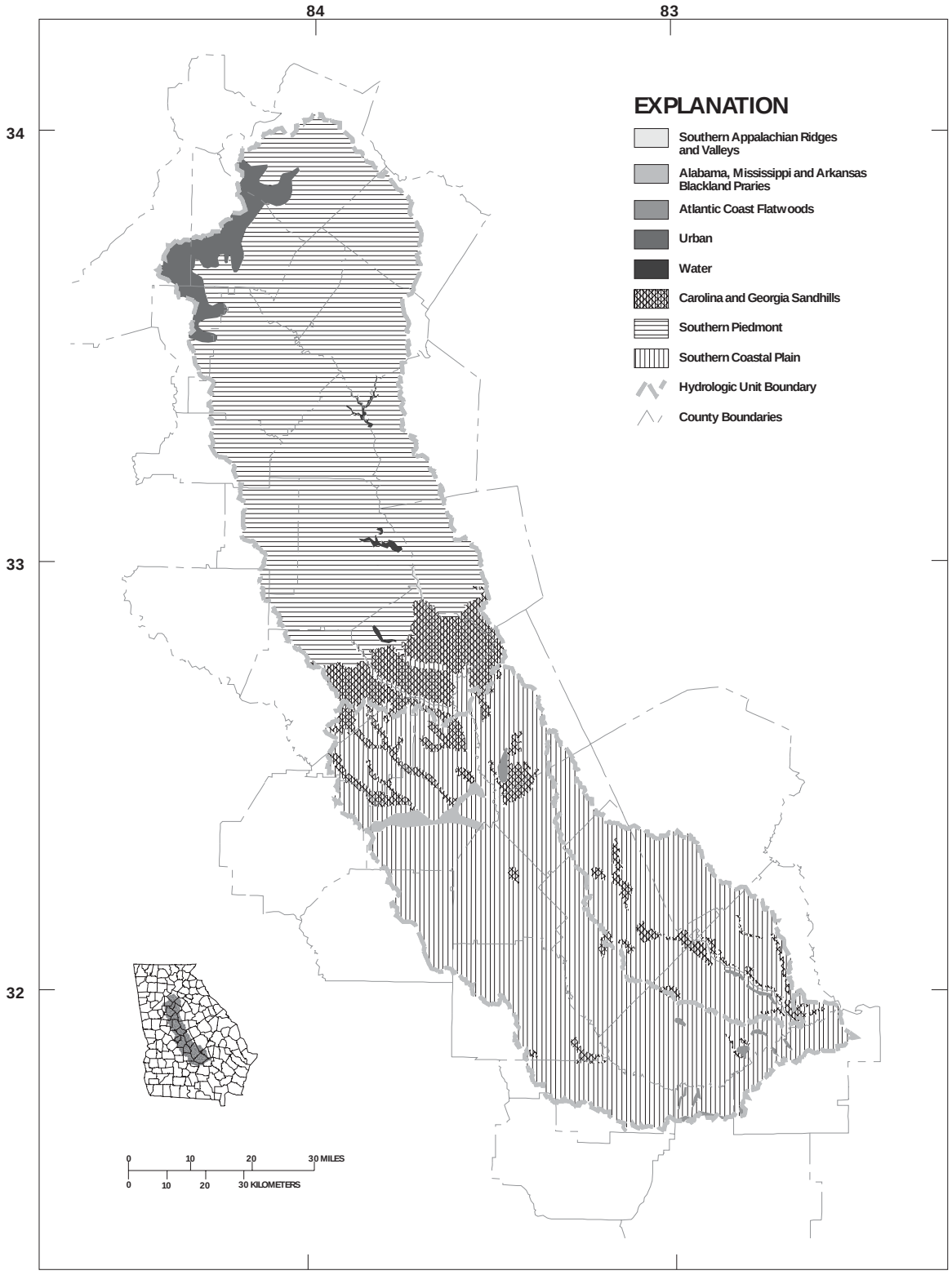


Figure 2-3. Major Land Resource Areas in the Ocmulgee River Basin

drainage area. The Little Ocmulgee and the Ocmulgee Rivers merge about 8 miles upstream of the Ocmulgee-Oconee River confluence at the western end of the Altamaha River basin. Stream networks within each HUC are shown in Figures 2-4 through 2-6.

2.1.5 Groundwater Resources

The Ocmulgee River basin contains a dynamic hydrological system that includes interactions between aquifers, streams, reservoirs, floodplains, and estuaries. Many principal rivers receive a substantial contribution of water from groundwater baseflow during dry periods. Three major aquifer systems, including the Piedmont crystalline rock aquifer and two Coastal Plain aquifers, underlie the Ocmulgee River basin. These aquifers are described below. The Coastal Plain aquifers are generally separated by confining units, and the Piedmont aquifer is typically unconfined.

Piedmont Province – Crystalline Rock Aquifer

The Piedmont province section of the Ocmulgee River basin is underlain by bedrock consisting primarily of granite, gneiss, schist, and quartzite. These rock formations make up the crystalline rock aquifer, which is generally unconfined. Igneous and metamorphic rocks are generally less permeable than coarse-grained or calcareous sedimentary rocks such as weakly cemented sandstone and limestone, respectively. Thus, where groundwater is present, it is stored in rock fractures and a mantle of soil and saprolite (i.e., chemically decomposed rock) and transmitted to wells via fractures, faults, foliations, or other geologic discontinuities (such as compositional layering) in the bedrock. Well yields in this aquifer tend to be unpredictable and highly variable. Typical well yields are 1 to 25 gallons per minute, though systematic well-siting techniques can produce high-yielding wells (greater than 100 gallons per minute). Currently, the crystalline rock aquifer is used primarily for domestic water supply and livestock watering. It is commonly believed that groundwater in the Piedmont part of Georgia is not sufficient to supply such uses as municipal supplies and industry, although several municipalities and industries use groundwater to augment local surface-water resources.

Because groundwater is transmitted through faults and fractures, each surface water drainage basin or watershed is also a groundwater drainage basin or watershed; surface and groundwater are in such close hydraulic interconnection that they can be considered as a single and inseparable system. In the Piedmont, the saprolite that holds groundwater may also contain considerable clay and may act locally as a barrier to groundwater pollution. The Piedmont section of the Ocmulgee River basin is generally ranked as having below-average pollution susceptibility.

The Coastal Plain portion of the Ocmulgee River basin contains two distinct aquifer systems, which are described below.

Coastal Plain Province – Cretaceous Aquifer System

The Cretaceous aquifer system is the deepest of the principal aquifers in South Georgia. Cretaceous units crop out immediately below the Fall Line. The principal water-bearing formation is the Providence Sand of Late Cretaceous Age. Older Cretaceous strata generally are too deep to be economically developed (Couch et al., 1995). The Cretaceous aquifer system serves as a major source of water in the northern third of the Coastal Plain. The aquifer system consists of sand and gravel that locally contains layers

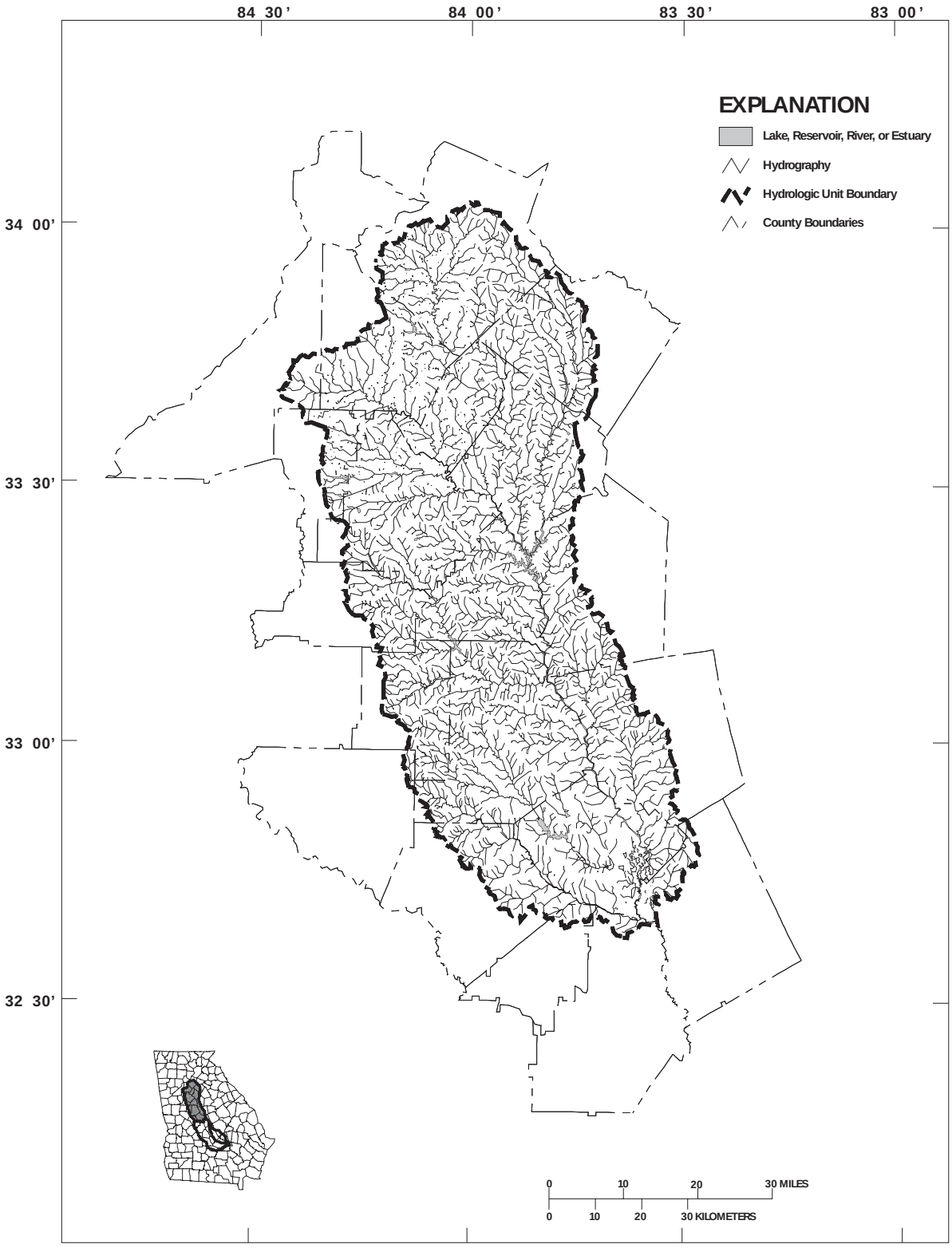


Figure 2-4. Hydrography, Ocmulgee River Basin, HUC 03070103

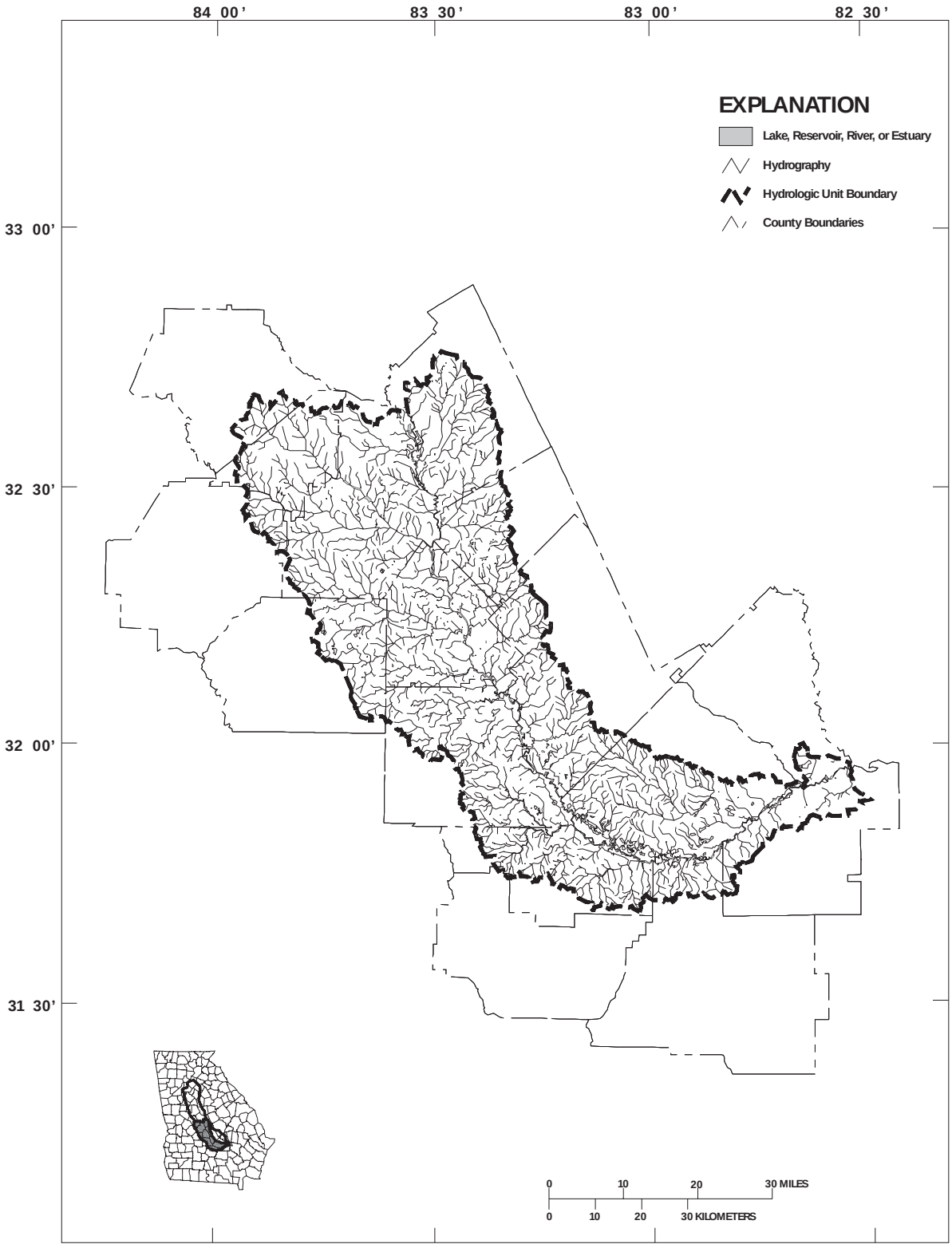


Figure 2-5. Hydrography, Ocmulgee River Basin, HUC 03070104

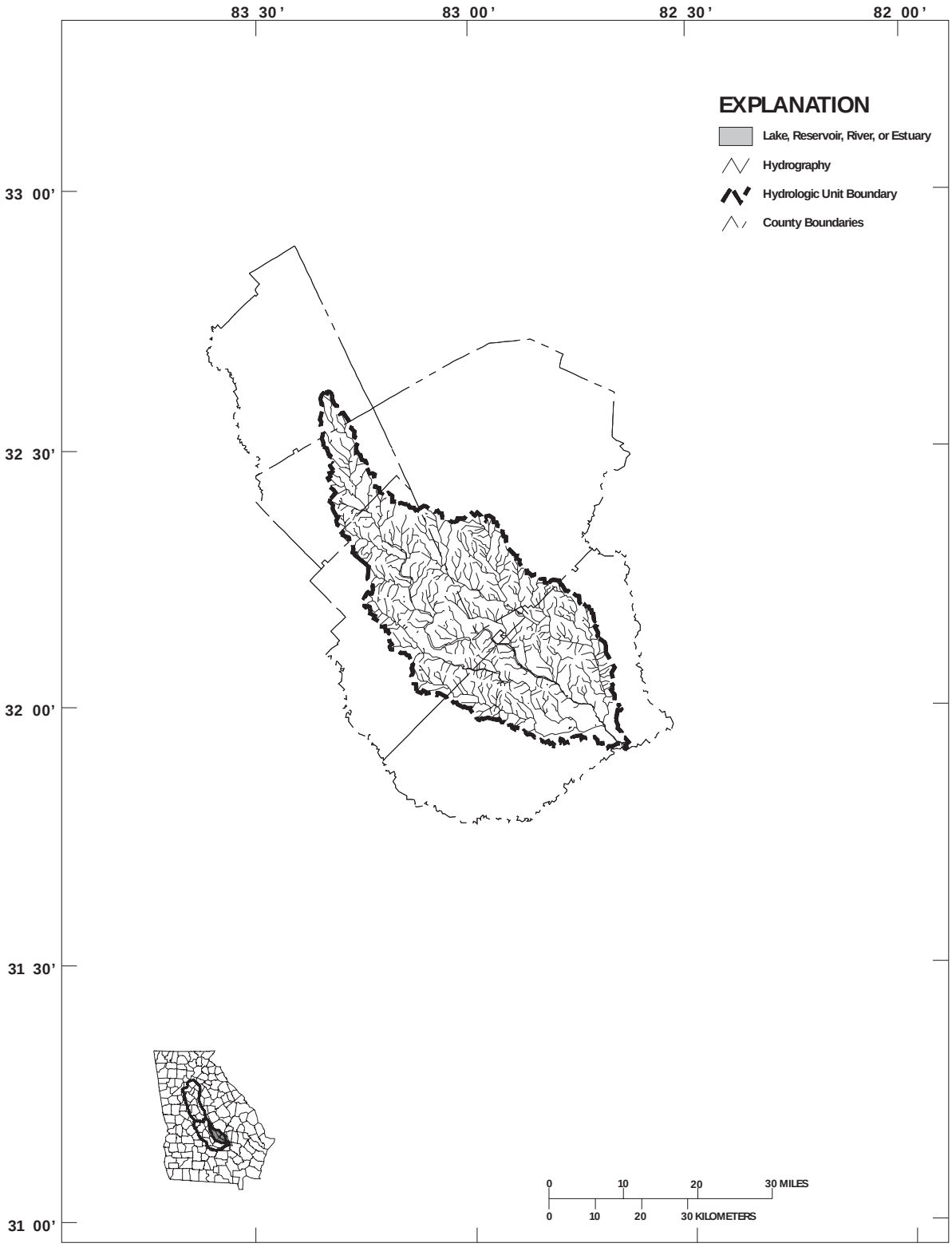


Figure 2-6. Hydrography, Ocmulgee River Basin, HUC 03070105

of clay and silt that function as confining beds. Wells in this aquifer typically yield between 50 and 1,200 gallons per minute.

Coastal Plain Province – Floridan Aquifer System

The Floridan aquifer system is one of the most productive groundwater reservoirs in the United States. This system supplies about 50 percent of the groundwater used in the state. It is a major water source throughout the Coastal Plain region of Georgia. 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 Coastal Plain portion of the Ocmulgee River basin. In the outcrop area between Twiggs and Wilcox Counties, rocks comprising the Floridan aquifer are mostly weathered to a clayey sand residuum that ranges from approximately 25 feet to 125 feet thick. The residuum is derived from the chemical weathering of the parent rock. The total thickness of the Floridan aquifer in the Ocmulgee basin ranges from a few tens of feet at its northern extent to more than 400 feet in the subsurface in extreme southern portions of the basin. Clastic grains of sand and shale are major components of the residuum of rocks comprising the Floridan aquifer near its northernmost extent. Throughout most of the southern part of the Ocmulgee basin, the Floridan aquifer consists of the Eocene Ocala Limestone and the Oligocene Suwannee Limestone.

2.1.6 Biological Resources

The Ocmulgee 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 Ocmulgee 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 of the Ocmulgee River basin lies in the Outer 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. The Ocmulgee River is a typical blackwater coastal stream, which is a result of tannins from decaying tree roots and other organic materials passing through the sandy soil and staining the water. However, unlike other black water rivers, the Ocmulgee has a high pH (near 7.0) due to a large input of carbonate-rich water from Magnolia Springs.

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 Ocmulgee 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 Ocmulgee River basin includes 105 species representing 21 different families (Evans 1991; P. Lanford, Georgia Department of Natural Resources, personal communication). The carp and minnow family, Cyprinidae, is the largest family in the basin with 27 species. Minnows are generally small fish and are very important to the aquatic food chain as food for larger fishes, reptiles, and birds. Carp grow larger and anglers occasionally seek them for food. The sunfish family, Centrarchidae, is the second largest family with 22 species. Many of its members and those in the catfish family, Ictaluridae, are highly prized by anglers. The Ocmulgee River basin contains 10 species of catfish. The sucker family, Catostomidae, contributes eight species to the overall fish fauna. Even though suckers are not highly sought by anglers, they are ecologically important because they often account for the largest fish biomass in Georgia streams. In the lower Ocmulgee River, suckers made up 42 percent of the total biomass in mainstream and 34 percent in slough samples (Coomer and Holder, 1980). According to the state list of protected fish species, the Ocmulgee River basin is home to one endangered species (Altamaha shiner, *Cyprinella xaenura*) and two rare species (goldstripe darter, *Etheostoma parvipinne*, and redeye chub, *Notropis harperi*).

Fishery

The Ocmulgee River offers excellent fishing for redbreast sunfish, bluegill, redear sunfish, largemouth bass, black crappie, and channel and flathead catfish. For example, the world record largemouth bass was caught in 1932 from Montgomery Lake, an oxbow lake on the Ocmulgee River in Telfair County. Anglers occasionally catch striped bass in the river. Stripers are usually associated with springs, which they use as cool water refuges. Therefore, protection of these springs is critical to the survival of striped bass in the summer months.

The largest tributary to the Ocmulgee River is the Little Ocmulgee River. It is home to many species of freshwater fish and offers good fishing for redbreast sunfish, bluegill, largemouth bass, catfish species, and chain and redfin pickerel.

The Fisheries Section of the Georgia Department of Natural Resources (DNR) operates several facilities within the river basin. Bowens Mill Fish Hatchery, located in Ben Hill and Wilcox counties, produces bluegill, redear sunfish, largemouth bass, channel catfish, and white x striped bass hybrids. Dodge County Public Fishing Area (PFA) contains an intensively managed 104-acre lake. This lake provides excellent fishing for largemouth bass, bluegill, redear sunfish, black crappie, and channel catfish. DNR is currently building another 106-acre public fishing lake (Ocmulgee PFA) in Bleckley and Pulaski counties.

Several other notable lakes and reservoirs are located within the Ocmulgee River basin and are listed in an upstream to downstream direction. Black Shoals Reservoir is a 650-acre reservoir constructed to meet the water supply needs of Rockdale County. Lake Varner is an 850-acre water supply reservoir in Newton County. Both lakes provide good fishing for largemouth bass, bream, crappie, and channel catfish.

Lake Jackson is a 4,750-acre impoundment located in Jasper, Butts, and Newton counties and is owned and operated by the Georgia Power Company. The Alcovy, South, and Yellow Rivers and Tussahaw Creek form Lake Jackson. With its 135 miles of shoreline, Lake Jackson is known as one of the better bream fishing lakes in middle Georgia. The lake also offers excellent fishing for black crappie, largemouth bass, spotted bass, white and channel catfish, and bullheads.

High Falls State Park Lake is a 650-acre lake operated by the Parks, Recreation, and Historic Sites Division of GA DNR. This lake produces good catches of crappie, bream, largemouth bass, catfish, white x striped bass hybrids, and white bass.

Lake Juliette, also known as Rum Creek, is a 3,600-acre Georgia Power Company reservoir impounded to provide cooling water for Plant Scherer's electric generating facility. This infertile reservoir with clear water, extensive aquatic plant beds, and areas of standing timber offers good fishing for redear sunfish, largemouth bass, and striped bass.

Lake Tobesofkee is a 1,750-acre reservoir near Macon operated by Bibb County. Lake Tobesofkee provides good fishing for white x striped bass hybrids, largemouth bass, channel catfish, and black crappie. The lake is also very popular with pleasure boaters, especially during the summer.

At least 15 species of exotic fish (Table 2-2), those not native to the river system, live within the Ocmulgee River basin (P. Lanford, Georgia Department of Natural Resources, personal communication). Many of these species are well established and are detrimental to native fish populations.

Table 2-2. Exotic fish species present in the Ocmulgee River Basin

Common name	Scientific name
Threadfin shad	*Dorosoma petenense*
Goldfish	*Carassius auratus*
Grass carp	*Ctenopharyngodon idella*
Blacktail shiner	*Cyprinella venusta*
Common carp	*Cyprinus carpio*
Flathead catfish	*Pylodictis olivaris*
White bass	*Morone chrysops*
Morone hybrids	*Morone sp.*
Green sunfish	*Lepomis cyanellus*
Longear sunfish	*Lepomis megalotis*
Lepomis hybrids	*Lepomis sp.*
Shoal bass	*Micropterus cataractae*
Spotted bass	*Micropterus punctulatus*
White crappie	*Pomoxis annularis*
Yellow perch	*Perca flavescens*

2.2 Population and Land Use

2.2.I Population

As of 1995, about 605,200 people lived in the Ocmulgee watershed (DRI/McGraw-Hill, 1996). Population distribution in the basin at the time of the 1990 census is shown by census blocks in Figure 2-7. The major population centers in the Ocmulgee watershed include the development surrounding the eastern portions of metropolitan Atlanta in the upper portion of the basin and around Macon in the central portion of the basin.

Between 1975 and 1995, the population in the Ocmulgee River basin increased by 1 percent per year (DRI/McGraw-Hill, 1996). Basin population is projected to increase at an average growth rate through 2050.

2.2.2 Land Cover and Use

Land use/land cover classification was determined for the Ocmulgee River basin based on high-altitude aerial photography for 1972-1976 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 1988-90 land cover interpretation showed 62.8 percent of the basin in forest cover, 9.9 percent in wetlands, 3.3 percent in urban land cover, and 23.3 percent in agriculture (Figures 2-8 through 2-10). Statistics for 15 landcover classes in the Georgia portion of the Ocmulgee River basin for the 1988-90 coverage are presented in Table 2-3 (GA DNR, 1996).

Table 2-3. Land Cover Statistics for the Ocmulgee Basin

Class Name	Percent	Acres
Open Water	1.0%	37,855
Clear Cut/Young Pine	9.0%	349,144
Pasture	10.2%	396,593
Cultivated/Exposed Earth	13.0%	503,605
Low Density Urban	2.5%	98,098
High Density Urban	0.8%	31,120
Emergent Wetland	0.2%	6,728
Scrub/Shrub Wetland	1.4%	54,100
Forested Wetland	8.2%	320,459
Coniferous Forest	17.8%	692,414
Mixed Forest	20.6%	798,619
Hardwood Forest	15.4%	596,916
Salt Marsh	0.0%	0
Brackish Marsh	0.0%	0
Tidal Flats/Beaches	0.0%	0
Total	100.0%	3,885,650

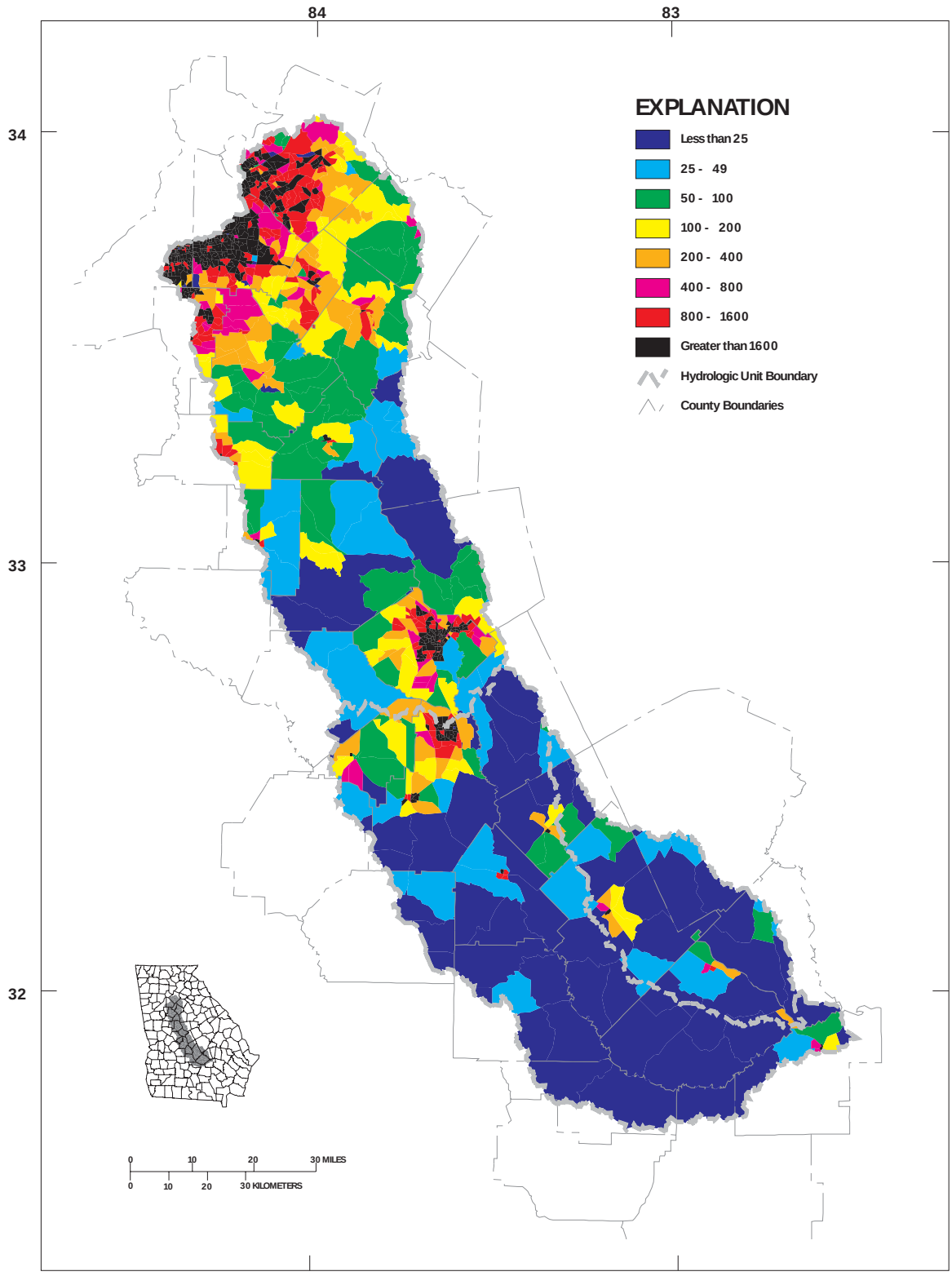


Figure 2-7. Population Density in the Ocmulgee River Basin (persons per square mile)

