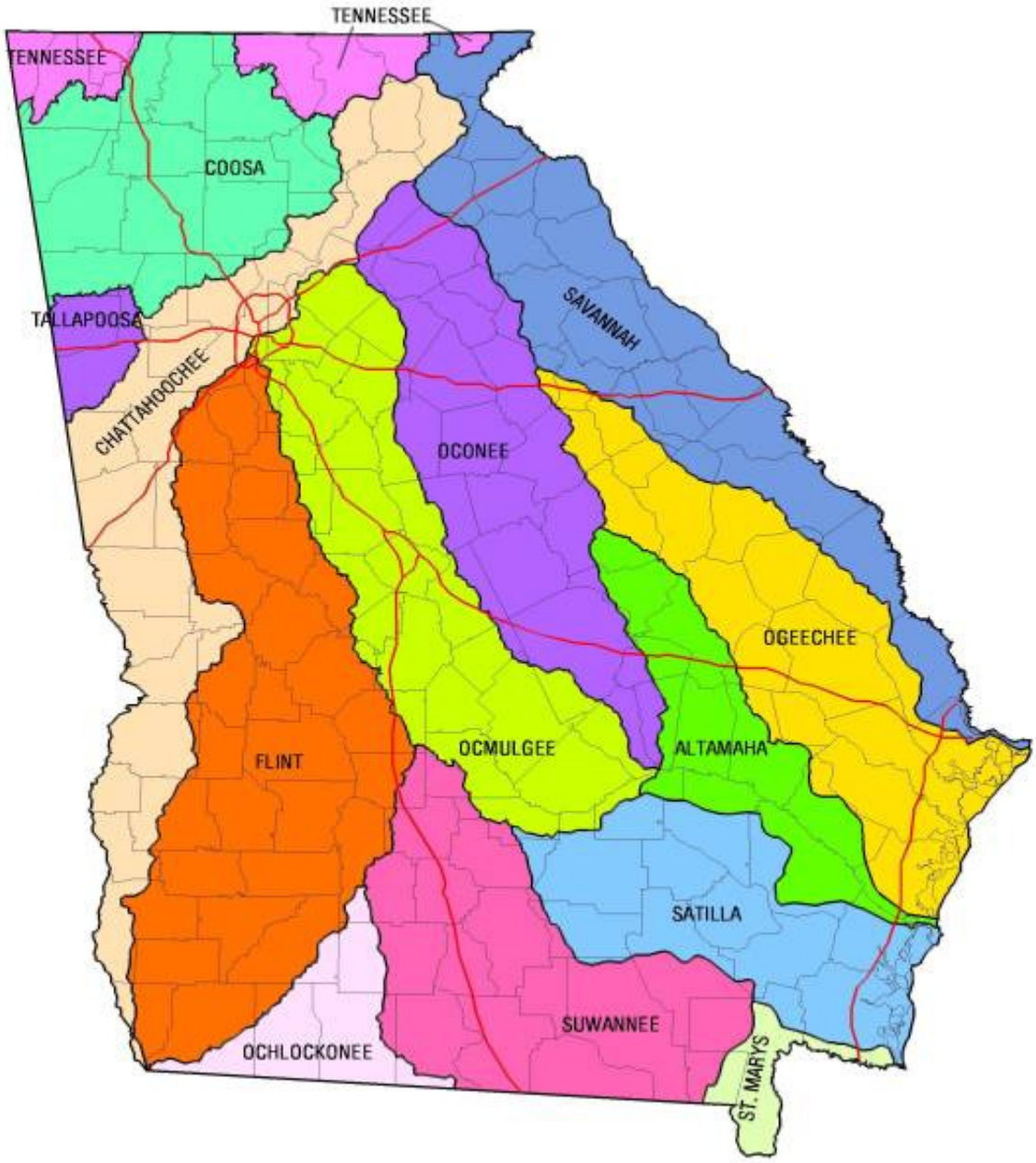
WATER QUALITY IN GEORGIA
2004-2005



Georgia Department of Natural Resources
Environmental Protection Division

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CHAPTER 1
Executive Summary

Purpose

This report, *Water Quality in Georgia, 2004-2005*, was prepared by the Georgia Environmental Protection Division (GAEPD) of the Department of Natural Resources (DNR). The DNR Coastal Resources (CRD) and Wildlife Resources Divisions (WRD), the Georgia Forestry Commission, and the Georgia Soil and Water Conservation Commission also contributed portions of the report. In addition, water quality data was provided by a number of governmental agencies and universities.

The report is often referred to as the Georgia 305(b) Report as portions of the report are prepared to comply with this section of the Federal Clean Water Act. Section 305(b) requires that each State prepare and submit to the Administrator of the United States Environmental Protection Agency (USEPA) a report, biennially, which describes water quality conditions of navigable waters across the State. The USEPA provides guidance to the States to establish a framework for consistent reporting across the nation. The USEPA reviews the individual State reports and uses the information to develop a national water quality inventory report, which is transmitted to the Congress of the United States.

This report provides an assessment of the water quality conditions of surface and groundwater in Georgia and includes a description of the nature, extent and causes of documented water quality problems. This assessment of water quality problem areas serves as the basis for lists required by Sections 303(d), 314, and 319 of the Clean Water Act. The report also includes a review and summary of ongoing wetland, estuary, and coastal public health/aquatic life issues; and water protection, groundwater, and drinking water program summaries.

In addition to complying with the Federal Clean Water Act, the major objective of this report is to provide Georgians a broad summary of information on water quality and the programs being implemented by the GAEPD and its partners to protect water resources across the State.

Water Protection In Georgia

The GAEPD is and has been since its inception in 1972 a comprehensive environmental agency responsible for environmental protection, management, regulation, permitting, and enforcement in Georgia. The GAEPD has for many years aggressively sought most available program delegations from the USEPA in order to

achieve and maintain a coordinated, integrated approach to environmental management. Today the GAEPD administers regulatory programs for water pollution control, water supply and groundwater management, surface water allocation, hazardous waste management, air quality control, solid waste management, strip mining, soil erosion control, geologic survey activities, radiation control, underground storage tanks, and safe dams.

This integrated approach to water pollution control originated in 1964 with the predecessor of the GAEPD, the Georgia Water Quality Control Board. The Georgia Water Quality Control Act of 1964 established the Board and consolidated all water pollution control functions under the Board. Early efforts by the Board in the late 1960s and early 1970s included documentation and assessment of water quality conditions, followed by judicial actions to force cleanup of targeted, priority water pollution problem areas. Another major action by the Board during this period was the establishment of water quality standards.

The Federal Clean Water Act of 1972 established the national goal of the protection and propagation of fish, shellfish, and wildlife, and for recreation in and on the water wherever attainable. Most industries in Georgia had installed effective water pollution control facilities by the end of 1972. In the mid/late 1970s, the GAEPD placed emphasis on the construction of municipal treatment plants, issuance of NPDES permits to municipal and industrial discharges, and the initiation of programs to monitor permit compliance and take appropriate enforcement actions. Major monitoring, modeling, and basin planning work was coordinated in support of treatment plant design and permitting programs. Priority was placed on targeted waters and on discharges to water quality limited stream segments through the construction grant priority funding list.

Today the Watershed Protection Branch of the GAEPD, in cooperation with many local, state, and federal agencies, coordinates programs to address most aspects of water pollution control including, monitoring; water quality modeling to develop wasteload allocations and total maximum daily loads (TMDLs); TMDL implementation plans; river basin management planning and the continuing planning process; water quality standards; local watershed assessment and watershed protection plans; nonpoint source management; erosion and sedimentation; stormwater management; the State revolving loan process for funding municipal water pollution control plant construction; the NPDES permit and enforcement program for municipal and industrial point sources; industrial pretreatment; land application of treated wastewater and regulation of concentrated animal feedlot operations (CAFOs).

The GAEPD has designated the Georgia Soil and Water Conservation Commission as the lead agency for dealing with water quality problems caused by agriculture. The Georgia Forestry Commission has been designated by the GAEPD as the lead agency to deal with water quality problems due to commercial forestry operations.

Water Protection Programs

Background. Georgia is rich in water resources. According to USEPA estimates, the State has 44,056 miles of perennial streams, 23,906 miles of intermittent streams, and 603 miles of ditches and canals for a total of 70,150 stream miles. Also, the State has 4.8 million acres of wetlands (9% tidally affected), 425,582 acres of public lakes and reservoirs, 854 square miles of estuaries, and 100 miles of coastline. This rich water heritage is often taken for granted. However, unusual events such as the flood in the summer of 1994 and drought conditions experienced throughout Georgia in 1986, 1988 and 1999-2002 serve as reminders that water resources cannot be taken for granted and sound regulatory programs are necessary to protect the resources.

In 2004-2005, the GAEPD placed emphasis on comprehensive statewide water management planning, monitoring and assessment, water quality modeling and TMDLs, TMDL implementation plan development, State revolving loan programs, NPDES permitting and enforcement, nonpoint source pollution abatement, stormwater management, erosion and sediment control and public participation projects.

Comprehensive Statewide Water Management Planning. In 2004 the Georgia General Assembly passed new water planning legislation to take the place of river basin planning. The 2004 Comprehensive State-wide Water Management Planning Act calls for the EPD to prepare a comprehensive water plan and provides fundamental goals and guiding principles for the development of the plan. This work is discussed in Chapter 2. Georgia will continue to use a rotating basin approach as a basis for watershed protection including monitoring, assessment, listing, TMDL development and NPDES permit reissuance.

Watershed Projects. The GAEPD is working with the United States Environmental Protection Agency (USEPA) and South Carolina on several Savannah River projects; with the USEPA and the Alabama Department of Environmental Management (ADEM) on water quality issues in the Coosa River and Lake Weiss; and with the Florida Department of Environmental Protection and the Suwannee River Water Management District to coordinate water protection efforts in the Suwannee River Basin.

Monitoring and Assessment. Georgia's waters are currently classified for one of the following water use classifications: drinking water, recreation, fishing, coastal fishing, wild river, or scenic river. Specific water quality standards are assigned to support each water use classification. The use classifications and standards are discussed in some detail in Chapter 3. The quality of Georgia's waters is judged by the extent to which the waters support the uses (comply with standards set for the water use classification or designations) for which they have been designated. Water quality monitoring programs

and information on assessments of Georgia's waters are discussed in Chapter 3.

Water Quality Modeling/Wasteload Allocation/TMDL Development. In 2004-2005, a significant amount of modeling work was conducted in support of the development of wasteload allocations and TMDLs. During this period TMDLs were established for 303(d) listed waters in the Coosa, Tallapoosa and Tennessee River Basins. These TMDLs were finalized by EPD and approved by the EPA in 2004. TMDLs were also developed by EPD for listed waters in the Savannah and Ogeechee River basins and approved by the EPA in 2005. In addition, TMDLs were developed by EPD for listed waters in the Ochlockonee, Suwanee, Satilla and St. Marys and publicly noticed in 2005. These TMDLs will be finalized and submitted to the EPA for approval in 2006. This work is discussed in Chapter 3. Over the two-year period, more than 135 TMDLs were developed. To date more than 1250 TMDLs have been developed for 303(d) listed waters in Georgia.

TMDL Implementation Plan Development. In 2004 a total of 213 TMDL implementation plans and revisions were developed for TMDLs in the Chattahoochee and Flint River Basins. Another 147 plans and revisions for TMDLs in the Coosa, Tallapoosa and Tennessee River Basins were initiated in 2005 and are scheduled for completion in 2006. To date a total of 864 TMDL plans and revisions have been prepared to implement TMDLs in Georgia. This work is discussed in Chapter 7.

State Revolving Loan Fund and Georgia Loan Fund. In March 1988, Georgia became the third State in the nation to receive a Capitalization Grant from the USEPA for implementation of the State Revolving Loan Fund (SRF). In 2004-2005 more than 132 million dollars were obligated to communities for wastewater system improvements through the Georgia Environmental Facilities Authority (GEFA) in the form of low-interest, SRF and Georgia Fund loans. The loan programs are discussed in Chapter 7.

GEFA Implementation Unit. The Metropolitan North Georgia Water Planning District (District) was created on April 5, 2001 (2001 S.B. 130) as a planning entity dedicated to developing comprehensive regional and watershed-specific plans to be implemented by local governments in the District.

The enabling legislation required the District to develop plans for stormwater management, wastewater treatment, and water supply and conservation in its 16-county area that includes Bartow, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Fulton, Forsyth, Gwinnett, Hall, Henry, Paulding, Rockdale and Walton Counties. These plans are designed to protect water quality and public water supplies, protect recreational values of the waters, and to minimize potential adverse impacts of development on waters in and downstream of the region.

Limited water resources combined with the region's growth places the District in a

unique position relative to other areas in Georgia. With a finite water resource and a population of nearly 4 million and growing, the need to carefully and cooperatively manage and protect Metropolitan Atlanta's rivers and streams has become a priority.

The GAEPD was charged with the enforcement of these plans. The Watershed Protection Branch, GEFA Implementation Unit, was assigned the responsibility of ensuring the implementation of the plans developed by the District.

NPDES Permitting and Enforcement. A considerable amount of time was allocated to treated wastewater discharge permit reissuance activities in 2004-2005. NPDES permits were modified or reissued to 208 municipal/private dischargers and to 150 industrial dischargers. In addition, 55 private dischargers were covered under general permit No. GA550000. Since the initiation of the program in 1974, NPDES permit issuance and enforcement has been a high priority for the GAEPD.

Compliance and enforcement activities continued to receive significant attention in 2004-2005. By the end of 2005, of 125 major municipal discharges, 119 facilities were in general compliance with final limitations. The remaining six facilities are under compliance schedules to resolve the noncompliance or implementing infiltration/ inflow strategies. Enforcement action has been taken by the GAEPD to insure problems are alleviated. Of 42 major industrial discharges, 40 facilities were achieving permit compliance at the end of 2005. The one major industrial discharger not in compliance at the end of 2005 is under an order to attain compliance.

The GAEPD utilizes all reasonable means to attain compliance, including technical assistance, noncompliance notification letters, conferences, consent orders, and civil penalities. Emphasis is placed on achieving compliance through cooperative action. However, compliance cannot always be achieved in a cooperative manner. The Director of the GAEPD has the authority to negotiate consent orders or issue administrative orders. In 2004-2005 768 Orders were issued and a total of $3,200,000 in negotiated settlements was collected. This includes enforcement actions for all aspects of the water protection program including violations of the Georgia Water Quality Control Act, the Federal Clean Water Act and NPDES permits, excluding stormwater. In 2004-2005 a total of 339 stormwater Orders were issued and a total of $1,073,312 in negotiated settlements was collected. Permitting, compliance and enforcement work is discussed in Chapter 7.

Concentrated Animal Feeding Operations. Georgia adopted rules for swine feeding operations in 1999. Rules were adopted for animal (non-swine) feeding operations in 2001. During 2002 and 2003 rules were developed and implemented for large chicken feeding operations. Work was continued in 2004-2005 to implement this program. This process is discussed in Chapter 7.

Zero Tolerance. In response to a resolution adopted in 1998 by Georgia Department of Natural Resources that directed EPD to provide the "best quality of effort possible enforcing Georgia's environmental laws", a "zero tolerance" strategy was adopted for certain high growth areas of the state requiring enforcement action on any and all noncompliance issues. Significant work was conducted in 2004-2005 to implement this strategy. This process is discussed in Chapter 7.

Nonpoint Source Management Program. Nonpoint source management programs have allowed the GAEPD to place increasing emphasis on the prevention, control and abatement of nonpoint sources of pollution. The GAEPD is responsible for administering and enforcing laws to protect the waters of the State, defined to include surface and ground water. Consequently, the GAEPD has been designated as the administering or lead agency for implementing the State's Nonpoint Source Management Program. This 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, non-governmental organizations and individual citizens.

Georgia's initial Nonpoint Source Assessment Report was completed in compliance with the Federal Clean Water Act and approved by the USEPA in January 1990. This report, as required by Section 305(b) of Public Law 92-500, serves as the current process to update the Nonpoint Source Assessment Report.

In January 1997, the GAEPD initiated efforts with the University of Georgia - Institute of Community Affairs and Development to revise and update the Nonpoint Source Management Program. This revision of the State's Nonpoint Source Management Program is intended to meet the requirements for funding under Section 319(b) of the Federal Clean Water Act and to delineate short and long-term goals and implementation strategies. Just as important, it is also 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 the time period FFY 2000 through FFY 2004.

The State's Nonpoint Source Management Program focuses on the comprehensive categories of nonpoint sources of pollution identified by the USEPA: Agriculture, Silviculture, Construction, Urban Runoff, Hydrologic/Habitat Modification, Land Disposal, Resource Extraction and Other Nonpoint Sources. This revision of the State's Nonpoint Source Management Program was developed through a consultatory process, incorporating input from a wide range of stakeholders involved in nonpoint source management activities throughout the State: local, regional, State and Federal agencies, as well as private, non-governmental organizations. This process encouraged

intergovernmental resource sharing and increased stakeholder involvement. This revision of the State's Nonpoint Source Management Program established new partnerships and strengthened existing partnerships in the development and implementation of nonpoint source strategies.

Under Section 319(h) of the Federal Clean Water Act, the USEPA awards a Nonpoint Source Implementation Grant to the GAEPD to fund eligible projects, which support the implementation of the State's Nonpoint Source Management Program. Section 319(h) Grant funds for the prevention, control and/or abatement of nonpoint sources of pollution are made available annually to public agencies in Georgia. With funding from Section 319(h) FY96 – FY05 Grants, the GAEPD has awarded over $25 million in grant funds to State agencies, local and regional governments, Resource Conservation and Development Councils, State colleges and universities to fund eligible projects supporting the State's Nonpoint Source Management Program. The nonpoint source programs are described in Chapter 7.

Stormwater Management. The GAEPD developed its Storm Water Permitting Strategy in February 1991, and revised it in February 1997. Georgia's Phase II Storm Water Permitting Strategy was approved by USEPA in May 2000, and Phase II designation criteria was developed by GAEPD in July 2002. In 1994-1995 a total of 58 NPDES permits were issued to large and medium municipal separate storm sewer systems (MS4s). The 45 NPDES permits covering the Atlanta metro area were reissued in 1999 and 2004. The 13 NPDES permits for medium MS4s were reissued in 2000 and 2005. In December 2002, GAEPD issued an NPDES General Permit for Phase II MS4s, and this permit currently regulates 84 cities and counties.

In 1993, a general NPDES permit for storm water associated with industrial activity was issued. This permit was reissued in 1998. The permit was administratively extended in 2003, with approximately 3500 facilities retaining coverage. Multiple stakeholder meetings were held in the following two years, leading to a new permit issuance in March 2005. This permit was appealed in April 2005 by one industry and several environmental groups. Many months of negotiation meetings are expected to result in a new draft permit in 2006.

The general permit for storm water from construction activities was issued in September 1996, appealed, and eventually overturned by a State Administrative Law Judge in April 1998. The permit was redrafted and issued in July 1999 and was subsequently appealed. Settlement negotiations began in October 1999. A revised general NPDES permit for construction activities was issued on June 12, 2000, and became effective on August 1, 2000. The permit was reissued by GAEPD on August 13, 2003. The permit was re-issued as three permits; Stand Alone, Infrastructure and Common Development, and required coverage for projects disturbing one acre or more. Storm water management is discussed in Chapter 7.

Erosion and Sediment Control. The Georgia Erosion and Sedimentation Act was signed into law in 1975 and has been amended several times since that date, most recently 2001.The legislative intent of the Act was to establish a comprehensive and statewide soil, erosion and sedimentation control program to protect and conserve air, land and water resources through the adoption and implementation of local ordinances and programs which regulate certain land disturbing activities generally associated with urban development. EPD implements the program where there is no local ordinance.

The Act requires an erosion and sedimentation control plan and a land disturbing activity permit for sites greater than 1 acre. Erosion and Sedimentation control plans must be reviewed and approved by the Soil and Water Conservation District or by the local issuing authority before the land disturbing activity permit can be issued. Buffers of 25 feet for warm water streams and 50 feet for trout streams are required by the Act for the protection of water quality. The Act provides for a variance from these buffers under certain circumstances. Variances can only be issued by EPD. Procedures and criteria for obtaining a stream buffer variance are outlined in DNR's Erosion and Sedimentation Control Rules and Regulations and become part of the Land Disturbing Activity Permit. The Act provides for monetary penalties of up to $2,500 per day, enforced by EPD or by the local issuing authority.

The Act was amended by House Bill 285 in 2003 to create an integrated permitting program for erosion and sedimentation control for land disturbing activities of one acre or greater, thereby standardizing the requirements for local Land Disturbing Activity Permits and the NPDES Construction Storm Water Permits. HB 285 also established a new, mandatory training and certification program for all individuals involved with erosion and sediment control. This new program, which is being administered by the Georgia Soil and Water Conservation Commission, requires those individuals to obtain the applicable certification by December 31, 2006. The third major component of HB 285 was to authorize the first NPDES permit fee program in Georgia. The bill authorized a fee of up to $80 per disturbed acre, with half of that amount to go to the local issuing authority. The amendments required the Georgia Board of Natural Resources to adopt amendments to the Erosion and Sedimentation Rules to implement these requirements. Local issuing authorities were required to amend their local ordinances to implement the changes in the Act by July 1, 2004. The Act was amended by Senate Bill 460 in 2004 to add three new criteria under which the EPD director can consider stream buffer variances. The legislation also required The Georgia Board of Natural Resources to adopt amendments to the Erosion and Control Rules to implement the new criteria.

Major Issues and Challenges

Georgia is one of the fastest growing states in the nation. The burgeoning population places considerable demands on Georgia's ground and surface water resources in

terms of water supply, water quality and assimilative capacity. The problems and issues are further complicated by the fact that surface water resources are limited in South Georgia and groundwater resources are limited in North Georgia. In some locations, the freshwater resources are approaching their sustainable limits. Thus, several key issues and challenges to be addressed now and in the future years include (1) minimizing withdrawals of water by increasing conservation, efficiency and ruse, (2) maximizing returns to the basin through reducing interbasin transfers and limiting use of septic tanks and land application of treated wastewater where water is limited, (3) meeting instream and offstream water demands through storage, aquifer management and reducing water demands, (4) protecting water quality by reducing wastewater discharges and runoff from land to below the assimilative capacity of the streams. The implementation of the Comprehensive Statewide Water Management Planning process in Georgia provides a framework for addressing each of the key issues.

The pollution impact on Georgia streams has radically shifted over the last two decades. Streams are no longer dominated by untreated or partially treated sewage discharges which resulted in little or no oxygen and little or no aquatic life. The sewage is now treated, oxygen levels have returned and fish have followed. However, another source of pollution is now affecting Georgia streams. That source is referred to as nonpoint and consists of mud, litter, bacteria, pesticides, fertilizers, metals, oils, suds and a variety of other pollutants being washed into rivers and lakes by stormwater. This form of pollution, although somewhat less dramatic than raw sewage, must be reduced and controlled to fully protect Georgia's streams. Structural and nonstructural techniques such as pollution prevention and best management practices must be significantly expanded to minimize nonpoint source pollution. These include both watershed protection through planning, zoning, buffer zones, and appropriate building densities as well as increased use of stormwater retention ponds, street cleaning and perhaps eventual limitations on pesticide and fertilizer usage.

Another issue of importance is the reduction of toxic substances in rivers, lakes, sediment and fish tissue is extremely important in protecting both human health and aquatic life. The sources are widespread. The most effective method to reduce releases of toxic substances into rivers is pollution prevention, which consists primarily of eliminating or reducing the use of toxic materials or at least reducing the exposure of toxic materials to drinking water, wastewater and stormwater. It is very expensive and difficult to reduce low concentrations of toxic substances in wastewaters by treatment technologies. It is virtually impossible to treat large quantities of stormwater and reduce toxic substances. Therefore, toxic substances must be controlled at the source.

It is clear that local governments and industries, even with well-funded efforts, cannot fully address the challenges of toxic substances and nonpoint source pollution control. Citizens must individually and collectively be part of the solution to these challenges. The main focus is to achieve full public acceptance of the fact that some of everything

put on the ground or street ends up in a stream. Individuals are littering, driving cars which drip oils and antifreeze, applying fertilizers and pesticides and participating in a variety of other activities contributing to toxic and nonpoint source pollution. If streams and lakes are to be pollutant free, then some of the everyday human practices must be modified. The GAEPD will be emphasizing public involvement; not only in decision-making but also in direct programs of stream improvement. The first steps are education and adopt-a-stream programs.

CHAPTER 2
Comprehensive Statewide Water Management Planning

Background

Georgia's future relies on the protection and sustainable management of the state's limited water resources. The 2004 Comprehensive Statewide Water Management Planning Act mandates the development of a statewide water plan that supports a far-reaching vision for water resource management:

> "Georgia manages water resources in a sustainable manner to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens". (O.C.G.A. 12-5-522(a))

The Act also identifies the following nine principles to guide the water planning process:

1. Effective water resources management protects public health, safety and welfare of Georgia's citizens.

2. Water resources are managed in a sustainable manner so that current and future generations have access to adequate supplies of quality water that supports both human needs and natural systems.

3. All citizens have a stewardship responsibility to conserve and protect the water resources of Georgia.

4. Water management efforts recognize that economic prosperity and environmental quality are interdependent.

5. Water quality and quantity and surface and ground water are interrelated and require integrated planning as well as reasonable and efficient use.

6. A comprehensive and accessible database is developed to provide sound scientific and economic information upon which effective water management decisions can be based.

7. Water resource management encourages local/regional innovation, implementation, adaptability and responsibility for watershed and river basin management.

8. Sound water resources management involves meaningful participation, coordination and cooperation among interested and affected stakeholders and citizens as well as all levels of governmental and other entities managing and/or utilizing water.

9. Periodic revisions of the plan are required to incorporate new scientific and policy insights, as well as changing social, economic, cultural, and environmental factors.

The legislation in 2004 created a framework for developing Georgia's first comprehensive statewide water management plan by providing a vision/goal for water management and guiding principles for developing the plan. In addition, the planning process must:

1. Evaluate water trends and conditions to determine the types of challenges that we face now or will face in the future;

2. Evaluate our legal/management structure (i.e., statutes, rules, programs, policies) to address those challenges;

3. Identify gaps and other weaknesses in our water management approach; and

4. Identify options for addressing these gaps and weaknesses and the benefits and drawbacks of each option.

The Act charges the Georgia Environmental Protection Division with development of the statewide water plan and creates the Georgia Water Council, to oversee plan development. Currently, state and federal statutes form the foundation for Georgia's water management programs. Two goals that resonate throughout federal and state statutes can be summed up as:

Protect public health and environmental quality; and

Meet future needs while protecting aquifers, instream uses and downstream users.

The goals of the Comprehensive Statewide Water Management Planning Act are aligned with these statutory goals. Achieving the goals with the increasing demands for water for all purposes will require a comprehensive approach to planning and managing

water resources.

The statewide water planning process presents Georgians the opportunity to comprehensively evaluate and adjust statutes, regulations, and management programs to achieve sustainable management of our water resources. An opportunity of this nature has not presented itself since water management programs first began to take shape, over thirty years ago.

Major Water Management Planning Objectives

The Comprehensive Statewide Water Management Planning Act does not define the mechanisms by which the state is to achieve its vision for water management. For this reason EPD, using products from the efforts of the 2001 Joint Water Study Committee and with oversight of the Water Council, has prioritized four major water management objectives to guide the research and planning strategies for the initial plan development:

1. Minimize withdrawals of water by increasing conservation, reuse, and efficiency. Because of increasing demands being placed on Georgia's water resources, the comprehensive statewide water plan must address increasing efforts related to 1) conservation, 2) efficiency, and 3) water reuse. These three sub-objectives are the focus of minimizing withdrawals.

Water conservation, the "beneficial reduction in water use, waste, and loss," is a broad and varied water policy area. Water efficiency, or using the least possible amount of water necessary to achieve a desired result, is generally considered an aspect of conservation. Water reuse, or the use of reclaimed or recycled water, although specifically a water supply mechanism, is often used as one of the tools for conserving water resources.

The University of Georgia's Carl Vinson Institute of Government produced for EPD a research document titled, *Water Conservation, Efficiency and Reuse*. EPD used this report along with other reference material to develop policy options for review by a series of advisory committees.

2. Maximize returns of water to the basin through the management of interbasin transfers, land application and on-site sewage disposal systems. Georgia's water resources are becoming increasingly strained by greater demands as the State's population and economy grow. As a result, specific policies that clearly define a strategy for maximizing return flows to water bodies have become more critical. Land application of wastewater, septic systems, and interbasin transfers are all consumptive uses of water that do not return water to the point of withdrawal, at least in a timely and quantifiable manner. Nevertheless, all three of these water uses also serve beneficial purposes that are valuable to society.

The principle of reasonable use that underlies Georgia's water management program includes a responsibility to return water for reasonable use downstream. Returning water to its river basin is valuable and Georgian's have a responsibility to return as much water as practicable based on water quality and economic conditions. Because of this responsibility, it is important to develop water management policies that balance the water demands of our growing population against the equally important need to maximize water returns to our river basins. Careful development of policy options for these three consumptive water uses will be an important part of the water plan's role in meeting the requirements of the Comprehensive Statewide Water Management Act.

The University of Georgia's Carl Vinson Institute of Government prepared for EPD a research document titled, *Maximizing Water Returns to River Basins*. This document examines the water management objective of maximizing water returns to river basins in terms of current knowledge and water policies adopted in other states.

3. Meet instream and offstream demands for water through surface storage, aquifer management and reducing water demands. Long-term management of water resources is a growing concern in many parts of the State. As economic development and population growth increases, new policies and practices will be needed to meet the vision for sustainable management of Georgia's water resources.

The quantity of water resources in the State is influenced by precipitation, ground cover, water storage, aquifer/surface water interaction, water withdrawals, and wastewater returns. Although Georgia's climate provides generally for abundant precipitation, it does not necessarily occur where and when needed to meet the demands of society and natural systems.

Sustainable management of Georgia's waters means ensuring that water is available, now and in the future, for people's use away from the water source, also known as offstream uses. These uses include water supply for domestic use, for industrial purposes, and for agricultural uses, including irrigation, all of which are fundamental to the state's economy and to the quality of life of Georgia residents.

To fully accomplish this vision, however, Georgia's waters must, at the same time, be managed to meet instream needs. The term "instream uses" addresses fish and wildlife and ecosystem support, but goes beyond that to include water that provides other benefits while in the stream including hydropower production, navigation, and recreation. Finally, instream flows also transport water to meet the needs of downstream water users, water that provides for both offstream and instream use in lower segments of our river basins.

Meeting offstream and instream needs for water is, of course, complicated by the fact

that precipitation varies, with resultant variations in streamflow and groundwater levels. Storing water at higher flow times in order to meet demand at lower flow times can provide ways to adapt. As stated by the Carl Vinson Institute of Government, the question inherent in this management objective can be stated as follows:

> "How will it be possible to spread the water supplies over time and space such that human needs are met while natural systems are kept healthy and continue to provide crucial environmental services upon which we depend?"

