Ochlockonee River Basin Management Plan 2002

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.]

Ochlockonee River Basin Management Plan 2002

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:

Environmental Protection Division
Georgia Department of Natural Resources
Floyd Towers East
205 Butler Street, S.E.
Atlanta, Georgia 30334

Contents

Section 8

List of Figures

List of Tables

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

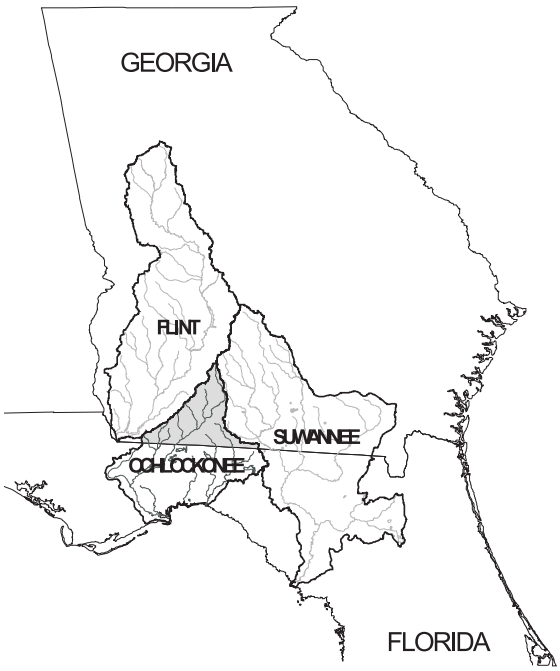
This Ochlockonee River Basin Management Plan includes strategies to address a number of different basinwide objectives. These include:

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



Ochlockonee River Basin Characteristics

The Ochlockonee River basin is located in the southwest part of Georgia, occupying an area of 6,330 square miles of which approximately 1,460 square miles are within Georgia. The basin lies within the Coastal Plain physiographic province, which extends throughout the southeastern United States. The Ochlockonee River drains into the Gulf of Mexico. One of the unique features of the Ochlockonee River is the presence of two smaller watersheds, the Aucilla River and Ward Creek watersheds, each of which discharge their waters separately into the Gulf of Mexico without ever merging with the Ochlockonee River.

Water Resources

The surface water resources of the basin are divided into four watersheds or hydrologic units: the Upper Ochlockonee River, the Middle Ochlockonee River, Wards Creek, and the Aucilla River.

Biological Resources

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

Population and Land Use Characteristics

The major population centers in the Ochlockonee River basin include Thomasville, Moultrie, Cairo and Pelham. The population is expected to increase at an average growth rate through 2050.

More than 51 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 Ochlockonee basin includes part or all of 7 Georgia counties. These counties are members of two different Regional Development Centers.

Water Quantity Conditions

Surface water supplies in the basin include water in rivers, and ponds. Groundwater is the primary water source of the Ochlockonee River basin. In the Coastal Plain Province, aquifer yields are higher and groundwater withdrawals make up the majority of the total water budget. Georgia's Drinking Water Program oversees 11 active and permitted public water systems in the Ochlockonee River basin.

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 Ochlockonee River basin is considerable. Future agricultural water demand is expected to increase significantly within the basin.

Water Quality Conditions

The major environmental stressors that impair or threaten water quality in the Ochlockonee River basin include traditional chemical stressors, such as oxygen demanding substances 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 1998-1999 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 Ochlockonee 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 2 permitted major municipal wastewater discharges with flows greater than 1 MGD in the Ochlockonee River basin. There are also 5 minor public discharges. EPD monitors compliance of these permits and takes appropriate enforcement action for violations. As of the 1998-1999 water quality assessment, 2 stream segments (totaling 16 miles) were identified in which municipal

discharges contributed to a failure to support designated uses. Total maximum daily loads (TMDLs) were established in 2001 for these segments. The TMDLs for these segments are being implemented through the NPDES permitting process and nonpoint source programs.

Industrial discharges. There are relatively few industrial wastewater dischargers in the basin including 1 major facility. EPD identified no stream segments where permitted industrial discharges contributed to a failure to support designated uses.

Permitted storm water discharges. Urban storm water runoff in the Ochlockonee 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 and are deposited in water bodies. The 1998-1999 water quality assessment results for the Ochlockonee 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 storm water 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.

Support of Designated Uses

Under Georgia regulations, designated uses and associated water quality standards provide goals for water quality protection. EPD assessed the streams in the Ochlockonee basin and reported the results in *the Georgia 2000 305(b)/303(d) list*. This assessment indicated that 1 out of 26 stream segments (4 miles) supported uses, and 7 out of 26 (67 miles) partially supported uses, while 18 out of 26 (138 miles) did not support designated uses.

Key Environmental Stressors

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

Dissolved Oxygen. The 1998-1999 water quality assessments indicated that listings due to violations of water quality standards for dissolved oxygen were one of the most commonly listed causes of failure to support designated uses. Dissolved oxygen concentrations contributed to lack of full support on 147 miles, constituting 19 stream segments. 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 during the 1998-2000 period significantly impacted the southern part of the state, including the Ochlockonee River basin. According to EPD's "1998-2000 Georgia Drought Report," the rainfall shortage in this region amounted to almost 23 inches. The drought conditions likely contributed to the low dissolved oxygen concentrations documented in the Ochlockonee River and its tributaries. In addition, it should be noted that dissolved oxygen concentrations are naturally low in parts of the Ochlockonee River basin.

Fecal coliform bacteria. The 1998-1999 water quality assessments indicate that listings due to violations of water quality standards for fecal coliform bacteria were one of the most commonly listed causes of failure to support designated uses. Fecal coliform bacteria concentrations contributed to lack of full support on 125 miles, constituting 17 stream segments. Fecal coliform bacteria may arise from point and nonpoint sources, such as wastewater treatment plants, agricultural nonpoint sources, leaking septic systems, and storm water 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.

Nutrient loading. Nutrient loading is potentially an important issue in the Ochlockonee River basin. Excess nutrient loads can promote undesirable growth of algae and degradation of water quality. The major sources of nutrient loading in the Ochlockonee basin are agricultural runoff, urban runoff, storm water, and wastewater treatment facilities.

Fish tissue contamination. Fish consumption guidelines for individual fish species are in effect for 3 stream segments (51 miles). The majority of the guidelines for stream segments are the result of mercury. Most of the mercury load is believed to be of atmospheric or natural origin.

Flow and Temperature Modification. Stream flow and temperature affect the kinds of organisms able to survive in the water body. Stream flow and temperature also affect how much oxygen is available to the organisms. The potential threats to temperature regime in streams of the Ochlockonee basin are warming by small impoundments, increases in paved surface area, and the removal of trees which provide shade along stream banks.

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

Strategies for Water Supply

At this time, water quantity appears to be adequate for all uses within the Georgia portion of the Ochlockonee basin, and there are no major new water supply projects proposed. There are, however, several water quantity concerns in the Ochlockonee basin which are of significance to decision makers.

Strategies for Water Quality

Water quality in the Ochlockonee 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 twenty years.

The primary source of pollution that continues to affect waters of the Ochlockonee 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 Ochlockonee 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 Ochlockonee 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 ground water 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 Ochlockonee 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 standard within a two year period, a TMDL will be established for a specific pollutant on the specific stream segment in accordance with EPA guidance. TMDLs established for 303(d) listed waters in the Ochlockonee River basin in 2001. Implementation plans will be developed in 2002.
- **Source Water Protection.** Most of the public water supply in the Ochlockonee 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 guidance.
- **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 Ochlockonee 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.

Forestry is a major part of the economy in the Ochlockonee basin and commercial forest lands represent over 51 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.

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 Ochlockonee River Basin

This basin plan represents one step in managing the water resources in the Ochlockonee 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. The Ochlockonee River

basin team and local advisory committee will both be reorganized to initiate the next iteration of the cycle. Agencies and organizations with technical expertise, available resources, and potential implementation responsibilities are encouraged to become part of the basin team. Other stakeholders can stay involved through working with the local advisory committee, and participating in locally initiated watershed planning and management activities. The next scheduled update of the Ochlockonee 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 Ochlockonee 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 Ochlockonee River basin characteristics, describe the status of water quality and quantity in the Ochlockonee 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. 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.

A separate document is available from Georgia EPD that describes the RBMP approach in greater detail.

Initial Efforts for the Ochlockonee 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 Ochlockonee River (Figure 1-1). Under the RBMP approach, the Ochlockonee River plan will be updated every five years. During the first iteration of RBMP in Georgia, much effort and resources are being dedicated to making programmatic changes, building the infrastructure of RBMP, cataloging current water management activities and beginning to coordinate with the many agencies, organizations, and individuals that have a stake in river basin management. As a result, some portions of the RBMP cycle have had to be condensed during this first iteration; in particular, it has not been possible to spend as much effort on developing management strategies as is planned for future iterations. Future iterations of the basin planning cycle will provide a better opportunity for developing new, innovative, and cost-effective strategies for managing water quality and quantity.

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

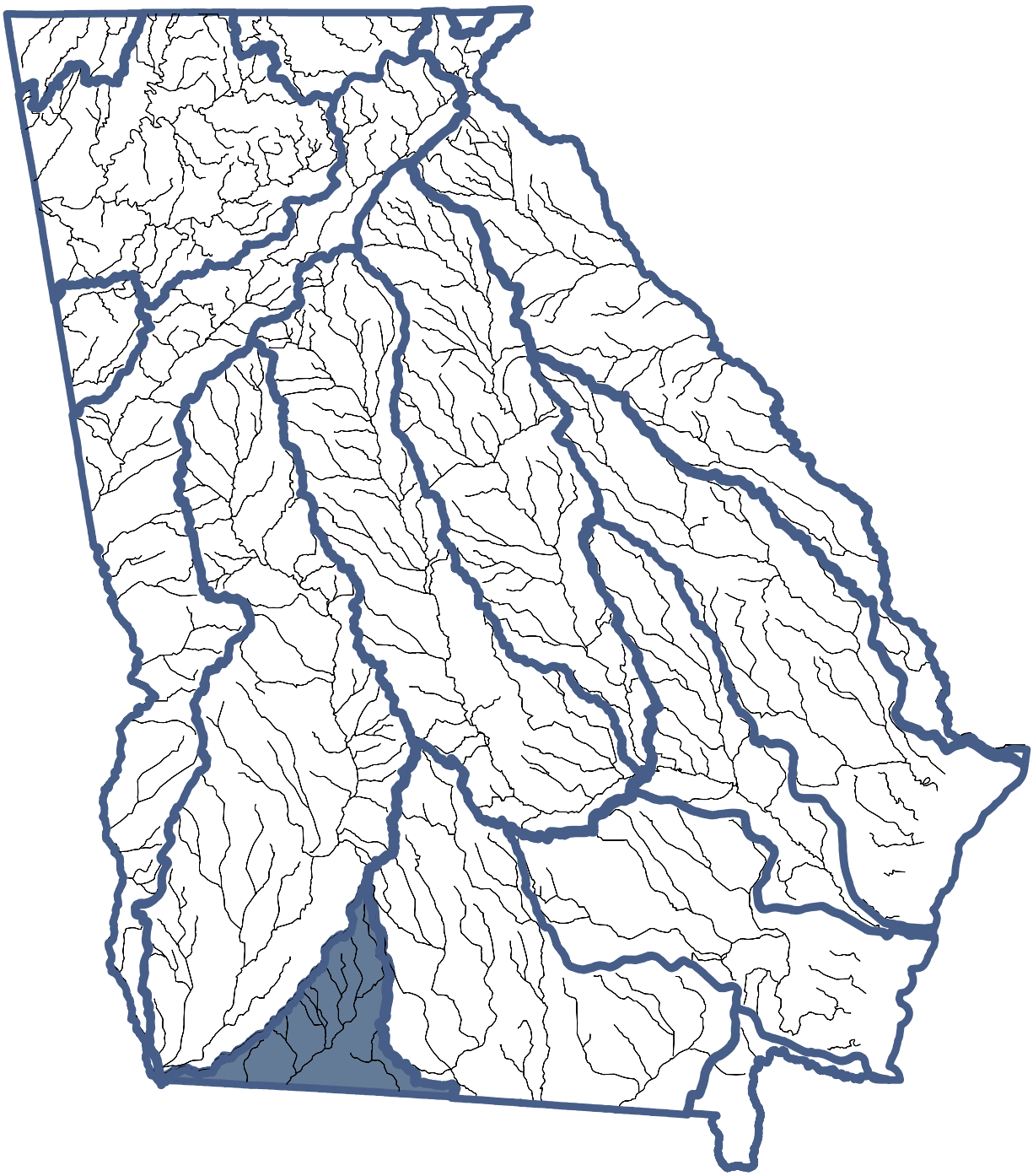


Figure I-1. The Ochlockonee River Basin

4.0 Environmental Stressors

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

5.0 Assessment

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

6.0 Concerns and Priority Issues

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

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

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

The schedules of activities for the first two Ochlockonee River basin cycles, i.e., 1997-2002 and 2002-2007, are provided in Figures 1-2 and 1-3.

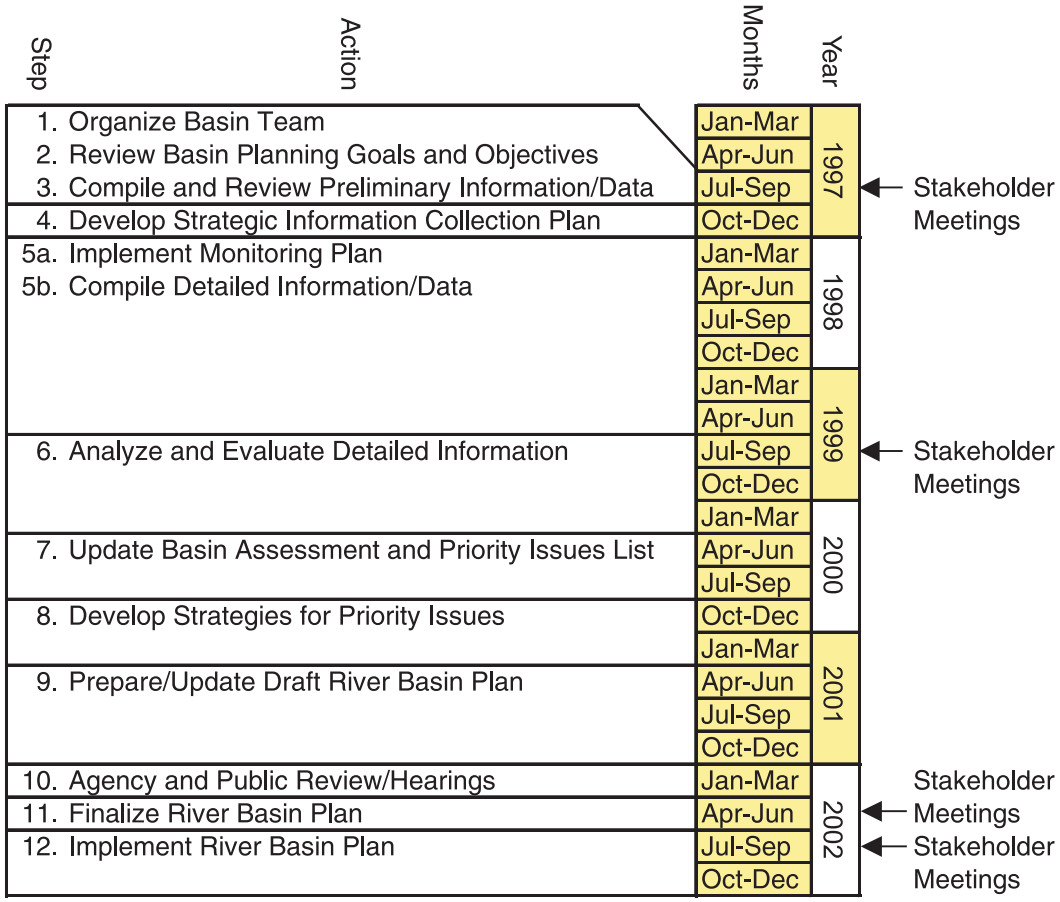


Figure I-2. Ochlockonee River Basin Planning Schedule, I[st] Cycle, I997-2002

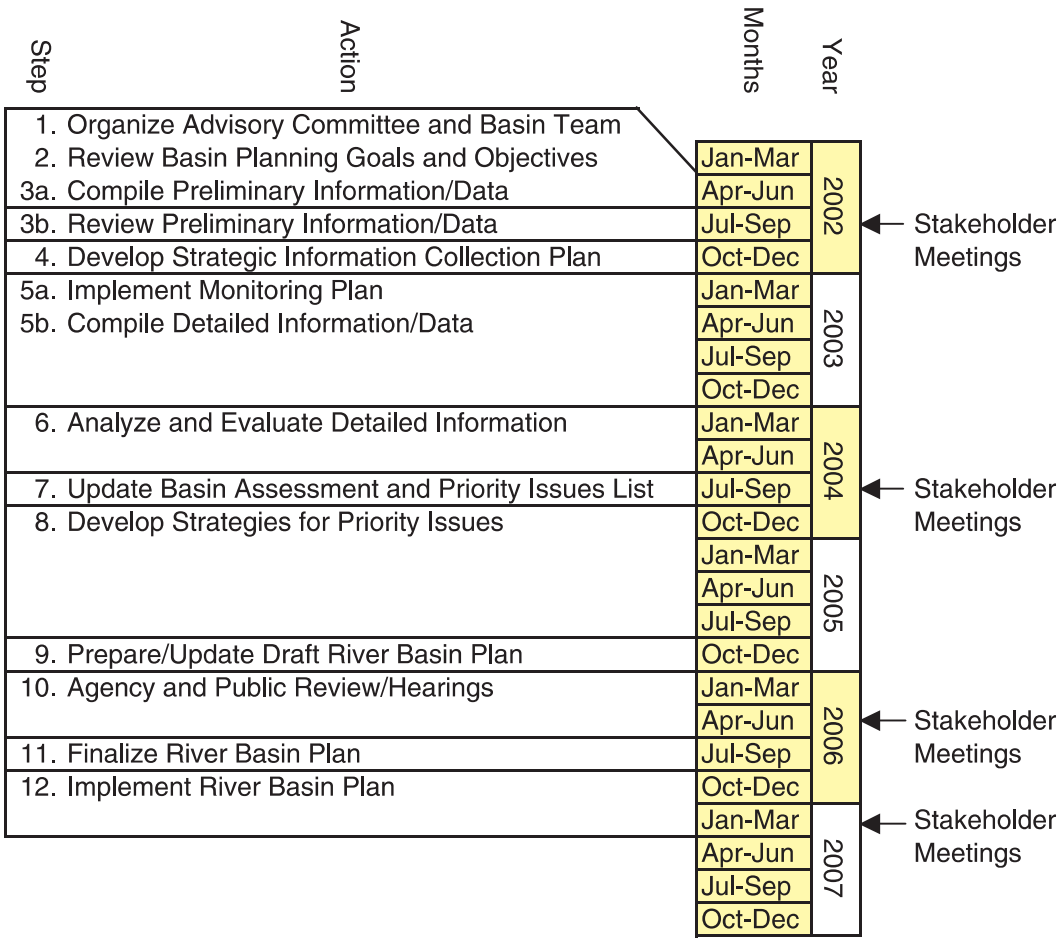


Figure I-3. Ochlockonee River Basin Planning Schedule, 2nd Cycle, 2002-2007

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. The Ochlockonee River basin team will begin reorganizing itself in 2002.

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

Support the Local Advisory Committee

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

The committees consist of local people representing a variety of stakeholder interests including local governments, agriculture, industry, forestry, environmental groups, landowners, and citizens. Committee members and chairs are appointed by the EPD Director following a nomination process at the beginning (step 1) of each 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 Ochlockonee River Basin Local Advisory Committee serving for the first planning cycle (through April 2002).

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 sub-watershed level. These local forums might already exist in the form of conservation districts or watershed associations, or may be created as an outgrowth of RBMP.

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

Mr. Thomas Coleman Mid South Georgia Soil 4518 Dunn Road Hartsfield, Georgia 31513	Mr. Tony Rojas, City Manager City of Moultrie Post Office Box 580 Moultrie, Georgia 31776	Mr. Roger Thigpen Georgia Pacific Corporation 830 Spring Creek Road Bainbridge, Georgia 31717
Mr. Belton Dykes Grady County Farm Bureau Box 547 Cairo, Georgia 31728	Mr. Ron Simpson Georgia Conservancy Post Office Box 5782 Albany, Georgia 31706	Mr. Vernon Horne Beadles Lumber Company Box 3457 Moultrie, Georgia 31776
Mr. Darrell Sinclair Thomas County Farm Bureau 2376 Georgia Highway 122 Thomasville, Georgia 31792	Mr. David Burke Oil Dri Corporation of Georgia Post Office Box 380 Ocholockonee, Georgia 31773	Mr. Donnie Turner 19833 Georgia Highway 33 Pavo, Georgia 31778
Mr. Tom Berry, City Manager City of Thomasville Post Office Box 1540 Thomasville, Georgia 31792	Mr. Dan Bollinger SW Georgia Regional Development Center 30 West Broad Street Post Office Box 346 Camilla, Georgia 31730	William Perry, City Manager City of Thomasville PO Box 1540 Thomasville, Ga. 31799-1540
Mr. Jack Powell County Administrator 201 North Main Street, Room 1 Sylvester, Georgia 31791		Steve Sykes, City Engineer City of Thomasville PO Box 1540 Thomasville, Ga. 31799-1540

Attend a Stakeholder Meeting

The RBMP approach includes regularly-scheduled 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.

Figures 1-2 and 1-3 show the timing of stakeholder meetings that have been and will be held as part of the Ochlockonee basin RBMP cycles. EPD hosted the initial stakeholder meeting in Thomasville in early 1998 to invite and encourage stakeholder input early in the planning process for the Ochlockonee River basin. Focused monitoring in the Ochlockonee River basin was conducted in 1998. The data was assessed in the 1999 and waters not meeting water quality standards were public noticed in February, 2000. This work along with priority issues was presented to and discussed with the Local Advisory Committee in October, 2000. Draft strategies to address priority issues were presented to and discussed with the Local Advisory Committee in August, 2001. Due to the extended monitoring program and compressed schedule for problem listing and strategy development, the second stakeholder meeting was not held. A second group of stakeholder meetings—to give stakeholders the opportunity to review this river basin management plan—is planned for the March-April 2002. A final group of meetings in late 2002 will give stakeholders a chance to discuss implementation of management strategies. The next set of stakeholder meetings after the implementation phase of the first cycle is planned for 2002, providing stakeholders an opportunity to be involved in the planning for the next cycle of RBMP in the Ochlockonee basin. The dates of ensuing stakeholder meetings are indicated in Figure 1-3.

What's Next?

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

In This Section

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

Section 2

River Basin Characteristics

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

The physical characteristics of the Ochlockonee River basin include its location, physiography, soils, climate, surface water and ground water 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 Ochlockonee River basin is located in mid to southwestern Georgia and is flanked by the Flint River basin to the west and the Suwannee River basin to the east (Figure 2-1). The headwaters are located in Worth County and the river flows in a southwesterly direction into Florida and eventually empties into the Gulf of Mexico. The Ochlockonee River basin is located in Georgia and Florida and drains approximately 6,330 square miles. Approximately 1460 square miles of the basin are in Georgia. One of

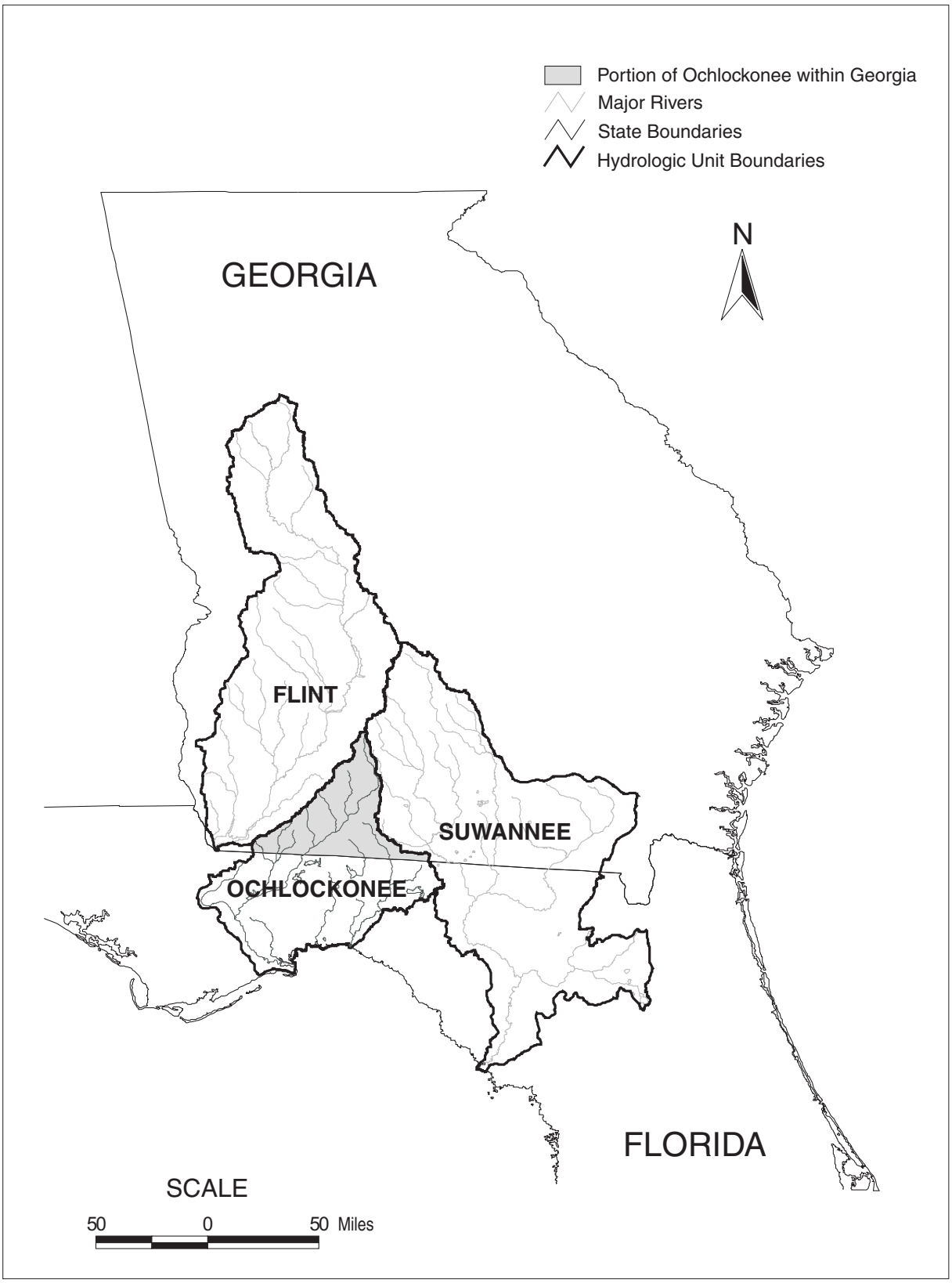


Figure 2-I. Location of the Ochlockonee River Basin

the unique features of the Ochlockonee River basin is the presence of three smaller watersheds, each of which discharges their waters separately into the Gulf of Mexico without ever merging with the waters of the Ochlockonee River. The Aucilla River and Wards Creek watersheds flow into Florida east of the Ochlockonee River. A tributary of the Apalachicola River, N. Mosquito Creek, lies within Georgia to the west of the Ochlockonee River.

The U.S. Geological Survey (USGS) has divided the Ochlockonee River basin into five 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 Ochlockonee 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 Ochlockonee River Basin in Georgia

03110103	Aucilla River
03120001	Wards Creek
03120002	Upper Ochlockonee River
03120003	Lower Ochlockonee River
03130011	N. Mosquito Creek (Apalachicola River)

2.I.2 Climate

The Ochlockonee River basin is characterized by mild winters and hot summers. Mean annual precipitation ranges from 46 to 52 inches per year. Precipitation occurs as rainfall. 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 68 degrees Fahrenheit (Journey and Atkins, 1996; citing Peck et al., 1992; Schneider et al., 1965; and Carter and Stiles, 1983).

2.I.3 Physiography, Geology, Soils, and Hydrogeology

Physiography

The Ochlockonee, Satilla, St. Marys and Suwannee River basins lie entirely within the Coastal Plain physiographic province, which extends throughout the southeastern margin of the United States. The physiography of these river basins reflects a geologic history of repeated periods of land submergence which is typical of the Coastal Plain Province. These basins include all or portions of the Tifton Upland, the Okefenokee Basin, the Bacon Terraces and the Barrier Island Sequence districts of the Coastal Plain. The Ochlockonee River basin lies within the western third of the Tifton Upland District. The Satilla River basin lies entirely within the Bacon Terraces and Barrier Island Sequence districts. The St. Marys River basin lies entirely within the Okefenokee Basin and Barrier Island Sequence districts. The Suwannee River basin lies within the Tifton Upland and Okefenokee Basin districts.

The Tifton Upland District is characterized by a well developed, extend dendritic stream pattern where narrow, rounded interfluves occur 50 to 200 feet above relatively narrow stream valley floors. The northwestern boundary of the district is the base of the Pelham Escarpment, which rises as much as 200 feet above the Dougherty Plain to the west. The Okefenokee Basin District is typified by very low topographic relief, numerous extensive swamps, and local sand ridges. The Bacon Terraces District displays a very extended, southeast trending dendritic drainage pattern containing ling, narrow

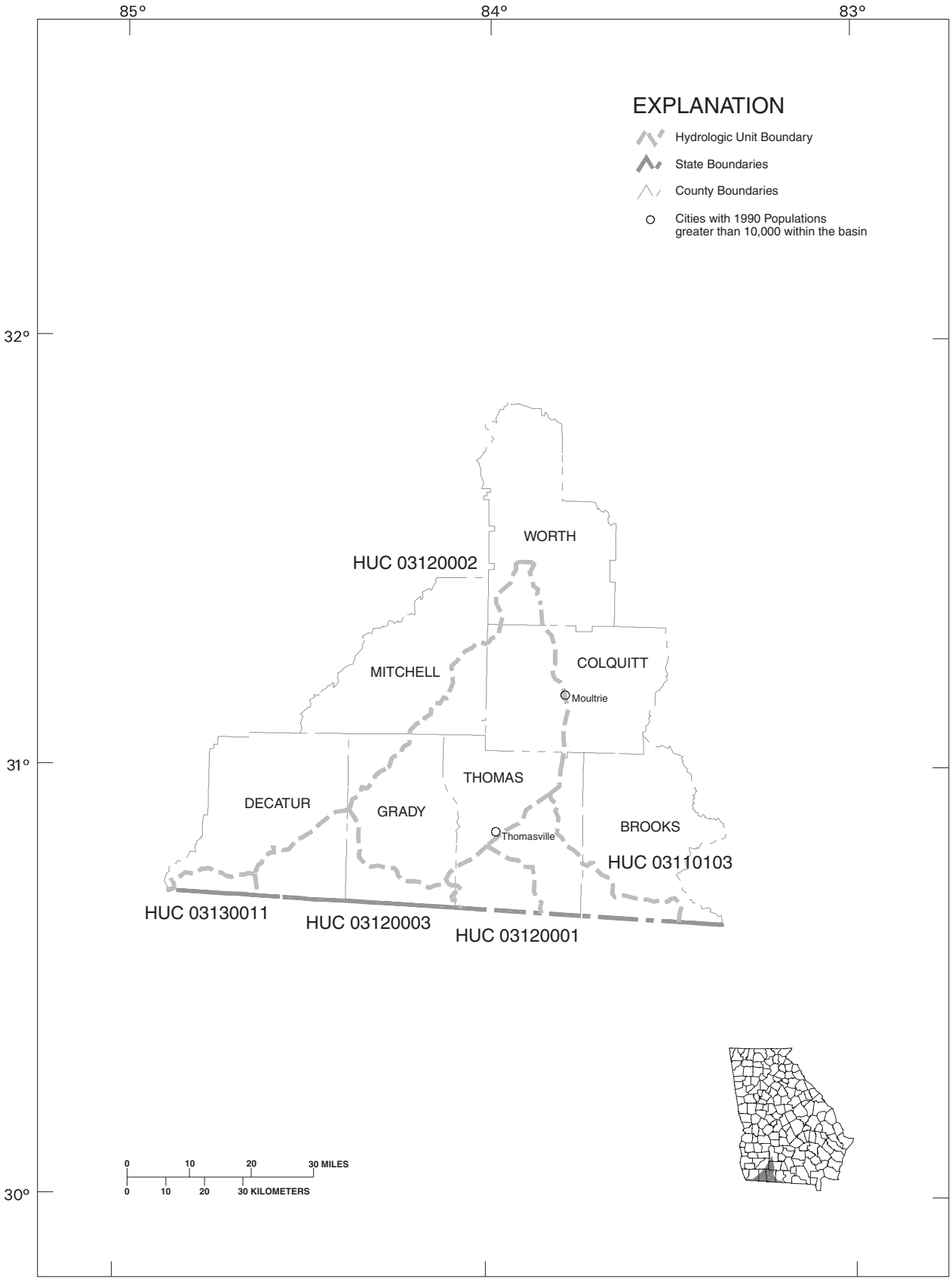


Figure 2-2. Hydrologic Units and Counties of the Ochlockonee River Basin

interfluves with gently rounded to flat summits that are 50 to 100 feet above narrow, marshy floodplains. The district also contains several low, moderately dissected terraces which are generally parallel to the coastline. From west to east, these are designated the Hazlehurst, Pearson, Claxton, Argyle, Waycross and Penholoway terraces. The Barrier Island Sequence District is characterized by a series of prominent marine terraces which form a step-like progression of decreasing altitudes toward the sea. The former, higher sea levels created barrier island-salt marsh environments parallel to and similar to those found on the present coast. The terraces are composed of sand ridges marking the former barrier islands, and are flanked by fresh water marshes at the former salt marsh locations. They have undergone slight to moderate dissection which is generally more advanced at the western edge of the district. Trail Ridge is the most prominent of these terraces with a maximum elevation of approximately 160 feet. It marks the western boundary of the Barrier Island Sequence District where it joins the Bacon Terraces and Okefenokee Basin districts. Other, less prominent terraces in the district, from west to east, are the Wicomico, Penholoway, Talbot, Pamlico, Princess Anne, and Silver Bluff-Holocene terraces.

The streams in these basins are typical of the Coastal Plain. They generally lack the riffles and shoals that are common to streams in the Piedmont Province to the north, and exhibit more extensive floodplain development and greater sinuosity.

Carolina Bays are elliptical or "spoon-shaped" wetland depressions aligned roughly north-northwest and are logically well developed throughout the area east of the Suwannee River basin. Lime sinks and lake-filled sinks are well developed in areas underlain by limestone in the shallow subsurface, notably in the Lake Park area south and west of Valdosta, Lowndes County.

Geology

Weathered, poorly consolidated sediments underlie all of these river basins, and are dominantly composed of sands, clays, and gravels which range from Miocene to Holocene in age. These sediments include the Miccosukee Formation (Pliocene age), Altamaha Formation and various formations of the Hawthorne Group (all Miocene age), as well as barrier island and marsh/lagoon facies of the numerous shoreline complexes (Pleistocene to Holocene age). Local occurrences of calcareous sediments include the Suwannee Limestone (Oligocene age) and Duplin Marl (Pliocene age). Other rock types in the area include dolomite, chert, peat, phosphate and fuller's earth, as well as Quaternary alluvium in the flood plains along the major stream valleys. Most of these sediments were deposited in either terrestrial or shallow marine environments.

Sediments in the area are locally mined for construction sand and fill material. In addition, the Meigs Member of the Coosawhatchie Formation (Hawthorne Group) is the source of the economically important fuller's earth clay deposits being mined in the Ochlockonee River Basin. In the past, crushed stone was produced from some of the limestone deposits, and a few of the larger Carolina Bays were mined for peat.

Soils

The Ochlockonee River Basin is within the Southern Coastal Plain Major Land Resource Area (MLRA) (Figure 2-3). This area is characterized by nearly level to gently sloping, well drained upland soils that are dissected by nearly level, poorly drained soils along narrow drainageways. Most of the soils are strongly acid, are low in organic matter content, and low in natural fertility. Although individual soils vary considerably across the river basin, they can be categorized into three major groups.