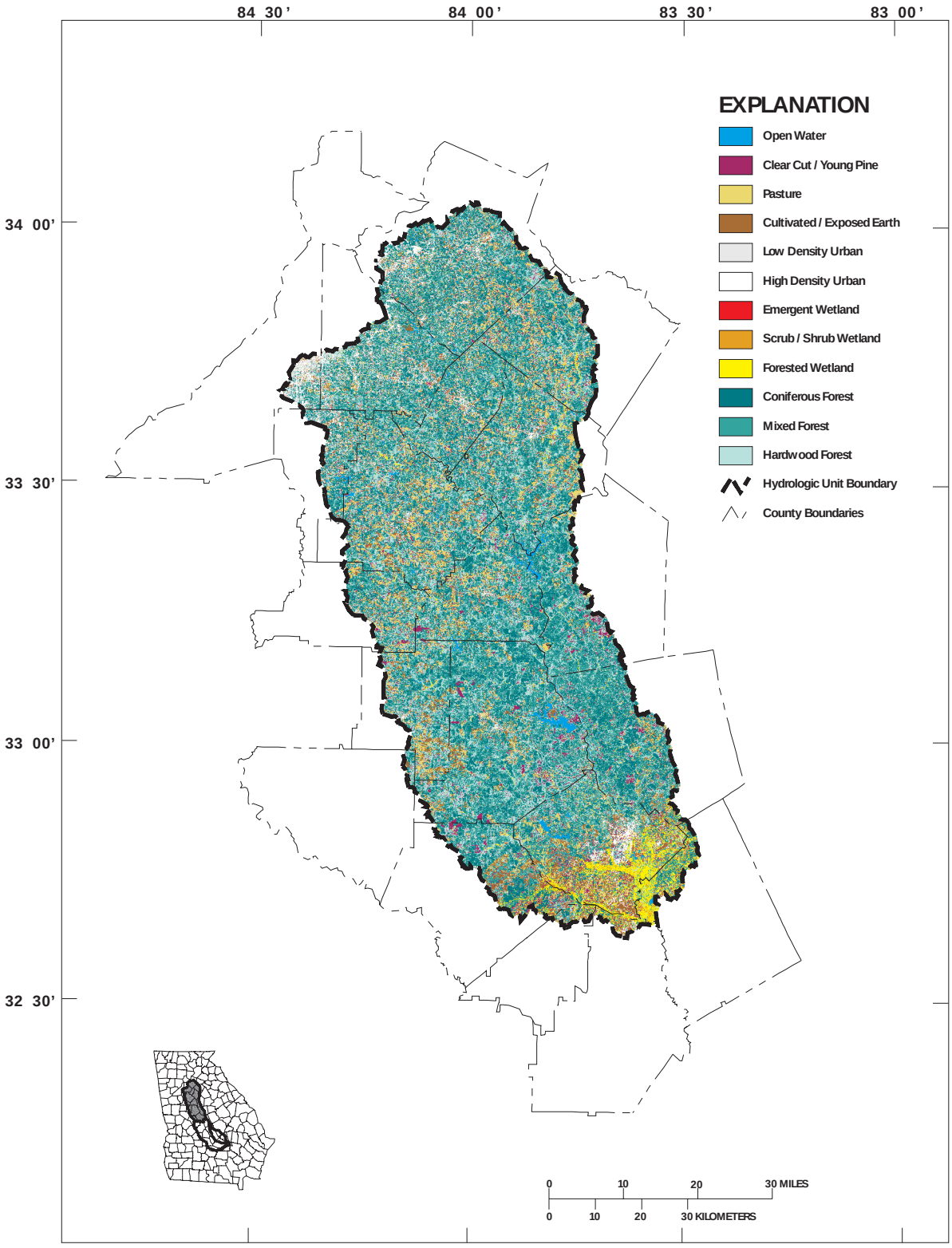


Figure 2-8. Land Cover 1990, Ocmulgee River Basin, HUC 03070103

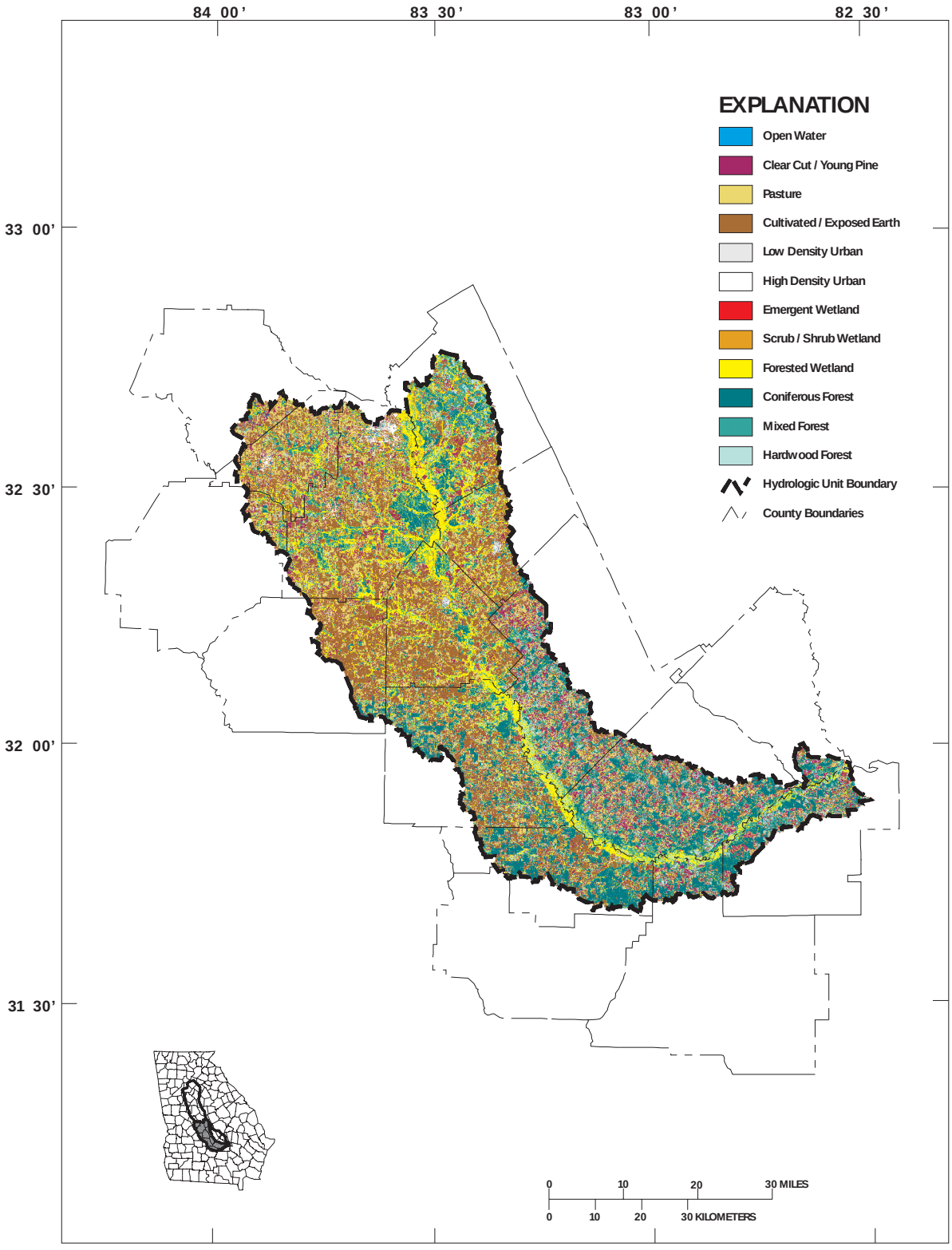


Figure 2-9. Land Cover 1990, Ocmulgee River Basin, HUC 03070104

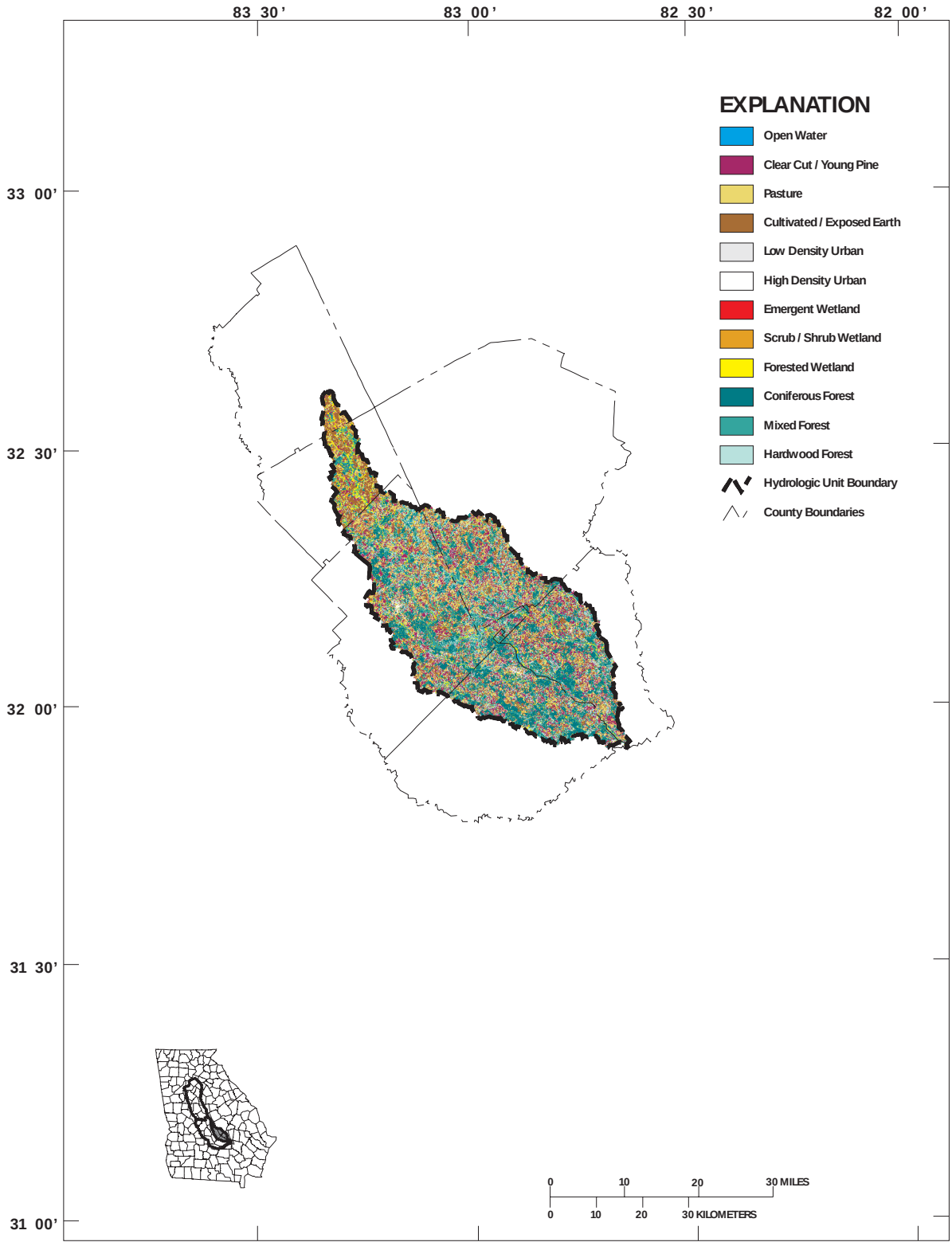


Figure 2-10. Land Cover 1990, Ocmulgee River Basin, HUC 03070105

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, and other products. Statewide, the forest industry output for 2002 grew to approximately $30.5 billion dollars. 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 dollars. Georgians are benefited directly by 177,000 job opportunities created by the manufacture of paper, lumber, furniture and various other wood products as well as benefiting the consumers of these 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 4,188,700 acres of commercial forest land contained in the entire counties that are within the basin representing approximately 60.45 percent of the total land area. Private landowners account for 82 percent of the commercial forest ownership while the forest industry companies account for 14 percent. Governmental entities account for about 4 percent of the forestland. Figure 2-11 depicts silvicultural land use in the Ocmulgee basin. Forestry acreage in the Ocmulgee River basin is summarized in Table 2-4.

There were approximately 75,300 acres classified as non-stocked in the 1997 survey but still remained in forestland.

For the period from 1982 to 1997, for the entire counties within the basin, the area classified as commercial forestland decreased approximately 13,896 acres or 0.3 percent. The area classified as pine type decreased approximately 148,466 acres or 7 percent. The area classified as oak-pine type increased approximately 23,871 acres or 4.5 percent. The area classified as upland hardwood decreased approximately 17,349 acres or 1.8 percent, and the area classified as bottomland hardwood increased approximately 52,348 acres or 8.5 percent.

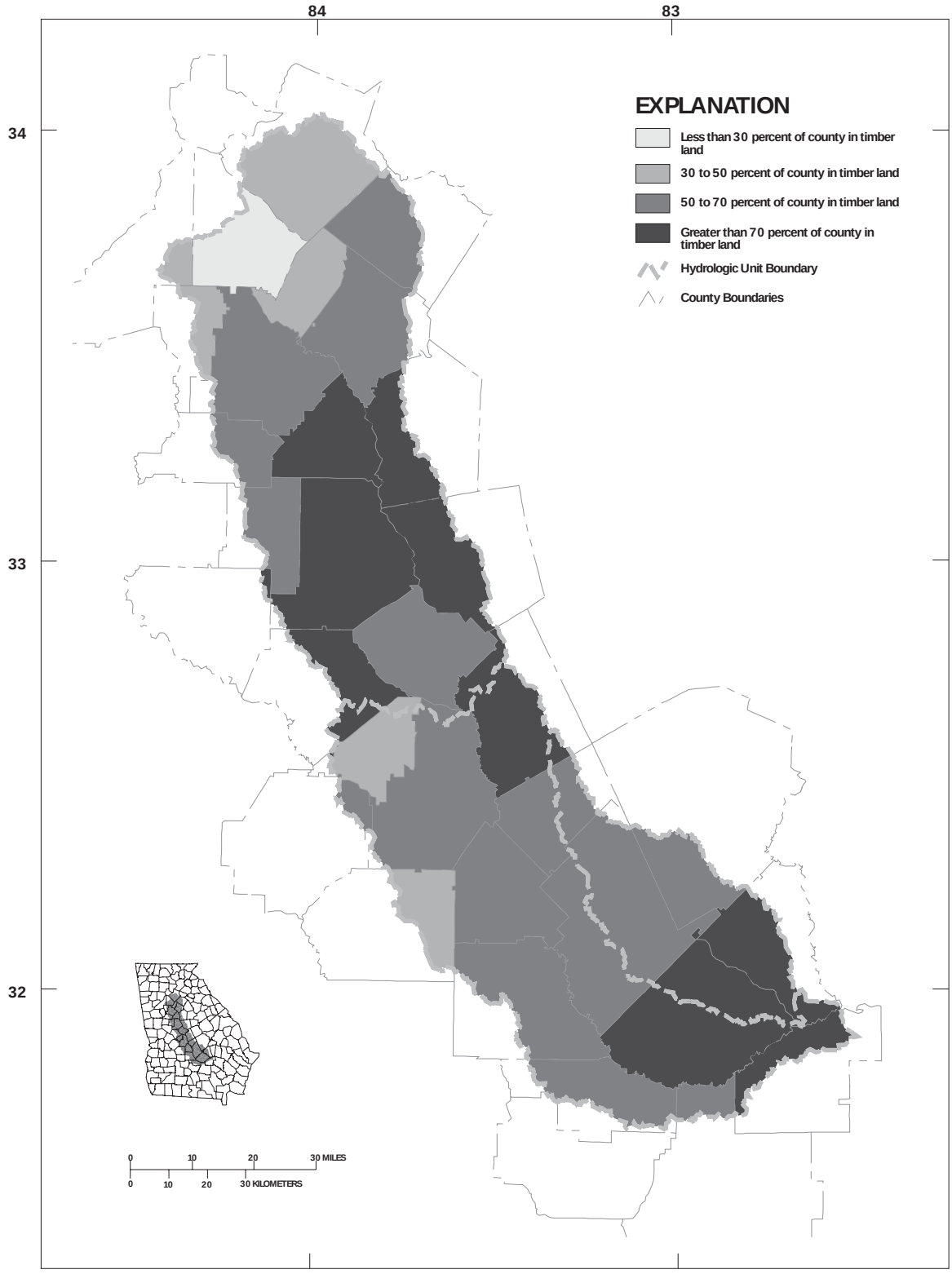


Figure 2-II. Silvicultural Land in the Ocmulgee River Basin

Table 2-4. Commercial Forest and Forest Type Acreage of Entire Counties in the Ocmulgee River Basin

County	Commercial Forest	Pine	Oak-pine	Upland Hardwood	Lowland Hardwood
Ben Hill	109,500	67,200	16,800	2,300	15,200
Bibb	87,100	44,600	11,000	16,200	15,200
Bleckley	78,600	38,200	5,100	15,400	20,000
Butts	83,300	39,500	9,000	34,500	200
Clayton	28,100	8,900	4,600	4,500	6,400
Coffee	240,900	137,900	30,400	8,800	53,000
Crawford	163,200	82,900	37,500	32,300	10,400
DeKalb	37,300	20,800	500	13,800	2,200
Dodge	204,700	103,100	22,800	28,200	46,300
Dooly	110,500	38,500	15,200	11,800	36,400
Fulton	123,800	51,900	9,800	52,700	8,600
Gwinnett	104,400	26,500	23,300	51,400	3,300
Henry	109,700	46,100	19,200	38,700	5,800
Houston	122,900	50,600	14,100	27,400	30,800
Jasper	190,700	97,100	15,500	69,800	7,600
Jeff Davis	151,600	101,100	20,400	4,900	20,300
Jones	210,700	135,300	37,600	25,500	10,100
Lamar	72,100	29,600	15,000	12,400	15,000
Laurens	312,200	153,400	20,000	62,500	74,300
Macon	154,800	57,900	14,300	46,300	36,300
Monroe	194,300	91,500	28,800	61,900	11,700
Newton	98,700	44,900	16,600	27,200	10,000
Peach	40,900	20,400	8,300	5,300	5,500
Pulaski	79,800	19,700	9,700	23,400	25,000
Rockdale	39,000	12,800	0	26,200	0
Spalding	66,900	17,800	21,500	18,600	6,800
Telfair	210,700	107,200	20,700	31,400	48,000
Twiggs	188,500	63,400	31,300	50,900	38,700
Upson	153,800	55,900	18,500	62,700	12,100
Walton	114,700	23,700	27,300	44,400	15,300
Wheeler	153,600	91,600	13,000	11,600	37,400
Wilcox	151,700	87,400	11,300	5,600	40,000
Total	*4,188,700*	*1,967,400*	*549,100*	*928,600*	*667,900*

Agriculture

Agriculture in the Ocmulgee River basin is a varied mixture of animal operations and relatively intensive commodity production. Agriculture land comprises some 19 percent of the land use within the basin.

Total farmland in the basin, approximately 728,831 acres (Figure 2-12), has declined steadily since 1982. Almost 45 percent of this farmland is in pasture. The remaining 55 percent is dedicated to growing cotton, peanuts, tobacco, and small grain (wheat, sorghum, soybean, millet). Commodity producers applied 98.54 million gallons per day to over 158,908 irrigated acres during 1998. Wilcox, Dodge, Irwin, and Pulaski Counties contain the larger 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 intense in the upper portions of the Ocmulgee River basin and is comparable with that of other river basins in the Piedmont MLRA. Approximately 109,960 head of cattle, 5,035 head of swine, and 9,238,041 broilers and layers are raised on animal operations in the basin (Table 2-5).

Table 2-5. Agricultural Operations in the Ocmulgee River Basin (data supplied by NRCS)

Element	HUC 03070103	HUC 03070104	HUC 03070105	Ocmulgee Basin Total
Number of Farms (1997)	2,063	1,605	650	4,318
Dairy Cattle (Head 2000)	3,723	3,249	88	7,060
Beef Cattle (Head 2000)	56,403	32,816	13,681	102,900
Hogs and Pigs (Head 2000)	2,221	1,859	955	5,035
Boilers (1997)	4,312,466	4,538,015	0	8,850,481
Layers (1997)	283,035	104,402	123	387,560
Irrigated Acres (1998)	6,432	125,181	27,295	158,908
Irrigated Water Use (MGD 1995)	6.11	75.21	17.21	98.54
Harvested Cropland (Acres 1997)	62,908	281,923	54,176	399,007
Total Farm Land (1997)	242,225	385,750	100,855	728,831

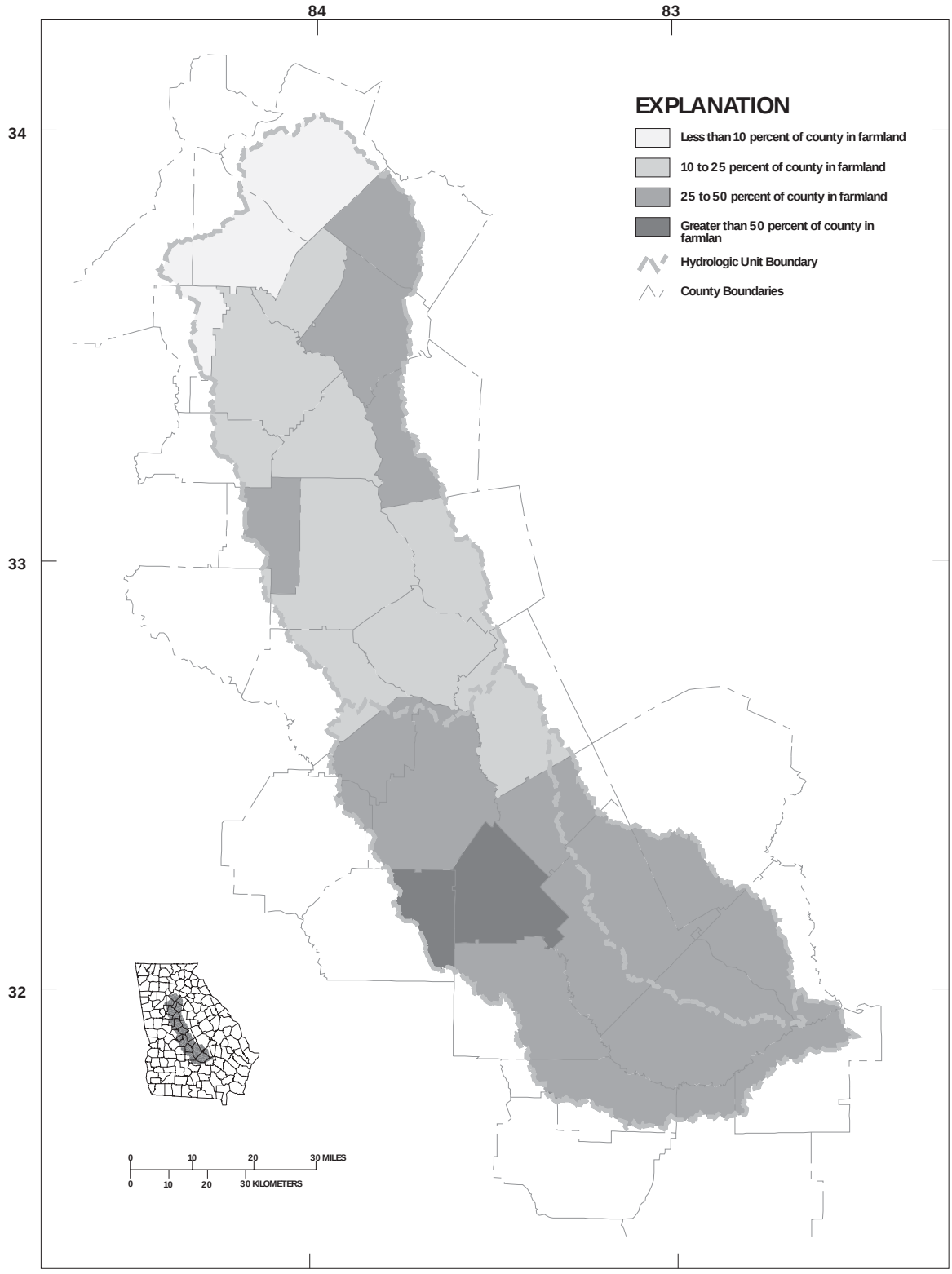


Figure 2-12. Agricultural Land in the Ocmulgee River Basin

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.

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 Ocmulgee River basin includes part or all of 30 Georgia counties (Table 2-6 and Figure 2-2); however, only six are entirely within the basin, and two counties have less than 20 percent of their land area within the basin. Thus there are a total of 28 counties with significant jurisdictional in the basin. Municipalities or cities are communities officially incorporated by the General Assembly. Georgia has more than 530 municipalities. Table 2-7 lists the municipalities in the Ocmulgee River basin.

Table 2-6. Georgia Counties in the Ocmulgee River Basin

Counties Entirely Within the Ocmulgee River Basin	Counties Partially Within the Ocmulgee River Basin		Counties With Less Than 20% Area Within the Basin
Bibb	Ben Hill	Jones	Coffee
Butts	Bleckley	Lamar	Macon
Dodge	Clayton	Laurens	
Pulaski	Crawford	Monroe	
Rockdale	DeKalb	Newton	
Telfair	Dooly	Peach	
	Gwinnett	Spalding	
	Henry	Twiggs	
	Houston	Walton	
	Jasper	Wheeler	
	Jeff Davis	Wilcox	

Table 2-7. Georgia Municipalities in the Ocmulgee River Basin

HUC 03070103 – Upper Ocmulgee River Subbasin				
Adgaterville	East Juliette	Huber	Mansfield	Skipperton
Almon	Elberta	Indian Springs	McDonough	Smarr
Arkwright	Ellenwood	Jackson	Milstead	Snapping Shoals
Avondale	Experiment	Jenkinsburg	Musella	Snellville
Barnesville	Flippen	Jersey	Norcross	Social Circle
Belmont	Flovilla	Jonesboro	Oak Hill	Sofkee
Between	Forest Park	Juliette	Orchard Hill	Stark
Blacksville	Forsyth	Kelleytown	Orrs	Starrsville
Bolingbroke	Frnaklinton	Lawrenceville	Oxford	Stewart
Byron	Glen Haven	Lilburn	Panthersville	Stockbridge
Clinton	Gloster	Lithonia	Pepperton	Stone Mountain
Conley	Goggins	Lizella	Pittman	Trickem
Constitution	Gray	Locust Grove	Popes Ferry	Walden
Conyers	Grayson	Loganville	Porterdale	Walnut Grove
Covington	Hampton	Luella	Rex	Wesleyan
Culloden	High Falls	Luxomni	Round Oak	Whitehorse
Dames Ferry	Highland Mills	Macon	Sandy	Worthville
Dry Branch	Hillsboro	Magnet	Scottdale	Youth
HUC 03070104 – Lower Ocmulgee River Subbasin				
Abbeville	Centerville	Gresston	Jacksonville	Powersville
Adams Park	Clinchville	Grovania	Kathleen	Queensland
Bonaire	Cochran	Hartford	Milan	Rhine
Bowens Mill	Elko	Hawkinsville	Owensboro	Unadilla
Browndale	Finleyson	Hayneville	Perry	Warner Robins
Bullard	Fort Valley	Henderson	Pineview	
HUC 03070105 – Little Ocmulgee River Subbasin				
Alamo	Chauncey	Empire	Jay Bird Springs	Scotland
Cadwell	Chester	Godsinsville	McRae	Towns
Cary	Eastman	Helena	Planfield	Yonkers

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 2-8 summarizes the RDCs and the associated counties within the Ocmulgee River basin.

Table 2-8. Regional Development Centers in the Ocmulgee River Basin

Regional Development Center	Member Counties with Land Area in the Ocmulgee Basin
Atlanta Regional Commission	Clayton, DeKalb, Gwinnett, Henry, Rockdale
Heart of Georgia-Altamaha	Bleckley, Dodge, Jeff Davis, Telfair, Wheeler, Wilcox
McIntosh Trail	Butts, Lamar, Spalding
Middle Georgia	Bibb, Crawford, Houston, Jones, Monroe, Peach, Pulaski, Twiggs
Northeast Georgia	Jasper, Newton, Walton
South Georgia	Ben Hill
Southeast Georgia	Coffee

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 Georgia Water Quality Control Board first established the water use classifications and standards 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 2-9 provides a summary of water use classifications and criteria for each use.

Congress made changes in the Clean Water Act (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 2-9. 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.

In the latter 1960s through the mid-1970s there were numerous 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 Ocmulgee River Basin

Waters in the Ocmulgee River basin are classified as fishing, recreation, or drinking water. Most of the waters are classified as fishing. Those waters explicitly classified in Georgia regulations are shown in Table 2-10; all waters not explicitly classified are classified as fishing.

Table 2-I0. Ocmulgee River Basin Waters Classified in Georgia Regulations[1]

Water Body	Segment Description	Use Classification
Alcovy River	Georgia Hwy. 81 to City of Covington Water Intake	Drinking Water
Big Haynes Creek	Georgia Hwy. 20 to Bald Rock Road	Drinking Water
Big Haynes Creek	Georgia Hwy. 78 to Confluence with Yellow River	Drinking Water
Jackson Lake	From South River at Georgia Hwy. 36; from Yellow River at Georgia Hwy. 36; from Alcovy River at Newton Factory Road Bridge to Lloyd Shoals Dam	Recreation
Ocmulgee River	Georgia Hwy. 18 to Macon Water Intake	Drinking Water
Tobesofkee Creek	Lake Tobesofkee	Recreation
Towaliga River	Headwaters to Georgia Hwy. 36	Drinking Water
Towaliga River	Georgia Hwy. 36 to High Falls Dam	Recreation
Yellow River	Georgia Hwy. 124 to Poterdale Water Intake	Drinking Water

[1] Rules and Regulations for Water Quality Control, Chapter 391-3-6(13). Waters within the Ogeechee 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
- Ground Water Quantity

Section 3

Water Quantity

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

Surface water is the primary water source in the Piedmont province of the Ocmulgee River basin because groundwater yields from crystalline rock aquifers tend to be low. Within the Coastal Plain province, aquifer yields are higher and groundwater withdrawals are the primary part of the total water budget. Although most public water supply withdrawals in the Piedmont province are from surface water sources, with the exception of counties near or immediately below the Fall Line, most public-supply water in the Coastal Plain comes from groundwater sources. As previously mentioned, the two sources of supply are not independent because groundwater discharge to streams is important in maintaining dry-weather flow. Thus, withdrawal of groundwater can, under certain conditions, also result in reduction in surface water flow.

Water use in the Ocmulgee River basin is expected to increase in the near future especially in Gwinnett, Bibb and Houston counties due to above average population growth rates.

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 Ocmulgee 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 Ocmulgee basin is provided by groundwater, although there are several surface water systems. 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 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 Ocmulgee River basin, there are approximately 120 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 Ocmulgee 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 Ocmulgee River basin has a drainage area of 6,080 square miles. The basin lies in central Georgia and extends from the Piedmont physiographic province into the lower Coastal Plain province. Roughly half of the basin's acreage lies north of the transition between the two provinces, the Fall Line.

Small impoundments in the basin, all low head hydroelectric projects, include Lake Tobesofkee on Tobesofkee Creek, the Porterdale impoundment on the Yellow River, the river industrial impoundment on the Yellow River, the Panola Shoals impoundment on the South River, and the High Falls impoundment on the Towaliga River.

The Ocmulgee River basin's northern region is limited in the quantity of surface water available. Municipal water supplies are almost exclusively dependent on surface waters. In times of low flow, the ability to withdraw water from the basin may be severely limited. In the southern region of the basin, water resources become much more abundant.

In this Coastal Plain region, the flow of the Ocmulgee River is augmented by groundwater discharge from the underlying aquifer systems. Municipal drinking water supplies, unlike those in the northern region, are almost exclusively dependent on groundwater sources.

The upper Ocmulgee River basin has the greatest demand for water use and the least available supply. The lower half of the basin has relatively low demand, has relatively abundant water resources, and provides the greatest opportunity for future water use development.

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, governmental, institutional, manufacturing, and other demands such as distribution system losses.

Currently, the Ocmulgee River basin has 30 surface water withdrawal permits. 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 Ocmulgee River basin is considerable. The counties to the north of the Fall Line do not generally contain large areas of irrigated farmland. Major irrigation takes place on crops grown throughout Pulaski, Houston, Dodge, Telfair, and Ben Hill Counties.

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 Ocmulgee River basin grew from about 6,400 in 1974 to an all time maximum for the basin of about 161,000 in 1998. Assuming growth rates continue as observed in the Ocmulgee River basin between 1982 and 1998, there will be approximately 235,000 acres under irrigation by 2020.

Table 3-1. Irrigated Acres in the Ocmulgee River Basin, 1974-1995

Year	HUC 03070103	HUC 03070104	HUC 03070105	Basin Total
1974	158	3,762	477	4,397
1978	2,232	42,438	11,886	56,556
1979	3,338	56,277	15,432	75,047
1980	1,587	65,427	18,308	85,322
1981	7,315	86,559	21,367	115,241
1982	8,907	88,866	19,705	117,478
1984	5,267	100,439	19,858	125,564
1986	3,943	106,467	21,970	132,380
1989	4,678	110,573	22,354	137,605
1992	5,280	115,373	22,896	143,549
1995	5,856	121,116	25,095	152,067
1998	6,432	126,858	27,295	158,908

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 Ocmulgee River basin reflects the influence of these variables (Table 3-2). There has been a relatively steady increase in agricultural water use in the Ocmulgee River basin from 52.61 MGD in 1980 to 106.54 MGD in 2000.

Table 3-2. Historical Agricultural Water Use (MGD) in the Ocmulgee River Basin, 1980-1995

Year	HUC 03070103	HUC 03070104	HUC 03070105	Basin Total
1980	3.69	37.07	11.85	52.61
1985	12.82	53.84	6.92	73.58
1987	12.19	70.97	9.73	92.90
1990	11.10	42.36	6.67	60.14
1995	12.76	60.16	10.97	83.89
2000	12.75	76.13	17.67	106.54

Source: Georgia Geological Survey

Approximately 93 percent of the agricultural water used in 1998 was for irrigation purposes (99.17 MGD). The central portion of the basin just below the Fall Line is where the majority of agricultural irrigation occurs. The remaining 7 percent (7.37 MGD) was used for animal operations.

Future agricultural water demand is expected to increase significantly within the basin to 130 MGD by the year 2020 on a projected 235,000 acres under irrigation by that time, assuming growth rates in the basin between 1982 and 1998 continue as observed. Table 3-3 shows the likely range of 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 Agricultural Water Use in the Ocmulgee River Basin, 1995-2020

Year	Projected Water Use (MDG)
2005	101.6
2010	110.9
2015	120.2
2020	129.5

Power Generation Water Demand

There are four power generating plants located within the Ocmulgee basin that use the water resources of the basin.

Navigational Water Demand

There is no commercial navigation in the Ocmulgee basin.

Recreation

Recreation activities in the Ocmulgee 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 Ocmulgee 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 seven-day average flow, which would have occurred during any ten-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 gallons per day (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.

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 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. Generally, agricultural users are not required to submit any water use reports.

In the Ocmulgee River Basin, a total of 2,233 surface and/or groundwater permits have been issued.

3.2.4 Flooding and Floodplain Management

Portions of the Ocmulgee River basin were severely affected by the massive flooding that occurred in parts of Georgia in 1994 and some counties on the western side of the basin were included in Federal Disaster Declaration #1209 as a result of the 1998 floods. The floods of 1994 and 1998 further substantiated the fact that flooding is the number one natural hazard in Georgia.

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 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 workshop covers the related aspects of the National Flood Insurance Program (NFIP), administration and enforcement of local flood ordinances, 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 is 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

Groundwater sources in the Ocmulgee River basin are related to physiographic provinces. Groundwater supplies are concentrated in the lower half of the basin in the Coastal Plain province. In the upper half of the basin, north of the Fall Line, the crystalline rock formation that underlies the Piedmont province greatly restricts groundwater availability. Some studies have shown that there may be contact zones, fractures, and shear planes capable of producing water yields as high as 400 gallons per minute (GPM) in the Piedmont, though the common range of production is less than 50 GPM. Techniques for locating these reliable sources have improved greatly over the past 10 years and will likely continue to do so.

The southern part of the Ocmulgee River basin is in the Coastal Plain physiographic province. The Coastal plain area lies south of the Fall Line. It is a region underlain by alternating layers of sand, clay, and limestone that generally become deeper and thicker to the southeast.

The Coastal Plain part of the Ocmulgee basin includes parts of Bibb, Peach, Houston, Twiggs, Macon, Bleckley, Pulaski, Dooley, Laurens, Dodge, Wilcox, Ben Hill, Telfair, Wheeler, Coffee, and Jeff Davis Counties. The main groundwater source in these counties 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.

The groundwater permits are for users equal to or greater than 100,000 GPD. 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 Ocmulgee River basin is considerable. The counties to the north of the Fall Line do not generally contain large areas of irrigated farmland. Major irrigation takes place on irrigated crops are grown throughout Pulaski, Houston, Dodge, Telfair, and Ben Hill Counties.

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 2,233 surface and 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 withdrawals can lead to lowering or drawdown of the water table. Localized groundwater drawdowns are generally discovered only after 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 drawdowns 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 pumped safely, without endangering other users or drawing down the aquifer too greatly. Permit withdrawal limits may then be set at some safer yield that is determined by these pumping tests. These tests may also indicate that proposed pumping amounts may require more wells to be drilled to spread out the ultimate production impact on the aquifer.

References

Georgia Environmental Protection Division. 1985. Water Availability and Use Report, Ocmulgee 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 Ocmulgee 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 five years).

Municipal Wastewater Discharges

Municipal wastewater treatment plants are among the most significant point sources regulated under the NPDES program in the Ocmulgee 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 $100 million in construction and upgrade of municipal water pollution control plants in the Ocmulgee 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, 17 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 one million gallons per day (MGD) or greater in the Ocmulgee River basin. The geographic distribution of dischargers is shown 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 Ocmulgee River basin in presented in Appendix C.