Three sets of policy tools that can help us address this challenge will be the focus of policy options developed to address this management objective: surface storage or reservoir policies, instream flow policies, and aquifer management policies. The University of Georgia's Carl Vinson Institute of Government produced for EPD a research document titled, *Balancing Instream and Offstream Uses*, that addresses these three sets of policy tools.

4. Protect water quality by reducing discharges of pollutants to streams and runoff from land, so as not to exceed the assimilative capacity of the streams is the fourth and last major objective to be addressed in the first iteration of the comprehensive statewide water plan.

Georgia's continued growth and development will be accompanied by significant increases in the volume and character of pollutants discharged to our waters from point and nonpoint sources. These increases, if not managed appropriately, will compromise the ability to use these waters in beneficial ways. To achieve this objective, Georgia will need to protect clean waters, restore impaired waters and maintain assimilative capacity for current and future users.

The University of Georgia's Carl Vinson Institute of Government produced for EPD a research document titled, *Protecting Water Quality*, that provides information on federal and state water law, water quality standards and monitoring, stormwater management, on-site wastewater management and infrastructure financing. This document, as well as those mentioned above, is available at www.cviog.uga.edu/services/policy/environmental/policyreports.

Stakeholder Participation

The process used to develop the statewide plan provides for meaningful participation, coordination, and cooperation among interested and affected stakeholders and citizens as well as all levels of governmental and other entities managing or utilizing water. Opportunities to become involved in the statewide plan development are provided

through over-sight by the Water Council, the use of advisory committees, opportunities for stakeholders to provide comments and/or information on the development of water management objectives/sub-state planning and their related tools and options, and by participating in Water Council town hall meetings.

The Water Council is a coordinating committee created by the Comprehensive Statewide Water Management Planning Act. According to the Act, the Water Council's purpose is to:

- Ensure coordination, cooperation and communication among state agencies and their water-related efforts in the development of a comprehensive statewide water management plan
- Provide input to the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources concerning development of the plan
- Review, modify if necessary, and approve the final draft of the proposed plan
- Recommend such proposed plan for consideration by the General Assembly

The Water Council consists of eight state agency officials who serve ex officio; the chairperson of the Senate Natural Resources and Environment Committee, ex officio, and an additional member of that committee selected by the committee chairperson; the chairperson of the House Natural Resources and Environment Committee, ex officio, and an additional member of that committee selected by the committee chairperson; one member who is not a member of the General Assembly who is appointed by the Speaker of the House of Representatives; and one member who is not a member of the General Assembly who is appointed by the President Pro Tempore of the Senate. The director of the Georgia Environmental Protection Division serves as the chairperson of the Water Council.

The members of the Water Council are:

- Dr. Carol A. Couch -- Director, Environmental Protection Division (Chairperson)
- Mike Beatty -- Commissioner, Georgia Department of Community Affairs
- Gus Bell -- Savannah, Georgia
- David Bennett -- Executive Director, Georgia Soil and Water Conservation Commission

- Senator John Bulloch, District 11
- Paul Burks -- Executive Director, Georgia Environmental Facilities Authority
- Noel Holcomb -- Commissioner, Georgia Department of Natural Resources
- Tommy Irvin -- Commissioner, Georgia Department of Agriculture
- Jerry Lane -- Claxton, Georgia
- Representative Tom McCall, District 30
- Representative Lynn Smith, District 70
- Kenneth Stewart Jr. -- Director, Georgia Forestry Commission
- Senator Ross Tolleson, District 20
- B.J. Walker -- Commissioner, Georgia Department of Human Resources

The Statewide Advisory Committee (SAC) provides EPD with statewide perspectives on Georgia's overarching goals for water management, water management objectives, and the array of new policy tools identified for development in the first state water plan. Statewide perspectives are needed to bring the full range of Georgia's geographic, economic, cultural, jurisdictional, and water resource realities into discussions of the water management. The committee is primarily composed of representatives of organizations that have statewide constituencies and interest.

The primary purpose of the statewide advisory committee is to provide structured "Statewide" perspectives and input on water management policy tools and/or options. The state advisory committee is not asked to reach consensus on specific decisions, but to assess each set of policy option in some detail for the purpose of providing insight from diverse perspectives to help EPD refine and improve Georgia's water management policies and/or options. Each policy options package presented to the SAC, along with the meeting summaries, is posted at http://www.gadnr.org/gswp/.

Technical Advisory Committees (TAC) provide early input, when needed, by answering specific technical questions needed to inform water policy options. The technical advisors have extensive expertise and are actively working on and/or researching the topic being addressed. TAC members bring a broad range of scientific, technical, and practical experience to EPD during the planning process. These technical advisory committees work with EPD associates to build the scientific and technical foundation upon which policy options will be developed. Two TACs, one to address

water conservation and one to address water reuse, were convened to support work on the first water management objective, minimizing withdrawals.

The Basin Advisory Committees are shown in Figure 1. The committees represent the groups of basins shown on the map along with a separate committee focused on aquifers along the coast and a committee focused on the North Georgia Metro Water Planning District. Because water follows geographic boundaries defined by nature, these basin advisory committees are organized along river basin and aquifer boundaries. The primary purpose of the basin advisory committees is to provide structured “regional” perspectives and input on water management objectives and potential policy tools and/or options. Each policy options package presented to the BACs, along with the meeting summaries, is posted at http://www.gadnr.org/gswp/.

Tasks and Milestones

EPD is developing the first Statewide Comprehensive Water Plan to be provided to the Georgia Water Council in July 2007. This initial statewide plan will focus on the policy framework and an array of tools necessary for developing the region-specific management strategies to be developed for subsequent editions of the statewide plan. The first iteration of the plan will identify and fill the "gaps" that may exist in Georgia’s current array of water laws, regulations, and policies that may impede progress toward the four water management objectives.

Figure 1. Basin Advisory Committees

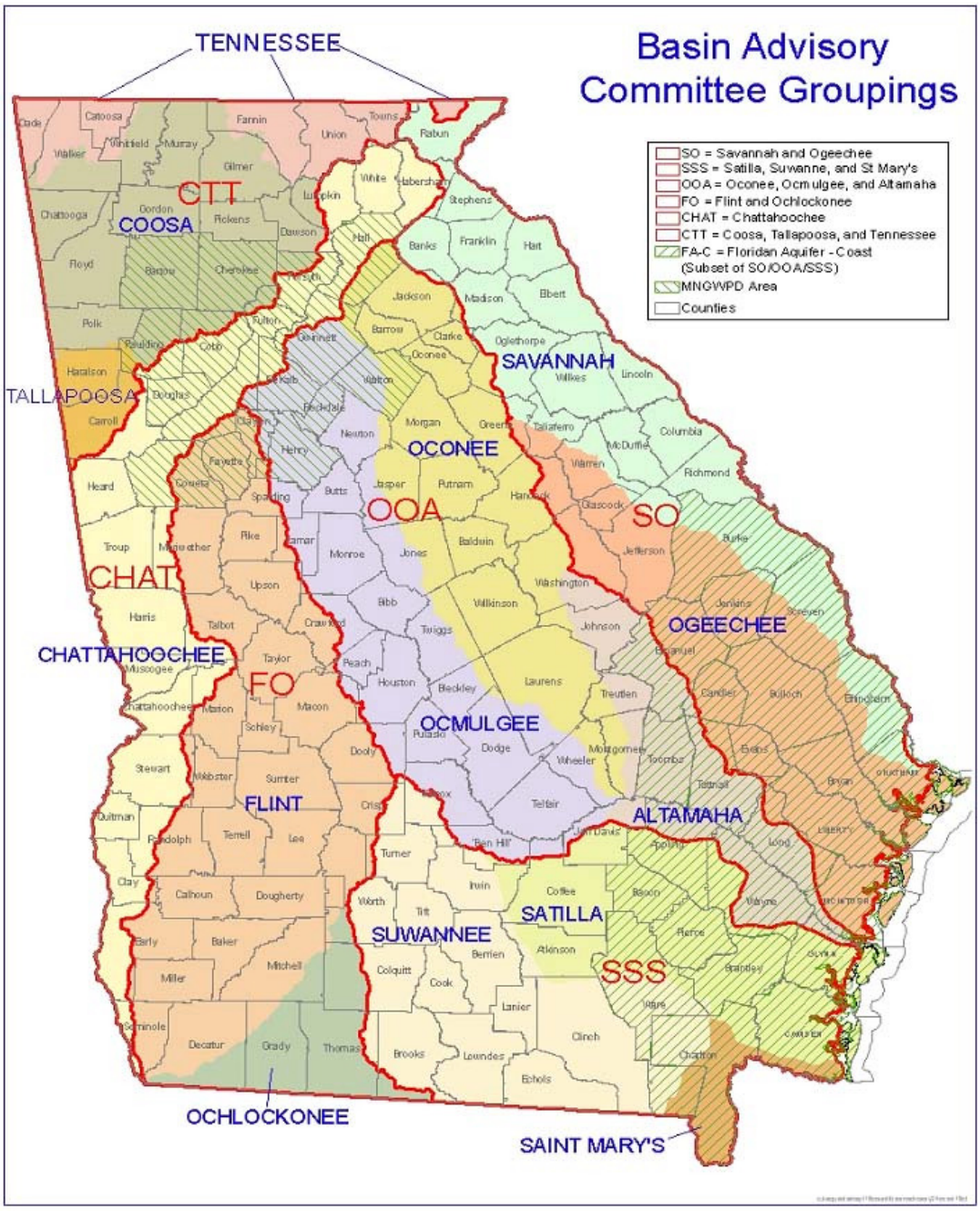
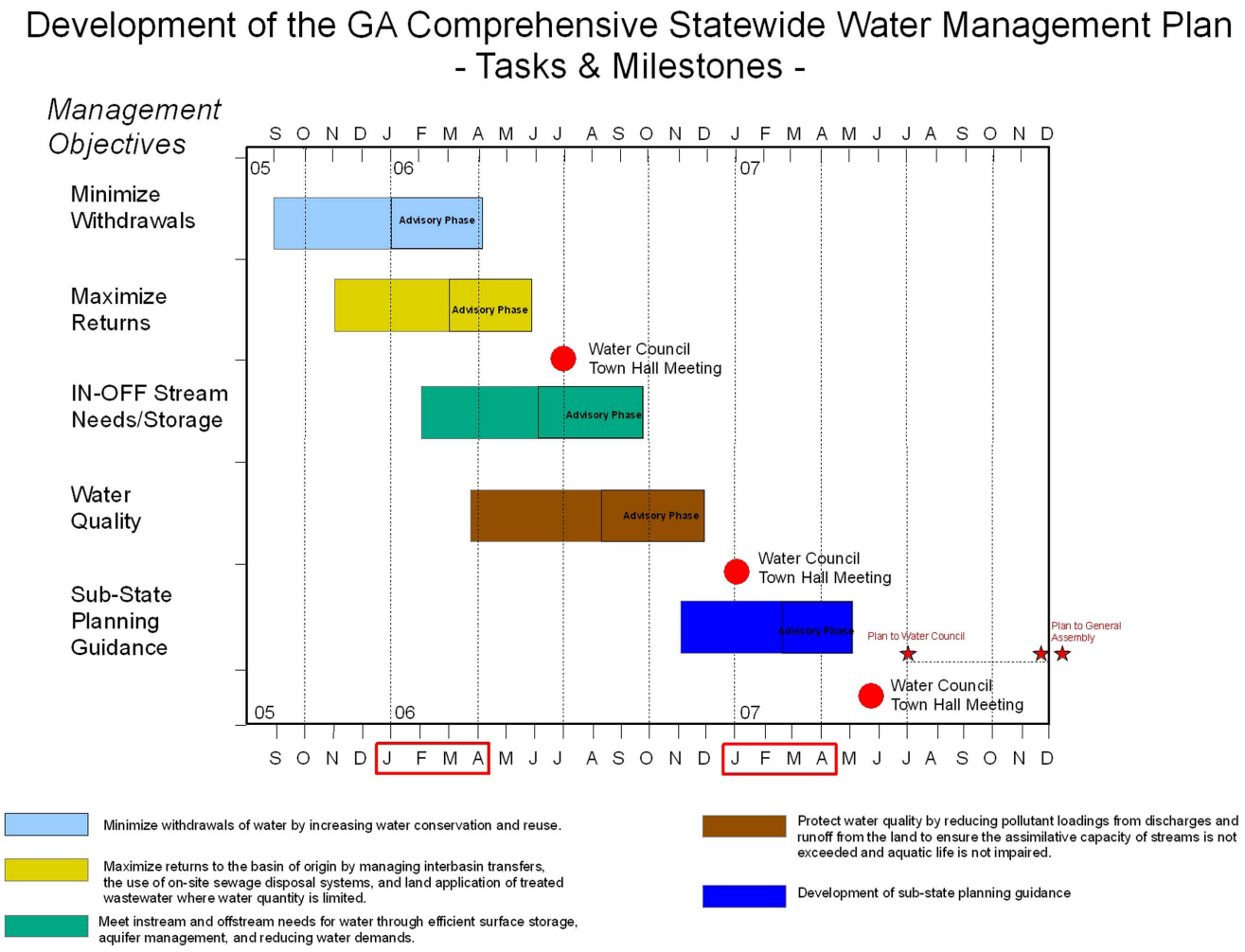


Figure 2 shows the tasks, milestones and advisory periods for the first four water management objectives and sub-state planning. The first iteration of the plan will not

include the actual development of region-specific water management strategies. The first iteration will evaluate water trends and

Figure 2. Tasks and Milestones



conditions to determine the types of challenges that the state may face in advancing the four water management objectives; evaluate legal/management structure (i.e., statutes, rules, programs, policies) to address those challenges; identify gaps and other weaknesses in Georgia's current management approach; identify options for addressing

these gaps and weaknesses; and outline guidance for region-specific water management strategies. The first iteration will, however, include the framework and an array of tools necessary for developing the region-specific management strategies to be developed for subsequent editions of the statewide plan.

CHAPTER 3
Water Quality Monitoring And Assessment

Background

Water Resources Atlas. In an effort to move toward national consistency in estimating river miles and lake acreage, the U.S. Environmental Protection Agency in cooperation with the U.S. Geological Survey (USGS) developed and provided to the States in 1992 estimates for use in this report. The estimates were based on the USGS 1:100,000 Digital Line Graph (DLG) which provides a national database of hydrologic traces. The DLG in coordination with the USEPA River Reach File provided a consistent computerized methodology for summing river miles and lake acreage for each State. The estimates are based on hydrologic features on the USGS 1:100,000 scale map series. The 1:100,000 scale map series is the most detailed scale available nationally in digital form and includes 75 to 90 percent of the hydrologic features on the USGS 1:24,000 scale topographic map series. Included in river mile estimates are perennial streams (streams that flow all year), intermittent streams (streams that stop flowing during dry weather), and ditches and canals (waterways constructed by man). Since 1992, USEPA enhanced the database from which the original estimates were made. The miles of streams were reduced by nearly 1,000 miles while the total acreage estimate for lakes increased by nearly 4000 acres.

The estimates for Georgia used in this report are 44,056 miles of perennial streams, 23,906 miles of intermittent streams, and 603 miles of ditches and canals for a total of 70,150 geological stream miles. The information provided by the USEPA estimates the number of lakes in Georgia to be 11,813 with a total acreage of 425,382. This information is summarized in Table 1.

Georgia has 14 major river basins. These are the Altamaha, Chattahoochee, Coosa, Flint, Ochlockonee, Ocmulgee, Oconee, Ogeechee, St. Marys, Satilla, Savannah, Suwannee, Tallapoosa, and the Tennessee. The rivers in Georgia provide the water needed by aquatic life, animals and humans to sustain life. Water also provides significant recreational opportunities, is used for industrial purposes, drives turbines to provide electricity, and assimilates our wastes.

Water Use Classifications and Water Quality Standards. 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 waters of the State. The water use classifications and standards were first established by the

TABLE 1. WATER RESOURCES ATLAS

State Population	8,383,915
State Surface Area	58,910 square miles
Number of Major River Basins	14
Number of Perennial River Miles	44,056 miles
Number of Intermittent River Miles	23,906 miles
Number of Ditches and Canals	603 miles
Total River Miles	70,150 miles
Number of Lakes Over 500 Acres	48
Acres of Lakes Over 500 Acres	265,365 acres
Number of Lakes Under 500 Acres	11,765
Acres of Lakes Under 500 Acres	160,017 acres
Total Number of Lakes & Reservoirs, Ponds	11,813
Total Acreage of Lakes, Reservoirs, Ponds	425,382 acres
Square Miles of Estuaries	854 square miles
Miles of Coastline	100
Acres of Freshwater Wetlands	4,500,000 acres
Acres of Tidal Wetlands	384,000 acres

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 GAEPD. Georgia was again one of the first states to receive federal approval of a statewide system of water use classifications and standards. Table 2 provides a summary of water use classifications and criteria for each use.

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. This action represented the culmination of 25 years of effort to improve and protect water quality in order that all waters in Georgia could be classified for uses in accordance with goals in the Federal Clean Water Act

TABLE 2. 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] (no./100 ml)**	**Maximum (no./100ml)**	**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
Coastal Fishing[3]							
Fishing	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					
Agriculture[4]	5,000	--	--	3.0	6.0-8.5	5	90
Industrial[4]	--	--	--	3.0	6.0-8.5	5	90
Navigation[4]	5,000	--	--	3.0	6.0-8.5	5	90
Urban Stream[4]	2,000	5,000	--	3.0	6.0-8.5	--	--

[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 2°F 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.
[4]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 these use designations in 1993.

which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water. This goal had been interpreted by the USEPA to be achieved if waters of the State achieved standards associated with the classifications of fishing (including secondary contact recreation) or recreation. Based on Georgia's progress to achieve this goal, the USEPA had reviewed and approved Georgia standards every three years since 1972.

However, in the 1989 triennial review, the USEPA changed its interpretation of the Clean Water Act goal to include the requirement that all waters be classified to protect the use of swimming or primary contact recreation. In order to comply with this change

in Federal requirements, the Board of Natural Resources adopted in December 1989, revised standards which established a fecal coliform bacteria standard of a geometric mean of 200 per 100 ml for all waters with the use designations of fishing or drinking water to apply during the months of May - October (the recreational season). This standard provides the regulatory framework to support the USEPA requirement that States protect all waters for the use of primary contact recreation.

In addition, 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, the Board of Natural Resources adopted 31 numeric standards for protection of aquatic life and 90 numeric standards for the protection of human health. Table 3 provides a summary of toxic substance standards that apply to all waters in Georgia.

In 1995, the Board of Natural Resources adopted additional water quality standards for West Point Lake. Additional standards for Lakes Jackson and Walter F. George were adopted in 1996. Standards were adopted for chlorophyll a, pH, total nitrogen, phosphorus, fecal coliform bacteria, dissolved oxygen, and temperature. Also, standards for major tributary phosphorus loading were established. Water quality standards were adopted by the Board for Lakes Lanier and Allatoona in 2000 and Carters in 2002. The standards for the six lakes are summarized in Table 4.

Water Quality Monitoring

Goals. The goal of the water protection program in Georgia is to effectively manage, regulate, and allocate the water resources of Georgia. In order to achieve this goal, it is necessary to monitor the water resources of the State to establish 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, develop TMDLs, verify water pollution control plant compliance, and document water use impairment and reasons for problems causing less than full support of designated water uses. Trend monitoring, intensive surveys, lake, estuary, biological, toxic substance monitoring, aquatic toxicity testing, and facility compliance sampling are some of the monitoring tools used by the GAEPD.

Trend/River Basin/TMDL Monitoring. Long term monitoring of streams at strategic locations throughout Georgia, trend or ambient monitoring, was initiated by the GAEPD during the late 1960s. This work is conducted by EPD associates and through cooperative agreements with federal, state, and local agencies who collect samples from groups of stations at specific, fixed locations throughout the year.

TABLE 3. Georgia Instream Water Quality Standards For All Waters: Toxic Substances

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

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

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

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

		Acute	Chronic
1.	Arsenic		
	(a) Freshwater	340 µg/l [1]	150 µg/l [1]
	(b) Coastal and Marine Estuarine Waters	69 µg/l [1]	36 µg/l [1]
2.	Cadmium		
	(a) Freshwater	2.0 µg/l [1, 3]	1.3 µg/l [1, 3]
	(b) Coastal and Marine Estuarine Waters	42 µg/l [1]	9.3 µg/l [1]
3.	Chromium III		
	(a) Freshwater	320 µg/l [1,3]	42 µg/l [1,3]
	(b) Coastal and Marine Estuarine Waters	--	--
4.	Chromium VI		
	(a) Freshwater	16 µg/l [1]	11 µg/l [1]
	(b) Coastal and Marine Estuarine Waters	1,100 µg/l [1]	50 µg/l [1]
5.	Copper		
	(a) Freshwater	7.0 µg/l [1,2*,3]	5.0 µg/l [1,2*,3]
	(b) Coastal and Marine Estuarine Waters	4.8 µg/l [1,2]	3.1 µg/l [1,2]
6.	Lead		
	(a) Freshwater	30 µg/l [1,3]	1.2 µg/l [1,2*,3]
	(b) Coastal and Marine Estuarine Waters	210 µg/l [1]	8.1 µg/l [1]
7.	Mercury		
	(a) Freshwater	1.4 µg/l	0.012 µg/l [2]
	(b) Coastal and Marine Estuarine Waters	1.8 µg/l	0.025 µg/l [2]
8.	Nickel		
	(a) Freshwater	260 µg/l [1,3]	29 µg/l [1,3]
	(b) Coastal and Marine Estuarine Waters	74 µg/l [1]	8.2 µg/l [1]
9.	Selenium		
	(a) Freshwater	--	5.0 µg/l
	(b) Coastal and Marine Estuarine Waters	290µg/l [1]	71 µg/l [1]
10.	Silver	-- [4]	-- [4]
11.	Zinc		
	(a) Freshwate	65 µg/l [1,3]	65 µg/l [1,3]
	(b) Coastal and Marine Estuarine Waters	90 µg/l [1]	81 µg/l [1]
12.	Lindane [Hexachlorocyclohexane (g-BHC-Gamma)]		
	(a) Freshwater	0.95 µg/l	
	(b) Coastal and Marine Estuarine Waters	0.16 µg/l	

[1] The in-stream criterion is expressed in terms of the dissolved fraction in the water column . Conversion factors used to calculate dissolved criteria are found in the EPA document – National Recommended Water Quality Criteria – Correction, EPA 822-Z-99-001, April 1999.

[2] The in-stream criterion is lower than the EPD laboratory detection limits (A "*" indicates that the criterion may be higher than or

lower than EPD laboratory detection limits depending upon the hardness of the water).
[3] The aquatic life criteria for these metals are expressed as a function of total hardness (mg/l) in a water body. Values in the table above assume a hardness of 50 mg/l CaCO3. For other hardness values, the following equations from the EPA document – National Recommended Water Quality Criteria – Correction, EPA 822-Z-99-001, April 1999 should be used. The minimum hardness allowed for use in these equations shall not be less than 25 mg/l, as calcium carbonate and the maximum shall not be greater than 400 mg/l as calcium carbonate.

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

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

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

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

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

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

[4] This pollutant is addressed in 391-3-6-.06.

(iii) Instream concentrations of the following chemical constituents listed by the U.S. Environmental Protection Agency as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed criteria indicated below under 7-day, 10-year minimum flow (7Q10) or higher stream flow conditions except within established mixing zones or in accordance with site specific effluent limitations developed in accordance with procedures presented in 391-3-6-.06.

1.	Chlordane	
	(a) Freshwater	0.0043 µg/l*
	(b) Coastal and Marine Estuarine Waters	0.004 µg/l*
2.	Cyanide	
	(a) Freshwater	5.2 µg/l*
	(b) Coastal and Marine Estuarine Waters	1.0 µg/l*
3.	Dieldrin	
	(a) Freshwater	0.056 µg/l*
	(b) Coastal and Marine Estuarine Waters	0.0019 µg/l*
4.	4,4'-DDT	0.001 µg/l*
5.	a-Endosulfan	
	(a) Freshwater	0.056 µg/l*
	(b) Coastal and Marine Estuarine Waters	0.0087 µg/l*
6.	b-Endosulfan	
	(a) Freshwater	0.056 µg/l*
	(b) Coastal and Marine Estuarine Waters	0.0087 µg/l*
7.	Endrin	
	(a) Freshwater	0.036 µg/l*
	(b) Coastal and Marine Estuarine Waters	0.0023 µg/l*
8.	Heptachlor	
	(a) Freshwater	0.0038 µg/l*
	(b) Coastal and Marine Estuarine Waters	0.0036µg/l*
9.	Heptachlor Epoxide	
	(a) Freshwater	0.0038 µg/l*
	(b) Coastal and Marine Estuarine Waters	0.0036 µg/l*

10	Pentachlorophenol	
	(a) Freshwater	2.1 µg/l*
	(b) Coastal and Marine Estuarine Waters	7.9 µg/l*
11.	PCBs	
	(a) Freshwater	0.014 µg/l*
	(b) Coastal and Marine Estuarine Waters	0.03 µg/l*
12.	Phenol	300 µg/l
13.	Toxaphene	0.0002 µg/l*

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

(iv) Instream concentrations of the following chemical constituents listed by the U. S. Environmental Protection Agency as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed criteria indicated below under annual average or higher stream flow conditions:

1.	Acenaphthene	2700 µg/l
2.	Acenaphthylene	**
3.	Acrolein	780 µg/l
4.	Acrylonitrile	0.66 µg/l
5.	Aldrin	0.00014 µg/l
6.	Anthracene	110000 µg/l
7.	Antimony	4300 µg/l
8.	Arsenic	50 µg/l
9.	Benzidine	0.00054 µg/l
10.	Benzo(a)Anthracene	0.049µg/l
11.	Benzo(a)Pyrene	0.049µg/l
12.	3,4-Benzofluoranthene	0.049µg/l
13.	Benzene	71 µg/l
14.	Benzo(ghi)Perylene	**
15.	Benzo(k)Fluoranthene	0.049µg/l
16.	Beryllium	**
17.	a-BHC-Alpha	0.013 µg/l
18.	b-BHC-Beta	0.046 µg/l
19.	Bis(2-Chloroethyl)Ether	1.4 µg/l
20.	Bis(2-Chloroisopropyl)Ether	170000 µg/l
21.	Bis(2-Ethylhexyl)Phthalate	5.9 µg/l
22.	Bromoform (Tribromomethane)	360 µg/l
23.	Butylbenzyl Phthalate	5200
24.	Carbon Tetrachloride	4.4 µg/l
25.	Chlorobenzene	21000 µg/l
26.	Chlorodibromomethane	34 µg/l
27.	2-Chloroethylvinyl Ether	**
28.	Chlordane	0.0022 µg/l
29.	Chloroform (Trichloromethane)	470 µg/l
30.	2-Chloronaphthalene	4300 µg/l
31.	2-Chlorophenol	400 µg/l
32.	Chrysene	0.049 µg/l
33.	Dibenzo(a,h)Anthracene	0.049 µg/l
34.	Dichlorobromomethane	46 µg/l
35.	1,2-Dichloroethane	99 µg/l
36.	1,1-Dichloroethylene	3.2 µg/l
37	1,2 – Dichloropropane	39 µg/l
38.	1,3-Dichloropropylene	1700 µg/l
39.	2,4-Dichlorophenol	790 µg/l
40.	1,2-Dichlorobenzene	17000 µg/l
41.	1,3-Dichlorobenzene	2600 µg/l
42.	1,4-Dichlorobenzene	2600 µg/l
43.	3,3'-Dichlorobenzidine	0.077 µg/l
44.	4,4'-DDT	0.00059 µg/l
45.	4,4'-DDD	0.00084 µg/l
46.	4,4'-DDE	0.00059 µg/l
47.	Dieldrin	0.00014 µg/l

48.	Diethyl Phthalate	120000 µg/l
49.	Dimethyl Phthalate	2900000 µg/l
50.	2,4-Dimethylphenol	2300 µg/l
51.	2,4-Dinitrophenol	14000 µg/l
52.	Di-n-Butyl Phthalate	12000 µg/l
53.	2,4-Dinitrotoluene	9.1 µg/l
54.	1,2-Diphenylhydrazine	0.54 µg/l
55.	Endrin	0.81 µg/l
56.	Endrin Aldehyde	0.81 µg/l
57.	alpha – Endosulfan	240 µg/l
58.	beta – Endosulfan	240 µg/l
59.	Endosulfan Sulfate	240 µg/l
60.	Ethylbenzene	29000 µg/l
61.	Fluoranthene	370 µg/l
62.	Fluorene	14000 µg/l
63.	Heptachlor	0.00021 µg/l
64.	Heptachlor Epoxide	0.00011 µg/l
65.	Hexachlorobenzene	0.00077 µg/l
66.	Hexachlorobutadiene	50 µg/l
67.	Hexachlorocyclopentadiene	17000 µg/l
68.	Hexachloroethane	8.9 µg/l
69.	Indeno(1,2,3-cd)Pyrene	0.049 µg/l
70.	Isophorone	2600 µg/l
71.	Lindane [Hexachlorocyclohexane (g-BHC-Gamma)]	0.063 µg/l
72.	Methyl Bromide (Bromomethane)	4000 µg/l
73.	Methyl Chloride (Chloromethane)	**
74.	Methylene Chloride	1600 µg/l
75.	2-Methyl-4,6-Dinitrophenol	765 µg/l
76.	3-Methyl-4-Chlorophenol	**
77.	Nitrobenzene	1900 µg/l
78.	N-Nitrosodimethylamine	8.1 µg/l
79.	N-Nitrosodi-n-Propylamine	1.4 µg/l
80.	N-Nitrosodiphenylamine	16 µg/l
81.	PCBs	0.00017 µg/l
82.	Pentachlorophenol	8.2 µg/l
83.	Phenanthrene	**
84.	Phenol	4,600,000 µg/l
85.	Pyrene	11,000 µg/l
86.	1,1,2,2-Tetrachloroethane	11 µg/l
87.	Tetrachloroethylene	8.85 µg/l
88.	Thallium	6.3 µg/l
89.	Toluene	200000 µg/l
90.	Toxaphene	0.00075 µg/l
91.	1,2-Trans-Dichloroethylene	140000
92.	1,1,2-Trichloroethane	42 µg/l
93.	Trichloroethylene	81 µg/l
94.	2,4,6-Trichlorophenol	6.5 µg/l
95.	1,2,4-Trichlorobenzene	940 µg/l
96.	Vinyl Chloride	525 µg/l

**These pollutants are addressed in 391-3-6-.06.

(v) Site specific criteria for the following chemical constituents will be developed on an as-needed basis through toxic pollutant monitoring efforts at new or existing discharges that are suspected to be a source of the pollutant at levels sufficient to interfere with designated uses:

1. Asbestos

(vi) instream concentrations of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) must not exceed 0.0000012 µg/l under long-term average stream flow conditions.

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

TABLE 4. WATER QUALITY STANDARDS FOR MAJOR LAKES

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

(a) West Point Lake: Those waters impounded by West Point Dam and downstream of U.S. 27 at Franklin.

(i) Chlorophyll a: For the months of April through October, the average of monthly photic zone composite samples shall not exceed 27 µg/l at the LaGrange Water Intake.