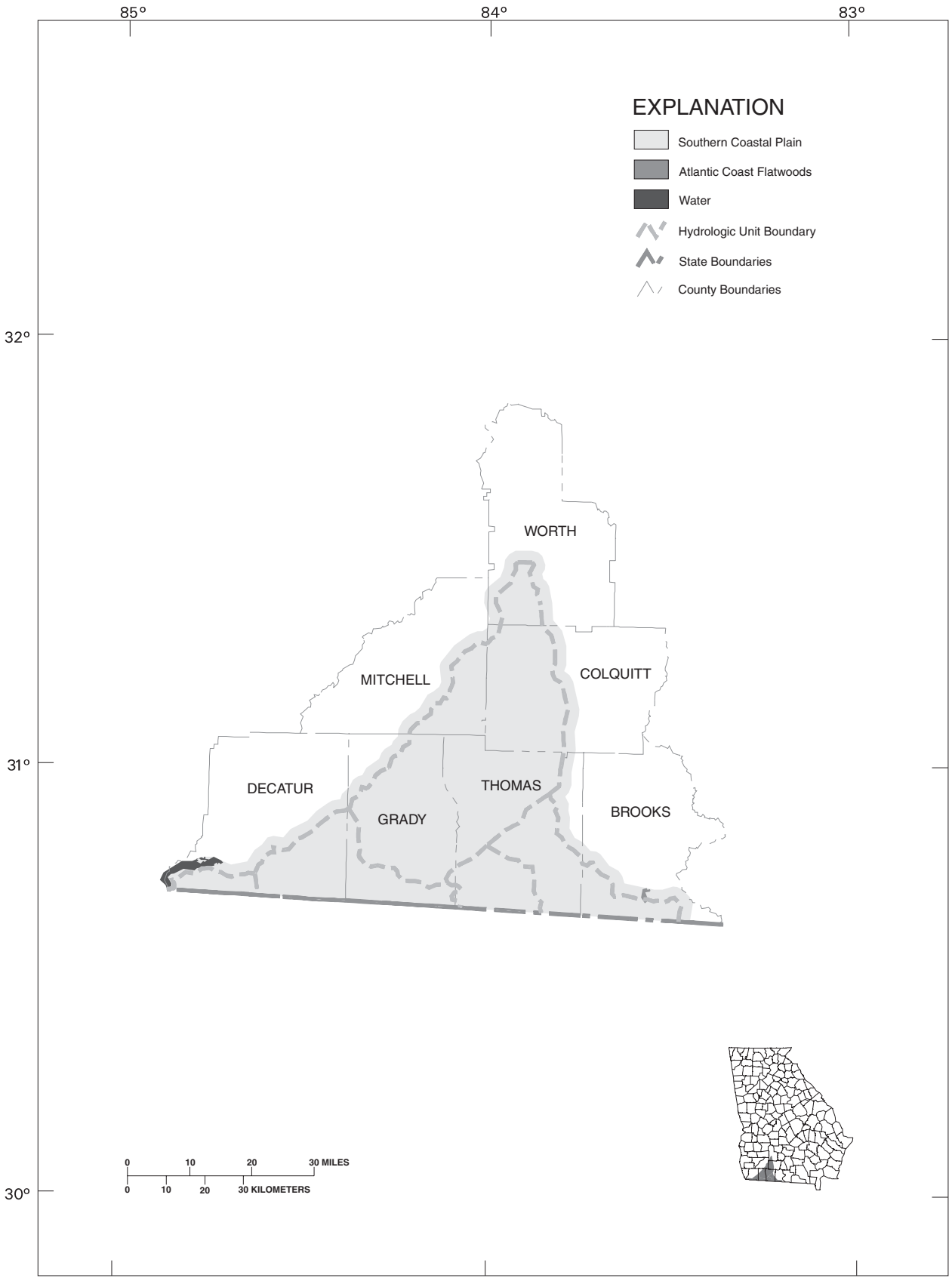


Figure 2-3. Major Land Resource Areas in the Ochlockonee River Basin

The first group of soils covers the northern two-thirds of the area, beginning at the southwest corner and going across to the east-northeast. This group is dominated by nearly level and very gently sloping Tifton and Dothan soils. These are well drained upland soils that have a sandy surface layer and a yellowish brown or strong brown, loamy subsoil. The surface layer is normally loamy sand and is about 10 inches thick. The subsoil is mostly sandy clay loam. Characteristic of these soils is a layer of plinthite in the subsoil at a depth of about 30 inches. Plinthite is an iron-rich mixture of clay with quartz and other constituents that can perch water during wet seasons. The soils within this group are the best suited for agriculture.

The second group of soils covers the lower third of the river basin. This group is dominated by Orangeburg, Faceville, and Lucy soils. These are mostly very gently sloping or gently sloping, well drained soils. They are slightly more sloping and dissected than the soils in the previous group. These soils are distinguished by their red subsoil. Orangeburg and Lucy soils have a sandy surface layer and a loamy subsoil. Faceville soils have a loamy surface layer and a clayey subsoil.

The third major group of soils is scattered throughout the first two areas. This group includes nearly level, poorly drained soils along narrow drainageways and floodplains. Most of these soils are sandy throughout, but some of them have a loamy subsoil at various depths. Water tables are commonly at or near the surface during wet seasons, and the soils are subject to flooding. Dominant soils in these areas are Osier and Pelham.

Hydrogeology

Coastal Plain sediments underlie the entire region and groundwater is produced from several aquifers. Sources of ground water include, in order of importance, the unconfined Surficial aquifer, the Upper and Lower Brunswick aquifers and the Upper and Lower Floridan aquifers. The Surficial aquifer is up to 230 feet thick and consists of interlayered, Miocene and younger, sand, clay and limestone. It is underlain by the Upper and Lower Brunswick aquifers both of which are composed of 150 and 70 feet, respectively, of poorly sorted sand. The Upper and Lower Floridan aquifers consist of Eocene to Oligocene carbonate rocks (largely limestone and dolostone) 700 to 2,500 feet in thickness. In each of the aquifers, except for the Surficial aquifer, the groundwater is under confined (aquifer) conditions. Most of these aquifers consistently have excellent water quality; however, the Lower Floridan aquifer is saline and generally does not meet drinking water standards.

2.1.4 Surface Water Resources

The main stem of the Ochlockonee River and its tributaries are the principal surface water resources in the basin. One of the unique features of this basin is the presence of two smaller watersheds, the Aucilla River and Ward Creeks, each of which discharge separately into the Gulf of Mexico without ever merging with the waters of the Ochlockonee River. The annual flow of the river as it crosses the Georgia-Florida border is estimated at 850 cfs, with a 7Q10 estimate of 24 cfs. There are no large storage reservoirs or hydroelectric plants in the Ochlockonee River basin. Stream networks within each HUC are shown in Figures 2-4 through 2-8.

2.1.5 Ground Water Resources

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

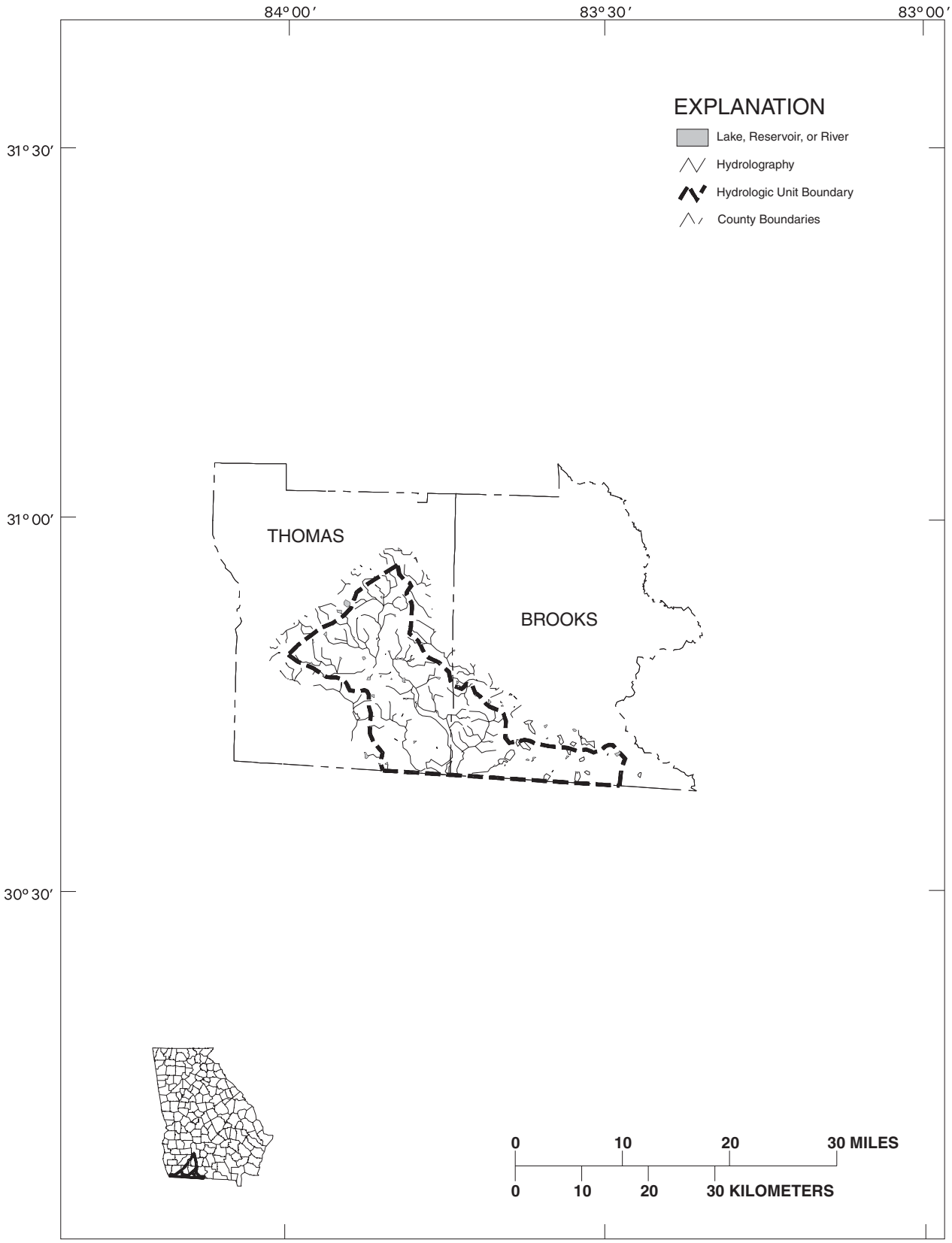


Figure 2-4. Hydrography, Ochlockonee River Basin, HUC 03110103

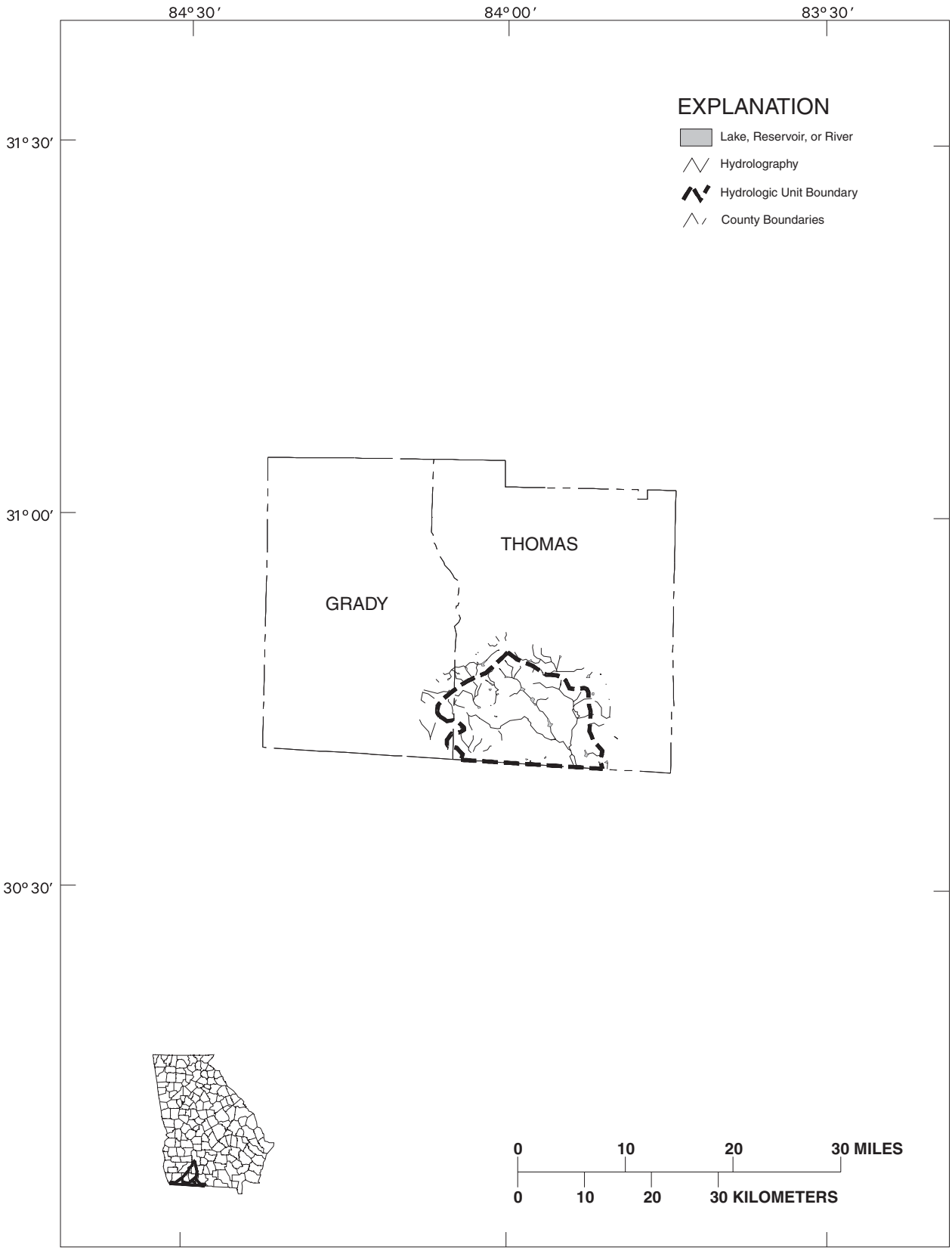


Figure 2-5. Hydrography, Ochlockonee River Basin, HUC 03120001

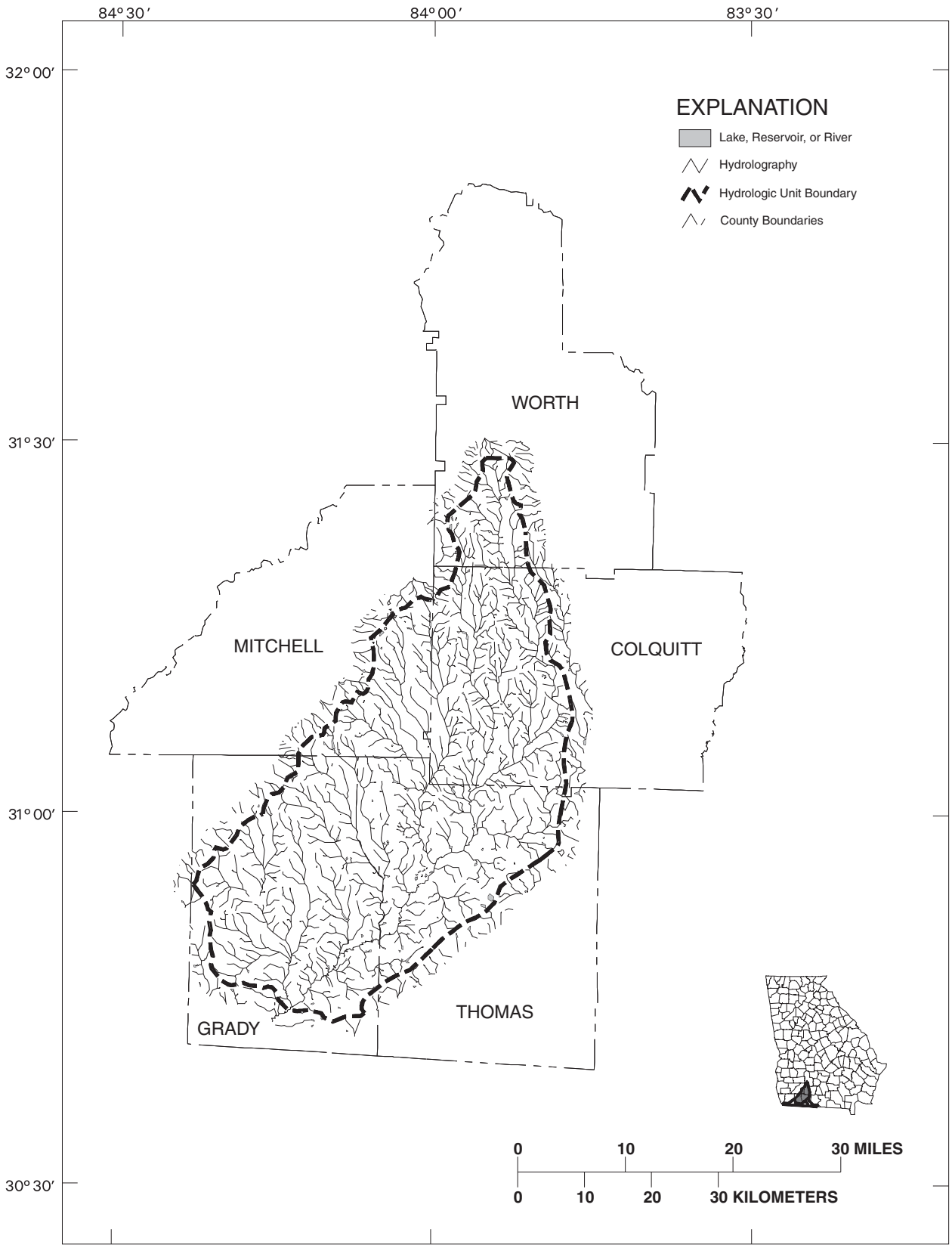


Figure 2-6. Hydrography, Ochlockonee River Basin, HUC 03120002

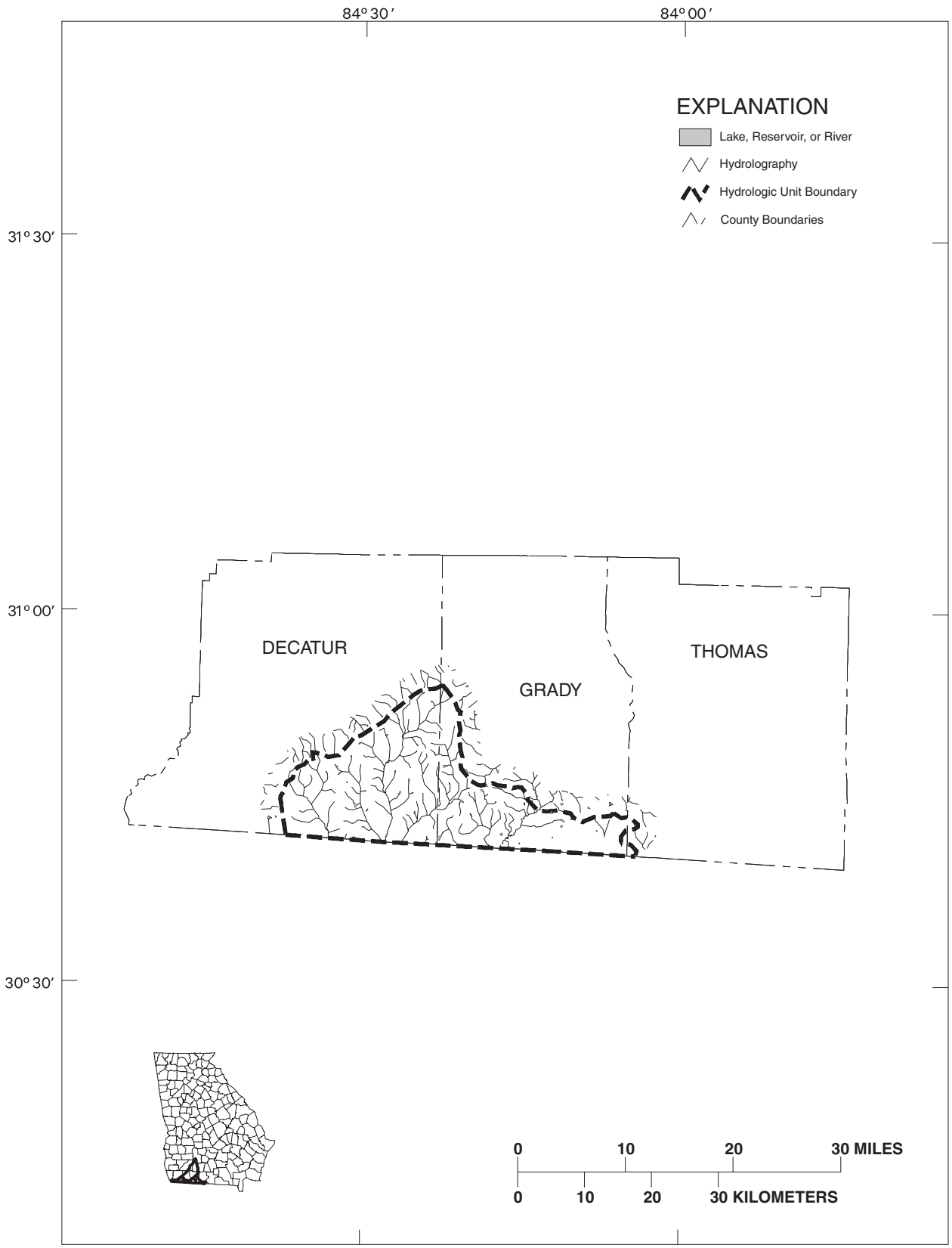


Figure 2-7. Hydrography, Ochlockonee River Basin, HUC 03120003

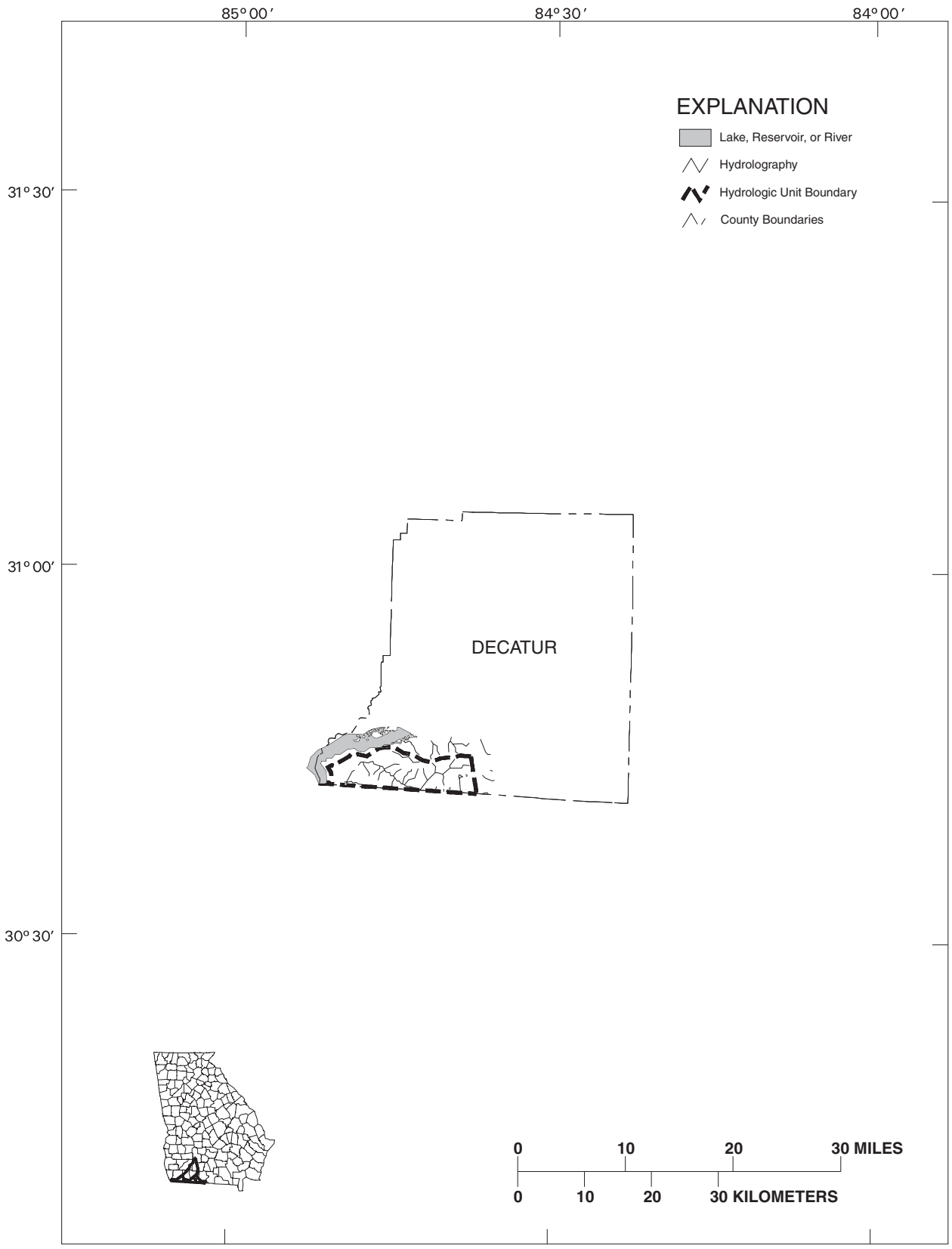


Figure 2-8. Hydrography, Ochlockonee River Basin, HUC 03130011

Floridan aquifer

The Floridan aquifer underlies the rest of the southern portion of the basin. The aquifer is overlain by approximately 25-125 feet of sandy clay residuum derived from chemical weathering of the underlying rock. The total thickness of the Floridan aquifer in the basin ranges from a few feet in the north to more than 400 feet in the extreme southern portion of the basin. Clastic grains of sand and shale are major components of the Floridan aquifer near its northernmost extent, where it is dominantly limestone in the Ochlockonee basin. Throughout most of the basin, the aquifer can be divided into three thick limestone formations: the Tampa Limestone, the Suwannee Limestone and the Ocala Limestone. The Tampa Limestone consists of whitish gray limestone that has a shale bed at its base. This shale acts as a confining layer to the underlying Suwannee and Ocala limestones (Miller, 1986). Below the Tampa, the Suwannee limestone is a massive chalky unit that is easily dissolved and weathered. For this reason, the many solution cavities in the Tampa provide abundant water to the underlying Ocala Limestone. The Ocala Limestone is the principal unit of the Floridan aquifer, and contains an upper friable, porous unit and a lower fine-grained unit (Miller, 1986). This lower unit contains most of the groundwater in the Floridan Aquifer (Torak and others, 1993). The Ocala is underlain by the clay-rich Lisbon Formation, which acts as a slower confining bed to the water-bearing limestones above. Well yields in the Floridan aquifer can range from about 40 GPM in the north to more than 10,000 GPM in the thickest, southern most portion of the Floridan aquifer. The Floridan serves as the main aquifer from Decatur and Burke counties to the coast.

2.1.6 Biological Resources

The Ochlockonee River basin supports a diverse and rich mix of terrestrial and aquatic habitats and is home to several federally and state-protected species. The basin encompasses parts of five major land resource areas. Some of the biological resources of the basin are summarized below.

Fish Fauna

The fish fauna existent in the Ochlockonee River is similar to other unregulated coastal plain streams in that it possesses a high percentage of desirable game fish species. Redbreast sunfish, largemouth bass, and channel catfish contribute most to the game fish population by weight. Although not a game fish, spotted suckers are prevalent and contribute significantly to population biomass. Grayfin redhorses are also present, but not as numerous as spotted suckers.

Several species including the Suwannee bass, Bannerfin shiner, and Spotted bullhead that occur in the Ochlockonee Basin are listed as rare in Georgia. Striped bass, which migrate upstream from Lake Talquin, are also present in limited numbers.

Fisheries

Despite its relatively small size, the Ochlockonee supports a heavily utilized fishery that yields good angler catch rates. Redbreast sunfish are the dominant fish harvested both by number and weight followed by channel catfish. Stream access is largely limited to bridge crossings and launching a boat can be difficult at times due to low water levels. Thus, it is not surprising that a significant amount of fishing pressure on the Ochlockonee comes from bank anglers. Most of the fishing pressure occurs in late spring when water levels recede within the bank.

2.2 Population and Land Use

2.2.I Population

As of 1995, about 60,500 people lived in the Ochlockonee watershed (DRI/McGraw-Hill, 1996). Population distribution in the basin at the time of the 1990 census by census blocks is shown in Figure 2-9. Population centers in the Ochlockonee watershed include the development surrounding Thomas and Grady Counties.

Between 1995 and 2050, it is estimated that the population in the Ochlockonee River basin will increase by 0.8 percent per year (DRI/McGraw-Hill, 1996).

One area in which this river basin will differ slightly from state trends, is an age difference of residents 65 and older. This is in contrast with the 17 percent share this group is forecasted to comprise in Georgia by 2050. The river basin will mirror state trends in terms of its elderly population with the 65 and older age group showing the largest gains in share through 2050, at which time 20 percent of the population will be in this age group.

2.2.2 Employment

The Ochlockonee River basin supported 125,300 jobs in 1995. It is moving from a manufacturing- to a service-based economy. In the coming years, a decrease in jobs is expected in manufacturing and durable goods, offset by an increase in jobs in the service and trade sectors.

2.2.3 Land Cover and Use

Land use/land cover classification was (Figures 2-10 through 2-19) determined for the Ochlockonee River Basin based on high-altitude aerial photography for 1972-76 (U.S. Geological Survey, 1972-78). 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 41 percent of the basin in forest cover, 8 percent in wetlands, 2 percent in urban land cover, and 44 percent in agriculture (Figures 2-15 through 2-19). Statistics for 15 landcover classes in the Georgia portion of the Ochlockonee River basin for the 1988-90 coverage are presented in Table 2-2 (GA DNR, 1996).

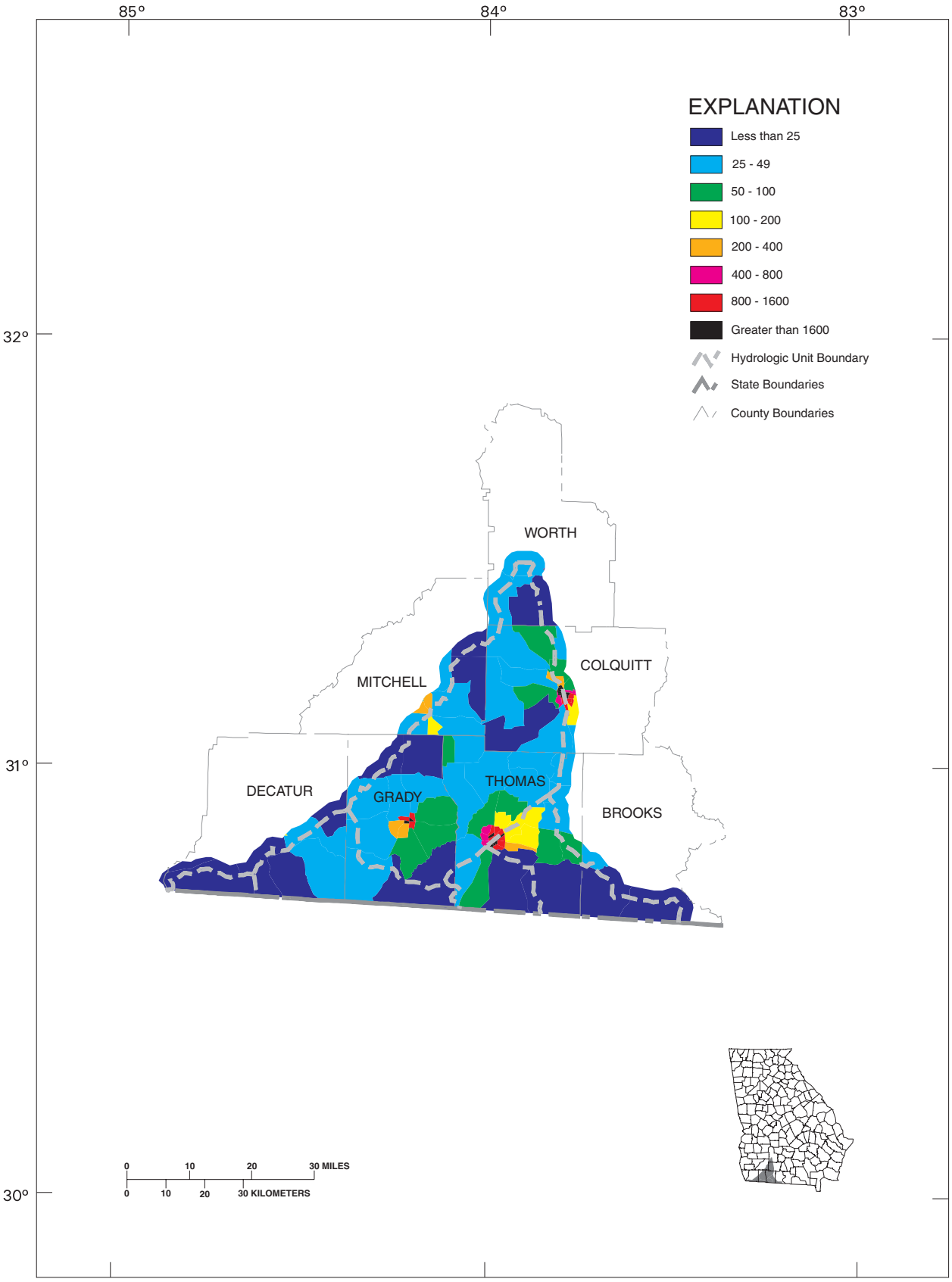


Figure 2-9. Population Density in the Ochlockonee River Basin, 1990 (persons per square mile)

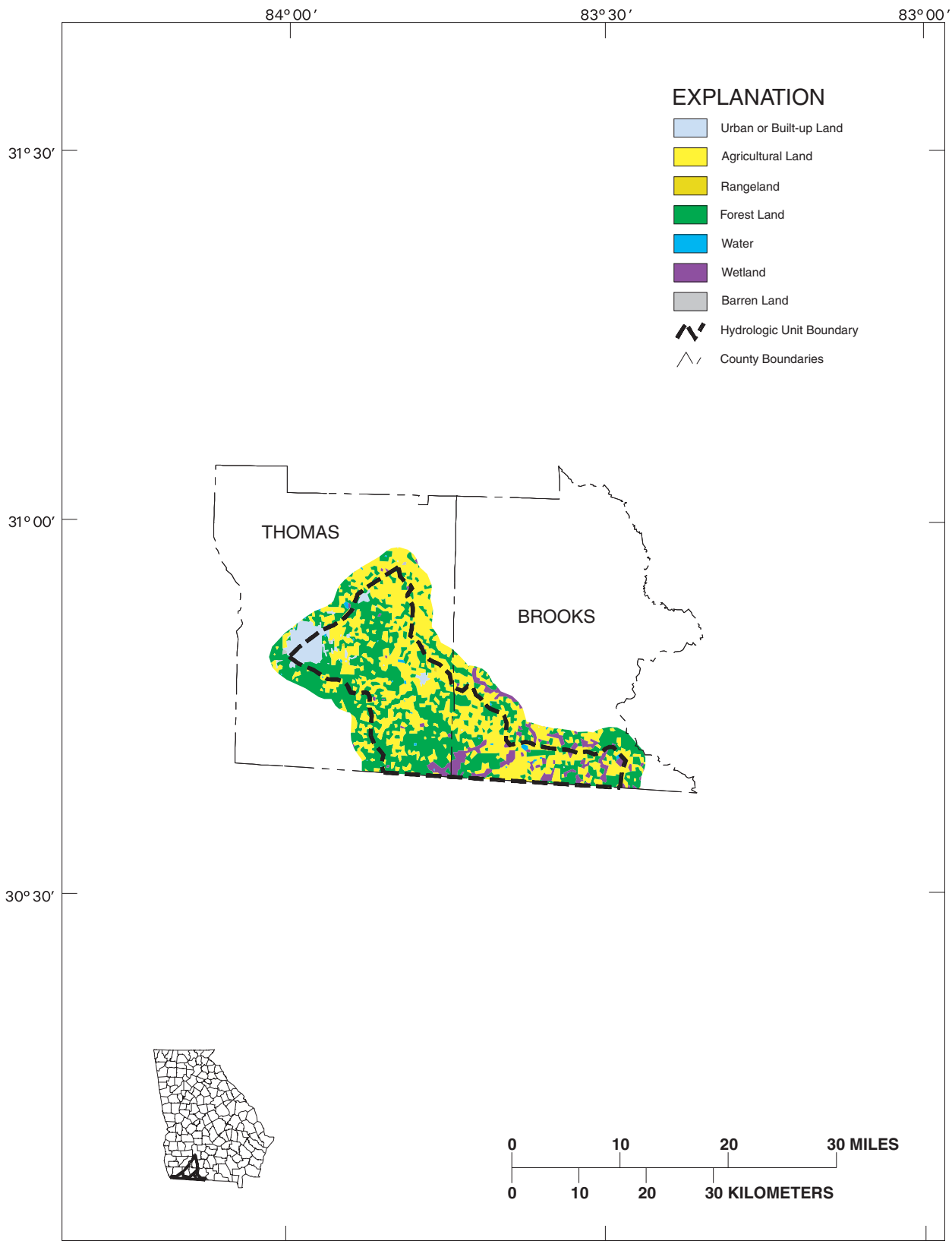


Figure 2-10. Land Use, Ochlockonee River Basin, HUC 03110103, USGS 1972-76 Classification Updated with 1990 Urban Areas