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

NPDES Permit No.	Facility Name	County	Receiving Stream	Permitted Monthly Avg. Flow
		HUC 03070103		
GA0021041	BARNESVILLE GORDON RD	LAMAR	TOBESOFKEE CR	1.2
GA0038423	CASEY & HUIE WRF	CLAYTON	BLALOCK RESERVOIR	15
GA0020575	CLAYTON CO NORTHEAST	CLAYTON	PANTHER CR	6
GA0026816	DEKALB CO POLEBRIDGE CR	DEKALB	SOUTH RV	20
GA0024147	DEKALB CO SNAPFINGER CR	DEKALB	SOUTH RV	36
GA0031801	FORSYTH NORTHEAST	MONROE	TOWN CR TO RUM CR	1.4
GA0020214	GRIFFIN CABIN CREEK	SPALDING	CABIN CREEK	1.5
GA0032841	GWINNETT CO BEAVER/SWEETWATER	GWINNETT	SWEETWATER	4.5
GA0047627	GWINNETT CO JACKS CR	GWINNETT	YELLOW RV TO OCMULGEE RV	1
GA0030732	GWINNETT CO JACKSON CR	GWINNETT	JACKSON CR	3
GA0023973	GWINNETT CO NO BUSINESS	GWINNETT	NO BUSINESS CR	1
GA0047911	GWINNETT CO YELLOW RV	GWINNETT	YELLOW RV/SWEETWATER CR	12
GA0049352	HENRY CO CAMP CR	HENRY	CAMP CREEK TRIB	1.5
GA0020788	LOGANVILLE WPCP	WALTON	BIG FLAT CR TRIB	1.75
GA0024538	MACON POPLAR ST	BIBB	OCMULGEE RV	20
GA0024546	MACON ROCKY CR	BIBB	OCMULGEE RV	24
GA0023949	MCDONOUGH WALNUT CR	HENRY	WALNUT CR	1
GA0021610	ROCKDALE CO ALMAND BRANCH	ROCKDALE	ALMAND BR TO SOUTH RV	1.25
GA0047678	ROCKDALE CO QUIGG BRANCH	ROCKDALE	YELLOW RV	3
		HUC 03070104		
GA0031046	FORT VALLEY WPCP	PEACH	BAY CR TO INDIAN CR TRIB	2.2
GA0020338	HAWINSVILLE SOUTH	PULASKI	OCMULGEE RV	1.3
GA0046027	HAWKINSVILLE NORTH	PULASKI	OCMULGEE RV	1
GA0036765	HAZLEHURST BULLY CR	JEFF DAVIS	OCMULGEE RV	1.5
GA0021334	PERRY WPCP	HOUSTON	BIG INDIAN CREEK	3
GA0037796	WARNER ROBINS OCMULGEE RV	HOUSTON	OCMULGEE RV	3
GA0030325	WARNER ROBINS SANDY RUN	HOUSTON	SANDY RUN CR	9

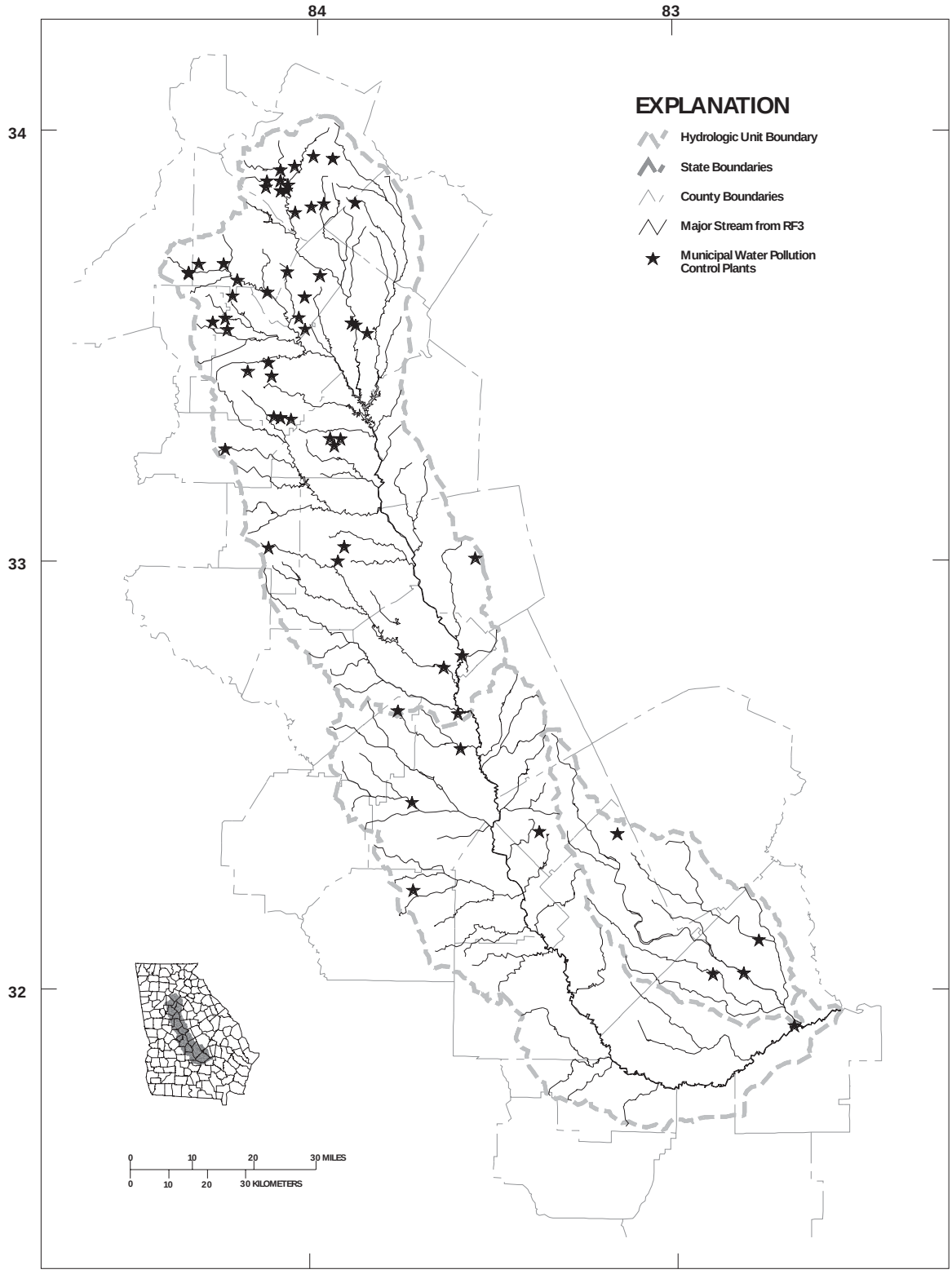

Figure 4-I. Geographic Distribution of Dischargers

Most urban wastewater treatment plants also receive industrial process and nonprocess 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 111 permitted municipal, state, federal, private, and industrial wastewater and process water discharges in the Ocmulgee River basin, as summarized in Table 4-2 and shown in Figures 4-2 through 4-4. The complete permit list is summarized in Appendix C.

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

HUC	Major Municipal Facilities	Major Industrial and Federal Facilities	Minor Public Facilities	Minor Private and Industrial Facilities	Total
03070103	19	3	25	37	84
03070104	7	1	4	5	17
03070105	0	0	8	2	10
Total	*26*	*4*	*37*	*44*	*111*

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 non-contact 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 Ocmulgee River basin in Georgia.

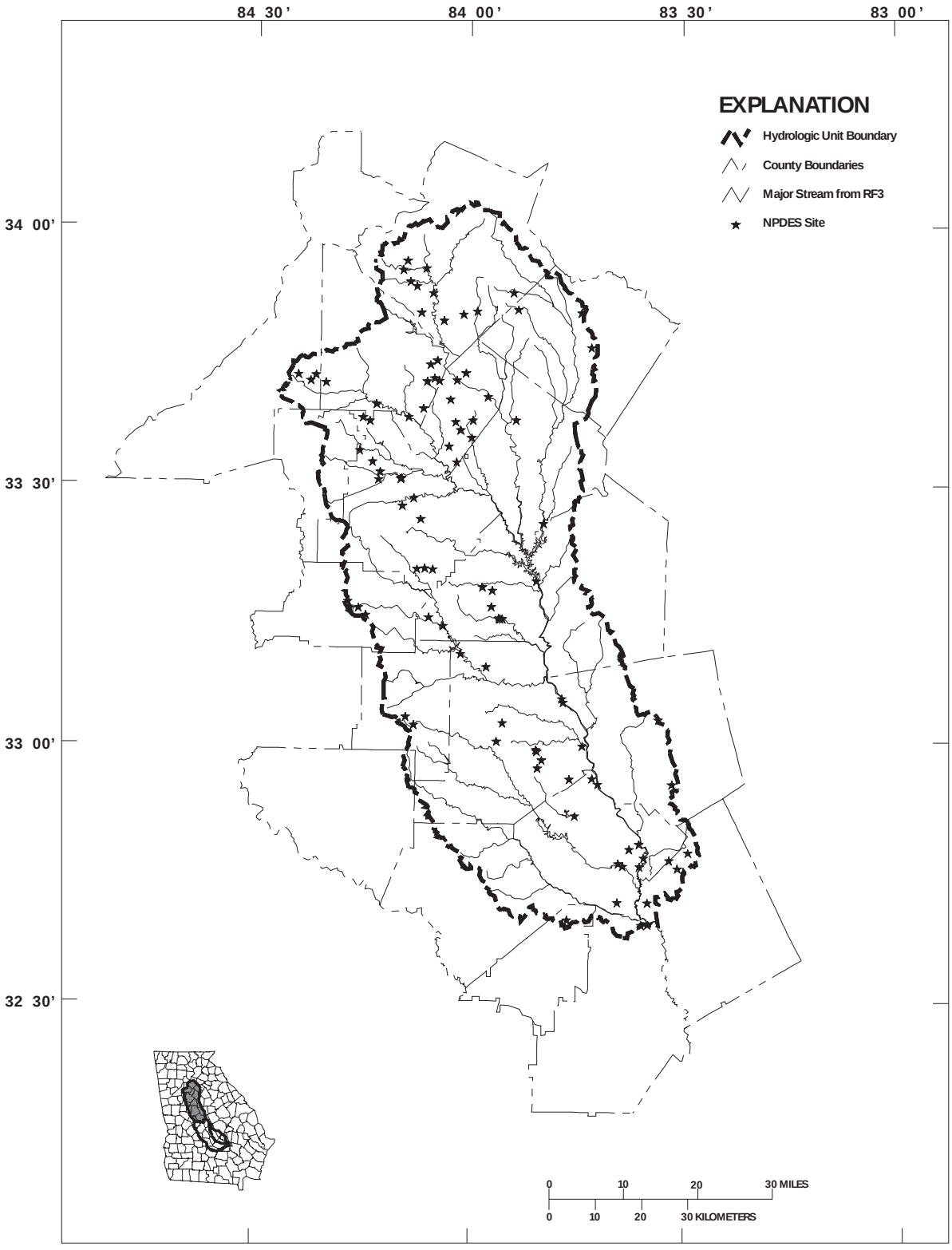

Figure 4-2. Locations of Permitted Point Source Discharges, Ocmulgee River Basin, HUC 03070103

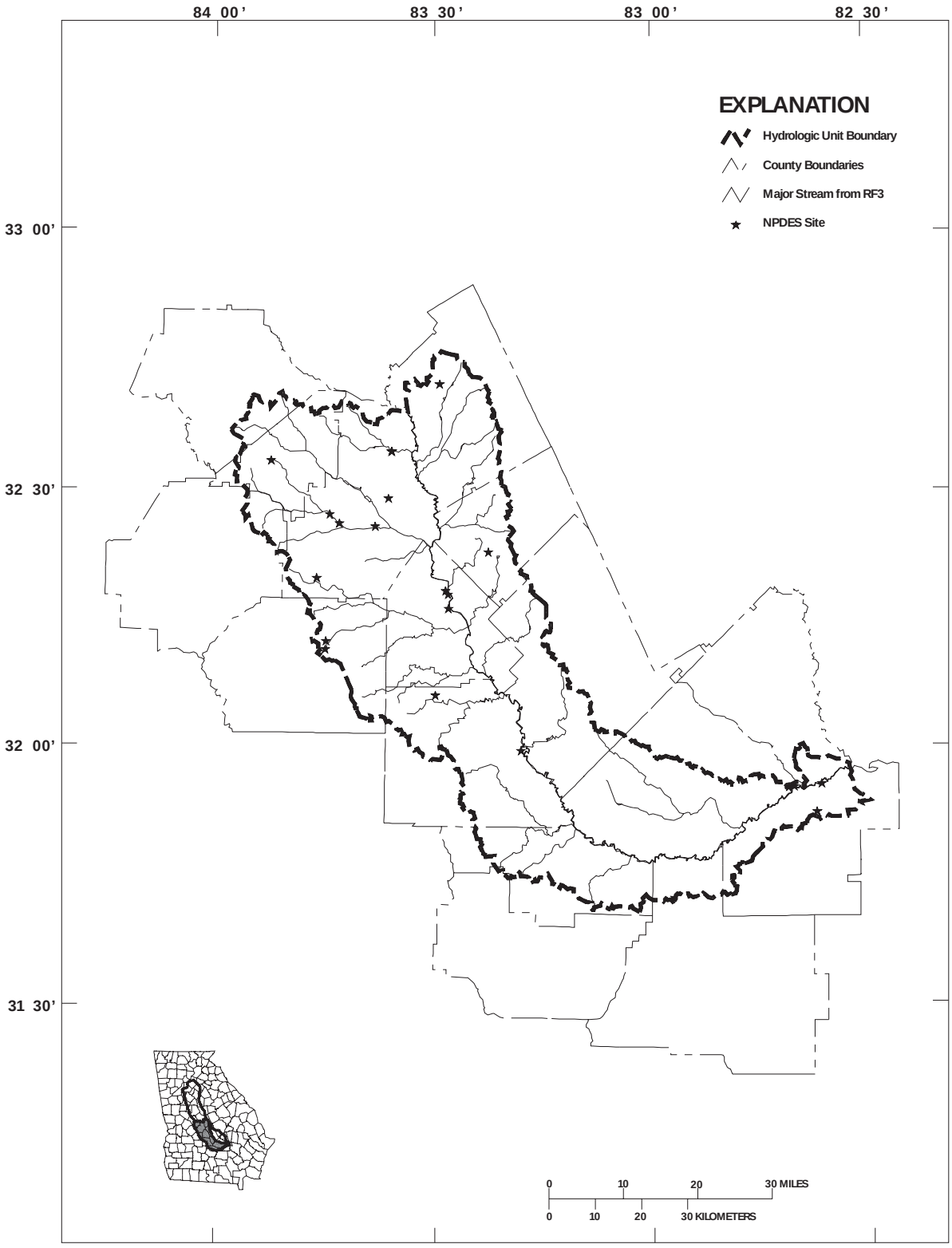

Figure 4-3. Locations of Permitted Point Source Discharges, Ocmulgee River Basin, HUC 03070104

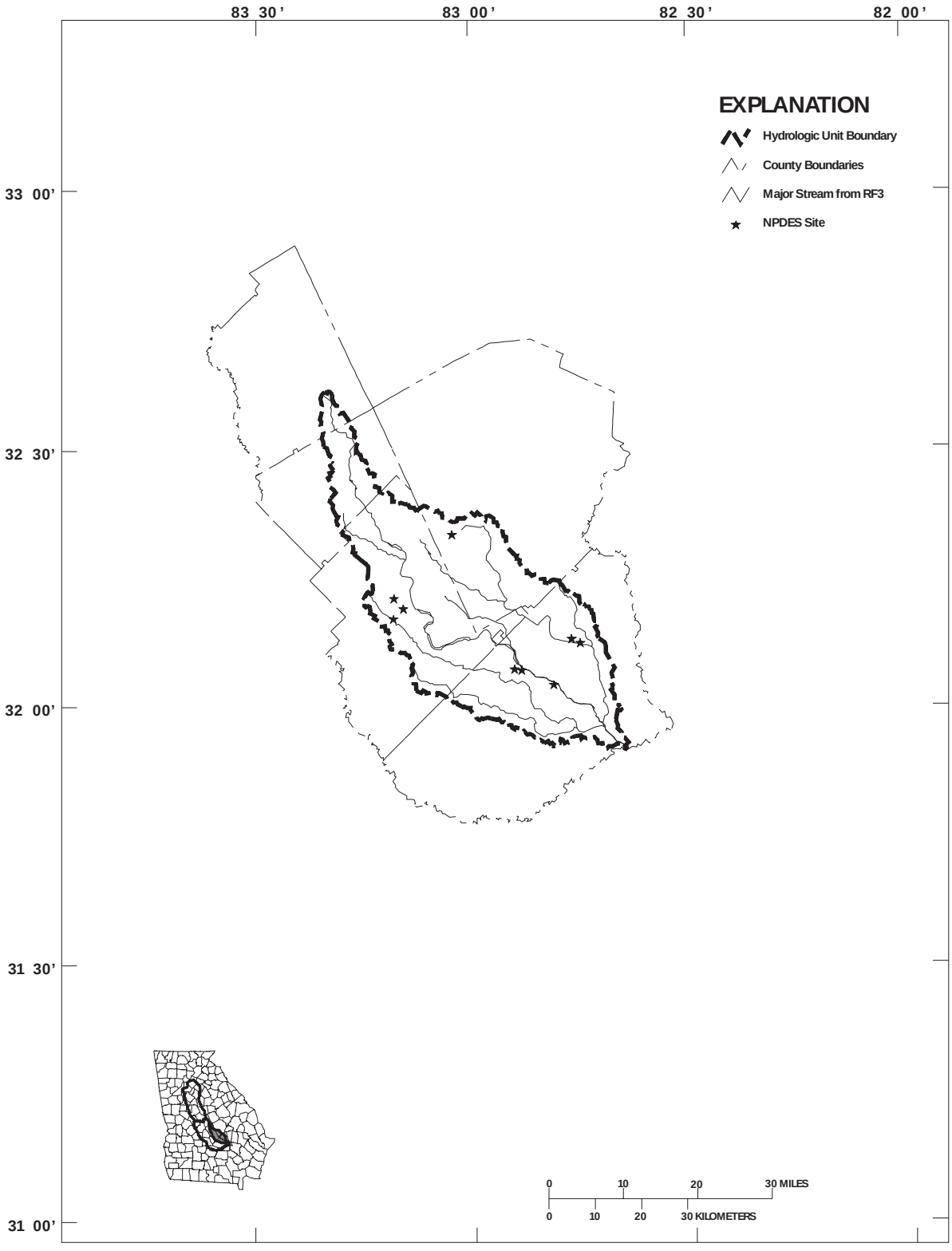

Figure 4-4. Locations of Permitted Point Source Discharges, Ocmulgee River Basin, HUC 03070105

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

NPDES Permit No.	Facility Name	County	Description	Flow (Mgd)	Receiving Stream
HUC 03070103					
GA0026069	GA POWER ARKWRIGHT	BIBB	INDUSTRY	480	OCMULGEE RV
GA0003409	SPRINGS IND INC GRIFFIN	SPALDING	INDUSTRY	1	CABIN CR
GA0003115	WILLIAM CARTER COMPANY	LAMAR	INDUSTRY	1.3	TOBESOFKEE CR
HUC 03070104					
GA0002852	USAF ROBINS AFB	HOUSTON	FEDERAL	2.1	HORSE CR TRIB

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

Combined Sewer Overflows

Combined sewers carry both stormwater runoff and sanitary sewage in the same pipe. Most 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 water body.

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, oxygen-demanding waste (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 is one City of Atlanta CSO that is treated prior to discharge to a tributary of the South River in the upper Ocmulgee River basin (HUC 03070103).

NPDES Permitted Stormwater Discharges

Urban stormwater runoff in the Ocmulgee basin has been identified as a source of stressors from pollutants such as 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 may threaten fisheries in the Ocmulgee 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. A total of 25 Phase I municipalities drain to the Ocmulgee River basin. Of the 86 cities and counties affected by the Phase II stormwater regulations, 21 are in the Ocmulgee 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 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 594 NOIs had been filed for the Ocmulgee 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 an 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 Ocmulgee Basin are listed in Table 4-4. The locations of all LASs within the basin are shown in Figures 4-5 through 4-7.

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 by 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 Figure 4-8 through 4-10.

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

Facility Name	County	Permit No.	Permitted Flow (MGD)
AMERICAN DEHYDRATED FOODS	WALTON	GA01-571	
ATLANTA SOUTH KOA	HENRY	GA03-829	0.02
BUTTS CO WATER & SEWER LAS	BUTTS	GA02-038	0.3
CA SIMPSON COMMERICIAL PROPERTY	BUTTS	GA02-225	0.3
CHESTER	DODGE	GA02-202	0.175
CHRIST SANCTIFIED HOLY CHURCH	HOUSTON	GA03-962	0.018
CLAYTON CO HUIE LAS	CLAYTON	GA02-008	19.5
COVINGTON	NEWTON	GA02-055	4.8
FLYING J INC	BUTTS	GA03-799	0.06
GA DIAGNOSTIC CENTER	BUTTS	GA02-245	0.225
GA PUBLIC SAFETY TRAINING CENTER	MONROE	GA02-201	0.12
HENRY CO INDIAN CR LAS	HENRY	GA02-250	1.5
HENRY CO SIMPSON MILL LAS	HENRY	GA02-203	0.18
HENRY CO SPRINGDALE LAS	HENRY	GA02-239	1
HY-LINE INTERNATIONAL INC	NEWTON	GA01-461	0.002
LOCUST GROVE LAS	HENRY	GA02-070	0.3
LOGANVILLE LAS	WALTON	GA02-174	0.25
MCRAE LAD	TELFAIR	GA02-248	0.8
MELROSE SUBDIVISION	HENRY	GA03-832	
MILAN	DODGE	GA02-086	0.2
PUBLIX SUPER MARKET	GWINNETT	GA02-220	
UNADILLA	DOOLY	GA02-151	0.54
UNITY GROVE ELEMENTARY	HENRY	GA03-835	0.013
WALNUT CREEK RECLAMAMTION FACILITY	HENRY	GA02-137	4