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

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

(iv) Phosphorus: Total lake loading shall not exceed 2.4 pounds per acre foot of lake volume per year.

(v) Fecal Coliform Bacteria:

1. U.S. 27 at Franklin to New River: Fecal coliform bacteria shall not exceed the Fishing criterion as presented in 391-3-6-.03(6)(c).

2. New River to West Point Dam: Fecal coliform bacteria shall not exceed the Recreation criterion as presented in 391-3-6-.03(6)(b).

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

(vii) Temperature: Not to exceed 90°F. At no time is the temperature of the receiving waters to be increased more than 5°F above intake temperature.

(viii) Major Lake Tributaries: For the following tributaries, the annual total phosphorus loading to West Point Lake shall not exceed the following:

1.	Yellow Jacket Creek at Hammet Road:	11,000 pounds.
2.	New River at Hwy 100:	14,000 pounds.
3.	Chattahoochee River at U.S. 27:	1,400,000 pounds.

(b) Lake Walter F. George: Those waters impounded by Walter F. George Dam and upstream to Georgia Highway 39 near Omaha.

(i) Chlorophyll a: For the months of April through October, the average of monthly photic zone composite samples shall not exceed 18 ug/l at mid-river at U.S. Highway 82 or 15 ug/l at mid-river in the dam forebay.

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

(iii) Total Nitrogen: Not to exceed 3.0 mg/l as nitrogen in the photic zone.

(iv) Phosphorous: Total lake loading shall not exceed 2.4 pounds per acre-foot of lake volume per

year.

(v) Fecal Coliform:

1. Georgia Highway 39 to Cowikee Creek: Fecal coliform bacteria shall not exceed the Fishing criterion as presented in 391-3-6-.03(6)(c)(iii).

2. Cowikee Creek to Walter F. George Dam: Fecal coliform bacteria shall not exceed the Recreation criterion as presented in 391-3-6-.03(6)(b)(I).

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

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

(viii) Major Lake Tributary: The annual total phosphorous loading to Lake Walter F. George, monitored at the Chattahoochee River at Georgia Highway 39, shall not exceed 2,000,000 pounds.

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

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

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

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

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

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

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

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

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

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

(d) Lake Allatoona: Those waters impounded by Allatoona Dam and upstream to State Highway 5 on the Etowah River, State Highway 5 on Little River, the Lake Acworth dam, and the confluence of Little Allatoona Creek and Allatoona Creek. Other impounded tributaries to an elevation of 840 feet mean sea level corresponding to the normal pool elevation of Lake Allatoona.

(i) Chlorophyll a: For the months of April through October, the average monthly mid-channel photic zone composite samples shall not exceed the chlorophyll a concentrations at the locations listed below:

1.	Upstream from the Dam	10 ug/l
2.	Allatoona creek upstream form I-75	10 ug/l
3.	Mid-Lake downstream from Kellogg Creek	10 ug/l
4.	Little River upstream from Highway 205	15 ug/l
1.	Etowah River upstream from Sweetwater Creek	12 ug/l

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

(iii) Total Nitrogen: Not to exceed 4 mg/l as nitrogen in the photic zone.

(iv) Phosphorous: Total lake loading shall not exceed 1.3 pounds per acre-foot of lake volume per year.

(v) Fecal Coliform:

1. Etowah River, State Highway 5 to State Highway 20: Fecal coliform bacteria shall not exceed the Fishing Criterion as presented in 391-3-6-.03(6)(c)(iii).

2. Etowah River, State Highway 20 to Allatoona Dam; Fecal coliform bacteria shall not exceed the Recreation criteria as presented in 391-3-6-.03(6)(b)(i).

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

(vii) Temperature:

1. Etowah River, State Highway 5 to State Highway 20: Water temperature shall not exceed the Fishing criterion as presented in 391-3-6-.03(6)(b)(iv).

2. Etowah River State Highway 20 to Allatoona Dam: Water temperature shall not exceed the Recreation criterion as presented in 391-3-6-.03(6)(b)(iv).

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

1.	Etowah River at State Highway 5 spur and 140, at the USGS gage	340,000 lbs/yr
2.	Little River at State Highway 5 (Highway 754)	42,000 lbs/yr
3.	Noonday Creek at North Rope Mill Road	38,000 lbs/yr
4.	Shoal Creek at State Highway 108 (Fincher Road)	9,200 lbs/yr

(e) Lake Sidney Lanier. Those waters impounded by Buford Dam and upstream to Belton Bridge Road on the Chattahoochee River, 0.6 miles downstream from State Road 400 on the Chestatee River, as well as other impounded tributaries to an elevation of 1070 feet mean sea level

corresponding to the normal pool elevation of Lake Sidney Lanier.

(i) Chlorophyll a: For the months of April through October, the average of monthly mid-channel photic zone composite samples shall not exceed the chlorophyll a concentrations at the locations listed below:

1.	Upstream from the Buford Dam forebay	5 ug/l
2.	Upstream from the Flowery Branch confluence	5 ug/l
3.	At Browns Bridge Road (State Road 369)	5 ug/l
4.	At Bolling Bridge (State Road 53) on Chestatee River	10 ug/l
5.	At Lanier Bridge (State Road 53) on Chattahoochee River	10 ug/l

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

(iii) Total Nitrogen: Not to exceed 4 mg/l as nitrogen in the photic zone.

(iv) Phosphorous: Total lake loading shall not exceed 0.25 pounds per acre-foot of lake volume per year.

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

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

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

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

1.	Chattahoochee River at Belton Bridge Road	178,000 pounds
2.	Chestatee River at Georgia Highway 400	118,000 pounds
3.	Flat Creek at McEver Road	14,400 pounds

(f) Carters Lake: Those waters impounded by Carters Dam and upstream on the Coosawattee River as well as other impounded tributaries to an elevation of 1072 feet mean sea level corresponding to the normal pool elevation of Carters Lake.

(i) Chlorophyll a: For the months of April through October, the average of monthly mid-channel photic zone composite samples shall not exceed the chlorophyll a concentrations at the locations listed below:

1.	Carters Lake upstream from Woodring Branch	5 ug/l
2.	Carters Lake at Coosawattee River embayment mouth	10 ug/l

(ii) pH: within the range of 6.0 – 9.5 standard units.

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

(iv) Phosphorous: Total lake loading shall not exceed 172,500 pounds or 0.46 pounds per acre-foot of lake volume per year.

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

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

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

(viii) Major Lake Tributaries: For the following major tributaries, the annual total phosphorous loading at the compliance monitoring location shall not exceed the following:

1.	Coosawattee River at Old Highway 5	151,500 pounds
2.	Mountaintown Creek at U.S. Highway 76	8,000 pounds

The cooperating agencies conduct certain tests in the field and ship stream samples to the GAEPD or USGS laboratories for additional laboratory analyses. Although there have been a number of changes over the years, much of the trend monitoring is still accomplished through similar cooperative agreements.

Today the GAEPD contracts with the United States Geological Survey (USGS) for the statewide trend sampling work, and with the Columbus Water Works for samples on the Chattahoochee River below Columbus. In addition to monthly stream sampling, a portion of the work with the USGS involves continuous monitoring at several locations across the State. Automatic monitors which continuously record dissolved oxygen, temperature, pH and conductivity data are located on the Chattahoochee and South Rivers downstream of Atlanta, the Conasauga River below Dalton, the Coosa River at the State Line and the Ocmulgee River downstream of Macon.

In addition to work done through cooperative agreements, GAEPD associates collect monthly samples from a number of locations across the state as part of the trend monitoring program. In 2000-2001 the GAEPD added two trend monitoring sampling teams. One team works from the Brunswick District Office and the second team works from the EPD Atlanta Office. The Brunswick sampling team conducts monthly sampling at locations across south Georgia in the Ochlockonee, Suwannee, Satilla, Altamaha, Savannah and Ogeechee River basins. The Atlanta sampling team conducts monthly sampling at stations across the Coosa, Tallapoosa, Chattahoochee, Flint, Oconee and Ocmulgee River basins. The work of the two sampling teams adds significantly to the number of locations sampled each year which compliments the rotating basin trend monitoring program.

The trend monitoring network in place in 1994 is shown in Figure 1. In 1995, the GAEPD adopted and implemented significant changes to the strategy for trend monitoring in Georgia. The changes were implemented to support River Basin Management Planning and TMDL programs. 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. Statewide trend monitoring was continued at the core station locations, in the Chattahoochee in the Atlanta and Columbus areas, and at all continuous monitoring locations. The remainder of the trend monitoring resources were devoted to the basins of focus each year. As a result, more sampling was conducted along the mainstem and in the smaller tributaries of each river. In 1995 the Chattahoochee and Flint River basins were the basins of monitoring focus; in 1996 was the Coosa, Tallapoosa and Oconee; 1997 the Savannah and Ogeechee River basins; in 1998 the Ochlockonee, Suwannee, Satilla, and the St. Marys; and in 1999 the Ocmulgee, Oconee, and Altamaha. This completed the initial five year cycle of focused river basin monitoring. A second cycle was completed in 2000-2004 and a third cycle was be initiated in 2005.

FIGURE 1
GEORGIA TREND MONITORING NETWORK
STATION LOCATIONS 1994

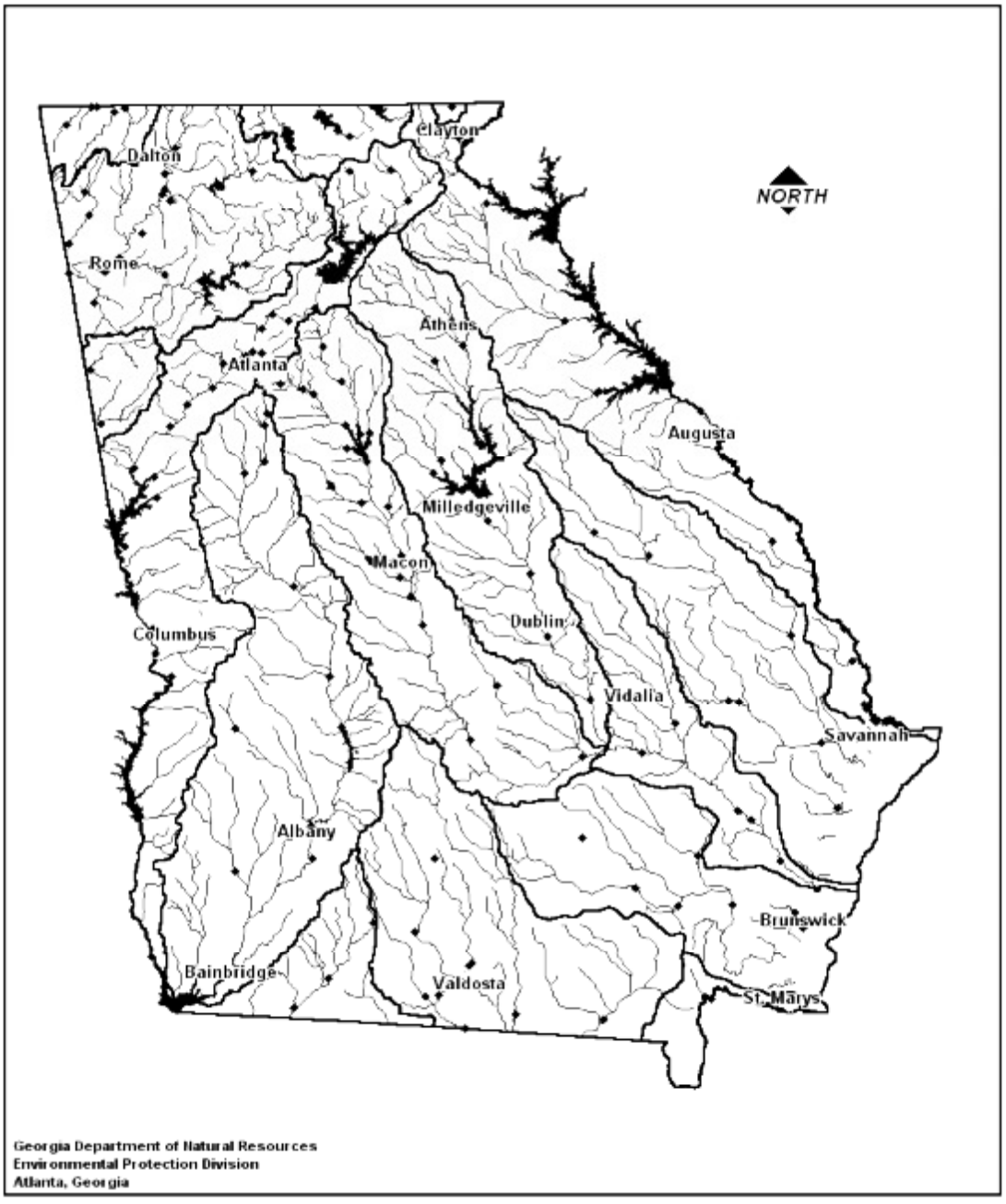


FIGURE 2
GEORGIA TREND MONITORING NETWORK
STATION LOCATIONS 2000-2004

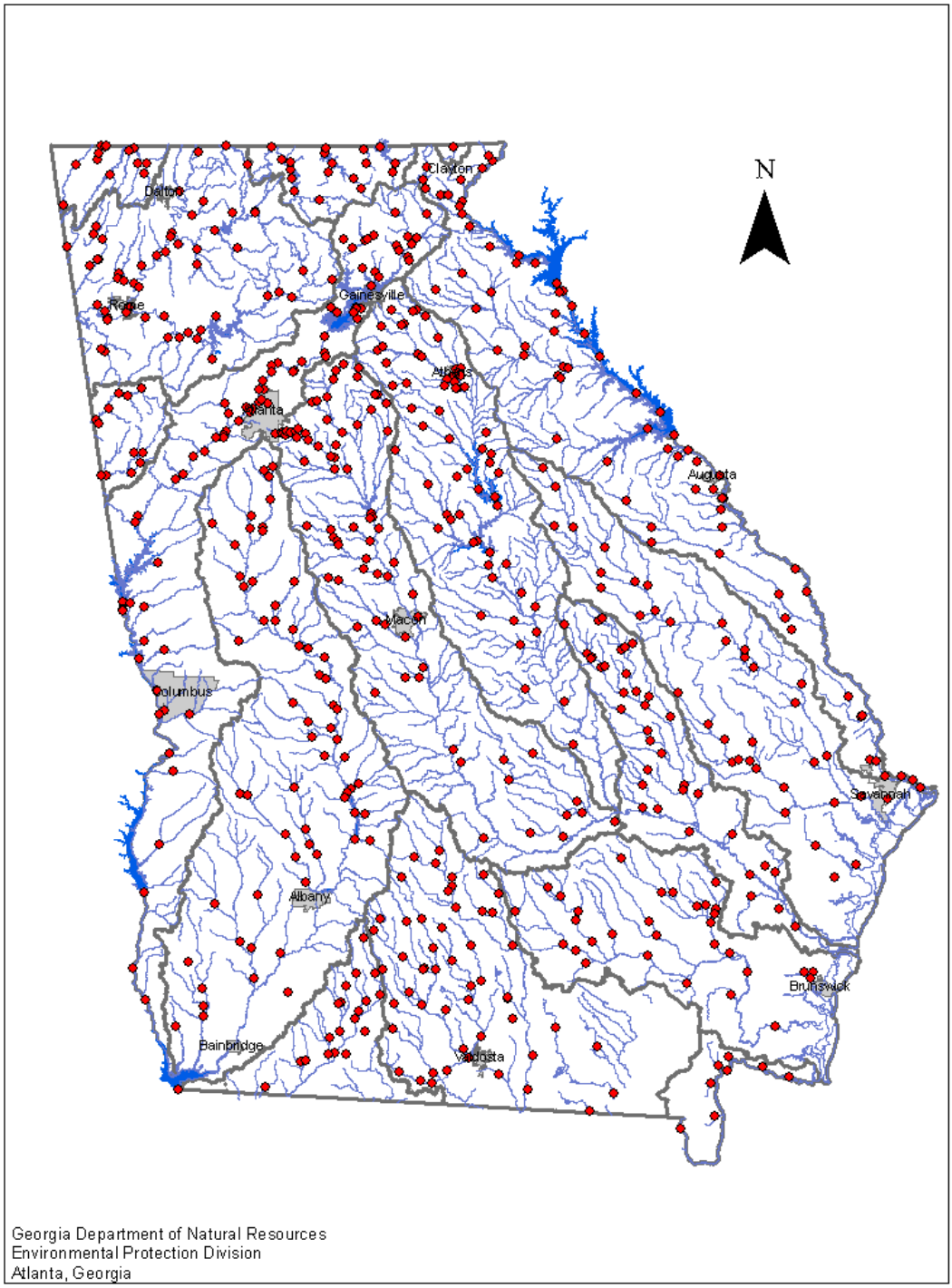


Figure 2 shows the monitoring network stations for the period 2000-2004. Figures 3

and 4 show the trend monitoring station locations in 2004 and 2005, and Tables 5 and 6 provide a list of stations and parameters for the 2004 and 2005 monitoring networks.

Intensive Surveys. Intensive surveys complement long term fixed station monitoring as these studies focus intensive monitoring 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 where 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.

Biological Monitoring. Biological monitoring is performed in order to assess the biological integrity of the States waters. The Department of Natural Resources' Wildlife Resource Division has been conducting bioassessments using fish as the indicator species since the early 1990's. The primary technique for determining the quality of fish communities is called the Index of Biotic Integrity (IBI). This index utilizes the numbers and types of fish species present in a stream to produce a stream score or rating for comparison across streams within a particular ecoregion or to the same stream over time. Biological monitoring is useful in detecting intermittent sources of pollution that may not be caught in trend monitoring of water quality parameters. The Tennessee Valley Authority has also collected fish IBI data in Georgia.

Lake Monitoring. The GAEPD has maintained monitoring programs for Georgia's public access lakes for many years. In the late 1960's, lake water quality studies were conducted on Lake Lanier and Jackson Lake. Also at that time 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, GAEPD staff participated in the USEPA National Eutrophication Survey which included fourteen lakes in Georgia. Additional lake monitoring continued through the 1970s. The focus of these studies was primarily problem/solution oriented and served as the basis for regulatory decisions. Georgia's water quality monitoring network has collected long term data from sites in four major lakes including Lake Lanier, West Point Lake, Lake Harding, and Jackson Lake.

In 1980-1981, the GAEPD 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

FIGURE 3
GEORGIA TREND MONITORING NETWORK
STATION LOCATIONS 2004

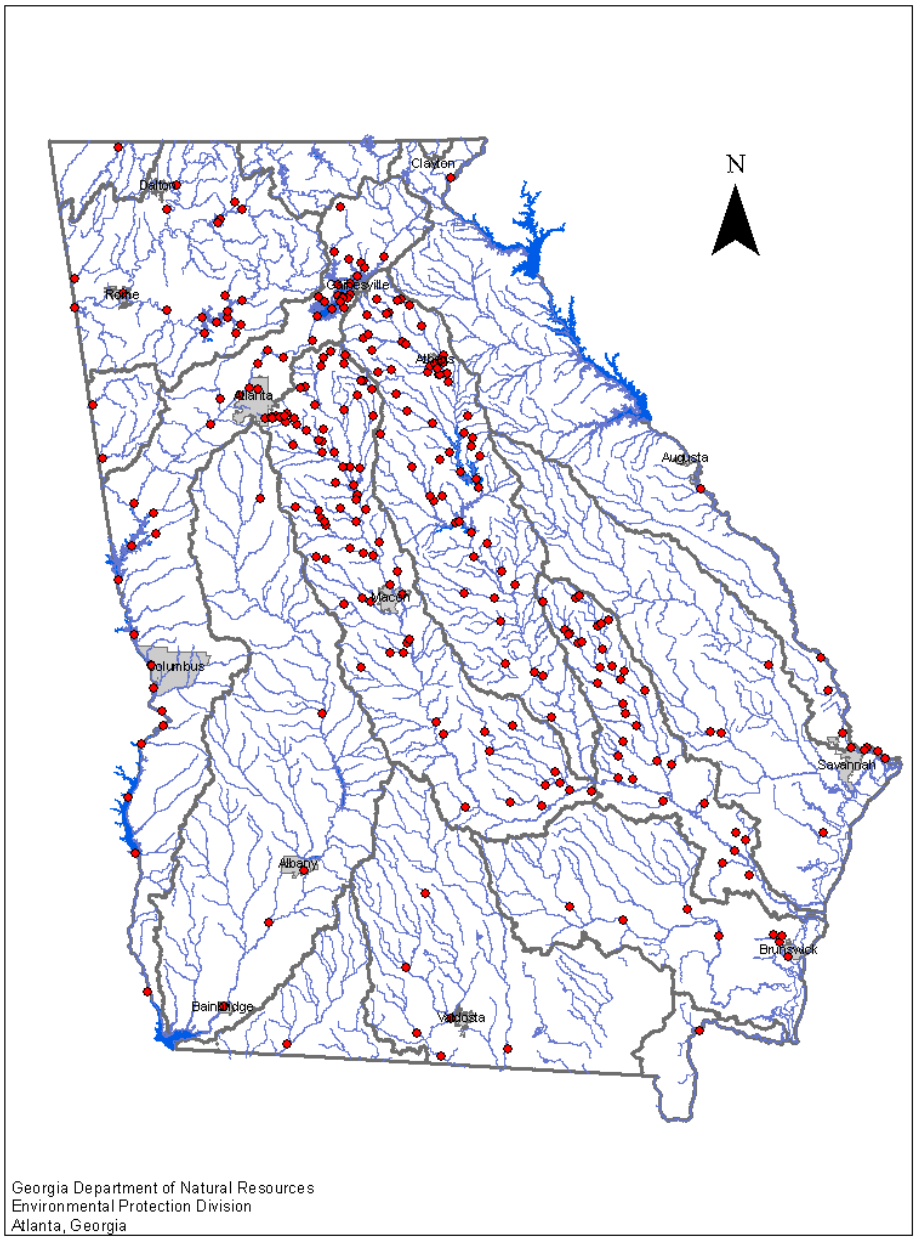


FIGURE 4
GEORGIA TREND MONITORING NETWORK
STATION LOCATIONS 2005

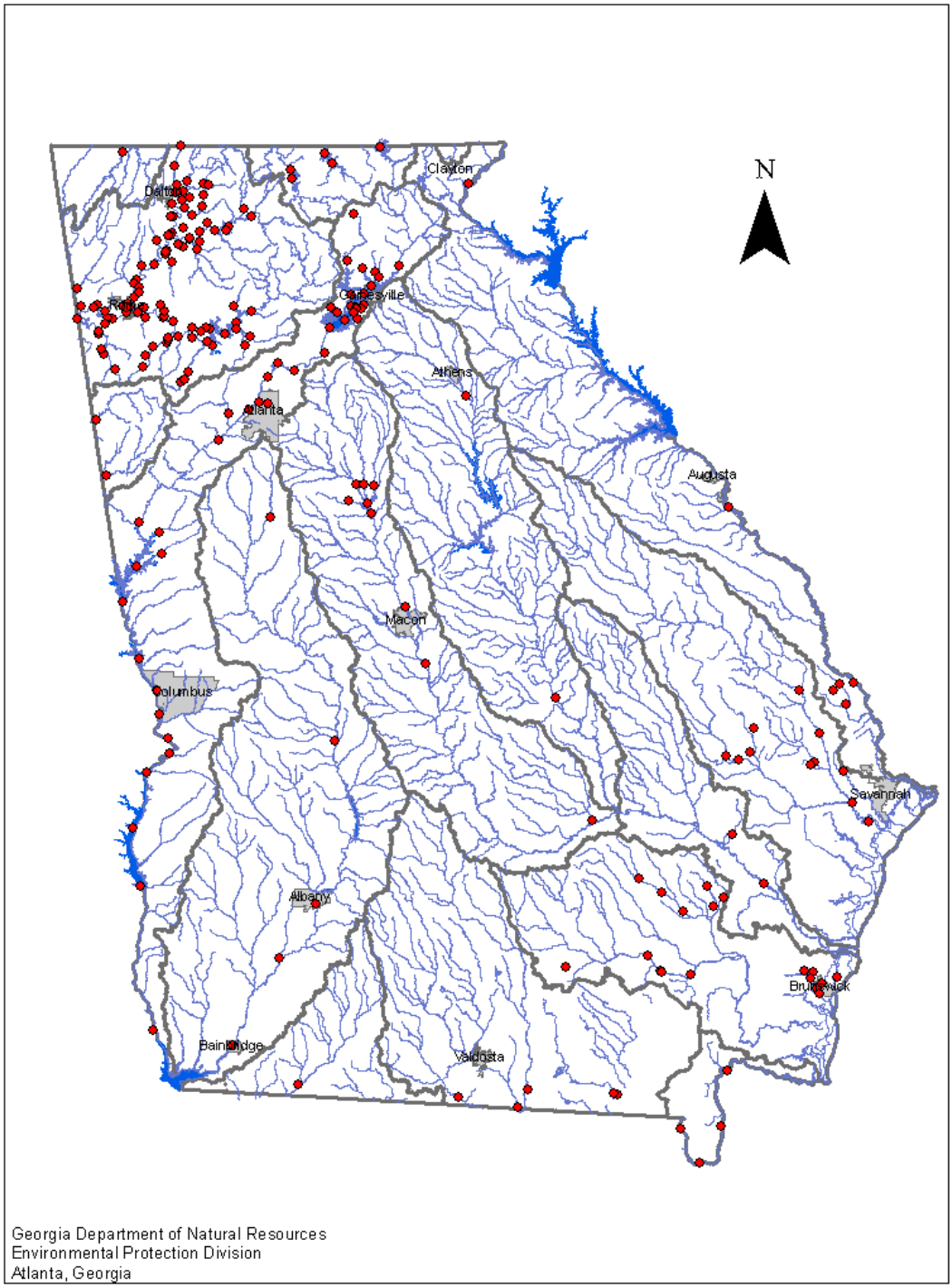


TABLE 5. GEORGIA TREND MONITORING NETWORK 2004

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
01001001	Chattooga River at U.S. Highway 76 near Clayton, Georgia	C	Standard
01011001	Savannah River at 0.5 Mile Downstream from Spirit Creek near Augusta	C	Standard
01014001	Savannah River at Seaboard Coast Line Railway near Clyo, Georgia	C	Standard
01015001	Savannah River - U.S. Highway 17	C	Standard
02023001	Ogeechee River at State Road 24 near Oliver, Georgia	C	Standard
03035001	Oconee River at FAS 1086 near Watkinsville, Georgia	C	Standard
03051001	Oconee River at Interstate Highway 16 near Dublin, Georgia	C	Standard
04140001	South River at Island Shoals Road near Snapping Shoals, Georgia	A	Standard
04220001	Yellow River at State Road 212 near Stewart, Georgia	C	Standard
04250001	Ocmulgee River - 1.1 Miles Downstream From Yellow and South	C	Standard + Chlorophyll
04310001	Alcovy River at Newton Factory Bridge Road near Stewart, Georgia	C	Standard
04450001	Tussahaw Creek at Fincherville Road near Jackson, Georgia	A	Standard
05010001	Ocmulgee River at Macon Water Intake near Macon, Georgia	C	Standard
05015001	Ocmulgee River - 6.0 Miles D/S from Tobesofkee Creek	C	Standard
05025001	Ocmulgee River at U.S. Highway 341 at Lumber City, Georgia	C	Standard
06016001	Altamaha River - 6.0 Miles Downstream From Doctortown near Gardi	C	Standard
07005801	Brunswick River - U.S. Highway 17	C	Standard
07021001	Satilla River at State Roads 15/121 near Hoboken, Georgia	C	Standard
09001001	Suwannee River at U.S. Highway 441 near Fargo, Georgia	C	Standard
09044501	Withlacoochee River at Clyattville-Nankin Road near Clyattville, Georgia	C	Standard
10017001	Ochlockonee River - Bridge 3.2 Miles North of State Line near Calvary	C	Standard
11011001	Flint River at State Road 138 near Jonesboro, Georgia	BM	Standard, Metals
11013001	Flint River at State Road 54 near Fayetteville, Georgia	BM	Standard, Metals
11013401	Camp Creek at State Road 85 near Fayetteville, Georgia	BM	Standard, Metals
11015001	Flint River at Ackert Road near Inman, Georgia	BM	Standard, Metals
11018001	Flint River at State Road 92 near Griffin, Georgia	C	Standard, Metals
11019801	Wildcat Creek at Moon Road near Griffin, Georgia	BM	Standard, Metals
11020001	Flint River at State Road 16 near Griffin, Georgia	BM	Standard, Metals
11024501	Whitewater Creek at Morgan Mill Road near Brooks, Georgia	BM	Standard, Metals
11025001	Line Creek at State Road 16 near Digbey, Georgia	BM	Standard, Metals
11027201	White Oak Creek at State Road 54 near Sharpsburg, Georgia	BM	Standard, Metals
11028001	White Oak Creek at State Road 85 near Alvaton, Georgia	BM	Standard, Metals
11031201	Red Oak Creek at Harman Hall Road near Imlac, Georgia	BM	Standard, Metals
11031801	Flint River at State Road 18 near Molena, Georgia	BM	Standard, Metals
11032301	Elkins Creek at State Road 109 near Molena, Georgia	BM	Standard, Metals
11035501	Flint River at State Road 36 near Thomaston, Georgia	BM	Standard, Metals
11036501	Lazer Creek at State Road 41 near Talbotton, Georgia	BM	Standard, Metals
11039001	Potato Creek at Alabama Road near Piedmont, Georgia	BM	Standard, Metals
11040001	Potato Creek at State Road 74 near Thomaston, Georgia	BM	Standard, Metals
11041501	Bell Creek at Gordon School Road near Lincoln Park, Georgia	BM	Standard, Metals
11045501	Swift Creek at State Road 3 near Thomaston, Georgia	BM	Standard, Metals
11050001	Flint River at U.S. Highway 19 near Culloden, Georgia	BM	Standard, Metals
11051001	Ulcohatchee Creek at Charlie Reeves Road near Roberta, Georgia	BM	Standard, Metals
11054651	Patsiliga Creek at Patsiliga Creek Bridge Road (CR 128) near Reynolds	BM	Standard, Metals
11056401	Horse Creek at Miona Springs Road near Marshallville, Georgia	BM	Standard, Metals
11056501	Flint River at State Road 127 near Marshallville, Georgia	BM	Standard, Metals
11058401	Whitewater Creek at State Road 3 near Butler, Georgia	BM	Standard, Metals