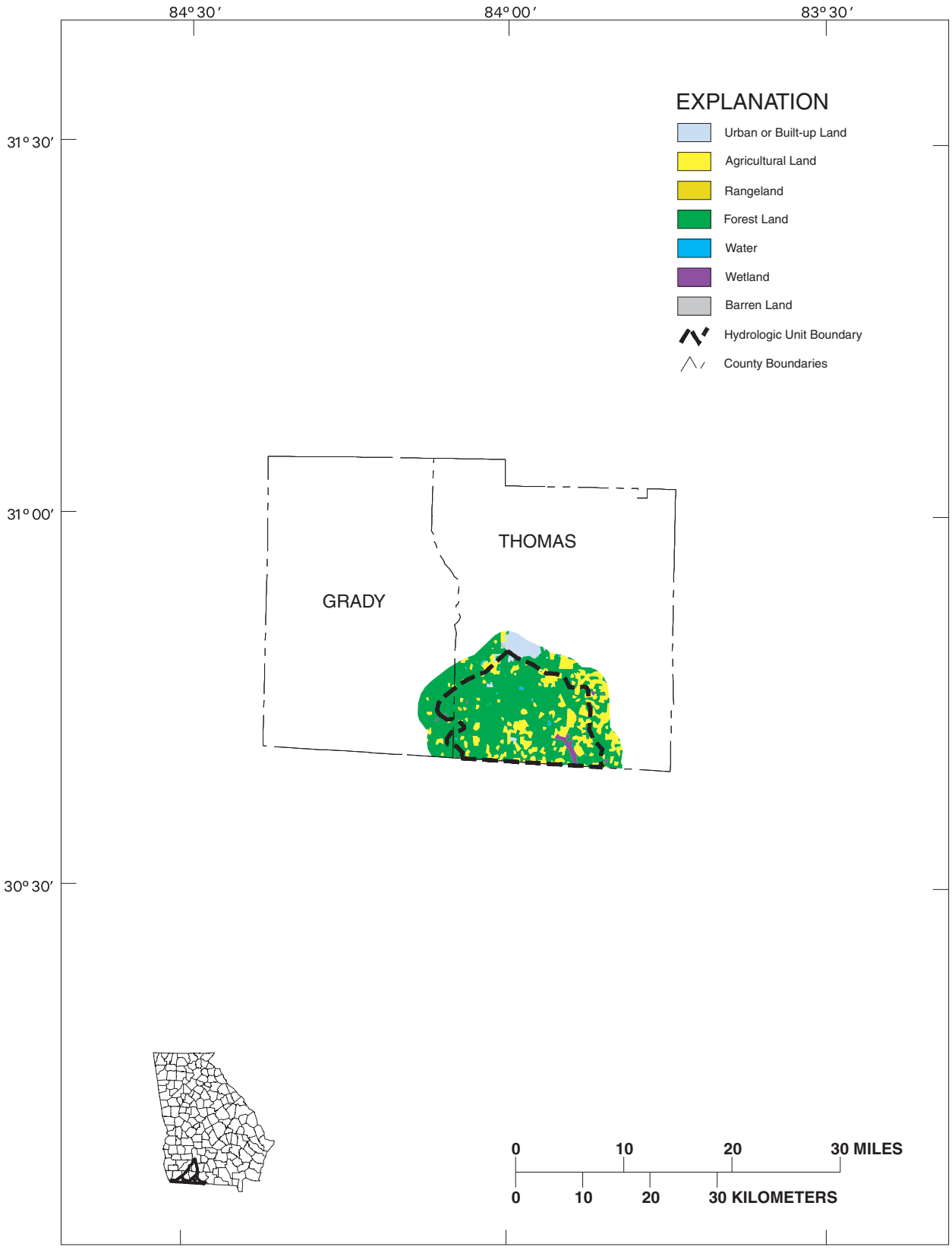


Figure 2-11. Land Use, Ochlockonee River Basin, HUC 03120001, USGS 1972-76 Classification Updated with 1990 Urban Areas

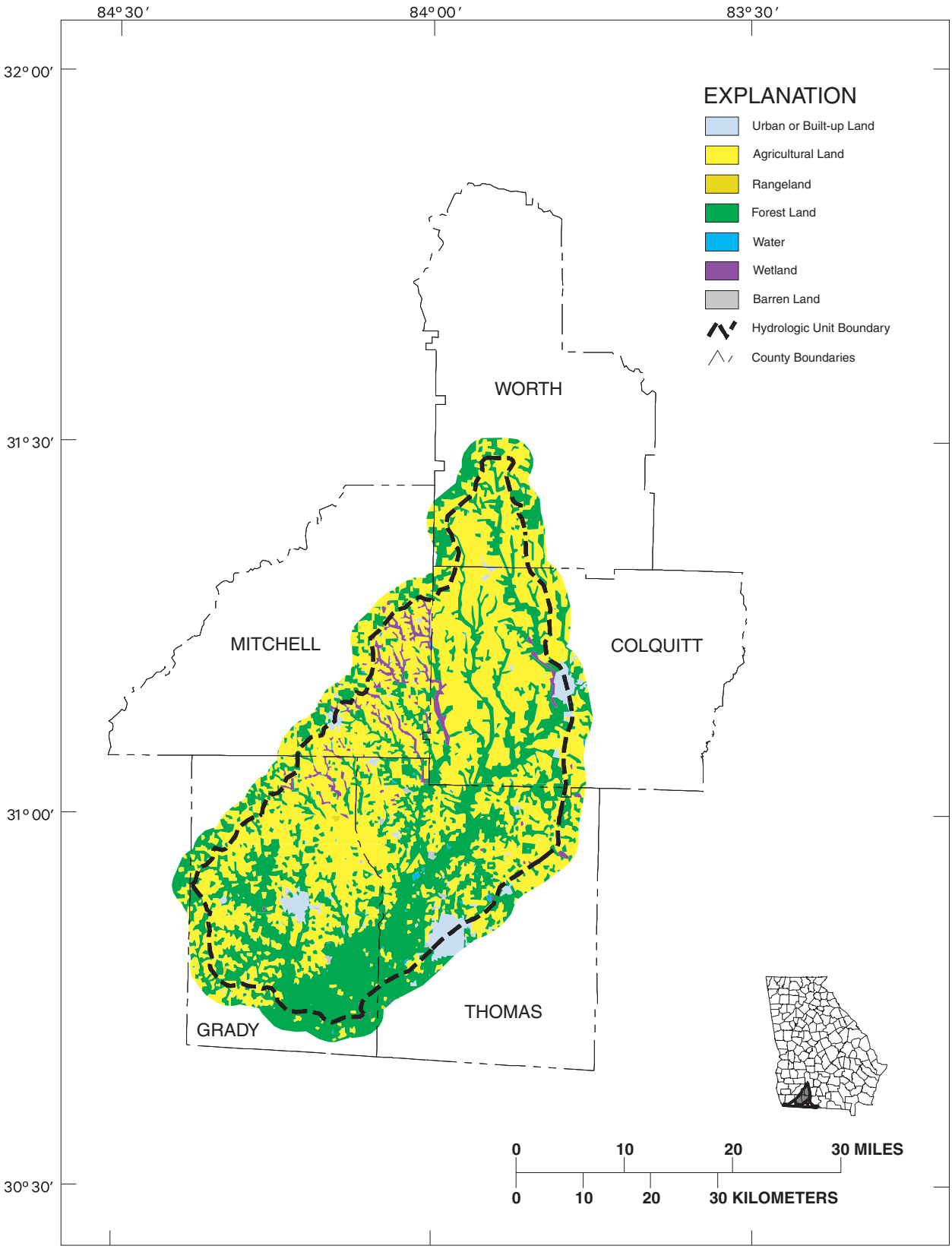


Figure 2-12. Land Use, Ochlockonee River Basin, HUC 03120002, USGS 1972-76 Classification Updated with 1990 Urban Areas

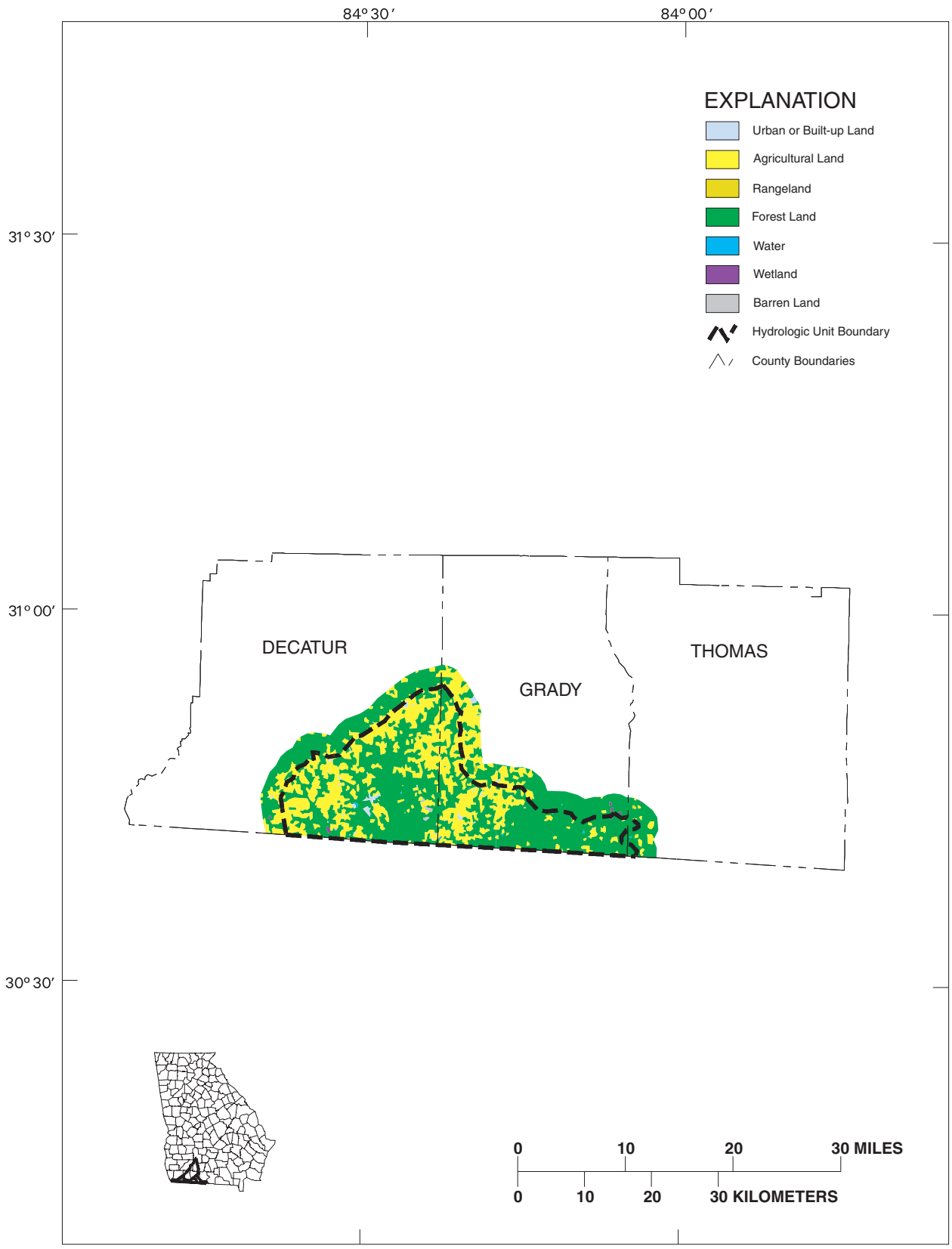


Figure 2-13. Land Use, Ochlockonee River Basin, HUC 03120003, USGS 1972-76 Classification Updated with 1990 Urban Areas

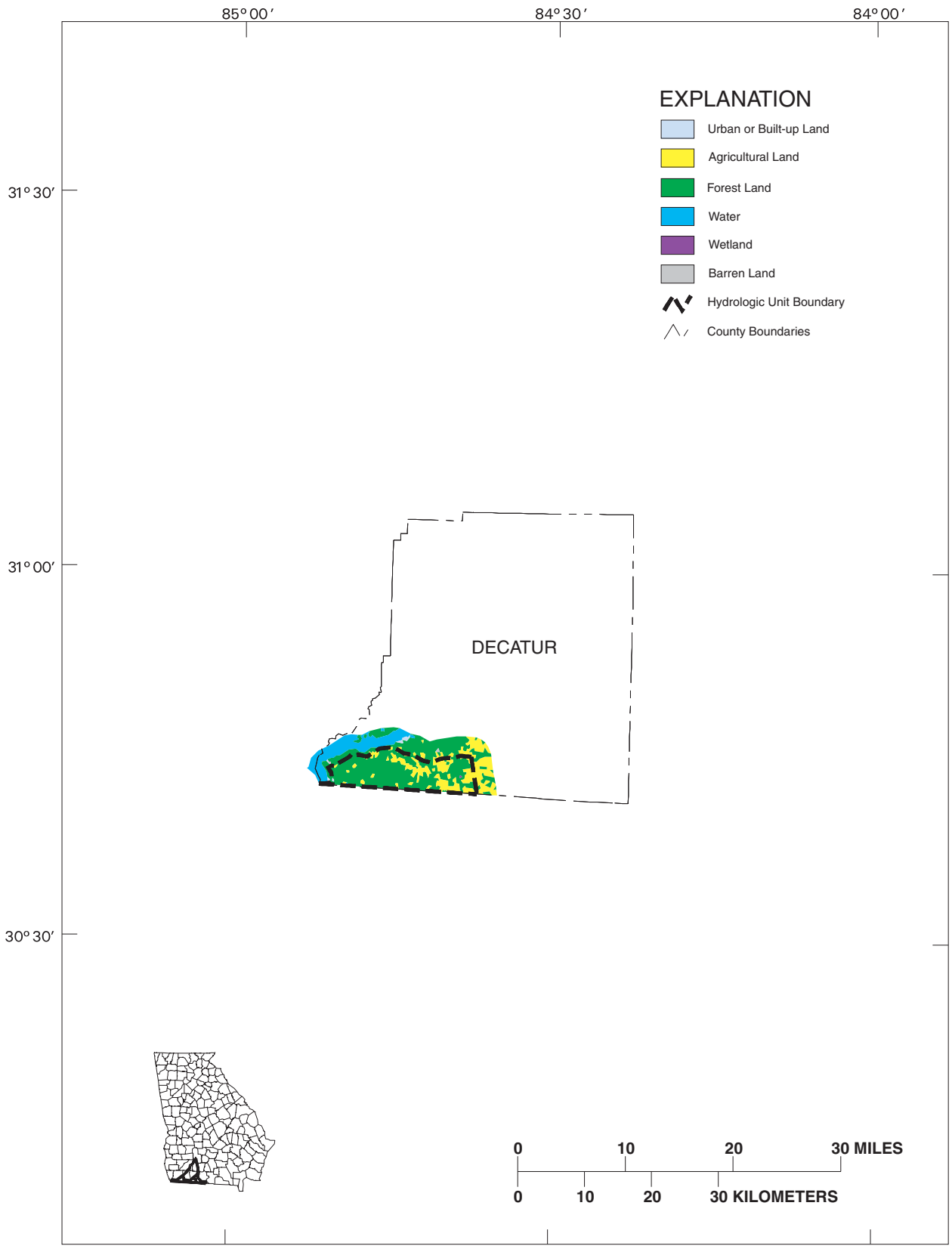


Figure 2-14. Land Use, Ochlockonee River Basin, HUC 03130011, USGS 1972-76 Classification Updated with 1990 Urban Areas

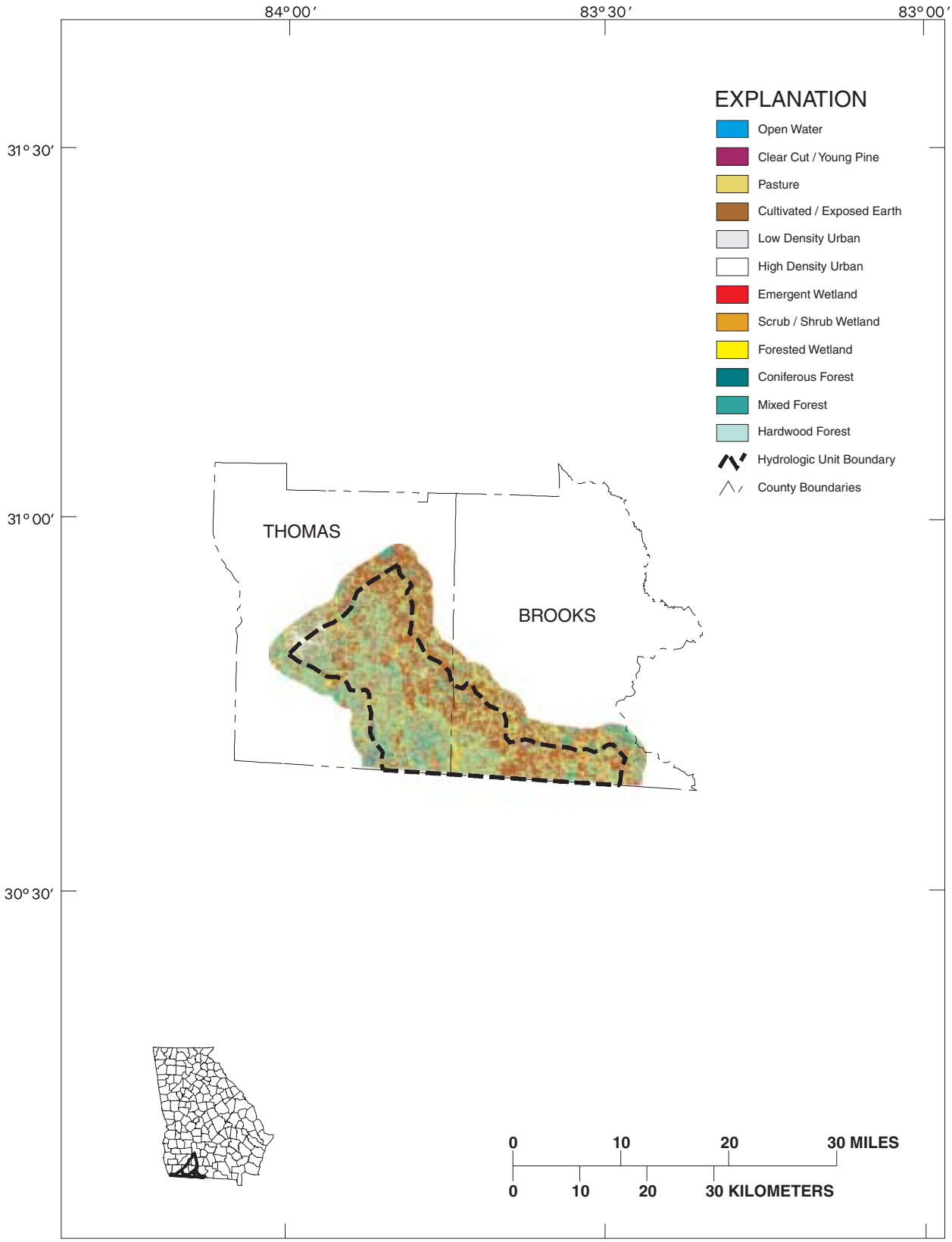


Figure 2-15. Land Cover 1990, Ochlockonee River Basin, HUC 03110103

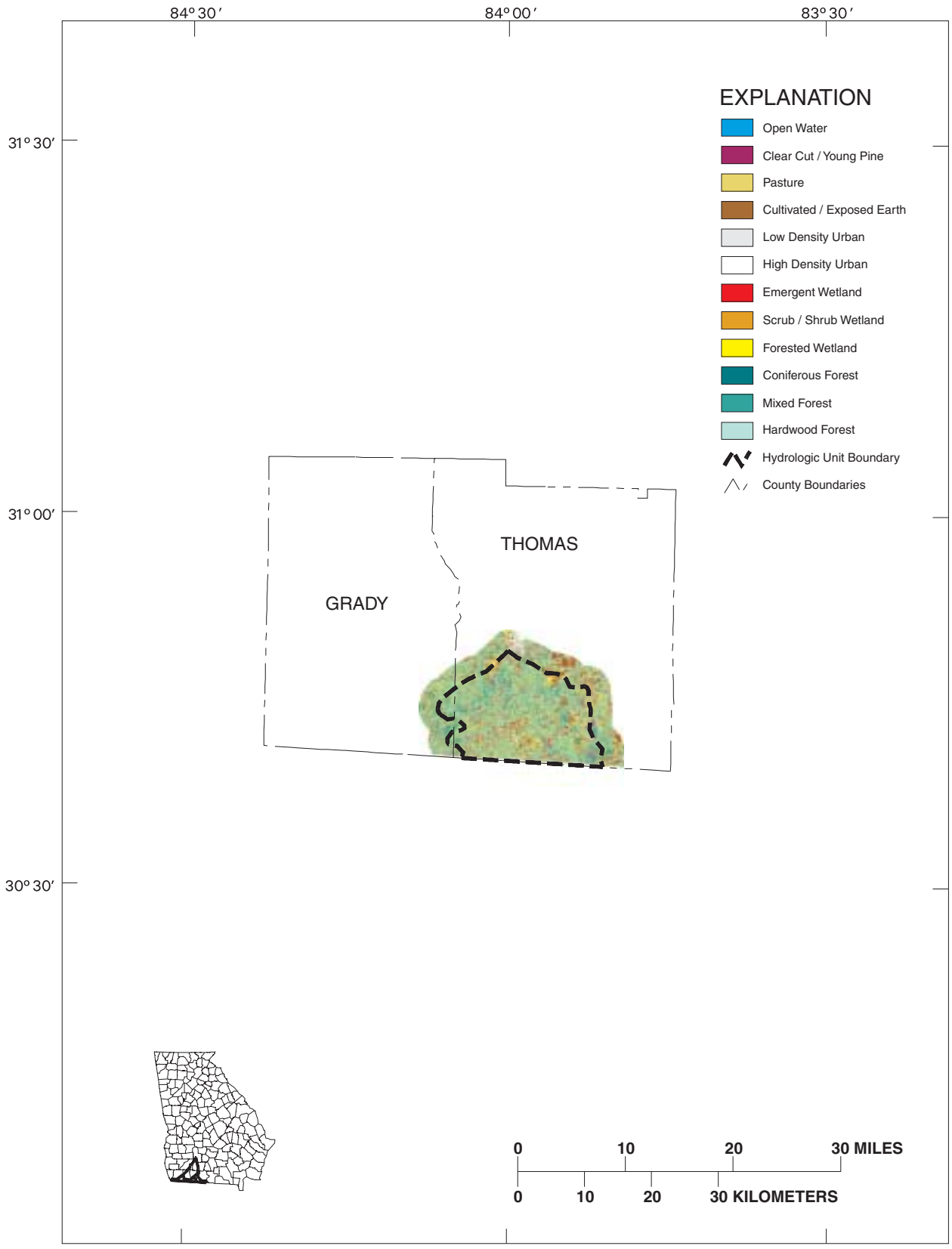


Figure 2-16. Land Cover 1990, Ochlockonee River Basin, HUC 03120001

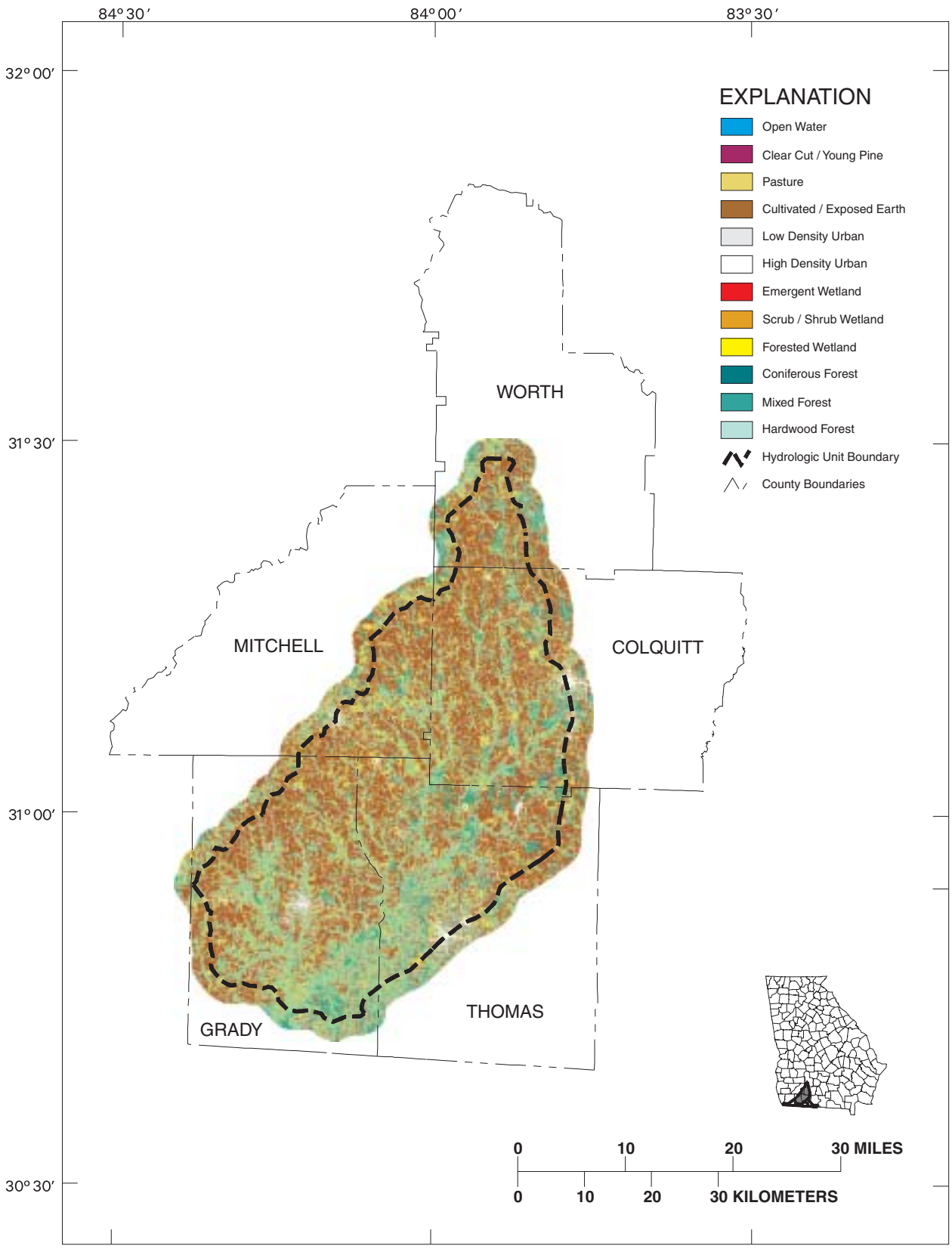


Figure 2-17. Land Cover 1990, Ochlockonee River Basin, HUC 03120002

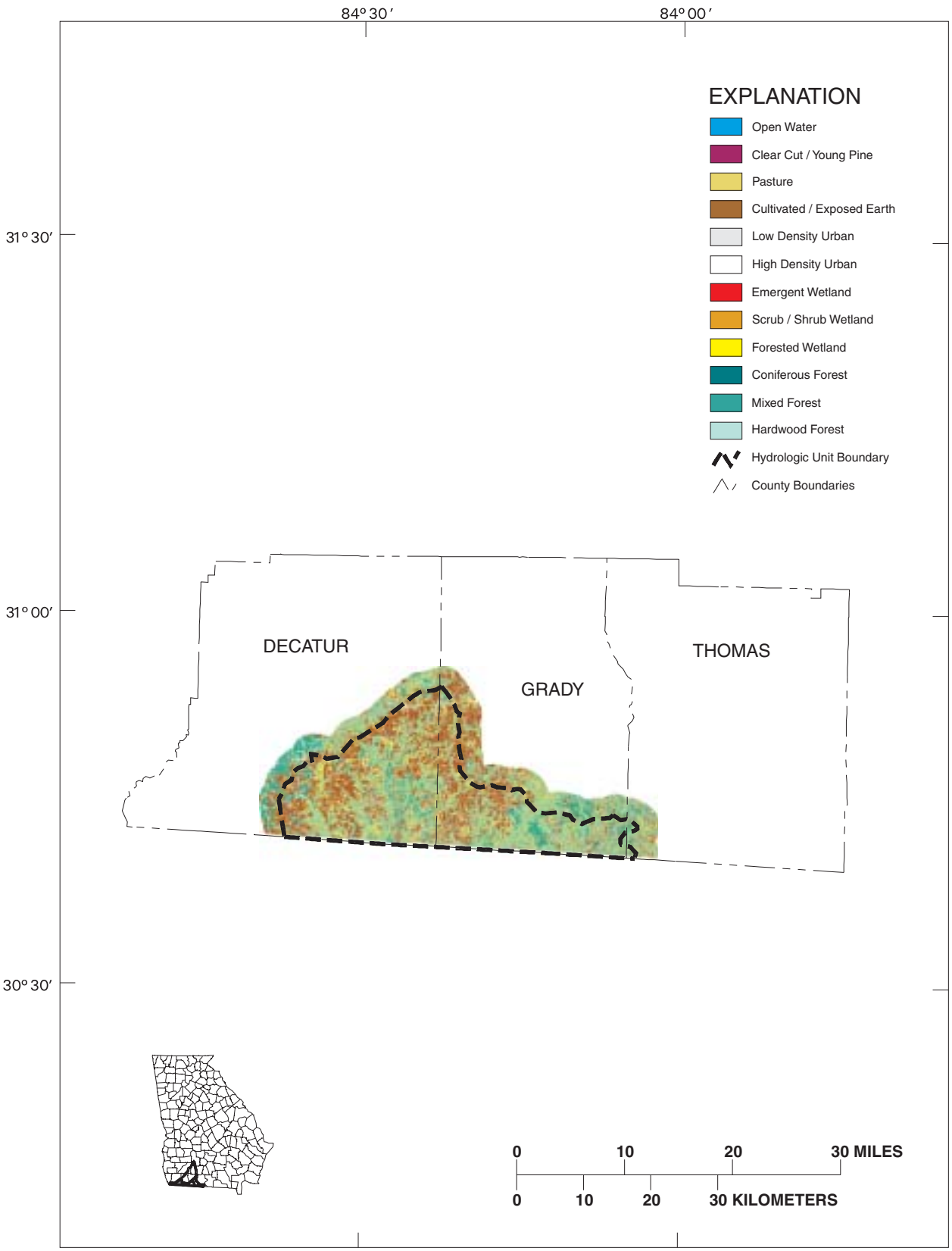


Figure 2-18. Land Cover 1990, Ochlockonee River Basin, HUC 03120003

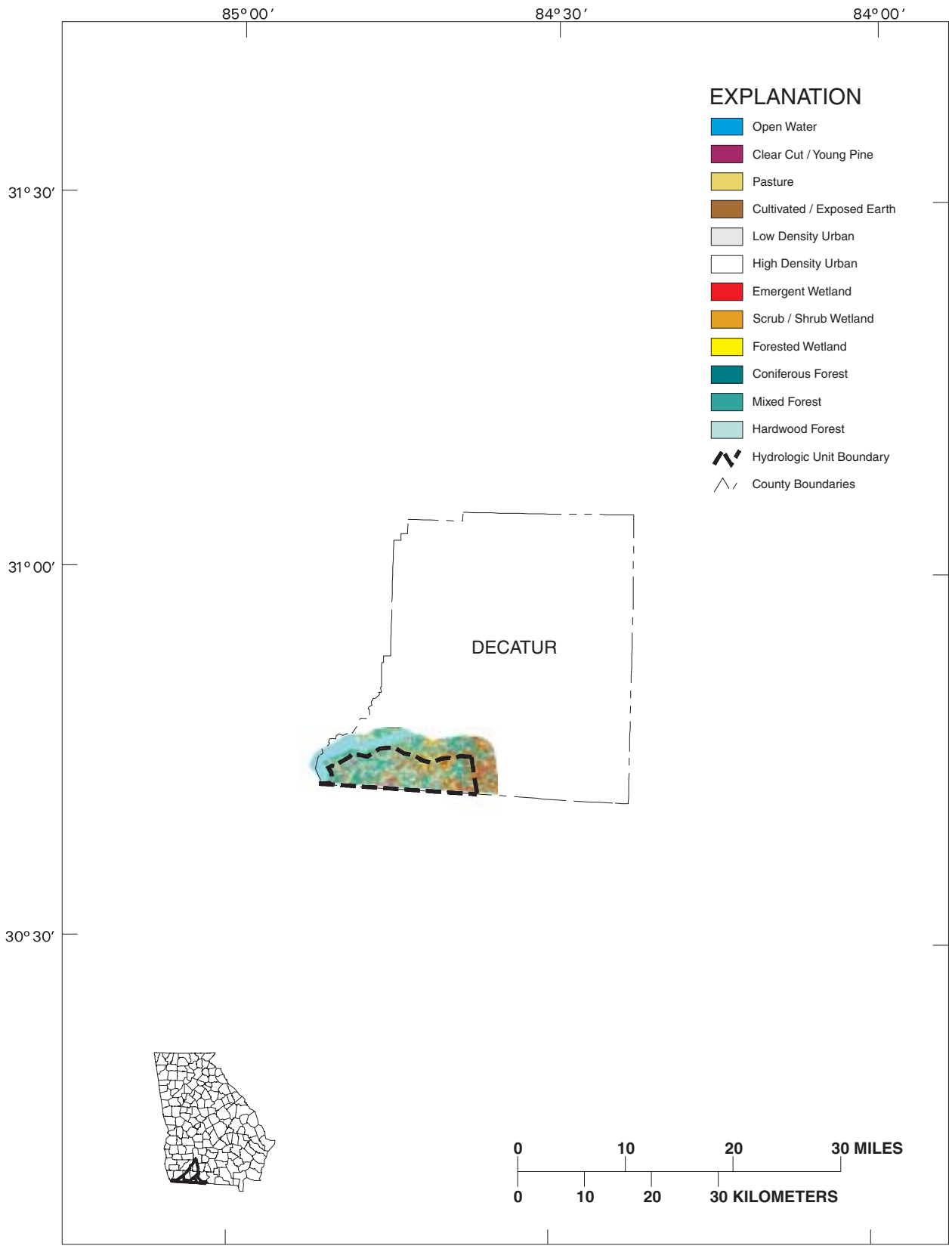


Figure 2-19. Land Cover 1990, Ochlockonee River Basin, HUC 03130011

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

Class Name	%	Acres
Open Water	0.5	5,230.5
Clear Cut/Young Pine	4.6	44,978.2
Pasture	12.9	126,412.8
Cultivated/Exposed Earth	31.0	303,919.5
Low Density Urban	1.2	11,476.6
High Density Urban	0.4	4,116.6
Emergent Wetland	2.4	23,374.8
Scrub/Shrub Wetland	0.2	2,157.0
Forested Wetland	5.2	50,441.0
Coniferous Forest	6.4	62,475.9
Mixed Forest	30.6	300,098.6
Hardwood Forest	3.7	36,026.8
Salt Marsh	0.0	0.0
Brackish Marsh	0.0	0.0
Tidal Flats/Beaches	0.0	0.0
Total	*100.0*	*979,881.0*

Forestry

Forestry is a major part of the economy within the basin. Markets for forest products afford landowners excellent investment opportunities to manage and sell their timber, pine straw, naval stores, etc., products. Statewide, the forest industry output for 1997 grew to approximately $19.5 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 $9.3 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 is approximately 1,228,400 acres of commercial forest land for the entire counties within the basin. Approximately 51.5 percent of the total land area is commercial forest. Private landowners account for 89 percent of the commercial forest ownership while the forest industry companies account for 10 percent. Governmental entities account for about 1 percent of the forest land. Figure 2-20 depicts silvicultural land use in the Ochlockonee basin. Forestry acreage in the Ochlockonee River basin is summarized in Table 2-3.

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

County	Commercial Forest	Pine	Oak-pine	Upland Hardwood	Lowland Hardwood
Brooks	189,300	58,900	28,300	30,700	69,300
Colquitt	168,800	81,200	28,900	6,700	36,500
Decatur	201,100	108,900	36,200	23,800	28,100
Grady	166,700	56,600	28,100	50,800	29,500
Mitchell	121,500	79,000	7,700	19,500	11,600
Thomas	187,000	68,900	61,900	23,200	33,100
Worth	194,000	94,300	37,600	10,300	44,500
Total	*1,228,400*	*547,800*	*228,700*	*165,000*	*252,600*

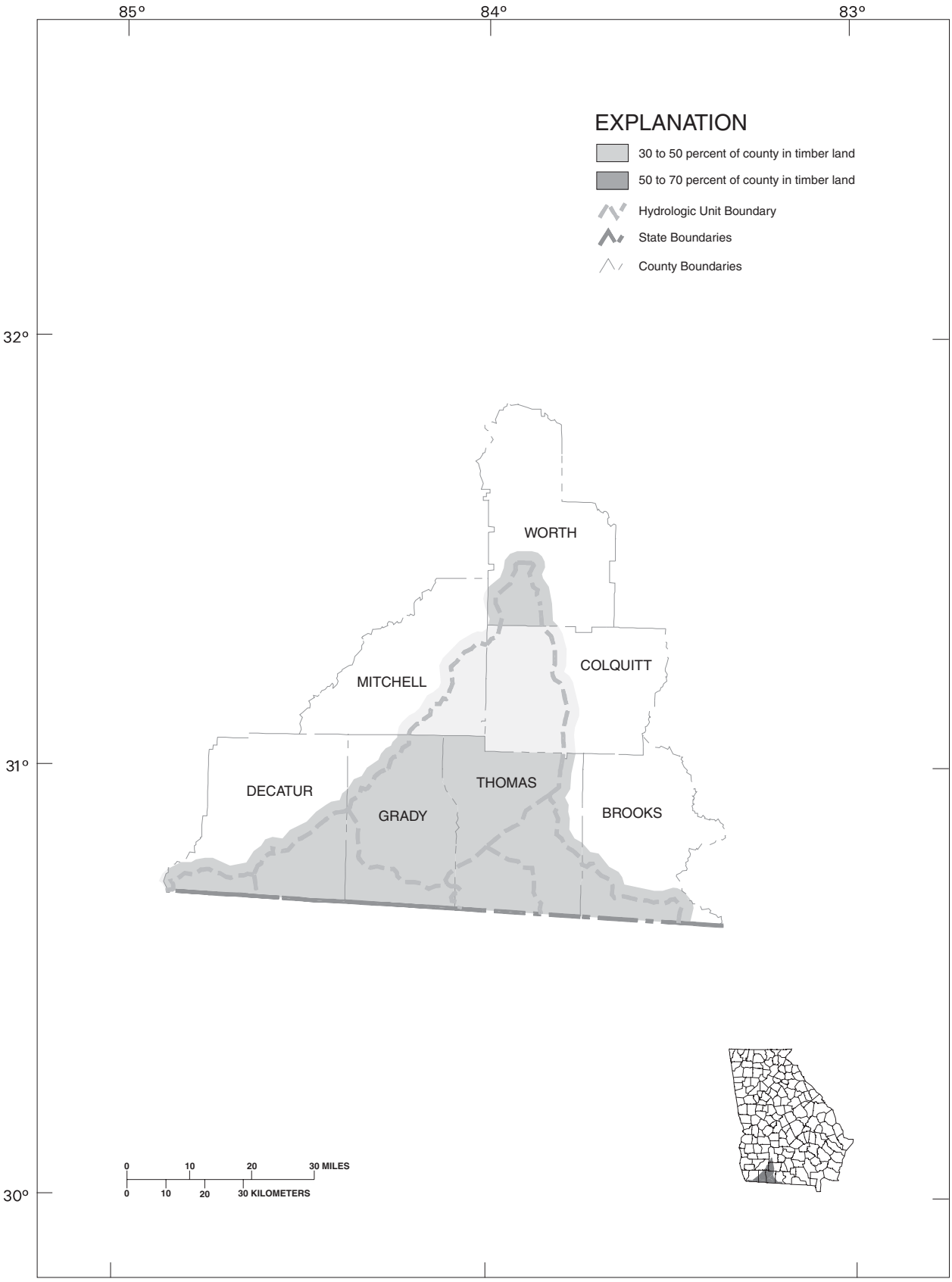


Figure 2-20. Silviculture Land in the Ochlockonee River Basin

For the period from 1982 to 1997, for the entire counties within the basin, the area classified as commercial forestland increased approximately 14 percent. The area classified as pine type increased approximately 7.3 percent. The area classified as oak-pine type increased approximately 83.5 percent. The area classified as upland hardwood decreased approximately 12.6 percent. The area classified as bottomland hardwood increased approximately 6.8 percent.