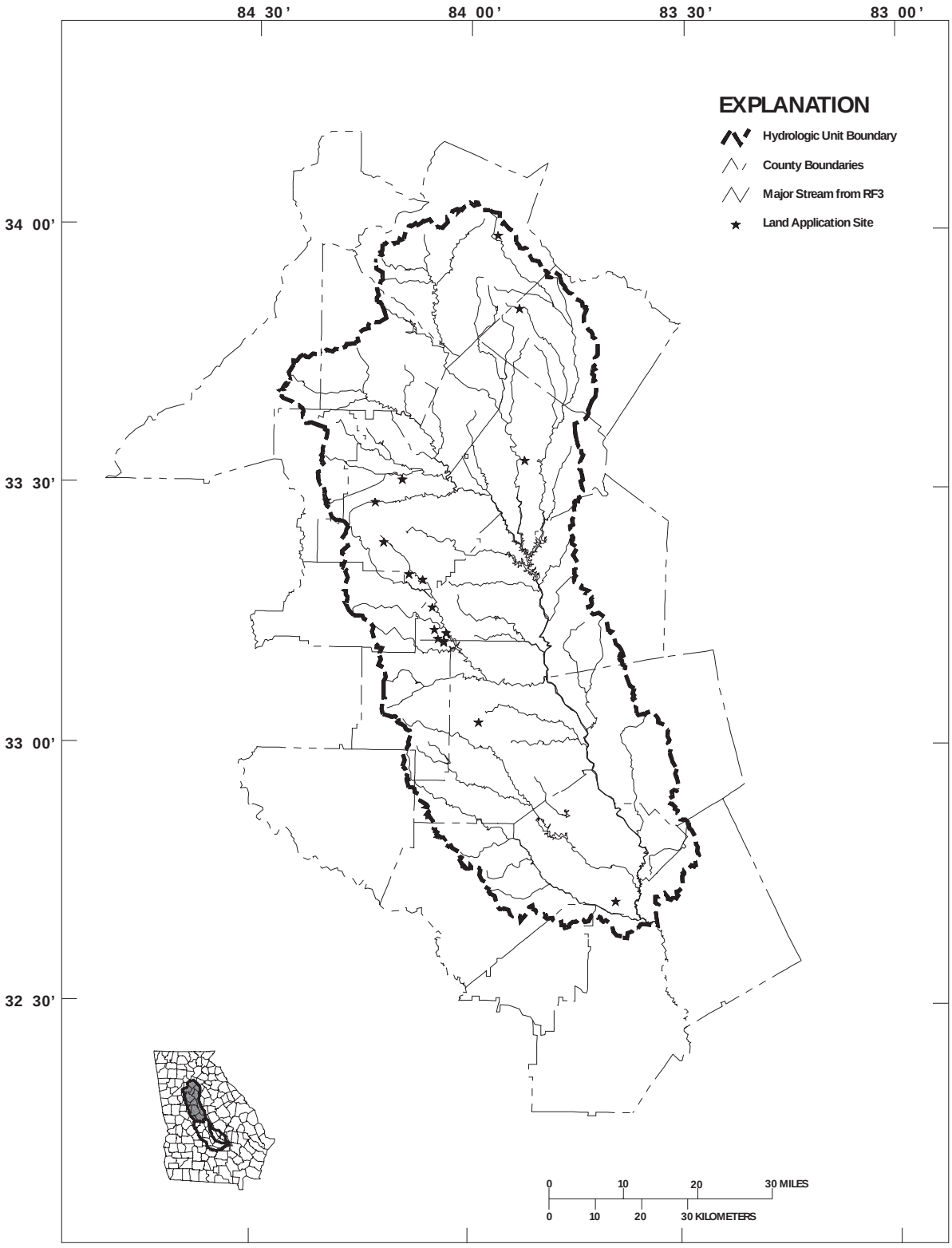

Figure 4-5. Land Application Systems, Ocmulgee River Basin, HUC 03070103

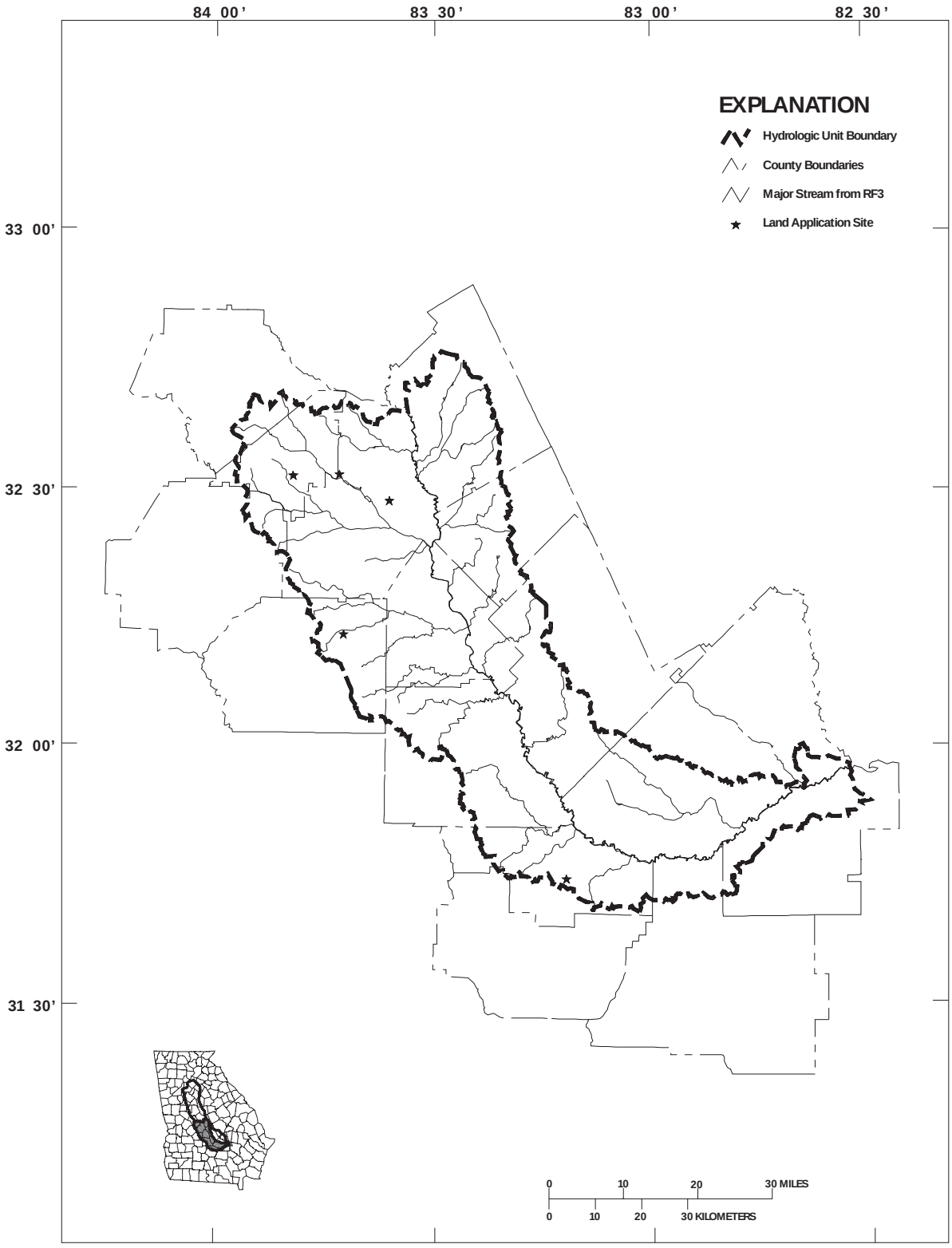

Figure 4-6. Land Application Systems, Ocmulgee River Basin, HUC 03070104

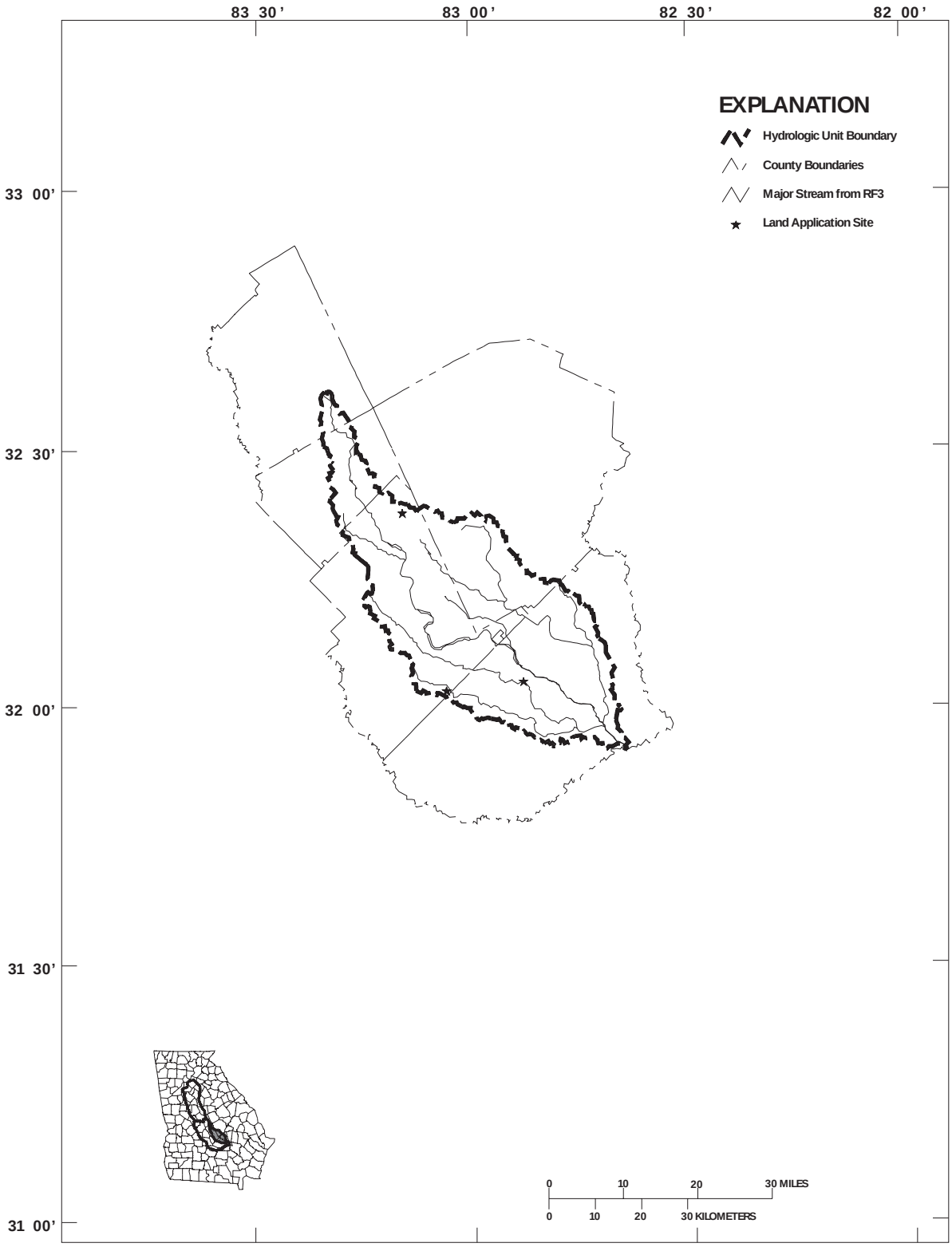

Figure 4-7. Land Application Systems, Ocmulgee River Basin, HUC 03070105

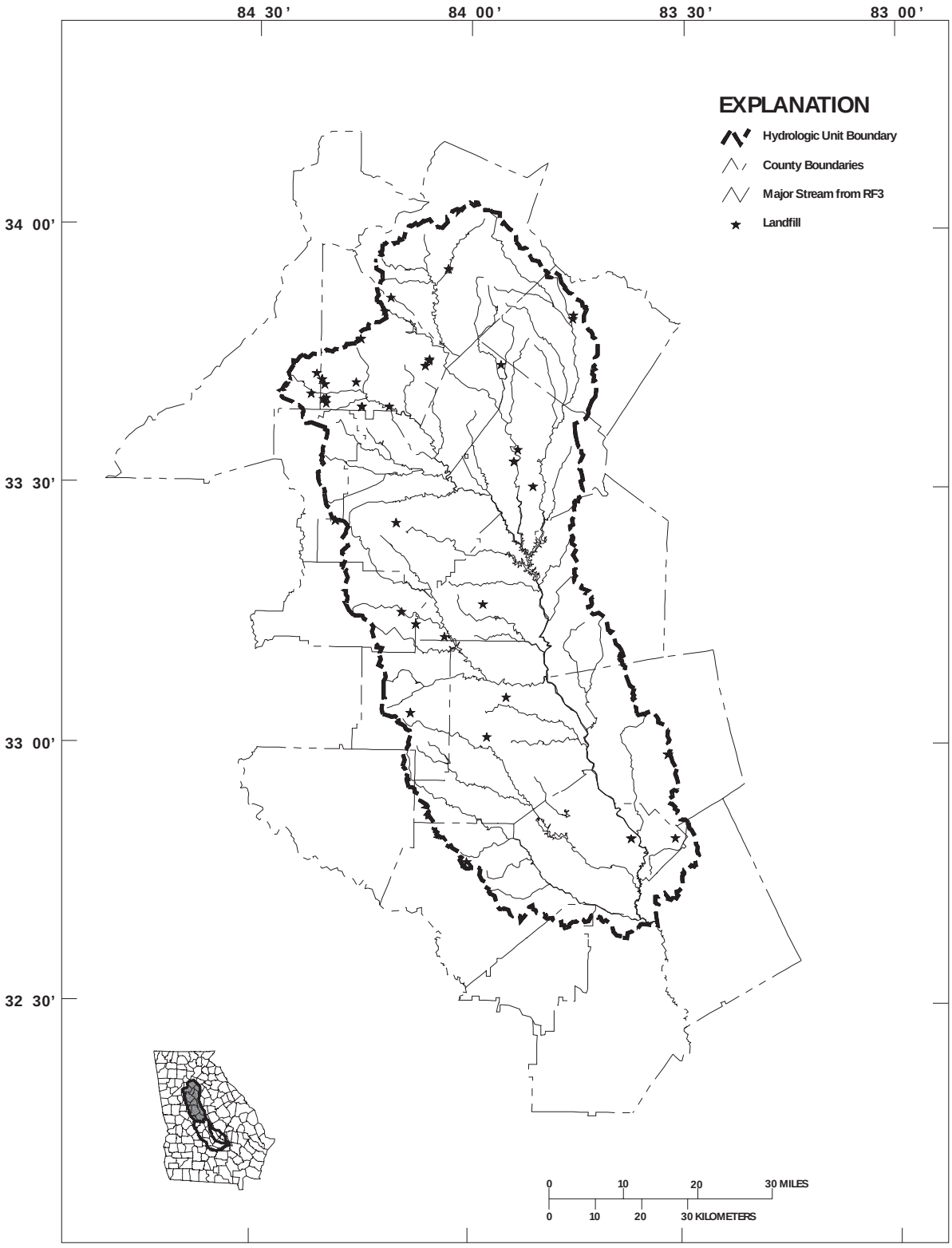

Figure 4-8. Landfills, Ocmulgee River Basin, HUC 03070103

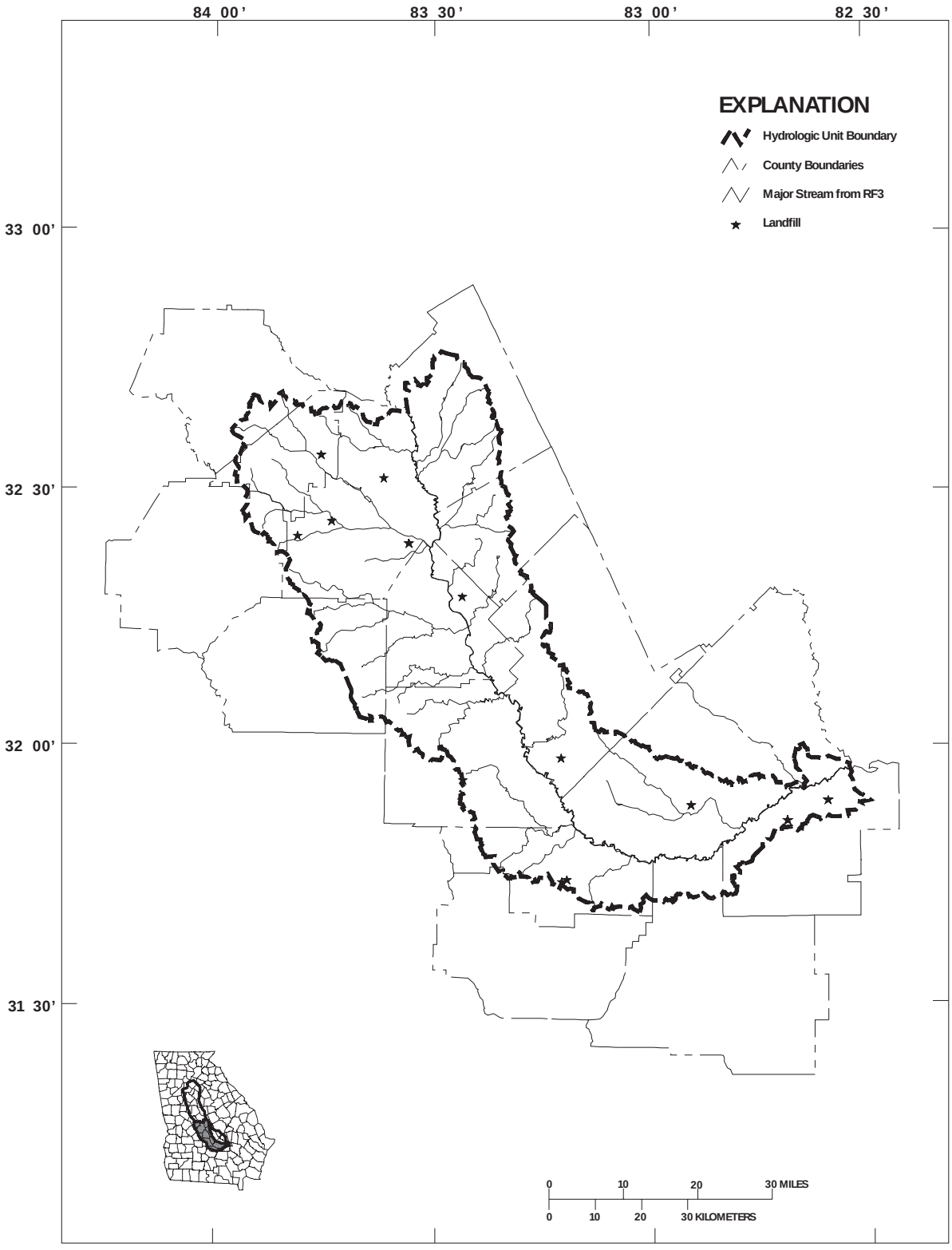

Figure 4-9. Landfills, Ocmulgee River Basin, HUC 03070104

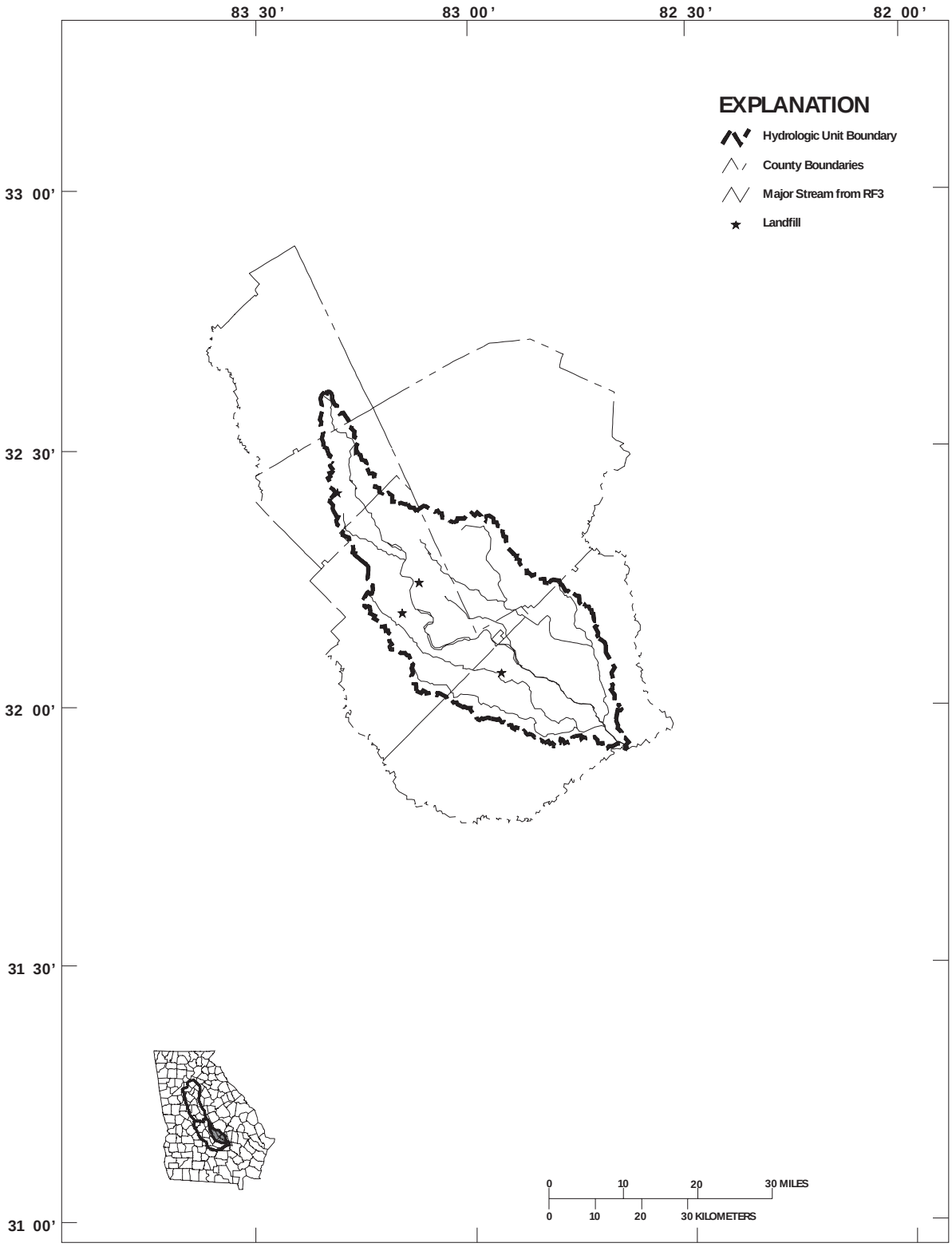

Figure 4-10. Landfills, Ocmulgee River Basin, HUC 03070105

4.I.2 Nonpoint Sources

The pollution impact on Georgia's streams has radically shifted over the last two decades. Steams 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.

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 Ocmulgee 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 is can also include crop debris and animal wastes. Excess sediment loads can damage aquatic habitat by smothering and shading food organisms, alter natural substrate, and destroy 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)
Ben Hill	65%	38,230	36.0	107	0.11	41	0.043
Bibb	100%	5,204	27.1	16	0.09	6	0.035
Bleckley	83%	45,873	28.0	147	0.12	51	0.041
Butts	100%	7,365	13.0	26	0.05	11	0.023
Clayton	45%	2,580	14.5	9	0.05	4	0.020
Coffee	9%	76,637	24.3	419	0.16	122	0.048
Crawford	45%	14,480	33.8	57	0.15	20	0.053
DeKalb	70%	199	6.6	2	0.07	1	0.022
Dodge	99%	44,284	17.6	133	0.08	50	0.031
Dooly	29%	154,242	47.4	420	0.15	158	0.058
Fulton	6%	12,513	28.6	33	0.07	13	0.029
Gwinnett	61%	2,761	5.9	75	0.16	18	0.038
Henry	94%	44,085	35.1	131	0.11	52	0.044
Houston	98%	111,912	57.2	330	0.18	120	0.665
Jasper	38%	13,739	12.9	99	0.10	39	0.038
Jeff Davis	19%	16,706	7.4	112	0.06	30	0.016
Jones	47%	31,043	43.5	109	0.16	39	0.056
Lamar	72%	32,016	24.7	116	0.09	42	0.034
Laurens	18%	100,069	26.8	296	0.12	108	0.044
Macon	8%	88,717	65.2	200	0.09	44	0.020
Monroe	98%	44,702	35.0	150	0.12	55	0.044
Newton	88%	51,916	44.0	153	0.14	60	0.053
Peach	94%	43,696	34.9	125	0.11	46	0.041
Pulaski	100%	69,158	30.9	180	0.10	70	0.039
Rockdale	100%	10,645	36.3	41	0.14	14	0.048
Spalding	44%	24,366	42.0	74	0.13	28	0.050
Telfair	100%	71,081	40.1	276	0.19	87	0.059
Twiggs	67%	17,509	29.4	47	0.11	18	0.043
Upson	2%	12,767	11.4	75	0.07	27	0.025
Walton	51%	49,674	31.9	198	0.15	69	0.053
Wheeler	58%	40,088	31.7	112	0.13	43	0.051
Wilcox	70%	104,735	46.5	293	0.16	110	0.058

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

In July and August 1996, USEPA conducted biological assessments on Georgia watersheds that had sufficient agricultural loading to potentially impair designated stream use to determine which of those waters should be added to Georgia's Section 303(d) list of streams with water quality limited segments. Those waters identified by USEPA as potentially impaired by agricultural nonpoint source loading and added to the 303(d) list in December 1996 are shown in Table 4-6. USEPA finalized total maximum daily loads (TMDLs) for these waters in 2002.

Table 4-6. Waters Identified as Potentially Impacted by Agricultural Nonpoint Source Loading and Added to the Georgia 303[d] List

Water Body	County	Pollutant[s] of Concern
Little Ocmulgee River	Bleckley and Dodge	Biota, Habitat
Big Creek	Houston and Pulaski	Biota, Habitat
Tobesofkee Creek	Monroe, Bibb, and Lamar	Biota, Habitat

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 their 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 particular 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 pesticide/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 since 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 nonherbicide 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 rang 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 Ocmulgee 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 includes 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 Ocmulgee 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 4-7). This does not include natural disturbances such as weather, insects, animal, wildfire, or disease.

Table 4-7. 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, woods 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. The potential impact to water quality from erosion and sedimentation is increased if BMPs are not adhered to.

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 is one commercial forest seed orchard located in Pulaski County, and it is operated by the GFC. There are three private nurseries that grow containerized seedlings. They are located in DeKalb, Dodge and Telfair counties.

According to the Water Quality in Georgia 2002 Report, no streams were identified in the basin as impacted due to commercial forestry activities. However, 54 stream segments are listed as biota impaired mainly due to sedimentation from nonpoint source activities.

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 reaeration 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 raises 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 Ocmulgee 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 that 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 Ocmulgee also discharge 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 ground water, 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 a corresponding increase in the nitrate fraction.

Sources of Nutrient Loading

The major sources of nutrient loading in the Ocmulgee basin are wastewater treatment facilities, urban runoff and stormwater, and agricultural runoff. Concentrations found in the streams and rivers of the Ocmulgee basin represent a combination 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 Ocmulgee River basin can be obtained by examining results from EPD long-term trend monitoring stations. Trends in instream total phosphorus concentrations at two sites in the Ocmulgee River are shown in Figures 4-11 and 4-12. 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 third most commonly listed cause of nonsupport of designated uses in the Georgia 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 10 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 from 1998 to 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 two sites in the Ocmulgee River basin are shown in Figures 4-13 and 4-14. All waters in the Ocmulgee basin have a state water quality standard of 4.0 mg/L. As shown in Figures 4-13 and 4-14, dissolved oxygen concentrations are usually above this standard.

4.2.3 Metals

A violation of water quality standards for metals attributed to nonpoint sources was detected in one segment of the Ocmulgee River during the 1999 sampling. Point sources of metals in the Ocmulgee basin (wastewater treatment plants and certain industrial discharges) have been brought into compliance with permit limits, leaving nonpoint sources that are more difficult to control as the primary cause of impairment.

4.2.4 Fecal Coliform Bacteria

Violations of the standard for fecal coliform bacteria were the 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 two sites in the Ocmulgee River basin are shown in Figures 4-15 and 4-16.

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.

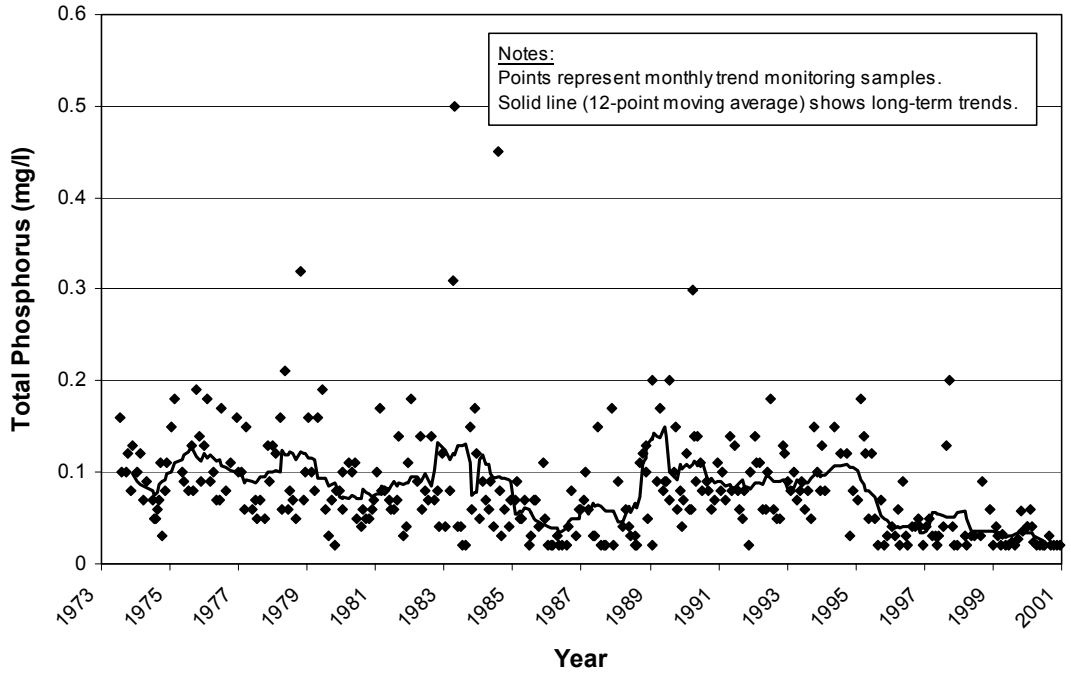

Figure 4-II. Total Phosphorus Concentrations, Ocmulgee River at the Water Intake for the City of Macon, GA

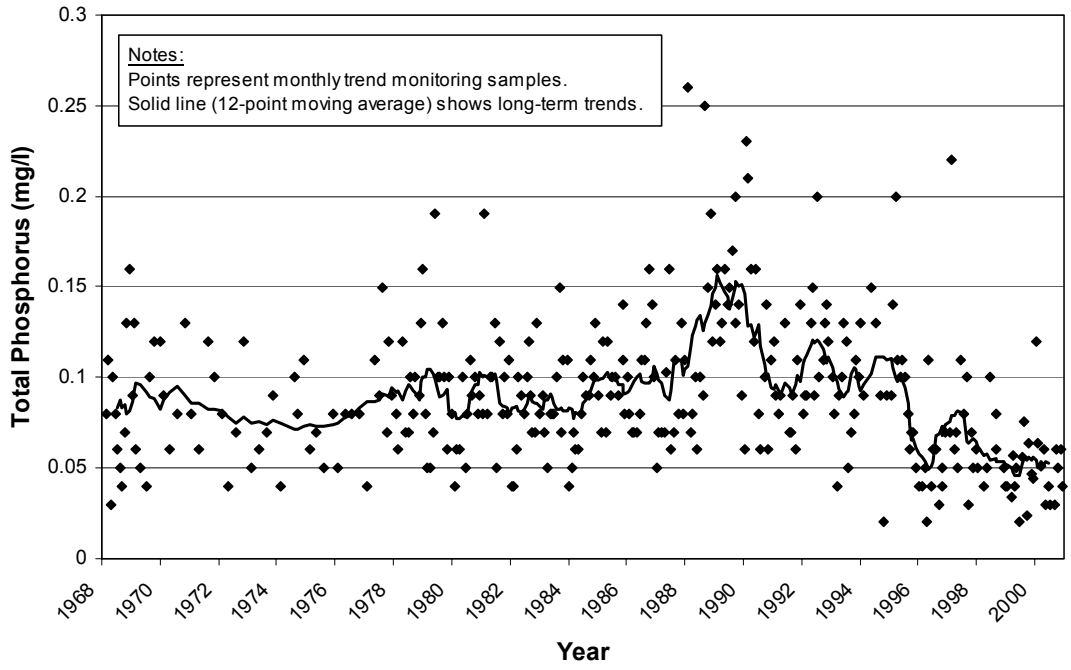

Figure 4-I2. Total Phosphorus Concentrations, Ocmulgee River at U.S. Highway 341 at Lumber City, GA

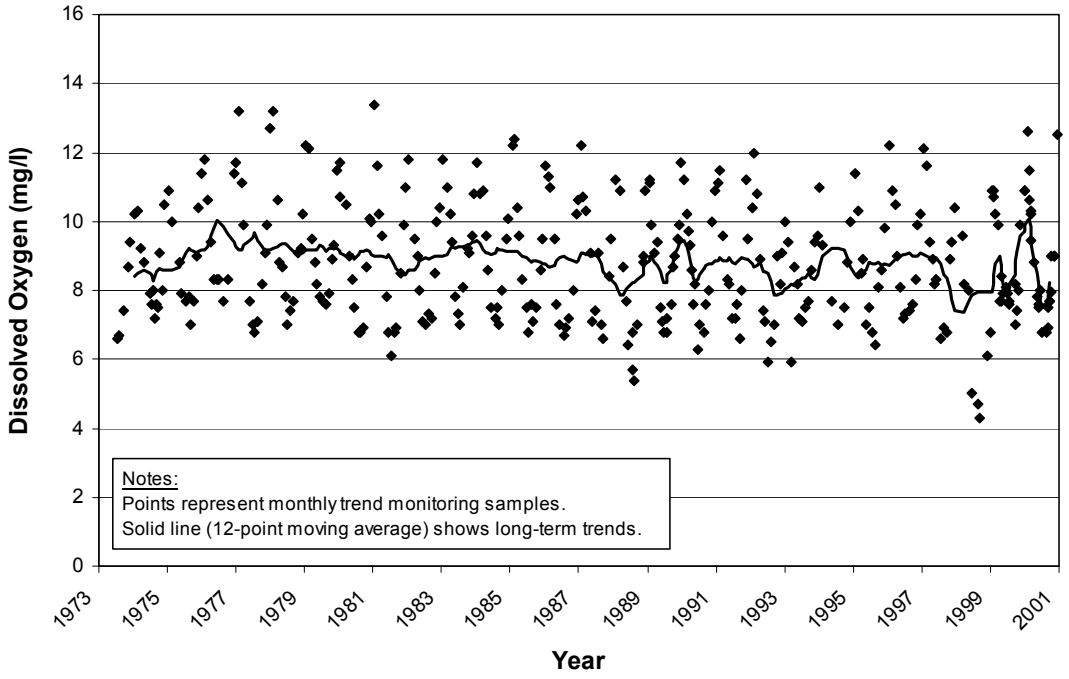

Figure 4-I3. Dissolved Oxygen Concentrations, Ocmulgee River at the Water Intake for the City of Macon, GA

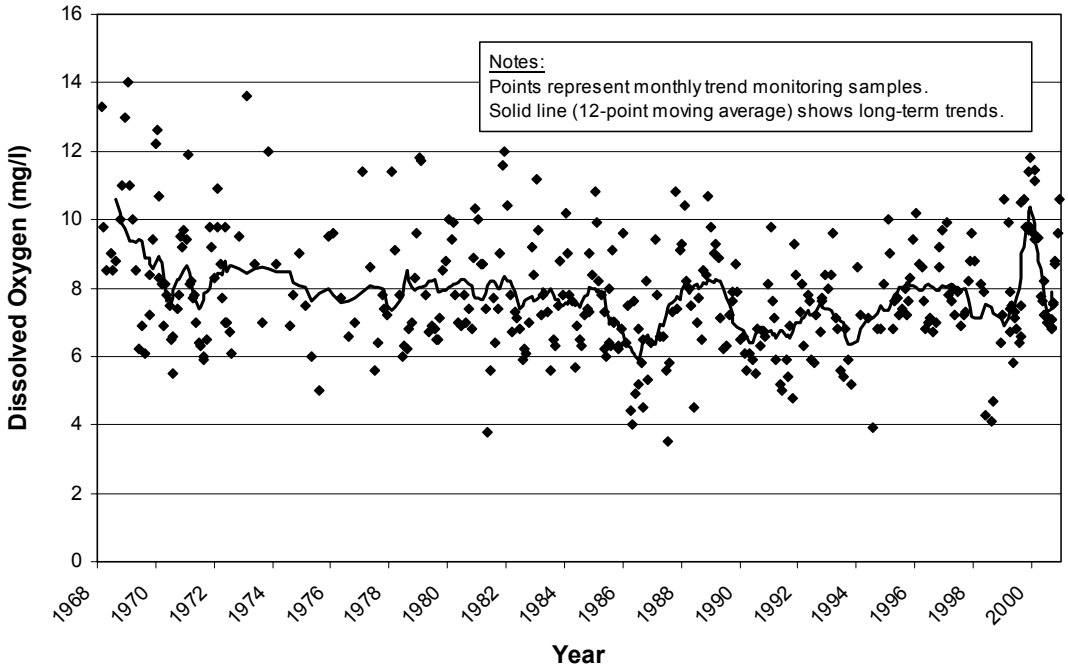

Figure 4-I4. Dissolved Oxygen Concentrations, Ocmulgee River at U.S. Highway 341 at Lumber City, GA

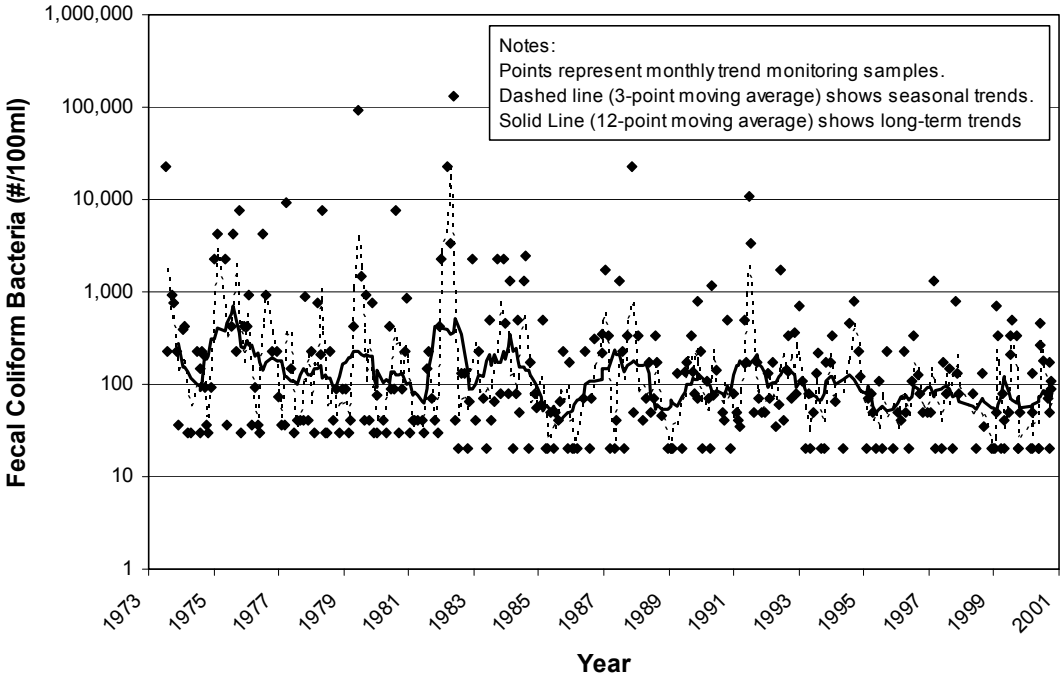

Figure 4-I5. Fecal Coliform Bacteria Concentrations, Ocmulgee River at the Water Intake for the City of Macon, GA

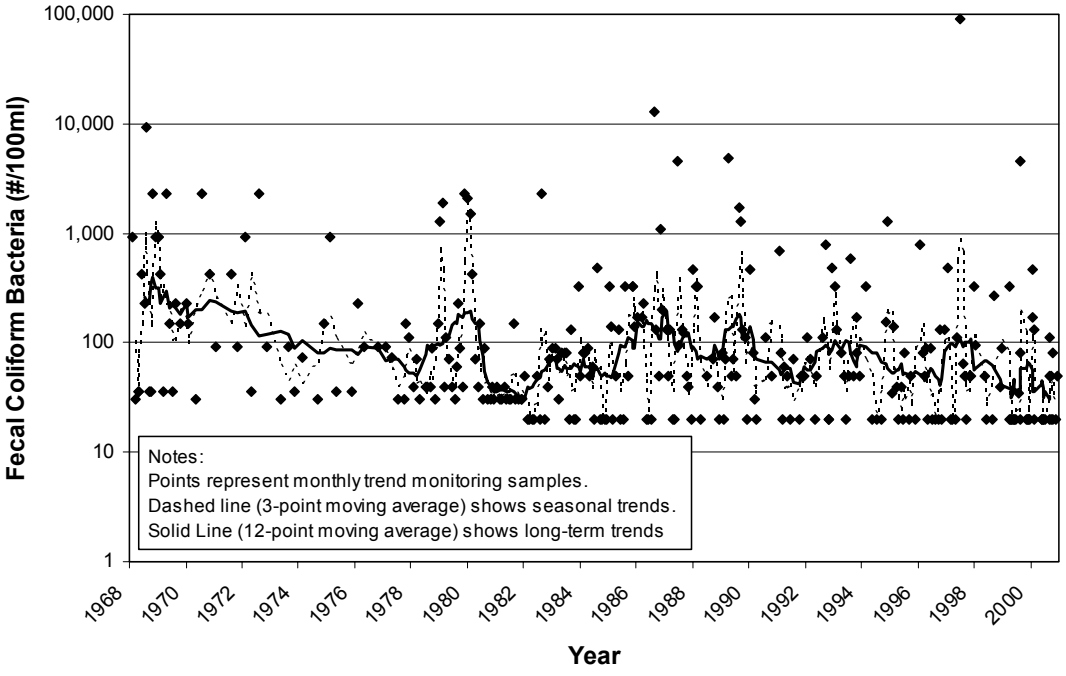

Figure 4-I6. Fecal Coliform Bacteria Concentrations, Ocmulgee River at U.S. Highway 341 at Lumber City, GA

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 Ocmulgee 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 greatly declined with a switch to less persistent pesticides. Recent research by 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

Poor or very poor fish communities due to sediment were the second-most commonly listed cause of nonsupport of designated uses in the Georgia 2002 303(d) list. 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 Ocmulgee 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 Ocmulgee basin is loss of riparian tree cover, which can lead to increased water temperatures.

4.2.9 pH

pH is a relative measure of the acidity or alkalinity of a solution, and generally ranges from 0 to 14 with a pH of 7 indicating a neutral solution (for example, distilled water). Decreasing pH below 7 indicates greater acidity, while increasing pH above 7 indicates greater alkalinity. For example, vinegar has a pH of 2, while bleach has a pH of 12.5. Aquatic life can tolerate a pH in a fairly narrow range. Georgia's water quality standards state that pH must remain in a range of 6.0 to 8.5. In addition to the direct harmful effects of high or low pH to aquatic organisms, low pH is a further problem because it can increase the concentrations of dissolved metals in water, which are harmful to aquatic life.

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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 Ocmulgee 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 Ocmulgee River basin is taken from the "Georgia Environmental Protection Water Availability and Use Report, Ocmulgee 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 both groundwater and surface water 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. There are 23 municipal surface water permits in this basin.

5.1.2 Agriculture

As stated in Section 3.2.2, water demand for agricultural use in the Ocmulgee River basin is considerable. Irrigated crops are grown in Pulaski, Houston, Dodge, Telfair, Ben Hill and other counties in the basin. In 2000 approximately 93 percent of the agricultural water used was for irrigation purposes (99.17 MGD). The remaining 7 percent was used for animal operations. Future agricultural water demand is expected to increase slightly within the basin to 144.08 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 several hydropower facilities in the Ocmulgee River basin.

Lake Jackson, owned and operated by Georgia Power is a major hydropower facility in the Ocmulgee River basin. Lake Juliette is a man-made cooling water storage lake for Plant Scherer also owned and operated by Georgia Power.

Jackson lake is a hydroelectric impoundment that was constructed in 1910. The hydroelectric generating station (Lloyd Shoals) began operation in 1911 and is owned and operated by the Georgia Power Company. The reservoir is located in Newton, Jasper, and Butts counties approximately 50 miles southeast of Atlanta, Georgia. Lake Jackson is a 4,750 acre lake with 135 miles of shoreline. The major tributaries to the lake are the South, Yellow, and Alcovy Rivers and Tussahaw Creek. The water use classification of the lake is Recreation.

Lake Juliette is a 3,600 acre, man-made cooling water storage lake for Plant Scherer, owned and operated by Georgia Power. The lake is located about 17 miles north of Macon, Georgia near the Omulgee River in Monroe County. The lake and surrounding uplands are maintained in cooperation with the Georgia Department of Natural Resources. Lake Juliette is strictly a fishing lake with no private cabins, dock, marinas, beaches or commercial areas. Limited hunting, fishing and camping are allowed.

5.1.5 Navigation

There is no commercial navigation in the Ocmulgee 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 Ocmulgee 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 lower half of the Ocmulgee basin. 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 in this area are the main use of groundwater. Groundwater use is limited in the northern counties of the basin from Gwinnett through Newton and Butts to Bibb.

Problems have been noted with the Floridan aquifer in the nearby 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 Ocmulgee River basin.

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 USEPA. 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-I. 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 water body 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...

Georgia is also developing site-specific standards for major lakes where control of nutrient loading is required to prevent problems associated with eutrophication. The Board of Natural Resources adopted lake standards for Jackson Lake for chlorophyll *a,*

pH, total nitrogen, phosphorus, fecal coliform bacteria, dissolved oxygen, and temperature (Table 5-3).

Table 5-3. Water Quality Standards for Jackson Lake

(16) **Specific Criteria for Lakes and Major Lake Tributaries**. In addition to the general criteria, the following lake specific criteria are deemed necessary and shall be required for the specific water usage as shown:

(c) Lake Jackson: Those waters impounded by Lloyd Shoals Dam and upstream to Georgia Highway 36 on the South and Yellow Rivers, upstream to Newton Factory Bridge Road on the Alcovy River and upstream to Georgia Highway 36 on Tussahaw Creek.

(i) Chlorophyll *a*: For the months of April through October, the average of monthly mid-channel photic zone composite samples shall not exceed 20 μg/l at a location approximately 2 miles downstream of the confluence of the South and Yellow Rivers at the junction of Butts, Newton and Jasper Counties.

(ii) pH: Within the range of 6.0-9.5 standard units.

(iii) Total Nitrogen: Not to exceed 4.0 mg/l as nitrogen in the photic zone.

(iv) Phosphorous: Total lake loading shall not exceed 5.5 pounds per acre-foot of lake volume per year.

(v) Fecal Coliform: Fecal coliform bacteria shall not exceed the Recreation criterion as presented in 391-3-6-.03(6)(b)(I).

(vi) Dissolved Oxygen: A daily average of 5.0 mg/l and no less than 4.0 mg/l at all times at the depth specified in 391-3-6-.03(5)(f).

(vii) Temperature: Water temperature shall not exceed the Recreation criterion as presented in 391-3-6-.03(6)(b)(iv).