TABLE 5. GEORGIA TREND MONITORING NETWORK 2004

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
11058501	Whitewater Creek at State Road 195 near Ideal, Georgia	BM	Standard, Metals
11059801	Buck Creek at State Road 240 near Ideal, Georgia	BM	Standard, Metals
11060001	Flint River at State Roads 26/49 near Montezuma, Georgia	C	Standard, Metals
11060191	Camp Creek at State Road 49 near Oglethorpe, Georgia	BM	Standard, Metals
11060201	Beaver Creek at State Road 49 near Montezuma, Georgia	BM	Standard, Metals
11060501	Hogcrawl Creek at River Road near Montezuma, Georgia	BM	Standard, Metals
11061101	Pennahatchee Creek at Baggs Road near Vienna, Georgia	BM	Standard, Metals
11061201	Turkey Creek at State Road 230 at Drayton, Georgia	BM	Standard, Metals
11061301	Flint River at State Road 27 near Vienna, Georgia	BM	Standard, Metals
11061421	Lime Creek at Spring Hill Church Road near Cobb, Georgia	BM	Standard, Metals
11061901	Gum Creek at U.S. Highway 280 at Coney, Georgia	BM	Standard, Metals
11062771	Swift Creek at Jamestown Road near Warwick, Georgia	BM	Standard, Metals
11064001	Muckalee Creek at State Road 30 near Americus, Georgia	BM	Standard, Metals
11064201	Muckalee Creek at State Road 118 near Smithville, Georgia	BM	Standard, Metals
11064451	Muckaloochee Creek at Smithville Road near Starksville, Georgia	BM	Standard, Metals
11064501	Muckalee Creek at State Road 195 near Leesburg, Georgia	BM	Standard, Metals
11065001	Kinchafoonee Creek at State Road 41 near Preston, Georgia	BM	Standard, Metals
11065501	Lanahassee Creek at State Road 153 near Preston, Georgia	BM	Standard, Metals
11067501	Kinchafoonee Creek at State Road 118 near Smithville, Georgia	BM	Standard, Metals
11068001	Kinchafoonee Creek at Prison Farm Road near Dawson, Georgia	BM	Standard, Metals
11079501	Fowltown Creek at Palmyra Road near Albany, Georgia	BM	Standard, Metals
11090401	Flint River at State Road 234 near Albany, Georgia	BM	Standard, Metals
11101001	Raccoon Creek at State Road 3 near Baconton, Georgia	BM	Standard, Metals
11101801	Cooleewahee Creek at State Road 91 at Newton, Georgia	BM	Standard, Metals
11102001	Flint River at State Road 37 at Newton, Georgia	BM	Standard, Metals
11105501	Pachitla Creek at State Road 37 near Edison, Georgia	BM	Standard, Metals
11106001	Ichawaynochaway Creek at State Road 216 near Milford, Georgia	BM	Standard, Metals
11106201	Chickasawhatchee Creek at State Road 234 near Albany, Georgia	BM	Standard, Metals
11106301	Chickasawhatchee Creek at State Road 37 near Elmodel, Georgia	BM	Standard, Metals
11106501	Ichawaynochaway Creek at State Road 91 near Newton, Georgia	BM	Standard, Metals
11107501	Big Slough at State Road 65 near Camilla, Georgia	BM	Standard, Metals
11107801	Big Slough at State Road 97 near Bainbridge, Georgia	BM	Standard, Metals
11109001	Flint River at U.S. Highway 27-B near Bainbridge, Georgia	BM	Standard, Metals
11430001	Dry Creek at County Road 279 near Hentown, Georgia	BM	Standard, Metals
11450001	Spring Creek at State Road 91 near Colquitt, Georgia	BM	Standard, Metals
11470001	Aycocks Creek at Holmes Road near Boykin, Georgia	BM	Standard, Metals
11490001	Spring Creek near Iron City, Georgia	BM	Standard, Metals
11780501	Fishpond Drain at State Road 39 near Donalsonville, Georgia	BM	Standard, Metals
12010001	Chattahoochee River at State Roads 17/75 near Nacooche, Georgia	BM	Standard, Metals
12020001	Chattahoochee River at State Road 115 near Leaf, Georgia	BM	Standard, Metals
12024001	Soque River at State Road 197 near Clarkesville, Georgia	BM	Standard, Metals
12028001	Soque River at State Road 105 near Demorest, Georgia	BM	Standard, Metals
12030001	Chattahoochee River at Duncan Bridge Road near Cornelia, Georgia	BM	Standard, Metals
12030021	Mossy Creek at State Road 254 near Cleveland, Georgia	BM	Standard, Metals
12030085	Chattahoochee River at Belton Bridge Road near Lula, Georgia	A	Standard, Metals
12030141	West Fork Little River at Jess Helton Road near Clermont, Georgia	BM	Standard, Metals
12030201	Lake Sidney Lanier at Lanier Bridge (SR 53) on Chattahoochee River	A	Standard, Chlorophyll
12033201	Dicks Creek at Forest Service Road 144-1 near Neels Gap, Georgia	C	Standard, Metals
12034681	Tesnatee Creek at County Road 200 near Cleveland, Georgia	BM	Standard, Metals
12035001	Chestatee River at Georgia Highway 52 near Dahlonega, Georgia	BM	Standard, Metals

TABLE 5. GEORGIA TREND MONITORING NETWORK 2004

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
12035071	Yahoola Creek at State Road 60 near Dahlonega, Georgia	BM	Standard, Metals
12035101	Yahoola Creek at Georgia Highway 52 near Dahlonega, Georgia	BM	Standard, Metals
12035401	Chestatee River at State Road 400 near Dahlonega, Georgia	A	Standard, Metals
12037001	Lake Sidney Lanier at Boling Bridge (State Road 53) on Chestatee River	A	Standard, Chlorophyll
12038001	Lake Sidney Lanier at Browns Bridge Road (State Road 369)	A	Standard, Chlorophyll
12038501	Flat Creek at McEver Road near Gainesville, Georgia	A	Standard, Metals
12039401	Lake Sidney Lanier upstream from Flowery Branch Confluence	A	Standard, Chlorophyll
12040001	Lake Sidney Lanier upstream from the Buford Dam Forebay	A	Standard, Chlorophyll
12043001	Chattahoochee River at State Road 20 near Buford, Georgia	BM	Standard, Metals
12048001	Chattahoochee River at McGinnis Ferry Road	BM	Standard, Metals
12050001	Chattahoochee River - Gwinnett County Water Intake	BM	Standard, Metals
12050301	Suwanee Creek at U.S. Highway 23 near Suwanee, Georgia	BM	Standard, Metals
12054401	Johns Creek at Old Alabama Road near Alpharetta, Georgia	BM	Standard, Metals
12055001	Chattahoochee River - DeKalb County Water Intake	BM	Standard, Metals
12055361	Crooked Creek at Spalding Drive near Norcross, Georgia	BM	Standard, Metals
12060001	Big Creek at Roswell Water Intake near Roswell, Georgia	BM	Standard, Metals
12064001	Willeo Creek at State Road 120 near Roswell, Georgia	RC	Standard, Metals
12070001	Chattahoochee River at Cobb County Water Intake near Roswell	RC	Standard, Metals
12070011	Chattahoochee River at Johnson Ferry Road near Atlanta, Georgia	BM	Standard, Metals
12072101	Sope Creek at Columns Drive near Marietta, Georgia	BM	Standard, Metals
12073201	Long Island Creek at Northside Drive near Atlanta, Georgia	BM	Standard, Metals
12073901	Rottenwood Creek at Interstate North Parkway near Smyrna, Georgia	BM	Standard, Metals
12080001	Chattahoochee River - Atlanta Water Intake	RC	Standard, Metals
12090001	Peachtree Creek at Northside Drive near Atlanta, Georgia	RC	Standard, Metals
12090901	Nancy Creek at West Wesley Road near Atlanta, Georgia	BM	Standard, Metals
12105001	Chattahoochee River - I-285 Upstream from Proctor Creek	RC	Standard, Metals
12105701	Proctor Creek at Northwest Drive near Atlanta, Georgia	BM	Standard, Metals
12106001	Chattahoochee River at Bankhead Highway	BM	Standard, Metals
12109001	Nickajack Creek at Bankhead Highway (U.S. 78) near Mableton, Georgia	BM	Standard, Metals
12109451	Sandy Creek at Bolton Road near Atlanta, Georgia	BM	Standard, Metals
12113051	Utoy Creek at Great Southwest Parkway near Atlanta, Georgia	BM	Standard, Metals
12118001	Sweetwater Creek at Powder Springs Road near Austell, Georgia	BM	Standard, Metals
12120001	Sweetwater Creek at Interstate Highway 20	RC	Standard, Metals
12130001	Chattahoochee River at State Road 166 near Ben Hill, Georgia	BM	Standard, Metals
12134501	Camp Creek at Cochran Road near Fairburn, Georgia	BM	Standard, Metals
12138501	Deep Creek at Cochran Road near Fairburn, Georgia	BM	Standard, Metals
12140001	Chattahoochee River - Georgia Highway 92	RC	Standard, Metals
12140201	Anneewakee Creek at State Road 166 near Douglasville, Georgia	BM	Standard, Metals
12140501	Chattahoochee River at Capps Ferry Road near Rico, Georgia	C	Standard, Metals
12141511	Bear Creek at State Road 70 near Rico, Georgia	BM	Standard, Metals
12145001	Snake Creek at Banning Mill Road near Whitesburg, Georgia	BM	Standard, Metals
12148001	Cedar Creek at Brimer Road near Roscoe, Georgia	BM	Standard, Metals
12150001	Chattahoochee River at State Road 16 near Whitesburg, Georgia	BM	Standard, Metals
12169801	Centralhatchee Creek at U.S. Highway 27 near Franklin, Georgia	BM	Standard, Metals
12170001	Chattahoochee River at U.S. Highway 27 near Franklin, Georgia	A	Standard, Metals
12171201	Hillabahatchee Creek at State Road 34 near Franklin, Georgia	BM	Standard, Metals
12174301	New River at State Road 100 near Corinth, Georgia	A	Standard, Metals
12180001	Chattahoochee River at LaGrange Water Intake near LaGrange, Georgia	A	Standard, Chlorophyll
12181601	Yellow Jacket Creek at Hammet Road near Hogansville, Georgia	A	Standard, Metals
12181801	Beech Creek at Hammett Road near LaGrange, Georgia	BM	Standard, Metals

TABLE 5. GEORGIA TREND MONITORING NETWORK 2004

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
12190001	Long Cane Creek at Webb Road near West Point, Georgia	BM	Standard, Metals
12200001	Chattahoochee River - 1.0 Mile U/S from U.S. Hwy. 29 near West Point	BM	Standard, Metals
12201301	Flat Shoals Creek at State Road 18 near West Point, Georgia	BM	Standard, Metals
12201901	Mountain Oak Creek at State Road 103 near Hamilton, Georgia	BM	Standard, Metals
12210001	Chattahoochee River - Upstream from Bartletts Ferry Dam	BM	Standard, Metals
12211201	Mulberry Creek at Hamilton-Mulberry Grove Road near Mulberry Grove	BM	Standard, Metals
12212001	Chattahoochee River at Columbus Water Intake near Columbus, Georgia	BM	Standard, Metals
12214651	Bull Creek at U.S. Highway 27 near Columbus, Georgia	BM	Standard, Metals
12216001	Chattahoochee River - Downstream from Columbus WTF	BM	Standard, Metals
12216701	Upatoi Creek at Red Arrow Road (Fort Benning) near Columbus, Georgia	BM	Standard, Metals
12218001	Chattahoochee River - Downstream Oswichee Creek	C	Standard, Chlorophyll
12218901	Hannahatchee Creek at Toby Road near Union, Georgia	BM	Standard, Metals
12219001	Chattahoochee River at Spur 39 near Omaha, Georgia	A	Standard, Metals
12219101	Chattahoochee River/Walter F. George Lake at U.S. Highway 82	A	Standard, Chlorophyll
12219301	Pataula Creek at State Road 50 near Georgetown, Georgia	BM	Standard, Metals
12219501	Chattahoochee River/Walter F. George Lake at Dam Forebay	A	Standard, Chlorophyll
12219601	Chattahoochee River at State Road 37 near Fort Gaines, Georgia	BM	Standard, Metals
12219801	Chattahoochee River at State Road 62 near Hilton, Georgia	BM	Standard, Metals
12220001	Chattahoochee River at U.S. Highway 84 near Alaga, Georgia	BM	Standard, Metals
12230001	Chattahoochee River at State Road 91 near Steam Mill, Georgia	C	Standard, Metals
13030001	Tallapoosa River at U.S. Highway 78 near Tallapoosa, Georgia	A	Standard
14010051	Coosa River at U.S. Highway 76 near Dalton, Georgia	C	Standard
14030001	Conasauga River at Tilton Bridge near Tilton, Georgia	C	Standard
14250001	Oostanaula River at Rome Water Intake near Rome, Georgia	C	Standard
14300001	Etowah River at State Road 5 spur near Canton, Georgia	C	Standard
14300601	Shoal Creek at State Road 108 near Waleska, Georgia	A	Standard
14302001	Lake Allatoona - Off Fields Landing - 44E-45E	A	Standard
14304001	Little River at State Road 5 near Woodstock, Georgia	A	Standard
14304221	Noonday Creek at North Rope Mill Road near Woodstock, Georgia	A	Standard
14304801	Lake Allatoona - Little River Emb - Upstream Highway 205	A	Standard
14305801	Lake Allltoona - North Of Galts Ferry Landing	A	Standard
14307501	Lake Allatoona At Highway 293	A	Standard
14309001	Lake Allatoona 300 Meters Upstream Dam	A	Standard
14330001	Etowah River at FAS 829 near Euharlee, Georgia	C	Standard
14450001	Coosa River at Georgia/Alabama State Line near Coosa, Georgia	C	Standard
14560001	Chattooga River at FAS 1363 near Chattoogaville, Georgia	C	Standard
15090001	West Chickamauga Creek at State Road 146 near Lakeview, Georgia	C	Standard

[1]There are three major types of stations: core(C), annual (A), and basin monitoring (BM).

[2]Standard parameters include gage height, air temperature, water temperature, dissolved oxygen, turbidity, conductivity, BOD5, pH, alkalinity, hardness, ammonia, nitrite+nitrate, phosphorus, TOC, and fecal coliform bacteria.

TABLE 6. GEORGIA TREND MONITORING NETWORK 2005

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
01001001	Chattooga River at U.S. Highway 76 near Clayton, Georgia	C	Standard
01011001	Savannah River 0.5 Mile d/s from Spirit Creek near Augusta, Georgia	C	Standard
01013001	Brier Creek near Millhaven, Georgia	A	Standard
01014001	Savannah River at Seaboard Coast Line Railway near Clyo, Georgia	C	Standard
01014501	Ebenezer Creek at Half Moon Landing	A	Standard
02010001	Ogeechee River at Georgia Highway 78 near Wadley, Georgia	A	Standard
02011701	Williamson Swamp Creek at Georgia Highway 231	A	Standard
02023001	Ogeechee River at State Road 24 near Oliver, Georgia	C	Standard
02027001	Canoochee River at U.S. Highway 301	A	Standard
02027201	Canoochee River near Daisy, Georgia	A	Standard
02029501	Canoochee River at Georgia Highway 67	A	Standard
02350001	North Newport River at Halfmoon Landing	A	Standard
03015001	North Oconee River - Athens Water Intake	A	Standard
03035001	Oconee River at FAS 1086 near Watkinsville, Georgia	C	Standard
03036701	Apalachee River - Near Bostwick	A	Standard
03041701	Little River at State Road 16 near Eatonton, Georgia	A	Standard
03043401	Murder Creek at New Glenwood Springs Road (FAS 777) nr Eatonton	A	Standard
03045001	Oconee River - Milledgeville Water Intake	A	Standard
03046001	Oconee River - 1 Mile Downstream Central State Hospital	A	Standard
03047501	Oconee River at Georgia Highway 57	A	Standard
03051001	Oconee River at Interstate Highway 16 near Dublin, Georgia	C	Standard
04108001	South River - Bouldercrest Road	A	Standard
04111001	South River - Georgia Highway 155	A	Standard
04111701	South River - Klondike Road	A	Standard
04140001	South River at Island Shoals Road near Snapping Shoals, Georgia	C	Standard
04205001	Yellow River - Killian Hill Road	A	Standard
04210001	Yellow River - Conyers Water Intake	A	Standard
04220001	Yellow River at State Road 212 near Stewart, Georgia	C	Standard
04310001	Alcovy River at Newton Factory Bridge Road near Stewart, Georgia	C	Standard
04350051	Lake Jackson – Confluence of South, Alcovy & Yellow Rivers	A	Standard, Chlorophyll
05005001	Ocmulgee River - Georgia Highway 16	A	Standard
05007001	Towaliga River - Georgia Highway 83	A	Standard
05007501	Falling Creek - FAS 1640 Near East Juliet	A	Standard
05010001	Ocmulgee River at Macon Water Intake near Macon, Georgia	C	Standard
05013601	Tobesofkee Creek - U.S. Highways 41 and 129	A	Standard
05015001	Ocmulgee River - 6.0 Miles D/S from Tobesofkee Creek near Warner Robins	C	Standard
05025001	Ocmulgee River at U.S. Highway 341 at Lumber City, Georgia	C	Standard
06010001	Ohoopee River at Georgia Highway 56	A	Standard
06014001	Altamaha River at U.S. Highway 301	A	Standard
06016001	Altamaha River - 6.0 Miles Downstream From Doctortown near Gardi	C	Standard
06017001	Altamaha River at Seaboard Railway at Everett	A	Standard
07004001	Turtle River off Hermitage Island	A	Standard
07005201	Turtle River at Georgia Highway 303	A	Standard
07005801	Brunswick River at U.S. Highway 17	C	Standard
07016601	Seventeen Mile Creek at Georgia Highway 64	A	Standard
07019001	Satilla River at FAS 598 North of Waycross	A	Standard
07021001	Satilla River at State Roads 15/121 near Hoboken, Georgia	C	Standard
07025001	Little Satilla River at Seaboard Railroad at Offerma	A	Standard
07026001	Satilla River at U.S. Highway 84	A	Standard

TABLE 6. GEORGIA TREND MONITORING NETWORK 2005

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
08010001	Saint Marys River at U.S. Highway 301	A	Standard
09001001	Suwannee River at U.S. Highway 441 near Fargo, Georgia	C	Standard
09012001	Alapaha River at Georgia Highway 94 nr Statenville	A	Standard
09018301	New River at U.S. Highway 82 near Tifton, Georgia	A	Standard
09029501	Withlacoochee River at McMillian Road near Bemiss, Georgia	A	Standard
09036001	Withlacoochee River at Georgia Highway 94	A	Standard
09038401	Indian Creek at FAS 1753 near Berlin, Georgia	A	Standard
09040001	Withlacoochee River at U.S. Highway 84	A	Standard
09042001	Okapilco Creek at U.S. Highway 84	A	Standard
09044501	Withlacoochee River at Clyattville-Nankin Road near Clyattville, Georgia	C	Standard
10003001	Ochlockonee River at FAS 1205 near Moultrie, Georgia	A	Standard
10010001	Ochlockonee River at U.S. Highway 84	A	Standard
10017001	Ochlockonee River - Bridge 3.2 Miles North of State Line near Calvary	C	Standard
11011001	Flint River at State Road 138 near Jonesboro, Georgia	A	Standard
11013001	Flint River at State Road 54 near Fayetteville, Georgia	A	Standard
11018001	Flint River - Georgia Highway 92	C	Standard
11025001	Line Creek at State Road 16 near Digbey, Georgia	A	Standard
11050001	Flint River at U.S. Highway 19 near Culloden, Georgia	A	Standard
11060001	Flint River - Georgia Highways 26 and 49	C	Standard
11090401	Flint River at State Road 234 near Albany, Georgia	A	Standard
11102001	Flint River at State Road 37 at Newton, Georgia	C	Standard
11109001	Flint River at U.S. Highway 27-B near Bainbridge, Georgia	C	Standard
12010001	Chattahoochee River at State Roads 17/75 near Nacooche, Georgia	A	Standard
12030001	Chattahoochee River at Duncan Bridge Rd. near Cornelia, Georgia (Hwy 384)	A	Standard
12030085	Chattahoochee River at Belton Bridge Road near Lula, Georgia	A	Standard
12030141	West Fork Little River at Jess Helton Rd. near Clermont	A	Standard
12030151	East Fork Little River at Honeysuckle Rd. near Clermont	A	Standard
12030161	Lake Sidney Lanier – Little River Embayment between M1WC & 3LR	A	Standard, Chlorophyll
12030171	Wahoo Creek at Ben Parks Road near Murrayville, GA	A	Standard
12030201	Lake Sidney Lanier at Lanier Bridge (SR 53) on Chattahoochee River	A	Standard, Chlorophyll
12033201	Dicks Creek at Forest Service Road 144-1 near Neel Gap, Georgia	C	Standard
12035401	Chestatee River at State Road 400 near Dahlonega, Georgia	A	Standard
12037001	Lake Sidney Lanier at Boling Rd. (SR 53) on Chestatee River	A	Standard, Chlorophyll
12038001	Lake Sidney Lanier at Browns Bridge Rd. (SR 369)	A	Standard, Chlorophyll
12038501	Flat Creek at McEver Road near Gainesville, Georgia	A	Standard
12038610	Balus Creek at McEver Road near Oakwood, Georgia	A	Standard
12038651	Lake Sidney Lanier - Flat Creek Embayment, 100' U/S M7FC	A	Standard, Chlorophyll
12038681	Lake Sidney Lanier – Balus Creek Embayment, 0.34 mi. SE M6FC	A	Standard, Chlorophyll
12038781	Mud Creek at McEver Road near Flowery Branch, GA	A	Standard
12038801	Lake Sidney Lanier – Mud Creek Embayment, between Marina and Ramp	A	Standard, Chlorophyll
12039401	Lake Sidney Lanier upstream from Flowery Branch confluence	A	Standard, Chlorophyll
12039601	Six Mile Creek at Burrus Mill Road near Coal Mountain, GA	A	Standard
12039621	Lake Sidney Lanier – Six Mile Creek Embayment, 300’ E M9SM	A	Standard, Chlorophyll
12040001	Lake Sidney Lanier upstream from the Buford Dam Forebay	A	Standard, Chlorophyll
12048001	Chattahoochee River at McGinnis Ferry Road	A	Standard
12055001	Chattahoochee River at DeKalb County Water Intake	A	Standard
12060001	Big Creek at Roswell Water Intake near Roswell, Georgia	A	Standard
12070001	Chattahoochee River at Cobb County Water Intake	C	Standard
12080001	Chattahoochee River at Atlanta Water Intake	A	Standard

TABLE 6. GEORGIA TREND MONITORING NETWORK 2005

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
12090001	Peachtree Creek at Northside Drive near Atlanta, Georgia	A	Standard
12106001	Chattahoochee River at Bankhead Highway	A	Standard
12120001	Sweetwater Creek at Interstate Highway 20	A	Standard
12140001	Chattahoochee River at Georgia Highway 92	C	Standard
12140501	Chattahoochee River at Capps Ferry Road near Rico, Georgia	A	Standard
12150001	Chattahoochee River at State Road 16 near Whitesburg, Georgia	A	Standard
12170001	Chattahoochee River at U.S. Highway 27 near Franklin, Georgia	A	Standard
12174301	New River at State Road 100 near Corinth, Georgia	A	Standard
12180001	West Point Lake at LaGrange Water Intake near LaGrange, Georgia	C	Standard, Chlorophyll
12181601	Yellow Jacket Creek at Hammet Road near Hogansville, Georgia	A	Standard
12190001	Long Cane Creek at Webb Road near West Point, Georgia	A	Standard
12200001	Chattahoochee River - 1.0 Mile U/S from U.S. Highway 29 near West Point	A	Standard
12210001	Chattahoochee River upstream from Bartletts Ferry Dam	A	Standard
12212001	Chattahoochee River at Columbus Water Intake	A	Standard
12216001	Chattahoochee River d/s from Columbus Wastewater Treatment Plant	A	Standard
12218001	Chattahoochee River downstream from Oswichee Creek near Columbus	C	Standard
12219001	Chattahoochee River at Spur 39 near Omaha, Georgia	A	Standard
12219101	Lake Walter F. George at U.S. Hwy. 82 near Georgetown, Georgia	A	Standard, Chlorophyll
12219501	Lake Walter F. George 300 Meters Upstream Dam	A	Standard, Chlorophyll
12230001	Chattahoochee River at Georgia Highway 91	C	Standard
13010001	Little Tallapoosa River at Georgia Highway 100 near Bowdon, Georgia	BM	Standard, Metals
13012001	Indian Creek at State Line Road near Bowdon, Georgia	BM	Standard, Metals
13013001	Buffalo Creek at Bethesda Church Road near Roopville, Georgia	BM	Standard, Metals
13014101	Buffalo Creek at Martin Cemetery Road near Carrollton, Georgia	BM	Standard, Metals
13015701	Little Tallapoosa River at U.S. Highway 27 near Carrollton, Georgia	BM	Standard, Metals
13017001	Buck Creek at State Road 16 near Carrollton, Georgia	BM	Standard, Metals
13020501	Tallapoosa River at Rockmart Road near Draketown, Georgia	BM	Standard, Metals
13020901	Little River at East Church Road near Buchanan, Georgia	BM	Standard, Metals
13021001	Tallapoosa River at U.S. Highway 27 near Felton, Georgia	BM	Standard, Metals
13028001	Tallapoosa River at Jacksonville Road near Tallapoosa, Georgia	BM	Standard, Metals
13030001	Tallapoosa River at Georgia Highway 8 near Tallapoosa, Georgia	BM	Standard, Metals
13030501	Walker Creek at Providence Church Road near Tallapoosa, Georgia	BM	Standard, Metals
14005951	Jacks River at County Road 187 near Higdon, Georgia	BM	Standard, Metals
14006001	Jacks River at Old Highway 2 near Alaculsy, Georgia	BM	Standard, Metals
14007021	Conasauga River at Carlton Petty Road near Gregory, Georgia	BM	Standard, Metals
14010051	Conasauga River at U.S. Highway 76 near Dalton, Georgia	C	Standard, Metals
14015401	Coahulla Creek at U.S. Highway 76 near Dalton, Georgia	BM	Standard, Metals
14018501	Holly Creek at State Road 61 near Chatsworth, Georgia	BM	Standard, Metals
14020501	Holly Creek at Georgia Highway 225 near Chatsworth, Georgia	BM	Standard, Metals
14030001	Conasauga River at Tilton Bridge near Tilton, Georgia	C	Standard, Metals
14040001	Conasauga River at State Road 136 near Resaca, Georgia	BM	Standard, Metals
14056901	Ellijay River at State Road 5 near Ellijay, Georgia	BM	Standard, Metals
14079011	Cartecay River at State Road 2 Connector near Ellijay, Georgia	BM	Standard, Metals
14109901	Coosawattee River at Georgia Highway 5 near Ellijay, Georgia	BM	Standard, Metals
14115001	Mountaintown Creek at State Road 282 near Ellijay, Georgia	BM	Standard, Metals
14116001	Tails Creek at State Road 282 near Ellijay, Georgia	BM	Standard, Metals
14119301	Carters Lake (CR1) - Upper Lake, Coosawattee Arm	A	Standard, Chlorophyll
14119401	Carters Lake (CR3) - Midlake	A	Standard, Chlorophyll
14119901	Talking Rock Creek at Georgia Highway 136 near Blaine, Georgia	BM	Standard, Metals

TABLE 6. GEORGIA TREND MONITORING NETWORK 2005

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
14120001	Coosawattee River at U.S. Highway 411 near Carters, Georgia	BM	Standard, Metals
14125001	Pine Log Creek at Georgia Highway 53 near Sonoraville, Georgia	BM	Standard, Metals
14125501	Salacoa Creek at Lovebridge Road NE near Redbud, Georgia	BM	Standard, Metals
14130001	Coosawattee River at State Road 225 near Calhoun, Georgia	BM	Standard, Metals
14220001	Oostanaula River at U.S. Highway 41 near Resaca, Georgia	BM	Standard, Metals
14230031	Oothkalooga Creek at State Road 156 near Calhoun, Georgia	BM	Standard, Metals
14230101	Oostanaula River at Georgia Highway 156 near Calhoun, Georgia	BM	Standard, Metals
14234001	Johns Creek at State Road 156 near Curryville, Georgia	BM	Standard, Metals
14237001	Little Armuchee Creek at Big Texas Valley Road NW near Armuchee, Georgia	BM	Standard, Metals
14237501	Heath Creek at Texas Valley Road NW near Rome, Georgia	BM	Standard, Metals
14238001	Lavendar Creek at Little Texas Valley Road NW near Rome, Georgia	BM	Standard, Metals
14239001	Armuchee Creek at Old Dalton Road near Rome, Georgia	BM	Standard, Metals
14239501	Woodward Creek at Bells Ferry Road NE near Rome, Georgia	BM	Standard, Metals
14250001	Oostanaula River at Rome Water Intake near Rome, Georgia	C	Standard, Metals
14270001	Etowah River at State Road 53 near Dawsonville, Georgia	BM	Standard, Metals
14271001	Amicalola Creek at State Road 53 near Dawsonville, Georgia	BM	Standard, Metals
14281001	Etowah River at Yellow Creek Road near Ball Ground, Georgia	BM	Standard, Metals
14290501	Long Swamp Creek at Conn's Creek Road near Ball Ground, Georgia	BM	Standard, Metals
14295001	Sharp Mountain Creek at State Road 5 near Ball Ground, Georgia	BM	Standard, Metals
14300001	Etowah River at State Road 5 spur near Canton, Georgia	A	Standard, Metals
14300601	Shoal Creek at State Road 108 near Waleska, Georgia	A	Standard, Metals
14302001	Lake Allatoona at Etowah River upstream from Sweetwater Creek	A	Standard, Chlorophyll
14304001	Little River at State Road 5 near Woodstock, Georgia	A	Standard, Metals
14304101	Noonday Creek at Georgia Highway 92 near Woodstock, Georgia	A	Standard, Metals
14304801	Lake Allatoona at Little River upstream from Highway 205	A	Standard, Chlorophyll
14305801	Lake Allatoona downstream from Kellogg Creek	A	Standard, Chlorophyll
14306471	Stamp Creek at State Road 20 near Cartersville, Georgia	BM	Standard, Metals
14307001	Allatoona Creek at Stilesboro Lane near Kennesaw, Georgia	BM	Standard, Metals
14307501	Lake Allatoona at Allatoona Creek upstream from Interstate 75	A	Standard, Chlorophyll
14309001	Lake Allatoona Upstream from Dam	A	Standard, Chlorophyll
14310011	Etowah River at U.S. Highway 41 near Cartersville, Georgia	BM	Standard, Metals
14317501	Etowah River at State Road 61 near Cartersville, Georgia	BM	Standard, Metals
14325001	Pumpkinvine Creek at County Road 636 near Emerson, Georgia	BM	Standard, Metals
14326001	Raccoon Creek at State Road 113 near Stilesboro, Georgia	BM	Standard, Metals
14329501	Euharlee Creek at County Road 32 near Stilesboro, Georgia	BM	Standard, Metals
14330001	Etowah River at Hardin Bridge near Euharlee, Georgia	C	Standard, Metals
14340201	Two Run Creek at Reynolds Bridge Road near Kingston, Georgia	BM	Standard, Metals
14340991	Spring Creek at State Road 20 near Rome, Georgia	BM	Standard, Metals
14350011	Etowah River at Turner Mccall Boulevard near Rome, Georgia	BM	Standard, Metals
14357551	Silver Creek at Crescent Avenue near Rome, Georgia	BM	Standard, Metals
14401011	Coosa River at Blacks Bluff Road near Rome, Georgia	BM	Standard, Metals
14401501	Webb Creek at Blacks Bluff Road SW near Rome, Georgia	BM	Standard, Metals
14403901	Beech Creek at Mays Bridge Road SW near Rome, Georgia	BM	Standard, Metals
14407901	Cabin Creek at State Road 20 near Rome, Georgia	BM	Standard, Metals
14425001	Cedar Creek at Cave Springs Road near Cedartown, Georgia	BM	Standard, Metals
14450001	Coosa River - Georgia/Alabama State Line Monitor	C	Standard, Metals
14491001	Duck Creek at State Road 337 near LaFayette, Georgia	BM	Standard, Metals
14540001	Spring Creek at State Road 337 near Trion, Georgia	BM	Standard, Metals
14544001	Cane Creek at Club Drive near Trion, Georgia	BM	Standard, Metals