Agriculture

The Ochlocknee River Basin is one of Georgia's most productive agriculture areas. In fact, agriculture accounts for almost 40 percent of the land use in the basin despite soils that are strongly acidic, low in organic matter, and low in natural fertility.

In 1997, there were some 384,436 acres devoted to agricultural production (Figure 2-21). All major commodities that are grown in Georgia (peanuts, corn, cotton, oats, rye, sorghum, soybeans, and tobacco) are produced in the Basin. Grady is the top corn-producing county in Georgia, with Mitchell County also in the top ten with respect to corn production. Colquitt County leads the State in cotton and tobacco production. Brooks, Decatur, Mitchell, and Thomas Counties all rank among the State's top ten in cotton production. Worth County is among the State's leaders in peanut, rye, and sorghum production.

Orchard production is also significant in the Basin. In fact, Brooks County is Georgia's second most productive county for peaches; while Colquitt County also ranks in the top ten counties. Grady, Mitchell, and Thomas Counties all rank among the State's leaders with respect to pecan production. Additionally, the Basin serves as a core for a strong vegetable production market in the South Georgia.

Georgia's irrigation permit database shows 1,039 irrigation permits have been issued for the purpose of agricultural irrigation in the Ochlocknee River Basin. Commodity producers, in the counties that comprise the Basin, applied some 141.61 million gallons of water per day for supplemental irrigation to over 238,651 acres. This equates to an average of 7.9 inches per acre for 1995. A vast majority of agricultural water use for irrigation came from groundwater sources, some 83 percent, in 1995. Decatur, Mitchell, and Grady Counties contain two-thirds of the Basin's irrigated acreage.

In addition to commodity production, the Ochlocknee River Basin has an intensive animal industry as well. Table 2-4 shows number of animals by sector within the animal agricultural industry in the Basin. Brooks, Mitchell, and Colquitt Counties rank among the State's top ten counties in three areas—Mitchell and Colquitt with the number of cattle on farm; Mitchell and Brooks with milk production; and all three counties with respect to swine production. Poultry production is present, and growing, in the Basin due to new hatcheries and processing plants near Camilla.

Collectively, across all animal operations, there are an estimated 101,907 Animal Units (AUs) in the Basin. AUs are defined here as 1000 lb. Animal Equivalents. Animal operations, in the counties that comprise the Basin, used some 2.01 million gallons of water per day in 1995. Additionally, some 1.3 million tons per year of animal waste was generated on these operations. Producers handle animal waste through various management activities that utilize nutrients, and other soil amendment benefits, for commodity production.

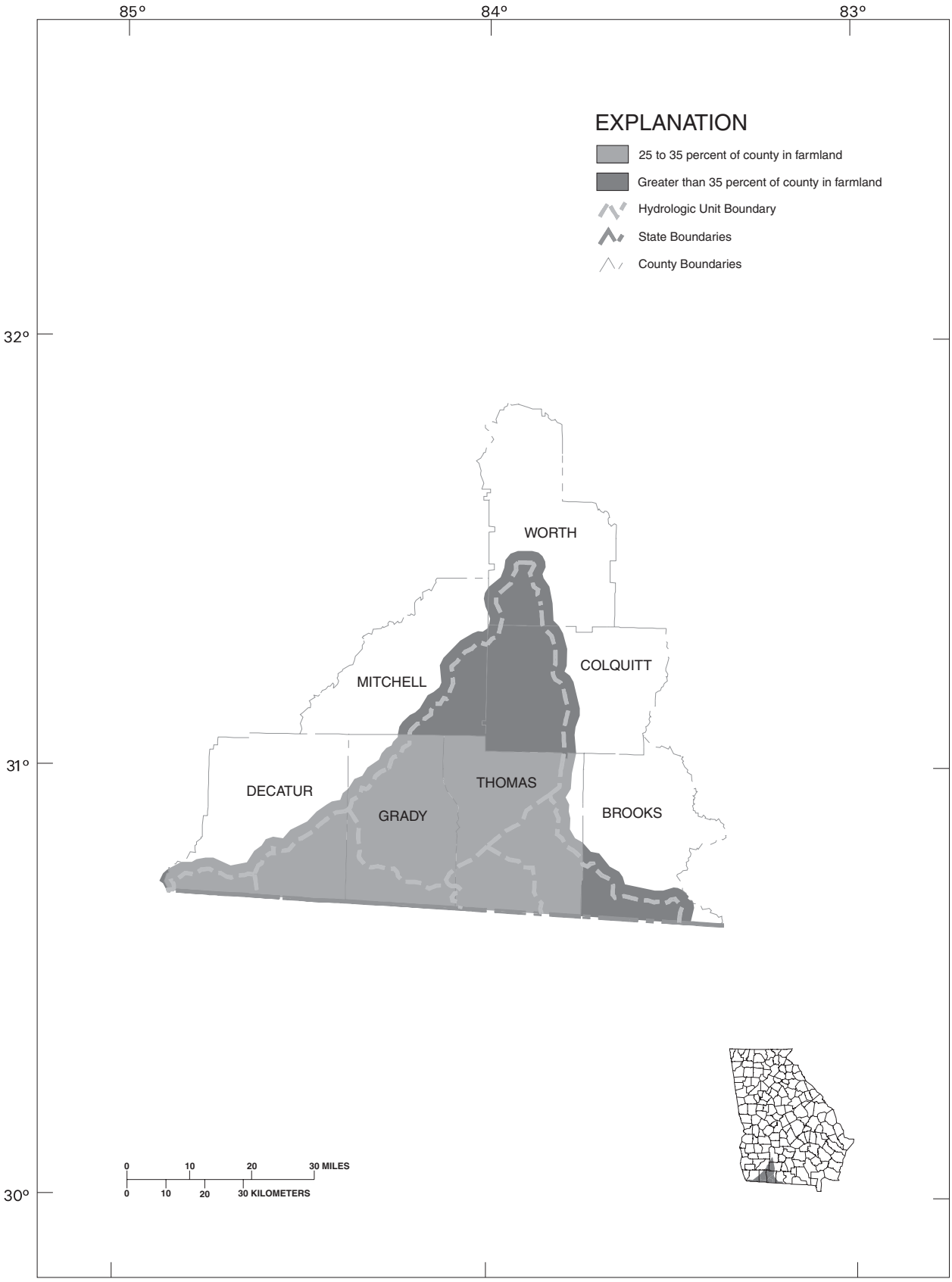


Figure 2-21. Agriculture Land in the Ochlockonee River Basin

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

Element	Watershed 03120001	Watershed 03120002	Watershed 03120003	Watershed 03110103	Ochlockonee Basin Total
Acres	23488	226951	22816	50368	323622
Dairy Cattle (Head 1997)	88	1887	294	482	2751
All Cattle and Calves (Head 1997)	2312	31090	7271	5599	46272
Hogs and Pigs (Head 1996)	4745	42918	5131	10950	63744
Boilers (thousands, 1997)	258031	13708983	3129689	217647	17314351
Layers (thousands, 1997)	0	27554	0	0	27554
Irrigated Acres (1995)	2011	38338	22673	5551	68573
Total Agriculture Acres (1989-1997)	30059	266116	24583	63677	384436

Agriculture is a key component of the Ochlocknee River Basin's economy. In 1997, agriculture contributed over $2.5 billion to the local economy. Along with significant agricultural production, however, comes an increased potential for agricultural non-point source pollution. As a part of the river basin planning process, the Georgia Soil and Water Conservation Commission (GSWCC)—with technical assistance from the Natural Resources Conservation Service (NRCS)—assess agricultural impacts on water quantity and water quality. Historical, present, and future agricultural water demand is assessed in Section 3; while agricultural non-point source pollution is assessed in Section 4.

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 storm water 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, storm water and development ordinances; undertaking water supply and wastewater treatment planning; and participating in programs to protect wellheads and significant ground water recharge areas. Many local governments are also responsible for operation of water supply and wastewater treatment facilities.

The Ochlockonee River basin includes part of 7 Georgia counties (Table 2-5 and Figure 2-2). Municipalities or cities are communities officially incorporated by the General Assembly. Georgia has more than 530 municipalities. Table 2-6 lists the municipalities in the Ochlockonee River basin.

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

Counties Entirely Within the Ochlockonee River Basin	Counties Partially Within the Ochlockonee River Basin	Counties With Less Than 20% Area Within the Basin
None	Colquitt, Mitchell, Decatur, Grady, Thomas	Worth, Brooks

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

HUC 03120001				
Metcalf				
HUC 03120002				
Bridgeboro	Doerun	Laney	Ochlockonee	Sigsbee
Cairo	Funston	Meigs	Pelham	Thomasville
Coolidge	Gordy	Merrillville	Pine Park	Whigham
Cotton	Hartsfield	Moultrie	Sale City	
Dawesville	Hinsonton	Murphy	Schley	
HUC 03120003				
Climax	Attapulgus	Calvary	Beachton	
Fowlton	Amsterdam	Reno		

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.

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

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

Regional Development Center	Member Counties with Land Area in the Ochlockonee Basin
Southwest Georgia	Worth, Mitchell, Colquitt, Decatur, Grady, Thomas
South Georgia	Brooks

2.4 Water Use Classifications

2.4.1 Georgia's Water Use Classification System

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

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

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

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

	Bacteria (fecal coliform)		Dissolved Oxygen (other than trout streams)[2]		pH	Temperature (other than trout streams)[2]	
Use Classification[1]	30-Day Geometric Mean[3] (no/100 ml)	Maximum (no./100ml)	Daily Average (mg/l)	Minimum (mg/l)	Std. Units	Maximum Rise above Ambient (°F)	Maximum (°F)
Drinking Water requiring treatment	1,000 (Nov-April) 200 (May-October)	4,000 (Nov-April)	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	1,000 (Nov-April)	4,000 (Nov-April)	5.0	4.0	6.0-	5	90
Coastal Fishing[4]	200 (May-October)				8.5		
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°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 same as fishing with the exception of dissolved oxygen which is site specific.

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

In the latter 1960s through the mid-1970s there were many water quality problems in Georgia. Many stream segments were classified for the uses of navigation, industrial, or urban stream. Major improvements in wastewater treatment over the years have allowed the stream segments to be raised to the uses of fishing or coastal fishing which include

more stringent water quality standards. The final two segments in Georgia were upgraded as a part of the triennial review of standards completed in 1989. All of Georgia's waters are currently classified as either fishing, recreation, drinking water, wild river, scenic river, or coastal fishing.

2.4.2 Water Use Classifications for the Ochlockonee River Basin

Waters in the Ochlockonee River basin are classified as fishing, recreation.

References

Georgia Game and Fish. 1966. Ochlockonee River Fish Population Studies, June and October 1966 (unpublished).

Heath, R.C. 1989. The Piedmont ground-water system. pp. 1-13 in Daniel, C.C. III, R.K. White, and P.A. Stone, Ground Water in the Piedmont, Proceedings of a Conference on Ground Water in the Piedmont of the Eastern United States. Clemson University, Clemson, South Carolina.

Hobbs, H.H. 1981. The Crayfishes of Georgia. Smithsonian Contributions to Zoology, Number 318.

Miller, J.A. 1986. Hydrogeologic framework of the Floridan aquifer system in Florida and parts of Georgia, Alabama, and South Carolina: U. S. Geological Survey Professional Paper 1430-B, 91p.

Miller, J.A. 1990. Ground Water Atlas of the United States—Segment 6—Alabama, Florida, Georgia, and South Carolina. Hydrologic Investigations Atlas 730-G. U.S. Geological Survey. 730-G. U.S. Ge.

Neves, R.J., A.E. Bogan, J.D. Williams, S.A. Ahlstedt, and P.W. Hartfield. 1997. Status of aquatic molluscs in the southeastern United States: A downward spiral of diversity. Pages 43-85 in G.W. Benz and D.E. Collins, editors, Southeastern Aquatic Fauna in Peril: The Southeastern Perspective. Special Publication 1, Southeast Aquatic Research Institute. Lenz Design and Communication, Decatur, Georgia.

Peck, M.F., C.N. Joiner, and A.M. Cressler. 1992. Ground-Water Conditions in Georgia, 1991. Open-File Report 92-470. U.S. Geological Survey.

Torak, L.J., Davis, G.S., Strain, G. A., and Herndon, J.G. 1993. Geohydrology and evaluation of water resource potential of the Upper Floridan aquifer in the Albany area, southwestern Georgia: U.S. Geological Survey Water-Supply Paper 2391, 59p.

Watters, G.T. 1994. An annotated bibliography of the reproduction and propagation of the Unionoidea. *Ohio Biological Survey, Miscellaneous Contributions*, 1: 1-158.

Williams, J.D., M.L. Warren, K.S. Cummings, J.L. Harris, and R.J. Neves. 1992. Conservation status of freshwater mussels of the United States and Canada. *Fisheries*, 18(9): 6-22.

Williamson, G.K., and R.A. Moulis. 1994. Distribution of Amphibians and Reptiles in Georgia. Savannah Science Museum, Inc. Savannah, Georgia.

In This Section

Section 3

Water Quantity

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

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

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

Water use in the Ochlockonee River Basin is expected to remain stable in the near future due to 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 ground water supplies. Then, general surface water availability is presented, followed by ground water availability.

3.1 Drinking Water Supply

3.1.1 Drinking Water Supplies in the Ochlockonee 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 ground water pumped to the surface from wells or naturally flowing water from springs. Unlike other basins in Georgia, the main source of drinking water in the Ochlockonee River basin is provided by ground water. There are three different types of public water systems: community, non-community non-transient, and non-community transient.

Types of Public Water Systems

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

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

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

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

3.1.2 Drinking Water Demands

Over the next few years there will be an increase in the use of ground water to be used for drinking water from the Ochlockonee River basin. One particular area that is expected to increase is Thomas County.

3.1.3 Drinking Water Permitting

The Georgia Safe Drinking Water Act of 1997, the Rules for Safe Drinking Water (391-3-5) adopted under the act 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 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 Ochlockonee River basin is a 6330 square-mile landmass in southern Georgia that extends into Florida. The basin's headwaters are in Worth County. Of its 6330 square miles, approximately 1460 square miles are within Georgia.

The main stem of the Ochlockonee River and its tributaries are the principal surface water resources in the basin. The annual average flow of the river as it crosses the Georgia-Florida border is estimated at 850 cfs, with a 7Q10 estimate of 24 cfs.

One of the unique features of the Ochlockonee River is the presence of two smaller watersheds, the Aucilla River and Ward Creek watersheds, each of which discharge their waters separately into the Gulf of Mexico without ever merging with the waters of the Ochlockonee River. Thomasville is the basin's largest population center in Georgia.

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 Ochlockonee River basin contains only one industrial surface water withdrawal permit. The permit is listed in Table 3-1. 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.

Table 3-I. Surface Water Withdrawals

Facility	Type	Source	Mon Avg (Mgd)	Max Day (Mgd)	County
Englehard Corporation	Industrial	LT Attapulgus Creek	1.50	2.2	Decatur

Agricultural Water Demand

The demands on 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. As of 1996, the EPD had issued 968 agricultural permits for water withdrawal permits to entities located within the Ochlocknee River Basin. Within Georgia, agricultural permit holders are by law (O.C.G.A. Section 12-5-31 et seq.) exempted from requirements to report their water use, which make determining exact historical, current, and future agricultural water demand rather challenging.

Irrigated Acreage

The total water demand from agriculture, including both surface water and ground water 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 historical, current, and future, agricultural water use in the basin. Table 3-2 shows historical irrigated acreage in the basin from 1974 to 1998.

Table 3-2. Irrigated Acres in the Ochlocknee River Basin, 1974-1998.

Ochlocknee River Basin - Irrigated Acres				
year	Sub-Basin 03110103	Sub-Basin 03070202	Sub-Basin 03070203	Basin Total
1974	1746	5573	396	7715
1978	8393	26174	5126	39694
1979	7270	30546	5858	43674
1980	9216	41981	3967	55164
1981	12884	40883	4541	58308
1982	14957	41427	4560	60944
1984	13445	38394	4803	56642
1986	14170	38694	4877	57741
1989	16441	46986	4840	68267
1992	15844	50682	4876	71402
1995	16131	51599	4964	72695
1998	16339	52265	5029	73633

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

Irrigated acres in the Ochlocknee River Basin grew from 7,715 in 1974 to an all time maximum, for the Basin, of 73,633 in 1998. This represents an annual growth rate of 14.21 percent during the period of record. Much of this growth occurred in the 1970's during an extensive increase in the number of irrigation systems statewide, principally cable tow and center pivot systems. Since 1982, irrigated acreage across Georgia has continued to grow, but at a much slower rate, approximately 1.6 percent annually. Despite recent expansions in irrigated acreage, the Ochlocknee River Basin over the same time period has experienced a slower an annual growth rate of 1.3 percent. Cotton, peanuts, and corn are the primary crops under irrigation, but there is also a notable effort to irrigate vegetables in the Basin.

Water Demand

Agricultural water demand is dependent upon a number of variable 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 Ochlocknee River basin reflects the influence of these variables (Table 3-3). No distinct trend can be observed. From 1980 to 1995 there was an increase of 14 MGD from 32 MGD in 1980 to 46 MGD in 1995.

Table 3-3. Historical Agricultural Water Use in the Ochlocknee River Basin, 1980-1995.

Ochlocknee River Basin - Agricultural Water Use				
year	03110103	03120002	03120003	Basin total
1980	2.67	28.00	1.80	32.47
1985	5.64	5.84	1.51	12.99
1987	7.68	33.98	2.27	43.93
1990	8.41	19.70	1.14	29.25
1995	14.96	27.96	3.42	46.35

Source: Georgia Geological Survey

Over 98 percent of the agricultural water used in 1995 was for irrigation purposes (45.61 MGD). The remaining 2 percent (.74 MGD) was used for animal operations. Ground water sources provided 68 percent of the water used by this industry in 1995.

Future Water Use

Agricultural producers are constantly reacting to changing climate and market conditions; thus, rendering any projections regarding future agricultural water use extremely difficult. Projecting irrigated acreage based on historical trends, and then assuming various water application rates, is likely the most stable approach to estimating future water use in this industry. Irrigation systems represent a significant investment for agricultural producers. Operational modifications based on changing climate and market conditions will occur on land under irrigation.

Table 3-4 shows the historical and projected acres under irrigation for the Ochlocknee River Basin and each sub-basin. Assuming the 2.14 percent annual growth rate, observed in the Ochlocknee River Basin between 1992 and 1998, continues; irrigated acreage in the Basin will reach 117,322 acres by the year 2020.

Table 3-4. Irrigated Acreage 1974-1998, Projected through 2020.

Ochlocknee River Basin - Irrigated Acres				
Year	Sub-Basin 03110303	Sub-Basin 03120002	Sub-Basin 03120003	Basin Total
1974	1746	5573	396	7715
1978	8393	26174	5126	39694
1979	7270	30546	5858	43674
1980	9216	41981	3967	55164
1981	12884	40883	4541	58308
1982	14957	41427	4560	60944
1984	13445	38394	4803	56642
1986	14170	38694	4877	57741
1989	16441	46986	4840	68267
1992	15844	50682	4876	71402
1995	16131	51599	4964	72695
1998	16339	52265	5029	73633
2000	17,046	54,526	5,246	76,818
2005	18,949	60,615	5,832	85,397
2010	21,066	67,385	6,483	94,934
2015	23,418	74,910	7,207	105,536
2020	26,033	83,276	8,012	117,322

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

Future agricultural water demand is expected to increase significantly within the basin to 65.45 MGD by the year 2020. Undesirable climate and favorable market conditions could force producers to demand as much as 104.72 MGD on the projected 117,322 acres under irrigation by that time. Conversely, desirable climate conditions and unfavorable market conditions may result in a much lower demand, 43.63 MGD by 2020. Table 3-5 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 3-5. Projected Agricultural Water Use [MGD] through 2020.

Ochlocknee River Basin - Agricultural Water Use			
Year	Low Scenario	Expected Scenario	High Scenario
2000	28.57	42.85	68.57
2005	31.76	47.64	76.23
2010	35.31	52.96	84.74
2015	39.25	58.88	94.20
2020	43.63	65.45	104.72

USDA-NRCS estimates are based on average water application rates for all commodities.

Power Generation Water Demand

There are no power generating plants located within the Ochlockonee basin that use the water resources of the basin.

Navigational Water Demand

There is no commercial navigation in the Ochlockonee basin.

Recreation

Recreation activities in the Ochlockonee River Basin includes fishing, 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 Ochlockonee River basin assume that sufficient surface water flow will be available to assimilate waste and ensure that water quality criteria will be met.

3.2.3 Surface Water Withdrawal Permitting

The 1977 Surface Water Amendments to the Georgia Water Quality Control Act of 1964 require all non-agricultural users of more than 100,000 GPD on a monthly average (from any Georgia surface water body) to obtain a permit for this withdrawal from EPD. These users include municipalities, industries, military installations, and all other non-agricultural users. The statute stipulates that all pre-1977 users who could establish the quantity of their use prior to 1977 would be "grandfathered" for that amount of withdrawal. Table 3-6 lists the permits in effect in the Ochlockonee River basin.

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.

Table 3-6. Active Municipal and Industrial Ground Water Withdrawal Permits in the Ochlockonee River Basin

GEORGIA COUNTY	PERMIT NUMBER	PERMIT USER NAME	PERMITTED MONTHLY AVG W/D (MGD)	PERMITTED YEARLY AVG W/D (MGD)	PERMITTED AQUIFER
Thomas	136-0004	Thomasville, City of - Water & Light Department	8.000	6.500	Floridan
Grady	065-0001	Cairo, City of	3.500	3.000	Floridan
Mitchell	101-0001	Pelham, City of	1.000	0.900	Floridan
Thomas	136-0001	Sunnyland (formerly Lykes)	0.750	0.750	Floridan
Grady	065-0002	Torrington Company	0.350	0.350	Floridan
Colquitt	035-0003	Riverside, Town of	0.350	0.260	Floridan
Thomas	136-0006	Boston, City of	0.300	0.240	Floridan
Thomas	136-0002	Meigs, City of	0.200	0.200	Floridan
Thomas	136-0005	Thomasville, City of - Waverly Four Corners	0.171	0.171	Floridan
Thomas	136-0008	Oil-Dri Corp - South Plant	0.100	0.100	Floridan
Thomas	136-0009	Oil-Dri Corp - North Plant	0.100	0.100	Floridan

Farm Irrigation Permits

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

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

3.2.4 Flooding and Floodplain Management

The Ochlockonee River basin was unaffected by the massive flooding that occurred in parts of Georgia in 1994, however, many counties within the Ochlockonee, Suwannee, Satilla and St. Marys basins were included in Federal Disaster Declaration #1209 as a result of the 1998 floods. The Floods of 1998 further substantiated the fact that flooding is the number one natural hazard in Georgia.

In March 1991, severe storms caused flooding in counties within St. Marys, Suwannee and Satilla river basins. On March 1991, the counties of Appling, Atkinson, Bacon, Berrien, Clinch, Coffee, Jeff Davis, Johnson, Lanier, Laurens, Lowndes, Pierce, Thomas and Ware were declared disaster areas.

All of the counties within the Ochlockonee River basin currently participate in the National Flood Insurance Program (NFIP).

Floodplain development is a constant concern, because development within floodplain areas can increase flood levels, thereby increasing the number of people and the amount of property at risk. The term "floodplain management" is often used as a synonym for program or agency-specific projects and regulations. It is in fact quite a broad concept.

Floodplain management is a continuous process of making decisions about whether flood plains are to be used for development and how they are to be developed.

Floodplain Management Activities

To increase understanding and maintain a working knowledge of floodplain management, Georgia's Floodplain Management Office periodically conducts training workshops throughout the State for local officials. The Floodplain Management Office held a workshop on May 13, 1999, for local officials from Glynn and Camden counties at the City of Brunswick government offices. The workshop covered the related aspects of the National Flood Insurance Program (NFIP), administration and enforcement of local flood ordinance, the effects of floodplain management on flood insurance rates and flood hazard mitigation.

The Floodplain Management Office also participates in the annual Governor's Severe Weather conference held on Jekyll Island. 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.

3.3 Ground Water Quantity

3.3.1 Ground Water Sources

The Ochlockonee River basin in Georgia is in the physiographic province known as the Coastal Plain province. South of the fall line is the Costal Plain area, a region underlain by alternating layers of sand, clay, and limestone which get deeper and thicker to the southeast.

The Ochlockonee basin extends into parts of Decatur, Grady, Mitchell, Colquitt, Worth, Thomas, and Brooks counties. The Floridan Aquifer is the aquifer of choice.

3.3.2 Ground Water 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.

Existing permitted municipal and industrial groundwater users are shown on Table 3-6, by county. These permits are for users equal to or greater than 100,000 gallons per day. Users below this amount of groundwater are not required to have a permit for their withdrawals.

3.3.3 Ground Water Supply Permitting

Nonagricultural Permits

The Georgia Ground Water Use Act of 1972 requires permits from EPD for all non-agricultural users of ground water 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. Ground water use reports are generally required of the applicant on a semi-annual basis. The objective here is the same as with surface water permits. A list of active Georgia municipal and industrial ground water withdrawal permits is provided in Table 3-6.

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 ground water permitting statute, the lower threshold is 100,000 GPD; however users of less water may apply and be granted a permit. Agricultural withdrawal permits are too numerous to list in this document.

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

Excessive Ground Water Withdrawals

Excessive ground water withdrawal can lead to lowering or drawdown of the water table. Localized groundwater drawdowns are generally discovered only after the fact of permitting has occurred and withdrawal operations begun. To avoid such a possibility, if an application for a very large use of groundwater is received, the Water Resources Management Program of the Georgia EPD can take certain steps to possibly contain 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 nor drawing down the aquifer too greatly. Permit withdrawal limits may then be set at some safer yield which is determined by these pumping tests. These tests may also indicate that proposed pumping amounts may require more wells drilled to spread out the ultimate production impact on the aquifer.

References

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.

Georgia Environmental Protection Division. 1987. Water Availability And Use Report, Coastal Plain River Basins.

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 Ochlockonee 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 storm water discharges, which tend to be discharged at highly irregular, intermittent rates, depending on precipitation. Nondischarging waste disposal facilities, including land application

systems and landfills, which are not intended to discharge treated effluent to surface waters, are also discussed in this section.

NPDES Permitted Wastewater Discharges

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

Municipal Wastewater Discharges

Municipal wastewater treatment plants are among the most significant point sources regulated under the NPDES program in the Ochlockonee 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 $12.5 million in construction and upgrade of municipal water pollution control plants in the Ochlockonee River basin; a summary of these investments is provided in Appendix C. These upgrades have resulted in significant reductions in pollutant loading and consequent improvements in water quality below wastewater treatment plant outfalls. As of the 1998-1999 water quality assessment, 16 miles of rivers/streams were identified in which municipal discharges contributed to not fully supporting designated uses, all of which are being addressed through the NPDES permitting process.

Table 4-1 displays the major municipal wastewater treatment plants with permitted discharges of 1 million gallons per day (MGD) or greater in the Ochlockonee 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 Ochlockonee River Basin in presented in Appendix D.

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

NPDES Permit No.	Facility Name	County	Receiving Stream	Permitted Monthly Avg. Flow
HUC 03120002				
GA0024660	Moultrie WPCP	Colquit	Ochlockonee Rv	4.0
GA0024082	Thomasville WPCP	Thomas	Oquina Cr	6.5

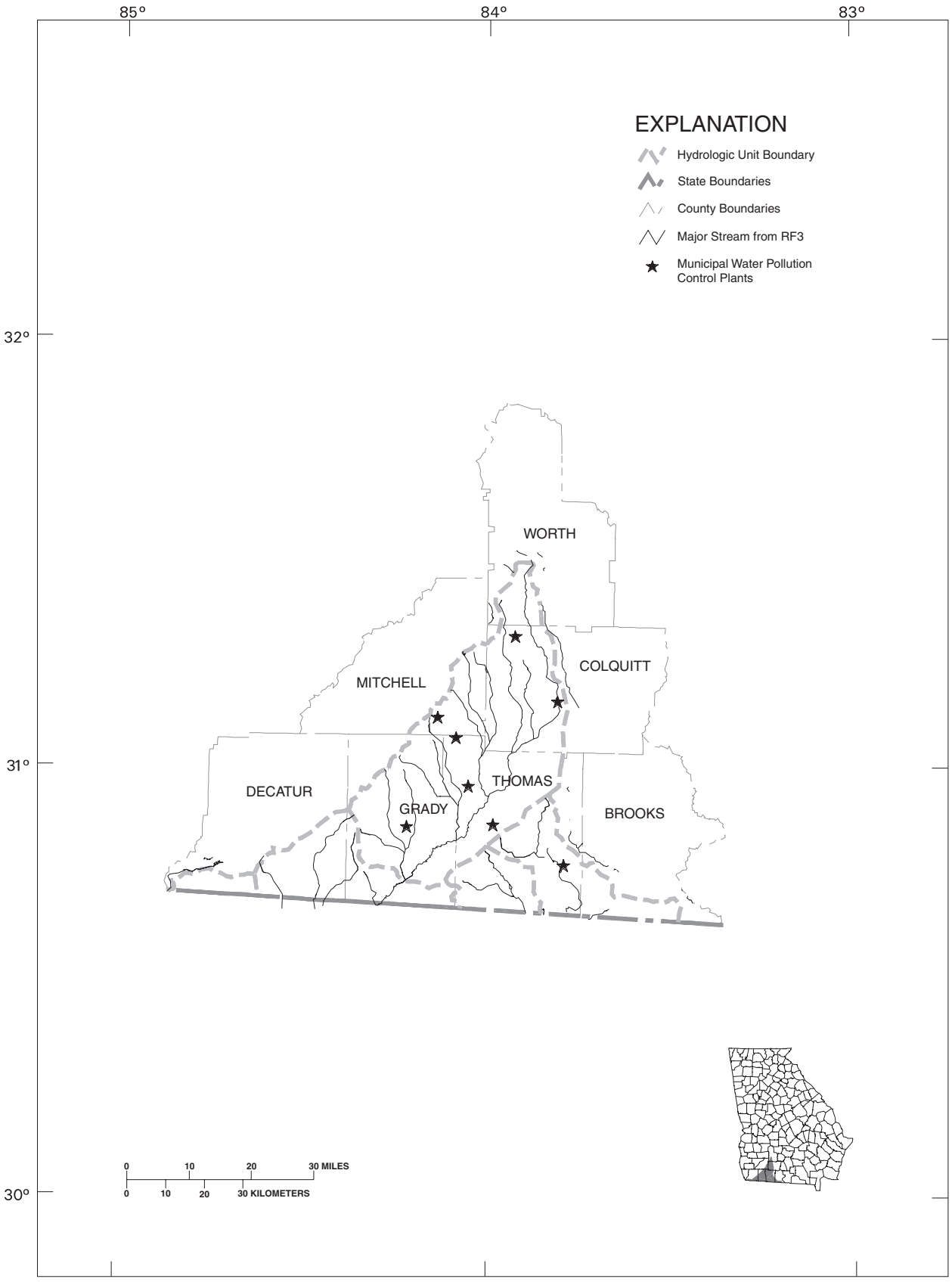


Figure 4-I. Location of Municipal Wastewater Treatment Plants in the Ochlockonee River Basin

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 16 permitted municipal, state, federal, private, and industrial wastewater and process water discharges in the Ochlockonee River basin, as summarized in Table 4-2. The complete permit list is summarized in Appendix D.

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

HUC	Major Municipal Facilities	Major Industrial and Federal Facilities	MinorPublic Facilities	Minor Private and Industrial Facilities	Total
03110103	0	0	1	0	1
03120002	2	1	3	5	11
03120003	0	0	0	4	4
Total	2	1	4	9	16

The nature of industrial discharges varies widely compared to discharges from municipal plants. Effluent flow is not usually a good measure of the significance of an industrial discharge. Industrial discharges can consist of organic, heavy oxygen-demanding waste loads from facilities such as pulp and paper mills; large quantities of noncontact cooling water from facilities such as power plants; pit pumpout and surface runoff from mining and quarrying operations, where the principal source of pollutants is the land-disturbing activity rather than the addition of any chemicals or organic material; or complex mixtures of organic and inorganic pollutants from chemical manufacturing, textile processing, metal finishing, etc. Pathogens and chlorine residuals are rarely of concern with industrial discharges, but other conventional and toxic pollutants must be addressed on a case-by-case basis through the NPDES permitting process. There are no major industrial or federal wastewater treatment plants with discharges into the Ochlockonee River basin in Georgia.

There are also minor industrial discharges which may have the potential to cause localized stream impacts, but are relatively insignificant from a basin perspective. The locations of permitted point source discharges of treated wastewater in the Ochlockonee River basin are shown in Figures 4-2 through 4-5.