(viii) Major Lake Tributaries: For the following major tributaries, the annual total phosphorous loading to Lake Jackson shall not exceed the following:

1. South River at Island Shoals: 179,000 pounds
2. Yellow River at Georgia Highway 212: 116,000 pounds
3. Alcovy River at Newton Factory Bridge Road:55,000 pounds
4. Tussahaw Creek at Fincherville Road: 7,000 pounds

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 and sediment 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 monthly sampling across south Georgia in the Ochlockonee, Suwannee, Satilla, Altamaha, Savannah and Ogeechee River basins. The Atlanta sampling team conducts monthly sampling in parts of the Coosa, Tallapoosa, Chattahoochee, Flint, Oconee, and Ocmulgee River basins. 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 Ocmulgee 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 Ocmulgee River basin used in 1999. During this period, 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

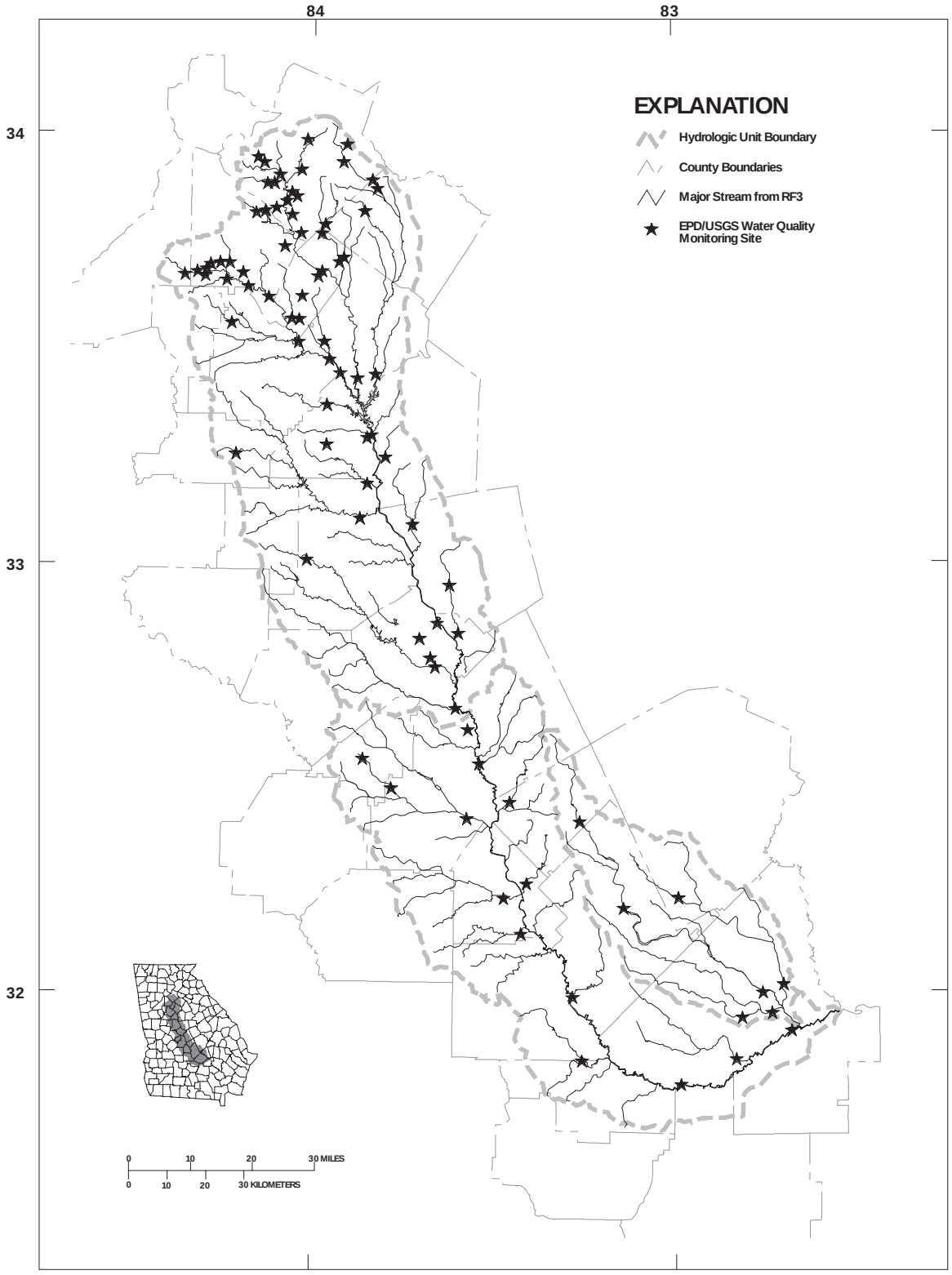

Figure 5-I. Ocmulgee River Basin Trend Monitoring Network Station Locations

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 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 postimpoundment 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. One of the studies was conducted on Jackson Lake. The study results were used as the basis for establishing lake-specific water quality standards for Jackson Lake in 1996 (see Table 5-3). Subsequent annual monitoring data have shown compliance with the lake-specific water quality standards for Jackson Lake.

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.

The three measures of Carlson's Trophic State Index were combined into a single total trophic state index (TTSI) and used with other field data and observation to assess the trophic condition of each lake. Higher values of the TTSI represent more eutrophic, less desirable conditions. Monitoring efforts have continued since the 1980-1981 Lake Classification Survey with a focus on major public lakes (those with a surface area greater than 500 acres), and the TTSI has continued to be employed as a tool to mark trophic state trends. The monitoring project for major lakes became a part of the River Basin Management Planning process in 1995, with resumption of basin cycle lake quarterly monitoring in 1997. The major lakes in the Ocmulgee basin are listed in Table 5-4 and are ranked for the years of 1985-1993 and 1999 (basin monitoring year in the 5-year cycle period of 1997-2001). Lake Jackson was not only monitored annually through 1993 as part of the major lakes monitoring project, but was also the subject of a Phase I Diagnostic-Feasibility study conducted by the EPD in the early 1990s.

Table 5-4. Major Public Lakes in the Ocmulgee River Basin Ranked by Sum of Trophic State Index Values, 1985-1993 and 1999 (of the 1997-2001 Basin Monitoring Cycle)

1985		1986		1987		1988		1989	
Jackson	172	Jackson	170	Jackson	170	High Falls	177	High Falls	191
High Falls	168	High Falls	163	High Falls	157	Jackson	<158	Jackson	188
Tobesofkee	152	Tobesofkee	155	Tobesofkee	<146	Tobesofkee	<151	Tobesofkee	180
Juliette	125	Juliette	135	Juliette	<108	Juliette	<123	Juliette	141
range for state	116-188	*range for state*	114-177	*range for state*	<108-184	*range for state*	111-178	*range for state*	123-209
1990		**1991**		**1992**		**1993**		**1999 (of 1997-2001)**	
Tobesofkee	173	High Falls	190	High Falls	194	High Falls	195	High Falls	169
Jackson	168	Jackson	162	Tobesofkee	176	Jackson	173	Tobesofkee	164
High Falls	159	Tobesofkee	149	Jackson	166	Tobesofkee	169	Jackson	161
Juliette	132	Juliette	133	Juliette	131	Juliette	136	Juliette	131
range for state	118-182	*range for state*	121-193	*range for state*	131-194	*range for state*	122-195	*range for state (1997-2001)*	119-169

Note: Higher values represent more eutrophic conditions.

DNR State Park Lake Swimming Beach Monitoring

The DNR Parks, Recreation and Historic Sites Division (PRHSD), operates public beaches on small lakes and reservoirs at some of the state parks in Georgia. State park beach monitoring of fecal coliform bacteria was conducted on a periodic park-by-park basis prior to 1996. Since 1996, an annual lake swimming beach monitoring project has been conducted by DNR at freshwater inland beaches operated by the PRHSD and will be continued as resources allow.

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 5-5. 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 Ocmulgee River basin, there are guidelines for mercury and PCBs 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 X 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 3 g/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 5-5. 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, EPD incorporated specific limitations on toxic pollutants in NPDES discharge permits wherever discharges were found to have toxic impacts or to include toxic pollutants.

In 1983, EPD intensified toxic substance stream monitoring efforts. This expanded toxic substance stream monitoring project includes 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 is now accomplished as needed as 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 water body supports its classified use. Depending on the frequency with which standards are not met, the water body is said to be supporting, partially supporting, or not supporting the designated use (see Box 5-1).

Appendix D includes lists of all 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 water body 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 consumption was in place for the water body.
  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 water body.
- 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 water body.

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-I: 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 Ocmulgee 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 some 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 USEPA guidance, which suggests any single excursion of a metal's 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 water body 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 residue 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 water body. 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 water body was placed in the partially supporting category. If the Value is greater than or equal to 2.0 mg/kg, a water body was placed in the not supporting category. See Box 5-2 for more details.

Fish/Shellfish Consumption Guidelines – Contaminants Other than Mercury

A water body 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 water body 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, 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 water body, that water body 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 Mercury Study Report to Congress (USEPA, 1997) and the 2000 Human Health Methodology (USEPA, 2000), and incorporated national dietary patterns of consumption across different 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 water body 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 Ocmulgee River basin. Most of these results were previously summarized in the Georgia 2002 305(b)/303(d) listing (Georgia DNR, 2002). Results are presented by HUC. A geographic summary of assessment results is provided by HUC in Figures 5-2 through 5-4.

Upper Ocmulgee River Subbasin (HUC 03070103)

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 68 stations located within this subbasin during 1999. Of those, seven are 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.

Four segments of the Ocmulgee River and 66 tributary segments were assessed as fully supporting the water use classification of fishing, drinking water, and/or recreation. 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 39 stream segments listed in this subbasin as not fully supporting designated water uses due to poor fish communities or sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing and/or drinking water was not fully supported in one Ocmulgee River segment, 58 tributary stream segments, and a 650 acre portion of Jackson Lake 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 Tissue

The water use classification of fishing was not fully supported in one segment of the Ocmulgee River (flathead catfish), one segment of the South River (largemouth bass), and in Jackson (channel catfish) and High Falls Lakes (largemouth bass and channel catfish) based on the listing of fish consumption guidelines recommended due to PCB residues in fish tissue. In High Falls Lake, new fish tissue data has been collected and assessed that documents that PCB residues have decreased below significant levels (DNR, 2003), and therefore it will be de-listed in the 2004 305(b)/303(d) list.

The water use classification of drinking water was not fully supported in Big Haynes Reservoir in Rockdale County based on mercury residues in fish tissue. The assessment for mercury in fish tissue is based on Trophic-Weighted Residue Value being in excess of 0.3 mg of mercury per kilogram of fish tissue. See Box 5-2 for details regarding assessment of mercury in fish tissue.

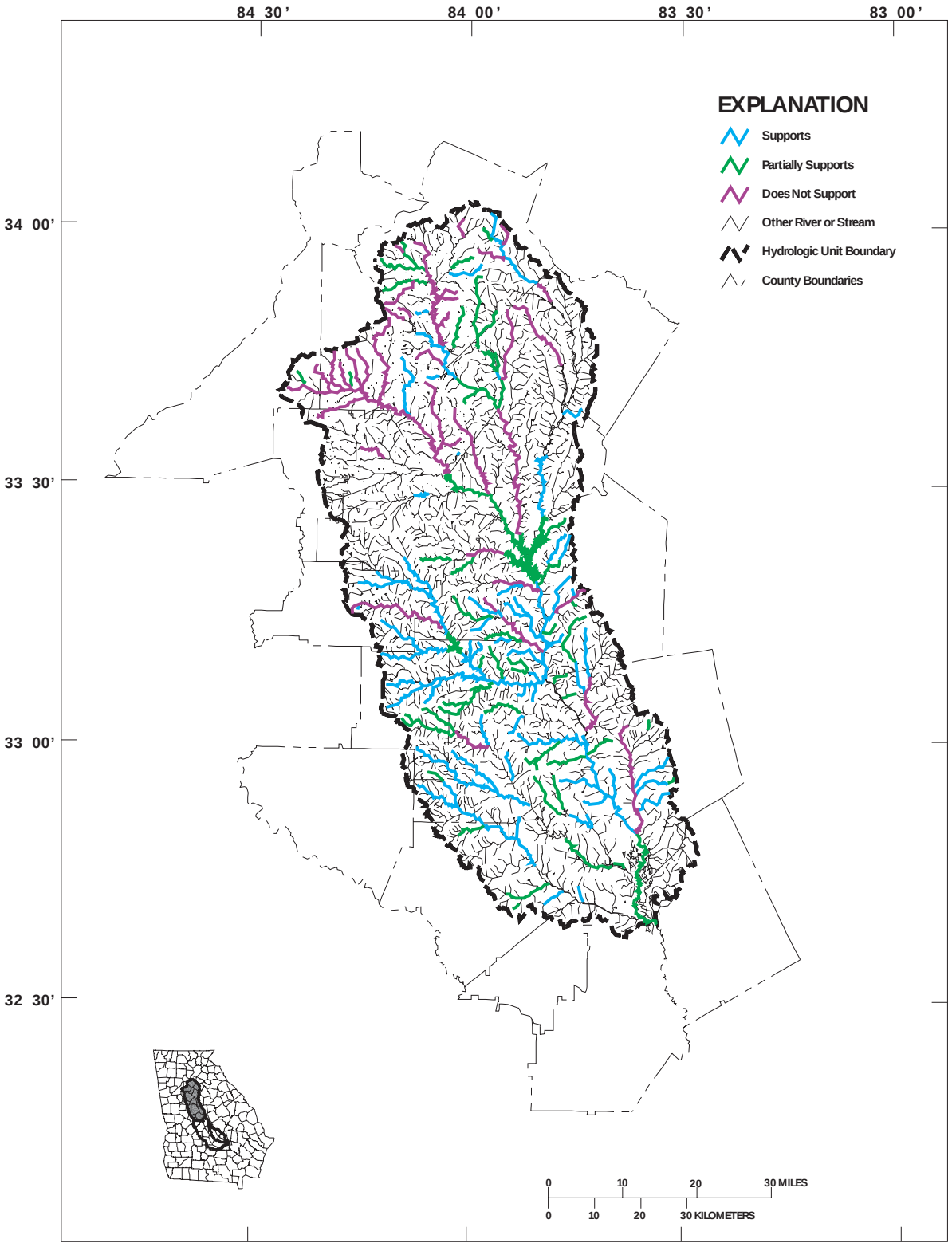

Figure 5-2. Geographic Summary of Assessment Results in the Ocmulgee River Basin, HUC 03070103 (Upper Ocmulgee River)

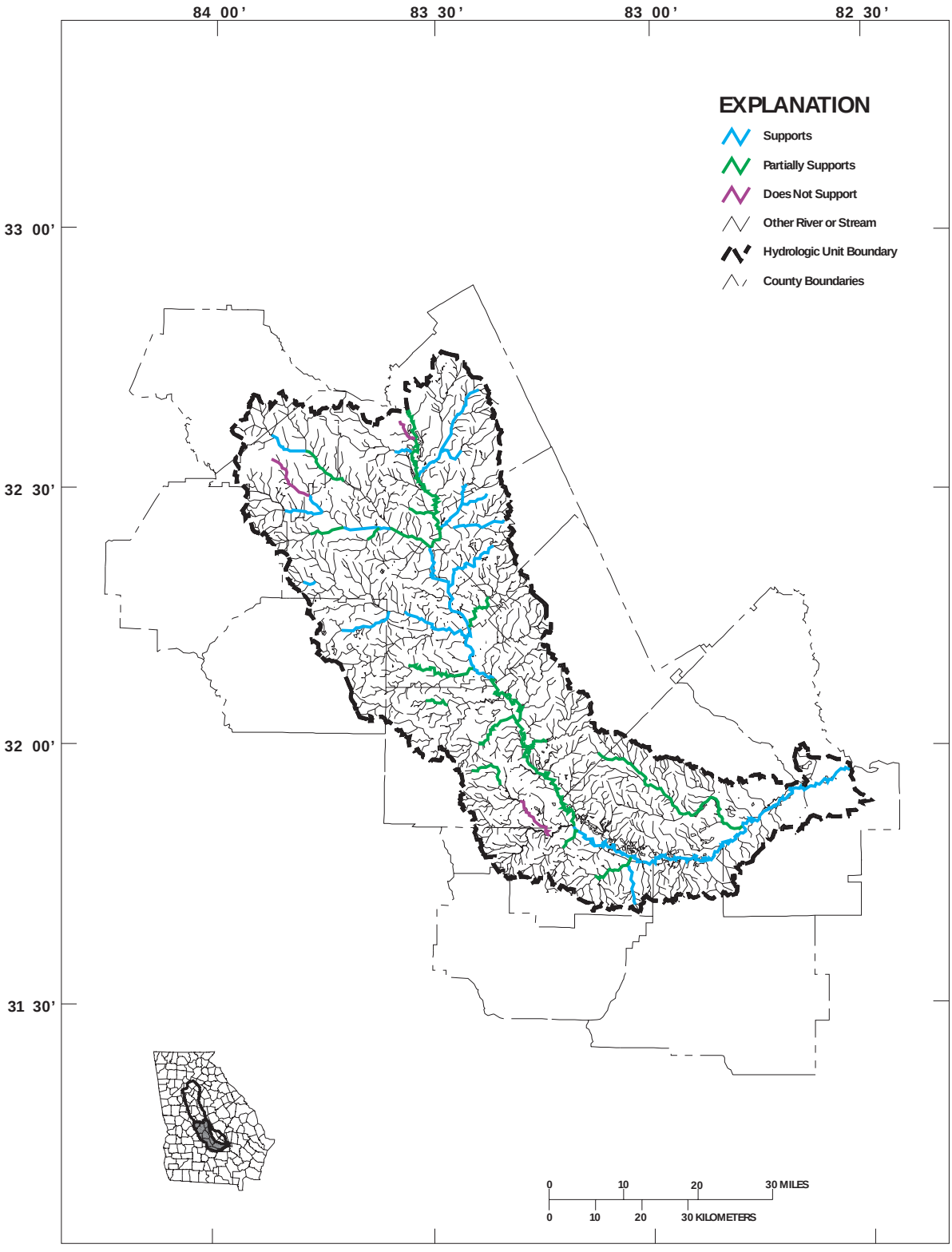

Figure 5-3. Geographic Summary of Assessment Results in the Ocmulgee River Basin, HUC 03070104 (Lower Ocmulgee River)

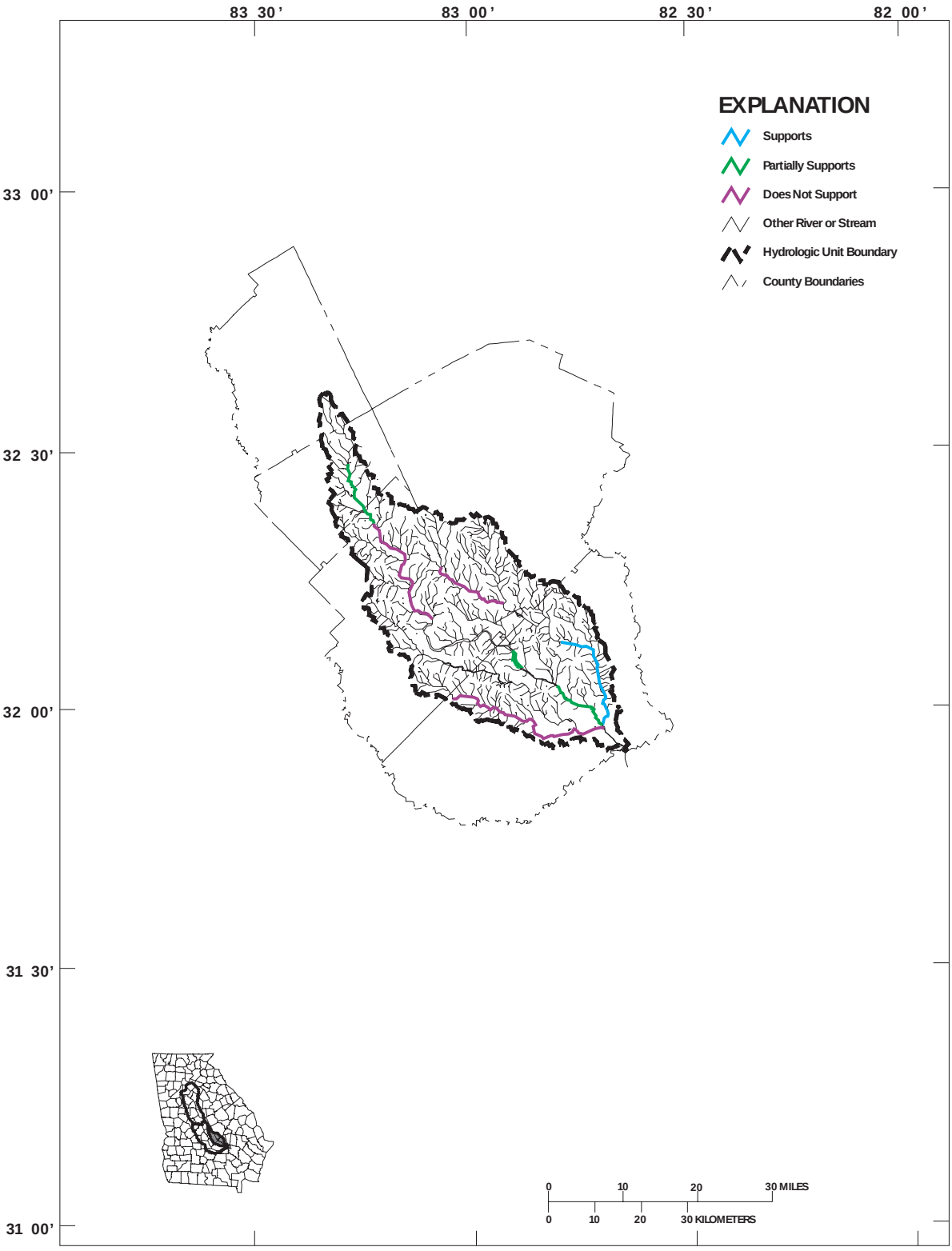

Figure 5-4. Geographic Summary of Assessment Results in the Ocmulgee River Basin, HUC 03070105 (Little Ocmulgee River)

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in two 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 the cause of low dissolved oxygen in streams in the Ocmulgee River basin.

pH

The water use classification of fishing was not fully supported in one tributary stream segment due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to nonpoint source influences or natural conditions.

Toxicity

The water use classification of fishing was not fully supported in two tributary stream segments due to toxicity. Aquatic toxicity tests of effluent from dischargers predicted toxicity in the receiving streams at critical, low flow conditions.

Lower Ocmulgee River Subbasin (HUC 03070104)

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 14 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 segments of the Ocmulgee River and 16 tributary segments (totaling 210 miles) were assessed as 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 15 stream segments listed in this subbasin as not fully supporting designated water uses due to poor fish communities or sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing and/or drinking water was not fully supported in two Ocmulgee River mainstem segment and three 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 two Ocmulgee River mainstem segments due to PCB residues in fish tissue. The guidelines are for flathead catfish.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in four 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. Horse Creek in Houston County was also affected by a municipal water pollution control plant. The plant relocated its

discharge point from Horse Creek to the Ocmulgee River on August 31, 1999. Natural conditions may contribute to or be the cause of low dissolved oxygen in many streams in the Ocmulgee River basin.

Metals

The water use classification of fishing was not fully supported in one Ocmulgee River mainstem segment due to exceedance of metals standards (mercury) from nonpoint sources.

pH

The water use classification of fishing was not fully supported in two tributary streams due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to point source influences, nonpoint source influences, or natural conditions.

Little Ocmulgee River Subbasin (HUC 03070105)

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 seven 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 from 1999.

One tributary segments was assessed as 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 or sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in two 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 Little Ocmulgee State Park Lake (Gum Creek Swamp) in Telfair and Wheeler Counties based on mercury residues in fish tissue. The assessment for mercury 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 for details regarding assessment of mercury in fish tissue.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in one Little Ocmulgee River mainstem segment and four 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 Ocmulgee River basin.

pH

The water use classification of fishing was not fully supported in one tributary stream segment due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to point source influences, nonpoint source influences, or natural conditions.

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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 Ocmulgee 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

Section 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 fecal coliform bacteria followed biota impacts, dissolved oxygen and fish consumption issues. Fecal coliform bacteria are associated primarily with urban runoff or nonpoint sources. Biota impacts are due primary to nonpoint sources such as urban runoff, development, and agriculture. Low dissolved oxygen conditions were primarily associated with natural drought conditions. Three lakes and portions of the South and Ocmulgee Rivers were listed due to fish consumption issues. Fish consumption issues on the river segments and two of the lakes are associated with PCBs (which are no longer manufactured but persist in the aquatic environment for some time). Mercury was the issue with fish tissue at the third lake. Five segments were listed due to pH exceedances, one segment was listed for mercury exceedance, and two segments were listed as a result of aquatic toxicity testing results on municipal or industrial water pollution control plant effluent, which predicted toxicity in the receiving stream at critical low 7Q10 stream flows.

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. Further, strong 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 Ocmulgee 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-I. Summary of Concerns in the Ocmulgee River Basin

Stressors of Concern	Potential Source of the Stressor by HUC		
	HUC 03070103	HUC 03070104	HUC 03070105
Fecal Coliform Bacteria	Multiple source potential	Multiple source potential	Multiple source potential
Erosion and Sedimentation	Urban and Rural NPS	Urban and Rural NPS	Urban and Rural NPS
Dissolved Oxygen	Natural Inputs, Urban and Rural NPS, WPCP and Industrial effluent	Natural Inputs, Urban and Rural NPS, WPCP effluent	Natural Inputs, Urban and Rural NPS, WPCP effluent
Fish Consumption Guidelines	PCBs persisting in environment	PCBs persisting in environment	Nonpoint Mercury
pH	Natural inputs, Urban and Rural NPS	Natural inputs, Urban and Rural NPS, WPCP effluent	Natural inputs, Urban and Rural NPS
Metals		Nonpoint Mercury	
Toxicity	Municipal or Industrial effluent		

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

Use Classification of Water Body Segments	Pollutants Causing Impairment by HUC		
	HUC 03070103	HUC 03070104	HUC 03070105
Fishing (Support for Aquatic Life)	Sediment, pH, low DO, toxicity	Sediment, pH, low DO, metals	Sediment, pH, low DO
Fishing (Fish Consumption)	PCBs	PCBs	Mercury
Fishing (Secondary Contact Recreation)	Fecal coliform bacteria	Fecal coliform bacteria	Fecal coliform bacteria
Drinking Water	Fecal coliform bacteria		
Recreation	Fecal coliform bacteria		

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

Upper Ocmulgee River Subbasin (HUC 03070103)

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 39 stream segments listed in this subbasin as not fully supporting designated water uses due to poor fish communities or sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing and/or drinking water was not fully supported in one Ocmulgee River mainstem segment, 58 tributary stream segments, and a 650 acre portion of Jackson Lake 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 Tissue

The water use classification of fishing was not fully supported in two segments of the Ocmulgee River (flathead catfish), one segment of the South River (largemouth bass), and in Jackson (channel catfish) and High Falls Lakes (largemouth bass and channel catfish) based on PCB residues in fish tissue.

The water use classification of drinking water was not fully supported in Big Haynes Reservoir in Rockdale County based on mercury residues in fish tissue. The assessment for mercury in fish tissue 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 regarding assessment of mercury in fish tissue.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in two 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 the cause of low dissolved oxygen in streams in the Ocmulgee River basin.

Nutrients

The water use classifications of fishing or recreation are potentially threatened in Lakes Jackson, Juliette, Tobesobkee and High Falls Lake due to inputs of nutrients, which may cause excess algal growths in the lakes. Nutrient sources include water pollution control plant discharges, lake fertilization and nonpoint sources from urban and agricultural areas.

pH

The water use classification of fishing was not fully supported in one tributary stream segment due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to nonpoint source influences or natural conditions.

Toxicity

The water use classification of fishing was not fully supported in two tributary stream segments due to toxicity. Aquatic toxicity tests of effluent from dischargers predicted toxicity in the receiving streams at critical, low flow conditions.

Lower Ocmulgee River Subbasin (HUC 03070104)

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 15 stream segments listed in this subbasin as not fully supporting designated water uses due to poor fish communities or sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing and/or drinking water was not fully supported in one Ocmulgee River mainstem segment and three 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 one Ocmulgee River mainstem segment due to PCB residues in fish tissue. The guidelines are for flathead catfish.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in four 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. Horse Creek in Houston County was also affected by effluent from a municipal water pollution control plant. The plant relocated its discharge point from Horse Creek to the Ocmulgee River on August 31, 1999. Natural conditions may contribute to or be the cause of low dissolved oxygen in many streams in the Ocmulgee River basin.

Metals

The water use classification of fishing was not fully supported in one Ocmulgee River mainstem segment due to exceedance of metals standards (mercury) from nonpoint sources.

pH

The water use classification of fishing was not fully supported in two tributary streams due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to point source influences, nonpoint source influences, or natural conditions.

Little Ocmulgee River Subbasin (HUC 03070105)

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 or sedimentation.

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in two 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 Little Ocmulgee State Park Lake (Gum Creek Swamp) in Telfair and Wheeler Counties based on mercury residues in fish tissue. The assessment for mercury 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 regarding assessment of mercury in fish tissue.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in one Little Ocmulgee River mainstem segment and four 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 Ocmulgee River basin.

pH

The water use classification of fishing was not fully supported in two tributary stream segments due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to point source influences, nonpoint source influences, or natural conditions.

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 Ocmulgee 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 Ocmulgee 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 with multiple data points which showed metals concentrations from nonpoint sources in excess of water quality standards and 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 standards violations for pH, fecal coliform bacteria or issues with biota (sedimentation) or fish tissue. Waters added to the Georgia 303(d) list by USEPA 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 Ocmulgee 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 standard are in question in the scientific community. 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 Ocmulgee 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 Ocmulgee 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 south central region of the state which includes the Ocmulgee 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.

Among 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 2,333 permits are in the Ocmulgee 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: Georgia completed and adopted a Drought Plan in March 2003.)

6.3.1 Priorities for Competing Demands

With regard to the priority 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 and Industrial (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) cannot be met under conditions of water shortage, efforts will be made to optimize the mix of economic and environmental values.

References

EPD. 2002. Water Quality in Georgia, 2000-2001. Georgia Department of Natural Resources, Environmental Protection Division, Atlanta, Georgia.

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

In This Section

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 Ocmulgee 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 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 Ocmulgee 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 Ocmulgee River basin. Section 7.2 describes the general and basinwide implementation strategies most relevant to the Ocmulgee 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 Ocmulgee River Basin

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

- Protecting water quality in lakes, rivers, and streams 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 waterborne 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 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 Ocmulgee 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 Ocmulgee River basin.

7.1.1 Water Quality Overview

As discussed in Section 5, water quality in the Ocmulgee 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 Ocmulgee River basin results from nonpoint sources. Key types of nonpoint source pollution impairing or potentially threatening water quality in the Ocmulgee River basin include erosion and sedimentation, bacteria and oxygen demanding substances from urban and rural nonpoint sources, metals from urban and rural 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 Ocmulgee 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 (RDCs). 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 Ocmulgee 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 Ocmulgee 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 USEPA guidance. The TMDL will specify the allowable loading of a pollutant from both point and nonpoint sources. 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 a nonpoint source. In those cases where the cause of the problem is a municipal or industrial water pollution control plan discharge, 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 Ocmulgee 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 USEPA 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 sub-section 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 for specific waters as needed. 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 Ocmulgee 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, four major conservation programs from USDA will be available to producers and rural landowners. These are the Environmental Quality Incentives Program (EQIP); 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. These conservation programs are also augmented by the NRCS watershed program, which provides landowners with cost share incentives to install conservation measures.

Forestry is a major part of the economy in the Ocmulgee basin. The Georgia Forestry Commission (GFC) is the lead agency for controlling silvicultural nonpoint source pollution. The GFC develops forestry BMP practice guidelines, encourages BMP implementation via University of Georgia sponsored educational workshops and demonstrations, 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 Ocmulgee 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* 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 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. (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 2,333 permits are in the Ocmulgee River basin.)

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 Ocmulgee 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 water body. 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 Ocmulgee River basin, it will become even 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) sets 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 7 mile radius of the intake and 50/75 feet outside the 7 mile radius; and
- A reservoir management plan (including a 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; and
- 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 USEPA's initiatives.

USEPA 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. USEPA 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 assist 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 USEPA in November 2001. The public and USEPA 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 USEPA in March 2002. USEPA 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 Ocmulgee 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 Ocmulgee 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:

NA Waters assessed as supporting designated uses. These waters are not part of the Georgia 303(d) list.

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 USEPA. 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 developed 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.

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 water body 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.

History

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:

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 water body 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 achieves compliance with water quality standards and supports designated uses.

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 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 Ocmulgee 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 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 re-issuance. 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 two 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 previously noted.

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 re-issuance. 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 re-issuance. 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. An example would be in the upper Ocmulgee River basin. EPD has established water quality standards for total phosphorus loading for major tributaries to Jackson Lake (see Table 5-3). Based on the tributary standards, EPD is implementing a strategy to reduce phosphorus loading from upstream water pollution control plant discharges.

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 to not elevate the receiving stream more than 2 degrees Fahrenheit. There are no trout streams in the Ocmulgee River basin.

Stormwater 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 EPD subsequently received delegation from the USEPA in January 1991 to issue NPDES permits for regulating stormwater in Georgia. EPD 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 EPD 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 EPD. Each year, the EPD 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 Stormwater Management Program. The EPD provides comments on the Annual Reports to the MS4 permittees, noting areas of noncompliance and recommending improvements to the local Stormwater Management Programs.

On December 8, 1999 USEPA promulgated the Phase II Rules for Storm Water. Phase II requires NPDES permitting and the development of Stormwater 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). EPD 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, EPD 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 EPD has issued general permits for the 11 industrial subcategories defined in the Phase I Federal Storm Water Regulations. During 1993, the EPD 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 Notice of Intent applications for this general permit have been submitted to the EPD.

A second general NPDES permit that would regulate stormwater discharges from construction activities was issued by EPD and subsequently appealed in 1992, 1994, 1995, 1996, and 1999. Settlement negotiations involving the regulated community who filed the three petitions, several environmental organizations, EPD, and a professional facilitator began in October 1999. After months of negotiation, EPD 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 EPD 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 reports, *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 USEPA 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 USEPA: Agriculture, Silviculture, Construction, Urban Runoff, Resource Extraction, Land Disposal, Hydrologic/Habitat Modification, and Other Nonpoint Sources. The Georgia EPD 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

Georgia's Soil and Water Conservation Districts (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

Georgia's Soil and Water Conservation Commission (SWCDs) receive no annual appropriations and are not regulatory or enforcement agencies. Therefore, the Georgia Soil and Water Conservation Commission (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 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 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. 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 2002 Farm Bill provides a number of programs and processes designed to address 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.

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, Occupational Safety and Health Administration (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 EPD 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. Part of the Oconee National Forest is located in the Ocmulgee River basin in Jasper and Jones counties.

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, and community Adopt-A-Stream programs.
- 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 7.3.6.
- Implement the Georgia Adopt-A-Stream Program, as described in Section 7.3.6.
- 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, most recently in 2001. The legislative intent of the Act was to establish a comprehensive statewide soil, erosion and sedimentation control program to protect and conserve air, land, and water resources. This was to be accomplished 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 statues 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 (DNR), 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 Zell 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 protects 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 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 USEPA 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 USEPA carry out enforcement in freshwater wetlands. Normal 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 uplands by major drainage nor convert certain bottomland hardwood wetlands to pine stands via mechanical site preparation without first securing a permit from the COE.