TABLE 6. GEORGIA TREND MONITORING NETWORK 2005

STATION NUMBER	LOCATION	TYPE[1]	PARAMETERS[2]
14550001	Chattooga River - 600 Feet Below U.S. Highway 27 near Summerville	BM	Standard, Metals
14555001	Raccoon Creek at State Road 114 near Summerville, Georgia	BM	Standard, Metals
14560001	Chattooga River at Holland-Chattoogaville Road near Summerville, Georgia	C	Standard, Metals
14565001	East Fork Little River at State Road 48 near Cloudland, Georgia	BM	Standard, Metals
15006001	Little Tennessee River at Georgia Highway 246 near Dillard, Georgia	BM	Standard, Metals
15019901	Mill Creek at Mill Creek Road near Presley, Georgia	BM	Standard, Metals
15019991	Hiawassee River at Streak Hill Road near Presley, Georgia	BM	Standard, Metals
15026001	Lake Chatuge (LMP 12) - at State Line	BM	Standard, Chlorophyll
15026501	Brasstown Creek at U.S. Highway 76 near Blairsville, Georgia	BM	Standard, Metals
15027001	Brasstown Creek at State Road 66 near Young Harris, Georgia	BM	Standard, Metals
15030000	Lake Nottely (LMP 15A) - at Reece Creek	BM	Standard, Chlorophyll
15034001	Nottely River at State Road 180 near Blairsville, Georgia	BM	Standard, Metals
15035001	Nottely River at Morgan Bridge near Blairsville, Georgia	BM	Standard, Metals
15037001	Youngcane Creek at Byers Road near Youngcane, Georgia	BM	Standard, Metals
15039801	Lake Nottely (LMP 15) - at Dam Pool	BM	Standard, Chlorophyll
15040000	Lake Blue Ridge (LMP18A) - 4 Miles Upstream Dam	BM	Standard, Chlorophyll
15040051	Nottely River at John Smith Road near Ivylog, Georgia	BM	Standard, Metals
15048701	Cooper Creek at State Road 60 near Suches, Georgia	BM	Standard, Metals
15058001	Toccoa River at Shallowford Bridge near Dial, Georgia	BM	Standard, Metals
15059901	Lake Blue Ridge (LMP 18) - Dam Pool	BM	Standard, Chlorophyll
15060401	Hemptown Creek at State Road 245 near Mineral Bluff, Georgia	BM	Standard, Metals
15060501	Toccoa River at Curtis Switch Road near Mineral Bluff, Georgia	BM	Standard, Metals
15061001	Fighting Town Creek at West Tennessee Road near McCaysville, Georgia	BM	Standard, Metals
15072001	Little Chickamauga Creek at Hackett Mill Road near Ringgold, Georgia	BM	Standard, Metals
15073001	East Chickamauga Creek at Bandy Road near Ringgold, Georgia	BM	Standard, Metals
15074001	Dry Creek at Houston Valley Road near Ringgold, Georgia	BM	Standard, Metals
15075001	Tiger Creek at State Road 3 near Ringgold, Georgia	BM	Standard, Metals
15080001	South Chickamauga Creek at FAS 819 near Graysville, Georgia	BM	Standard, Metals
15081001	Peavine Creek at Old Dixie Highway near Graysville, Georgia	BM	Standard, Metals
15089001	West Chickamauga Creek at Glass Mill Road near Chickamauga, Georgia	BM	Standard, Metals
15090001	West Chickamauga Creek at Georgia Highway 146 near Lakeview, Georgia	C	Standard, Metals
15099001	Chattanooga Creek at State Road 341 near Chattanooga, Tennessee	BM	Standard, Metals
15099501	Rock Creek at State Road 193 at Flintstone, Georgia	BM	Standard, Metals
15100001	Chattanooga Creek at Burnt Mill Road at St. Elmo, Tennessee	BM	Standard, Metals
15299951	Dry Creek at Maple Street near Chattanooga, Tennessee	BM	Standard, Metals
15300001	McFarland Branch at State Line Road near Chattanooga, Tennessee	BM	Standard, Metals
15350001	Lookout Creek at Old Cloverdale Road near Sulphur Springs, Georgia	BM	Standard, Metals
15400001	Lookout Creek at Creek Road near New England, Georgia	BM	Standard, Metals

[1]There are three major types of stations: core(C), annual (A), and basin monitoring (BM).

[2]Standard parameters include gage height, air temperature, water temperature, dissolved oxygen, turbidity, conductivity, BOD5, pH, alkalinity, hardness, ammonia, nitrite+nitrate, phosphorus, TOC, and fecal coliform bacteria.

175 identified lakes in 340 sampling trips. The data collected included depth profiles for dissolved oxygen, temperature, pH, and specific conductance, Secchi disk transparency, and chemical analyses for chlorophyll a, total phosphorus, nitrogen

compounds, and turbidity. The three measures of Carlson'sTrophic State Index were combined into a single trophic state index (TTSI) and used with other field data and observations to assess the trophic condition of each lake and to establish categories of lakes relative to need for restoration and/or protection. Eight lakes were determined to have the a need for restoration and/or protection (Category A), twenty-eight lakes were found to have moderate need for protection (Category B), and one hundred twenty-seven lakes were found to have few water quality problems (Category C).

Monitoring efforts have continued since the 1980-1981 Lake Classification Survey with a focus on Category A lakes and major lakes (those with a surface area greater than 500 acres). Five lakes (Hillsboro Lake, Floyd State Park Upper and Lower Lakes, Rome City Park Pond, and Heath Park Lake) were removed from Category A and placed in Category B in 1984. Even though their trophic condition remained unchanged, the lake management authorities for these lakes indicated no conflict between the lake condition and intended uses. Three lakes remained as Category A lakes: Jackson Lake, High Falls Lake, and Williams Public Fishing Area Lake. Point source nutrient reduction has been implemented in the Jackson Lake and High Falls Lake watersheds and these lakes have been changed to Category B. Williams Public Fishing Area Lake was drained in the early 1990s due to problems with the dam and there are no plans to fill the lake.

The monitoring of major lakes (> 500 acres) since 1984 has continued to use the TTSI as a tool to mark trophic state trends. The major lakes are listed in Table 7 are ranked according to the TTSI for the period 1986-2003. Work on major lakes is now conducted as a part of the river basin planning process. Quarterly major lakes monitoring was conducted in 2002 and 2003 according to the river basin monitoring schedule. Basin major lakes monitored in 2002 were lakes Hartwell, Russell and Clarks Hill (Savannah). In 2003 the only major lake in the basins of focus was Banks Lake (Suwannee).

A Clean Lakes Phase I Diagnostic/ Feasibility study was conducted for Jackson Lake in 1989 and 1990. This study documented reductions in phosphorus loading. Despite this, the lake remains nutrient sensitive. Consequently, it was recommended that the total phosphorus loading from all sources be held constant or reduced. This study also documented an approximate 40% reservoir storage loss since inundation in 1910 due to sedimentation. Since sedimentation in the upper reaches of the lake interferes with recreation, sediment removal was offered as a management option.

A joint GAEPD-USEPA study of West Point Lake was conducted in 1987-1988. Sufficient data were available at the end of 1988 for the GAEPD to document nutrient problems and implement a control strategy. Because the nutrient loading was point source dominated, all major point sources were directed to reduce total phosphorus to 0.75 mg/l by 1992 with a 50% reduction by the middle of 1990. The phosphorus reduction process was aided in the 1990 when the Georgia General Assembly adopted legislation for a statewide ban on high phosphate detergents. This action along with the

TABLE 7. MAJOR LAKES RANKED BY SUM OF TROPHIC STATE INDEX VALUES 1986-2005

1985		1986		1987		1988		1989	
Sinclair	188	Harding	177	Harding	184	Harding	178	Blackshear	209
Seminole	184	Oliver	176	Oliver	177	High Falls	177	WF George	192
Blackshear	181	Seminole	175	Goat Rock	174	Blackshear	177	Harding	191
Worth	177	Goat Rock	171	Jackson	170	Seminole	174	High Falls	191
Jackson	172	Jackson	170	Worth	167	Goat Rock	173	Jackson	188
Harding	171	Worth	164	Blackshear	<167	Oliver	171	Oliver	184
Oconee	169	High Falls	163	Carters	166	Banks	169	Tobesofkee	180
High Falls	168	WF George	162	Tugalo	166	West Point	169	Goat Rock	179
WF George	161	Blackshear	162	Seminole	<160	WF George	168	Carters	179
Oliver	161	Oconee	161	High Falls	157	Oconee	164	Seminole	174
West Point	157	West Point	160	Banks	<157	Worth	164	Allatoona	171
Goat Rock	155	Allatoona	157	West Point	<156	Jackson	<158	Worth	170
Tobesofkee	152	Tobesofkee	155	Sinclair	<154	Sinclair	<152	Sinclair	169
Nottely	148	Sinclair	152	Clarks Hill	151	Tobesofkee	<151	Banks	166
Chatuge	145	Tugalo	148	Tobesofkee	<146	Russell	<145	Oconee	165
Tugalo	144	Chatuge	147	Oconee	<145	Allatoona	<141	West Point	164
Allatoona	136	Carters	144	Allatoona	<143	Chatuge	139	Nottely	158
Banks	135	Nottely	142	WF George	<141	Tugalo	<133	Tugalo	156
Carters	134	Banks	140	Nottely	<137	Lanier	<132	Russell	156
Blue Ridge	125	Juliette	135	Russell	<133	Nottely	<132	Clarks Hill	153
Juliette	125	Russell	131	Chatuge	<132	Carters	<127	Chatuge	151
Lanier	123	Lanier	128	Rabun	<130	Juliette	<123	Juliette	141
Clarks Hill	123	Clarks Hill	123	Hartwell	<126	Burton	<120	Hartwell	138
Rabun	122	Hartwell	121	Lanier	<123	Blue Ridge	<119	Blue Ridge	133
Russell	122	Blue Ridge	119	Burton	<119	Clarks Hill	<118	Rabun	128
Burton	121	Rabun	117	Blue Ridge	<117	Hartwell	<114	Lanier	<128
Hartwell	116	Burton	114	Juliette	<108	Rabun	111	Burton	123

1990		1991		1992		1993		1997-2001 Basin Cycle		
										Year
Sinclair	182	Blackshear	193	High Falls	194	High Falls	195	High Falls	169	1999
Blackshear	178	High Falls	190	Seminole	183	Blackshear	185	West Point	164	2000
Oliver	177	Harding	185	WF George	181	Seminole	175	Tobesofkee	164	1999
Harding	174	Seminole	181	Tobesofkee	176	Goat Rock	173	WF George	163	2000
Tobesofkee	173	Worth	176	Blackshear	176	Jackson	173	Oconee	162	1999
Jackson	168	Goat Rock	174	Goat Rock	173	Sinclair	172	Jackson	161	1999
Goat Rock	167	WF George	172	Sinclair	172	Worth	172	Blackshear	160	2000
Oconee	166	West Point	171	Oliver	168	Oconee	172	Sinclair	160	1999
Worth	163	Allatoona	167	Harding	166	Harding	170	Worth	157	2000
Chatuge	161	Banks	164	Jackson	166	Oliver	170	Carters	155	2001
Tugalo	161	Jackson	162	Oconee	163	Tobesofkee	169	Harding	155	2000
High Falls	159	Oconee	161	West Point	163	WF George	169	Tugalo	154	1997
Seminole	154	Oliver	157	Nottely	161	West Point	163	Goat Rock	153	2000
Allatoona	146	Sinclair	150	Tugalo	157	Allatoona	158	Seminole	152	2000
WF George	145	Tobesofkee	149	Worth	157	Russell	156	Oliver	152	2000
Clarks Hill	145	Clarks Hill	146	Banks	156	Carters	154	Russell	141	1997
Rabun	142	Russell	141	Allatoona	156	Banks	154	Allatoona	139	2001
West Point	141	Nottely	141	Chatuge	155	Clarks Hill	153	Rabun	136	1997
Burton	138	Chatuge	138	Burton	149	Hartwell	146	Chatuge	135	2001
Hartwell	136	Blue Ridge	136	Russell	147	Nottely	145	Juliette	131	1999
Blue Ridge	135	Carters	135	Carters	143	Chatuge	145	Burton	129	1997
Nottely	132	Juliette	133	Rabun	143	Burton	145	Clarks Hill	129	1997
Juliette	132	Tugalo	133	Blue Ridge	141	Tugalo	143	Nottely	127	2001
Russell	128	Hartwell	132	Hartwell	138	Blue Ridge	140	Lanier	127	2000
Lanier	126	Burton	130	Lanier	138	Rabun	140	Hartwell	127	1997
Banks	<122	Rabun	122	Clarks Hill	131	Juliette	136	Blue Ridge	119	2001
Carters	118	Lanier	121	Juliette	131	Lanier	122			

implementation of phosphorus reduction at the majority of the major metropolitan Atlanta water pollution control plants has resulted in a significant reduction in phosphorus reaching West Point Lake. In March 1990, the Georgia General Assembly passed Senate Bill 714 which mandated the State conduct comprehensive studies of publicly owned lakes (in excess of 1,000 acres) and develop water quality standards for pH, fecal coliform bacteria, chlorophyll a, total nitrogen, total phosphorus loading, and epilimnion dissolved oxygen. The Bill also requires that nutrient limits be established for major tributary streams to the lakes. The Bill mandated that comprehensive studies of Lake Lanier, Lake Walter F. George and West Point Lake be initiated in 1990, and three additional studies be performed each subsequent year on the remaining lakes of 1,500 acres or more, providing funds were available.

In March 1990, the GAEPD applied to and received from the USEPA Clean Lakes Phase I funds to be used to initiate studies of Lakes Lanier, Walter F. George, and West Point. Studies were begun in late 1990 and early 1991. Subsequently, EPD applied for funding for Lakes Allatoona and Blackshear. These were funded and sampling was initiated in April, 1992. Supplemental funding was awarded by Congress for the Lake Allatoona and Lake Lanier Phase I studies. Reports on these studies were completed in 1999. The GAEPD applied for Clean Lakes funds to conduct a Phase I Diagnostic-Feasibility study for Carters Lake in 1995. The application was approved and the field work for the Carters Lake project was completed in 1998. The Carters lake Phase I Diagnostic Feasibility Report was completed in 2000. Water quality standards were adopted for Carters Lake in 2002.

The Lake Walter F. George Phase I Diagnostic/Feasibility study was conducted by the GAEPD in 1990 and 1991. In 1992 and 1993, the work was continued by the Alabama Department of Environmental Management (ADEM) and Auburn University. These studies found the lake in relatively good condition. No water use (i.e. recreation or fishing) impacts were documented. Therefore, the management of nutrient loading, particularly phosphorus, was noted as an important longterm objective in maintaining the water quality of Lake Walter F. George. The Lake Walter F. George Phase I Diagnostic Feasibility Study Report was submitted to and approved by the USEPA in 1997.

The West Point Lake Clean Lakes study was completed in 1994 and the GAEPD proposed water quality standards for the lake which, after public review, were adopted by the Board of Natural Resources in 1995. The lake water quality standards for Walter F. George and Jackson Lakes were proposed and adopted by the Board of Natural Resources in October, 1996. The Clean Lakes studies for Lakes Allatoona and Lanier, conducted by Kennesaw State College and the University of Georgia, respectively, were completed in 1999 and water quality standards adopted by the Board of Natural Resources in 2000.

In 2004 and 2005, lake standards monitoring was conducted April through October, at the specified lake locations on Lakes West Point, Jackson, Walter F. George, Allatoona Lanier and Carters in accordance with the lakes standards law. In addition, tributary sampling was conducted monthly. In addition to monitoring for the required parameters of chlorophyll a, pH, total nitrogen, phosphorus and fecal coliform bacteria, water quality profile data were collected at each lake monitoring station.

The Little River Embayment of Lake Allatoona was included on Georgia's 2002 303(d) list for chlorophyll *a*. A Total Maximum Daily Load was completed in 2004 for this portion of the lake. Portions of Lake Allatoona, Lanier, Carters and Walter F. George were included on Georgia's 2006 303(d) list of waters for chlorophyll *a*. GAEPD is in the process of collecting nutrient data on the lakes that were listed, as well as their tributaries, in order to develop models on which to base total maximum daily loads. Sampling is being conducted in the tributaries to Lake Lanier in 2007.

Fish Tissue Monitoring. This assessment project is focused on fish tissue sampling and analyses, risk-based data assessment, and annual publication of consumption guidance in Georgia's Freshwater & Saltwater Sport Fishing Regulations and in Guidelines for Eating Fish from Georgia Waters. Fish tissue samples are collected in the fall from Georgia lakes and rivers, and analyzed in the winter and spring. Site-specific sampling in Georgia estuaries occurs between the spring and fall on a case specific basis. The sampling is conducted by either the GADNR Wildlife Resources Division (WRD), or the Coastal Resources Division (CRD), depending on whether the site is freshwater (WRD), or estuarine/marine waters (CRD). Samples are catalogued and transported to GAEPD or University of Georgia laboratories and results are reported to the GAEPD the following late summer or early fall. The data are assessed in the fall and winter and consumption guidance is updated each spring. The first risk-based consumption guidance was published in 1995.

In the fall of 2004 sampling was focused in the Oconee, Ocmulgee and Altamaha River basins. In the fall of 2005 sampling was focused in the Chattahoochee and Flint River basins. The data from the annual collections are utilized in reassessments that are incorporated annually into the *Guidelines for Eating Fish For Georgia Waters* and *Georgia's Freshwater and Saltwater Sport Fishing Regulations*.

Toxic Substance Stream Monitoring. The GAEPD has focused resources on the management and control of toxic substances in the State's waters for many years. Toxic substance analyses have been conducted on samples from selected trend monitoring stations since 1973. Wherever discharges were found to have toxic impacts or to include toxic pollutants, the GAEPD has incorporated specific limitations on toxic pollutants in NPDES discharge permits. In 1983 the GAEPD intensified toxic substance stream monitoring efforts. This expanded toxic substance stream monitoring project included facility effluent, stream, sediment, and fish sampling at specific sites downstream of selected industrial and municipal discharges. From 1983 through 1991,

ten to twenty sites per year were sampled as part of this project. Future work will be conducted as a part of the rotating basin monitoring program.

Aquatic Toxicity Testing. In 1982 the GAEPD incorporated biomonitoring or aquatic toxicity testing in selected industrial NPDES permits. Biomonitoring requirements are currently addressed in all municipal and industrial NPDES permits. In January 1995, the GAEPD issued approved NPDES Reasonable Potential Procedures which further delineated required conditions for conducting whole effluent toxicity (WET) biomonitoring for municipal and industrial discharges. The Reasonable Potential Procedures were updated in 2001. In addition, GAEPD developed a Whole Effluent Toxicity Strategy in 2001 which provided more detail as to how the State would determine what facilities needed a whole effluent toxicity limit in their permit and which outlined minimum data requirements for different types of facilities. The GAEPD started conducting aquatic toxicity tests on municipal and industrial water pollution control plant effluents in 1985. In 1988, the GAEPD constructed laboratory facilities to support chronic and acute testing capabilities. All toxicity testing was conducted in accordance with appropriate USEPA methods. The aquatic biomonitoring project (ABP) was initially funded with Federal CWA Section 205(j) Grant money, and later under Section 604(b). Requests for State funding were proposed annually and were unsuccessful. Continued funding under Section 604(b) met with difficulties and absorption of costs into the State budget not possible with the State government redirection priorities and privatization initiatives that were implemented in 1995. When reorganization of the Water Protection Branch was finalized in June 1996, the resources of the ABP were redirected into monitoring and TMDL areas. It was decided that the ABP would be phased out over the FY1997 period with the aquatic toxicity testing laboratory to be closed down by July 1, 1997. In addition to funding and redirection issues, it was decided that toxicity testing work would be required of individual permittees in the future.

Coastal Monitoring. The majority of coastal monitoring is conducted by the Coastal Resources Division (CRD). This work includes the national coastal assessment program, beach water quality monitoring, estuarine nutrient monitoring, shellfish sanitation monitoring and monitoring for harmful algae including Pfiesteria. This work is discussed in Chapter 5.

Facility Compliance Sampling. In addition to surface water quality monitoring, the GAEPD conducts evaluations and compliance sampling inspections of municipal and industrial water pollution control plants and on industrial pretreatment systems. Compliance sampling inspections include the collection of 24-hour composite samples, and an evaluation of the permittee sampling and flow monitoring operations. In excess of 350 sampling inspections were conducted by the GAEPD staff in 2004-2005. The results were used, in part, to verify the validity of permittee self-monitoring data and as supporting evidence, as applicable, in enforcement actions. In 2004 this work was focused in the Oconee, Ocmulgee and Altamaha River basins and in 2005 in the

Ochlockonee, Suwannee, Satilla and St. Marys River basins in support of the River Basin Planning process.

Surface Water Quality Summary

Data Assessment. Water quality data are assessed to determine if standards are met and if the waterbody supports its designated or classified water use. If monitoring data show that standards are not achieved, depending on the frequency standards are not met, the waterbody is said to be partially or not supporting the designated use. The data reviewed included GAEPD monitoring data, and data from other State, Federal, local governments, contracted Clean Lakes projects, data from three electrical utility companies and data from groups with approved QA/QC programs. Table 8 provides a list of agencies that contributed data for use in assessing water quality in this report.

The majority of coastal monitoring is conducted by the Coastal Resources Division. This work includes the national coastal assessment program, beach water quality monitoring, estuarine nutrient monitoring, shellfish sanitation monitoring and monitoring for harmful algae including Pfiesteria.

Appendix A includes lists of streams and rivers, lakes, and estuaries for which data have been assessed and indications are that designated uses for those waters are not fully supported. The lists are organized by river basin and 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, lake acres and square miles of estuaries 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 with water quality standards violations for which no actions have been initiated and therefore a TMDL is needed (Section 303(d)), and to document waters with nonpoint source problems (Section 319).

The Appendix A waters are described in the following categories: waters supporting designated uses, waters partially supporting designated uses, and waters not supporting designated uses. Waters were placed on the partially or not supporting lists based on the following assessments.

Fecal Coliform Bacteria. Georgia water quality standards establish a fecal coliform bacteria 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 bacteria criterion is a geometric mean (four samples collected over a 30-day period) of 1,000 per 100 ml and not to exceed 4,000 per 100 ml for any one sample.

The goal of fecal coliform sampling in 2004-2005 was to collect four samples in a thirty day period in each of four calendar quarters. If one geometric mean 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 was placed on the not support list.

TABLE 8
CONTRIBUTORS OF WATER QUALITY DATA FOR ASSESSMENT OF GEORGIA WATERS

GAEPD Watershed Planning and Monitoring Program	City of Gainesville
GAEPD Permitting and Compliance Program	City of LaGrange
GAEPD Brunswick District Office	City of Savannah
GAEPD Hazardous Waste Branch	Chatham County
DNR, Georgia Parks Recreation & Historic Sites Division	City of Augusta
DNR Coastal Resources Division	Georgia Mountains RDC
DNR Wildlife Resources Division	City of Conyers
State University of West Georgia	Kennesaw State University
Gainesville College	Lake Allatoona (Kennesaw State University)
Georgia Institute of Technology	Lake Lanier (University of Georgia)
Chattahoochee/Flint RDC	West Point (LaGrange College/Auburn University)
Upper Etowah Adopt-A-Stream	Lake Blackshear Watershed Association
Middle Flint RDC	University of Georgia
Heart of Georgia RDC	Southwire Company
Central Savannah RDC	Ellijay High School
U.S. Environmental Protection Agency	LaGrange College/Auburn University
U.S. Geological Survey	Georgia Power Company
U.S. Army Corps of Engineers	Oglethorpe Power Company
U.S. Forest Service	South Carolina Electric & Gas Co.
Tennessee Valley Authority	South Carolina DHEC
Cobb County	Jones Ecological Research Center
DeKalb County	Alabama DEM
Douglas County WSA	City of College Park
Fulton County	Columbus Water Works
Gwinnett County	Columbus Unified Government
City of Clayton	St. Johns WMD
Cartersville	Town of Trion
Georgia Ports Authority	Clayton County Water Authority
Cherokee County	City of Atlanta

In some cases the number of samples was not adequate to calculate geometric means due to sampling or laboratory difficulties. In these cases, the USEPA recommends the use of a review criterion of 400 per 100 ml to evaluate sample results. This bacterial density (400 per 100 ml) was used to evaluate data from the months of May through October and the maximum criterion of 4,000 per 100 ml was used in assessing the data

from the results of November through April when geometric mean data was not available. Thus, where geometric mean data was not available, waters were deemed not supporting uses when 26 percent or more of the samples had fecal coliform bacterial densities greater than the applicable review criteria (400 or 4,000 MPN/100 ml) and partially supporting designated uses when 11 to 25 percent of the samples were in excess of the review criterion.

Metals. In general, data on metals from any one given site are not frequent. Clean sampling techniques are used when metals are collected. If one sample was in excess of a standard, the stream segment was placed on the partial support list. If two samples indicated exceedence of water quality standards, the stream segment was placed on the not support list. This is in accordance with USEPA guidance which suggests listing if more than one sample exceeds the criteria. In addition, an asterisk is placed beside metals data in those cases where there is a minimal database. In 2004-2005, the goal was to collect metals samples in the winter and summer in the river basins of monitoring focus for comparison to water quality standards. Due to budget constraints, EPD was only able to monitor metals at new stations in the basins of focus in 2004 and was unable to monitor any of the basin streams for metals in 2005.

Toxicity Testing/Toxic Substances. Data from GAEPD toxicity testing of water pollution control plant effluents were used to predict toxicity in the receiving stream at critical 7Q10 low flow conditions. Based on the effluent toxicity, receiving waters were evaluated as not supporting when one or more tests gave a clear indication of instream toxicity and as partially supporting when based on predicted instream toxicity. Effluent data for toxic substances were used to designate either partial support or non-support based on whether instream corroborating data were available. When instream data were available, the stream was determined to be not supporting. 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% of the time, the waters were evaluated as not supporting the designated use. Between 11% and 25% noncompliance resulted in a partially supporting evaluation. Chapter 391-3-6-.03(7) of the Rules and Regulations for Water Quality Control states that “It is recognized that certain natural waters of the State may have a quality that will not be within the general or specific requirements contained herein. These circumstances do not constitute violations of water quality standards. This is especially the case for the criteria for dissolved oxygen, temperature, pH and fecal coliform.” South Georgia blackwater streams were not evaluated for compliance with the state pH standards because these streams have naturally low pH. In addition, a number of streams in the Ochlockonee, St. Marys, Satillia and Suwannee River Basin were removed from the partially supporting and not supporting lists for dissolved oxygen in 2006 based on the fact that these streams were determined to have naturally low dissolved oxygen concentrations. The

fact that the low dissolved oxygen in these streams is naturally occurring is documented in the dissolved oxygen Total Maximum Daily Loads that were established for them.

Fish/Shellfish Guidelines. USEPA guidance for evaluating fish consumption guidelines formation for 305(b)/303(d) use support determinations has been to assess a water as fully supporting uses if fish can be consumed in unlimited amounts; as partially supporting if consumption needs to be limited; and, as not supporting if no consumption is recommended. Georgia followed this guidance in evaluating the fish consumption guidelines for the 2000 and earlier 305(b)/303(d) lists. This assessment methodology was followed again in developing the 2002 305(b)/303(d) List for all fish tissue contaminants except mercury. Mercury in fish tissue was assessed and a segment or waterbody was listed if the Trophic-Weighted Residue Value (as described in the October 19, 2001 GAEPD "Protocol"), was in excess of the new USEPA water quality criterion (*Water Quality Criterion for the Protection of Human Health: Methylmercury*, EPA-823-R-01-001, January 2001). The USEPA criteria represents a national approach to address what mercury levels are protective for fishing waters. For mercury, waters were placed on the partial support list if the calculated Trophic-Weighted Residue Value was greater than 0.3 µg/g wet weight total mercury, and less than 2 µg/g wet weight, and on the not support list if the value was greater than 2 µg/g wet weight. Waters were included on the supporting list (assuming all other criteria were met) if the calculated Trophic-Weighted Residue Value was less than or equal to 0.3 µg/g. It is possible that some of these waters may have fish consumption guidelines in place for mercury. Georgia's fish consumption guidelines were developed using a risk-based approach to generate simple, understandable information for fish consumption that is species specific, and in many cases, size specific. It is published to help consumers of locally caught fish to make choices regarding consumption. However, for the purpose of assessing State waters, it is appropriate to use the State's criteria which accounts for different contaminant loads in different trophic levels of fish.

Biotic Data. The "Biota Impacted" designation in the "Criterion Violated" column indicates that studies showed a modification of the biotic community. Communities utilized were fish. Studies of fish populations by the DNR Wildlife Resources Division and the Tennessee Valley Authority 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.

Evaluation of Use Support. Table 9 provides summary information from Appendix A on the total number of stream miles, lake acres, or square miles of estuaries that fall in each use support category. Separate totals are given for waterbodies that were monitored, for which the assessment is based on current water quality data, and waters that were evaluated, for which assessment was made based on older data, location, and/or professional judgment. Many additional streams, particularly in urban areas may

not meet all standards, but monitoring resources are not adequate to sample all streams.

Assessment of Causes of Nonsupport of Designated Uses. There are many potential pollutants which may interfere with the designated use of a river, stream, lake, or estuary. These can be termed the causes of use nonsupport. Based on information presented in Appendix A, Table 10 summarizes the parameters of concern or the causes which contributed to nonsupport of water quality standards or designated uses of a particular waterbody.

Assessment of Potential Sources of Nonsupport of Designated Uses. Pollutants which impact waterbodies in Georgia may come from point or nonpoint sources. Point sources are discharges into waterways through discrete conveyances, such as pipes or channels. Municipal and industrial wastewater treatment facilities are the most common point sources. Point sources also include overflows of combined storm and sanitary sewers. Nonpoint sources are diffuse sources of pollution primarily associated with run off from the land following a rainfall event. Table 11 summarizes detailed information presented in Appendix A concerning the sources of pollutants which prevent achievement of water quality standards and use support in various waterbodies in Georgia.