Combined Sewer Overflows

Combined sewers are sewers that carry both storm water runoff and sanitary sewage in the same pipe. Most of these combined sewers were built at the turn of the century and were present in most large cities. At that time both sewage and storm water runoff were piped from the buildings and streets to the small streams that originated in the heart of the

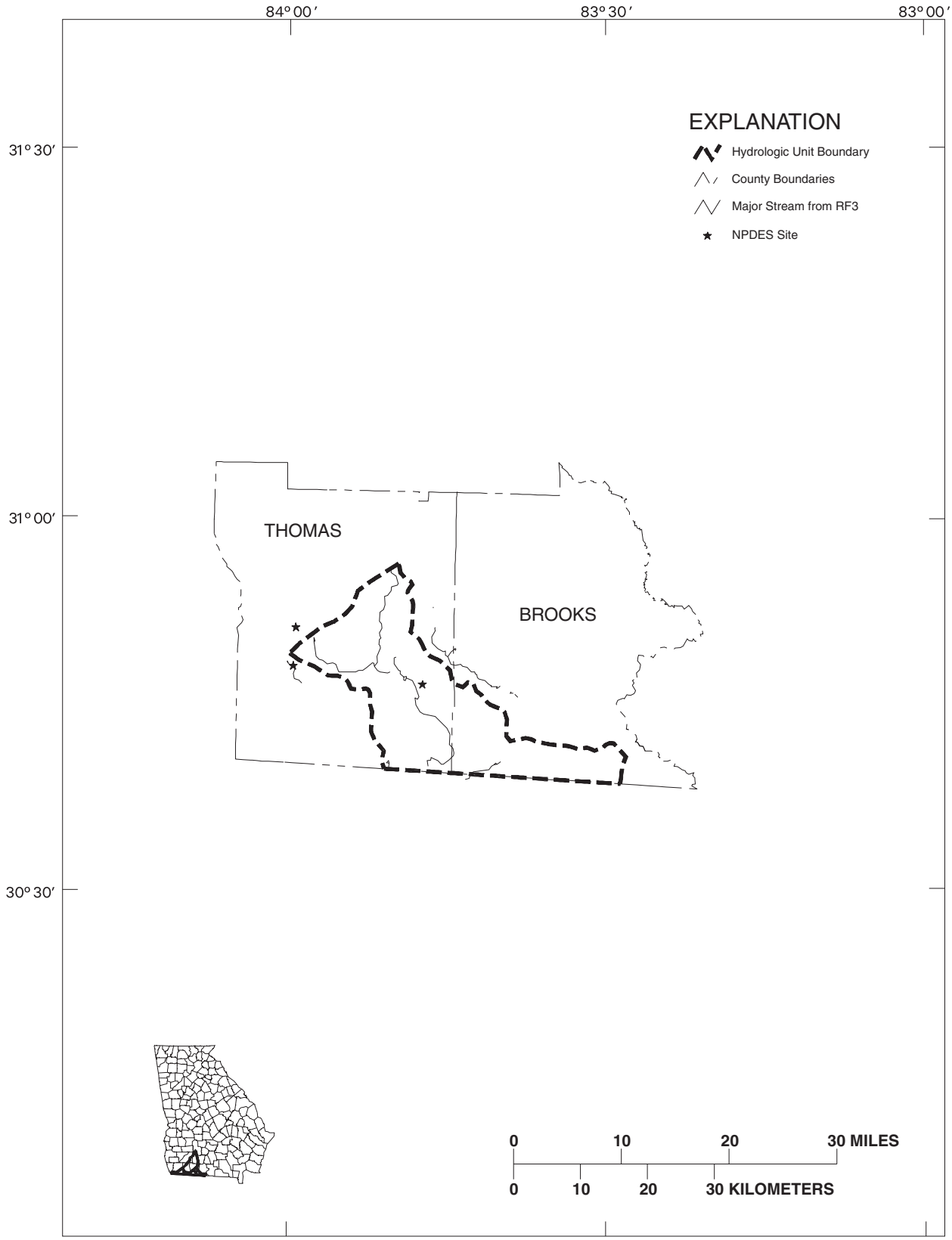


Figure 4-2. NPDES Sites Permitted by GAEPD, Ochlockonee River Basin, HUC 03110103

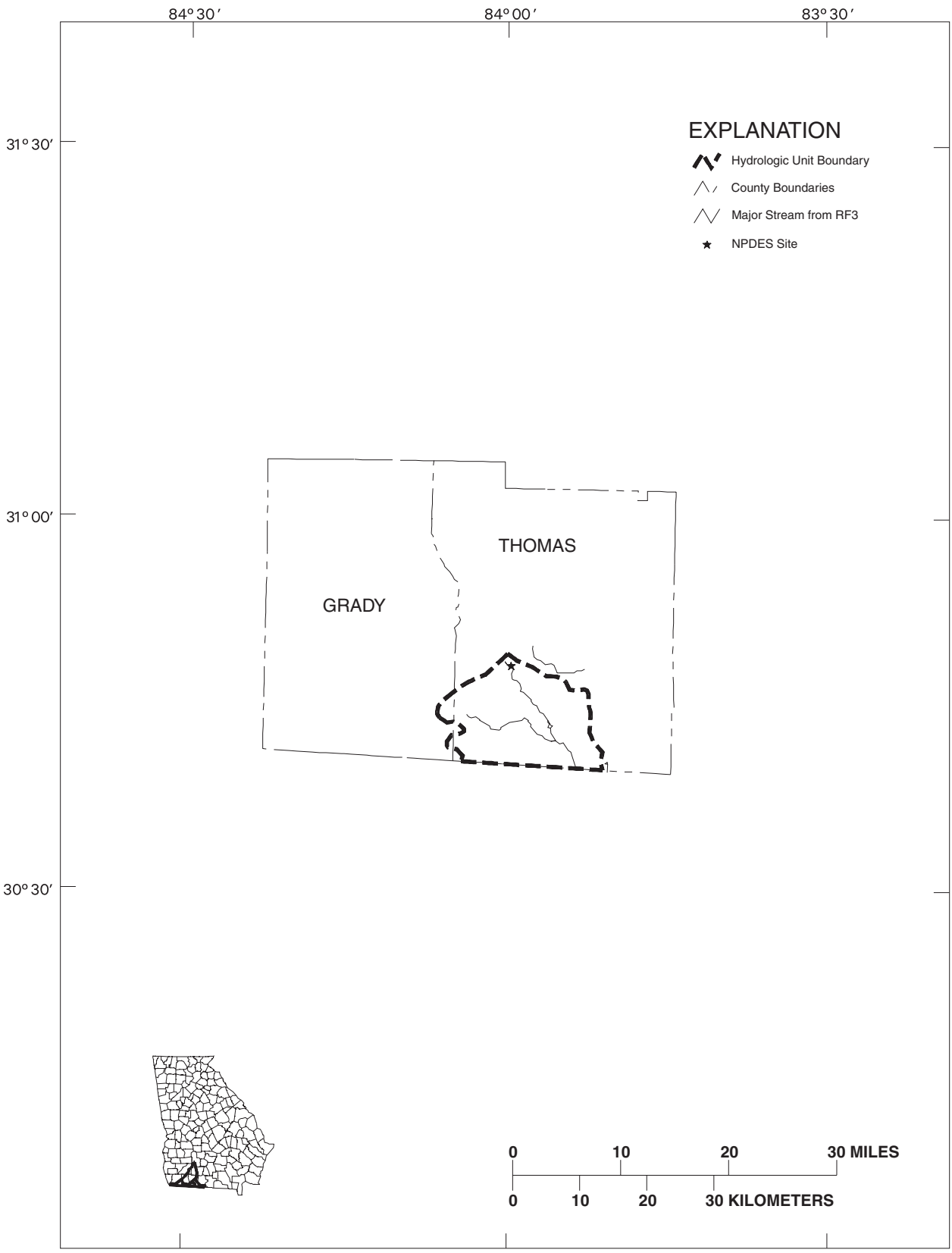


Figure 4-3. NPDES Sites Permitted by GAEPD, Ochlockonee River Basin, HUC 03120001

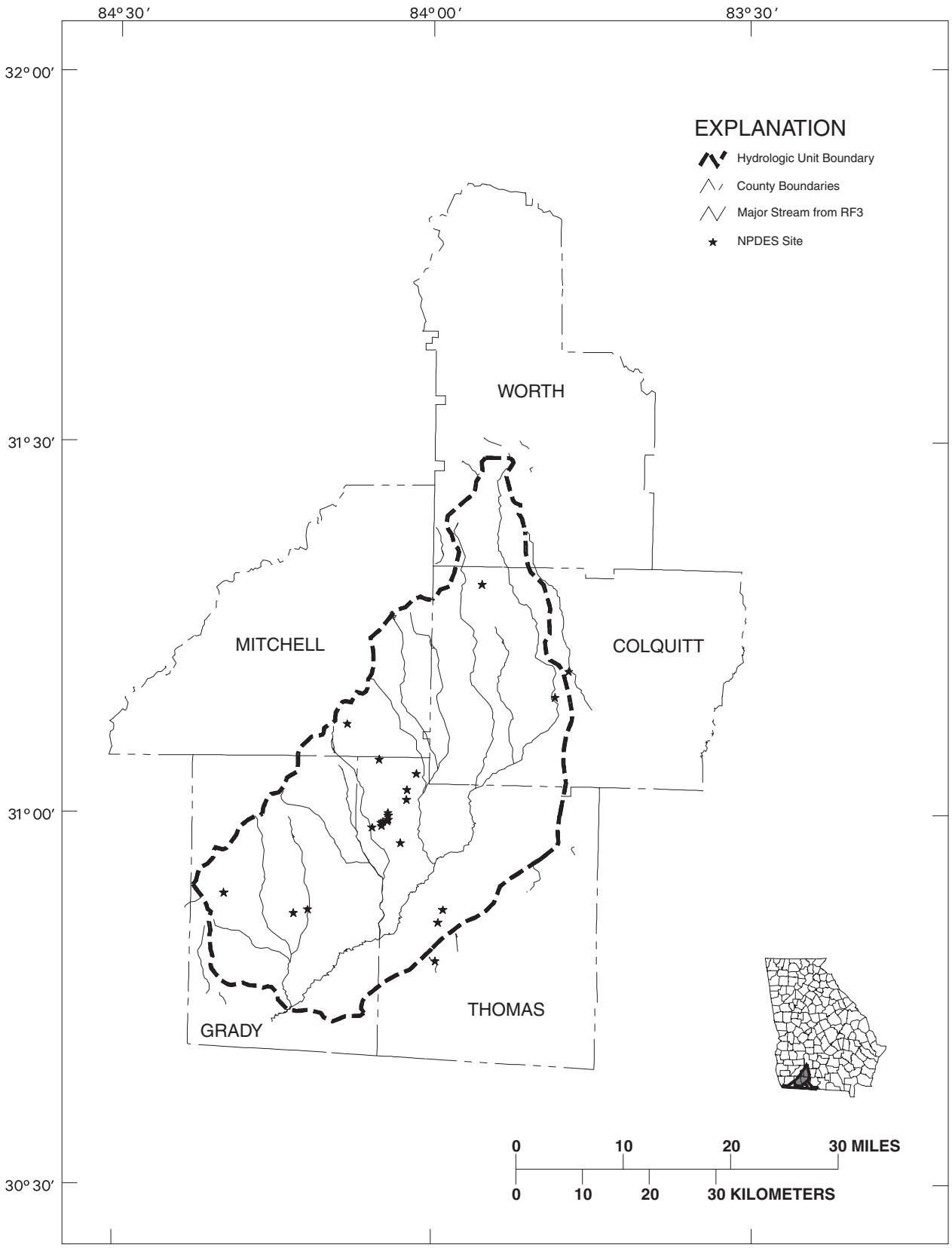


Figure 4-4. NPDES Sites Permitted by GAEPD, Ochlockonee River Basin, HUC 03120002

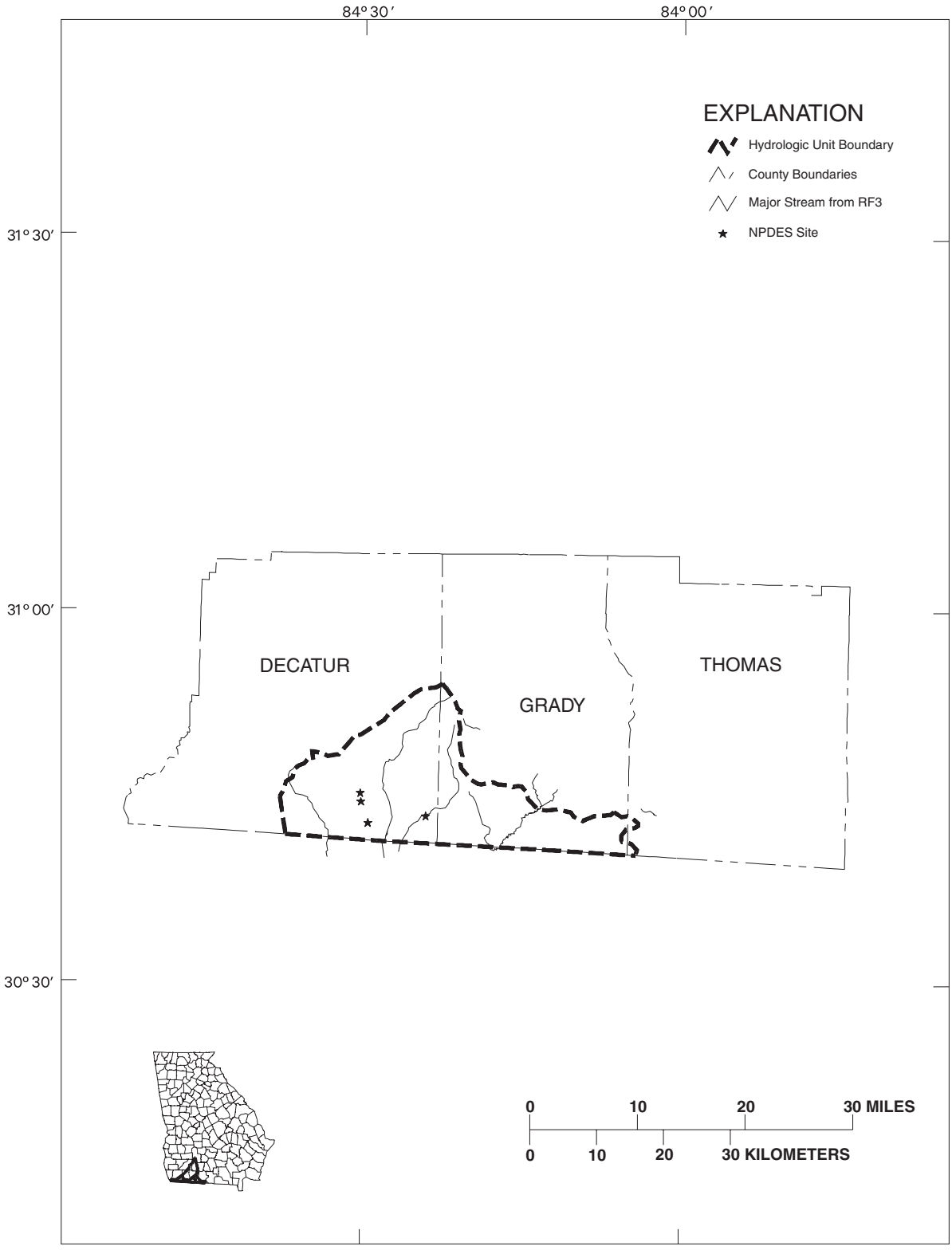


Figure 4-5. NPDES Sites Permitted by GAEPD, Ochlockonee River Basin, HUC 03120003

city. When these streams were enclosed in pipes, they became today's combined sewer systems. As the cities grew, their combined sewer systems expanded. Often new combined sewers were laid to move the untreated wastewater discharge to the outskirts of the town or to the nearest waterbody.

In later years wastewater treatment facilities were built and smaller sanitary sewers were constructed to carry the sewage (dry weather flows) from the termination of the combined sewers to these facilities for treatment. However, during wet weather, when significant storm water 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 storm water and sanitary waste. Uncontrolled CSOs thus discharge raw diluted sewage and can introduce elevated concentrations of bacteria, BOD, and solids into a receiving water body. In some cases, CSOs discharge into relatively small creeks.

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

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

NPDES Permitted Storm Water Discharges

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

Pollutants typically found in urban storm water 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. Storm water runoff may also increase the temperature of a receiving stream during warm weather, which potentially threatens valuable trout fisheries in the Ochlockonee River basin. All of these pollutants, and many others, influence the quality of storm water 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 Storm Water Discharges

In accordance with Federal "Phase I" storm water regulations, the state of Georgia has issued individual areawide NPDES municipal separate storm sewer system (MS4) permits to 58 cities and counties in municipal areas with populations greater than 100,000 persons. There were no permits issued in the Ochlockonee River basin.

Industrial Storm Water Discharges

Industrial sites often have their own storm water conveyance systems. The volume and quality of storm water 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 storm water 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 storm water 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 storm water pollution prevention plan; and, in some cases, analytical testing of storm water discharges from the facility. As with the municipal storm water permits, implementation of site-specific best management practices is the preferred method for controlling storm water runoff.

The 11th federally regulated industrial subcategory (construction activities) is covered under NPDES General Permit No. GAR100000. This general permit regulates storm water discharges associated with construction activity at sites and common developments disturbing more than five acres. The general permit requires the submission of a Notice of Intent (NOI) to obtain coverage under the permit, the preparation and implementation of an Erosion, Sedimentation, and Pollution Control Plan, and the preparation and implementation of a Comprehensive Monitoring Program which provides for monitoring of turbidity levels in the receiving stream(s) and/or storm water outfalls(s) during certain rain events. The general permit became effective on August 1, 2000 and will expire on July 31, 2003.

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.

A total of 147 municipal and 53 industrial permits for land application systems were in effect in Georgia in 2000. Municipal and other wastewater land application systems within the Ochlockonee Basin are listed in Table 4-3. The locations of all LASs within the basin are shown in Figures 4-6 through 4-8.

Table 4-3. Wastewater Land Application Systems in the Ochlockonee River Basin

Facility Name	County	Permit No.	Permitted Flow (Mgd)
Cairo Las	Grady	GA02-087	2.5
Coolidge	Thomas	GA02-145	0.083
Glen Mor Nursing Home	Thomas	GA03-706	0.008
Pelham Las	Mitchell	GA02-161	1.5
Thomas Co Correctional Las	Thomas	GA02-266	0.015
Twin Oaks Rental Comm	Thomas	GA03-802	0.03

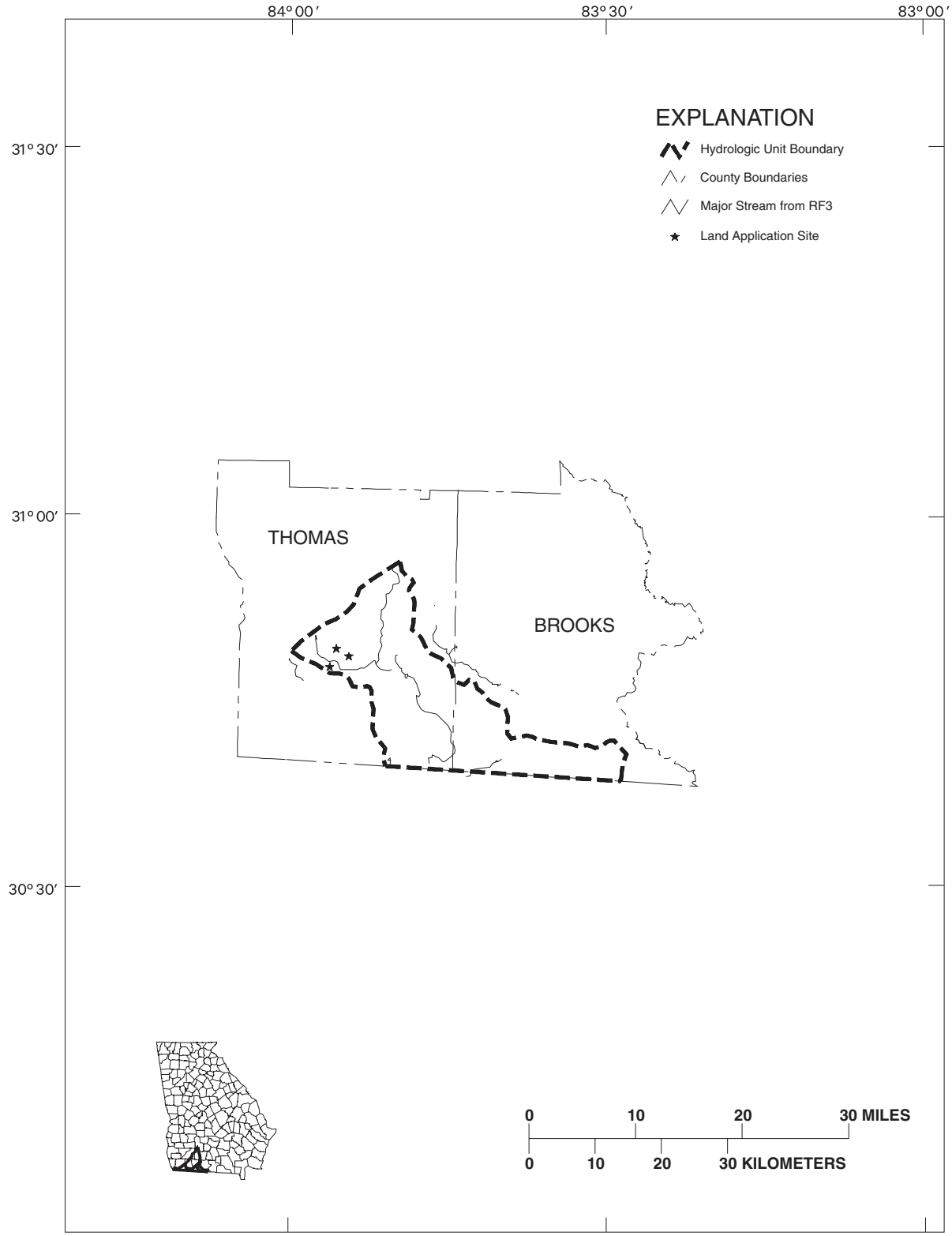


Figure 4-6. Land Application Systems, Ochlockonee River Basin, HUC 03110103

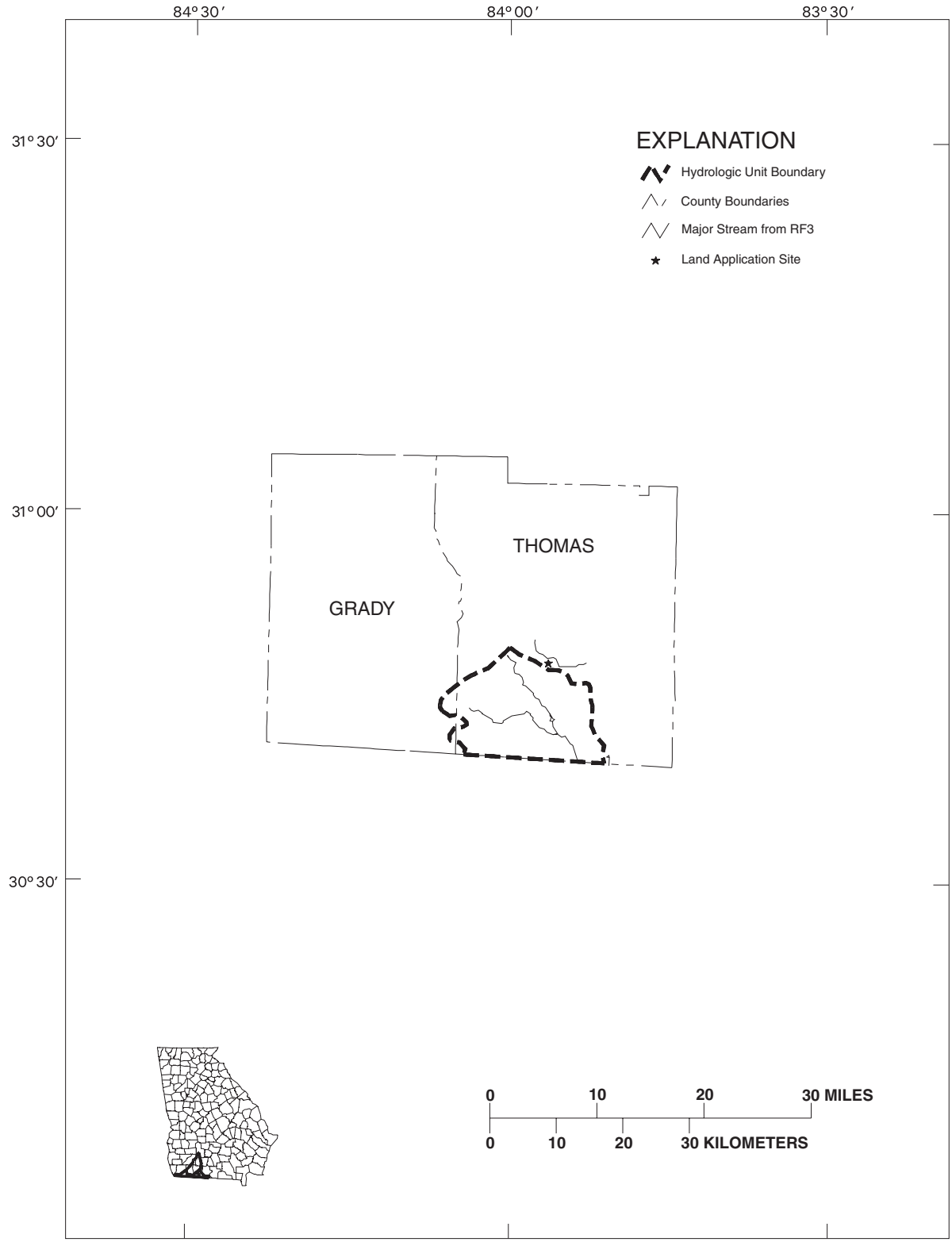


Figure 4-7. Land Application Systems, Ochlockonee River Basin, HUC 03120001

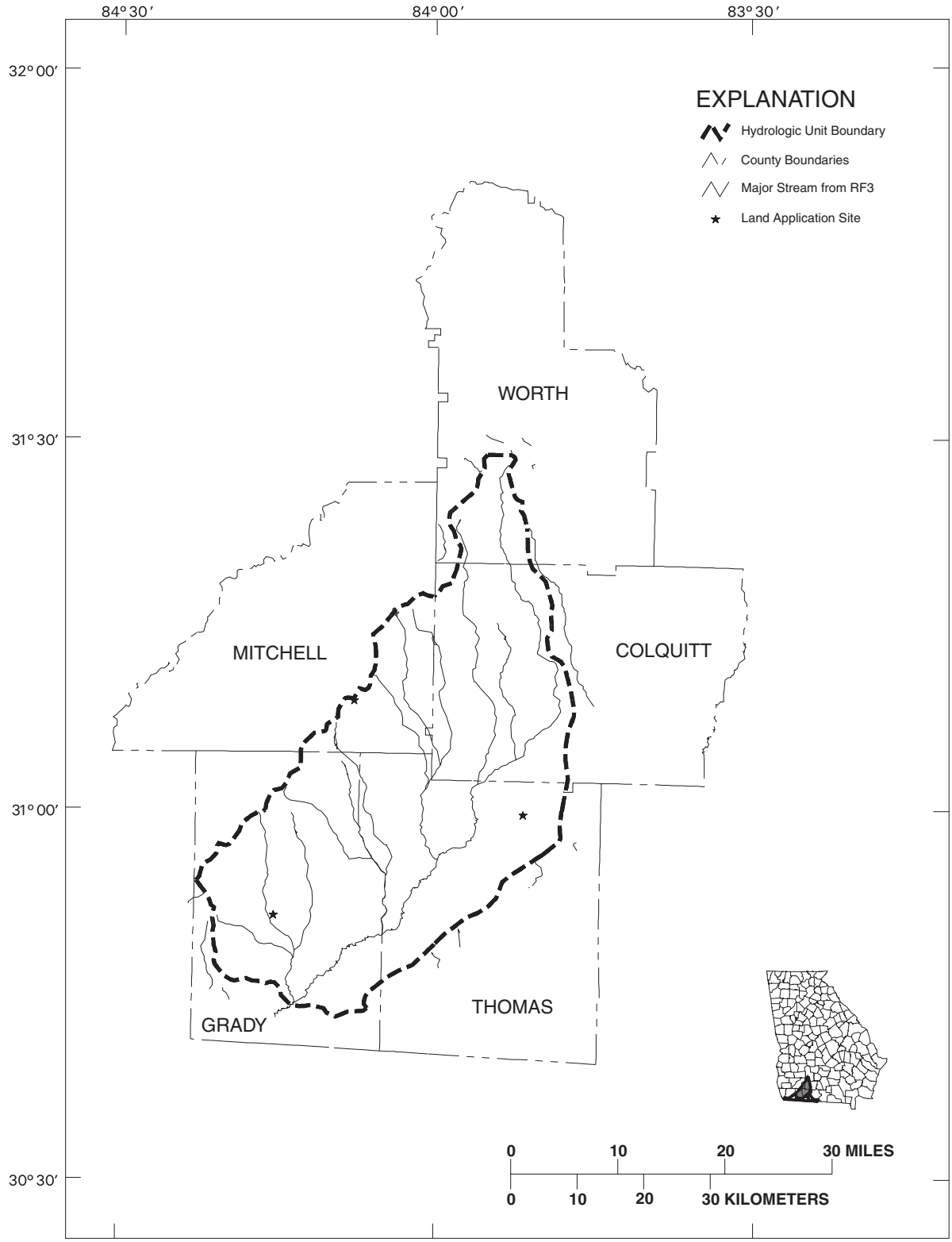


Figure 4-8. Land Application Systems, Ochlockonee River Basin, HUC 03120002

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 any landfills in Georgia. Groundwater contaminated by landfill leachate from older, unlined landfills represents a potential threat to waters of the state. Ground water and surface water monitoring and corrective action requirements are in place for all landfills operated after 1988 to identify and rededicate potential threats. The provisions of the Hazardous Sites Response Act address threats posed by older landfills as releases of hazardous constituents are identified. All new municipal solid waste landfills are required to be lined and to have a leachate collection system installed.

EPD's Land Protection Branch is responsible for permitting and compliance of municipal and industrial Subtitle D landfills. The location of permitted landfills within the basin is shown in Figures 4-9 through 4-11.

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 ground water. 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 1998-1999 water quality assessment results for the Ochlockonee 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.

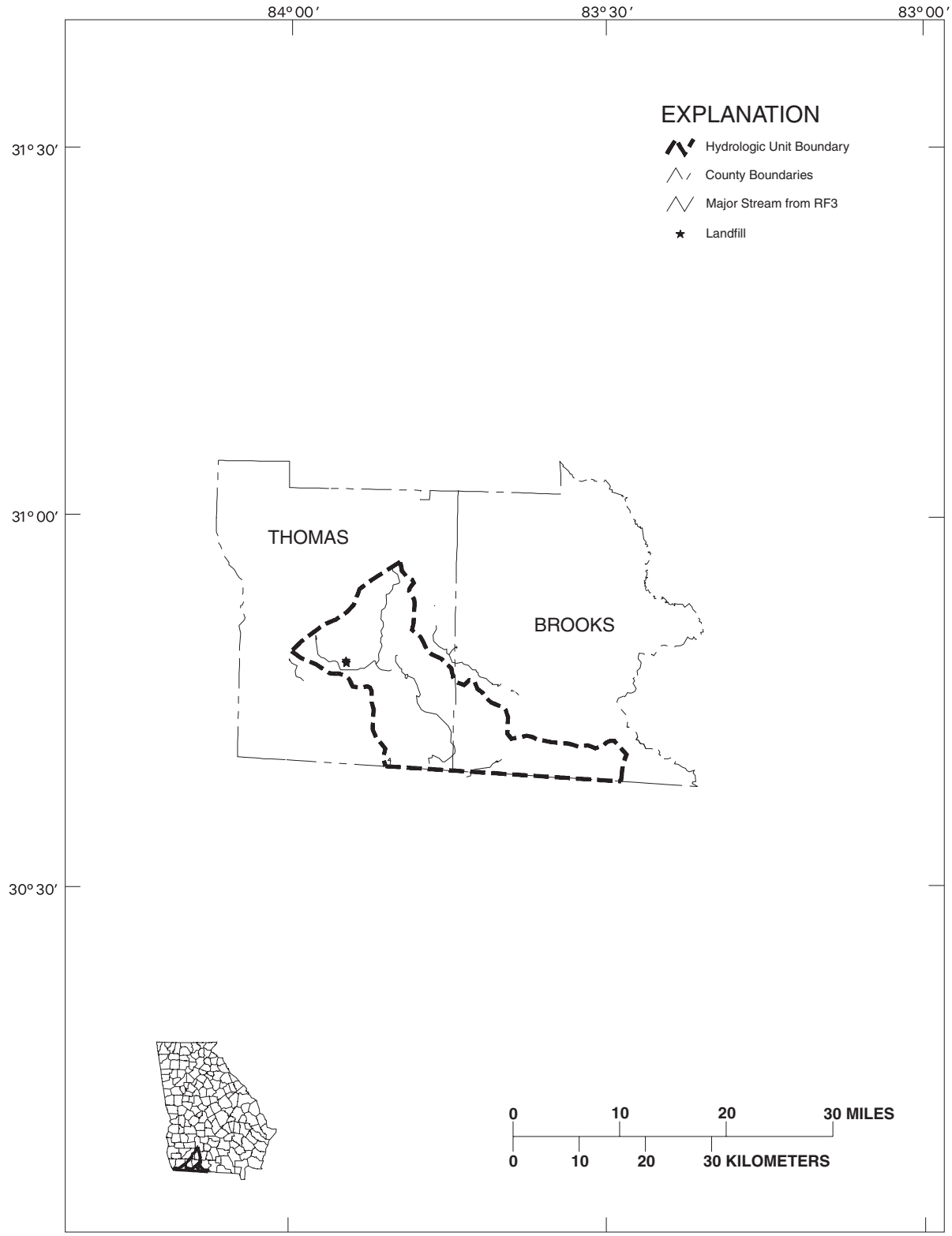


Figure 4-9. Landfills, Ochlockonee River Basin, HUC 03110103

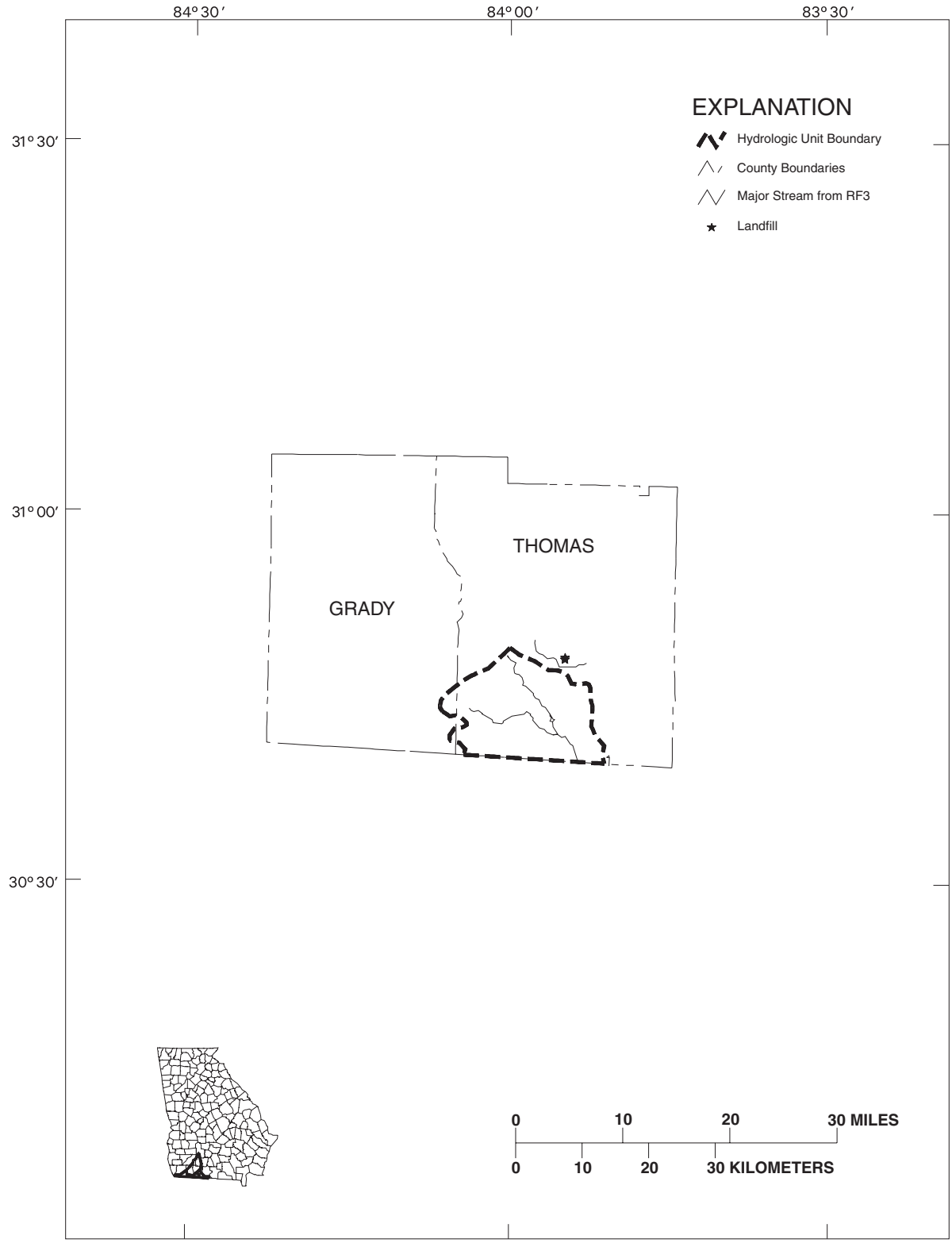


Figure 4-10. Landfills, Ochlockonee River Basin, HUC 03120001

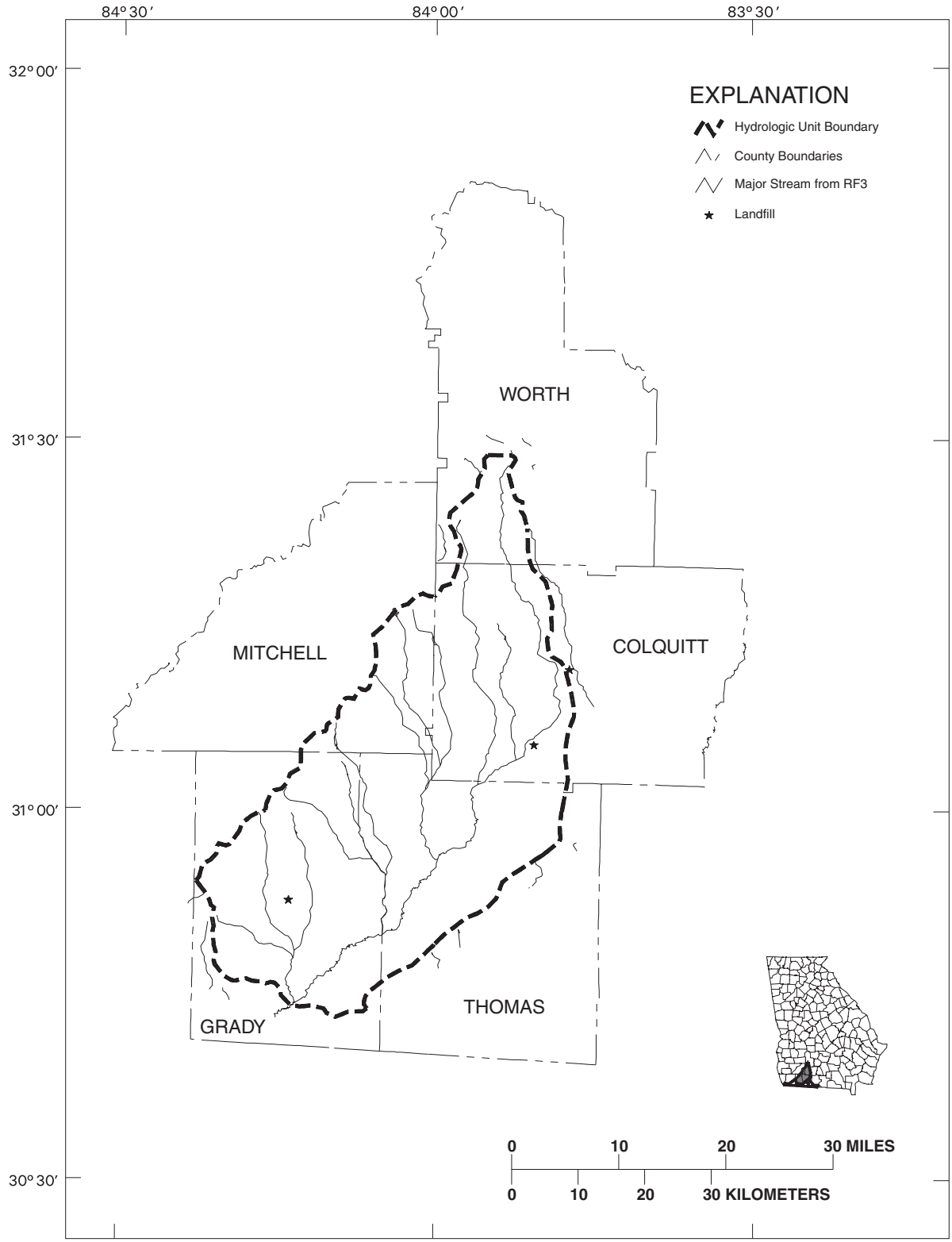


Figure 4-II. Landfills, Ochlockonee River Basin, HUC 03I20002

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 destroying spawning areas. Runoff with elevated sediment concentrations can also scour aquatic habitat, causing significant impacts on the biological community. Excess sediment can also increase water treatment costs, interfere with recreational uses of water bodies, create navigation problems, and increase flooding damage. In addition, a high percentage of nutrients lost from agricultural lands, particularly phosphorus, are transported attached to sediment. Many organic chemicals used as pesticides or herbicides are also transported predominantly attached to sediment.

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

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 ground water 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, include fecal bacteria, 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 nonherbicie 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 Ochlockonee 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 an impair streams that drain extensive commercial and industrial areas due to inputs of storm water 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 storm water 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 Ochlockonee 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. As an example, 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 preemergent control of crabgrass in February and October, and in the summer for postemergent 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 storm water 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

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. 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 1970's.