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 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 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 previously.

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 awareness of how individuals 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 individuals' 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 water body. 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 USEPA 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 ground water pollution. To do this, Georgia will assess, protect, and, where practical, enhance the quality of ground waters 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. EPD'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.

Groundwater 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 USEPA-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 clean up 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 Ocmulgee 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 Ocmulgee River basin.

7.3.IFecal Coliform Bacteria

Problem Statement

The water use classification of fishing and/or drinking water was not fully supported in 65 stream segments and a portion of 1 lake due to exceedances of the water quality standards for fecal coliform bacteria. These water quality exceedances are found throughout the Ocmulgee River basin and are primarily attributed to urban runoff, septic systems, sanitary sewer overflows, wastewater treatment plant discharges, 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.

Upper Ocmulgee River Subbasin (HUC 03070103)

The water use classification of fishing and/or drinking water was not fully supported in 1 Ocmulgee River mainstem segment, and 58 tributary stream segments, and a 650-acre portion of Jackson Lake 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.

Lower Ocmulgee River Subbasin (HUC 03070104)

The water use classification of fishing and/or drinking water was not fully supported in two Ocmulgee River mainstem segment and three 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.

Little Ocmulgee River Subbasin (HUC 03070105)

The water use classification of fishing was not fully supported in two 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

General goals for this plan are to meet water quality standards to support designated water uses and 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 Ocmulgee River basin follow.

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

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. Ongoing training activities within the basin that address fecal coliform concerns include Sustainable Agriculture and Farm-A-Syst. 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 USDA or other funding 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 7-1) on the 303(d) list impacted by fecal coliform bacteria (see Box 7-1 for background information about TMDLs).

Sources Considered in TMDL

Nonpoint sources had the greatest impact on fecal coliform bacteria loading in the Ocmulgee River basin, while most point sources did not significantly impact fecal coliform bacteria loading. Point sources were identified in 33 listed segments; nonpoint sources occurred in all 66 segments. Point sources were water pollution control plants (WPCPs) and combined sewer overflows (CSOs). Urban nonpoint sources included stormwater runoff, leaking sewer collection systems, leachate from landfills, improper disposal of waste materials, and domestic animal feces. 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 5-10 years. A 30-day critical period was determined during which the highest simulated violation of the standard occurred (geometric mean of at least 4 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 period.

Simulated loading over the 30-day critical period was adjusted so that the geometric mean of the concentrations (the nth root of the product of n concentrations) at each segment's outlet was less than or equal to the target of 200 counts/ 100 mL. TMDLs were calculated as the sum of point and nonpoint source loads over the 30-day critical period and a margin of safety was applied. A TMDL was reported for each listed stream segment (Table 7-1).

TMDL Implementation

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

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, EPD and USEPA finalized TMDLs for stream segments on the 2002 303(d) list for the Ocmulgee River basin in 2002. 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.

Table 7-I. Fecal Coliform Bacteria TMDLs in the Ocmulgee River Basin

Stream Name	Segment Description[1]	HUC	Length (miles)	Use Support[2]	TMDL (#/30 days)
Alcovy River	Cedar Creek to Bay Creek	03070103	4	NS	4.74E+12
Alligator Creek	Batson Creek to Lime Sink Creek	03070105	12	NS	9.20E+12
Almand Branch	Tanyard Branch to Snapping Shoals	03070103	5	NS	7.73E+11
Bay Creek	Headwaters to Beaver Creek	03070104	9	NS	3.02E+11
Beaver Ruin Creek	Gwinnett County	03070103	8	PS	3.11E+12
Big Cotton Indian Creek	Panther Creek to Brush Creek	03070103	5	NS	2.25E+12
Big Flat Creek	Headwaters to Flat Creek	03070103	13	NS	7.26E+12
Big Haynes Creek	Brushy Creek to Little Panther Creek	03070103	2	PS	2.68E+12
Big Haynes Creek	Headwaters to Brushy Creek	03070403 03070103	9	PS	2.68E+12
Big Haynes Creek	Little Haynes Creek to Yellow River	03070103	5	PS	2.68E+12
Big Indian Creek	Mossy Creek to Ocmulgee	03070104	7	PS	3.27E+12
Big Sandy Creek	Aboothlacoosta Creek to Ocmulgee	03070103	10	NS	5.60E+11
Bromolow Creek	Headwaters to Beaver Ruin Creek	03070103	5	PS	7.75E+12
Cabin Creek	Headwaters Griffin to Towaliga River	03070103	16	NS	6.06E+11
Camp Creek	Headwaters to Jackson Creek	03070103	6	NS	3.20E+12
Cedar Creek	Headwaters to Alcovy River	03070103	4	PS	1.72E+11
Cobbs Creek	Headwaters to Shoal Creek	03070103	7	NS	2.96E+12
Conley Creek	Headwaters to South River	03070103	9	NS	4.88E+12
Doless Creek	Headwaters to Doolittle Creek	03070103	2	PS	8.52E+10
Doolittle Creek	Headwaters to South River	03070103	5	NS	1.15E+12
Falling Creek	Little Falling Creek to Ocmulgee River	03070103	9	NS	7.52E+11
Honey Creek	Headwaters to South River	03070103	13	NS	2.94E+11
Hopkins Creek	Headwaters to Alcovy River	03070103	4	NS	3.33E+11
House Creek	Ball Creek to Little House Creek	03070104	8	NS	1.51E+11
Intrenchment Creek	Headwaters to South River	03070103	6	NS	4.40E+12
Jacks Creek	Headwaters to Yellow River	03070103	4	NS	1.65E+12
Jackson Creek	Gwinnett County	03070103	7	PS	1.03E+13
Little Haynes Creek	Hwy 20 to Big Haynes Creek	03070103	11	NS	9.33E+11
Little Stone Mountain Creek	Headwaters to Stone Mountain Lake	03070103	3	NS	5.34E+11
Little Suwanee Creek	Tributary to Yellow River	03070103	2	NS	1.48E+12
McClain Branch	Headwaters to Honey Creek	03070103	2	NS	3.45E+11
No Business Creek	Headwaters to Norris Lake	03070103	6	NS	2.25E+l2
North Branch South River	Atlanta	03070103	3	PS	4.36E+11
Ocmulgee River	Sandy Run Creek to Big Indian Creek	03070104	23	PS	9.24E+15
Ocmulgee River	Tobesofkee Creek to Echeconnee Creek	03070103	7	PS	1.06E+14
Pew Creek	Gwinnett County	03070103	4	PS	1.35E+12
Rocky Creek	D/s English Rd (CR152) to Tawaliga River	03070103	5	PS	5.5E+12
Shetley Creek	Headwaters to Bromolow Creek	03070103	2	NS	6.85E+11
Shoal Creek	Headwaters to Alcovy River	03070103	5	NS	8.13E+11
Shoal Creek	Headwaters to South River	03070103	7	NS	1.29E+12
Snapfinger Creek	DeKalb County	03070103	18	NS	7.59E+11

Stream Name	Segment Description[1]	HUC	Length (miles)	Use Support[2]	TMDL (#/30 days)
Snapping Shoals Creek	Almand Branch to South River	03070103	10	NS	1.85E+12
South River	Atlanta to Flakes Mill Road	03070103	16	NS	3.106E+13
South River	Flakes Mill Road to Pole Bridge Creek	03070103	9	NS	5.87E+13
South River	Pole Bridge Creek To Hwy 20	03070103	15	NS	8.64E+13
South River	Snapping Shoals to Jackson Lake	03070103	7	PS	1.49E+14
South River	Hwy 20 to Snapping Shoals Creek	03070103	11	PS	1.49E+14
Stone Mountain Creek	Headwaters to Stone Mountain Lake	03070103	4	NS	1.72E+12
Sugar Creek	U/S Memorial Drive to South River	03070103	6	NS	1.68E+12
Sweetwater Creek	Lee Daniel Creek to Yellow River	03070103	6	NS	1.85E+13
Swift Creek	Headwaters to Yellow River	03070103	5	NS	7.96E+11
Tobesofkee Creek	Cole Creek to Todd Creek	03070103	8	NS	5.82E+11
Tobesofkee Creek	Lake Tobesofkee to Rocky Creek	03070103	10	PS	5.82E+11
Town Branch	D/S Jackson South WPCP to Aboothlacoosta Creek	03070103	3	NS	2.75E+11
Turkey Creek	Headwaters to Yellow River	03070103	4	NS	7.30E+11
Turnpike Creek	Hwy 280 to Sugar Creek	03070105	24	NS	7.76E+12
Tussahaw Creek	Wolf Creek to Lake Jackson	03070103	6	NS	3.67E+14
Walnut Creek	Headwaters to Ocmulgee River	03070103	20	NS	4.02E+11
Watson Creek	Headwaters to Yellow River	03070103	3	NS	1.07E+12
Wise Creek	Headwaters to Ocmulgee River	03070103	6	NS	1.79E+11
Yellow River	Big Haynes Creek to Jackson Lake	03070103	25	NS	8.25E+13
Yellow River	Hammock Creek to Big Haynes Creek	03070103	9	PS	6.53E+13
Yellow River	Sweetwater Creek to Centerville Creek	03070103	15	NS	5.23E+13
Yellow Water Creek	1 mile d/s Stark Road	03070103	7	NS	2.84E+11
Lake Jackson	Newton, Butts, and Jasper Counties	03070103	N/A[3]	PS	TBD[4]

[1]See Appendix D for designated uses.
[2]NS = Not supporting designated use; PS = Partially supporting designated
[3]Affected area equals 650 acres.
[4]To be determined. Monitoring data was insufficient to develop a TMDL.

Management Option Evaluation

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

Action Plan

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

EPD will assess use support in listed stream segments and encourage 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 the attention of localities 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 Ocmulgee 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 work force 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 were completed for stream segments on the 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 2002 Farm Bill will

be targeted to areas of apparent water quality impact, including rural streams that may contain excessive fecal coliform loads from animal and cropland operations.

Local SWCDs will convene Local Work Groups to identify local 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 Ocmulgee River basin in 2007.

7.3.2 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. There are 55 stream segments listed in this subbasin as not fully supporting designated uses due to poor fish communities or sedimentation. 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.

Upper Ocmulgee River Subbasin (HUC 03070103)

There are 39 stream segments listed in this subbasin as not fully supporting the designated water use of fishing due to poor fish communities due to sedimentation.

Lower Ocmulgee River Subbasin (HUC 03070104)

There are 15 stream segments listed in this subbasin as not fully supporting the designated water use of fishing due to poor fish communities due to sedimentation.

Little Ocmulgee River Subbasin (HUC 03070105)

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

General Goals

A general goal of this plan is to control erosion and sedimentation from land disturbing activities in order to meet narrative turbidity water quality standards and support designated uses. The plan also seeks to increase public awareness of erosion and sedimentation through coordinated education and outreach efforts.

Ongoing Efforts

General ongoing efforts as well as a summary of the sediment TMDLs in the Ocmulgee River basin follow.

A. General Efforts

Sediment TMDLs have been completed for 41 stream segments. TMDL implementation plans will be developed in 2003. TMDLs will be developed during the next basin planning cycle for 16 stream segments that were added to the Georgia 2002 303(d) list based on data collected in 2001.

Forestry and Agriculture both have voluntary Erosion and Sedimentation Control Act (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 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 from their surveys for increased BMP education through local talks, workshops, etc. The Georgia Forestry Association, the American Forest and Paper Association (AF&PA), and the University of Georgia 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 and 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 EPD and subsequently appealed in 1992, 1994, 1995, 1996, and 1999. Settlement negotiations involving the regulated community who filed the three petitions, several environmental organizations, EPD, and a professional facilitator began in October 1999. After months of negotiation, EPD 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. 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 Task Force, which conducted over 200 inspections between May and September 2001. The Task Force 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 called 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 Department of Transportation (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 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 Erosion and 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 that 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 Ocmulgee River basin.

Forestry BMP Education

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

- Upper Ocmulgee River Subbasin (Hydrologic Unit 03070103) – 153 personnel
- Lower Ocmulgee River Subbasin (Hydrologic Unit 03070104) – 141 personnel
- Little Ocmulgee River Subbasin (Hydrologic Unit 03070105) – 61 personnel

Upper Ocmulgee River Subbasin (HUC 03070103)

The GFC conducted BMP Implementation and Compliance Surveys in 1991, 1992, 1998, and in 2002. No data was extracted specifically for the Ocmulgee River basin during the 1991 survey. However the data for the Upper Ocmulgee River subbasin should

be similar to the statewide data for the Piedmont region. There, the results indicate that the overall percentage of acres in compliance with BMPs was 77.9 percent. The percentage of streambanks or channels in compliance with BMPs was 95.9 percent.

During the 1992 survey, the GFC examined approximately 1,295 acres on 17 sites in the Upper Ocmulgee subbasin. Fifteen sites were evaluated on non-industrial private forestlands (NIPF), with one each evaluated on forest industry and public lands. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 90 percent of the harvested acres were in compliance with BMPs. By ownership, compliance was 89.2 percent on NIPF and 100 percent on both forest industry and public lands.
- Overall, 94 percent of main haul road miles were in compliance with BMPs. By ownership, compliance was 94 percent on NIPF, 100 percent on forest industry, and 100 percent on public lands.
- No mechanical site-prepared acres were evaluated.
- There was one site that had chemical site preparation and that occurred on the NIPF landowner. The percentage of acres in compliance with BMPs was 99 percent. That one site also had been burned with 100 percent of the acres in compliance with BMPs. That site also was reforested with 100 percent of the acres being in compliance with BMPs.
- Overall, 89.9 percent of the acres were in compliance with BMPs. By ownership, compliance was 89.2 percent on NIPF and 100 percent on forest industry and public lands.
- There were 44.1 miles of stream evaluated with 99.1 percent being in compliance with BMPs.

During the 1998 survey, the GFC examined approximately 1,706 acres on 21 sites in the Upper Ocmulgee subbasin. Eighteen sites were on NIPF landowners and three 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, 93.9 percent of the streamside management zone (SMZ) acres were in compliance with BMPs with 12 water quality risks identified. The percentage of applicable BMPs implemented was 82 percent. The main problem was logging debris was left in stream channels on 41 percent of the sites. Rutting occurred on 20 percent of the sites. By ownership, overall compliance was 93.1 percent and implementation was 79.7 percent on NIPF lands. On forest industry lands, compliance and implementation were both 100 percent.

- Overall, 28 stream crossings were evaluated and all occurred on the NIPF lands. Only 17.9 percent were in full compliance with BMPs. The percentage of applicable BMP implementation was 42 percent resulting in 28 water quality risks identified. Serious problems were found regarding random crossings; steep approaches; proper culvert location; installation, inadequate size, and stabilization of exposed fill; and the use of skidder fords and debris and dirt type crossings and their removal.
- Overall, 59 percent of the forest road miles evaluated were in compliance with BMPs. The percentage of applicable BMPs implemented was 71.7 percent resulting in 8 water quality risks identified. The main problem was inadequate or lack of installation of water diversion measures in roads as this was done on only

29 percent of the sites. By ownership, on NIPF lands, overall compliance was 57.8 percent with 70.8 percent of the BMPs implemented resulting in 8 water quality risks identified. On forest industry lands, compliance was 66.7 percent, with 76 percent of the applicable BMPs being implemented and no water quality risks.

- Overall, 98.3 percent of the harvested acres were in compliance with BMPs. The percentage of BMP Implementation was 80.4 percent resulting in 9 water quality risks. The main problems found were log decks that were retired and stabilized on 38 percent of the sites and skid trails that were retired and stabilized on 50 percent of the sites. By ownership, on NIPF lands, overall compliance was 98 percent with 80 percent of the applicable BMPs implemented resulting in 9 water quality risks. On forest industry lands, compliance was 99 percent with 82 percent of the applicable BMPs implemented but no water quality risks identified.
- Overall, 100 percent of the mechanical site preparation, chemical site preparation, burning, and artificial regeneration acres were in compliance with BMPs as well as the percentage of BMP implementation. No water quality risks were identified.
- There were 7 perennial and 10 intermittent streams evaluated, accounting for approximately 7.94 miles of stream; 90.4 percent of those miles were in compliance with BMPs.
- Overall, 98.3 percent of the acres in the Upper Ocmulgee River subbasin were in compliance with BMPs. The percentage of applicable BMPs implemented was 72.6 percent resulting in 57 water quality risks. By ownership, compliance on NIPF lands was 98.0 percent with 71.2 percent of the applicable BMPs implemented resulting in all 57 water quality risks. On forest industry lands, BMP compliance was 99.1 percent, with 84.1 percent of the applicable BMPs implemented but no water quality risks identified.

During the 2002 survey, the GFC evaluated approximately 1,411 acres on 22 sites in the Upper Ocmulgee subbasin. Eighteen sites were on NIPF lands, two sites were on forest industry lands, and two sites were on public 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, 97.5 percent of the streamside management zone (SMZ) acres on 21 sites were in compliance with BMPs. The percentage of applicable BMPs implemented was 87 percent resulting in 9 water quality risks identified. The main problem was logging debris was left in stream channels on 32 percent of the sites. Roads within the SMZs were not maintained or adequately stabilized but on 28.6 percent of the sites. Water bars were not installed in firebreaks that tied into stream channels. By ownership, overall compliance was 95.5 percent and implementation was 83.9 percent on NIPF lands resulting in 9 water quality risks. On forest industry lands, compliance and implementation were both 100 percent. On public lands, compliance and implementation were both 100 percent.
- Overall, 16 stream crossings were evaluated on 13 sites. Thirteen of these crossings occurred on the NIPF lands, and the remaining three occurred on public lands. The forest industry did a great job of avoiding crossings altogether. On NIPF lands, six of the crossings were pre-existing, and seven were new and associated with the forest operation. Only 16.7 percent of the pre-existing crossings were in full compliance with BMPs while 28.6 percent of the new crossings were in compliance. Overall on NIPF lands, compliance was 23.1 percent and the percentage of applicable BMP implementation was 70.3 percent

resulting in 27 water quality risks identified. Serious problems were found regarding steep approaches, proper culvert installation, inadequate size and stabilization of exposed fill, the use of debris and dirt type crossings and their removal. On public lands, there were three new dirt and debris crossings used on one site. Compliance was zero percent and BMP implementation was 81.8 percent, but no water quality risk was identified.

- Overall, 23.8 percent of the 34.2 forest road miles evaluated on 21 sites were in compliance with BMPs. There were 32.62 miles of pre-existing road of which only 21.4 percent were in compliance with BMPs. Of the 1.58 miles of newly constructed road, 74.7 percent were in compliance with BMPs. The overall percentage of applicable BMPs implemented was 73.6 percent resulting in 18 water quality risks identified. The main problem was inadequate or lack of installation of water diversion measures in roads as this was done on only 29 percent of the sites. By ownership, on NIPF lands, overall compliance was 16.1 percent with 73.1 percent of the BMPs implemented resulting in 18 water quality risks identified. On forest industry lands, overall compliance was 93.5 percent with 79.2 percent of the applicable BMPs being implemented and no water quality risks. On public lands, overall compliance was 92.5 percent with 69.2 percent of the applicable BMPs being implemented.
- Overall, 99.2 percent of the harvested acres were in compliance with BMPs on 22 sites. The percentage of BMP implementation was 88.5 percent resulting in 5 water quality risks. Main problems found were log decks that were retired and stabilized on 85.7 percent of the sites and skid trails that were retired and stabilized on 68.8 percent of the sites. By ownership, on NIPF lands, overall compliance was 98.8 percent with 86.5 percent of the applicable BMPs implemented resulting in 5 water quality risks. On forest industry and public lands, compliance was 100 percent with 100 percent of the applicable BMPs implemented.
- There were no mechanical or chemical site preparation, artificial regeneration or forest fertilization sites evaluated in the subbasin.
- There was one site evaluated for pre-suppression firebreak plowing on NIPF lands. Approximately 1.53 miles of break were evaluated with none in compliance with BMPs or BMP implementation. Six water quality risks were identified.
- Overall, 22 sites were evaluated for equipment servicing. Overall BMP implementation was 98.5 percent. Only one site had evidence of improper servicing and that occurred on NIPF land.
- There were 4 perennial and 20 intermittent streams evaluated accounting for approximately 12.48 miles of stream of which 93.3 percent of those miles were in compliance with BMPs. The 2.65 miles of perennial streams were in 100 percent compliance, while the 9.83 miles of intermittent streams were in 91.56 percent compliance.
- Overall, 99.1 percent of the acres evaluated in the Upper Ocmulgee River subbasin were in compliance with BMPs. The percentage of applicable BMPs implemented was 81.7 percent resulting in 66 water quality risks. By ownership, the number of acres in compliance on NIPF lands was 98.7 percent with 79.9 percent of the applicable BMPs implemented resulting in all 66 water quality risks. On forest industry lands, the number of acres in BMP Compliance was 100 percent with 92.8 percent of the applicable BMPs implemented. On public lands, the number of acres in BMP Compliance was 100 percent with 89.7 percent of the applicable BMPs implemented.

Lower Ocmulgee River Subbasin (HUC 03070104)

The GFC conducted BMP Implementation and Compliance Surveys in 1991, 1992, 1998, and in 2002. No data was extracted specifically for the Ocmulgee River basin during the 1991 survey. However the data for the Lower Ocmulgee River subbasin should be similar to the statewide data for the Coastal Plain region where the percentage of acres in compliance with BMPs was 93.3 percent with 95.1 percent of the stream miles in compliance with BMPs.

During the 1992 survey, the GFC examined approximately 2,282 acres on 16 sites in this subbasin. Eleven sites were evaluated on non-industrial private forestlands (NIPF) with five on forest industry lands. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 89.6 percent of the harvested acres were in compliance with BMPs. By ownership, compliance was 79.4 percent on NIPF lands and 97.8 percent on forest industry.
- Overall, 86.7 percent of main haul road miles were in compliance with BMPs. By ownership, compliance was 82 percent on NIPF lands and 100 percent on forest industry.
- One mechanical site-prepared site was evaluated on both NIPF and forest industry land each. The percentage of acres in compliance was 100 percent.
- No sites were evaluated for chemical site preparation.
- One site was evaluated on both NIPF and forest industry land each for burning. Overall, 88.8 percent of the burned acres were in compliance with BMPs. By ownership, compliance was 85.1 percent on NIPF lands and 98 percent on forest industry.
- No sites were evaluated for reforestation.
- Overall, 89.4 percent of the total acres were in compliance with BMPs. By ownership, compliance was 81.7 percent on NIPF lands and 97.9 percent of forest industry lands.
- There were 16.6 miles of stream evaluated, with 92.2 percent of the miles being in compliance with BMPs.

During the 1998 survey, the GFC examined approximately 1,337 acres on 17 sites in the Lower Ocmulgee River subbasin. Thirteen sites were on NIPF lands and four 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 executed in their entirety over the tract. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 86.2 percent of the streamside management zone (SMZ) acres were in compliance with BMPs. The percentage of applicable BMPs implemented was 72.2 percent resulting in 5 water quality risks identified. The main problem was logging debris was left in stream channels on 89 percent of the sites. Rutting occurred on 22 percent of the sites. By ownership, compliance was 70.4 percent and implementation was 71.1 percent on NIPF lands resulting in 5 water quality risks. On forest industry lands, compliance was 93.6 percent with implementation at 77.8 percent but no water quality risks identified.
- Overall, 39 stream crossings were evaluated and only 7.7 percent were in full compliance with BMPs. The percentage of applicable BMP implementation was 52.9 percent resulting in 15 water quality risks identified. Serious problems were

found regarding random crossings; road ditches connected to stream channels; proper culvert location; installation, inadequate size, and stabilization of exposed fill; the use of skidder fords and debris and dirt type crossings, and their removal. By ownership, on NIPF lands, compliance was 0 percent and implementation was 49.1 percent resulting in 12 water quality risks. On forest industry lands, compliance was 42.9 percent and implementation was 64.7 percent resulting in 3 water quality risks.

- Overall, 88 percent of the forest road miles evaluated were in compliance with BMPs. The percentage of applicable BMPs implemented was 71.3 percent resulting in 3 water quality risks identified. The main problem was inadequate or lack of installation of water diversion measures in roads as this was done on only 21 percent of the sites. By ownership, on NIPF lands, overall compliance was 84.1 percent with 71.9 percent of the BMPs implemented resulting in 3 water quality risks identified. On forest industry lands, compliance was 91.3 percent, with 69.6 percent of the applicable BMPs being implemented and no water quality risks.
- Overall, 99.4 percent of the harvested acres were in compliance with BMPs. The percentage of BMP implementation was 94.9 percent resulting in no water quality risks. The main problem found was skid trails that were retired and stabilized on 71 percent of the sites. By ownership, on NIPF lands, overall compliance was 98.9 percent with 93.7 percent of the applicable BMPs implemented. On forest industry lands, compliance was 100 percent with 100 percent of the applicable BMPs implemented.
- Overall, 100 percent of the mechanical site preparation, chemical site preparation, burning, and artificial regeneration acres were in compliance with BMPs, as well as the percentage of BMP implementation. No water quality risks were identified.
- There were no perennial and 10 intermittent streams evaluated, accounting for approximately 10.41 miles of stream of which 88.6 percent were in compliance with BMPs.
- Overall, 99 percent of the acres evaluated in the Lower Ocmulgee River subbasin were in compliance with BMPs. The percentage of applicable BMPs implemented was 75 percent, resulting in 23 water quality risks. By ownership, compliance on NIPF lands was 98.4 percent with 73.9 percent of the applicable BMPs implemented resulting in 20 water quality risks. On forest industry lands, BMP compliance was 99.6 percent with 78.16 of the applicable BMPs implemented with 3 water quality risks identified.

During the 2002 survey, the GFC evaluated approximately 1,779 acres on 16 sites in the Lower Ocmulgee subbasin. Twelve sites were on NIPF lands and four sites were on forest industry lands. No sites were evaluated on public 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, 96.6 percent of the streamside management zone (SMZ) acres on 11 sites were in compliance with BMPs. The percentage of applicable BMPs implemented was 85.7 percent resulting in 4 water quality risks identified. Appropriate SMZ widths were established, and the recommended tree canopy was maintained on 81.8 percent of the sites. Harvesting within the SMZ minimized soil disturbance on 100 percent of the sites. Logging debris was left in stream channels on 10 percent of the sites. Roads within the SMZs were not maintained or adequately stabilized on any of the sites. Mechanical site preparation occurred within the

SMZ on 1 site. By ownership, overall compliance was 96.1 percent and implementation was 82.3 percent on NIPF lands resulting in 3 water quality risks. On forest industry lands, compliance was 97.4 percent, and implementation was 91.7 percent, resulting in 1 water quality risk.

- Overall, 26 stream crossings were evaluated on 8 sites. Twenty of these crossings occurred on the NIPF lands, and the remaining six occurred on forest industry lands. Sixteen of the crossings were pre-existing, and 10 were new and associated with the forest operation. Only 62.5 percent of the pre-existing crossings were in full compliance with BMPs while 10 percent of the new crossings were in compliance. Of the total crossings, 42.3 percent were in compliance with BMPs. By ownership, on NIPF lands, total compliance on 20 crossings was 50 percent, of which 90 percent of the pre-existing crossings were in compliance, while only 10 percent of the new crossings were in compliance. The percentage of applicable BMP implementation was 72.4 percent resulting in 21 water quality risks identified. Problems were found regarding proper culvert installation, inadequate size, and stabilization of exposed fill. The use of skidder fords and debris and dirt type crossings and their removal accounted for 45 percent of the non-compliance. On forest industry lands, there were 6 pre-existing crossings of which only 1 was in compliance. There were no new crossings constructed. Compliance was 16.7 percent, and BMP implementation was 65.4 percent, resulting in 6 water quality risks identified.
- Overall, 68.3 percent of the 12.32 forest road miles evaluated on 15 sites were in compliance with BMPs. There were 11.11 miles of pre-existing road of which only 64.9 percent were in compliance with BMPs. Of the 1.21 miles of newly constructed road, 100 percent were in compliance with BMPs. The overall percentage of applicable BMPs implemented was 77.2 percent resulting in 14 water quality risks identified. The main problem was inadequate or lack of installation of water diversion measures in roads, as this was done on only 45 percent of the sites. By ownership, on NIPF lands, overall compliance was 64.6 percent with 74.2 percent of the BMPs implemented resulting in 9 water quality risks identified. On forest industry lands, overall compliance was 78.6 percent with 83.7 percent of the applicable BMPs being implemented and 5 water quality risks.
- Overall, 99.9 percent of the harvested acres were in compliance with BMPs on 16 sites. The percentage of BMP implementation was 91.4 percent resulting in 4 water quality risks. Main problems found were skid trails were retired and stabilized on 50 percent of the sites. By ownership, on NIPF lands, overall compliance was 96.1 percent with 82.3 percent of the applicable BMPs implemented, resulting in 3 water quality risks. On forest industry and public lands, compliance was 97.4 percent with 91.7 percent of the applicable BMPs implemented resulting in 1 water quality risk.
- There was one mechanical site preparation site evaluated in the subbasin and that occurred on NIPF land. Overall, 100 percent of the acres were in compliance with BMPs, and 100 percent of the BMPs were implemented.
- There were no chemical site preparation, burning, artificial regeneration, or forest fertilization sites evaluated in the subbasin.
- Overall, 14 sites were evaluated for equipment servicing. Overall BMP implementation was 97.6 percent. Only at one site was there evidence of improper servicing, and that occurred on NIPF land.
- There were 2 perennial and 11 intermittent streams evaluated accounting for approximately 10.38 miles of stream of which 89.8 percent of those miles were in

compliance with BMPs. The 1.18 miles of perennial streams were in 100 percent compliance, while the 9.20 miles of intermittent streams were in 88.48 percent compliance.

- Overall, 99.8 percent of the acres evaluated in the Lower Ocmulgee River subbasin were in compliance with BMPs. The percentage of applicable BMPs implemented was 83.1 percent resulting in 50 water quality risks. By ownership, the number of acres in compliance on NIPF lands was 99.7 percent with 82.2 percent of the applicable BMPs implemented resulting in 35 water quality risks. On forest industry lands, the number of acres in BMP compliance was 99.8 percent with 85.2 percent of the applicable BMPs implemented resulting in 15 water quality risks.

Little Ocmulgee River Subbasin (HUC 03070105)

The GFC conducted BMP Implementation and Compliance Surveys in 1991, 1992, 1998, and 2002. No data was extracted specifically for the Ocmulgee River basin during the 1991 survey. However the data for the Little Ocmulgee River subbasin should be similar to the statewide data for the Coastal Plain region where the percentage of acres in compliance with BMPs was 93.3 percent, with 95.1 percent of the stream miles in compliance with BMPs.

During the 1992 survey, the GFC examined approximately 244 acres on 6 sites in this subbasin. Five sites were evaluated on non-industrial private forestlands and 1 on forest industry lands. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 74.9 percent of harvested acres were in compliance with BMPs. By ownership, compliance was 73.7 percent on NIPF and 79 percent on forest industry.
- Overall, 81.2 percent of main haul road miles were in compliance with BMPs. By ownership, compliance was 86.2 percent on NIPF and 33.3 percent on forest industry.
- One site was evaluated for mechanical site preparation and that occurred on the NIPF. Overall, 97.8 percent of the acres were in compliance with BMPs.
- No sites were evaluated for chemical site preparation, burning, or regeneration.
- There were 1.5 miles of stream evaluated with 93.3 percent in compliance with BMPs.

During the 1998 survey, the GFC examined approximately 319 acres on 4 sites in this subbasin. Three sites were on the NIPF lands with 1 site on forest industry land. 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 executed in their entirety over the tract. Key highlights and areas for improvement for each category of practice are discussed below.

- Overall, 88.7 percent of the streamside management zone (SMZ) acres were in compliance with BMPs. The percentage of applicable BMPs implemented was 60 percent, resulting in 4 water quality risks identified. The main problems were logging debris left in stream channels, rutting, and un-stabilized roads within the SMZ. By ownership, compliance was 100 percent and implementation was 100 percent on NIPF lands resulting in 0 water quality risks. On forest industry lands, compliance was 81.8 percent with implementation at 33 percent with 4 water quality risks identified.

- Overall, 7 stream crossings were evaluated and all occurred on forest industry lands. None were in full compliance with BMPs. The percentage of applicable BMP implementation was 36 percent resulting in 6 water quality risks identified. Serious problems were found regarding random crossings, road ditches connected to stream channels, stabilization of exposed fill over culverts, the use of skidder fords and debris, and dirt type crossings and their removal.
- Overall, 81.7 percent of the forest road miles evaluated were in compliance with BMPs. The percentage of applicable BMPs implemented was 73.3 percent resulting in 2 water quality risks identified. The main problem was inadequate or lack of installation of water diversion measures in roads as this was done on only 50 percent of the sites. By ownership, on NIPF lands, overall compliance was 100 percent with 85.7 percent of the BMPs implemented resulting in 0 water quality risks identified. On forest industry lands, compliance was 77.1 percent with 62.5 percent of the applicable BMPs being implemented and 2 water quality risks.
- Overall, 92.5 percent of the harvested acres were in compliance with BMPs. The percentage of BMP implementation was 78.6 percent resulting in 1 water quality risk. The main problems found were un-stabilized log deck skid trails. By ownership, on NIPF lands, overall compliance was 100 percent with 100 percent of the applicable BMPs implemented. On forest industry lands, compliance was 86.8 percent with 50 percent of the applicable BMPs implemented resulting in 1 water quality risk.
- Overall, 97.1 percent of the mechanical site preparation acres on 2 NIPF sites were in compliance. No forest industry sites were evaluated. The percentage of BMP implementation was 80 percent. The main deficiency was windrows not on the contour.
- No sites were evaluated for chemical site preparation or burning.
- Overall, 91.4 percent of the artificial regeneration acres were in compliance with BMPs, with the percentage of BMP implementation at 67 percent. No water quality risks were identified. Machine planting did not follow the contour. This all occurred on the NIPF lands.
- There were no perennial and 2 intermittent streams evaluated accounting for approximately 1.13 miles of stream, of which 89.4 percent of those miles were in compliance with BMPs. On NIPF land, compliance was 100 percent and 82.4 percent on forest industry.
- Overall, 93.8 percent of the acres evaluated in the Little Ocmulgee River subbasin were in compliance with BMPs. The percentage of applicable BMPs implemented was 66.7 percent resulting in 13 water quality risks. By ownership, compliance on NIPF lands was 97.2 percent with 87.5 percent of the applicable BMPs implemented resulting in 0 water quality risks. On forest industry lands, BMP Compliance was 86.7 percent with 45.2 percent of the applicable BMPs implemented with 13 water quality risks identified.