Priorities for Action. The list of waters in Appendix A and B includes all waters for which available data indicate that water quality standards are or are not being met and designated uses are supported or not fully supported. This list of waters has become a comprehensive list of waters for Georgia incorporating the information requested by Sections 305(b), 303(d), 314, and 319 of the Federal CWA. As noted, waters listed as partially or not supporting their designated uses are active 305(b) waters. The list of lakes or reservoirs listed as partial or not supporting designated uses provides the information requested in Section 314 of the CWA. Waters with nonpoint sources identified as a potential cause of a standards violation are considered to provide the information requested in the CWA Section 319 nonpoint assessment. The 303(d) designation is described in the following paragraph.

The 303(d) list is a subset of the 305(b) listed waters. To develop the 303(d) list, the 305(b) list was reviewed and coded based on the guidance provided by the USEPA. First, segments were identified where enforceable State, local or Federal requirements have led to or will lead to attainment of water quality standards. Segments with ongoing action which will lead to attainment of water quality standards were assigned a “2" code under 303(d) status. A “3" code was assigned to segments where TMDLs have been developed and approved. The remaining segments are marked with an “X” and represent 303(d) listed waters for Georgia. In addition to these waters, the USEPA added waters to the Georgia 303(d) list on December 31, 1996, June 25, 1997, and

TABLE 9
Evaluation of Use Support By Waterbody Type
2004-2005

Degree of Use Support	Streams/Rivers (miles)			Lakes/Reservoirs (acres)			Estuaries (sq. miles)		
	Assessment Basis			Assessment Basis			Assessment Basis		
	Evaluated	Monitored	Total	Evaluated	Monitored	Total	Evaluated	Monitored	Total
Supported	2,417	2,941	5,359	978	232,710	233,688	741	20	761
Partially Supported	887	2,991	3,878	20	107,194	107,214	0	4	4
Not Supported	288	2,817	3,105	0	55,950	55,950	68	21	89
TOTAL	3,592	8,750	12,342	998	395,854	396,852	809	45	854

June 18, 1999. Those waters are shown in Appendix B. All the USEPA added waters have had TMDLs completed for them at this time and are no longer part of the 303(d) list. To summarize, the Georgia 303(d) list of waters is made up of those waters with an "X" in the column marked 303(d) in Appendix A.

Georgia is implementing a watershed approach to water resource management through a rotating basin approach. This approach provides the framework and schedule for actions to address waters on the Georgia 303(d) list. The rotating basin approach provides an opportunity to focus monitoring, assessment, problem prioritization, TMDL development, water resource protection strategy development and implementation resources in specific basins on an orderly five year rotating basis. Of course, significant problems may arise in basins other than the basins of focus and the GAEPD will continue to respond in an appropriate manner. Thus, a discussion for prioritization of the 305(b)/303(d) list must be made in the context of the river basin planning program and in the context of current actions underway to address water quality problems documented in the Georgia 305(b) report. The majority of resources will be directed to insuring the ongoing pollution control actions are completed and water quality improvements are achieved. This work applies to those waters which are identified as 305(b) waters and coded with a "2" in the 303(d) status column of the table. These stream segments while listed on the 305(b) report list are not segments on the Georgia 303(d) list in accordance with USEPA guidance as actions are ongoing which will resolve the issues. However, these streams are the highest priority waters as these segments will continue to require sources to complete actions and insure standards are achieved.

TABLE 10. Causes of Nonsupport of Designated Uses By Waterbody Type 2004-2005

Cause Cateogry	Rivers/Streams (miles) Contribution to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Fish Guidance	777	602
Toxicity	0	36
Pesticides	0	0
Priority Organics	1	0
Metals	1	42
Ammonia	0	0
PH	31	212
Dissolved Oxygen	531	726
Thermal-Modification	0	9
Pathogens	2,767	1,496
Biota Impacted	1,156	463
Other Inorganics	0	0
Cause Category	Lakes/Reservoirs (acres) Contribution to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Fish Guidance	96,044	650
Toxicity	0	0
Pesticides	0	0
Priority Organics	950	0
Metals	0	0
PH	0	0
Dissolved Oxygen	0	0
Thermal-Modification	650	0
Pathogens		
Chlorophyll	65,626	0
Cause Category	Estuaries (square miles) Contribution to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Priority Organics	0	2
Metals	0	2
Dissolved Oxygen	70	19
Pathogens	0	0
Fish Guidance	2	21

1 A water body may be affected by several different causes or sources and its size is counted in each relevant cause category. Thus totals will be significantly larger and will not sum to totals in Table 3-9 or Appendix A.

2 Major Contribution - A cause or source makes a major contribution to impairment if it is the only one responsible for less than full use support, or if it predominates over others.

3 Moderate/Minor - A cause or source makes a moderate/minor contribution to impairment if it is one of multiple causes responsible for less than full use support.

TABLE 11. Potential Sources of Nonsupport of Designated Uses By Waterbody Type 2004-2005

Cause Cateogry	Rivers/Streams (miles) Contribution to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Industrial Point	0	42
Industrial Nonpoint	40	159
Municipal Point	53	147
Municipal Nonpoint	0	0
Combined Sewer/ Overflows	0	93
Urban Runoff/ Stormwater	1,651	321
Hydropower/Habitat/ (Dam Release)	11	2
Thermal Modification	0	0
Nonpoint Source	4,666	318
Agriculture	0	0
Silviculture	0	0
Resource Extraction	0	0
Land Disposal	0	0
Natural Sources	0	0
Cause Category	Lakes/Reservoirs (acres) Contribution to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Industrial Point	650	0
Industrial Nonpoint	55,950	0
Municipal Point	0	0
Municipal Nonpoint	0	0
Urban Runoff/ Stormwater	194	93,309
Nonpoint Sources	13,061	93,309
Cause Category	Estuaries (square miles) Contribution to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Industrial Point	0	92
Industrial Nonpoint	1	4
Municipal Point	0	88
Urban Runoff/ Stormwater	0	70
Nonpoint Sources	0	67
Marina	0	0

These stream segments have been assigned priority one. This is evidenced by the “1" noted in the far right column titled priority on the listing.

Second priority was allocated to segments with multiple data points which showed metals or other toxic substance concentrations 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 guideline listings, or poor fish communities, or fecal coliform bacteria, pH or temperature standards violations. Waters added to the Georgia 303(d) list by EPA were also assigned to third priority.

Several issues helped forge the rationale for priorities. First, strategies are currently in place to address many of the significant water quality problems across the state and significant resources will be required to ensure that these actions are completed. Second, a large percentage of waters for which no control strategy is currently in place are listed due to fish consumption guidelines or as a result of exceedence of criteria of fecal coliform bacteria due to urban runoff or nonpoint sources or atmospheric deposition. At the present time, the efficacy of the fecal coliform bacteria standard is in question in the scientific community. The primary cause for mercury contamination of fish tissue is air deposition. Steps are being taken at the national level to reduce air deposition of mercury.

The rotating basin approach process provides the framework for the long-term schedule for developing TMDLs for 303(d) listed segments. TMDLs were proposed for 303(d) listed waters in the Savannah and Ogeechee River Basins in 2004 and for 303(d) listed waters in the Ochlockonee, Suwannee, Satilla and Savannah River Basins in 2005. The TMDLS for the Savannah and Ogeechee were approved by the USEPA in early 2005 and the TMDLS for the Ochlockonee, Suwannee, Satilla and Savannah were approved in early 2006.

The lists in Appendix A and B will continue to reflect the segments where water quality data indicate compliance with or problems with achieving compliance with water quality standards. These segments will be removed when the actions have been taken and compliance attained. The list will grow and shrink based on these considerations and any new standard or approaches implemented in the future. This will also affect the 303(d) list as these entries will undergo changes along with the 305(b) list.

CHAPTER 4
Wetland Programs

Introduction

Various assessments of Georgia's wetlands have identified from 4.9 to 7.2 million acres, including more than 600,000 acres of open water habitat found in estuarine, riverine, palustrine, and lacustrine environments. Estimates of wetland losses since colonial settlement beginning in 1733 and expanding over the next two and one-half centuries are between 20-25% of the original wetland acreage.

Georgia has approximately 100 miles of shoreline along the south Atlantic, with extensive tidal marshes separating the barrier island sequences of Pleistocene and Holocene age from the mainland. Georgia's coastline and tidal marshes are well preserved compared to other South Atlantic states.

Georgia's interior ranges in elevation from sea level to 4,788 feet at Brasstown Bald in the Blue Ridge Mountain Province. At the higher elevations, significant, pristine cool water streams originate and flow down steep to moderate gradients until they encounter lower elevations of the Piedmont Province. Many of the major tributaries originating in the mountains and piedmont have been impounded for hydropower and water supply reservoirs. These man-made lakes constitute significant recreational resources and valuable fishery habitat. At the fall-line, streams flowing southeasterly to the Atlantic, or south-southwesterly to the Gulf, have formed large floodplains as each encounters the soft sediments of the upper Coastal Plain.

Other significant wetlands found in the state are associated with blackwater streams originating in the Coastal Plain, lime sink-holes, spring heads, Carolina bays, and the great Okefenokee Swamp, a bog-swamp measuring approximately one-half million acres in south Georgia and north Florida. The swamp drains to the east by the St. Marys River into the Atlantic, and to the west by the Suwannee River into the Gulf.

The lower Coastal Plain has frequently been referred to as Atlantic Coastal Flatwoods, where seven tidal rivers headwater in the ancient shoreline terraces and sediments of Pleistocene age. Scattered throughout the flatwoods are isolated depressional wetlands and drainageways dominated by needle-leaved and broad-leaved tree species adapted to long hydroperiods.

Due to considerable variation in the landscape in topography, hydrology, geology, soils, and climatic regime, the state has one of the highest levels of biodiversity in the eastern United States. The state provides a diversity of habitats for nearly 4,000 vascular plant species and slightly less that 1,000 vertebrate species. Numerous plant and animal species are endemic to the state. Many of the rarer species are dependent upon wetlands for survival.

Extent of Wetland Resources

Assessments of wetland resources in Georgia have been carried out with varying degrees of success by the USDA Natural Resources Conservation Service, the USFWS National Wetland Inventory, and the state Department of Natural Resources. The extent and location of specific tidal marsh types have been reported in numerous scientific papers and reports. Estimates of other specific wetlands types, such as bottomland hardwood swamps, are also reported in studies on a regional scale.

Hydric soils as mapped in county soil surveys are useful indicators of the location and extent of wetlands for the majority of Georgia counties with complete surveys. The dates of photography from which the survey maps are derived vary widely across the state. There is an ongoing effort by NRCS to develop digital databases at the soil mapping unit level, but most of these data sets are not yet available. However, soil surveys have proven useful in wetland delineation in the field and in the development of wetland inventories. County acreage summaries provide useful information on the distribution of wetlands across the state.

The National Wetland Inventory (NWI) of the U.S. Fish and Wildlife Service utilizes soil survey information during photo-interpretation in the development of the 7.5 minute, 1:24,000 scale products of this nationwide wetland inventory effort. Wetlands are classified according to the Cowardin system, providing some level of detail as to the characterization of individual wetlands. Draft products are available for the 1,017 7.5 minute quadrangles in the state of Georgia, and many final map products have been produced. All of these quadrangles are available in a digital format, and an effort is underway to combine them into a single, seamless database for Georgia. Although not intended for use in jurisdictional determinations of wetlands, these products are invaluable for site surveys, trends analysis, and landuse planning.

A complementary database was completed by Georgia DNR in 1991 and is based on classification of Landsat TM satellite imagery. Due to the limitations of remote sensing technology, the classification scheme is simplified in comparison to the Cowardin system used with NWI. Integration of this digital information with

Geographic Information System technology is straight-forward. The inclusion of other upland landcover classes adds to the utility of this database in environmental analysis and landuse planning.

A summary of wetland acreages derived from this database is as follows: open water = 647,501; emergent wetlands = 351,470; scrub/shrub wetlands = 387,793; forested wetlands = 3,194,593; salt marshes = 241,242; brackish marshes = 91,951; and tidal flats/beaches = 14,750. The total wetland acreage based on Landsat TM imagery is 4,929,300 acres or 13.1% of Georgia's land area. This data underestimates the acreage of forested wetlands in the Piedmont and Coastal Plain, where considerable acreage may have been classified as hardwood or mixed forest. The data overestimates emergent and scrub/shrub wetlands in the pine flatwoods because of wet surface soils associated with clear-cuts or young pine plantations. The data under-estimates the tidal marshes and tidal flats because of a high tide stage that flooded considerable acreage. The targeted accuracy level for the overall landcover assessment using Landsat imagery was 85%. However, the classification error was not necessarily distributed equally throughout all classes.

Georgia reported landcover statistics by county in 1996 that included acreage occurrences for 15 landcover classes derived from early spring Landsat TM satellite imagery from 1988-1990. This document (Project Report 26) and accompanying landcover map of the state at a scale of 1:633,600 (1 inch = 10 miles) are available to the public from the Georgia Geologic Survey, Map Sales office.

Similar Landsat-based landcover databases have been produced with more recent imagery. The Federal government completed mapping in Georgia using imagery form the mid-1990s as part of the National Landcover Database. The Georgia Gap Analysis Program, supported in part by Georgia DNR, has completed an 18-class database using imagery from 1997-1999. Both these databases include wetland landcover classes.

Wetland Trends In Georgia

The loss of wetlands has become an issue of increasing concern to the general public because of associated adverse impacts to flood control, water quality, aquatic wildlife habitat, rare and endangered species habitat, aesthetics, and recreation. Historically, we have often treated wetlands as "wastelands" that needed "improvement". Today, "swamp reclamation" acts are no longer funded or approved by Congress and wetland losses are in part lessened. However, we still lack accurate assessments for current and historic wetland acreages. For

this reason, we have varying accounts of wetland losses, which provide some confusion in the public's mind as to trends.

The most recent (1991) and precise measure of Georgia's wetland acreage has been developed by the U.S. Fish and Wildlife Service's National Wetland Inventory efforts. This statistically sound study was based upon 206 sample plots of four (4) square miles each that were delineated and measured from 1975 and 1982 aerial photography. The total acreage of wetlands for Georgia was estimated at 7,714,285 acres in 1982 as compared to earlier estimates of 5.2 million acres. This estimate is considerably higher than the total shown in a 1984 trend study and is due in part to better quality photography.

Georgia's total wetland area covers an estimated 20 percent of the State's landscape. This total (7.7 mil. ac.) includes approximately 367,000 acres of estuarine wetlands and 7.3 million acres of palustrine wetlands (forested wetlands, scrub-shrub, and emergents). A net wetland loss due to conversion of approximately 78,000 acres was estimated for the seven (7) year period, while 455,000 acres were altered by timber harvesting. These latter estimates are less reliable than the total acreage and are slightly higher than the 1984 study. Regardless of the method used to measure total acreage or wetland losses, Georgia still retains the highest percentage of pre-colonial wetland acreage of any southeastern state. The state lacks the resources to conduct an independent monitoring program on the frequency of wetland alterations by class or type.

All dredge and fill activities in freshwater wetlands are regulated in Georgia by the U.S. Army Corps of Engineers (COE). Joint permit procedures between the COE and DNR, including public notices, are carried out in tidally influenced wetlands. Separate permits for alterations to salt marsh and the State's waterbottoms are issued by the Coastal Marshlands Protection Committee, a State permitting authority. Enforcement is carried out by the State, COE and EPA in tidal waters, and by the COE and EPA in freshwater systems. Normal agricultural and silvicultural operations are exempted under Section 404 regulations with certain conditions.

Integrity of Wetland Resources

Wetland Use Support. In Georgia, wetland uses are tied to both the state water quality standards through the definition of "water" or "waters of the state", and to established criteria for wetlands protection (Chap. 391-3-16-03) associated with the Comprehensive Planning Act of 1989 (O.C.G.A. 12-2-8).

The definition of "water" or "waters of the State" (Chap. 391-3-6) means "any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, wetlands, and all other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the state which are not entirely confined and retained completely upon the property of a single individual partnership, or corporation". The waters use classifications and general criteria for all waters are discussed elsewhere in this report.

The Comprehensive Planning Act requires all local governments and regional development centers to recognize or acknowledge the importance of wetlands for the public good in the landuse planning process. All local governments (municipalities and county governments) were required, beginning in 1990 and ending in 1995, to meet minimum criteria for wetland use and protection. Each government is required to map wetlands using DNR or NWI maps, and describe how wetlands will be protected from future development.

The wetlands protection criteria define freshwater "wetlands" as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 32.93)". This definition is not intended to include "coastal marshlands" or tidal salt marshes as defined by the Coastal Marshlands Protection Act. The minimum area of wetlands to be identified in landuse planning is not to exceed five acres.

The categories of freshwater wetlands and aquatic habitats to be identified, defined and mapped by the State and included in landuse planning are open water, non-forested emergent, scrub/shrub, forested and altered wetlands. Landuse plans must address at least the following considerations with regard to wetland classes identified in the database:

- Whether impacts to an area would adversely affect the public health, safety, welfare, or the property of others.

- Whether the area is unique or significant in the conservation of flora and fauna including threatened, rare or endangered species.

- Whether alteration or impacts to wetlands will adversely affect the function, including the flow or quality of water, cause erosion or shoaling, or impact navigation.

- Whether impacts or modification by a project would adversely affect fishing or recreational use of wetlands.

- Whether an alteration or impact would be temporary in nature.

- Whether the project contains significant state historical and archaeological resources, defined as "Properties On or Eligible for the National Register of Historic Places".

- Whether alteration of wetlands would have measurable adverse impacts on adjacent sensitive natural areas.

- Where wetlands have been created for mitigation purposes under Section 404 of the Clean Water Act, such wetlands shall be considered for protection.

The mapping of altered wetlands defined as "areas with hydric soils that have been denuded of natural vegetation and put to other uses, such as pasture, row crops, etc., but that otherwise retain certain wetland functions and values" has not been completed due to a lack of resources. It is unlikely that there will be any significant resources committed at the state or federal levels for monitoring wetland alterations and conversions in the near future.

The acceptable uses of wetlands without long term impairment of function were identified in wetland protection criteria as the following:

Timber production and harvesting. The socio-economic value of wetlands for consumptive uses such as timber and wood products production is extremely high. High quality hardwoods are produced along the major river corridors throughout the state. There are established "best management practices" for harvesting in wetlands; the level of compliance with these voluntary standards is monitored by the Georgia Forestry Commission in cooperation with the DNR-EPD.

Wildlife and fisheries management. Wetlands are an invaluable resource, both ecologically and economically. They are among the state's most biologically productive ecosystems and are crucial as habitats for wildlife. Wetlands function as essential breeding, spawning, nursery, nesting, migratory, and/or wintering habitat for much of the migratory and resident fauna. More than 40% of the state threatened and endangered plant and animal species depend heavily on wetlands. Coastal wetlands function as nursery and spawning grounds for 60-90% of commercial fin and shellfish catches. In addition, high levels of plant productivity in coastal wetlands contribute to corresponding levels of invertebrate

organisms upon which fish and other animals feed. Plant decomposition in wetlands is also important for waterfowl production, which contributes to the economy through hunting-related expenditures.

Water Quality Protection. Wetlands help to maintain water quality and improve degraded water by removing, transforming, or retaining nutrients; processing chemical and organic wastes and pollutants; and reducing sediment loads. Wetlands function as sediment, toxic substance, and nutrient traps, performing functions similar to a waste treatment plant. Wetland vegetation filters and retains sediments which otherwise enter lakes, streams, and reservoirs, often necessitating costly maintenance dredging activities. Wetlands may also perform similar purification functions with respect to ground water. Those wetlands hydrologically connected to ground water could also be a source of recharge for underground water supplies, in which case the natural settling and filtering of pollutants would increase the purity of the water resource. As with any filter, wetlands can be damaged, overloaded, or made nonfunctional. Wetlands conservation and careful management of point and non-point pollutants can provide good wetland filtration of materials.

Recreation. The non-consumptive uses of wetlands may contribute most significantly and positively to quality of life, yet these uses are often undervalued or unrecognized altogether. Wetlands are areas of great diversity and beauty and provide open space for recreational and visual enjoyment. They support a myriad of recreational activities including boating, swimming, birdwatching, and photography. In addition, tidal, coastal, and inland wetlands provide educational opportunities for nature observation and scientific study.

Natural water quality treatment or purification. (See wastewater treatment above). Maintaining the biological and ecological integrity of wetlands is essential to the capitalization of these natural systems for the improvement of water quality and quantity. The polluting, filling, silting, channelizing, draining, dredging, and converting to other uses of wetlands are destructive to the ecological functions of wetlands.

Other uses permitted under Section 404 of the Clean Water Act. Such uses must have an overwhelming public interest. Unacceptable uses of wetlands include:

- Receiving areas for toxic or hazardous waste or other contaminants.
- Hazardous or sanitary waste landfills.
- Other uses unapproved by local governments.

The criteria established by the State for freshwater wetlands are designed to assist in the identification and protection of wetlands, and do not constitute a state or local permit program. The protection of coastal marshlands, seashores, and tidal waterbottoms is described under the Estuary and Coastal Assessment section of this report.

Wetland Monitoring. The state maintains monitoring and enforcement procedures for estuarine marshes under authority of the Coastal Marshlands Protection Act of 1970. Monthly or bimonthly over-flights are made of the Georgia coastline for potential violations. Restoration and penalties are provided for in the Act.

The State does not maintain a specific monitoring program for freshwater wetlands because of the size of the area (>37 million acres), lack of resources, and weak public support for a state-managed regulatory program. At this time no assessment of costs has been made for establishing any monitoring of wetland changes for the entire state.

Additional Wetlands Protection Activities

Georgia is protecting its wetlands through aggressive land acquisition, public education, land use planning, regulatory programs, and wetland restoration. Since 1987, the state has acquired roughly 200,000 acres through program expansion and the Preservation 2000 and RiverCare 2000 acquisition efforts. Additional protection to wetlands is provided either directly or indirectly by several statutes listed below, but described elsewhere in this report. These state laws are as follows:

- Coastal Marshlands Protection Act
- Shore Protection Act
- 401 Water Quality Certification
- Water Quality Control Act
- Ground Water Use Act
- Safe Drinking Water Act
- Erosion and Sedimentation Control Act
- Metropolitan Rivers Protection Act

Land Acquisition. Recent land acquisition activities that represent significant protection of wetland acreage include Chickasawhatchee Swamp WMA in southwest Georgia, where combined wetland and upland acreage totals 19,680 acres. In the Altamaha River basin, a total of 3,600 acres containing significant floodplain acreage is jointly managed by DNR and The Nature Conservancy at

Moody Forest Natural Area. Preservation by DNR of a Carolina bay at Big Dukes Pond NA added 1,220 acres, including a wood stork rookery site. Other wetland acres have recently been protected through the establishment of Conasauga River Natural Area in northwest Georgia.

Education And Public Outreach. WRD has one full-time person involved in aquatic education, providing training for educators in wetland values and acting as a resource person for developing and coordinating teaching materials. The Aquatic Education Program consists of three key components: Youth Education, Adult Education, and Kids Fishing. Youth Education involves training educators to use Aquatic Project Wild (APW), which consists of instructional workshops and supplementary conservation curriculum materials for teachers of K-12 grade age children. About 1,000 educators are trained annually to use APW in the classroom. Adult Education consists primarily of producing educational materials such as the annual Freshwater and Saltwater Sport Fishing Regulations, Reservoir and Southeast Rivers Fishing Predictions, Small Georgia Lakes Open to Public Fishing, Introduction to Trout Fishing, news releases, brochures, radio Public Service Announcements, videos, and staff presentations to sportsmen and civic organizations, as well as large events. The purpose of Kids Fishing Events (KFEs) is to introduce youth and their families to the joys of recreational fishing. The Aquatic Education Program touches tens of thousands of youths and adults each year, bringing these people closer to the environment, and teaching them conservation principles that are important to sustaining wetlands and healthy fish populations.

State Protected Species in Wetlands. With assistance from the USFWS, Section 6 Federal Aid Program, and USDA-FS Stewardship Program, WRD developed and published a descriptive handbook of Georgia's 103 protected plant species that include endangered, threatened, unusual, and rare plant species found in the state. Forty percent of the protected species are dependent on wetland or aquatic habitats in the vast majority known occurrences. The "Protected Plants of Georgia" book includes illustrations, descriptions, threats to species or their habitats, range in adjoining states, historical notes, and recommendations for management of protected species habitats. The protected plant book has been distributed to all DNR personnel and wildlife biologists involved in the management of state properties. It has been distributed to the Georgia Forestry Commission, USDA-Natural Resource Conservation Service, Forest Service, USFWS, Corps of Engineers, US EPA, major utility companies, forest products corporations, consulting biologists, educators, and private citizens. The book calls the public's attention to the need to protect wetlands on private property as well as public property in the state. In addition, the following species are subjects of continuing research funded through Section 6 USFWS grant-in-aid programs:

- Loggerhead sea turtle - nest survey and protection, educational material
- Wood stork - aerial surveys of rookeries and educational material
- Bald eagle - nest surveys, monitoring, and management
- Manatee - comprehensive management plan implementation, investigate and analyze habitat use and movements
- Wood stork - ecology of coastal colonies
- Listed aquatic species - Conasauga River corridor identification and mapping of essential habitats
- Listed animal species - protected animal book for the State of Georgia (111 species)
- Goldline darter - life history and status in Coosawattee River system
- Tennessee Yellow-eyed Grass - surveys for undocumented populations
- Whorled Sunflower - habitat management plan development
- Pitcherplant Bogs - habitat management plan development
- Swamp Buckthorn - status survey

Federal funds made available through USFWS were used to complete an assessment of Carolina bays in Georgia. A combination of aerial photography and field surveys were used to priories these wetlands for value in protecting wetland functions and in providing significant habitat to support wetland-dependant ecosystems. A final report on this effort will be available in 2004.

Managing Wetlands on State WMAs, PFAs, Parks, Heritage Preserves, and Natural Areas. M.A.R.S.H. Project. Georgia DNR-WRD has a cooperative agreement with Ducks Unlimited (DU) for the purpose of acquiring, developing, restoring, or enhancing waterfowl habitat. A major aspect of this agreement is the M.A.R.S.H. program (Matching Aid to Restore States Habitat). Under the MARSH program, 7.5% of the money raised by DU in Georgia is made available as matching funds for work to develop, improve, or restore waterfowl habitat.

Since 1985, 1.2 million dollars have been spent on habitat projects in the state of Georgia involving thousands of acres of wetlands. Completed projects include:

Altamaha WMA - 4,500 acres
Ansley-Hodges Memorial Marsh - 42 acres
B.F. Grant WMA - 45 acres
Crockford-Pigeon Mtn WMA - 35 acres
Fishing Creek WMA - 50 acres
Horse Creek WMA - 110 acres
Arrowhead - 28 acres
Blanton Creek WMA - 50 acres
Clark Hill - 70 acres
Dyar Pasture - 60 acres
Grand Bay WMA - 8,730 acres
Joe Kurz WMA - 50 acres

Mayhaw WMA - 45 acres
Oconee WMA - 150 acres
Rum Creek WMA - 25 acres
West Point WMA - 20 acres

Assessment of DNR-Managed Wetlands. In 1990, while developing a state wetland conservation plan and strategy for mitigation of impacts from water supply reservoirs and public fishing lakes, Georgia DNR/WRD made an assessment of wetlands on DNR-managed state-owned lands. As part of this assessment, an effort was made to identify degraded wetland acreage suitable for mitigation. Degraded wetlands were identified as having potentials for restoration or enhancement of wetland functions and values.

Table 4-1 summarizes DNR-managed lands (as of 1990) by various categories. This plan was developed by DNR and Law Environmental, Inc. to mitigate potential impacts from future development of regional water supply reservoirs and public fishing areas. DNR still has under study and evaluation a potential regional water supply reservoir in the Tallapoosa River basin. To date there has been implementation of mitigation on state lands at a mitigation site at Horse Creek WMA for wetlands losses associated with the construction of the Dodge County PFA. Mitigation is being pursued for wetland impacts associated with the development of a public fishing area at Ocmulgee WMA.

TABLE 4-1
ASSESSMENT OF DNR LANDS (1990).

Categories	Total Acreage	Total Wetland Acreage	Acreage Suitable for Mitigation	
			Restoration	Enhancement
WMA/PFA Sites	128,106	38,754	1,782	9,749
Park Sites	43,850	6,158	509	86
Other Sites*	58,712	12,126	83	2,322
	230,668	57,038	2,374	12,157

*Includes natural areas, heritage preserves, and some barrier islands (Ossabaw, Sapelo)

CHAPTER 5
Estuary and Coastal Programs

Background

The Georgia Department of Natural Resources (DNR) Coastal Resources Division (CRD) primarily conducts monitoring and management of Georgia's coastal environments. The CRD operates the Coastal Management program and the Shellfish Sanitation program; manages recreational and commercial fisheries; and reviews applications for permits under the Coastal Marshlands Protection Act and Shore Protection Act. CRD also oversees several EPA wetland protection development grants. The DNR Wildlife Resources (WRD) and Environmental Protection Divisions (GAEPD) each play additional roles in this effort and interact with various agencies on management of Georgia's coastal areas. The Georgia University System conducts research on estuarine and coastal habitats from Skidaway Oceanographic Institute in Savannah and the University of Georgia Marine Institute on Sapelo Island.

Water Quality Monitoring

The GAEPD monitors estuarine water quality as part of its long-term trend-monitoring network. Additional intensive surveys have been conducted with major studies for the North River, Satilla River, Brunswick/ Turtle Rivers, North Newport River, and Savannah River and several estuarine sites have been included in the GAEPD toxics monitoring projects. Monitoring of estuaries and coastal waters is also being conducted, as these areas are the focus of monitoring efforts associated with the River Basin Management Planning Program.

The GAEPD monitoring programs have included sampling for the presence of potentially toxic materials in water, sediment, fish, oysters, shrimp, and blue crabs. To date, only one site sampled as part of the toxics monitoring has revealed metals or organic compounds at problem concentrations. Based on the sampling at this site near Brunswick, a seafood consumption advisory was issued. This advisory is noted in Chapter 6.

The CRD provides enhanced water quality monitoring through implementation of the Comprehensive Coastal Monitoring Project. CRD staff monitor water, sediment, and biological tissue quality for both non-point and point source contaminants in estuarine and near shore coastal waters. Four distinct

monitoring programs are administered by CRD staff to accomplish the goals of the comprehensive Coastal Monitoring Program. Two programs, Shellfish Sanitation and Beach Monitoring, are concerned with public health. The other two programs, Nutrient Monitoring and the National Coastal Assessment are designed to generate baseline monitoring data for trends.

Shellfish Sanitation Program

CRD's Shellfish Sanitation Program monitors the quality of Georgia's shellfish waters for harmful bacteria that might affect the safety of shellfish for human consumers. Nine (9) harvest areas are designated for the recreational picking of oysters and clams by the general public. An additional seventeen (17) harvest areas are designated for the commercial harvest of oysters and clams.