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 practices except in forest tree nurseries which is a very minor land use. Insects in pine stands are controlled by chlorpyrifos, diazinon, malathion, acephate, carbaryl, lindane, and dimethoate. Diseases

are controlled using chlorothalonil, dichloropropene, and mancozeb. There are three commercial forest tree nurseries within the basin.

According to the Water Quality in Georgia 1998 Report, no streams were identified in the basin as impacted due to commercial forestry activities.

Statewide BMP Implementation Survey

The Georgia Forestry Commission (GFC) conducted statewide BMP implementation surveys in 1991 and 1992 and most recently completed its third survey in 1998. The purposes of these surveys are to determine to what extent forestry BMPs are being implemented and are they effective in minimizing erosion. The surveys were set up to evaluate streamside management zones (SMZs), roads, stream crossings, timber harvesting, mechanical site preparation, chemical treatments, burning, and regeneration operations typically associated with forestry.

During the 1992 survey, 2,456 acres were evaluated on 10 private landowner sites within the Ochlockonee Basin. The percentage of acres in compliance with BMPS was 98 percent.

During the 1998 survey, the GFC evaluated 9 sites involving 225 acres of land within the Ochlockonee Basin. All 9 sites were on private lands. Overall, the percentage of applicable BMPs implemented was 79 percent. However the area affected by the lack of BMP implementation was minimal as the percentage of acres in compliance with BMPs was 98 percent.

Streamside Management Zones: Approximately 9.96 acres of SMZs were evaluated on 5 sites. The percentage of applicable BMPs implemented was 68 percent and the percentage of acres in compliance with the BMPs was 60 percent. Most noted problems involved roads or main skid trails within the SMZ, excessive soil disturbance, and logging debris left in streams.

Main Haul Roads: Approximately 2.37 miles of main haul roads were evaluated on the 9 sites. The percentage of applicable BMPs implemented was 86 percent and the percentage of actual miles in compliance with the BMPs was 98 percent. Excessive roads grades were identified on 1 of 2 sites and turnouts were needed in road ditches on 2 sites. Roads were well drained with diversions and reshaped and stabilized on 75 percent of the sites.

Stream Crossings: Nine stream crossings were evaluated on two sites. The percentage of applicable BMPs implemented was 20 percent and the percentage of actual crossings in compliance with BMPs was 0 percent. Most noted problems involved random crossings, skidders using fords in streams for crossings, steep approaches to streams, and the use of debris and dirt as a type of crossing and then not removing it when the job was finished.

Timber Harvesting Outside the SMZ: Approximately 215.04 acres were evaluated on 9 sites. The percentage of applicable BMPs implemented was 93 percent and the percentage of acres in BMP compliance was 99 percent. The most noted problem involved the lack of installing water bars in skid trails and stabilizing them on rolling terrain.

No sites were evaluated for mechanical site preparation, chemical treatments, burning, or mechanical regeneration.

Stream Miles: Approximately 1.5 miles of stream were evaluated on 5 sites. The percentage of miles in compliance with BMPs was 78 percent. A stream habitat assessment was conducted above and below 4 of these sites. The above site stream was the reference section and used to compare any potential impairment that would typically

show up in the downstream section below the forestry operation. No downstream segments were determined to be impacted.

Another statewide BMP survey is scheduled for calendar year 2001.

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 increases the rate of metabolic activity in natural waters, which in turn may increase oxygen consumption by aquatic species.

4.1.4 Physical Habitat Alteration

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

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

4.2 Summary of Stressors Affecting Water Quality

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

4.2.1 Nutrients

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

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

Point and nonpoint sources to the Ochlockonee also discharge large quantities of nitrogen, but nitrogen is usually present in excess of amounts required to match the available phosphorus. Nitrogen (unlike phosphorus) is also readily available in the atmosphere and 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 corresponding increase in the nitrate fraction.

Sources of Nutrient Loading

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

Point source loads can be quantified from permit and effluent monitoring data, but nonpoint loads are difficult to quantify. Rough estimates of average nutrient loading rates from agriculture are available; however, nonpoint loads from urban/residential sources in the basin have not yet been quantified. The long-term trends in phosphorus within the Ochlockonee River basin can be obtained by examining results from EPD long-term trend monitoring stations. The trend in instream total phosphorus concentrations at one site in the Ochlockonee River basin is shown in Figure 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 was the most commonly listed cause of nonsupport of designated uses in 1998-1999. Problems with oxygen depletion in rivers and streams of the Ochlockonee basin are associated with

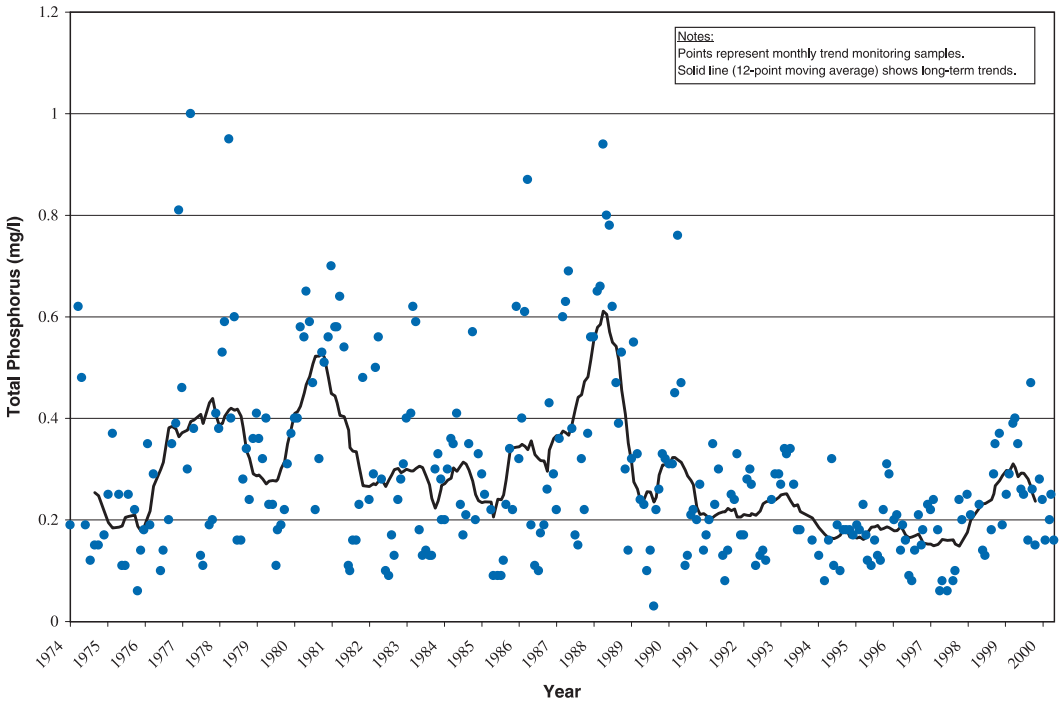


Figure 4-I2. Total Phosphorus Concentrations, Ochlockonee River at Hadley Ferry Rd near Calvary, GA

oxygen-demanding wastes from point and nonpoint sources. Historically, the greatest threat to maintaining adequate oxygen levels to support aquatic life has come from the discharge of oxygen-demanding wastes from wastewater treatment plants. Treatment upgrades and more stringent permit limits have reduced this threat substantially. Today, dissolved oxygen issues in the Ochlockonee River basin are mainly associated with nonpoint source discharges. It should be noted also that dissolved oxygen concentrations are naturally lower in parts of the Ochlockonee River basin.

The trend in instream dissolved oxygen concentrations at one site in the Ochlockonee River basin is shown in Figure 4-13. All waters in the Ochlockonee basin have a state water quality standard of 4.0 mg/L. As shown in Figure 4-13, dissolved oxygen concentrations are usually above this standard.

4.2.3 Metals

No violations of water quality standards for metals were detected in the Ochlockonee River during the 1998 sampling.

4.2.4 Fecal Coliform Bacteria

Violations of the standard for fecal coliform bacteria were the secondly most commonly listed cause of nonsupport of designated uses in the 1998-1999 water quality assessment. 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. Observed violations of the fecal coliform standard below several wastewater treatment plants on the Ochlockonee River have generally been rapidly corrected in recent years.

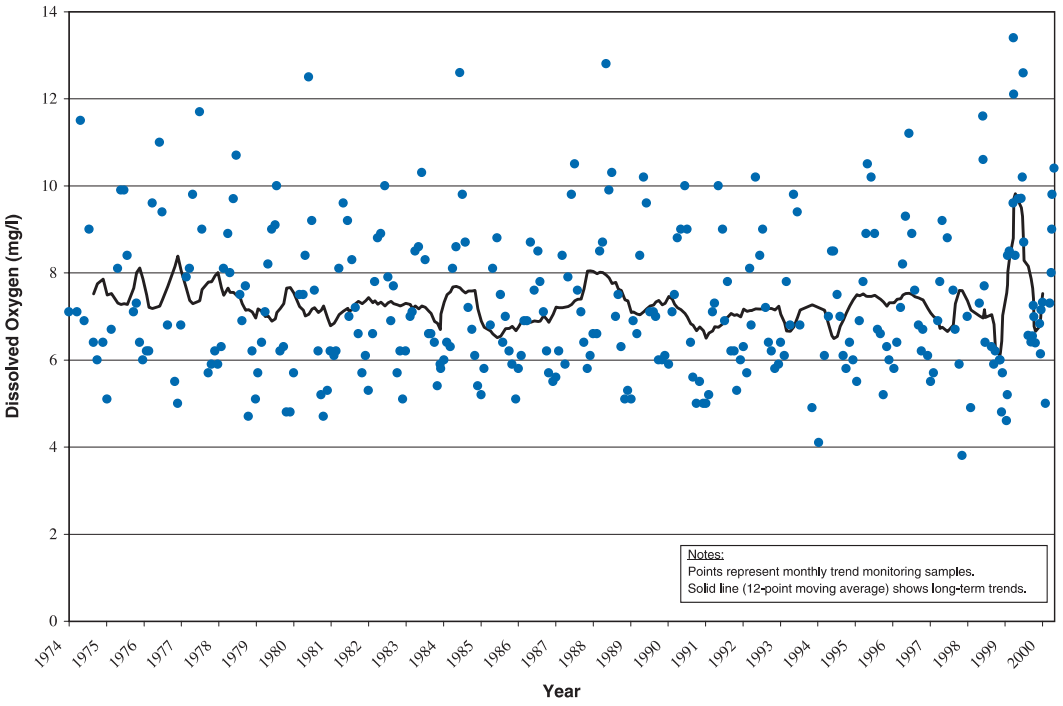


Figure 4-13. Dissolved Oxygen Concentrations, Ochlockonee River at Hadley Ferry Rd near Calvary, GA

The trend in instream fecal coliform concentrations at one site in the Ochlockonee River basin is shown in Figure 4-14.

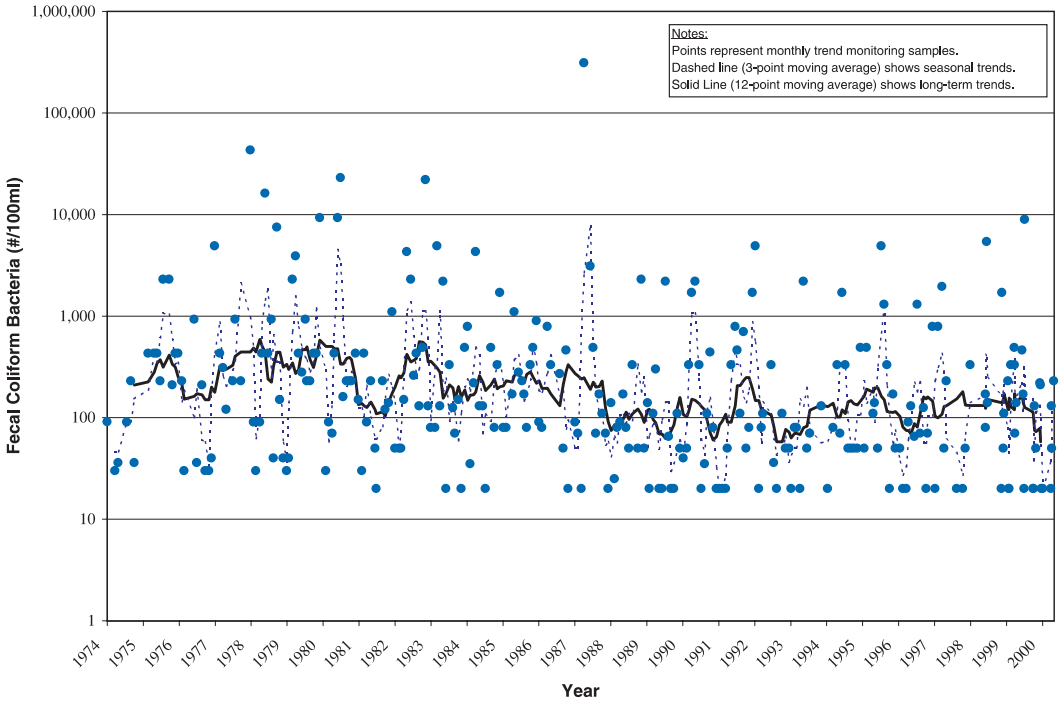


Figure 4-14. Fecal Coliform Bacteria Concentrations, Ochlockonee River at Hadley Ferry Rd near Calvary, GA

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.

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 Ochlockonee River basin in problem concentrations. It should be noted, however, that most monitoring has been targeted to waters located below point sources where potential problems were suspected. Agricultural sources were potentially important in the past, particularly from cotton production in the Coastal Plain, but the risk has apparently greatly declined with a switch to less persistent pesticides. Recent research by USGS Hippe et al., 1994; Stell et al., 1995) suggests pesticide/herbicide loading in urban runoff and storm water may be of greater concern than agricultural loading, particularly in streams of the metropolitan Atlanta area.

4.2.6 Stressors from Flow Modification

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

4.2.7 Sediment

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

Long term observation of river bathymetry associated with fisheries studies indicate evidence of fish habitat alteration through sedimentation. Suspended sediments for the

most part appear to be originating from the upper part of the watershed where agriculture (i.e. cotton) is expanding again.

4.2.8 Habitat Degradation and Loss

In many parts of the Ochlockonee 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 Ochlockonee basin is loss of riparian tree cover, which can lead to increased water temperatures.

References

Delaplane, K.S., ed. 1991. 1991 Georgia Pest Control Handbook. Special Bulletin 28 Cooperative Extension Service, The University of Georgia College of Agriculture, Athens, Georgia.

EPD. 1998. Water Quality in Georgia, 1996-1997. Georgia Department of Natural Resources, Environmental Protection Division, Atlanta, GA.

SCS. 1993. Georgia Watershed Agricultural Nonpoint Source Pollution Assessment, Cooperative River Basin Study. Prepared by U.S. Department of Agriculture, Forest Service, Conservation Service. Soil Conservation Service, Atlanta, Georgia.

Stell, S.M., E.H. Hopkins, G.R. Buell, and D.J. Hippe. 1995. Use and Occurrence of Pesticides in the Apalachicola-Chattahoochee-Flint River Basin, Georgia, Alabama, and Florida, 1960-91. Open-File Report 95-739. U.S. Geological Survey, Atlanta, Georgia.

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 Ochlockonee 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 Ochlockonee basin is taken from the Georgia Environmental Protection Water Availability and Use Report, Coastal Plain River Basins, the Regional Economic Forecast of Population and Employment Comprehensive Study, Volume 1, and updated from other Georgia Environmental Protection Division sources where available.

5.1.1 Municipal and Industrial Water Uses

Water use in the basin is almost exclusively groundwater for municipal and industrial supplies. The largest groundwater withdrawal permit in the basin is the City of Thomasville (7.30 mgd). Other permitted withdrawers located in the basin include Sunnyland Foods (1.60 mgd), Florida Crushed Rock (3.19 mgd) and the City of Cairo (2.50 mgd).

Only one major surface water withdrawal is located in the basin and that is Englehard Minerals (1.50 mgd) which is permitted to withdraw from the Little Attapulgus Creek.

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 a 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 no drinking water plants located in this basin and no known and potential raw water quality problems.

5.1.2 Recreation

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

5.1.3 Hydropower

There are no hydropower facilities in the Ochlockonee basin.

5.1.4 Navigation

There is no commercial navigation in the Ochlockonee basin.

5.1.5 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 Ochlockonee River basin assume that sufficient surface water flow will be available to assimilate waste and ensure that water quality criteria will be met.

5.1.6 Assessment of Ground Water

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

Problems have been noted with the large mount of agricultural use from the Floridan aquifer in the nearby Flint River basin and EPD has therefore had to implement severe policy restrictions on all new Flint River basin agricultural irrigators. At present, such a limiting policy is not soon anticipated for the Ochlockonee River basin.

In the past, some stakeholders have expressed concern to EPD about the quantity of groundwater that may be captured and used in Georgia before flowing into Florida. This reflects concern from both Florida agricultural interest and users of the many springs in northwest Florida. The Floridan aquifer in this area is extremely transmissive and significant water use in Georgia may potentially impact aquifer water levels in Florida.

5.2 Assessment of Water Quality

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

introductory material, detailed assessment results by subbasin are presented in Section 5.2.4.

5.2.1 Water Quality Standards

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

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

In addition to the basic water quality standards shown above, Congress made changes in the Clean Water Act in 1987 which 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)[1]		pH	Temperature (other than trout streams)[1]	
Use Classification	30-Day Geometric Mean[2] (MPN/100 ml)	Maximum (MPN./100 ml)	Daily Average (mg/l)	Minimum (mg/l)	Std. Units	Maximum Rise (°F)	Maximum (°F)
Drinking Water requiring treatment	1,000 (Nov-April) 200 (May-Oct)	4,000 (Nov-April)	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[3]	1,000 (Nov-April) 200 (May-Oct)	4,000 (Nov-April)	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 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 2EF is allowed in Secondary Trout Streams.

2 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.

3 Standards are same as fishing with the exception of dissolved oxygen which is site specific.

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

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

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

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

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

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

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

5.2.2 Surface Water Quality Monitoring

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

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

EPD used a variety of monitoring tools to collect information for water quality assessments and for basin planning. These tools include trend 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 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 who 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, routine chemical trend monitoring is still accomplished through similar cooperative agreements.

Today EPD contracts with the United States Geological Survey (USGS) for the majority of the trend sampling work. 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. 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 Ochlockonee 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 Ochlockonee, Suwannee, Satilla, and St. Marys River basins during 1998.

Figure 5-1 shows the focused monitoring network for the Ochlockonee River basin used in 1998. During this period statewide trend monitoring was continued at a number of station locations statewide and at all continuous monitoring locations. The remainder of the trend monitoring resources were devoted to the Ochlockonee, Suwannee, Satilla, and St. Marys 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 model. Models are used for wasteload allocations and/or TMDLs and as tools for use in making regulatory decisions. Impact studies are conducted when information on the cause-and-effect relationships between pollutant sources and receiving waters is needed. In many cases biological information is collected along with chemical data for use in assessing environmental impacts.

Lake Monitoring

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

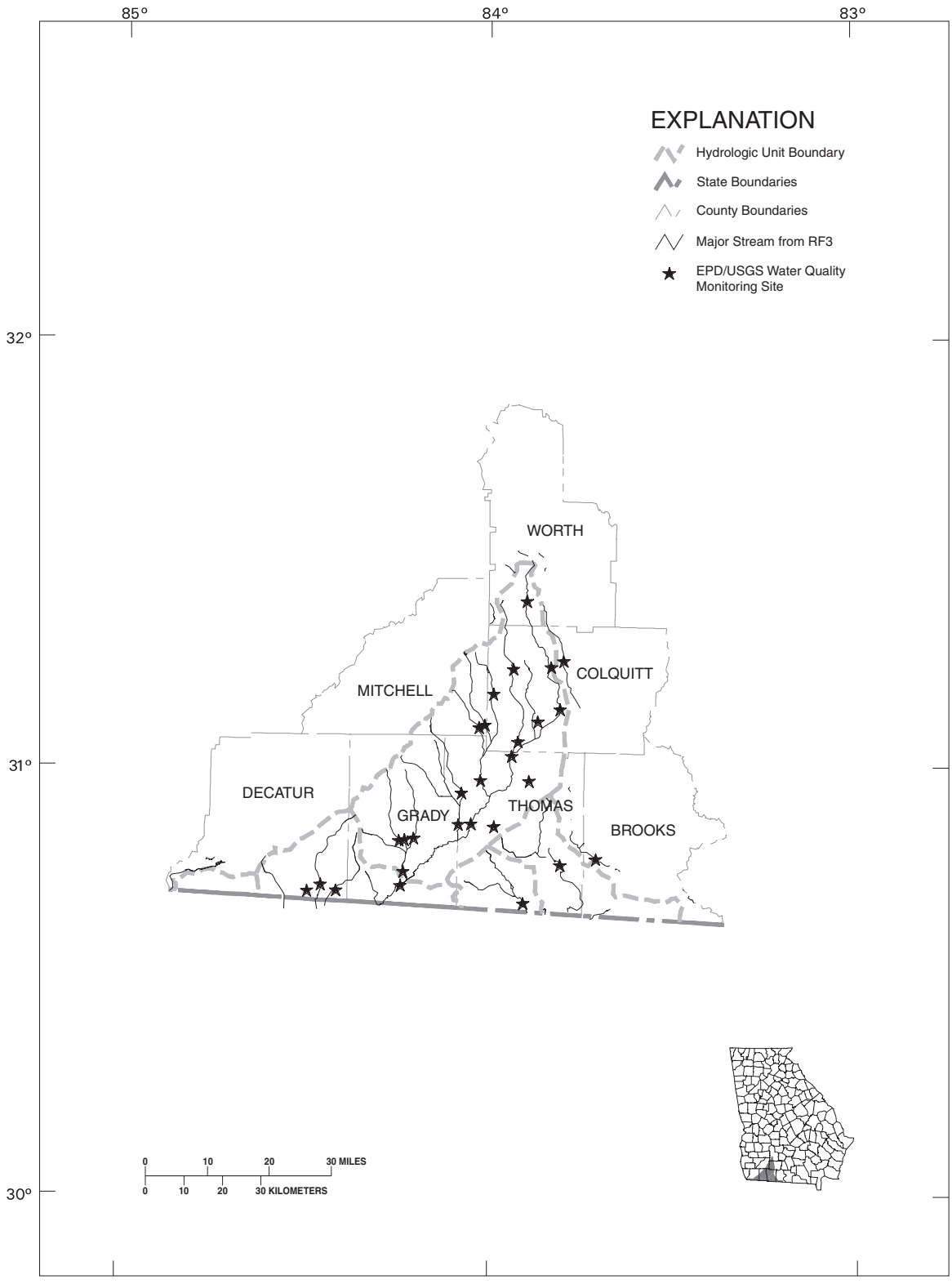


Figure 5-I. Ochlockonee River Basin Trend Monitoring Network Station Locations

regulatory decisions. In the 1990s, EPD conducted Clean Water Phase I Diagnostic – Feasibility studies on several major lakes. The study results were used as the basis for establishing lake-specific water quality standards.

Trophic Condition Monitoring

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

Fish Tissue Monitoring

The DNR conducts fish tissue monitoring for toxic chemicals and issues fish consumption guidelines as needed to protect human health. It is not possible for the DNR to sample fish from every stream and lake in the state. However, high priority has been placed on the 26 major reservoirs which 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 down-stream of urban and/or industrial areas a high priority. In addition, DNR will focus attention on areas which are frequented by a large number of anglers.

The program includes testing of fish tissue samples for the substances listed in Table 5-3. Of the 43 constituents tested, only PCBs, chlordane, and mercury have been found in fish at concentrations which could create risk to human health from fish consumption.

Table 5-3. Parameters for Fish Tissue Testing

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

The test results have been used to develop consumption guidelines which are updated annually and provided to fishermen when they purchase fishing licenses. This program will continue and will be coordinated as a part of the River Basin Management Planning process in the future.

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 3g/day to a high of 30 g/day is evaluated and one of four different recommendations made: no restriction, limit consumption to 1 meal per week, limit consumption to 1 meal per month, or do not eat.

Toxic Substance Stream Monitoring

EPD has focused resources on the management and control of toxic substances in the state's waters for many years. Toxic substance analyses were conducted on samples from selected trend monitoring stations from 1973-1991. Wherever discharges were found to have toxic impacts or to include toxic pollutants, EPD has incorporated specific limitations on toxic pollutants in NPDES discharge permits.

In 1983 EPD intensified toxic substance stream monitoring efforts. This expanded toxic substance stream monitoring project 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. Future work will be conducted as a part of the River Basin Management Planning process.

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.

More than 280 sampling inspections were conducted by EPD staff statewide in 1998. 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 1998, this work was focused on facilities in the Ochlockonee, Suwannee, Satilla, and St. Marys River basins in support of the basin planning process.

Aquatic Toxicity Testing

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

5.2.3 Data Analysis

Assessment of Use Support - General Procedures

EPD assesses water quality data to determine if water quality standards are met and if the waterbody supports its classified use. If monitoring data shows that standards are not achieved, depending on the frequency with which standards are not met, the waterbody is said to be not supporting or partially supporting the designated use (see box).

Analysis of data for fecal coliform bacteria, metals, toxicity, dissolved oxygen, fish/shellfish consumption advisories, 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 Ochlockonee River basin focused monitoring in 1997-1998 was to collect four samples in a thirty 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 1998 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 USEPA guidance, which suggests any single excursion of a metals criteria be listed.

Toxicity Testing/Toxic Substances

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

Dissolved Oxygen, pH, Temperature

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

Fish/Shellfish Consumption Guidelines

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

Biotic Data

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

Appendix E includes lists of all streams and rivers in the basin for which data have been assessed. The lists include information on the location, data source, designated water use classification, criterion violated, potential cause, actions planned to alleviate the problem, and estimates of stream miles affected. The list is further coded to indicate status of each waterbody under several sections of the Federal Clean Water Act (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.
- A fish consumption guideline was in place for the waterbody.

The partially supporting list may also include stream reaches based on predicted concentrations of metals at low stream flow (7Q10 flows) in excess of state standards as opposed to actual measurements on a stream sample. 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.
- A fish consumption ban was in place for the waterbody.
- Acute or chronic toxicity tests documented or predicted toxicity at low stream flow (7Q10) due to a municipal or industrial discharge to the waterbody.

Additional specific detail is provided in the following paragraphs (see box) on analysis of data for fecal coliform bacteria, metals, toxicity, dissolved oxygen, fish/shellfish consumption advisories, and biotic data.

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 Ochlockonee River basin. Most of these results were previously summarized in the Georgia 2000 305(b)/303(d) listing (Georgia DNR, 2000). Results are presented by HUC. A geographic summary of assessment results is provided by HUC in Figures 5-2 through 5-5.

Ochlockonee River Subbasin (HUC 03110103)

Appendix E summarizes the determination of support for designated uses of all assessed rivers and streams within this hydrologic unit (GA DNR, 2000).

Monitoring data was collected from one monitoring station located within this subbasin during the 1998. Historically, no trend monitoring stations were sampled within this subbasin. The following assessment is based on data from these monitoring stations.

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in one tributary stream segment and one Aucilla River mainstem segment 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.

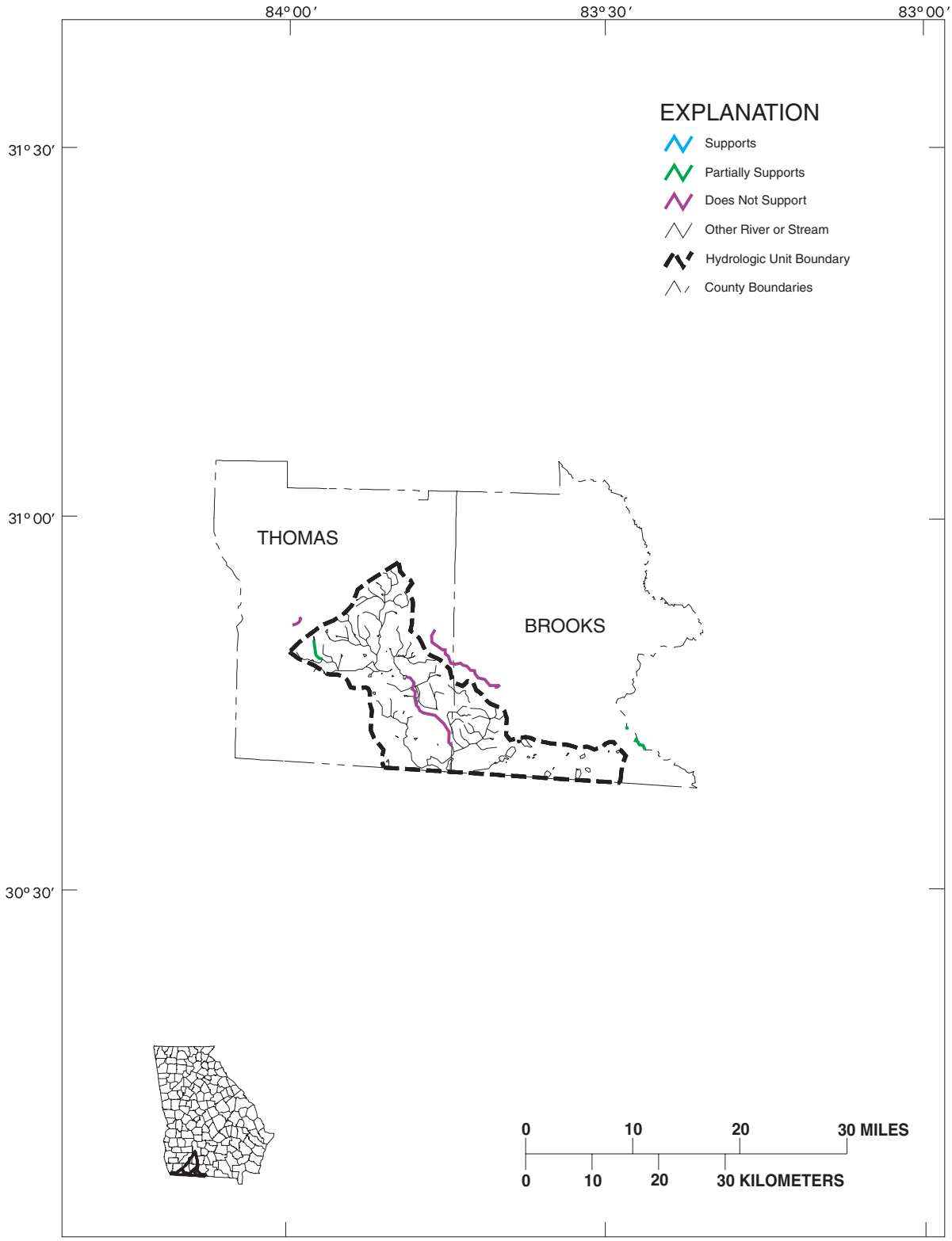


Figure 5-2. Assessment of Water Quality Use Support in the Ochlockonee River Basin, HUC 03110103

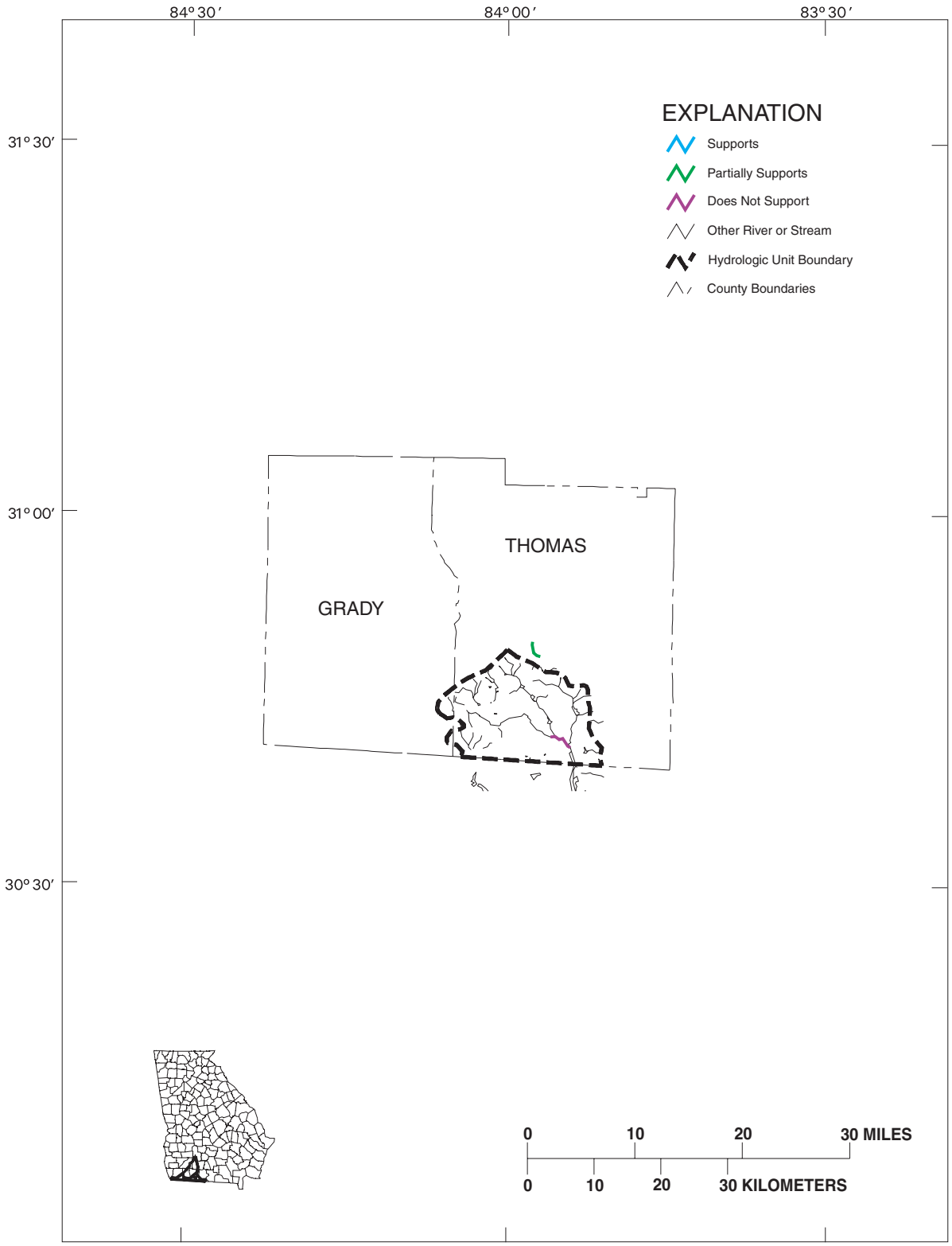


Figure 5-3. Assessment of Water Quality Use Support in the Ochlockonee River Basin, HUC 03120001

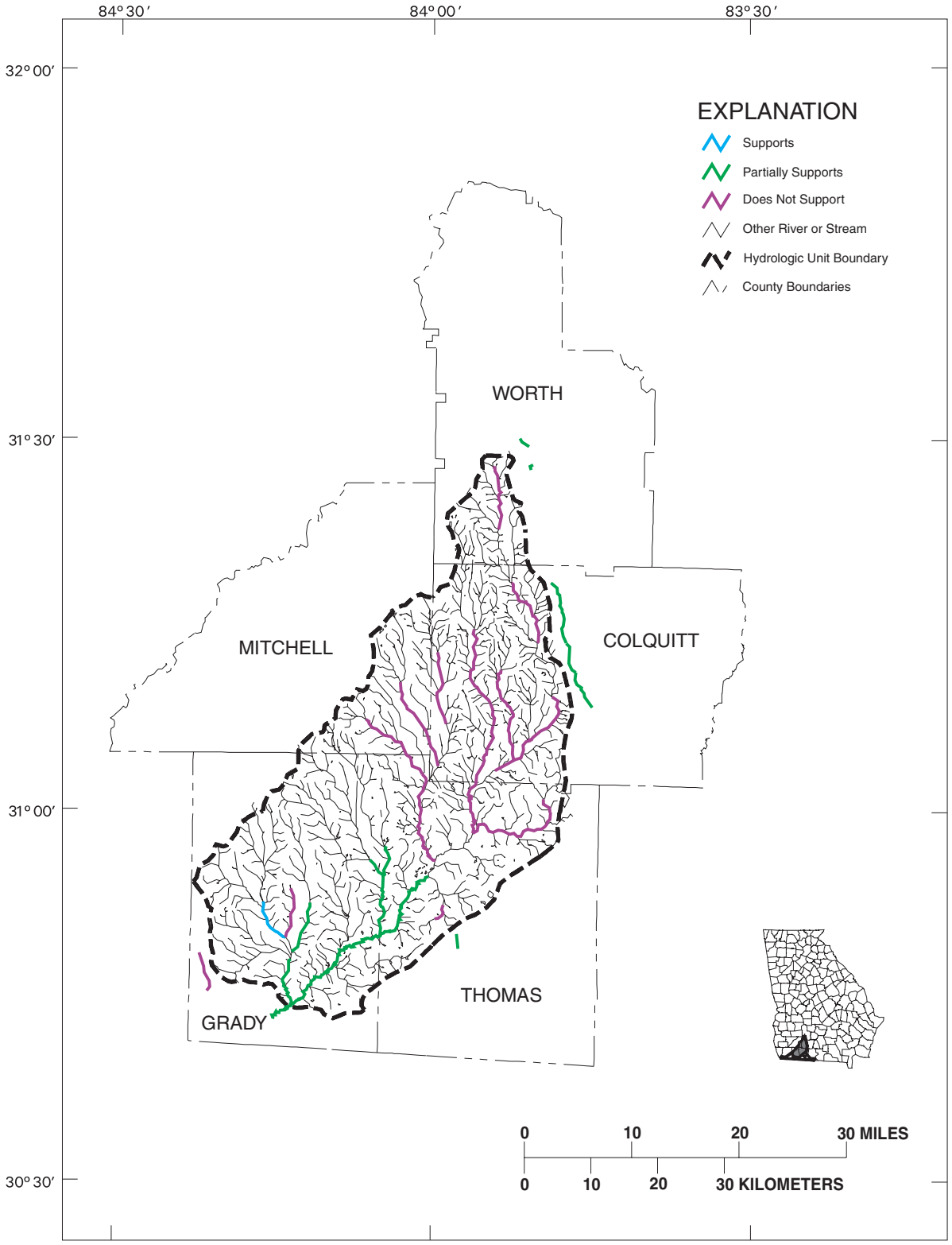


Figure 5-4. Assessment of Water Quality Use Support in the Ochlockonee River Basin, HUC 03120002

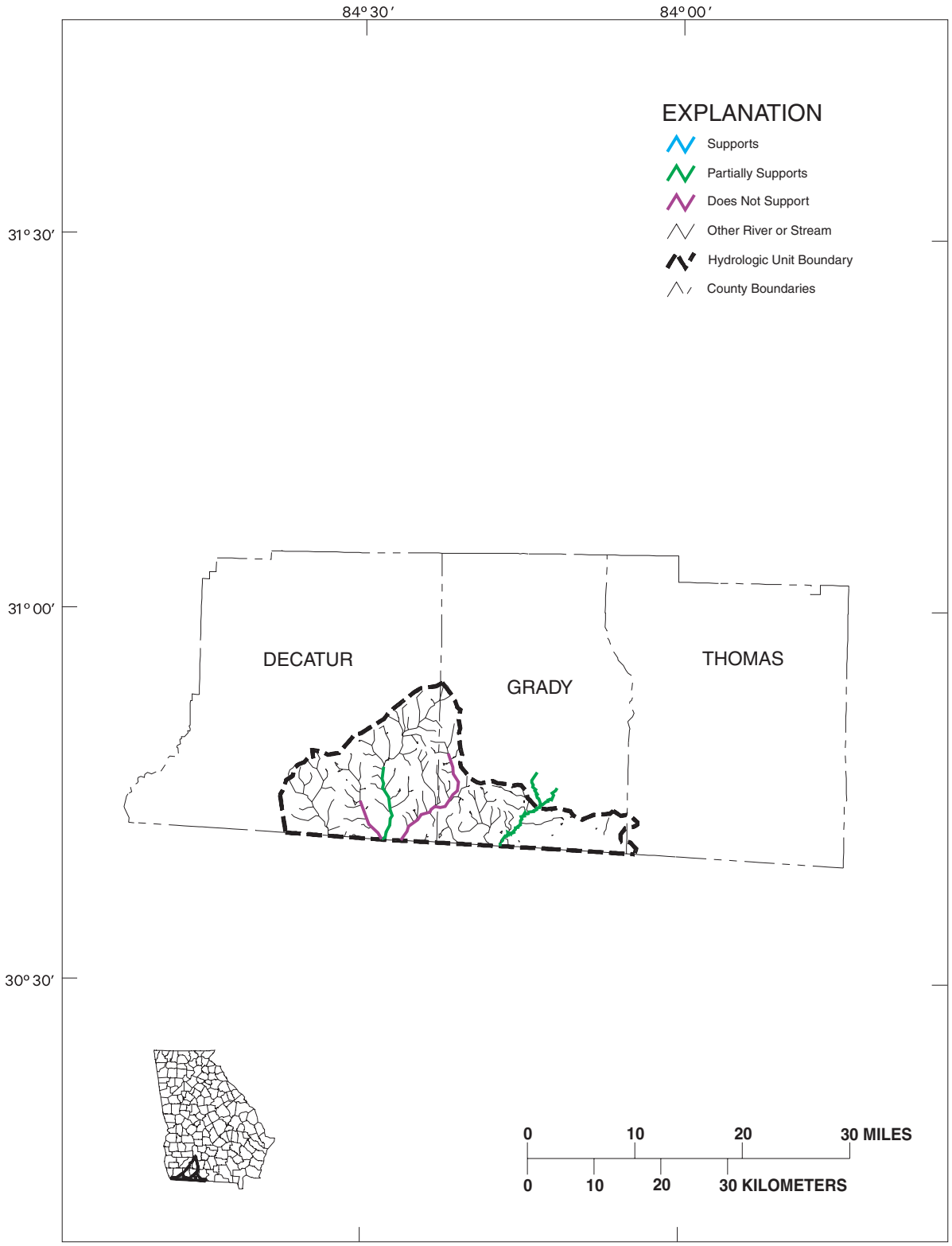


Figure 5-5. Assessment of Water Quality Use Support in the Ochlockonee River Basin, HUC 03120003

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in one tributary stream segment and one Aucilla River mainstem segment due to dissolved oxygen concentrations less than standards. Low dissolved concentrations were attributed to nonpoint sources or urban runoff. Dissolved oxygen may be lower in this area due to natural conditions.