During the 2002 survey, the GFC examined approximately 653 acres on 7 sites in this subbasin. All seven sites were on the NIPF 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, 98.8 percent of the streamside management zone (SMZ) acres were in compliance with BMPs. The percentage of applicable BMPs implemented was

96.3 percent resulting in no water quality risks. Appropriate SMZ widths were established and maintained on 83.3 percent of the sites. Logging debris was kept out of stream channels on all sites. Soil disturbance within the SMZS was minimized on all sites. One site did have a road within the SMZ with water control structures that directed surface flow toward the stream.

- Overall, eight stream crossings were evaluated on four of the NIPF sites. All eight were in full compliance with BMPs. The percentage of applicable BMP implementation was 94.2 percent, resulting in no water quality risks. The only problem found was the lack of water diversion measures before stream approaches.
- Overall, 95.7 percent of the forest road miles evaluated on 7 sites were in compliance with BMPs. Of the 3.36 miles of pre-existing road, 95.2 percent were in compliance with BMPs. Approximately 100 percent of the 0.4 miles of newly constructed road were in compliance with BMPs. The percentage of applicable BMPs implemented was 92.9 percent resulting in no water quality risks identified. The main problem was inadequate or lack of installation of water diversion measures prior to SMZs as this was done on only 33 percent of the sites.
- Overall, 99.9 percent of the harvested acres on 7 sites were in compliance with BMPs. The percentage of BMP implementation was 96.7 percent resulting in no water quality risks. Main problems found were un-stabilized skid trails.
- There were no sites evaluated for mechanical site preparation, burning, artificial regeneration, or forest fertilization practices.
- One site was evaluated for chemical site preparation. Overall, the percentage of acres in BMP compliance was 100 percent, and BMP implementation was 100 percent with no water quality risks identified.
- Overall, seven sites were evaluated for equipment servicing. Overall BMP implementation was 100 percent.
- There were no perennial and 6 intermittent streams evaluated, accounting for approximately 3.7 miles of stream of which 91.6 percent were in compliance with BMPs.
- Overall, 99.9 percent of the acres evaluated in the Little Ocmulgee River subbasin were in compliance with BMPs. The percentage of applicable BMPs implemented was 95.5 percent, resulting in no water quality risks.

B. Sediment TMDLs

EPD established TMDLs for 41 stream segments that were not meeting designated uses due to sedimentation. Two of the segments, Shellstone Creek and Little Shellstone Creek, were subsequently changed to a status of meeting designated uses on the 2002 305(b)/303(d) list, so the remaining 39 TMDLs are presented in Table 7-2. USEPA established a TMDL for one segment as well (Tobesofkee Creek, shown at the end of Table 7-2). One of the EPD TMDLs is also for Tobesofkee Creek, but it is for a segment upstream from the one discussed in the USEPA TMDL.

Excessive sedimentation is harmful to aquatic life, which is discussed in detail in Section 4.2.7. Georgia's water quality regulations provide a narrative standard for the maintenance of biological integrity (391-3-6-.03(2)(a), EPD, 2002), and state that waters must be free of materials that produce conditions that interfere with designated uses (391-3-6-.03(5)(c), GAEPD, 2002). All of the streams have a designated use of fishing. The TMDLs were finalized and approved in early 2002.

The TMDLs were developed using a modeling approach to predict the amount of sediment that can reach each stream without causing further impact. In some cases, the

results showed that a reduction in sediment load was needed. In other cases, no reduction in sediment load was indicated. This seems counter-intuitive – that the segment is impacted by sediment yet no reduction is needed – until you consider historic land use and long-term sediment transport dynamics. During the late 1800s and the early 1900s in the Georgia Piedmont region, there was widespread clearing of land, as well as a lack of agricultural practices that reduce soil erosion. Huge volumes of sediment moved into the streams and filled stream channels. During the last several decades, however, much agricultural land has been converted to forest, and soil conservation practices have greatly reduced erosion from agricultural lands. Many of the impacted streams now have sediment delivery rates similar to streams showing no impacts from sedimentation. The conclusion is that current impacts are due to historic sediment deposited in the stream channels. Sediment does get carried downstream during high stream flows, so it is assumed that the sediment will eventually clear out of the streams. Recent research shows that channels in headwater and upper stream reaches are getting larger, which suggests that sediment is moving out of these streams (Rulhman and Nutter, 1999).

Summary of Data Used for Basis of Listing

The listings with EPD TMDLs were based on studies performed by WRD in 1998 and 1999 on the fish communities occurring in the streams. WRD gathered data on fish using specific sampling techniques and calculated measures of the health of the fish populations using the Index of Biotic Integrity (IBI) and the modified Index of Well-Being (IWB). These indexes account for the density, diversity, condition, weight, and other factors that characterize the fish populations. Streams having IBI and IWB scores of Excellent, Good, or Fair were listed as meeting designated use, while streams with scores of Poor or Very Poor were listed as not meeting designated use and were placed on the 305(b)/303(d) list.

The USEPA TMDL was based on USEPA studies in that watershed in 2001.

Sources Considered in TMDLs

Both point sources and nonpoint sources of sediment were considered in the TMDLs. Nonpoint sources are associated with soil erosion from a variety of land covers – agricultural lands, urban lands, quarries and strip mines, road surfaces and ditches, and even forests and pastures. Modeling results found that the primary land cover that contributes sediment was agricultural lands (74.3 percent), followed by quarries and strip mines (11.0 percent), and roads and ditches (10.7 percent). However, the proximity of these lands to the streams had a great impact on the amount of sediment delivered to the stream. Point sources included permitted discharges of solids and turbidity, and WLAs were set according to permit limits. Soil erosion from construction sites were also considered to be point sources since they are regulated by NPDES permits for stormwater discharge.

TMDL Modeling Methods and Results for Nonpoint Sources

Nonpoint source loads were estimated using the Universal Soil Loss Equation (USLE) and the Watershed Characterization System (WCS). The USLE has been used for decades, primarily in the agricultural field to estimate average annual sediment loss from fields based on several factors. It has been applied to many land uses in addition to agriculture. WCS incorporates the USLE to calculate sediment loss, and uses another relationship to predict the amount of sediment delivered to the streams. Sediment loads from roads and ditches in the watershed were also included, and silvicultural practices in forests were considered. All upstream areas were included in the analysis.

The modeling was performed on the impaired watersheds and 38 unimpaired watersheds. The model predicted an average annual sediment load of 0.54 tons/acre/year for the unimpaired watersheds. This loading rate was the basis for establishing the TMDLs. EPD used 0.54 tons/acre/year as the TMDL loading rate if a watershed's rate was greater than

0.54 tons/acre/year. If a watershed's loading rate was less than 0.54 tons/acre/year, the watershed's current loading rate was used. In each case, the TMDL loading rate was multiplied by the watershed area to convert the TMDL into tons/year of sediment.

TMDL Implementation

Point sources will continue to be regulated under the NPDES permitting system. The EPD will coordinate with RDCs in the development of implementation plans to address nonpoint source issues. The implementation plans are scheduled for completion in 2003.

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.

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.

Table 7-2. TMDLs for Biological Impairment Due to Sediment in the Ocmulgee River Basin

Stream Name	Segment Description	HUC	Length (miles)	TMDL (tons/yr)	WLA (tons/yr)	LA (tons/yr)
Bay Creek	Headwaters to Beaver Creek	03070104	9	697	100	597
Big Sandy Creek	Upstream Indian Springs	03070103	8	1,507	0	1,507
Brown Branch	Headwaters (locust Grove) to Wolf Creek	03070103	5	1,664	0	1,664
Butlers Creek	Tributary to Ocmulgee River	03070103	5	270	0	270
Cabin Creek	Headwaters, Griffin to Towaliga River	03070103	16	4,150	257	3,893
Calaparchee Creek	Upstream Lake Wildwood	03070103	13	1,331	0	1,331
Cole Creek	Tributary to Tobesofkee Creek	03070103	6	484	0	484
Eightmile Creek	Tributary to Towaliga River	03070103	5	92	0	92
Gladesville Creek	Headwaters to Little Falling Creek	03070103	9	656	0	656
Hansford Branch	Monroe County	03070103	2	28	0	28
Harmon Pye Branch	Tributary to Wise Creek	03070103	1	337	0	337
Hartley Branch	Tributary to Deep Creek	03070103	1	1,420	0	1,420
Herds Creek	D/S Ga. Hwy. 212 to Ocmulgee River	03070103	6	1,370	0	1,370
Little Chehaw Creek	Headwaters to Chehaw Creek	03070103	3	1,048	0	1,048
Little Deer Creek	Headwaters to Deer Creek	03070103	6	3,075	40	3,035
Little Deer Creek Tributary	Headwaters to Little Deer Creek	03070103	1	383	38	345
Long Branch	Tributary to Ocmulgee River	03070103	3	491	0	491
Malholms Creek	Headwaters to Tussahaw Creek	03070103	6	755	0	755
Mill Dam Creek	Monroe County	03070103	4	225	0	225
Phinazee Creek	Lamar/Monroe Counties	03070103	6	382	0	382
Red Creek	Tributary to Rocky Creek	03070103	3	1,226	0	1,226
Rock Creek	Upstream Lite-N-Tie Rd.	03070103	1	458	90	368
Rocky Creek	Downstream from English Rd (CR 152) to Towaliga River	03070103	4	1,283	0	1,283
Rocky Creek	Jasper County	03070103	5	252	0	252
Rocky Creek	Upstream Big Sandy Creek	03070103	6	346	0	346
Rocky Creek	Upstream Lake Wildwood	03070103	7	1,613	0	1,613
Rum Creek	Rum and Town Creeks, Upstream Lake Juliette	03070103	6	2,962	64	2,898
Sand Branch	Tributary to Towaliga River	03070103	2	51	0	51

Table 7-2. TMDLs for Biological Impairment Due to Sediment in the Ocmulgee River Basin

Stream Name	Segment Description	HUC	Length (miles)	TMDL (tons/yr)	WLA (tons/yr)	LA (tons/yr)
Scoggins Creek	Tributary to Ocmulgee River	03070103	2	535	0	535
Third Branch	Tributary to Ocmulgee River	03070103	3	72	0	72
Tobesofkee Creek	Barnesville to Cole Creek	03070103	8	9,260	43	9,217
Tobler Creek	Tributary to Ocmulgee River	03070103	6	2,271	0	2,271
Town Branch	Headwaters (Jackson) to Aboothlacoosta Creek	03070103	3	290	21	269
Tributary to Tobesofkee Creek	Barnesville	03070103	2	358	0	358
Walnut Creek	Downstream Hwy 42	03070103	4	2,758	0	2,758
Walnut Creek	Headwaters to Ocmulgee River	03070103	20	10,551	0	10,551
White Creek	Lamar/Monroe Counties	03070103	4	438	0	438
Wise Creek	Headwaters to Ocmulgee River	03070103	6	1,769	0	1,769
Wood Creek	Headwaters to d/s Ga. Hwy. 83	03070103	3	634	0	634
Tobesofkee Creek (USEPA TMDL)	Monroe, Bibb, and Lamar Counties	03070103	Not specified	29,400	162*	22,300

Key Participants and Roles

The Georgia Forestry Commission (GFC): encourages 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:

- 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.
- Promptly reforest harvested acres to ensure long-term forest productivity and conservation of forest resources.
- 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 USEPA approved BMPs in all forest management operations.
- 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.
- 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.
- Manage company lands of ecologic, geologic, or historic significance in a manner that accounts for their special qualities.
- Contribute to bio-diversity by enhancing landscape diversity and providing an array of habitats.
- Continue to improve forest utilization to help ensure the most efficient use of forest resources.
- Continue the prudent use of forest chemicals to improve forest health and growth while protecting employees, neighbors, the public, and sensitive lands.
- 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.
- Publicly report program participants' progress in fulfilling their commitment to sustainable forestry.
- 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 that 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

Controlling erosion and sedimentation from land disturbing activities in order to meet narrative water quality standards is an important management objective.

Management Option Evaluation

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

Action Plan

Sediment TMDLs have been completed for 42 stream segments. TMDL implementation plans will be developed in 2003. TMDLs will be developed for 16 new stream segments that were added to the Georgia 2002 303(d) list using 2001 data during the next river basin planning cycle.

EPD and WRD will continue to develop biological monitoring capabilities designed to assess aquatic life. EPD will work with local governments with the issuing authority 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, 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 the forestry BMPs through workshops and demonstrations. GFC will continue to monitor BMP implementation rates through biennial surveys and determine effectiveness of BMPs through habitat assessments and rapid bioassessments of the aquatic organisms above and below forestry operations. 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 forestry community to provide BMP training.

American Forest and Paper Association (AF&PA): Member companies 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 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 PRMS reporting system.

7.3.3 Low Dissolved Oxygen

Problem Statement

Water use classification for fishing was not fully supported in 11 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.

Upper Ocmulgee River Subbasin (HUC 03070103)

The water use classification of fishing was not fully supported in two 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 the cause of low dissolved oxygen in streams in the Ocmulgee River basin.

Lower Ocmulgee River Subbasin (HUC 03070104)

The water use classification of fishing was not fully supported in four 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. Horse Creek in Houston County was also affected by effluent from a municipal water pollution control plant. The plant relocated its discharge point from Horse Creek to the Ocmulgee River on August 31, 1999. Natural conditions may contribute to the cause of low dissolved oxygen in streams in the Ocmulgee River basin.

Little Ocmulgee River Subbasin (HUC 03070105)

The water use classification of fishing was not fully supported in one Little Ocmulgee River mainstem segment and four 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 the cause of low dissolved oxygen in streams in the Ocmulgee River basin.

General Goals

A general goal of the plan is to 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 Ocmulgee River basin are discussed.

A. General Efforts

TMDLs have been completed for the all 2002 303(d) listed stream segments except for Horse Creek. 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 11 stream segments (Table 7-3) 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 USEPA 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 TMDL

Ten point sources were identified in 5 of the 11 segments. These sources included several ponds and wastewater treatment facilities, and two 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 Ocmulgee River basin.

TMDL Methods and Results

EPD 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 Ocmulgee River basin (supplemented with 2000 sediment oxygen demand measurements from other streams in southern Georgia). Since natural DO concentrations were consistently below the numeric standard, EPD 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 7-3). Load reductions were recommended for two 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. EPD 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 the public and encourage the use of best management practices for improving dissolved oxygen concentrations.

Table 7-3. Dissolved Oxygen TMDLs in the Ocmulgee River Basin

Stream Name	Segment Description[1]	HUC	Length (miles)	Use Support[2]	TMDL (lbs/day)[3]
Alligator Creek	Batson Creek to Lime Sink Creek	03070105	12	NS	92
Big Creek	Headwaters to Ocmulgee River	03070104	33		169
Big Horse Creek	Alligator Creek to Ocmulgee River	03070104	15	PS	139
Cabin Creek	Headwaters, Griffin to Towaliga River	03070103	16	NS	767
Doless Creek	Headwaters to Dolittle Creek	03070103	2	PS	6
Gum Swamp Creek	Hwy 257 to Little Creek	03070105	19	NS	141
House Creek	Ball Creek to Little House Creek	03070104	8	NS	72
Limestone Creek	Headwaters to Ocmulgee River	03070104	7	PS	51
Little Ocmulgee River	Wilcox Creek to Alligator Creek	03070105	12	PS	548
Sugar Creek	Turnpike Creek to Little Ocmulgee River	03070105	5	NS	131
Turnpike Creek	Hwy 280 to Sugar Creek	03070105	24	NS	204

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

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 Ocmulgee 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

A specific management objective is to maintain dissolved oxygen concentrations adequate to support aquatic life and meet water quality standards.

Action Plan

- EPD will implement TMDL wasteload allocations through the NPDES permitting program; assess use support in the listed waters; develop TMDL implementation plans.

- Local governments will implement stormwater management strategies and manage operations of water pollution control plants; 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 Ocmulgee River basin in 2003-2007.

7.3.4 Fish Consumption Guidelines

Problem Statement

The water use classifications were not fully supported in four water body segments and four lakes due to fish consumption guidelines for mercury and/or PCBs. There are no known point source discharges or other identifiable anthropogenic sources of mercury or PBCs 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. PCBs are no longer manufactured but persist in the aquatic environment for some time.

Upper Ocmulgee River Subbasin (HUC 03070103)

The water use classification of fishing was not fully supported in one segment of the Ocmulgee River (flathead catfish), one segment of the South River (largemouth bass) and in Jackson (channel catfish) and High Falls Lakes (channel catfish and largemouth bass) based on PCB residues in fish tissue.

The water use classification of drinking water was not fully supported in Big Haynes Reservoir in Rockdale County based on mercury residues in fish tissue. The assessment for mercury in fish tissue 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 regarding assessment of mercury in fish tissue.

Lower Ocmulgee River Subbasin (HUC 03070104)

The water use classification of fishing was not fully supported in two Ocmulgee River mainstem segments due to PCB residues in fish tissue. The guidelines are for flathead catfish. These segments were added to the Georgia 303(d) List in 2002. TMDLs will be developed for these segments in the next basin plan cycle.

Little Ocmulgee River Subbasin (HUC 03070105)

The water use classification of fishing was not fully supported in Little Ocmulgee State Park Lake (Gum Creek Swamp) in Telfair and Wheeler counties based on mercury residues in fish tissue. The assessment for mercury 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 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 and PCB TMDLs in the Ocmulgee 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 PCBs or mercury in the Ocmulgee River basin watersheds. Ongoing efforts will focus on continued monitoring of residue levels and issuance of updated consumption guidelines. TMDLs have been completed for listed segments on the Ocmulgee and South Rivers and for Jackson, High Falls, and the Little Ocmulgee State Park Lakes. TMDL implementation plans will be developed in 2003.

B. Mercury TMDLs

USEPA established mercury TMDLs for the Big Haynes Reservoir and the Little Ocmulgee State Park Lake in February 2002 (Table 7-4). 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 individual water bodies using measured mercury concentrations, fish consumption rates, and related factors.

Table 7-4. Mercury TMDLs

Lake Name	Location	HUC	Acres Affected	Use Support	TMDL (kg/yr of Hg)
Big Haynes Reservoir	Rockdale County	03070103	650	PS	0.03
Little Ocmulgee State Park Lake (Gum Swamp Creek)	Telfair and Wheeler Counties	03070105	224	PS	3.77

PS = Partially supporting designated

Sources Considered in TMDL

USEPA estimated that air deposition causes 99 percent of mercury contamination. 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 estimated that water point sources cause 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 TMDLs for mercury shown in Table 7-4.

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.

C. PCB TMDLs

EPD established polychlorinated biphenyl (PCB) TMDLs for one stream segment and two lakes in the Ocmulgee River basin (Table 7-5). See Box 7-1 for background information about TMDLs.

Table 7-5. PCB TMDLs in the Ocmulgee River Basin

Stream Name	Segment Description	HUC	Extent	Use Support[1]	TMDL	Year
South River	Highway 20 to Snapping Shoals Creek	03070103	11 miles	PS	1.04E-3 kg/day	2002
High Falls Lake	Monroe County	03070103	4102 acres	PS	0 kg/day	1998
Jackson Lake	Newton, Butts, and Jasper Counties	03070103	699 acres	PS	0 kg/day	1998

[1] PS – Partially Supporting designated use

Sources Considered in TMDL

There are no known point or nonpoint sources of PCBs in the watersheds. No NPDES point sources are permitted to discharge PCBs. EPD attributed PCB loading to urban runoff and combined sewer overflows. Other possible sources are soil erosion, air deposition, and movement of contaminated sediment.

TMDL Modeling Methods and Results

PCBs in fish tissue accumulate over time and do not depend on season; therefore, average annual flow and average annual loading were used as the critical conditions. For the PCB TMDLs, EPD multiplied the average annual flow by the water quality standard to calculate a TMDL of 1.04E-3 kg/day of PCBs.

TMDL Implementation

EPD will develop a TMDL Implementation Plan in 2003.

Identified Gaps and Needs

The source of mercury or PCBs 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 and PCBs are 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 reduction required in the TMDL.

Method of Tracking Performance

Trends in fish tissue concentration of mercury and PCBs.

7.3.5 pH

Problem Statement

The water use classification of fishing was not fully supported in five segments due to an exceedance of water quality standards for pH.

Upper Ocmulgee River Subbasin (HUC 03070103)

The water use classification of fishing was not fully supported in one tributary stream segment due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to nonpoint source influences or natural conditions.

Lower Ocmulgee River Subbasin (HUC 03070104)

The water use classification of fishing was not fully supported in two tributary streams due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to point source influences, nonpoint source influences, or natural conditions.

Little Ocmulgee River Subbasin (HUC 03070105)

The water use classification of fishing was not fully supported in two tributary stream segments due to pH levels below the minimum pH standard of 6.0. It is not known whether the pH violations are due to point source influences, nonpoint source influences, or natural conditions.

General Goals

One of the general goals is to meet water quality standards to support a designated stream classification of fishing.

Ongoing Efforts

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

A. General Efforts

TMDLs have been completed for the four listed tributary stream segments. TMDL implementation plans will be completed in 2003.

Other efforts include encouraging local watershed planning and management to ensure that designated water uses are supported.

B. pH TMDLs

TMDLs were established for four stream segments that did not meet the pH criteria for their designated uses (see Box 7-1 for background information about TMDLs). All of the streams have a designated use of fishing. The TMDLs were prepared by the USEPA and finalized in early 2002.

pH is a relative measure of the acidity or alkalinity of a solution, and generally ranges from 0 to 14 with a pH of 7 indicating a neutral solution (for example, distilled water). Decreasing pH below 7 indicates greater acidity, while increasing pH above 7 indicates greater alkalinity. For example, vinegar has a pH of 2, while bleach has a pH of 12.5. Aquatic life can tolerate a pH in a fairly narrow range. Georgia's water quality standards state that pH must remain in a range of 6.0 to 8.5. These stream segments have violations for pH less than 6. Low pH is problematic because it can increase the concentrations of dissolved metals in water, which is harmful to aquatic life.

The listed stream segments are shown in Table 7-6. Note that all have the same TMDL – a pH of 6.0 to 8.5. Since pH is not a load but a relative measure of acidity/ alkalinity the TMDL uses the Georgia water quality standard as the target. These TMDLs specify that waters discharged into these stream segments, both from point and nonpoint sources, have a pH within the 6.0 – 8.5 range.

Table 7-6. pH TMDLs in the Ocmulgee River Basin

Stream Name	Segment Description	HUC	Length (miles)	Use Support	TMDL
Boar Tusk Creek	Headwaters to Yellow River	03070103	3	PS	pH 6.0 to 8.5
House Creek	Ball Creek to Little House Creek	03070104	8	NS	pH 6.0 to 8.5
Sugar Creek	Turnpike Creek to Little Ocmulgee River	03070105	5	NS	pH 6.0 to 8.5
Turnpike Creek	Hwy 280 to Sugar Creek	03070105	24	NS	pH 6.0 to 8.5

NS – Not supporting designated use
PS – Partially supporting designated use

Summary of Data and Sources

All of the pH violations for the listed segments are for pH values lower than 6. Monitoring data from 1999 were evaluated in the assessment. Lower pH readings tended to occur during summertime low flow conditions.

Sugar Creek has one permitted point source, while the other segments have no permitted point sources. A five-year compliance history for the point source discharge (Eastman South WPCP) showed no permit violations for pH.

The TMDLs for these segments state that there are potential nonpoint sources that could contribute to or be the cause of the pH violations. However, there is no information currently available to characterize potential nonpoint sources. The low pH values may be a result of natural processes in the watershed.

TMDL Implementation

Point sources will continue to be regulated under the NPDES permitting system; however, the analyses suggest that point sources are not likely to be the cause of impairment in the watersheds. The EPD will work with the RDCs to develop implementation plans in 2003.

Identified Gaps and needs

The cause of the low pH in the streams is not well quantified. Natural processes within the watersheds may be the cause of the low pH values documented in the streams.

General Strategies for Action

Because the pH issues are not originating from any known point sources or other identifiable anthropogenic sources, the strategy is to provide for additional periodic monitoring to assess pH trends in the streams.

Action Plan

TMDLs have been completed for Boar Tusk Creek, House Creek, Sugar Creek, and Turnpike Creek. TMDL implementation plans will be completed in 2003.

Methods for Tracking Performance

Trends in pH values documented in water samples are a method of tracking performance.

7.3.6 Metals and Toxicity

Problem Statement

The water use classification of fishing was not fully supported in one segment due to an exceedance of water quality standards for metals, and in two segments due to toxicity.

Upper Ocmulgee River Subbasin (HUC 03070103)

The water use classification of fishing was not fully supported in two tributary stream segments due to toxicity. Aquatic toxicity tests of effluent from dischargers predicted toxicity in the receiving streams at critical, low flow conditions. The affected tributaries were Big Flat Creek (receiving effluent from the Loganville WPCP), and Cabin Creek (receiving effluent from the City of Griffin's Cabin Creek WPCP and Spring Industries, Inc.).

Lower Ocmulgee River Subbasin (HUC 03070104)

The water use classification of fishing was not fully supported in one Ocmulgee River segment due to exceedance of metals standards (mercury) from nonpoint sources.

General Goals

Meeting water quality standards to support a designated stream classification of fishing is one of the general goals.

Ongoing Efforts

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

A. General Efforts

TMDLs for chronic toxicity and mercury have been completed for the listed segments. TMDL implementation plans will be completed in 2003.

Encouraging local watershed planning and management to ensure that designated water uses are supported.

B. Toxicity and Mercury TMDLs

USEPA established TMDLs for the stream segments listed on the Georgia 2002 303(d) list for toxicity and mercury (see Box 7-1 for background information on TMDLs).

Toxicity harms living organisms through chronic and acute toxic effects. Chronic toxicity causes long-term stresses or abnormal changes to an organism, and acute toxicity causes short-term stresses or changes (Clesceri, 1998). The TMDL target of 1.0 chronic toxicity unit (TU_c) will prevent both chronic and acute effects based on USEPA's Technical Support Document for Water Quality-based Toxics Control. Chronic toxicity units are equal to 100 divided by the no observable effects concentration (NOEC). In the case of whole effluent toxicity, 1.0 TU_c indicates that undiluted effluent (an NOEC of 100 percent) causes no observable toxic effects. This target will prevent the effluent from causing toxicity, even during low flow conditions.

The mercury TMDL was established as a part of a TMDL developed for a portion of the Ocmulgee River from Cedar Creek to House Creek. The segment was listed on the Georgia 2000 303(d) list as not supporting designated uses due to mercury in fish tissue. USEPA finalized the TMDLs shown in Table 7-7 in February 2002.

Table 7-7. Toxicity and Mercury TMDLs in the Ocmulgee River Basin

Stream Name	Segment Description	HUC	Length (miles)	Use Support	TMDL
Big Flat Creek	Headwaters to Flat Creek	03070103	18	NS	1.0 TU_c
Cabin Creek	Headwaters to Towaliga River	03070103	16	NS	1.0 TU_c
Ocmulgee River	Cedar Creek to House Creek	03070104	36	PS	47.40 µg/yr

NS – Not supporting designated use
PS – Partially supporting designated use

Sources Considered in TMDL

USEPA considered point and nonpoint sources in the development of the TMDLs. Point sources were considered the source of the potential toxicity at critical low flow conditions. Nonpoint sources (air deposition) were considered the source of the mercury.

TMDL Results

In the toxicity TMDLs, present and future point sources were allocated 1.0 TU_c. Nonpoint sources were allocated 0.0 TU_c, meaning that present and future nonpoint sources should not contribute to toxicity. In the mercury TMDL, nonpoint sources, predominantly air deposition were allocated 42.48 µg/yr and point sources 0.20 µg/yr.

TMDL Implementation

EPD will develop TMDL implementation plans in 2003.

Identified Gaps and Needs

Addressing predicted toxicity in the point source discharges at critical, low flow conditions will require additional studies of the wastewaters being discharged and actions to reduce toxicity as needed to meet TMDL requirements. It is unknown if mercury concentrations documented in the water column in one Ocmulgee River segment represent actual mercury in the water or whether they are due to problems with quality assurance/or quality control issues in the sampling or analysis procedures. Samples collected by the USEPA during the TMDL development process indicated compliance with standards. Additional data is needed.

General Strategies for Action

Address predicted toxicity due to point sources at critical, low flow conditions through the NPDES permitting program is a general strategy for action. Conduct additional mercury monitoring.

Action Plan

TMDLs for chronic toxicity and mercury have been completed for the listed stream segments. TMDL implementation plans will be completed in 2003 with implementation of needed point source actions through the NPDES permitting program. Additional monitoring for mercury will be conducted on the stream segment of the Ocmulgee River listed for mercury.

Methods for Tracking Performance

Continued tracking of toxicity test results from tests conducted by point sources to assess predicted toxicity of their discharges. Assess mercury concentrations in the one segment of the Ocmulgee River listed on the Georgia 2002 303(d) list.

7.3.7 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* 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.

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In This Section

- Where Do We Go From Here?
- Working to Strengthen Planning and Implementation Capabilities
- Addressing the Impacts from Continued Population Growth and Land Development
- The Next Iteration of the Basin Cycle
- Priorities for Additional Data Collection

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 Ocmulgee 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 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 Ocmulgee 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 Ocmulgee 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 Ocmulgee 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; and
- Enforcing compliance with permit conditions.

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

- 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); and
- 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 Ocmulgee 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 Ocmulgee 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 Ocmulgee. 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 = $(e^{(1.128[\ln(\text{hardness})] - 3.6867)})(1.136672-[(\ln \text{hardness})(0.041838)]$ μg/l
chronic criteria = $(e^{(0.7852[\ln(\text{hardness})] - 2.715)})(1.101672-[(\ln \text{hardness})(0.041838)]$ μg/l

Chromium III
acute criteria = $(e^{(0.8190[\ln(\text{hardness})] + 3.7256)}(0.316)$ μg/l
chronic criteria = $(e^{(0.8190[\ln(\text{hardness})] + 0.6848)})(0.860)$ μg/l

Copper
acute criteria = $(e^{(0.9422[\ln(\text{hardness})] - 1.700)})(0.96)$ μg/l
chronic criteria = $(e^{(0.8545[\ln(\text{hardness})] - 1.702)})(0.96)$ μg/l

Lead
acute criteria = $(e^{(1.273[\ln(\text{hardness}) - 1.460)})(1.46203 - [(\ln \text{hardness})(0.145712)])$ μg/l
chronic criteria = $(e^{(1.273[\ln(\text{hardness}) - 4.705)})(1.46203 - [(\ln \text{hardness})(0.145712)])$ μg/l

Nickel
acute criteria = $(e^{(0.8460[\ln(\text{hardness})] + 2.255)})(.998)$ μg/l
chronic criteria = $(e^{(0.8460[\ln(\text{hardness})] + 0.0584)})(.997)$ μg/l

Zinc
acute criteria = $(e^{(0.8473[\ln(\text{hardness})] + 0.884)})(0.978)$ μg/l
chronic criteria = $(e^{(0.8473[\ln(\text{hardness})] + 0.884)})(0.986)$ 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 Ocmulgee River Basin

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
ABBEVILLE	GA0047643	0.28		WILCOX	OCMULGEE RV
ALAMO	GA0037753	0.375		WHEELER	ALLIGATOR CR
ARMSTRONG WORLD IND INC	GA0003077			BIBB	ROCKY CR
ATLANTA INTRENCHMENT CR CSO	GA0037168			DEKALB	ATLANTA/SOUTH RV/OCUMU
ATLANTA MCDANIEL ST CSO	GA0037133			FULTON	SOUTH RV
BARNESVILLE GORDON RD	GA0021041	1.2	Y	LAMAR	TOBESOFKEE CR
BIO-LAB INC CONYERS	GA0046779			ROCKDALE	ALMAND CR
BLUE CIRCLE AGGREGATES	GA0037877			MORGAN	SUGAR CR
BLUE CIRCLE INC DEKALB	GA0030066			DEKALB	SWIFT CR
BLUE CIRCLE INC NEWTON	GA0029971			NEWTON	LITTLE GUM CR
BOLINGREEN NURSING	GAPID1000	0.006		MONROE	BEAVER DAM CR
BORAL BRICKS INC	GA0035904			BIBB	OCMULGEE RV
BYRON POND	GA0026794	0.44		PEACH	ECHECONNEE CR
CADWELL WPCP	GA0025887	0.048		LAURENS	UNNAMED TRIB TO BAY CR
CAGLE'S INC PERRY	GA0002844	0		HOUSTON	BIG INDIAN CR
CASIE AND HUIE WRF	GA0038423	15	Y	CLAYTON	BLALOCK RESERVOIR

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
CLAYTON CO NORTHEAST	GA0020575	6	Y	CLAYTON	PANTHER CR
COCHRAN WPCP	GA0032107	0.6		BLECKLEY	JORDAN CR
DAN RIVER -PLANT CAMELLIA	GA0002224			MONROE	OCMULGEE RV
DAVIDSON MINERAL PROP DEKALB	GA0037273			DEKALB	PINE MT CR
DEKALB CO POLEBRIDGE CR	GA0026816	20	Y	DEKALB	SOUTH RV
DEKALB CO SNAPFINGER CR	GA0024147	36	Y	DEKALB	SOUTH RV
DNR HIGH FALLS STATE PARK	GAPID1000	0.02		MONROE	TOWALIGA RV
DNR INDIAN SPRINGS	GAPID1000	0.01		BUTTS	CHIEF MCINTOSH LK/BG SAND
DOE FFA/FHA	GA0048445	0		NEWTON	LAKE JACKSON
DOT REST AREA #22/I-75	GAPID1000	0.045		MONROE	LITTLE DEER CR
EASTMAN ROACH BRANCH WPCP	GA0026310	0.9		DODGE	ROACH BRANCH TRIB TO GUM
EASTMAN SOUTH WPCP	GA0046485	0.9		DODGE	SUGAR CR TRIB
FLORIDA ROCK INC MONROE	GA0035556			MONROE	RUM CR
FOREST GLEN ESTATES	GA0022284	0.03		BUTTS	CABIN CR
FORSYTH NORTHEAST	GA0031801	1.4	Y	MONROE	TOWN CR TO RUM CR
FORSYTH SOUTH	GA0024732	0.6		MONROE	SLIPPERY ROCK CR
FORT VALLEY WPCP	GA0031046	2.2	Y	PEACH	BAY CR TO INDIAN CR TRIB
GEORGIA POWER ARKWRIGHT	GA0026069	480	Y	BIBB	OCMULGEE RV
GEORGIA POWER LLOYD SHOAL	GA0004341			BUTTS	OCMULGEE RV
GEORGIA POWER SCHERER	GA0035564			MONROE	BERRY CR/RUM CR/OCMULGEE RV
GRIFFIN CABIN CR	GA0020214	1.5	Y	SPALDING	CABIN CR
GWINNETT CO BEAVER/SWEET	GA0032841	4.5	Y	GWINNETT	SWEETWATER CR
GWINNETT CO BIG HAYNES	GA0033847	0.5		GWINNETT	BIG HAYNES CR TRIB