TABLE 5-1
LOCATION AND SIZE OF AREAS
APPROVED FOR SHELLFISH HARVEST

County	Approved	Leased	Public
Chatham	2,903 acres	25	1,403 acres
Bryan/Liberty	Classification in progress	Classification in progress	Classification in progress
McIntosh	20,277 acres	15,157 acres	5,120 acres
Glynn/Camden	17,511 acres	9902 acres	7,609 acres

The Shellfish Sanitation Program is funded by the state of Georgia and consists of water quality monitoring, permitting shellfish harvesters, sanitary surveys, and reports to the Food and Drug Administration. The Program is administered under the authority of OCGA 27-4-190, which specifically details the law as it pertains to shellfish harvest.

The National Shellfish Sanitation Program requires that states show that shellfish harvest areas are "not subject to contamination from human and/or animal fecal matter in amounts that in the judgment of the State Shellfish Control Authority may present an actual or potential hazard to public health." National standards further require the state to regularly collect water samples from each approved

harvest area and to perform certain analytical procedures to ensure that the area is below the established fecal coliform threshold. Waters approved for shellfish harvest must have a geometric mean that does not exceed the threshold set forth by the FDA.

Water Quality sampling occurs monthly at eighty-two (82) stations in five (5) counties on the coast including Chatham, Liberty, McIntosh, Glynn, and Camden counties. These stations are located to give good coverage of all the approved harvest areas along the coast.

Permitting is required for all leaseholders and pickers engaging in the commercial harvest of shellfish in the state of Georgia. Additionally, certification of shellfish seed suppliers is done by CRD to ensure that all products entering the State for mariculture purposes has been tested by a pathology laboratory for a variety of common shellfish diseases.

Beach Monitoring Program

The Beach Monitoring Program was developed to protect swimmer health. CRD monitors Georgia's popular swimming beaches on Tybee, St. Simons, Jekyll, and Sea Island for fecal coliform bacteria. In April 2004, CRD began monitoring the beaches for enterococcus bacteria, in response to the federal Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000.

The BEACH Act is an amendment to the Federal Clean Water Act. The Act requires states to: 1) identify and prioritize their coastal recreational beaches; 2) monitor the beaches for the presence the bacterial indicator enterococcus; 3) notify the public when the EPA threshold for the enterococcus bacteria has been exceeded; and 4) report the location, monitoring, and notification data to EPA.

The coastal recreational beaches were identified and reported to EPA. See the table below. The beaches were prioritized into 3 tiers, based on use and proximity to potential pollution sources. Tier 1 beaches are high use beaches. Tier 2 beaches are lower use beaches. Tier 3 beaches are lowest use or low in potential pollution.

In April 2004, CRD began beach monitoring and public notification based on EPA's recommended levels of Enterococcus bacteria for marine recreational waters. CRD monitors for the indicator bacteria enterococcus. The notification procedures are activated when the laboratory reports that a beach sample has exceeded the EPA mandated enterococcus thresholds of 104 per 100 ml for a single sample, or a geometric mean of 35 per 100ml. The Tier 1 beaches are monitored weekly year-round. Tier 2 beaches are monitored monthly from April

through November. Tier 3 beaches are not monitored. Beaches under permanent swimming advisory are monitored quarterly.

EPA ID	Beach Name	Tier	County
GA154978	St. Simons 12th St. Goulds Inlet	1	Glynn
GA431870	St. Simons East Beach Old Coast Guard Station	1	Glynn
GA613921	Massengale on St. Simons	1	Glynn
GA375764	5th St Crossover on St. Simons	1	Glynn
GA776618	Lighthouse on St. Simons	1	Glynn
GA688687	Jekyll Clam Creek	1	Glynn
GA521101	Jekyll North at Dexter Lane	1	Glynn
GA129645	Jekyll Captain Wylly	1	Glynn
GA339359	Jekyll Convention Center	1	Glynn
GA202139	Jekyll South Dunes	1	Glynn
GA895834	Jekyll 4H Camp	1	Glynn
GA216208	Jekyll St. Andrews	1	Glynn
GA136053	Tybee Polk St	1	Chatham
GA378874	Tybee North at Gulick	1	Chatham
GA736216	Tybee Middle	1	Chatham
GA319508	Tybee Strand	1	Chatham
GA881548	Tybee South	1	Chatham
GA958433	Blythe Island Sandbar	2	Glynn
GA997306	Reimolds Pasture in Buttermilk Sound	2	Glynn
GA954033	Sea Island North	2	Glynn
GA910170	Sea Island South	2	Glynn
GA109786	Contentment Bluff Sandbar	2	McIntosh
GA551809	Dallas Bluff Sandbar	2	McIntosh
GA649062	Ossabaw Bradley	2	Chatham
GA405484	Ossabaw South	2	Chatham
Ga994539	Skidaway Narrows	2	Chatham
GA583441	Kings Ferry	2	Chatham
GA543512	Cumberland	3	Camden
GA781891	Little Cumberland	3	Camden
GA740854	Pelican Spit off Sea Island	3	Glynn
GA922112	Rainbow Bar	3	Glynn
GA381139	Wolf Island	3	McIntosh
GA364044	Sapelo Cabretta	3	Mcintosh
GA221111	Sapelo Nanny Goat	3	McIntosh
GA642495	Blackbeard Island	3	McIntosh
GA541863	St. Catherines Island	3	Liberty
GA713371	Ossabaw Middle	3	Chatham
GA182760	Wassaw Island	3	Chatham
GA365682	Williamson Island	3	Chatham
GA708259	Little Tybee Island	3	Chatham

For the notification component, CRD has worked in partnership with local governments, the Jekyll Island Authority, and the Coastal Health District to develop procedures to notify the public about elevated bacteria levels. The Coastal Health District issues a press release for a swimming advisory for the affected beach. The local governments activate advisory signage at access points to the affected beach. CRD places beach information on their web site, http://crd.dnr.state.ga.us and has partnered with the nonprofit organization Earth911 to show current beach conditions on their web site, http://www.earth911.org/waterquality/default.asp?cluster=2.
Earth911 has a free automatic e-mail service to which users can subscribe. The subscribers then receive an e-mail anytime a beach advisory is issued.

CRD reports Georgia's beach data annually to EPA through the EPA Central Data Exchange (CDX). Monitoring data is loaded into the modernized STORET. Notification data is loaded into the BEACON database and can be viewed at http://oaspub.epa.gov/beacon/beacon_national_page.main

Nutrient Monitoring Program

The Nutrient Monitoring Program is an effort funded by the state of Georgia to assess the nutrient loads in our sounds and estuaries. High nutrient loads have been linked to outbreaks of harmful algal blooms in other states and can result in large kills of fish and other marine life as well as human sickness. Nutrient monitoring began on March 1, 2000 and is a continuous program designed to establish trends for nitrate nitrogen, nitrite nitrogen, ammonia nitrogen, total dissolved phosphorus, ortho phosphate, and silicate. Nutrient samples are collected in three major coastal rivers (Ogeechee, Altamaha, and St. Marys) at six sites in each river. This sampling occurs monthly and provides data for the upper estuary, lower salinity environments. Moving seaward, nutrient samples are collected at 30 of the 82 shellfish sample sites. This provides nutrient and fecal coliform bacteria data from 30 sites in our tidal rivers and sounds. To capture nutrient data for our lower sounds, samples are collected at 24 sites in conjunction with the monthly shrimp and crab assessment. The Altamaha and Doboy Sounds, which are not routinely sampled on the shrimp and crab assessment, are sampled at twelve (12) stations in conjunction with the Altamaha River. Sample collection for nutrients occurs monthly at 84 stations on the coast and is creating a baseline dataset for nutrients in the coastal waters of Georgia.

National Coastal Assessment

The final coastal monitoring program administered by CRD is the most comprehensive. The National Coastal Assessment Program (NCA), formerly known as the National Environmental Monitoring and Assessment Program (EMAP), was created in 1988 by the U.S. EPA in cooperation with other federal agencies to provide basic answers relating to environmental problems impacting the Nation's ecological resources. Coastal Resources Division acquired funding from the EPA in 2000 to begin a five year pilot study in which 50 selected sites are sampled each year on the Georgia coast for a core suite of indicators including water quality parameters, sediment chemistry, sediment toxicity, benthic community composition, fish community composition, fish pathology, and contaminants in fish. EPA randomly selects these sample sites and the sampling occurs during the months of July and August each year. This specific time frame, sample site design, and sampling protocol allows each state to view a comparable "snapshot" of environmental conditions. The purpose of this monitoring initiative is to establish a baseline of environmental conditions in estuaries of the coastal states as part of a national survey of estuarine environmental health. The first two-year federal report on this program was completed during the spring of 2004. Currently, CRD is continuing work with the EPA NCA program through another phase II grant. The following proposal will extend NCA activities on the Georgia coast for an additional two years. The project will be conducted in FY 2005-2006 and will build upon and expand the processes and data developed during the preceding five-years.

A Comprehensive Monitoring and Assessment Study for Georgia Coastal Wetlands

The effective management of Georgia's coastal resources is becoming more dependent on a thorough understanding of the functions of the resources being managed. Tidal wetland habitats are being altered as development pressures increase. There is an overwhelming need to better understand the diversity and productivity of estuarine wetland species and their interactions with various habitat conditions.

Coastal Resources Division will evaluate wetland health by sampling nekton, juvenile fish and crustaceans in various habitat conditions in three river basins in coastal Georgia. Habitat conditions sampled will be categorized as pristine, moderately impaired and impaired, based on vegetative edge plant density. Nekton samples will be taken using a drop ring sampler at the vegetated edge. A trawl in the adjacent waterbody will collect juvenile fish and crustaceans. Water quality parameters will be collected at the trawl locations.

Vegetative edge density and biotic composition correlated with water quality parameters will give coastal resource managers a more holistic approach to wetland function. These data will provide a tool in which resource management decisions can be based.

Commercial and Recreational Fisheries

The CRD has several projects whose purposes are to determine the status of exploited stocks of commercially and recreationally important fish, crustaceans, and mollusks. The Ecological Monitoring Surveys Project conducts monthly assessment trawls (blue crabs, shrimp, and beginning in 2003, finfish) in the Wassaw, Ossabaw, Sapelo, St. Simons, St. Andrew and Cumberland Sound systems. This sampling is used to evaluate the abundance, size composition, reproductive status of penaeid shrimp and blue crab for the opening and closing of fishing seasons and areas. In addition, information collected on finfish and other invertebrate species since 2003, provides a broad ecologically based evaluation of species' abundance, distribution, and diversity in these sound systems. Information is also obtained on the commercial landings by species of fish and shellfish harvested each month in Georgia's coastal waters. The Marine Sportfish Population Health Study conducts stock assessments on selected marine sport fish (i.e. spotted sea trout and red drum) and conducts fishery-independent monitoring of estuarine species. The Fisheries Dependent Work Unit conducts the intercept portion of the Marine Recreational Fisheries Statistics Survey in cooperation with the National Marine Fisheries Service.

Total annual commercial landings in Georgia have ranged from 7.40 to 18 .11 million pounds of product during the period from 1994 to 2005, with an annual average of 10.87 million pounds. Penaeid shrimps are the most valuable catch in Georgia commercial landings, typically totaling over 17 million dollars (4.23 million pounds of tails) in unadjusted, ex-vessel value during recent years. Catches are composed primarily of white shrimp (*Litopenaeus setiferus*) during the fall, winter and spring, and brown shrimp (*Farfantepenaeus aztecus*) during the summer. These shrimp spawn in oceanic waters, but depend on the salt marsh wetlands to foster their juvenile and sub-adult stages. White shrimp landings have varied over the last 40 years with no overall trend. Research has shown that densities of spawning stock, and to a lesser extent fall harvest, respond strongly to cold air outbreaks during the early winter which produce wide scale kills of white shrimp, and to a suite of environmental variables impacting the salt marsh ecosystem which produce a range of growing conditions. Winter kills have been associated with freezes 1984, 1989, and 2000. With favorable environmental conditions and short maturation period, the stocks rebounded each time within 18 months.

A disease called black gill, caused by a ciliated protozoan, has impacted shrimp in several recent years. It was first observed in 1996 in the southern portion of the state and was speculated to be caused by freshets associated with Hurricane Fran and Tropical Storm Josephine. The disease has occurred each year since with the exception of 1997, 1998, and 2001. The disease appears to progress from north to south, first appearing in Wassaw Sound in August and being most prevalent in September. The disease seems to dissipate by December. Annual infection rates in 2002 were the highest ever recorded, with the coast-wide annual rate at 18.1%. The life cycle of this protozoan is not completely understood, and its impact on shrimp survival is uncertain. However, in 2002, spring white shrimp catches were above normal through August and after the disease outbreak dropped 50% below the long-term average. Although catch rates from fisheries independent monitoring surveys appear to have a negative relationship with infection rates, this relationship is not statistically significant. Research is needed to understand this organism's life cycle and the environmental factors that cause it to proliferate in some years but not others.

Trends in the brown shrimp fishery present a different picture. While recent landings and experimental catches have varied with no apparent pattern, the long term (40 year) trend in brown shrimp landings has been downward. Several alternative hypotheses bear examination. Reported declines in brown shrimp production may reflect the effects of a shrinking range due to land use practices, and climatological changes. Conditions for juvenile growth and survival may have been altered by a changing climate or direct and indirect alteration to nursery grounds (losses or changes in the quality of fresh and salt water wetlands). Additionally, possible misclassification of brown shrimp by Port Agents may be a factor in the earlier time series of the reported landings. Although highly unlikely with current fishing technology and economic conditions, over fishing of the spawning stock may be resulting in poorer recruitment to Georgia's nursery grounds. Some combination of factors may be influencing stock abundance. Economic conditions in all domestic shrimp fisheries are declining, primarily due to low unit prices kept down by high volumes of imported product, and by increasing costs of operation.

Reported annual blue crab (*Callinectes sapidus*) 2005 landings have recovered to near the 10-year average 4.9 million pounds (2005 = 3.7 million pounds). This, after a severe drought from 1998 to 2002 reduced annual harvest 80% of the long-term average of 7.99 million pounds. Blue crabs live longer than penaeid shrimps (3-4 years versus 1-2 years), and also exhibit less extreme fluctuations in annual abundance from one year to the next. The drought caused major shifts in the estuarine salinity regime - increasing salinity. This shift resulted in (1) higher predation by coastal predators, (2) increased prevalence of

the fatal disease *hematodinium*, (3) loss of habitat, (4) recruitment failure. Although, the drought ended with several tropical storms in the fall of 2002, a recover was not noticeable until the late 2004.

Total finfish landings have increased over time. This has been affected by the re-establishment of an offshore fleet in Georgia during the late 1970's. Snapper, grouper, porgy, king mackerel, sharks, wreckfish, and associated species have contributed to the trend. Some of these species are currently in an over-fished state and are under intensive management. Others, such as king mackerel, have responded positively to state and federal management. American shad populations in the Altamaha River have fluctuated over the past 30 years. Research conducted in 1967 and 1968 generated population size estimates, and the shad run of 1.9 million fish in 1968 was the largest of the time series examined. Additional research conducted since 1982 has been able to provide updated population estimates and has shown Altamaha shad runs quadrupling from 70,396 fish in 1991 to 272,556 in 1997. This rebound may be attributable to a statistically significant decrease in commercial fishing effort that occurred from 1982 to 1991. Apparently, as older fishermen have left, there have been few new entrants into the fishery. No effort estimates are available since 1991. Regulations have remained fairly constant over the past 15 years. The only two modifications were a 15-day season extension in 1983, and commercial fishing regulations in 1984 to clarify open and closed areas on the Altamaha River. No changes were made to shad sportfishing regulations. While the increases in landings and stock size during the early 1990's was significant, they still represent only a fraction of the 1968 run.

Total landings of bivalve mollusks have fluctuated greatly over the last 30 years. During the 1970's landings were totally dominated by oysters (*Crassostrea sp.*), generally over 50,000 pounds of raw meats per annum. During the early 1980's fishermen were increasingly focused on hard clams (*Mercenaria sp.*) due to stock declines in other areas along the east coast and their market value. This combined with increasing acreages available for harvest activities due to water quality certifications, allowed the replacement of oysters by clams as the premier species from 1986-1988. From 1988-1992 clam landings again declined and oyster landings grew. Since 1990, the clam landings have shown a general increase in contrast to the oyster fishery that, after large catches from 1989-92, have shown a steady decline since. In 2005, clam harvest was 106,032 pounds. Oyster harvest in 2005 was only 1,588 pounds – 20% above the ten-year average. Labor costs have effected this change in combination with temporary inaccessibility to some grounds because of conflicts over harvest rights. No acreage has been lost to deteriorating water quality. Current research is focusing on improvements in stock genetics (growth and appearance enhancements), cultch substrate comparisons, and establishing new populations.

The Research and Surveys Program (RSP) is responsible for collecting fisheries dependent and independent information necessary for managing Georgia's sportfish populations and enhancing saltwater sport fishing opportunities. Utilizing fish trawls, gillnets, trammel nets and hook and line gear, program personnel conduct monthly sampling activities to monitor Georgia's most popular marine sport fish. Fishery biologists conduct creel surveys of over 2000 anglers annually to estimate recreational angler effort and catch by species. Ongoing population monitoring efforts, life history investigations, and periodic stock assessments of these species allow managers to determine if fish populations are healthy and not being over-fished. Since the mid-1980's, regulations establishing seasons, creel limits, and size limits have been implemented or revised for 17 species to preserve sport fish stocks and reduce fishing mortality.

The Constituent Services Program is responsible for developing and improving public access to fishing areas through construction of fishing piers, boat ramps and boating service docks.

Sapelo Island National Estuarine Research Reserve

The Sapelo Island National Estuarine Research Reserve (SINERR) is one of 22 estuarine sites nationwide in the National Estuarine Research Reserve Program. Georgia began efforts to designate the Duplin Estuary as an estuarine sanctuary in 1975 and received designation from the Department of Commerce in 1976.

The SINERR has two primary functions: to protect natural and cultural resources and to allow scientists to investigate how such estuarine systems function. Of the 16,000 acres that make up Sapelo Island, SINERR occupies nearly one third. The DNR, which manages SINERR, also manages more than one half the island as the Richard J. Reynolds Wildlife Management Area and another 2,732-acre tract designated as the Natural Area. Hog Hammock, a 434-acre tract, is privately owned.

The DNR has instituted protective management practices while promoting visitor activities including guided interpretive tours, hunting, fishing, and nature study. DNR activities include managing wildlife and forest resources, enforcing conservation laws, operating the ferry and visitor use facilities, presenting educational programs for visitors, and assisting in scientific monitoring.

The University of Georgia Marine Institute largely carries on the research function of SINERR. The Maine Institute employs full-time scientists, technical, and support staff. Its research is centered on how salt-marsh estuaries function. Fully 80% of the Marine Institute research is conducted within the SINERR.

Coastal Zone Management

Recognizing the economic importance of environmentally sensitive coastal areas, the Federal Coastal Zone Management Act of 1972 encourages states to balance sustainable development with resource protection in their coastal zone. As an incentive, the federal government awards states financial assistance to develop and implement coastal zone management (CZM) programs that fulfill the guidelines established by the Act. As further incentive, states with federally approved CZM programs are granted "federal consistency" authority whereby any federal activity that may impact resources within a state's coastal zone must be consistent with the enforceable policies of that state's federally approved CZM program. Thus, states with approved programs have a voice in federal activities such as harbor projects; federal permits, federal fisheries management plans, and federally financed construction projects.

To achieve approval, state CZM programs must address the protection of natural resources and fish and wildlife, coastal development, public access to the coast for recreational purposes, and other aspects of coastal management. State programs must also include public and local government participation in coastal management decision making. States must submit CZM programs to the National Oceanic and Atmospheric Administration (NOAA) for approval in order to receive federal implementation funds. The annual amount of implementation funding available to each state with an approved program is based upon a formula factoring in the linear miles of coastline with coastal population. Georgia's approved Coastal Management Program is eligible for more than $2 million annually.

The Georgia Coastal Management Program is a networked program implemented by the CRD and other state agencies with management authority in the coastal area. As lead agency for the program, the CRD conducts numerous functions including managing saltwater fisheries, monitoring water quality, administering Coastal Marshlands Permits and Shore Permits, providing technical assistance, reviewing federal activities for consistency with the state laws that comprise the Coastal Management Program, and other activities. Other state, local, and federal agencies continue to administer their respective authorities, and cooperate with the CRD on coastal issues. Acting as a strategic plan for the coastal area, the Program relies on existing state laws and authorities to fulfill federal resource protection guidelines. The jurisdiction of the Program extends over the first and second tier of coastal counties to encompass all tidally influenced waters. This eleven-county area includes: Brantley, Bryan, Camden, Charlton, Chatham, Effingham, Glynn, Liberty, Long, McIntosh, and Wayne.

The Georgia Coastal Management Program seeks to balance economic development in Georgia's coastal zone with preservation of natural, environmental, historic, archaeological, and recreational resources for the benefit of Georgia's present and future generations. The Program offers Coastal Incentive Grants to local communities to promote grassroots solutions to coastal issues. The Program promotes interagency cooperation through regular meetings and technical assistance. A CRD satellite field office was opened at Richmond Hill in 2004 to better serve the public in the northern portions of the coast. Finally, the Program conducts a comprehensive environmental education program, operates the Coastal Ark mobile classroom and hosts the Coast Fest, an annual coastal environmental education festival.

The GAEPD has been an active participant in Coastal Management Programs throughout the development and implementation of the initiative. The agency has provided guidance and technical assistance in efforts to improve coastal water quality in general, and in the development of a Coastal NonPoint Source Control Program in particular. Under the Coastal Zone Act Reauthorization Amendments of 1990, Congress added a section entitled "Protecting Coastal Waters." That section directs states with federally approved CZM programs to develop a Coastal NonPoint Source Program. To that end, the GAEPD is assisting the CRD in l) identifying land uses which may cause or contribute to the degradation of coastal waters, 2) identifying critical coastal areas adjacent to affected coastal waters, 3) identification of appropriate measures related to land use impacts to achieve and maintain water quality standards and designated uses, and 4) identifying management boundaries to more effectively manage land use impacts and water uses to protect coastal waters.

CHAPTER 6
Public Health/Aquatic Life Issues

Fish Consumption Guidelines

Background. Fishing is a valuable activity to Georgia's citizens. The ways in which people participate in fishing varies widely. To some people, fishing is an activity associated with family. Teaching children to catch bream off a dock or taking a group of campers at a scout camp for an afternoon of bank fishing are both memorable experiences. Some people participate in fishing purely for the challenge of competition, either competing in an organized club tournament or just competing with the fish to bring to creel and release a limit. Catching fish for the dinner table is also a valuable activity. No matter how a person participates in fishing it should be a fun and safe activity. This also includes eating the fish.

Unfortunately, some fish from a few waterbodies contain substances, which prohibit the safe consumption in unlimited quantities. The Wildlife Resources Division (WRD), the Coastal Resources Division (CRD), and the GAEPD of the Georgia Department of Natural Resources (DNR) work cooperatively to collect and analyze fish samples to provide information for Georgia fishermen.

Fish Monitoring Program. Georgia has more than 44,000 miles of perennial streams and more than 421,000 acres of lakes. It is not possible for the DNR to sample every stream and lake in the state. However, high priority has been placed on the 26 major reservoirs, which make up more than 90% of the total lake acreage. These lakes will continue to be sampled as part of a five year rotating schedule to track any trends in fish contaminant levels. The DNR has also made sampling fish in rivers and streams downstream of urban and/or industrial areas a high priority. In addition, DNR focuses attention on public areas which are frequented by a large number of anglers.

The program includes testing of edible fish and shellfish tissue samples for the substances listed in Table 6-1. Of the 43 constituents tested, only PCBs, dieldrin, DDT and its metabolites, and mercury have been found in fish at concentrations above what may be safely consumed at an unlimited amount or frequency.

TABLE 6-1
PARAMETERS FOR FISH TISSUE TESTING

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

The use of PCBs, chlordane, DDT and dieldrin have been banned in the United States, and, over time, the levels are expected to continue to decline. Currently there are no restricted consumption recommendations due to chlordane. One water segment has a restriction in consumption recommended for one species due to dieldrin residues, and one pond has restrictions recommended due to DDT/DDD/DDE residues.

Mercury is a naturally occurring metal that cycles between the land, water, and the air. As mercury cycles through the environment it is absorbed and ingested by plants and animals. It is not known where the mercury in Georgia's fish originates. Mercury may be present due to mercury content in natural environments such as in South Georgia swamps, from municipal or industrial sources, or from fossil fuel uses. It has been shown that mercury contamination is related to global atmospheric transport. The EPA has evaluated the sources of mercury loading to several river basins in Georgia as part of TMDL development, and has determined that 99% or greater of the total mercury loading to these waters occurs via atmospheric deposition. States across the southeast and the nation have detected mercury in fish at levels that have resulted in limits on fish consumption. In 1995, the USEPA updated guidance on mercury, which documented increased risks of consuming fish with mercury. The DNR reassessed all mercury data and added reduced consumption guidelines in 1996 for a number of lakes and streams, which had no restrictions in 1995. The Georgia guidance for 2005 reflects the continued use of the more stringent USEPA risk level for mercury.

Evaluation Of Fish Consumption Guidance for Assessment Of Use Support. USEPA guidance for evaluating fish consumption advisory information for 305(b)/303(d) use support determinations has been to assess a water as fully supporting uses if fish can be consumed in unlimited amounts; as partially supporting if consumption needs to be limited; and, as not supporting if no consumption is recommended. Georgia followed this guidance in evaluating the fish consumption guidelines for the 2000 and earlier 305(b)/303(d) lists. This assessment methodology was followed again in developing the 2002 305(b)/303(d) List for all fish tissue contaminants except mercury. Mercury in fish tissue was assessed and a segment or waterbody was listed if the trophic-weighted fish community tissue mercury was in excess of the new USEPA water quality criterion (*Water Quality Criterion for the Protection of Human Health: Methylmercury*, EPA-823-R-01-001, January 2001). For mercury, waters were placed on the partial support list if the calculated trophic-weighted residue value was greater than 0.3 µg/g wet weight total mercury, and less than 2 µg/g wet weight, and on the not support list if the value was greater than or equal to 2 µg/g wet weight. For contaminants other than mercury (PCBs, dieldrin, DDT/DDD/DDE) waters were placed on the not support list if the assessment indicated any no consumption of fish, or placed on the partial support list if the assessment indicated any need for reduced consumption rates. The USEPA criterion represents a national approach to address what mercury levels are protective for fishing waters. The existence of risk-based recommendations to reduce consumption were used with respect to other contaminants detected in fish tissue. EPD formally adopted the 2001 EPA national human health

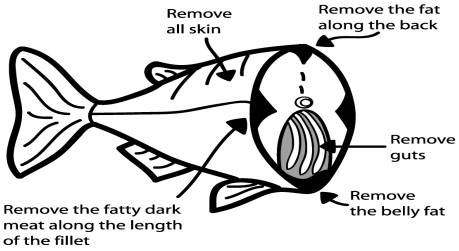
criterion for methylmercury as a human health standard for total mercury in fish tissue in the Georgia water quality rules in December 2002.

Risk-Based Assessment For Fish Consumption. In 1995, Georgia began issuing tiered recommendations for fish consumption. Georgia's fish consumption guidelines are "risk-based" and are conservatively developed using currently available scientific information regarding likely intake rates of fish and toxicity values for contaminants detected. One of four, simple, species-specific recommendations is possible under the guidelines: No Restriction, Limit Consumption to One Meal Per Week, Limit Consumption to One Meal Per Month, or Do Not Eat. In 2005, 58.5% of recommendations for fish tested in Georgia waters were for No Restriction, 26.8% were to Limit Consumption to One Meal Per Week, 13% were to Limit Consumption to One Meal Per Month, and 1.7% were Do Not Eat Advisories. Eighty-five percent of the recommendations available in 2005 were for no, or only minor restrictions (allowing more than 50 meals to be consumed per year). It should be noted that the dramatic increase of waters not fully meeting designated uses as related to fish consumption was a result of converting to a conservative risk-based approach for evaluating contaminants data in 1995, and not a result of increased contaminant concentrations in Georgia's fish.

General Guidelines to Reduce Health Risks. The following suggestions may help to reduce the risks of fish consumption:

Keep smaller fish for eating. Generally, larger older fish may be more contaminated than younger, smaller fish. You can minimize your health risk by eating smaller fish (within legal size limits) and releasing the larger fish.

Vary the kinds of fish you eat. Contaminants build up in large predators and bottom-feeding fish, like bass and catfish, more rapidly than in other species. By substituting a few meals of panfish, such as perch, sunfish and crappie, you can reduce your risk.
Eat smaller meals when you eat big fish and eat them less often. If you catch a big fish, freeze part of the catch (mark container or wrapping with species and location), and space the meals from this fish over a period of time.
Clean and cook your fish properly. How you clean and cook your fish can reduce the level of contaminants by as much as half in some fish. Some chemicals have a tendency to concentrate in the fatty tissues of fish. By removing the fish's skin and trimming fillets according to the diagram, you can reduce the level of chemicals substantially. Mercury is bound to the meat of the fish, so these precautions will not help reduce this contaminant.
Remove the skin from fillets or steaks. The internal organs (intestines, liver, roe, and so forth), and skin are often high in fat and contaminants.



Trim off the fatty areas shown in black on the drawing. These include the belly fat, side or body fat, and the flesh along the top of the back. Careful trimming can reduce some contaminants by 25 to 50%.
Cook fish so fat drips away. Broil, bake or grill fish and do not use the drippings. Deep-fat frying removes some contaminants, but you should discard and not reuse the oil for cooking. Pan frying removes few, if any, contaminants.

Specific Waterbody Consumption Guidelines. These guidelines are designed to protect you from experiencing health problems associated with eating contaminated fish. It should be noted that these guidelines are based on the best scientific information and procedures available. As more advanced procedures are developed these guidelines may change.

PCBs, chlordane, dieldrin, DDT and methylmercury build up in your body over time. It may take months or years of regularly eating contaminated fish to accumulate levels which would affect your health. It is important to keep in mind that these guidelines are based on eating fish with similar contamination over a period of 30 years or more. These guidelines are not intended to discourage people from eating fish. They are intended to help fishermen choose safe fish for the table.

Table 6-2 lists the lakes and streams where the fish have been tested and found to contain little or no contamination. There are no problems with eating fish from these water bodies.

Tables 6-3 and 6-4 list the lakes and streams where consumption guidance has been issued by the DNR. This information is provided annually in Georgia's Freshwater and Saltwater Fishing Regulations, which is available from DNR and also supplied with each fishing license purchased. This information is also updated annually in the DNR publication *Guidelines for Eating Fish From Georgia Waters*.

Special Notice For Pregnant Women, Nursing Mothers, and Children. If you plan to become pregnant in the next year or two, are pregnant now, or are a nursing mother, you and your children under 6 years of age are especially sensitive to the effects of some contaminants. For added protection, women in these categories and children may wish to limit consumption to a greater extent than recommended in Tables 6-3 and 6-4.

Fish tissue consumption guidelines are discussed in detail in the DNR publication *Guidelines for Eating Fish from Georgia Waters-2005 Update* that is reproduced in Appendix C.