Ochlockonee River Subbasin (HUC 03120001)

Appendix E summarizes the determination of support for designated uses of all assessed rivers and streams within this hydrologic unit (GA DNR, 2000).

Monitoring data was collected from one monitoring station located within this subbasin during the 1998. Historically, no trend monitoring stations were sampled within this subbasin. The following assessment is based on data from these monitoring stations.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in one Wards Creek mainstem segment due to dissolved oxygen concentrations less than standards. Low dissolved concentrations were attributed to nonpoint sources. Dissolved oxygen may be lower in this area due to natural conditions.

Ochlockonee River Subbasin (HUC 03120002)

Appendix E summarizes the determination of support for designated uses of all assessed rivers and streams within this hydrologic unit (GA DNR, 2000).

Monitoring data was collected from twenty monitoring stations located within this subbasin during 1998. Historically, one trend monitoring station has been sampled within this subbasin. The following assessment is based on data from these monitoring stations.

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in ten tributary stream segments and two Ochlockonee River mainstem 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 Ochlockonee River mainstem segments based on fish consumption guidelines due to mercury. The guidelines are for largemouth bass and white catfish.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in eleven tributaries and four Ochlockonee River mainstem segments due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations were attributed to nonpoint sources or urban runoff. Dissolved oxygen may be lower in these areas due to natural conditions.

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 no stream segments listed at this time in this

subbasin as not fully supporting designated water uses due to poor fish communities or sedimentation.

Ochlockonee River Subbasin (HUC 03120003)

Appendix E summarizes the determination of support for designated uses of all assessed rivers and streams within this hydrologic unit (GA DNR, 2000).

Monitoring data was collected from four monitoring stations located within this subbasin during 1998. Historically, one trend monitoring station was sampled within this subbasin. The following assessment is based on data from these monitoring stations.

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in 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 Ochlockonee River mainstem segment based on fish consumption guidelines due to mercury. The guidelines are for largemouth bass and spotted sucker.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in one tributary due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations were attributed to nonpoint sources. Dissolved oxygen may be lower in these areas due to natural conditions.

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 no stream segments listed at this time in this subbasin as not fully supporting designated water use due to poor fish communities or sedimentation.

References

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

Georgia Environmental Protection Division 1987. Water Availability and Use Report, Coastal Plain River Basins.

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 Ochlockonee 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 2000 305(b)/303(d) List as contributor to nonsupporting or partial supporting status was low dissolved oxygen followed by fecal coliform bacteria and fish consumption guidelines. Low dissolved oxygen conditions have been documented for many years in the waters of the Ochlockonee River and this situation is likely due primarily to natural conditions. Fish consumption issues are associated primarily with mercury as a result of air deposition and possibly naturally occurring sources and fecal coliform is associated primarily with urban runoff or nonpoint sources.

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 basin-wide 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, basin-wide management strategies will be needed.

Major water quality and quantity concerns for the Ochlockonee 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 Ochlockonee River Basin

Stressors of Concern	Potential Source of the Stressor by HUC			
	HUC 03110103	HUC 03120001	HUC 03120002	HUC 03120003
Fecal Coliform Bacteria	Multiple source potential		Multiple source potential	Multiple source potential
Erosion and Sedimentation			Urban and Rural NPS	Agricultural NPS
Dissolved Oxygen	Urban and Rural NPS	Urban and Rural NPS	Urban and Rural NPS	Urban and Rural NPS
Fish Consumption Guidelines			Nonpoint mercury	Nonpoint mercury
Drought Conditions (Gulf Coastal Plain Region)	Lack of Rainfall	Lack of Rainfall	Lack of Rainfall	Lack of Rainfall
Widespread Flooding	Heavy Rainfall	Heavy Rainfall	Heavy Rainfall	Heavy Rainfall

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

Use Classification of Waterbody Segments	Pollutants Causing Impairments by HUC			
	HUC 03110103	HUC 03120001	HUC 03120002	HUC 03120003
Fishing (Support for Aquatic Life)	DO, Fecal Coliform	DO	DO, Fecal Coliform	DO, Fecal Coliform
Fishing (Fish Consumption)			Mercury	Mercury
Drinking Water				

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, 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

Ochlockonee River Subbasin (HUC 03110103)

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in one tributary stream segment and one Aucilla River mainstem segment 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.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in one tributary stream segment and one Aucilla River mainstem segment due to dissolved oxygen concentrations less than standards. Low dissolved concentrations were attributed to nonpoint sources or urban runoff. Dissolved oxygen may be lower in this area due to natural conditions.

Drought Conditions

Severe drought conditions during the 1998-2000 period significantly impacted the southwest region of the state, which includes the Chattahoochee, Flint, Ochlockonee, and Suwanne River basins. According to EPD's "1998-2000 Georgia Drought Report," the rainfall shortage in this region amounted to almost 23 inches. The report provides a summary of the environmental, economic, and social impacts of the drought and an objective assessment of the state's vulnerability and mitigation efforts. In addition, the report evaluates the management actions implemented by state and local authorities during the drought and presents a set of recommendations for improving drought preparedness and response.

Flooding

In March 1998, Georgia experienced widespread flooding due to heavy rainfall. The severity of the rain and the damages that resulted from flooding caused more than 65 percent of Georgia's counties to be declared federal disaster areas under Presidential Disaster Declaration 1209. Among the counties in this basin that were designated federal disaster areas are Decatur, Grady, Mitchell, Thomas, and Worth. Before 1998, the last major flooding event occurred in July 1994, when tropical storm Alberto moved into southwest Georgia and caused the worst flooding in the State's history. In some parts of Georgia, the rainfall total was up to 27 inches.

Ochlockonee River Subbasin (HUC 03120001)

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in one Wards Creek mainstem segment due to dissolved oxygen concentrations less than standards. Low dissolved concentrations were attributed to nonpoint sources. Dissolved oxygen may be lower in this area due to natural conditions.

Drought Conditions

Severe drought conditions during the 1998-2000 period significantly impacted the southwest region of the state, which includes the Chattahoochee, Flint, Ochlockonee, and Suwanne River basins. According to EPD's "1998-2000 Georgia Drought Report," the rainfall shortage in this region amounted to almost 23 inches. The report provides a summary of the environmental, economic, and social impacts of the drought and an objective assessment of the state's vulnerability and mitigation efforts. In addition, the report evaluates the management actions implemented by state and local authorities during the drought and presents a set of recommendations for improving drought preparedness and response.

Flooding

In March 1998, Georgia experienced widespread flooding due to heavy rainfall. The severity of the rain and the damages that resulted from flooding caused more than 65 percent of Georgia's counties to be declared federal disaster areas under Presidential Disaster Declaration 1209. Among the counties in this basin that were designated federal disaster areas are Decatur, Grady, Mitchell, Thomas, and Worth. Before 1998, the last major flooding event occurred in July 1994, when tropical storm Alberto moved into

southwest Georgia and caused the worst flooding in the State's history. In some parts of Georgia, the rainfall total was up to 27 inches.

Ochlockonee River Subbasin (HUC 03120002)

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in ten tributary stream segments and two Ochlockonee River mainstem 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 Ochlockonee River mainstem segments based on fish consumption guidelines due to mercury. The guidelines are for largemouth bass and white catfish.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in eleven tributaries and four Ochlockonee River mainstem segments due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations were attributed to nonpoint sources or urban runoff. Dissolved oxygen may be lower in these areas due to natural conditions.

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 no stream segments listed at this time in this subbasin as not fully supporting designated water uses due to poor fish communities or sedimentation.

Flooding

In March 1998, Georgia experienced widespread flooding due to heavy rainfall. The severity of the rain and the damages that resulted from flooding caused more than 65 percent of Georgia's counties to be declared federal disaster areas under Presidential Disaster Declaration 1209. Among the counties in this basin that were designated federal disaster areas are Decatur, Grady, Mitchell, Thomas, and Worth. Before 1998, the last major flooding event occurred in July 1994, when tropical storm Alberto moved into southwest Georgia and caused the worst flooding in the State's history. In some parts of Georgia, the rainfall total was up to 27 inches.

Drought Conditions

Severe drought conditions during the 1998-2000 period significantly impacted the southwest region of the state, which includes the Chattahoochee, Flint, Ochlockonee, and Suwanne River basins. According to EPD's "1998-2000 Georgia Drought Report," the rainfall shortage in this region amounted to almost 23 inches. The report provides a summary of the environmental, economic and social impacts of the drought and an objective assessment of the state's vulnerability and mitigation efforts. In addition, the report evaluates the management actions implemented by state and local authorities during the drought and presents a set of recommendations for improving drought preparedness and response.

Ochlockonee River Subbasin (HUC 03120003)

Fecal Coliform Bacteria

The water use classification of fishing was not fully supported in 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 Ochlockonee River mainstem segment based on fish consumption guidelines due to mercury. The guidelines are for largemouth bass and spotted sucker.

Low Dissolved Oxygen

The water use classification of fishing was not fully supported in one tributary due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations were attributed to nonpoint sources. Dissolved oxygen may be lower in these areas due to natural conditions.

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 no stream segments listed at this time in this subbasin as not fully supporting designated water use due to poor fish communities or sedimentation.

Widespread Flooding

In March 1998, Georgia experienced widespread flooding due to heavy rainfall. The severity of the rain and the damages that resulted from flooding caused more than 65 percent of Georgia's counties to be declared federal disaster areas under Presidential Disaster Declaration 1209. Among the counties in this basin that were designated federal disaster areas are Decatur, Grady, Mitchell, Thomas, and Worth. Before 1998, the last major flooding event occurred in July 1994, when tropical storm Alberto moved into southwest Georgia and caused the worst flooding in the State's history.

Drought Conditions

Severe drought conditions during the 1998-2000 period significantly impacted the southwest region of he state which includes Chattahoochee, Flint, Ochlockonee, and Suwanne River basins. According to EPS's "1998-2000 Georgia Drought Report," the rainfall shortage in this region amounted to almost 23 inches. The report provides a summary of the environmental, economic and social impacts of the drought and an objective assessment of the state's vulnerability and mitigation efforts. In addition, the report evaluates the management actions implemented by state and local authorities during the drought and presents a set of recommendations for improving drought preparedness and response.

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 Ochlockonee 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 (2000) 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. These priorities were presented to and discussed with the local advisory committee in March 2000. The priorities were also public noticed and approved by the USEPA as part of the Georgia CWA 303(d) listing process in 2000 and discussed in the report, *Water Quality in Georgia, 1998-1999.*

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 which showed metals 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 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 Ochlockonee 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 2000 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 E).

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 fish consumption guidelines listings, and/or metal or fecal coliform bacteria standards violations. Waters added to the Georgia 303(d) list by EPA were also assigned to third priority. Within the current round of basin planning these sources will be addressed primarily through general strategies of encouraging best management practices for control of stressor loadings. In addition, additional work will be initiated to implement approved TMDLs on waters in this group. TMDLs have been completed on those waters in Appendix E that have a "3" in the column labeled 303(d).

Several issues helped forge the rationale for priorities. First, strategies are currently in place to address the significant water quality problems in the Ochlockonee River basin and significant resources will be required to ensure that these actions are completed. Second, the vast majority of waters for which no control strategy is currently in place are listed due to fish consumption guidelines or as a result of exceedance of fecal coliform bacteria due to urban runoff or nonpoint. At the present time, the efficacy of the standards for fecal coliform bacteria standard are in question in the scientific community, as described in Section 4.2. Also, there is no national strategy in place to address air

deposition of mercury which is thought to cause the mercury which contributes to the fish tissue guidance listings.

6.2.2 General Long-Term Priorities for Water Quality Concerns

Long-term priorities for water quality management in the Ochlockonee 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 significantly impacted the southwest region of the state which includes the Suwannee 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.
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.

6.3.1 Priorities for Competing Demands

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

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

In This Section

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

Section 7

Implementation Strategies

This section builds on the priority issues identified in Section 6 and proposes strategies to address the major water quality problems in the Ochlockonee 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 Ochlockonee 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 Ochlockonee River basin. Section 7.2 describes the general and basinwide implementation strategies most relevant to the Ochlockonee 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 Ochlockonee River Basin

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

- Protecting water quality in lakes, rivers, streams, and coastal waters 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.

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 Ochlockonee 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 Ochlockonee River basin.

7.1.1 Water Quality Overview

As discussed in Section 5, water quality in the Ochlockonee 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 twenty 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 Ochlockonee River basin results from nonpoint sources. Key types of nonpoint source pollution impairing or potentially threatening water quality in the Ochlockonee River basin include erosion and sedimentation, bacteria and oxygen demanding substances from urban and rural nonpoint sources, metals from urban 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 Ochlockonee River basin, yet growth without proper land use planning and implementation of best management practices to protect streams and rivers can create harmful impacts on the environment.

Because there are so many small sources of nonpoint loading spread throughout the watershed, nonpoint sources of pollution cannot effectively be controlled by state agency permitting and enforcement, even where regulatory authority exists. Rather, control of nonpoint loading will require the cooperative efforts of many partners, including state and federal agencies, individual landowners, agricultural and forestry interests, local county and municipal governments, and Regional Development Centers. A combination of regulatory and voluntary land management practices will be necessary to maintain and improve the water quality of rivers, streams, and lakes in the Ochlockonee 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 ground water 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 Ochlockonee 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 with a design flow greater than 0.5 million gallons per day, EPD requires a comprehensive watershed assessment and development of a watershed protection implementation 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 implementation 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 in a two year period, a TMDL will be established for a specific pollutant on the specific stream segment in accordance with EPA guidance. The TMDL will specify the allowable loading of a pollutant from both point and nonpoint sources. EPD will implement TMDLs through a watershed approach using a combination of regulatory and non-regulatory tools.
- **Source Water Protection.** The public water supply in the Ochlockonee basin is drawn from surface and groundwater. To provide for the protection of public water supplies, Georgia EPD developed a Source Water Assessment Program in alignment with the 1996 amendments to the Safe Drinking Water Act and corresponding recent EPA initiatives. This new initiative will result in assessments

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

Forestry is a major part of the economy in the Ochlockonee basin. The Georgia Forestry Commission (GFC) is the lead agency for controlling silvicultural nonpoint source pollution. The GFC develops forestry practice guidelines, encourages BMP implementation, conducts education, investigates and mediates complaints involving forestry operations, and conducts BMP compliance surveys. Recently, 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 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.

7.1.2 Water Quantity Overview

In addition to protecting water quality, it is essential to plan for water supply in the Ochlockonee River basin. The Georgia EPD Water Resources Branch regulates the use of Georgia's surface and ground water 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 May 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.

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 Ochlockonee basin. These general strategies are applicable throughout the basin to address both point and nonpoint source controls.

7.2.1 General Surface Water Protection Strategies

Antidegradation

The State of Georgia considers all waters of the state as high quality and applies a stringent level of protection for each waterbody. Georgia Rules and Regulations for Water Quality Control, Chapter 391-3-6-03(2)(b) contains specific antidegradation provisions as follows:

> (b) Those waters in the State whose existing quality is better than the minimum levels established in standards on the date standards become effective will be maintained at high quality; with the State having the power to authorize new developments, when it has been affirmatively demonstrated to the State that a change is justifiable to provide necessary social or economic development and

provided further that the level of treatment required is the highest and best practicable under existing technology to protect existing beneficial water uses. Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. All requirements in the Federal Regulations, 40 C.F.R. 131.12, will be achieved before lowering of water quality is allowed for high quality water.

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

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

Water Supply Watershed Protection Strategy

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

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

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

- An intake on a flowing stream (as opposed to being located within a reservoir) shall have no specified minimum criteria; and
- An intake with a water supply reservoir shall have a minimum of 100 feet natural buffer within a seven mile radius of the reservoir, and no impervious cover constructed within a 150 foot setback area on both banks of the stream.

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

goal by developing and implementing a source water assessment program (SWAP) in alignment with EPA's initiatives.

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 systems. EPD has given the Drinking Water Program (DWP) 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 2000. Georgia public noticed and submitted a draft 303(d) list package to the EPA in February 2000. The public and EPA reviewed the draft 303(d) list package and provided comments in March 2000. Georgia reviewed the input, made appropriate changes and submitted a final 303(d) listing to the EPA in April 2000. EPA approved the Georgia list in August 2000.

Georgia's 2000 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, 1998-1999*. The 305(b) assessment tables are reprinted in Appendix E of this report. The tables provide a code indicating the 303(d) listing status of assessed segments within the Ochlockonee River basin. An explanation of the codes is given below. An "X" in the 303(d) column indicates the segment is on the Georgia 303(d) list.

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 were completed and approved by EPA in 1998-2001. 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.

Georgia and/or EPA developed and publicly noticed TMDLs for all listed waters in the Ochlockonee River basin in 2000. Each of the TMDLs was finalized and approved by the EPA in 2001. The TMDLs are incorporated herein by reference. The TMDLs are too

voluminous to be attached, however, copies of any or all of the TMDLs adopted by reference may be obtained by contracting the Water Protection Branch.

7.2.2 Management of Permitted Point Sources

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

Analysis of Alternatives

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

Permit Issuance/Reissuance Strategies

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

Watershed Assessment Requirements

A watershed assessment is generally initiated when, due to growth and development, a local government sees a need to increase the hydraulic capacity of an existing wastewater treatment facility (or propose a new facility) and contacts the 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 are and will continue to be maintained, can the EPD develop a wasteload allocation and prepare a defensible permit for a proposed new wastewater treatment facility or proposed hydraulic expansion of an existing wastewater treatment facility discharging to the watershed. 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 ten years, various upgrades and improvements have been made to industrial and municipal treatment systems throughout the Ochlockonee River Basin. The funding for these projects has come from state and federal construction grants and loans and the citizens of local municipalities. Appendix C provides detailed information on expenditures by city and county governments on upgrading wastewater treatment facilities in the basin.

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 take place.

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

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

Chlorine

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

Ammonia

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

Metals/Priority Pollutants/Aquatic Toxicity

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

Color

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

Phosphorus

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

Temperature

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

Storm Water Permitting

The 1987 Amendments to the federal Clean Water Act require permits to be issued for certain types of discharges, with primary focus on runoff from industrial operations and large urban areas. The EPA promulgated Storm Water Regulations on November 16, 1990. EPD subsequently received delegation from the EPA in January 1991 to issue General Permits and regulate storm water in Georgia. EPD has developed and implemented a strategy which assures compliance with the federal regulations.

The “Phase I” 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. Accordingly, 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. These permits authorize the municipalities to discharge storm water from the MS4s which they own or operate, and incorporate detailed storm water management programs. These programs may include such measures as structural and non-structural controls, best management practices, inspections, enforcement and public education efforts. Storm water management ordinances, erosion and sediment control ordinances, development regulations and other local regulations provide the necessary legal authority to implement the storm water management programs. Illicit discharge detection and long-term wet weather sampling plans are also included in the management programs. The permit requires the submission of Annual Reports to EPD, describing the implementation of the

storm water management program. Among other things, the Annual Report includes a detailed description of the municipality's implementation of its Storm Water Management Plan.

EPA's Phase I Rule addresses only municipalities with populations greater than 100,000 people and construction sites larger than five acres. EPA is proposing a Phase II Rule for municipalities with populations less than 100,000 people and construction sites smaller than five acres. This rule is not expected to be finalized until at least March, 1999. The Phase II Rule will eventually impact some of the municipalities within the basin.

EPD has issued one general permit regulating storm water discharges for 10 of 11 federally regulated industrial subcategories defined in the Phase I Federal regulations. The eleventh subcategory, construction activities, will be covered under a separate general permit, which is not yet finalized. The general permit for industrial activities requires the submission of a Notice of Intent (NOI) for coverage under the general permit, the preparation and implementation of a storm water pollution prevention plan, and in some cases, the monitoring of storm water discharges from the facility. As with the municipal storm water permits, implementation of site-specific best management practices is the preferred method for controlling storm water runoff.

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 U.S. Environmental Protection Agency in September 2000. This revision was intended to satisfy the requirements for funding under Section 319(b) of the Clean Water Act of 1987 and to delineate short- and long-term goals and implementation strategies. Just as important, it was designed to be an information resource for the wide range of stakeholders across the State who are involved in the prevention, control and abatement of nonpoint sources of pollution. It has been developed as an inventory of the full breadth of nonpoint source management (regulatory and non-regulatory) in Georgia, including activities which are currently underway or planned for in the time period FFY 2000 through FFY 2004.

The State's *Nonpoint Source Management Program* focuses on the comprehensive categories of nonpoint sources of pollution identified by the U.S. Environmental Protection Agency: Agriculture, Silviculture, Construction, Urban Runoff, Resource

Extraction, Land Disposal, Hydrologic/Habitat Modification and Other Nonpoint Sources. The Georgia Environmental Protection Division solicited participation from State and Federal agencies, local and regional governments, State colleges and universities, businesses and industries, and nonprofit organizations with significant programs directed towards nonpoint source management. The State's *Nonpoint Source Management Program* comprehensively describes a framework for stakeholder coordination and cooperation and serves to implement a strategy for employing effective management measures and programs to control nonpoint source pollution statewide.

Agricultural Nonpoint Source Control Strategies

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

Soil and Water Conservation Districts (SWCDs)

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

Georgia Soil and Water Conservation Commission (GSWCC)

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

There are a number of other agricultural agencies administering programs to address water quality and natural resource management issues. Resource Conservation and Development (RC&D) Councils are organized groups of local citizens supported by 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 over the next five years until the second iteration of the River Basin Management Planning Cycle. Much of the information regarding opportunities to participate under this voluntary approach to complying with water quality standards is disseminated through commodity commissions and organizations such as the Farm Bureau Federation, Agribusiness Council, Cattlemen's Association, Milk Producers Association, Pork Producers Association, Poultry Federation, and other agricultural support industries.

Prioritization Activities under the Farm Bill

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

EQIP provides incentive payments and cost-sharing for conservation practices through 5 to10 year contracts. Producers may receive federal cost-sharing up to 75 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 a $50,000 in EQIP funds to implement needed conservation practices.

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

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

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

Forestry Nonpoint Source Control Strategies

In 1977, the Governor's Silviculture Task Force prepared a report which recommended a voluntary approach to the implementation of best management practices (BMPs) and the designation of the Georgia Forestry Commission (GFC) as the lead

agency for implementing the Silviculture portion of the State Section 208 Water Quality Management Plan. The GFC was designated as the lead agency for silvicultural nonpoint source pollution prevention in the state in November, 1979. The Forestry Nonpoint Source Control Program is managed and implemented by the GFC, with the support of the forest industry, for the voluntary implementation of best management practices.

The 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). The GFC investigates and mediates complaints involving forestry operations. In addition, the GFC conducts BMP compliance surveys to assess the effectiveness of BMP in the forest community. The GFC has established procedures for installing water control structures in firebreaks to reduce soil erosion and sedimentation.

Recently, 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.

Additional requirements are imposed within the National Forest areas of Georgia. Each National Forest produces and regularly updates and 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.

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 non-point 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 below in Section 7.3.6.
- Identify and evaluate resources to support urban watershed planning and management.

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

River Care 2000 Program

Georgia also has strategies to protect and manage riparian floodplain areas. Of particular relevance is River Care 2000, a conservation program which Governor Miller established in September 1995. One key objective of this program is acquisition of river-corridor lands for purposes of protection and to forestall unwise development in flood-prone areas. The Coordinating Committee has approved procedures for three types of

projects: Riverway Demonstration Projects, which improve public access to a river with scenic and recreation uses, and 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 state-wide 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. We still suffer from the 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 precolonial wetland acreage of any southeastern state.

Efforts to Track No Net Loss of Wetlands

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

All dredge and fill activities in freshwater wetlands are regulated in Georgia by the U.S. Army Corps of Engineers (COE) under Section 404 of the Clean Water Act. The majority of wetland alterations occur under nationwide or general permits, which include permits for bridge building, minor road crossing fills, and fills of less than ten acres above the “headwaters” point of non-tidal streams where the annual average flow is less than 5 cubic feet per second. Enforcement is carried out by the COE and EPA in freshwater wetlands. Normal agricultural and silvicultural operations are exempted under Section 404 regulations.

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

Land Acquisition

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

Beginning in 1990 Governor Zell Miller initiated Preservation 2000, a $60 million program to acquire 100,000 acres of lands to be used for wildlife and fisheries management, parks and recreation, natural area preservation, and general conservation.

Additional wetlands acquisition occurs as part of the River Care 2000 initiative, discussed above.

7.2.6 Stakeholder Involvement/Stewardship Strategies

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

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

General goals for stakeholder involvement and stewardship strategies are:

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

Georgia Adopt-A-Stream

The *Georgia Adopt-A-Stream Program* is a citizen monitoring and stream protection program with two staff positions in the Georgia EPD and five Regional Training Centers. The Regional Training Centers are a network of college-based training centers located in Americus, Columbus, Milledgeville, Savannah, and Valdosta, Georgia. 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: (1) increase individual's awareness of how they contribute to nonpoint source pollution problems, (2) generate local support for nonpoint source management through public involvement and monitoring of waterbodies, and (3) provide educational resources and technical assistance for addressing nonpoint source pollution problems statewide.

Currently, more than 10,000 volunteers participate in 200 individual and 45 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 235 sites throughout the State. These activities lead to a greater awareness of water quality and nonpoint source pollution, active cooperation between the public and local governments in protecting water resources, and the

collection of basic water quality data. The Georgia Adopt-A-Stream Program focuses on what individuals and communities can do to protect from nonpoint sources of pollution.

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

In addition, the *Georgia Adopt-A-Stream Program* and *Keep Georgia Beautiful Program* coordinate *Rivers Alive*, Georgia's annual volunteer river cleanup event held throughout the month of October that targets the cleanup 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 2000 included 85 local cleanup events and attracted more than 14,000 volunteers statewide. During October 2000, volunteers worked over 68,000 hours to remove more than 182,000 pounds of trash and garbage from 332 miles of the State's waterways. Previous river cleanup events in Georgia have been successful but pale in comparison to the success that has been achieved by *Rivers Alive 2000*.

The goals for *Rivers Alive 2001* are to have at least 16,000 volunteers with at least 100 local events statewide. These goals represent increased efforts that will result in cleaner waters in the State. Organizers and volunteers receive free t-shirts, watershed posters and signs, press releases and public service announcements. Additional information about *Rivers Alive 2001* is available on the website, 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 3000 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, 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, tech.ncdiscovery.org/ee/aas.htm.

In March 2001, the Georgia Adopt-A-Stream Program partnered with the Environmental Education Alliance of Georgia to conduct an annual conference and awards ceremony. The 2001 conference, *Georgia Environment – Reaching and Teaching Communities*, was held in Columbus, Georgia with over 200 participants.

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. Given the limited resources and the scope of efforts required to target each of these audiences concurrently, statewide nonpoint source education and outreach programs have been limited to the Georgia Adopt-A-Stream and Project WET Programs.

In October 1996, the Georgia EPD selected Project WET (Water Education for Teachers) curriculum 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 (K-12) ready teaching aids.

The success of the Georgia Project WET Program has been phenomenal. Since 1997, several Project WET facilitator training workshops have been successfully completed in Athens, Atlanta, Dahlonega, Macon, Savannah and Warner Robbins with over 200 Project WET facilitators trained statewide. In addition, 220 Project WET educator workshops have been completed in Georgia with more than 4000 formal and non-formal educators implementing the Project WET curriculum in Georgia with a substantial number of students—over 600,000 students annually!

The University of Georgia, Oglethorpe University, Georgia College and State University, North Georgia College and State University, Georgia Southern University and Kennesaw State University have successfully conducted numerous Project WET educator workshops for university pre-service classes with more than 700 education students certified as Project WET educators. Currently, there are 20 Project WET facilitators with over 325 educators having received certified Project WET training in the Ochlockonee and Suwannee River Basins.

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 ground waters, scripted theatrical performances and costumes for *Mama Bass and the Mudsliders*, and promotional and instructional training videos. In addition, the *Dragonfly Gazette*, a quarterly newsletter, and the *Georgia River of Words Art and Poetry Journal* are published and distributed to over 3000 educators statewide and nationally.

The Georgia Project WET Program has been nationally recognized as a model program for its training strengths and techniques—specifically, the use of arts in environmental education. The Georgia Project WET Program offers 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.

Over 20,000 entries were submitted to the *River of Words 2001* contest—three out of the eight National Grand Prize Winners selected in April 2001 were from Georgia! Since 1997, eight students from Georgia have been recognized as National Grand Prize Winners and an additional 60 students have been selected as National Finalists and Merit Winners.

The students' original art and poetry have been returned from the international competition and is currently on display in the *Georgia River of Words Exhibition*. The Georgia Project WET Program offers a guidebook for teachers with specific information about Georgia's watersheds. In addition, several nature centers throughout Georgia offer *River of Words* field trips for students and teachers.

7.2.7 Ground Water Protection Strategies

In 1984, EPD developed its first management plan to guide the management and protection of Georgia's ground water quantity and quality. The current version, Georgia Geologic Survey Circular 11, published in 1996, is the basis of Georgia's application to be certified by U.S. EPA for a Comprehensive State Ground Water Protection Plan (CSGWPP). The goal of Georgia's ground water 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 ground water is of the same value. The Division's goal is primarily preventive, rather than curative; but it recognizes that nearly all ground water 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 ground water 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 ground water from being significantly polluted and to clean-up ground water in the unlikely event pollution were to occur. Extensive monitoring has shown that incidents of ground water pollution or contamination are uncommon in Georgia; no part of the population is known to be at risk.

In general, the prevention of ground water 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 ground water contamination and the need for ground water protection.

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

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

- Storage/concentration/burial of radioactive wastes.
- Underground storage tanks.

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

Additionally, EPD has legal authority under the Georgia Water Quality Control Act to clean up ground water 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 ground water 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 Ochlockonee 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 basin-wide scale, locally-led efforts in the subbasins will be required to help to monitor, assess, restore, and maintain water quality throughout the Ochlockonee River basin.

7.3.1 Low Dissolved Oxygen

Problem Statement

Water use classification for fishing were not fully supported in several 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.

Ochlockonee River Subbasin (HUC 03110103)

The water use classification of fishing was not fully supported in one tributary stream segment and one Aucilla River mainstem segment due to dissolved oxygen concentrations less than standards. Low dissolved concentrations were attributed to nonpoint sources or urban runoff. Dissolved oxygen may be lower in this area due to natural conditions.

Ochlockonee River Subbasin (HUC 03120001)

The water use classification of fishing was not fully supported in one Wards Creek mainstem segment due to dissolved oxygen concentrations less than standards. Low dissolved concentrations were attributed to nonpoint sources. Dissolved oxygen may be lower in this area due to natural conditions.

Ochlockonee River Subbasin (HUC 03120002)

The water use classification of fishing was not fully supported in eleven tributaries and four Ochlockonee River mainstem segments due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations were attributed to nonpoint sources or urban runoff. Dissolved oxygen may be lower in these areas due to natural conditions.

Ochlockonee River Subbasin (HUC 03120003)

The water use classification of fishing was not fully supported in one tributary due to dissolved oxygen concentrations less than standards. Low dissolved oxygen concentrations were attributed to nonpoint sources. Dissolved oxygen may be lower in these areas due to natural conditions.

General Goals

Meet water quality standards to support designated water uses.

Ongoing Efforts

The Ochlockonee River is a Priority Area for USDA Cost-Share funds to implement agricultural BMPs through NRCS's EQIP Program. 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.

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 identify and characterize natural background dissolved oxygen concentrations in this area.

General Strategies for Action

Low dissolved oxygen concentrations in the various streams in the Ochlockonee River Basin were due to nonpoint sources and/or natural environmental conditions. EPD will address Nonpoint sources through a watershed protection strategy for the basin.

Specific Management Objectives

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

Action Plan

- EPD: monitor and assess use support in the listed waters and develop a watershed strategy for addressing nonpoint sources.

- Local governments will implement storm water management strategies and manage operations of water pollution control plants.
- 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.

Methods for Tracking Performance

A reevaluation of the status of the listed waterbodies will be made coincident with the next iteration of the RBMP management cycle for the Ochlockonee River basin in 2002-2006.

7.3.2 Fecal Coliform Bacteria

Problem Statement

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

Ochlockonee River Subbasin (HUC 03110103)

The water use classification of fishing was not fully supported in one tributary stream segment and one Aucilla River mainstem segment 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.

Ochlockonee River Subbasin (HUC 03120002)

The water use classification of fishing was not fully supported in ten tributary stream segments and two Ochlockonee River mainstem 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.

Ochlockonee River Subbasin (HUC 03120003)

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

General Goals

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

Ongoing Efforts

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 storm water discharges through the National Pollutant Discharge Elimination System (NPDES) permitting process. Sanitary sewer overflows are managed through EPD's Permitting Compliance and Enforcement Program. Animal wastes in Georgia are addressed through the Memorandum of Agreement (MOA) with NRCS and SWCC and through recently adopted rules designed to regulate Concentrated Animal Feeding Operations (CAFOs) for swine. This includes a requirement for certain operations to obtain individual NPDES permits. TMDLs were completed for each stream segment in 2001. TMDL implementation plans will be developed in 2002.

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 will be to make recommendations to the department regarding the approval of new systems, assist the Department with the development and revision of standards and guidelines for new technology, assist with the adoption of periodic updates to the Manual for On-Site Sewage Management Systems, and serve as the final authority in contested interpretation issues regarding the Rules and the Manual for On-site Sewage Management Systems.