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
GWINNETT CO JACKS CR	GA0047627	1	Y	GWINNETT	YELLOW RV TO OCMULGEE
GWINNETT CO JACKSON CR	GA0030732	3	Y	GWINNETT	JACKSON CR
GWINNETT CO NO BUSINESS	GA0023973	1	Y	GWINNETT	NO BUSINESS CR
GWINNETT CO YELLOW RV	GA0047911	12	Y	GWINNETT	YELLOW RV/ SWEETWATER CR
GWINNETT CO REUSE	GAG960000			GWINNETT	
HANSON AGGREGATES DEKALB	GA0046175			DEKALB	SWIFT CR
HAWKINSVILLE NORTH	GA0046027	1	Y	PULASKI	OCMULGEE RV
HAWKINSVILLE SOUTH	GA0020338	1.3	Y	PULASKI	OCMULGEE RV
HAZLEHURST BULLY CR	GA0036765	1.5	Y	JEFF DAVIS	OCMULGEE RV
HELENA WPCP	GA0048674	0.3		TELFAIR	OCMULGEE RV TRIB
HENRY CO CAMP CR	GA0049352	1.5	Y	HENRY	CAMP CR TRIB
HENRY CO MEADOW CR	GA0049239	0.015		HENRY	UNNAMED TRIB TO KALVES CR
HENRY CO SPRINGDALE	GA0037214	0.5		HENRY	BIG COTTON INDIAN CR
HENRY CO SPRINGDALE-WALNUT	GA0037869	0.4		HENRY	WALNUT CR TO SOUTH RV
HILLTOP NURSING HOME	GAPID1000	0.012		MONROE	SAND CR
HOLLINGSWORTH & VOSE COMPANY	GA0046426	0.75		PULASKI	OCMULGEE RV
HOUSWORTH ROCK QUARRY	GA0037010			DEKALB	CROOKED CR
J H HOUSE SCHOOL	GA0022195			ROCKDALE	MARK BRANCH
J M HUBER CORP	GA0002551			TWIGGS	STONE CR
JACKSON NORTHEAST	GA0032719	0.14		BUTTS	UNNAMED TRIB TO YELLOW WATER CR
JACKSON SOUTHSIDE	GA0023931	0.7		BUTTS	TOWN BRANCH TRIB
JACKSON YELLOW WATER CR	GA0021831	0.75		BUTTS	YELLOW WATER CR TRIB

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
LAKEVIEW UTILITIES INC	GA0035491	0.158		ROCKDALE	YELLOW RV
LOCUST GROVE EAST POND	GA0049760	0.05		HENRY	WOLF CR-TUSSAHAW CR
LOCUST GROVE SKYLAND MHP	GA0049816	0.2		HENRY	WOLF CR TRI TO TUSSAHAW C
LOGANVILLE WPCP	GA0020788	1.75	Y	WALTON	BIG FLAT CR TRIB
LUMBER CITY POND	GA0050199	0.22		TELFAIR	OCMULGEE RV
LYNN HAVEN NURSING HOME	GAPID1000	0.024		JONES	CHEHAW CR
MACON POPLAR ST	GA0024538	20	Y	BIBB	OCMULGEE RV
MACON ROCKY CR	GA0024546	24	Y	BIBB	OCMULGEE RV
MANSFIELD	GA0047759	0.06		NEWTON	PITTMAN BR
MAYAND CARTER OIL CO/RUMBLE RD	GAPID1000	0.005		MONROE	DEER CR
MCDONOUGH WALNUT CR	GA0023949	1	Y	HENRY	WALNUT CR
MCRAE GUM SWAMP	GA0026298	0.2		TELFAIR	GUM SWAMP CR
MIDDLE GA NURSING HOME	GAPID1000	0.017		DODGE	GUM SWAMP CR TRIB
MID-GEORGIA COGEN L.P.	GAR137605			HOUSTON	INDIAN CR
MONARCH WINE CO	GA0035955			FULTON	PRISON BR
MONROE COUNTY QUARRY	GA0046558			MONROE	LITTLE DEER CR
MT PARK ELEM SCHOOL	GAPID1000	0.01		GWINNETT	POUNDS CR
OGLETHORPE POWER SMARR	GA0038059			MONROE	LITTLE DEER CR
PARK PLACE NURSING FACILITY	GAPID1000	0.011		WALTON	MOUNTAIN CR
PERRY WPCP	GA0021334	3	Y	HOUSTON	BIG INDIAN CR
PINEHURST	GA0038075	0.12		DOOLY	SOUTH PRONG CR
PINEVIEW HEALTH CARE CTR	GAPID1000	0.012		WILCOX	CEDAR CR TRIB
POOLE'S MOBILE MANOR	GAPID1000	0.039		HENRY	SOUTH RV
RIVERWOOD INT	GA0003581			BIBB	OCMULGEE RV
ROCKDALE CO ALMAND BRANCH	GA0021610	1.25	Y	ROCKDALE	ALMAND BR TO SOUTH R

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
ROCKDALE CO HONEY CR	GA0022659	0.3		ROCKDALE	HONEY CR
ROCKDALE CO LAKERIDGE EST	GA0022586	0.09		ROCKDALE	ALMAND BRANCH TRIB
ROCKDALE CO QUIGG BRANCH	GA0047678	3	Y	ROCKDALE	YELLOW RV
ROCKDALE CO SCOTT CR	GA0026239	0.22		ROCKDALE	SCOTT CR
ROCKDALE CO SNAPPING SHOALS	GA0023035	0.45		ROCKDALE	SNAPPING SHOALS CR
ROCKDALE CO STANTON WOODS	GA0049085	0.15		ROCKDALE	ALMAND BRANCH TRIBUTARY
RUMBLE WWTP	GAPID1000	0.005		MONROE	LITTLE DEER CR
SCOTLAND POND	GA0032344	0.18		TELFAIR	LITTLE OCMULGEE RV
SINGLETON CHEVRON SERVICE	GAPID1000			HOUSTON	BIG CR
SOUTH HAMPTON MHP	GA0025305	0.1		SPALDING	TRIB TO THOMPSON CR
SOUTHERN NATURAL GAS BIBB	GA0037559			BIBB	UNNAMED TRIB/OCMULGEE RV
SOUTHERN RAILWAY	GA0002364			BIBB	OCMULGEE RV
SPRING INDUSTRIES INC	GA0037702			SPALDING	CABIN CR
SPRINGS IND INC GRIFFIN	GA0003409	1	Y	SPALDING	CABIN CR
STOCKBRIDGE WPCP	GA0023337	1.5	Y	HENRY	BUSH CR TRIB
USAF ROBINS AFB	GA0002852	2.1	Y	HOUSTON	HORSE CR TRIB
VULCAN MAT DEKALB	GA0023736			DEKALB	UNNAMED TRIB/YELLOW RV
VULCAN MAT GRAYSON	GA0033359			GWINNETT	BAY CR
VULCAN MAT GWINNETT	GA0003140			GWINNETT	SO BEAVER RN CR
VULCAN MAT QUARRY STOCKBRIDGE	GA0024406			HENRY	LITTLE COTTON INDIAN CR
WALTERS FARMS	GA0038181			LAMAR	
WARNER ROBINS OCMULGEE RV	GA0037796	3	Y	HOUSTON	OCMULGEE RV
WARNER ROBINS SANDY RUN	GA0030325	9	Y	HOUSTON	SANDY RUN CR

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
WILLIAM CARTER COMPANY	GA0003115	1.3	Y	LAMAR	TOBESOFKEE CR
WILLIAMS BROS BLUE CIRCLE	GA0002984			DEKALB	UNNAMED TRIB/PINE MT CR
WWTP INC HIGHLAND MILLS	GA0023752			SPALDING	WOLF CR/TROUBLESOME CR

Support of Designated Uses for Rivers, Streams, and Lakes in the Ocmulgee River Basin, 2000-2002

Rivers/Streams Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Miles
OCMULGEE RIVER BASIN			
HUC 03070103			
Aboothlacoosta Creek (4)	Butts Co.	Fishing	6
Alcovy River (18)	Headwaters to Walton Co. Line (Gwinnett Co.)	Fishing	15
Alcovy River (1)	Wrights Creek to Bear Creek (Newton Co.)	Fishing/Recreation	13
Beaverdam Creek (4)	Monroe/Bibb Counties	Fishing	6
Big Haynes Creek (1,23)	Big Haynes Cr. Reservoir to Little Haynes Creek (Rockdale Co.)	Drinking Water	1
Big Towaliga Creek (4)	Lamar Co.	Fishing	5
Briar Branch (4)	Upstream Towaliga River (Monroe Co.)	Fishing	2
Buck Creek (4)	Tributary to High Falls Lake (Lamar/Spalding Co.)	Fishing	14
Castleberry Creek (4)	Tributary to Rocky Creek (Monroe/Butts Co.)	Fishing	3
Chambliss Creek (4)	Tributary to Lake Juliette, Forsyth (Monroe Co.)	Fishing	4
Champion Creek (4)	Monroe Co.	Fishing	3
Coppas Branch (4)	Bibb Co.	Fishing	2

Rivers/Streams Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Miles
Crow Branch (4)	Jasper Co.	Fishing	3
Deer Creek (4)	Tributary to Rum Creek (Monroe Co.)	Fishing	10
Douglas Creek (4)	Upstream Little Sandy Creek (Butts Co.)	Fishing	4
Dry Bone Creek (4)	Jones/Bibb Counties	Fishing	7
Echeconnee Creek (4)	Rock Quarry Road to Knoxville Road (Monroe/Bibb Co.)	Fishing	27
Fambro Creek (4)	Monroe Co.	Fishing	4
Feagin Creek (4)	Jones Co.	Fishing	3
Gilmore Branch (4)	Tributary to Towaliga River (Monroe/Butts Co.)	Fishing	3
Hardy's Creek (4)	Jasper Co.	Fishing	6
Herds Creek (4)	Headwaters to Ga. Hwy. 212 (Jasper Co.)	Fishing	3
Indian Creek (4)	Lester Mill Rd., Locust Grove to Towaliga River (Henry/Butts Co.)	Fishing	8
Johnson Creek (2)	Tributary to Cabin Creek, Griffin (Spalding Co.)	Fishing	1
Kinnard Creek (4)	Tributary to Ocmulgee River (Jasper Co.)	Fishing	9
Lamar Branch (4)	Tributary to Echeconnee Creek (Bibb/Monroe Co.)	Fishing	3
Lee Creek (4)	Tributary to Ocmulgee River (Monroe Co.)	Fishing	6
Little Buck Creek (4)	Lamar Co.	Fishing	6
Little Falling Creek (4)	Jasper/Jones Counties	Fishing	5
Little Sandy Creek (4)	Butts Co.	Fishing	4
Little Tobesofkee Creek (4)	Lamar/Monroe Counties	Fishing	23
Little Towaliga River (4)	D/S Barnesville Reservoir (Lamar/Monroe Co.)	Fishing	13
Long Branch (4)	Upstream Big Sandy Creek (Butts Co.)	Fishing	4
Ocmulgee River (1)	Downstream Lloyd Shoals Dam (Butts/Jasper Co.)	Fishing	3
Ocmulgee River (1)	3 Miles Downstream Lloyd Shoals Dam to Towaliga River (Butts/Jasper/Monroe Co.)	Fishing	14
Ocmulgee River (1,28)	Hwy 18 to Beaverdam Creek (Monroe/Jones/Bibb Co.)	Drinking Water	9

Rivers/Streams Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Miles
Ocmulgee River (1)	Beaverdam Creek to Walnut Creek (Jones/Bibb Co.)	Drinking Water/ Fishing	10
Panther Creek (4)	Tributary to Yellow Water Creek (Butts Co.)	Fishing	4
Plymale Creek (4)	Butts Co.	Fishing	7
Pole Bridge Creek (15)	DeKalb Co.	Fishing	10
Pounds Creek (18)	Upstream Lakeview Ct. Lake (Gwinnett Co.)	Fishing	1
Pounds Creek (18)	Downstream Lakeview Court Lake (Gwinnett Co.)	Fishing	1
Prairie Creek (4)	Lamar Co.	Fishing	5
Pughs Creek (18)	Tributary to Yellow River (Gwinnett Co.)	Fishing	5
Reedy Creek (4)	Tributary to Tobesofkee Creek (Monroe Co.)	Fishing	4
Rock Creek (4)	Downstream Lite-N-Tie Rd. (Jones Co.)	Fishing	6
Rocky Creek (4)	Downstream Lake Wildwood (Bibb Co.)	Fishing	4
Rum Creek (4)	Downstream Lake Juliette (Monroe Co.)	Fishing	2
Sabbath Creek (4)	Tributary to Ocmulgee River (Bibb Co.)	Fishing	4
Sand Creek (4)	Jones Co.	Fishing	7
Scott Creek (23)	Headwaters to Deer Run Lake (Rockdale Co.)	Fishing	1
Spring Branch (4)	Tributary to Wise Creek (Jasper Co.)	Fishing	1
Stalking Head Creek (4)	Jones/Jasper Counties	Fishing	7
Standard Creek (4)	Monroe Co.	Fishing	2
Stone Mountain Creek (15)	Downstream Stone Mountain Lake (DeKalb Co.)	Fishing	5
Strouds Creek (2)	Social Circle (Walton/Newton Co.)	Fishing	3
Swan Creek (4)	Lamar Co.	Fishing	4
Todd Creek (4)	Tributary to Tobesofkee River (Monroe Co.)	Fishing	5
Tom George Creek (2)	DeKalb Co.	Fishing	2
Towaliga River (4)	Thompson Creek to Indian Creek (Spalding/Butts/Monroe Co.)	Fishing	10

Rivers/Streams Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Miles
Towaliga River (4)	Indian Creek to High Falls Lake (Butts Co.)	Fishing	7
Towaliga River (1,4,10)	High Falls Lake to Ocmulgee River (Butts/Monroe Co.)	Fishing	27
Town Creek (4)	Jones Co.	Fishing	4
Troublesome Creek (4)	Spalding Co.	Fishing	5
Walnut Creek (2)	Downstream McDonough Walnut Creek WPCP (Henry Co.)	Fishing	2
Whitewater Creek (4)	Headwaters to Echeconnee Creek (Crawford Co.)	Fishing	5
Wolf Creek (4)	Bibb Co.	Fishing	2
Wood Creek (4)	D/S Ga. Hwy. 83 to Echeconnee Creek (Monroe Co.)	Fishing	4
Yellow Creek (4)	Tributary to Little Tobesofkee Creek (Monroe Co.)	Fishing	9
Yellow River (18)	Centerville Creek to Hammock Creek (Gwinnett/DeKalb/Rockdale Co.)	Fishing	8
HUC 03070104			
Bay Creek (1)	Beaver Creek to Big Indian Creek (Peach/Houston Co.)	Fishing	3
Big Creek (4)	Headwaters to Burnham Creek (Houston Co.)	Fishing	12
Big Creek (Tucsawhatchee Creek) (1,10)	Hwy 230 to Ocmulgee River (Pulaski Co.)	Fishing	10
Big Indian Creek (4)	Baptist Creek to Bay Creek (Houston Co.)	Fishing	6
Big Indian Creek (4)	Flat Creek to Mossy Creek (Houston Co.)	Fishing	7
Coley Creek (4)	Bleckley Co.	Fishing	4
Jordan Creek (1)	Cochran to Ocmulgee River (Bleckley/Pulaski Co.)	Fishing	10
Little Shellstone Creek (4)	Headwaters to Shellstone Creek (Bleckley Co.)	Fishing	4
Little Sturgeon Creek (4)	Headwaters to Sturgeon Creek (Ben Hill Co.)	Fishing	7
Mossy Creek (4)	Taylors Mill Pond to Mule Creek (Peach Co.)	Fishing	6
Ocmulgee River (1)	Big Indian Creek to Pulaski/Wilcox Co. Line (Pulaski Co.)	Fishing	25
Ocmulgee River (1,9)	House Creek to Altamaha River (Telfair, Ben Hill, Coffee, Jeff Davis, Wheeler Co.)	Fishing	67

Rivers/Streams Supporting Designated Uses

Basin/Stream (Data Source)	Location	Water Use Classification	Miles
Richland Creek (4)	Schuffle Creek to Savage Creek (Twiggs Co.)	Fishing	5
Sandy Run Creek (1,2,4)	Downstream Warner Robins (Houston Co.)	Fishing	2
Savage Creek (4)	Headwaters to Ocmulgee River (Twiggs Co.)	Fishing	18
Shellstone Creek (4)	U.S. Hwy. 23 to Ocmulgee River (Twiggs/Bleckley Co.)	Fishing	8
South Prong Creek (4)	Headwaters to Big (Tucsawhatchee) Creek (Dooly/Pulaski Co.)	Fishing	12
South Shellstone Creek (1)	Downstream Coley, NW Cochran (Bleckley Co.)	Fishing	4
HUC 03070105			
Alligator Creek (1,4)	1mile d/s U.S. Hwy. 280 to Little Ocmulgee River (Wheeler Co.)	Fishing	16

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
OCMULGEE RIVER BASIN									
HUC 03070103									
Beaver Ruin Creek (2,18)	Gwinnett Co.	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	8	X	3	3
Big Haynes Creek (18)	Headwaters to Brushy Creek (Gwinnett Co.)	Fishing/Drinking Water	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	9	X	3	3
Big Haynes Creek (1,23)	Brushy Creek to Little Panther Creek (Rockdale Co.)	Drinking Water	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	2	X	3	3
Big Haynes Creek (23)	Little Haynes Creek to Yellow River (Rockdale Co.)	Drinking Water	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Big Sandy Creek (4)	Upstream Indian Springs (Butts Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	8	X	3	3
Boar Tusk Creek (2)	Headwaters to Yellow River (Rockdale Co.)	Fishing	pH	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	3
Bromolow Creek (1,18)	Headwaters to Beaver Ruin Creek (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	5	X	3	3

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
OCMULGEE RIVER BASIN									
Brown Branch (4)	Headwaters (Locust Grove) to Wolf Creek (Henry Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Brushy Fork Creek (1,18)	Lake Carlton to Big Haynes Creek (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Butlers Creek (4)	Tributary to Ocmulgee River (Jones Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Calaparchee Creek (4)	Upstream Lake Wildwood (Monroe/Bibb Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	13	X	3	3
Cedar Creek (18)	Headwaters to Alcovy River (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	4	X	3	3
Cole Creek (4)	Tributary to Tobesofkee Creek (Lamar/Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Deep Creek (4)	Headwaters to Echeconnee Creek (Crawford Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	7	X	X	3
Doless Creek (1)	Headwaters to Dolittle Creek (DeKalb Co.)	Fishing	DO,FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	2	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
OCMULGEE RIVER BASIN									
Eightmile Creek (4)	Tributary to Towaliga River (Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Gladesville Creek (4)	Headwaters to Little Falling Creek (Jasper Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	9	X	3	3
Hansford Branch (4)	Monroe Co.	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	2	X	3	3
Harmon Pye Branch (4)	Tributary to Wise Creek (Jasper Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	1	X	3	3
Hartley Branch (4)	Tributary to Deep Creek (Crawford Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	1	X	3	3
Herds Creek (4)	D/S Ga. Hwy. 212 to Ocmulgee River (Jasper Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Jackson Creek (1,18)	Gwinnett Co.	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	7	X	3	3
Little Chehaw Creek (4)	Headwaters to Chehaw Creek (Jones Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	3

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
OCMULGEE RIVER BASIN									
Little Deer Creek (4)	Headwaters to Deer Creek (Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Little Deer Creek Tributary (4)	Headwaters to Little Deer Creek (Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	1	X	3	3
Long Branch (4)	Tributary to Ocmulgee River (Jasper Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	3
Malholms Creek (4)	Headwaters (Jenkinsburg) to Tussahaw Creek (Butts Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Mill Dam Creek (4)	Monroe Co.	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	4	X	3	3
No Business Creek (1,18)	Headwaters to Norris Lake (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	6	X	3	3
North Branch South River (2)	Atlanta (Fulton Co.)	Fishing	FC	UR,CSO	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999. Atlanta's Federal CSO Consent Order, effective 9/98, requires compliance with water quality standards by 2/1/07.	3	X	3	3

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
OCMULGEE RIVER BASIN									
Ocmulgee River (1)	Walnut Creek to Tobesofkee Creek (Bibb Co.)	Fishing	FCG	UR	Urban runoff in Macon/Bibb Counties is being addressed in the EPD Stormwater Management Strategy. An area-wide stormwater permit was reissued 4/14/00. Fish Consumption Guidelines due to PCBs in Flathead Catfish. PCBs have been banned in the U.S., and levels have been declining.	11	X	X	3
Pew Creek (1,18)	Gwinnett Co.	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	4	X	3	3
Phinazee Creek (4)	Lamar/Monroe Counties	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Red Creek (4)	Tributary to Rocky Creek (Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	3
Rock Creek (4)	Upstream Lite-N-Tie Road (Jones Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	1	X	3	3
Rocky Creek (4)	Jasper Co.	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Rocky Creek (4)	Upstream Big Sandy Creek (Monroe/Butts Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3

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
OCMULGEE RIVER BASIN									
Rocky Creek (4)	D/S English Rd. (CR152) to Towaliga River (Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	4	X	3	3
Rocky Creek (4)	Upstream Lake Wildwood (Monroe/Bibb Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	7	X	3	3
Rocky Creek (1)	1 mi. u/s Rocky Creek Road toTobesofkee Creek, Macon (Bibb Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued 4/14/00.	5	X	3	3
Rum Creek (4)	Rum and Town Creeks, Upstream Lake Juliette (Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Sand Branch (4)	Tributary to Towaliga River (Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	2	X	3	3
Scoggins Creek (4)	Tributary to Ocmulgee River (Jones Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	2	X	3	3
South River (1,23)	Hwy 20 to Snapping Shoals Creek (Henry/Newton Co.)	Fishing	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 PCBs in fish tissue. PCBs have been banned in the U.S., and levels have been declining.	11	X	3	3

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
OCMULGEE RIVER BASIN									
South River (1,23)	Snapping Shoals to Jackson Lake (Newton Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	7	X	3	3
Third Branch (4)	Tributary to Ocmulgee River (Jones Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	3
Tobesofkee Creek (4)	Barnesville to Cole Creek (Lamar/Monroe Co.)	Fishing	Bio	NP	William Carter Co. closed and eliminated all discharges on 6/29/01. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	8	X	3	3
Tobesofkee Creek (1,4)	Lake Tobesofkee to Rocky Creek (Bibb Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued 4/14/00.	10	X	3	3
Tobler Creek (4)	Tributary to Ocmulgee River (Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Tributary to Tobesofkee Creek (1,3,4)	Barnesville (Lamar Co.)	Fishing	Bio	I1	William Carter Co. closed and eliminated all discharges on 6/29/01. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	2	X	3	3
Walnut Creek (4)	Downstream Hwy 42 (Crawford Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	4	X	3	3

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
OCMULGEE RIVER BASIN									
White Creek (4)	Lamar/Monroe Counties	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	4	X	3	3
Wood Creek (4)	Headwaters to d/s Ga. Hwy. 83 (Lamar/Monroe Co.)	Fishing	Bio	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	3
Yellow River (1,23)	Hammock Creek to Big Haynes Creek (Rockdale Co.)	Drinking Water	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	9	X	3	3
HUC 03070104									
Big Grocery Creek (4)	Headwaters to Ocmulgee River (Houston Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	4	X	X	3
Big Horse Creek (1,4)	Alligator Creek to Ocmulgee River (Telfair Co.)	Fishing	DO,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.	15	X	3,X	2
Big Indian Creek (4)	Mossy Creek to Ocmulgee River (Houston Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	7	X	3	3
Bluff Creek (4)	Ten Mile Creek to Ocmulgee River (Pulaski Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	4	X	X	3
Cedar Creek (4)	Headwaters to Brushy Creek (Wilcox Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	7	X	X	3

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
OCMULGEE RIVER BASIN									
Crooked Creek (4)	Cypress Lake to Ocmulgee River (Dodge Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	4	X	X	3
Flat Creek (4)	~0.4 mi u/s of US Hwy 41 to Big Indian Creek (Houston Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	5	X	X	3
Folsom Creek (4)	~0.2 mi d/s CR 33 to Ocmulgee River (Wilcox Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	9	X	X	3
Horse Creek (4)	Headwaters to Alligator Creek (Dodge/Telfair Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	17	X	X	3
House Creek (4)	Headwaters to Haw Pond Creek (Wilcox Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	7	X	X	3
Limestone Creek (4)	Okeetuck Creek to Big Indian Creek (Houston Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	3	X	X	3
Limestone Creek (1)	Headwaters to Ocmulgee River (Pulaski Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	7	X	3	2
Mossy Creek (4)	Mule Creek to Lake Joy (Peach/Houston Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	8	X	X	3

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
OCMULGEE RIVER BASIN									
Ocmulgee River (1)	Tobesofkee Creek to Echeconnee Creek (Bibb/Twiggs Co.)	Fishing	FC,FCG	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued 4/14/00. Fish Consumption Guidelines due to PCBs in Flathead Catfish. PCBs have been banned in the U.S., and levels have been declining.	7	X	3,X	3
Ocmulgee River (1)	Echeconnee Creek to Sandy Run Creek (Twiggs/Houston Co.)	Fishing	FCG	UR	Urban runoff in Macon/Bibb Counties is being addressed in the EPD Stormwater Management Strategy. An area-wide stormwater permit was reissued 4/14/00. Fish Consumption Guidelines due to PCBs in Flathead Catfish. PCBs have been banned in the U.S., and levels have been declining.	10	X	X	3
Ocmulgee River (1)	Sandy Run Creek to Big Indian Creek (Houston/Twiggs/Bleckley Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	23	X	3	3
Ocmulgee River (1,2)	Cedar Creek to House Creek (Wilcox/Dodge/Telfair Co.)	Fishing	Hg	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	36	X	3	2
Otter Creek (4)	~1.7 mi u/s GA 182 (Old River Road) to Ocmulgee River (Ben Hill Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	4	X	X	3
Sturgeon Creek (4)	Dickson Mill Creek to Ocmulgee River (Ben Hill Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	6	X	X	3

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
OCMULGEE RIVER BASIN									
Ten Mile Creek (4)	~0.7 mi u/s GA Hwy 257 to Bluff Creek (Pulaski Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	7	X	X	3
HUC 03070105									
Gum Swamp Creek (4)	Reedy Creek to Ga. Hwy. 257 (Bleckley/Dodge Co.)	Fishing	Bio	NP	EPD will address nonpoint sources through a watershed protection strategy.	12	X	X	3
Little Ocmulgee River (1)	Wilcox Creek to Alligator Creek (Wheeler Co.)	Fishing	DO	NP	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
OCMULGEE RIVER BASIN									
HUC 03070103									
Alcovy River (1)	Cedar Creek to Bay Creek (Walton Co.)	Fishing/Drinking Water	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	4	X	3	3
Almand Branch (1,2)	Tanyard Branch to Snapping Shoals (Rockdale Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Big Cotton Indian Creek (1)	Panther Creek to Brush Creek (Henry Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Big Flat Creek (1)	Headwaters to Flat Creek (Walton Co.)	Fishing	Tox,FC	M,UR	In July 2001, the City of Loganville completed facility construction and began startup operations of the upgraded facility. The City went from a rotating biological contact system to a sequencing batch reactor. Loganville WPCP passed last two consecutive toxicity tests in 8/01 and 10/01 and is meeting toxicity limits in permit and water quality standards for toxicity achieved. The permit for the facility contains a fecal coliform bacteria limit of 200/100ml. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	13	X	1,3	1
Big Sandy Creek (1)	Aboothlacoosta Creek to Ocmulgee River (Butts/Monroe Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	10	X	3	3

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
Cabin Creek (1,4)	Headwaters, Griffin to Towaliga River (Spalding Co.)	Fishing	Bio,Tox, FC, DO	I1,UR	Spring Industries under order to attain compliance with permit limits by 12/1/01. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	16	X	3	2
Camp Creek (1,2)	Headwaters to Jackson Creek (DeKalb/Gwinnett Co.)	Fishing	FC	UR	An area-wide stormwater permit was reissued in 1999. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Cobbs Creek (1,15)	Headwaters to Shoal Creek (DeKalb Co.)	Fishing	FC	UR	An area-wide stormwater permit was reissued in 1999. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	7	X	3	3
Conley Creek (1,15)	Headwaters to South River (Clayton/DeKalb Co.)	Fishing	FC	UR	An area-wide stormwater permit was reissued in 1999. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	9	X	3	3
Doolittle Creek (1,15)	Headwaters to South River (DeKalb Co.)	Fishing	FC	UR	An area-wide stormwater permit was reissued in 1999. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	3
Falling Creek (1,4,10)	Little Falling Creek to Ocmulgee River (Jones Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	9	X	3	3
Honey Creek (1,23)	Headwaters to South River (DeKalb/Rockdale Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	13	X	3	3

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
Hopkins Creek (1,2)	Headwaters to Alcovy River (Gwinnett Co.)	Fishing	FC	UR	An area-wide stormwater permit was reissued in 1999. Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	4	X	3	3
Intrenchment Creek (1,15)	Headwaters to South River, Atlanta (Fulton/DeKalb Co.)	Fishing	FC	UR,CSO	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999. Atlanta's Federal CSO Consent Decree, effective 9/98, requires compliance with water quality standards by 2/1/07.	6	X	3	3
Jacks Creek (1)	Headwaters to Yellow River (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	4	X	3	3
Little Haynes Creek (1,23)	Hwy 20 to Big Haynes Creek (Walton/Rockdale Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	11	X	3	3
Little Stone Mountain Creek (1,15)	Headwaters to Stone Mountain Lake (DeKalb Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	3	X	3	3
Little Suwanee Creek (1,18)	Tributary to Yellow River (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	2	X	3	3
McClain Branch (1,2,23)	Headwaters to Honey Creek (Rockdale Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	2	X	3	3

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
Shetley Creek (1,2)	Headwaters to Bromolow Creek (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	2	X	3	3
Shoal Creek (1,18)	Headwaters to Alcovy River, Lawrenceville (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	5	X	3	3
Shoal Creek (1,2,15)	Headwaters to South River (DeKalb Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	7	X	3	3
Snapfinger Creek (1,2,15)	DeKalb Co.	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	18	X	3	3
Snapping Shoals Creek (1,23)	Almand Branch to South River (Rockdale/Newton Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	10	X	3	3
South River (1,15,34,44)	Atlanta to Flakes Mill Road (Fulton/DeKalb Co.)	Fishing	FC	UR,CSO	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permiit was reissued in 1999. Atlanta's Federal CSO Consent Decree requires compliance with water quality standards by 2/1/07.	16	X	3	3

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
South River (1,2,15)	Flakes Mill Road to Pole Bridge Creek (DeKalb Co.)	Fishing	FC	UR,CSO	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999. Atlanta's Federal CSO Consent Decree requires compliance with water quality standards by 2/1/07.	9	X	3	3
South River (1,15,23)	Pole Bridge Creek to Hwy 20 (Rockdale/Henry Co.)	Fishing	FC	UR,CSO	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. Atlanta's Federal CSO Consent Decree requires compliance with water quality standards by 2/1/07.	15	X	3	3
Stone Mountain Creek (1,2,15)	Headwaters to Stone Mountain Lake (DeKalb Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	4	X	3	3
Sugar Creek (1,15)	U/S Memorial Drive to South River (DeKalb Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	6	X	3	3
Sweetwater Creek (1,2,18)	Lee Daniel Creek to Yellow River (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	6	X	3	3
Swift Creek (1,15)	Headwaters to Yellow River (DeKalb Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	5	X	3	3

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
Tobesofkee Creek (1)	Cole Creek to Todd Creek (Monroe Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	8	X	3	3
Town Branch (1,4)	Headwaters (Jackson) to Aboothlacoosta Creek (Butts Co.)	Fishing	Bio,FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	3	X	3	3
Turkey Creek (1,18)	Headwaters to Yellow River (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	4	X	3	3
Tussahaw Creek (1,4)	Wolf Creek to Lake Jackson (Butts Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3
Walnut Creek (1,4)	Headwaters to Ocmulgee River (Jones/Bibb Co.)	Fishing	Bio,FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued on 4/14/00.	20	X	3	3
Watson Creek (1,18)	Headwaters to Yellow River (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	3	X	3	3
Wise Creek (1,4)	Headwaters to Ocmulgee River (Jasper Co.)	Fishing	Bio,FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	6	X	3	3

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
Yellow River (1,18)	Sweetwater Creek to Centerville Creek (Gwinnett Co.)	Fishing	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. An area-wide stormwater permit was reissued in 1999.	15	X	3	3
Yellow River (1)	Big Haynes Creek to Jackson Lake (Newton Co.)	Fishing/Drinking Water	FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	25	X	3	3
Yellow Water Creek (1,4)	1 mile d/s Stark Road (Rd. S763), Jackson to Ocmulgee River (Butts Co.)	Fishing	FC	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	7	X	3	3
HUC 03070104									
Bay Creek (1,4)	Headwaters to Beaver Creek (Peach/Houston Co.)	Fishing	Bio,FC	UR	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution. EPD will address nonpoint source (urban runoff) through a watershed protection strategy.	9	X	3	3
Horse Creek (1,3)	Headwaters to Ocmulgee River, Warner Robins (Houston Co.)	Fishing	DO,pH	M,UR	Warner Robins relocated discharge from Horse Creek to the Ocmulgee River on 8/31/99. EPD will address nonpoint source (urban runoff) through a watershed protection strategy.	4	X	2	1
House Creek (1)	Ball Creek to Little House Creek (Wilcox/Ben Hill Co.)	Fishing	DO,pH,FC	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.	8	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
HUC 03070105									
Alligator Creek (1)	Batson Creek to Lime Sink Creek (Dodge/Laurens 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
Gum Swamp Creek (1)	Hwy 257 to Little Creek (Dodge Co.)	Fishing	DO	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	19	X	3	2
Sugar Creek (1)	Turnpike Creek to Little Ocmulgee River (Telfair Co.)	Fishing	DO,pH	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	5	X	3	2
Turnpike Creek (1,10)	Hwy 280 to Sugar Creek (Telfair Co.)	Fishing	DO,FC,pH	NP	Impairment will be addressed by implementing a locally developed plan that includes the remedial actions necessary for problem resolution.	24	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
HUC 03070103										
Big Haynes Reservoir (Black Shoals Lake) (1)	Rockdale Co.	Ocmulgee	Partial Support	Drinking Water	FCG(Hg)	NP	650	X	4	3
High Falls (1)	Monroe Co.	Ocmulgee	Partial Support	Recreation	FCG(PCBs)	UR,NP	699	X	3	3
Jackson (1)	Newton, Butts and Jasper Counties	Ocmulgee	Partial Support	Recreation	FCG(PCBs)	UR,NP	4,102	X	3	3
Jackson (1)	Newton, Butts and Jasper Counties	Ocmulgee	Partial Support	Recreation	FCG(PCBs), FC	UR,NP	650	X	3,4	3
HUC 03070105										
Little Ocmulgee State Park Lake (Gum Creek Swamp) (1)	Telfair and Wheeler Counties	Ocmulgee	Partial Support	Fishing	FCG(Hg)	NP	224	X	4	3