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

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. Previous sampling was not conducted at a sufficient frequency to determine whether the monthly geometric mean criterion specified in the standard has actually been violated. Thus, an initial effort in the

next RBMP cycle may be to continue to collect an adequate number of samples (four over a 30-day period) to support geometric mean calculations to determine if water quality standards are actually being exceeded.

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 and cost share dollars (Farm Bill), grants (Section 319) and should be concentrated in priority watersheds with sufficient technical workforce to implement BMPs through long term agreements or contracts to reduce sediment 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 basin-wide 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 2006 in accordance with the statewide RBMP management cycle. In addition, the EPD and EPA have developed TMDLs for 303(d) listed streams in the Ochlockonee River Basin. EPD will, along with partner agencies such as local governments, NRCS, GSWCC, GFC, be implementing the TMDLs.

Specific Management Objectives

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

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

Management Option Evaluation

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

Action Plan

TMDLs were completed for each stream segment in 2001. TMDL implementation plans will be completed in 2002.

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

EPD will continue to administer the NPDES and Permitting and Compliance and Enforcement (PCEP) Programs and encourage local planning to address management on a basin-wide scale. EPD will implement approved TMDLs.

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 Ochlockonee River basin in 2006.

B. General Strategies for Rural Sources

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

Specific Management Objectives

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

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

Management Option Evaluation

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

Action Plan

EPD will assess use support in 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 monitoring and assessment of Land Application Systems. EPD will implement approved TMDLs. TMDLs were completed for each stream segment in 2001. TMDL implementation plans will be developed in 2002.

GSWCC and local SWCDs and RC&D councils, with assistance from NRCS, will continue to support adoption of BMPs for animal waste handling and will follow up on

complaints related to fecal coliform bacteria associated with agriculture. Methods for prioritization and implementation of cost-share incentives under the 1996 Farm Bill will be targeted to areas of apparent water quality impact, including rural streams which may contain excessive fecal coliform loads from animal and cropland operations.

Local SWCDs will convene Local Work Groups to identify 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 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 Ogeechee River basin in 2002-2006.

7.3.3 Fish Consumption Guidelines

Problem Statement

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

Ochlockonee River Subbasin (HUC 03120002)

The water use classification of fishing was not fully supported in two Ochlockonee River mainstem segments based on fish consumption guidelines due to mercury. The guidelines are for largemouth bass and white catfish.

Ochlockonee River Subbasin (HUC 03120003)

The water use classification of fishing was not fully supported in one Ochlockonee River mainstem segment based on fish consumption guidelines due to mercury. The guidelines are for largemouth bass and spotted sucker.

General Goals

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

Ongoing Efforts

DNR has monitored fish and issued fish consumption guidelines. There are no known point source discharges or other identifiable anthropogenic sources of mercury in the Ochlockonee River Basin watersheds. Ongoing efforts will focus on continued monitoring of residue levels and issuance of updated consumption guidelines. TMDLs

were completed for each stream in 2001. TMDL implementation plans will be developed in 2002.

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

Identified Gaps and Needs

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

General Strategies for Action

Because mercury and dieldrin 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. The next round of fish tissue sampling for this watershed will be considered in fiscal year 2003 in accordance with the river basin monitoring cycle.
- EPD will evaluate the need for additional sampling of different media (fish tissue, water and/or sediment), if localized anthropogenic sources are indicated.

Method of Tracking Performance

Trends in fish tissue concentration; number of Fish Consumption Guidelines.

7.3.4 Erosion and Sedimentation

Problem Statement

Water use classifications for fishing and/or recreation 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. Potential threats from sediment loading are possible throughout the Ochlockonee River Basin, although there are no stream segments listed at this time in the basin as not fully supporting designated water 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.

Aucilla River Subbasin (HUC 03110103)

The 1992 Georgia Forestry Commission (GFC) compliance survey examined 1 site involving 450 acres in this subbasin. The site was evaluated on private land and overall, 97 percent of harvested acres and 97 percent of main haul road miles were in compliance with BMPs. No site-prepared acres or regenerated acres were evaluated.

There were no sites evaluated in this subbasin during the 1998 BMP survey.

Forestry BMP education is being targeted toward foresters, timber buyers, and loggers in the area to increase compliance. From December 1995 through December 2000, approximately 21 personnel affiliated with timber buyers and loggers living within the Aucilla River Basin have completed the three day Master Timber Harvester Workshop. BMP training was conducted by the GFC.

Another statewide BMP survey is scheduled for calendar year 2001.

Wards Creek Subbasin (HUC 03120001)

The 1992 Georgia Forestry Commission (GFC) compliance survey examined 2 sites involving 765 acres in this subbasin. Both sites each were evaluated on private lands. Overall, 97 percent of harvested acres and 97 percent of main haul road miles were in compliance with BMPs. No site-prepared acres or regenerated acres were evaluated.

There were no sites evaluated in this subbasin during the 1998 BMP survey.

Forestry BMP education is being targeted toward foresters, timber buyers, and loggers in the area to increase compliance. From December 1995 through December 2000, approximately 18 personnel affiliated with timber buyers and loggers living within the Wards Creek Basin have completed the three day Master Timber Harvester Workshop. BMP training was conducted by the GFC.

Another statewide BMP survey is scheduled for calendar year 2001.

Upper Ochlockonee River Subbasin (HUC 03120002)

The 1992 Georgia Forestry Commission (GFC) compliance survey examined 6 sites involving 1,211 acres in this subbasin. All six sites were evaluated on private lands. Overall, 99 percent of harvested acres and 100 percent of main haul road miles were in compliance with BMPs. No site-prepared acres or regenerated acres were evaluated.

The 1998 compliance survey evaluated 7 sites involving 162 acres. The percentage of applicable BMPs implemented was 80 percent and the percentage of acres in compliance with BMPs was 97 percent. The results for the following practices are as follows:

Streamside Management Zones: Approximately 9.96 acres of SMZs were evaluated on 5 sites. The percentage of applicable BMPs implemented was 68 percent and the percentage of acres in compliance was 60 percent. Most noted problems involved roads or main skid trails within the SMZ, excessive soil disturbance, and logging debris left in streams.

Stream Crossings: Nine stream crossings were evaluated on two sites. The percentage of applicable BMPs implemented was 20 percent and the percentage of actual crossings in compliance with BMPs was 0 percent. Most noted problems involved random crossings, skidders using fords in streams for crossings, steep approaches to streams, and the use of debris and dirt as a type of crossing and then not removing it when the job was finished.

Main Haul Roads: Approximately 1.62 miles of main haul roads were evaluated on the 7 sites. The percentage of applicable BMPs implemented was 94 percent and the percentage of actual miles in compliance with the BMPs was 99 percent. Roads were well

drained with diversions and reshaped and stabilized on 85 percent of the sites. All other BMPs were fully implemented.

Timber Harvesting Outside the SMZ: Approximately 152.04 acres were evaluated on 9 sites. The percentage of applicable BMPs implemented was 94 percent and the percentage of acres in BMP compliance was 99 percent. The most noted problem involved the lack of installing water bars in skid trails and stabilizing them on rolling terrain.

No sites were evaluated for mechanical site preparation, chemical treatments, burning, or mechanical regeneration.

Forestry BMP education is being targeted toward foresters, timber buyers, and loggers in the area to increase compliance. From December 1995 through December 2000, approximately 79 personnel affiliated with timber buyers and loggers living within the Upper Ochlockonee River Basin have completed the three day Master Timber Harvester Workshop. BMP training was conducted by the GFC.

Another statewide BMP survey is scheduled for calendar year 2001.

Middle Ochlockonee River Subbasin (HUC 03120003)

The 1992 Georgia Forestry Commission (GFC) compliance survey examined 1 site involving 30 acres in this subbasin. The site was evaluated on private lands. Overall, 100 percent of harvested acres and 100 percent of main haul road miles were in compliance with BMPs. No sites were evaluated for site preparation or regeneration.

The 1998 compliance survey evaluated 2 sites involving 63 acres. The percentage of applicable BMPs implemented was 75 percent and the percentage of acres in compliance with BMPs was 100 percent. The results for the following practices are as follows:

Streamside Management Zones: There were no streams on the sites evaluated and therefore no SMZs.

Stream Crossings: Since there were no streams, there were no stream crossings.

Main Haul Roads: Approximately 0.75 miles of main haul roads were evaluated on the 2 sites. The percentage of applicable BMPs implemented was 64 percent and the percentage of actual miles in compliance with the BMPs was 93 percent. Excessive roads grades were identified on 1 of 2 sites and turnouts were needed in road ditches on 2 sites. Roads were well drained with diversions and reshaped and stabilized on 50 percent of the sites.

Timber Harvesting Outside the SMZ: Approximately 63 acres were evaluated on 2 sites. The percentage of applicable BMPs implemented was 93 percent and the percentage of acres in BMP compliance was 99 percent. The most noted problem involved the lack of installing water bars in skid trails and stabilizing them on one site

No sites were evaluated for mechanical site preparation, chemical treatments, burning, or mechanical regeneration.

Forestry BMP education is being targeted toward foresters, timber buyers, and loggers in the area to increase compliance. From December 1995 through December 2000, approximately 44 personnel affiliated with timber buyers and loggers living within the Middle Ochlockonee River Basin have completed the three day Master Timber Harvester Workshop. BMP training was conducted by the GFC.

Another statewide BMP survey is scheduled for calendar year 2001.

General Goals

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

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

Ongoing Efforts

Forestry and Agriculture both have voluntary E&SC programs built around implementation of BMPs and water complaint resolution procedures in place. GSWCC recently updated and is distributing the Manual for Erosion and Sediment Control in Georgia and the Field Manual for Erosion and Sediment Control in Georgia. The GSWCC, with its agricultural partners, has produced and distributed three E&SC pamphlets; "Guidelines for Streambank Restoration", "A Guide to Controlling Erosion with Vegetation", and "Agricultural Management Practices". These, along with a number 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 for increased BMP education throughout local talks, workshops, etc. The Georgia Forestry Association and the American Forest and Paper Association (AF&PA) 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. As they become standard within the industry, the new Forestry BMP Guidelines, printed in January, 1999, will result in additional sedimentation reductions with more riparian tree cover left over perennial and intermittent streams.

EPD 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. EPD is also continuing its efforts to develop a NPDES General Permit (No. GAR100000) for storm water discharges associated with construction activity. The permit will provide guidelines and regulations for effective control of silt, sediment and other pollutants which are carried by storm water runoff from construction sites. The General Permit has been issued, appealed, and overturned four times between 1992 and 1998, but was approved in 2000.

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

There are several erosion educational initiatives underway which have an urban focus. Each year GSWCC and EPD conduct five formal E&SC courses to provide training to the regulated community, regulators, consultants, and interested citizens. GSWCC also

provides detailed E&SC training for 8 to 11 units of government each year. A task force established by the Lieutenant Governor and the Erosion and Sediment Control Technical Study Committee, known as DIRT II, is assessing 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 stream banks.

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

Identified Gaps and Needs

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

Many privately owned sawmills are not members of the AF&PA. These mills and their producers are not required to attend the Master Timber Harvesters Workshops at this time. The GFC, UGA, GFA, and the Southeastern Wood Producers Association are working on a solution. A need still exists for education of private landowners who are selling timber for the last time prior to land development. Many such landowners attempt to maximize return on timber, sometimes at the expense of BMPs.

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 basin-wide coordination between agencies and organizations providing public education and technical assistance may help extend outreach efforts.

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. The 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.

General Strategies for Action

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

Key Participants and Roles

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

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

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

11. Publicly report Program Participants' progress in fulfilling their commitment to sustainable forestry.
12. Provide opportunities for the public and the forestry community to participate in the commitment to sustainable forestry.

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

- Participants will meet or exceed all established BMPs, all applicable state water quality laws and regulations, and the requirements of the Clean Water Act for forestland.
- Participants will establish and implement riparian protection measures for all perennial streams and lakes and involve a panel of experts at the state level to help identify goals and objectives for riparian protection.
- Participants will individually, through cooperative efforts or through AF&PA, provide funding for water quality research.

Performance measures for Objective 10 state:

- Participants will encourage landowners 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

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

Management Option Evaluation

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

Action Plan

Following the 1998 BMP survey, the GFC met with the Georgia Forestry Association (GFA) Environmental subcommittee and Executive Board, members from the Society of American Foresters (SAF), the Association of Consulting Foresters (ACF), and the

Georgia State Board of Registration for Foresters to develop an action plan to improve BMP implementation, especially for stream crossings.

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. The GFC also met with the Executive Board of the Association of Conservation Districts to request speaking at any local meetings to educate landowners about BMPs and their responsibilities and liabilities.

GFC will continue to monitor BMP implementation rates through biennial surveys and determine effectiveness of BMPs through habitat assessments and rapid bio-assessments of the aquatic organisms above and below forestry operations.

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

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 NIMS reporting system.

7.3.5 Drought Conditions

Ochlockonee River Subbasins

Problem Statement

Drought conditions in Georgia during the May 1998- August 2000 period significantly impacted river basins throughout the state including the St Marys, Satilla, Suwannee and Ochlockonee 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 Suwannee and Ochlockonee regions were just over 22 inches and almost 25 inches in the St Marys and Satilla regions.

In 2000, GAEPD 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.

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.

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. Among the recommendations included 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, an 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.

7.3.6 Widespread Flooding

Problem Statement

In March 1998, Georgia experienced widespread flooding due to heavy rainfall. The severity of the rain and the damages that resulted from flooding caused more than 65 percent of Georgia's counties to be declared federal disaster areas under Presidential Disaster Declaration 1209. Among the counties in this basin that were designated federal disaster areas are Decatur, Grady, Mitchell, Thomas, and Worth. Before 1998, the last major flooding event occurred in July 1994, when tropical storm Alberto moved into southwest Georgia and caused the worst flooding in the state's history. In some parts of Georgia, the rainfall total was up to 27 inches.

General Goals

Continue to promote awareness and understanding of the need for floodplain and participation in the National Flood Insurance Program.

Ongoing Efforts

Although not as severe as the flood of 1994, the 1998 flooding affected a larger geographical area – more than 100 counties- mostly the central and southern parts of the state were impacted. In addition, to residential and commercial structures there was also

damage to infrastructures. The majority of the counties within the Ochlockonee, St. Marys, Satilla and Suwannee river basins were included in the Presidential disaster declaration.

Strategies

Communities participating in the National Flood Insurance Program (NFIP) are to continue enforcing local floodplain management requirements for new and substantially damaged or improved buildings located in Special Flood Hazard Areas.

Acquisition of structures in the floodway of communities affected by the flooding disaster.

Target affected structures in the floodplain for voluntary buyouts, elevation –in- place or relocation.

Update and revise community mitigation plan and strategies based on flooding event.

Initiate or enhance public awareness and education regarding the hazards of flooding and the availability of flood insurance.

Target non-NFIP communities for future participation.

Key Participants

Federal: *Emergency Management Agency (FEMA)* ensures coordination among Federal departments and agencies in delivery of disaster related assistance.

State: *Georgia Emergency Management Agency (GEMA)* coordinate the state's response and recovery efforts.

State: *Floodplain Management Office* provides technical assistance and guidance to local communities.

Local: *Local governments* provide for the protection of life and property, and reduce future flood related issues.

In This Section

Section 8

Future Issues and Challenges

8.1 Where Do We Go From Here?

The Dynamic Process of Basin Management

This plan represents another step in managing the water resources in the Ochlockonee 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 previously 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 Ochlockonee River basin will enter into its second iteration of the basin management cycle (beginning in late 2002). The next cycle will provide an opportunity to review issues that were not fully addressed during the first cycle and to reassesses 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 Ochlockonee 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 resource 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 Ochlockonee 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 storm water discharges as required, and land application systems.
- Issuing water supply permits.
- Enforcing compliance with permit conditions.

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

- Septic tank permitting and inspection (County Health Departments) and maintenance (individual landowners).
- Land development (land use) and zoning ordinances (local governments).
- Sanitary sewer and storm water ordinances (local governments).
- Water supply source water protection ordinances (local governments).
- Urban storm water and drainage (local governments).
- Erosion and sediment control (local governments).

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

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

Using the RBMP Framework to Improve Communication

Raising awareness frequently involves two-way communication. The RBMP framework's interactive planning and outreach sessions provide additional opportunities for two-way communication. For example, Basin Technical Planning Team meetings provide opportunities for partners to share information on their responsibilities and capabilities with each other. Similarly, River Basin Advisory Committee meetings and 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 (WPCA), 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 Ochlockonee River basin will enter into its second iteration of the basin management cycle. 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 1998 monitoring efforts were focused on Ochlockonee, Suwannee, Satilla, and St. Marys River basins in accordance with the EPD basin planning schedule. Intensive monitoring will return to the Ochlockonee basin in support of the next iteration of the basin planning cycle in 2003. Prior to this time, EPD and partners will develop a monitoring plan for the Ochlockonee. 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 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. Arsenic

(a) Freshwater	50 µg/l
(b) Coastal and Marine Estuarine Waters	36 µg/l

2. Cadmium

(a) Freshwater	
(at hardness levels less than 100 mg/l)	0.7 µg/l*
(at hardness levels of 100 mg/l to 199 mg/l)	1.1 µg/l*
(at hardness levels greater than or equal to 200 mg/l)	2.0 µg/l*
Note: Total hardness expressed as $CaCO_3$.	
(b) Coastal and Marine Waters	9.3 µg/l

3. Chlordane*

(a) Freshwater	0.0043 µg/l
(b) Coastal and Marine Estuarine Waters	0.004 µg/l

4. Chromium (VI)

(a) Freshwater	11 µg/l
(b) Coastal and Marine Estuarine Waters	50 µg/l

5. Total Chromium

(at hardness levels less than 100 mg/l)	120 µg/l
(at hardness levels of 100 mg/l to 199 mg/l)	210 µg/l
(at hardness levels greater than or equal to 200 mg/l)	370 µg/l
Note: Total hardness expressed as $CaC0_3$.	

6. Copper

(a) Freshwater	
(at hardness levels less than 100 mg/l)	6.5 µg/l*
(at hardness levels of 100 mg/l to 199 mg/l)	12 µg/l
(at hardness levels greater than or equal to 200 mg/l)	21 µg/l
Note: Total hardness expressed as $CaCO_3$.	
(b) Coastal and Marine Estuarine Waters	2.9 µg/l*

7. Cyanide*

(a) Freshwater	5.2 µg/l
(b) Coastal and Marine Estuarine Waters	1.0 µg/l

8. Dieldrin* 0.0019 µg/l

9. 4,4'-DDT* 0.001 µg/l

10. a-Endosulfan*
    (a) Freshwater 0.056 µg/l
    (b) Coastal and Marine Estuarine Waters 0.0087 µg/l

11. b-Endosulfan*
    (a) Freshwater 0.056 µg/l
    (b) Coastal and Marine Estuarine Waters 0.0087 µg/l

12. Endrin* 0.002 µg/l

13. Heptachlor*
    (a) Freshwater 0.0038 µg/l
    (b) Coastal and Marine Estuarine Waters 0.0036 µg/l

14. Heptachlor Epoxide*
    (a) Freshwater 0.0038 µg/l
    (b) Coastal and Marine Estuarine Waters 0.0036 µg/l

15. Lead*
    (a) Freshwater
    (at hardness levels less than 100 mg/l) 1.3 µg/l
    (at hardness levels of 100 mg/l to 199 mg/l) 3.2 µg/l
    (at hardness levels greater than or equal to 200 mg/l) 7.7 µg/l
    Note: Total hardness expressed as $CaCO_3$.
    (b) Coastal and Marine Estuarine Waters 5.6 µg/l

16. Lindane [Hexachlorocyclohexane (g-BHC-Gamma)] 0.08 µg/l

17. Mercury*
    (a) Freshwater 0.012 µg/l
    (b) Coastal and Marine Estuarine Waters 0.025 µg/l

18. Nickel
    (a) Freshwater
    (at hardness levels less than 100 mg/l) 88 µg/l
    (at hardness levels of 100 mg/l to 199 mg/l) 160 µg/l
    (at hardness levels greater than or equal to 200 mg/) 280 µg/l
    Note: Total hardness expressed as $CaCO_3$.
    (b) Coastal and Marine Estuarine Waters 8.3 µg/l

19. Pentachlorophenol*
    (a) Freshwater 2.1 µg/l
    (b) Coastal and Marine Estuarine Waters 7.9 µg/l

20. PCB-1016 0.014 µg/l

21. PCB-1221 0.014 µg/l

22. PCB-1232 0.014 µg/l

23. PCB-1242 0.014 µg/l

24. PCB-1248 0.014 µg/l

25. PCB-1254 0.014 µg/l

26. PCB-1260 0.014 µg/l

27. Phenol 300 µg/l

28. Selenium
    (a) Freshwater 5.0 µg/l
    (b) Coastal and Marine Estuarine Waters 71 µg/l

29. Silver **

30. Toxaphene 0.0002 µg/l

31. Zinc
    (a) Freshwater
    (at hardness levels less than 100 mg/l) 60 µg/l
    (at hardness levels of 100 mg/l to 199 mg/l) 110 µg/l
    (at hardness levels greater than or equal to 200 mg/l) 190 µg/l
    Note: Total hardness expressed as $CaCO_3$.
    (b) Coastal and Marine Estuarine Waters 86 µg/l

Notes:

* The in-stream criterion is lower than the EPD laboratory detection limits.

** Numeric limits are not specified. 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 annual average or higher stream flow conditions:

1. Acenaphthene **
2. Acenaphthylene **
3. Acrolein 780 µg/l
4. Acrylonitrile 0.665 µg/l
5. Aldrin 0.000136 µg/l
6. Anthracene 110000 µg/l
7. Antimony 4308 µg/l
8. Arsenic 0.14 µg/l
9. Benzidine 0.000535 µg/l
10. Benzo(a)Anthracene 0.0311 µg/l
11. Benzo(a)Pyrene 0.0311 µg/l
12. 3,4-Benzofluoranthene 0.0311 µg/l
13. Benzene 71.28 µg/l
14. Benzo(ghi)Perylene **

15. Benzo(k)Fluoranthene	0.0311 µg/l
16. Beryllium	**
17. a-BHC-Alpha	0.0131 µg/l
18. b-BHC-Beta	0.046 µg/l
19. Bis(2-Chloroethyl)Ethe	1.42 µg/l
20. Bis(2-Chloroisopropyl)Ether	170000 µg/l
21. Bis(2-Ethylhexyl)Phthalate	5.92 µg/l
22. Bromoform (Tribromomethane)	360 µg/l
23. Carbon Tetrachloride	4.42 µg/l
24. Chlorobenzene	21000 µg/l
25. Chlorodibromomethane	34 µg/l
26. 2-Chloroethylvinyl Ether	**
27. Chlordane	0.000588 µg/l
28. Chloroform (Trichloromethane)	470.8 µg/l
29. 2-Chlorophenol	**
30. Chrysene	0.0311 µg/l
31. Dibenzo(a,h)Anthracene	0.0311 µg/l
32. Dichlorobromomethane	22 µg/l
33. 1,2-Dichloroethane	98.6 µg/l
34. 1,1-Dichloroethylene	3.2 µg/l
35. 1,3-Dichloropropylene (Cis)	1700 µg/l
36. 1,3-Dichloropropylene (Trans)	1700 µg/l
37. 2,4-Dichlorophenol	790 µg/l
38. 1,2-Dichlorobenzene	17000 µg/l
39. 1,3-Dichlorobenzene	2600 µg/l
40. 1,4-Dichlorobenzene	2600 µg/l
41. 3,3'-Dichlorobenzidine	0.077 µg/l
42. 4,4'-DDT	0.00059 µg/l
43. 4,4'-DDD	0.00084 µg/l
44. 4,4'-DDE	0.00059 µg/l
45. Dieldrin	0.000144 µg/l
46. Diethyl Phthalate	120000 µg/l
47. Dimethyl Phthalate	2900000 µg/l
48. 2,4-Dimethylphenol	**
49. 2,4-Dinitrophenol	14264 µg/l
50. Di-n-Butyl Phthalate	12100 µg/l
51. 2,4-Dinitrotoluene	9.1 µg/l
52. 1,2-Diphenylhydrazine	0.54 µg/l
53. Endrin Aldehyde	0.81 µg/l
54. Endosulfan Sulfate	2.0 µg/l
55. Ethylbenzene	28718 µg/l
56. Fluoranthene	370 µg/l
57. Fluorene	14000 µg/l
58. Heptachlor	0.000214 µg/l
59. Heptachlor Epoxide	0.00011 µg/l
60. Hexachlorobenzene	0.00077 µg/l
61. Hexachlorobutadiene	49.7 µg/l
62. Hexachlorocyclopentadiene	17000 µg/l
63. Hexachloroethane	8.85 µg/l
64. Indeno(1,2,3-cd)Pyrene	0.0311 µg/l
65. Isophorone	600 µg/l
66. Lindane [Hexachlorocyclohexane g-BHC-Gamma)]	0.0625 µg/l
67. Methyl Bromide (Bromomethane)	4000 µg/l
68. Methyl Chloride (Chloromethane)	**
69. Methylene Chloride	H
70. 2-Methyl-4,6-Dinitrophenol	765 µg/l
71. 3-Methyl-4-Chlorophenol	**
72. Nitrobenzene	1900 µg/l
73. N-Nitrosodimethylamine	8.12 µg/l
74. N-Nitrosodi-n-Propylamine	**
75. N-Nitrosodiphenylamine	16.2 µg/l
76. PCB-1016	0.00045 µg/l
77. PCB-1221	0.00045 µg/l
78. PCB-1232	0.00045 µg/l
79. PCB-1242	0.00045 µg/l
80. PCB-1248	0.00045 µg/l
81. PCB-1254	0.00045 µg/l
82. PCB-1260	0.00045 µg/l
83. Phenanthrene	**
84. Phenol	4,600,000 µg/l
84. Pyrene	11,000 µg/l
85. 1,1,2,2-Tetrachloroethane	10.8 µg/l
85. Tetrachloroethylene	8.85 µg/l
87. Thallium	48 (6.3) µg/l I
88. Toluene	200000 µg/l
89. 1,2-Trans-Dichloroethylene	**
90. 1,1,2-Trichloroethane	41.99 µg/l
91. Trichloroethylene	80.7 µg/l
92. 2,4,6-Trichlorophenol	6.5 µg/l
93. 1,2,4-Trichlorobenzene	**
94. Vinyl Chloride	525 µg/l

Notes:

** Numeric limits are not specified. These pollutants are addressed in 391-3-6-.06.

† EPD has proposed to the Board of Natural Resources changing numeric limits for methylene chloride from

unspecified to 1600 µg/l consistent with EPA's National Toxics Rule.

‡ EPD has proposed to the Board of Natural Resources changing numeric limits for thallium from 48 to 6.3 µg/l consistent with EPA's National Toxics Rule.

IV 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

V 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.

(e) Applicable State and Federal requirements and regulations for the discharge of radioactive substances shall be met at all times.

Point Source Control Efforts

Georgia DNR's management has promoted continuing improvement in the quality of return flows from permitted point sources in the basin. During the past twenty-five years, the majority of our municipal wastewater treatment plants were constructed or updated to meet State and/or federally mandated effluent standards. State and federal grants and the citizens of local municipalities funded these projects. This massive construction program has been so successful that over 90% of all these facilities in Georgia are currently meeting their effluent limits. We must protect our investments in these facilities and in the State's water quality.

The history of construction improvements for permitted dischargers within the Ochlockonee basin is summarized in the following table:

HUC 03110103

1982	City of Boston started operation of a collection system and pond**.**

HUC 03120001

None

HUC 03120002

1938	Moultrie 0.75 MGD treatment system constructed.
1942	Southwest State Hospital constructed including an Imhoff tank and trickling filter system.
1944	City of Thomasville built a collection and treatment system.
1955	City of Thomasville system upgraded.
1960	Moultrie system expanded to 3 MGD.
1962	City of Thomasville system upgraded.
1968	City of Thomasville system upgraded.
1971	Pinewood Nursing Center system constructed.
1971	City of Doerun built an oxidation pond for $335,300.
1972	City of Pelham constructed a 0.75 MGD activated sludge system.
1972	City of Cairo upgraded their trickling filter system to contact stabilization.
1970s	Oil-Dri Corporation of Georgia built a settling pond.

1982	Moultrie expanded to 4 MGD and upgraded to include ammonia removal, sand filters and dechlorination for $6,000,000.
1983	Thor Mine pond constructed.
1983	City of Thomasville system upgraded to 4 MGD two stage trickling filter.
1987	City of Thomasville system upgraded by adding activated sludge for ammonia removal.
1987	City of Ochlocknee built a 11,550 gpd constructed wetlands system.
1988	Pinewood Nursing Center system upgraded.
1988	Ingersoll-Rand Company built a pretreatment system that discharges to the City of Cairo sewerage system.
1994	City of Pelham replaced their activated sludge system with a 1.5 MGD land application system for $2,996,000.
1998	City of Thomasville system upgraded by adding dechlorination facility.
1998	City of Cairo constructed a land application system for $4,396,674.
2000	Southwest State Hospital treatment system taken out of service and the hospital was connected to the City of Thomasville sewerage system.
2000	City of Ochlocknee expanded their constructed wetlands system to 50,000 gpd.

HUC 03120003

None

NPDES Permits for Discharges in the Ochlockonee River Basin

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
BOSTON POND	GA0033715	0.213		THOMAS	AUCILLA CREEK
DOERUN POND	GA0021717	0.15		COLQUITT	BRIDGE CREEK TRIBUTARY
ENGELHARD CORP DECATUR	GA0001678			DECATUR	LITTLE ATTAP CR
ENGELHARD CORP THOMAS	GA0046124			THOMAS	UNNAMED TRIB/LITTLE OCHLOCKONEE RV
ENGLEHARD SPECIALTY CHEMICALS	GA0046744			DECATUR	SWAMP CR/LITTLE ATTAPULGUS CR
FLORIDIN CO THOR MINE	GA0047520			THOMAS	HORSE CR
MEIGS WPCP	GA0048178	0.15		THOMAS	NORTH BRANCH OF OAKY WOOD
MILWHITE CO INC	GA0046736			DECATUR	DOUBLE BR/WILLACOOCHEE CR
MOULTRIE WPCP	GA0024660	4	Y	COLQUITT	OCHLOCKONEE RV
OCHLOCKNEE WPCP	GA0046370	0.015		THOMAS	PINE CR
OIL-DRI CORP OF AMERICA	GA0047511			THOMAS	HORSE CR
SUNNYLAND INC	GA0001279		Y	THOMAS	STEAM MILL BR/OQUINA CR
THOMASVILLE WPCP	GA0024082	6.5	Y	THOMAS	OQUINA CR TRIB

FACILITY NAME	NPDES #	PERMITTED FLOW (MGD)	MAJOR	COUNTY	RECEIVING STREAM
W B RODDENBERY COMPANY	GA0001660			GRADY	LITTLE TIRED CR
WAVERLY MINERAL PRODUCTS	GA0032409			THOMAS	OAKY WOODS CR
WHIGHAM HEALTH AND REHAB	GA0034509	0.01		GRADY	SWEETWATER CR

Support of Designated Uses for Rivers, Streams, and Lakes in the Ochlockonee River Basin, 1998-1999

Rivers/Streams Supporting Designated Uses

BASIN/STREAM (Data Source)	LOCATION	WATER USE CLASSIFICATION	MILES
OCHLOCKONEE RIVER BASIN			
HUC 03120002			
Tired Creek (1)	Wolf Cr. to Parkers Mill Cr. near Cairo (Grady Co.)	Fishing	4

Rivers/Streams Partially Supporting Designated Uses

BASIN/STREAM (Data Source)	LOCATION	WATER USE CLASSIFICATION	CRITERION VIOLATED	EVALUATED CAUSE(S)	ACTIONS TO ALLEVIATE	MILES	305(b)	303(d)	Priority
OCHLOCKONEE RIVER BASIN									
HUC 03110103									
Olive Creek (2)	Headwaters to upstream U.S. Hwy. 19, Thomasville (Thomas Co.)	Fishing	FC,DO	UR	EPD will address nonpoint source (urban runoff) through a watershed protection strategy.	3	X	3	2
HUC 03120002									
Barnetts Creek (1)	West Branch to Ochlockonee River, W. of Thomasville (Thomas/Grady Co.)	Fishing	DO	NP	EPD will address nonpoint sources through a watershed protection strategy.	8	X	3*	2
E. Br. Barnetts Creek (1)	Horse Cr. to Barnetts Cr. near Ochlocknee (Thomas Co.)	Fishing	DO	NP	EPD will address nonpoint sources through a watershed protection strategy.	3	X	3	2
Little Tired Creek (1,2,3)	SR188 downstream Cairo to Tired Cr. (Grady Co.)	Fishing	DO,FC	UR	EPD will address nonpoint source (urban runoff) through a watershed protection strategy.	6	X	3	2
Tired Creek (1)	Turkey Cr. to Ochlockonee River (Grady Co.)	Fishing	FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	6	X	3	3
HUC 03120003									
Attapulgus Creek (1)	Callahan Br. to Little Attapulgus Cr. (Decatur Co.)	Fishing	FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	8	X	3	3
Ochlockonee River (1)	Oquina Creek to Stateline (Thomas/Grady Co.)	Fishing	FCG	NP	EPD will address nonpoint sources through a watershed protection strategy. Note: Fish Consumption Guidelines due to mercury in fish tissue.	33	X	3	3

*Note: The “3” in the 303(d) column denotes the fact that the TMDL has been established for each pollutant and the segment is no longer on the Georgia 303(d) list.

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
OCHLOCKONEE RIVER BASIN									
HUC 03110103									
Aucilla River (1)	Masse Branch to Brooks County line near Boston (Thomas Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	10	X	3	2
HUC 03120001									
Wards Creek (1)	Pine Cr. to McKeever Slough E. of Metcalf (Thomas Co.)	Fishing	DO	NP	EPD will address nonpoint sources through a watershed protection strategy.	3	X	3	2
HUC 03120002									
Big Creek (1)	Headwaters to Little Cr. near Meigs (Mitchell/Thomas Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	12	X	3	2
Big Creek (1)	Woodhaven Rd. E. of Coolidge to Ochlockonee River (Thomas Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	12	X	3	2
Bridge Creek (1)	Mill Cr. to upstream Ga. Hwy. 111 near Moultrie (Colquitt Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	7	X	3	2
Bridge Creek (1)	Upstream Ga. Hwy. 111 near Moultrie to Ochlockonee River (Colquitt/Thomas Co.)	Fishing	DO	NP	EPD will address nonpoint sources through a watershed protection strategy.	10	X	3	2
Little Creek (1)	Ga. Hwy. 37 to Ochlockonee River near Moultrie (Colquitt Co.)	Fishing	DO	NP	EPD will address nonpoint sources through a watershed protection strategy.	9	X	3	2
Little Ochlockonee River (1)	Slocumb Branch to downstream SR 111 near Moultrie (Colquitt Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	9	X	3	2

BASIN/STREAM (Data Source)	LOCATION	WATER USE CLASSIFICATION	CRITERION VIOLATED	POTENTIAL CAUSE(S)	ACTIONS TO ALLEVIATE	MILES	305(b)	303(d)	Priority
OCHLOCKONEE RIVER BASIN									
Little Ochlockonee River (1)	Big Cr. to Ochlockonee River near Ochlocknee (Thomas Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	9	X	3	2
Lost Creek (1)	Upstream Ga. Hwy. 93 N.E. of Cotton to Little Ochlockonee River (Mitchell/Colquitt Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	9	X	3	2
Ochlockonee River (1)	Headwaters, upstream Ga. Hwy. 112 near Sylvester to Bay Branch, E. of Bridgeboro (Worth Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	8	X	3	2
Ochlockonee River (1)	D/S Ga. Hwy. 270 to Wolf Pit Branch (d/s Giles Millpond) (Colquitt Co.)	Fishing	DO	NP	EPD will address nonpoint sources through a watershed protection strategy.	7	X	3	2
Ochlockonee River (1,10)	SR 37 downstream Moultrie to upstream CR222 (Colquitt Co.)	Fishing	FC,DO,FCG	UR,M	EPD will address through a watershed protection strategy. Moultrie facility in compliance with DO limits (1999). Model predicts dissolved oxygen violations at low flows. Model calibration study ongoing. Note: FCG is a partial support.	11	X	3	2
Ochlockonee River (1)	Bridge Cr. to Big Cr. W. of Coolidge (Thomas Co.)	Fishing	DO,FCG	NP	EPD will address nonpoint sources through a watershed protection strategy. Note: FCG is a partial support.	7	X	3	2
Oquina Creek (1)	Bruces Branch to Cassidy Rd., Thomasville (Thomas Co.)	Fishing	FC	UR	EPD will address nonpoint source (urban runoff) through a watershed protection strategy.	2	X	3	3

BASIN/STREAM (Data Source)	LOCATION	WATER USE CLASSIFICATION	CRITERION VIOLATED	POTENTIAL CAUSE(S)	ACTIONS TO ALLEVIATE	MILES	305(b)	303(d)	Priority
OCHLOCKONEE RIVER BASIN									
Parkers Mill Creek (1,2)	Headwaters to Tired Cr., Cairo (Grady Co.)	Fishing	FC	M	Cairo completed Individual Control Strategy for metals in 1994. The City was given permission to begin operating its land application system on 3/11/98. The system has not operated as designed. Other treatment options are being considered.	5	X	3	3

BASIN/STREAM (Data Source)	LOCATION	WATER USE CLASSIFICATION	CRITERION VIOLATED	POTENTIAL CAUSE(S)	ACTIONS TO ALLEVIATE	MILES	305(b)	303(d)	Priority
OCHLOCKONEE RIVER BASIN									
HUC 03120003									
Little Attapulgus Creek (1)	Downstream Crescent Lake to Attapulgus Creek (Decatur Co.)	Fishing	FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	4	X	3	3
Swamp Creek (1)	SR 262 to Stateline (Decatur Co.)	Fishing	DO,FC	NP	EPD will address nonpoint sources through a watershed protection strategy.	4	X	3	2