Development Of New Risk Communication Tools For Women of Child-bearing Age and Children. In 2003, new approaches to spatial analyses were used to assess fish tissue contaminants by species and trophic level, and across distinct geographic areas including hydrologic unit codes, river basins, and hydrogeologic provinces of Georgia. The analyses were used to generate simple brochures with specific information targeting

TABLE 6-2. NO CONSUMPTION RESTRICTIONS - 2005

LAKES	RIVERS	
Allen Creek WMA Ponds A & B	Alcovy River	Moccasin Creek (Lake Burton Trout Hatchery)
Bowles C. Ford Lake	Boen Creek (Rabun Co.)	Mud Creek (Cobb County)
Brasstown Valley Kid's Fish Pond	Brasstown Creek (Towns Co.)	Nickajack Creek
Carters	Broad River	North Oconee River
City of Adairsville Pond	Buffalo Creek (Carroll Co.)	Noonday Creek (Cobb Co.)
Clayton Co. Water Auth. Lakes Blalock, Smith and Shamrock	Butternut Creek (Union Co.)	Ocmulgee River (Butts, Monroe, Houston & Pulaski Cos.)
Dodge County PFA	Cane Creek (Lumpkin Co.)	Oconee River (Below Barnett Shoals to Lake Oconee, & Laurens Co. & Milledgeville to Dublin)
Fort Yargo State Park Lake	Chattahoochee River (Chattahoochee, Early, & Stewart Cos.)	Ogeechee River (Ft. McAllister)
Hard Labor Creek (Rutledge)	Chattanooga Creek	Olley Creek
High Falls	Chattanooga River (NW Ga.)	Ponder Branch (Walker Co.)
Hugh M. Gillis PFA	Chickasawhatchee Creek	Proctor Creek
Juliette	Coleman River	Sewell Mill Creek
Ken Garden	Conasauga River in Cohutta Forest	Slab Camp Creek (Oconee Co.)
Mayer	Daniels Creek (Cloudland Canyon State Park)	South River (Butts Co., Hwy. 36)
McDuffie PFA East Watershed Ponds	Dukes Creek	Spirit Creek
Nancy Town Lake	East and South Chickamauga Creek	Stamp Creek (Pine Log WMA)
Oconee	Flint River (Dougherty, Baker & Mitchell Cos.)	Stekoa Creek
Olmstead	Goldmine Branch	Tallulah River
Paradise PFA (Patrick & Horseshoe 4)	Jacks River	Upatoi Creek
Payton Park Pond	Jones Creek	Yahoola Creek
Seed	Little Dry Creek (Floyd Co.)	Yellow River
Sinclair	Little Tallapoosa River	
Shepherd CEWC	Little Tennessee River	
Varner	Middle Oconee River	
Walter F. George	Mill Creek (Whitfield Co.)	

TABLE 6-3
GUIDELINES FOR LIMITING THE FISH YOU EAT
LAKES – 2005

Albany By-Pass Pond	**Redear**	**LMB, Catfish**	**Carp**
Acworth	**Bluegill, LMB < 16"**	**LMB > 16"**	
Allatoona	**Carp, Crappie, Spotted bass< 16", LMB 12-16", CCF, White bass < 12", G. redhorse**	**Spotted bass > 16", LMB > 16", HB >16"**	
Andrews	**CCF**	**LMB > 12"**	
Banks	**Bluegill**		**LMB > 12"**
Bartlett's Ferry	**Blk crappie <12", LMB <16", Spotted bass <12"**	**HB & Striped bass & LMB > 16", CCF, Blk crappie & Spotted bass >12"**	
Bear Cr. Reservoir	**Sunfish**	**LMB < 12", CCF >12"**	
Bennett CEWC PFA		**LMB > 12"**	
Black Shoals (Randy Poynter)	**CCF < 12", Redear**	**LMB 12-16", CCF >12", Blk crappie**	
Blackshear	**CCF < 12"**	**CCF > 12", LMB > 12"**	
Big Lazer PFA	**LMB 12-16", CCF**	**LMB > 16"**	
Blue Ridge	**CCF < 16", LMB < 12"**	**White bass & LMB 12-16", CCF > 16"**	
Burton	**LMB <16", CCF, Bluegill, White catfish**	**LMB > 16", Spotted bass 12-16"**	
Pond N. Bush Field, Augusta	**Bluegill, LMB < 12"**	**LMB 12-16"**	
Chatuge	**LMB >12", CCF >12"**	**Spotted bass 12-16"**	
Clarks Hill	**CCF, Black crappie, Redear, White perch, Striped bass, Spotted sucker, HB, LMB <16"**	**LMB > 16"**	
Evans County PFA	**CCF, LMB 12-16"**	**LMB > 16"**	
Goat Rock	**Blk crappie, LMB 12-16", Spotted sucker, Bluegill**	**HB < 12", CCF 12-16"**	**CCF & LMB > 16", HB >12", White bass**
Hartwell (Tugaloo Arm)	**Black crappie, Hybrid/Striped bass < 12", CCF < 16"**	**LMB < 16", Carp > 16"**	**HB/Striped bass 12-16"**
	DO NOT EAT Hybrid and Striped bass > 16 inches in length		**CCF & LMB > 16"**
Hartwell - main body of lake	**DO NOT EAT Hybrid and Striped bass (S C Dept. Health and Environmental Control 1-888-849-7241)**		**LMB, CCF**
Jackson	**Black crappie, Redear sunfish, Catfish < 16"**	**Catfish > 16", LMB**	
Lanier	**CCF & Striped bass < 16", Bluegill, Black crappie White catfish**	**Striped bass, Carp & CCF > 16", LMB, Spotted bass**	
L. Ocmulgee St. Pk.		**Brown bullhead 12-16"**	**LMB > 16"**
McDuffie PFA, West	**CCF**	**LMB**	
Nottely	**CCF, Black crappie**	**LMB > 12", Striped bass > 16"**	
Oliver	**Hybrid bass < 12", CCF < 16", Redear, Bluegill**	**LMB > 12"**	**CCF > 16"**
Rabun	**LMB 12-16", Bluegill, White catfish < 16"**	**White catfish & LMB > 16"**	
Reed Bingham S.P.			**LMB > 12"Catfish > 16"**
Richard B. Russell	**Crappie, Bluegill, White perch, Catfish**	**LMB > 12"**	
Seminole	**CCF, Spotted sucker, Blk crappie, Redear**	**LMB > 12"**	
Stone Mountain	**Catfish**	**LMB > 16"**	
Tobesofkee	**CCF, LMB 12-16"**	**LMB > 16"**	
Tugalo	**White catfish 12-16", Bluegill**		**LMB > 12"**
Tribble Mill Park Pond Gwinnett Co.	**Black Crappie, Bluegill, LMB < 12"**	**LMB 12-16"**	
West Point	**LMB, Carp, Spotted bass, Crappie, CCF & HB < 16"**	**CCF & Hybrid bass (HB) > 16"**	
Worth	**CCF > 12"**	**LMB > 12"**	
Yonah	**Bluegill**	**LMB 12-16", catfish 12-16"**	

Abbreviations: < means less than, > means more than, LMB = largemouth bass, HB = Hybrid bass, CCF = Channel catfish, Blk = Black

TABLE 6-4
GUIDELINES FOR LIMITING THE FISH YOU EAT
RIVERS – 2005

RIVERS/CREEKS	NO RESTRICTIONS	1 MEAL PER WEEK	1 MEAL PER MONTH
Alapaha River	Redbreast sunfish	Spotted sucker	LMB, Bullhead
Alapahoochee River		Bullhead	
Allatoona Creek, Cobb Co.		Spotted bass, Alabama Hog Sucker	
Altamaha River	Bluegill (US 1), CCF (below US 25)	Flathead catfish, LMB, CCF	
Apalachee River	CCF	LMB	
Beaver Creek (Taylor Co.)			Yellow bullhead
Brier Creek (Burke Co.)		Spotted sucker	LMB
Canoochee River		Redbreast	LMB, CCF
Casey Canal	LMB, Bluegill	Striped mullet	
Chatooga River (NE Ga., Rabun County)		Northern Hog Sucker, Silver Redhorse	
Chattahoochee River (Helen to Lanier)	CCF	Redeye bass, Bullhead, Redhorse	LMB
Chattahoochee River (Buford Dam to Morgan Falls Dam)	Brown trout, Carp, Rainbow trout	LMB	
Chattahoochee River (Morgan Falls Dam to Peachtree Creek)	Brown trout, LMB, Bluegill	Jumprock sucker	Carp, Striped bass
Chattahoochee River (Peachtree Creek to Pea Creek)	CCF, White sucker	Bluegill	Striped bass, Carp
Chattahoochee River (Pea Creek to West Point Lake, below Franklin)	CCF	LMB, Spotted bass	Striped bass
Chattahoochee River (Oliver Dam to Upatoi Creek)		Bullhead catfish	LMB
Chattahoochee River (West Point dam to I-85)	LMB, Bullheads	Spotted bass	
Chickamauga Creek (West)	Redbreast sunfish	Spotted bass	
Conasauga River (below Stateline)		Spotted bass	White bass, Buffalo
Coosa River (Rome to Hwy 100, Floyd Co.)		Spotted bass	LMB, Striped bass, Blue catfish
	DO NOT EAT SMALLMOUTH BUFFALO		
Coosa River (Hwy 100 to State line, Floyd Co.)	Spotted bass	LMB	Striped bass, CCF, Buffalo
Etowah River (Dawson County)		Blacktail Redhorse	
Etowah River (above Lake Allatoona)	Golden redhorse	Spotted bass	
Etowah River (below Lake Allatoona)	CCF, Striped bass, Bluegill	Spotted bass, LMB	Smallmouth buffalo
Flint River (Spalding/Fayette cos.)	Spotted sucker	LMB	
Flint River (Meriwether/Upson/Pike cos.)	CCF, Flathead catfish	Shoal bass	
Flint River (Taylor co.)	CCF, Shoal bass	LMB	
Flint River (Macon/Dooly/Worth/Lee cos.)	CCF	LMB	
Gum Creek (Crisp Co.)	Carp	LMB	
Ichawaynochaway Creek	Spotted Sucker	LMB	
Kinchafoonee Creek (above Albany)		LMB, Spotted sucker	
Little River (above Clarks Hill Lake)	Spotted sucker, Silver Redhorse	LMB	

Little River, (above Ga. Hwy 133, Valdosta)	Spotted sucker	LMB	
Muckalee Creek (above Albany)		LMB, Spotted sucker	
Ochlockonee River (near Thomasville)	Redbreast sunfish	Spotted sucker, White catfish	LMB
Ocmulgee River (below Macon, Bibb co.)	CCF	LMB	Flathead catfish
Ocmulgee River (Telfair/Wheeler cos.)	CCF	Flathead catfish, LMB	
Oconee River (above Barnett Shoals)		Silver redhorse, LMB	
Ogeechee River (all to Ft. McAllister)		Redbreast sunfish, CCF, Spotted sucker, Snail bullhead	LMB
Ohoopee River (Emanuel/Toombs cos.)		Spotted sucker, Redbreast	LMB
Okefenokee Swamp (Billy's Lake)		Flier	Bowfin
Oostanaula River, Hwy. 156, Calhoun	Bluegill	Smallmouth buffalo	
Oostanaula River, Hwy 140, to Coosa River	Bluegill	LMB, CCF, Spotted bass, Buffalo	
Patsiliga Creek (Taylor Co.)		Suckers, Chain Pickerel	Bass
Pipemaker Canal		LMB	
Satilla River (Waycross, Ware/Pierce cos.)		Redbreast sunfish, CCF	LMB
Satilla River (near Folkston, Camden Co.)			LMB, Redbreast
Savannah River (above & below New Savannah Bluff Lock & Dam)	Redear, Redbreast	Spotted sucker, LMB	
Savannah River (Chatham/Screven cos.)	CCF, Redear sunfish	LMB	
Savannah River (Effingham Co.)	CCF, Redbreast sunfish	White catfish	LMB, Bowfin
Savannah River (Tidal Gate)	Red drum	White catfish	
Short Creek (Warren Co.)		Sunfish	
South River (Henry Co., Snapping Shoals)	Silver redhorse, CCF	LMB	
Spring Creek (Seminole/Decatur/Miller Cos)	Spotted sucker	LMB	
St. Marys River (Camden Co.)	Redbreast, Striped mullet		LMB
St. Marys River (Charlton Co.)	Redbreast sunfish		LMB
Suwannee River		Bullhead, Chain pickerel	LMB
Swamp Creek (Redwine Cove Road)		Redeye bass	
Talking Rock Creek		Redeye bass	
Tallapoosa River	Bluegill	Blacktail Redhorse	
Trib. To Hudson River, Alto, Banks Co.	Brown bullhead	Redeye bass	
Withlacoochee River (Berrien/Lowndes cos.)		Redbreast sunfish	LMB

COASTAL RIVERS & CREEKS	NO RESTRICTIONS	1 MEAL PER WEEK	1 MEAL PER MONTH	DO NOT EAT
Turtle River System (Purvis, Gibson Crs.)		Black & Red drum, Flounder	Shrimp, Blue crab, SST, SKF, Sheepshead, Spot	STM, ACR, Bivalves*
Turtle & Buffalo Rivers (upriver Hwy 303)	White Shrimp	Red drum, Blue crab, Flounder, SST	SKF, BDR, ACR, Spot, Sheepshead	Striped Mullet, Bivalves *
Turtle River (Hwy 303 - Channel Marker 9)	White Shrimp	Red drum, Flounder	Blue crab, ACR, BDR, SST, SKF, Sheepshead	Spot, STM, Bivalves *
Turtle River (C. Marker 9 & So. Brunswick River to Dubignons & Parsons creeks)	White Shrimp, Flounder	Blue crab, BDR, RDR, SST, Sheepshead	ACR, STM,SKF, Spot	Bivalves *
Terry Creek South of Torras Causeway to Lanier Basin	Spot, STM, Shrimp, ACR, SST, SKF, Blue crab	Yellowtail (Silver perch)		Bivalves *
Terry and Dupree Creeks North of Torras Causeway to Confluence w/ Back River	Blue crab, Shrimp		STM, ACR, SST, SKF	Spot, Bivalves *
Back River One mile above Terry Creek to Confluence with Torras Causeway	STM, Shrimp, ACR, SST, SKF, Blue crab		Spot	Bivalves *
Back River South of Torras Causeway to St. Simons Sound	Spot, STM, Shrimp, ACR, SST, SKF, Blue crab			Bivalves *
Floyd Creek	Blue crab, Southern			

	kingfish			
Academy Creek	Blue crab			
* Bivalves are all clams, mussels and oysters; Shellfish ban under National Shellfish Sanitation Program; Species codes used above are: SST = Spotted Seatrout; ACR = Atlantic Croaker; SKF = Southern Kingfish (whiting); STM = Striped Mullet; BDR = Black Drum; RDR = Red Drum; SHH = Sheepshead				

King Mackerel Special Joint State Guidance Issued by Georgia, North Carolina, South Carolina and Florida For South Atlantic Ocean	
Size Range (Fork Length, Inches)	Recommendations for Meal Consumption of King Mackerel Caught Offshore Georgia Coast
24 To Less Than 33 Inches	No Restrictions
33 To 39 Inches	1 meal per month for pregnant women, nursing mothers and children age 12 and younger meal per week for other adults
Over 39 Inches	Do Not Eat

women of child-bearing age and children for distribution through health and nutrition related outlets. Brochures were generated for four distinct areas of Georgia, and English versions were released in November 2003, followed by publication of Spanish brochures in March of 2004. The College of Family and Consumer Sciences, Cooperative Extension Services, University of Georgia and the Chemical Hazards Program, Georgia Division of Public Health collaborated in the development of the brochures. The information will be updated as needed, and all brochures are currently available on the DNR website.

Bathing Area Monitoring

The U.S. Army Corps of Engineers has conducted fecal coliform monitoring at its bathing beaches in Georgia. Tennessee Valley Authority (TVA), Georgia Power, the U.S. Forest Service, the National Park Service, Georgia State Parks, and counties and cities throughout the state have also conducted some sampling. The City of Acworth closed a swimming beach on Lake Acworth in the early 1990s. In 1994-1995, a water quality investigation of Lake Acworth and its watershed was conducted by Kennesaw State College under a contract with Cobb County. Based on the results of the study, Cobb County developed and implemented portions of an action plan for water quality improvements. In 1997 the City of Acworth and Cobb County conducted monitoring on Lake Acworth. The City of Acworth reopened the beach in June 1998.

Shellfish Area Closures

The potential shellfish growing areas on the Georgia coast are classified as “Approved", “Restricted", or “Prohibited" in accordance with the criteria of the National Shellfish Sanitation Program. Shellfish growing areas are closed as a precaution to shell fishing because of the proximity to a marina or a municipal or industrial discharge. Georgia’s one hundred linear mile coastline contains approximately 700,000 acres of potential shellfish habitat. Only about 10% of that area, however, actually produces viable shellfish stocks. Lack of suitable clutch, tidal amplitudes, littoral slope, and other geomorphological features contribute to the limited occurrence of natural shellfish resources along the Georgia coast. Most shellfish in Georgia grow in the narrow intertidal zone and are exposed between high water and low water tide periods. Georgia maintains approximately 32,000 acres approved for the harvest of shellfish for commercial and/or personal consumption. Georgia currently has three harvest areas comprised of commercial leases and public recreational plots. Only those areas designated as Public Recreational Harvest or those areas under commercial lease are classified as "Approved". "Approved" areas are monitored regularly. All other waters of the state are classified as "Prohibited", are not monitored and are closed to the taking of shellfish due to the presence of human activities that may potentially create a problem. Even though some of these areas meet the

criteria to allow harvesting, they were classified as “Prohibited" so that a safe zone can be maintained in the event of an accidental spill. Additionally, another 179,000 acres of the potential shellfish growing area is classified as “Prohibited" due to the lack of available water quality data.

Pollution-Related Fish Kills

During the 2004-2005 period, a total of 28 fish kill events were reported, with 17 attributable to some pollutant entering a stream, lake, or reservoir. These events, including the suspected pollutant, its source, and estimated number of fish killed are presented in Table 6-5. Depending on the location, the first responders to a fish kill event are the DNR Wildlife Resources Division or Coastal Resources Division. GAEPD personnel typically augment the investigation. Depending on the circumstances causing the fish kill, GAEPD may issue a consent or administrative order and assess a civil penalty.

TABLE 6-5
Pollution-Caused Fish Kills - 2004-2005

Name of Waterbody	County	Date	Pollutant of Concern	Source(s) of Pollutants	Comments
Tributary to Snapfinger Creek	DeKalb	01/9 & 21/2004	Untreated Sewage	Blocked sewer pipe causing overflow	150 dead fish in private pond
Unnamed tributary to Nancy Creek	DeKalb	03/03-04/2004	F-500 Multi-Purpose Encapsulator Agent	DeKalb Co. Fire & Rescue Services	274 dead fish
Bull Creek	Muscogee	03/19-22/2004	Epoxy 6 (2-ethylhexyl glycidyl ether), spill	Kemira, Columbus	22,535 dead fish, plus other
Stacy and Drowning Bear Creeks	Whitfield	04/12-15/2004	Allyl alcohol spill	MFG Chemicals, Inc.	3,143 dead fish, plus other
Tanyard Branch and Almand Creek	Rockdale	05/26-28/2004	Chlorine (from stored pool chemicals)	Bio-Lab; runoff from fire fighting at site	7,360 dead fish (public only)
Unnamed tributary to Nancy Creek	Fulton	07/07-08/2004	Unknown	Unknown	546 dead fish
Pigeon Creek	Meriwether	07/8-15/2004	Dissolved Oxygen depletion; LAS pond discharge	City of Manchester LAS collection pond draining	68 dead fish, plus other
Unnamed tributary to Nash Creek	Fayette	08/03-04/2004	Dissolved Oxygen depletion from raw sewage spill	City of Fayetteville sewer overflow/lift station failure	653 dead fish
Unnamed tributary to Sweetwater Creek	Douglas	08/23/2004	Unknown	Unknown	18 dead fish
Cabin Creek	Spalding	08/30-31/2004	Unknown	Unknown	932 dead fish, plus other
Mill Creek	Paulding	09/01/2004	Unknown	Unknown	345 dead fish
Willacoochee Creek	Ben Hill	09/02/2004	Dissolved Oxygen deficiency	Construction of pipeline	490 dead fish
Impounded Unnamed tributary to Seventeen-Mile River; stormwater retention pond, City of Douglas	Coffee	09/30-10/01/2004	Dissolved Oxygen depletion/deficiency	Unknown	4,868 dead fish in pond
Unnamed tributary to Oothcalooga Creek	Gordon	10/04/2004	Unknown; suspected fire fighting chemicals	Unknown; suspected tire freight fire prior to kill	346 dead fish
Swift Creek	Bibb	10/27/2004	Surfactant	Spill;tractor-trailer accident	42 dead fish
Spirit Creek	Richmond	12/14-27/2004	Fuel oil spill	Fort Gordon energy plant	1,506 dead fish
Chalker Bridge Creek	Cobb	01/22-23/2005	Normal propyl acetate	Railroad car spill @ Brenntag Inc.	446 dead fish
Unnamed tributary to Jester Creek	Clayton	02/07-08/2005	Petroleum	Unknown	371 dead fish
Beaver Dam Ditch	Richmond	03/24-25/2005	Unknown	Unknown	2,506 dead fish
Hiawassee River headwaters	Towns	04/28/2005	Diesel/gasoline spill	Fuel tanker truck overturn	66 dead fish, plus other
Tributary to Mud Creek	Lowndes	5/20/2005	Unknown	Fire @ pecan processor	361 dead fish
Unnamed tributary to Chattahoochee River	DeKalb	06/03/2005	Unknown	Unknown	397 dead fish
Unnamed tributary to Rubes Creek	Cobb	06/25/2005	Fire fighting runoff/ incl. foam	Runoff from response to CVS bldg. fire fighting	565 dead fish
Ison Branch	Spalding	07/23/2005	Dissolved Oxygen deficiency	Unknown	197 dead fish
St. Augustine Creek	Chatham	09/23/2005	pH	Construction/pumping	106 dead fish
Goldens Creek	Warren	09/27-28/2005	Dissolved Oxygen deficiency from wastewater discharge	City of Warrenton wastewater treatment ponds	8266 dead fish
Tributary to Roach Branch	Dodge	10/30-31/2005	Dissolved Oxygen depletion from broken sewer line	City of Eastman sewer line	92 dead fish
Unnamed drainage canal	Pierce	12/16/2005	Unleaded gasoline spill	Fuel truck accident at Dixon Service Ctr., Blackshear	137 dead fish, plus other

CHAPTER 7
Watershed Protection Programs

Program Perspective

The first major legislation to deal with water pollution control in Georgia was passed in 1957. The Act was ineffective and was replaced by the Water Quality Control Act of 1964. This Act established the Georgia Water Quality Control Board, the predecessor of the Environmental Protection Division of the Georgia Department of Natural Resources which was established in 1972. Early efforts by the Board in the late 1960's and early 1970's included documenting water quality conditions, cleanup of targeted pollution problems and the establishment of water use classifications and water quality standards. Trend monitoring efforts were initiated and a modest State construction grants program was implemented.

In 1972 the Federal Water Pollution Control Act of 1972 was enacted by Congress. Today, this law is known as the Clean Water Act (CWA). The CWA set the national agenda for water protection and launched the national objective to provide "for the protection and propagation of fish, shellfish, and wildlife and provide for recreation in and on the water". The CWA established the NPDES permit system for regulation of municipal and industrial water pollution control plants, a water use classifications and standards process, and a construction grants process to fund the construction of municipal water pollution control facilities.

Most industries in Georgia had installed modern, effective water pollution control facilities by the end of 1972. In the mid/late 1970's emphasis was placed on the design and construction of municipal facilities through the federal Construction Grants Program. First and second round NPDES permits were negotiated and operation and maintenance, compliance monitoring, and enforcement programs initiated. Basin planning, trend monitoring, intensive surveys, modeling and wasteload allocation work was well underway.

In 1987 Congress made significant changes to the Clean Water Act. The Water Quality Act of 1987 placed increased emphasis on toxic substances, control of nonpoint source pollution, clean lakes, wetlands and estuaries. The Act required that all States evaluate water quality standards and adopt numeric criteria for toxic substances to protect aquatic life and public health. This work was initiated and completed by the GAEPD in the late 1980s. The Act also required each

State to evaluate nonpoint source pollution impacts and develop a management plan to deal with documented problems.
In the late 1980s and early 1990s, the Georgia General Assembly passed a number of laws that set much of the agenda for the GAEPD in the early 1990s. Laws such as the Growth Strategies Act which helps protect sensitive watersheds, wetlands, and groundwater recharge areas and the ban on high phosphate detergents to reduce nutrient loading to rivers and lakes were enacted. Legislation was passed in 1990 that required the GAEPD to conduct comprehensive studies of major publicly owned lakes and establish specific water quality standards for each lake. In addition in 1991 the General Assembly passed a law requiring a phosphorus limit of 0.75 mg/l for all major point sources discharging to the Chattahoochee River between Buford Dam and West Point Lake. Major river corridors were accorded additional protections with laws passed in 1991. Also in 1991, the General Assembly passed the Georgia Environmental Policy Act that requires an environmental effects report be developed for major State funded projects. In 1992, the General Assembly passed the River Basin Management Planning Act that required the GAEPD develop and implement plans for water protection for each major river basin in Georgia. In 2004, the General Assembly passed the Statewide Comprehensive Water Management Planning Act. This legislation replaced the river basin management planning legislation and charged the EPD with the responsibility of developing a comprehensive statewide water management plan for Georgia in accordance with the following policy statement: ”Georgia manages water resources in a sustainable manner to support the state’s economy, protect public health and natural systems, and to enhance the quality of life for all citizens,” The work ongoing to implement this significant legislation was discussed in detail in Chapter 2 and at appropriate locations through this report.

In 2004-2005 high priority was placed on Comprehensive Statewide Water Management Planning, monitoring and assessment, water quality modeling and TMDL development, TMDL implementation plan development, State revolving loan programs, NPDES permitting and enforcement, nonpoint source pollution abatement, stormwater management, erosion and sediment control, and public participation projects.

Comprehensive Statewide Water Planning

Comprehensive statewide water planning efforts were expanded significantly in 2004 with the passage of O.C.G.A. 12-5-520 by the Georgia General Assembly. The Act provides for the development of river basin management plans for the major rivers in the State. The Act provides guidance regarding the content of the plans and for local input to plan development. The Act also provides that upon adoption of a plan by the Board of Natural Resources all permitting and other

activities conducted by or under the control of the Department of Natural Resources are consistent with the plan. This work is discussed in Chapter 2.

Watershed Projects

The GAEPD is working with the United States Environmental Protection Agency (USEPA) and South Carolina on several Savannah River projects; with the USEPA and the Alabama Department of Environmental Management (ADEM) on water quality issues in the Coosa River and Lake Weiss; and with the Florida Department of Environmental Protection and the Suwannee River Water Management District to coordinate water protection efforts in the Suwannee River Basin. Significant work was also done by Alabama, Florida and Georgia in cooperation with the Corps of Engineers to conduct studies of the Apalachicola/ Chattahoochee/Flint and Alabama/Coosa/Tallapoosa river basins to facilitate efforts to develop agreements regarding water allocations. The GAEPD supports these projects to avoid duplication of effort and to effectively leverage resources to accomplish watershed protection in interstate river basins.

Water Quality Monitoring

The goal of the water protection program in Georgia is to effectively manage, regulate, and allocate the water resources of Georgia. In order to achieve this goal, it is necessary to monitor the water resources of the State to establish 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 and/or total maximum daily loads (TMDLs) for new and existing facilities, verify water pollution control plant compliance, and document water use impairment and reasons for problems causing less than full support of designated water uses. Trend monitoring, intensive surveys, toxic substances monitoring, aquatic toxicity testing and facility compliance sampling are some of the monitoring tools used by the GAEPD. Monitoring programs are discussed in Chapter 3.

Water Quality Modeling/Wasteload Allocations/TMDL Development

The GAEPD conducted a significant amount of modeling in 2004-2005 in support of the development of wasteload allocations and total maximum daily loads (TMDLs). In 2003, TMDLs were developed and publicly noticed for segments on the Georgia 2002 303(d) list in the Coosa, Tallapoosa and Tennessee River Basins. These TMDLs were finalized, submitted to and approved by the EPA in 2004. In 2004, TMDLs were developed and publicly noticed for segments on the Georgia 2004 303(d) list for the Savannah and Ogeechee River Basins. These TMDLS were finalized, submitted to and approved by EPA in 2005. Also in 2005, TMDLs were developed and public noticed for segments on the 2004 303(d) list

for waters in the Ochlockonee, Suwanee, Satilla, and St Marys River Basins. These TMDLs will be finalized and submitted to EPA for approval in early 2006. Over the 2004-2005 period, more than 135 TMDLs were developed. To date more than 1250 TMDLs have been developed for 303(d) listed waters in Georgia.

TMDL Implementation

As TMDLs are developed, plans are needed to guide implementation of pollution reduction strategies. TMDLs are implemented through changes in NPDES permits to address needed point source improvements and/or implementation of best management practices to address nonpoint sources of pollution. Changes in NPDES permits to address point issues are made by the GAEPD in coordination with local governments and industries. Planning for implementation of management practices and activities to address the nonpoint sources of pollution is being conducted through the development of Tier 3 level TMDL implementation plans prepared by GAEPD and Tier 2 plans prepared through contracts with Regional Development Centers (RDCs) and other public contractors. Tier 3 plans are developed in-house by GAEPD staff for segments "partially impaired due to fecal coliform; segments "impaired" due to natural conditions, fish consumption advisories, legacy sediment; or segments where TMDL models estimate a zero percent load reduction would be necessary to achieve standards. The Tier 2 plans are intended as platforms for instituting and continuing a local water quality protection and restoration process. They initiate public outreach, bring together local stakeholder groups who work together to assess the sources and causes of the impairment, identify appropriate management practices and activities, and set forth a plans of action to monitor progress and achieve the TMDL for each segment impairment.

In 2004 a total of 213 TMDL implementation plans and revisions were developed for TMDLs in the Chattahoochee and Flint River Basins. Another 147 plans and revisions for TMDLs in the Coosa, Tallapoosa, and Tennessee River Basin were initiated in 2005 and scheduled for completion in 2006. To date a total of 864 plans and revisions have been prepared to implement TMDLs in Georgia.

State Revolving Loan and Georgia Fund Loan Programs

Georgia presently administers loans through the Georgia Environmental Facilities Authority (GEFA) and the GAEPD a State Revolving Loan Fund (SRF) and a Georgia Fund program that provide low interest loans for the construction of municipal wastewater treatment facilities and nonpoint source pollution control projects. The SRF program was initiated in 1988 to the full extent allowed by the 1987 amendments to the Clean Water Act. With the initiation of SRF, the federal

Construction Grants program has been phased out and all federal monies received through the Environmental Protection Agency are being used to capitalize the SRF program.

Considerable amounts of money have been required for water pollution abatement in Georgia and additional expenditures will be needed in the future. Local governments have the responsibility of securing funding for water pollution control projects including CSO controls. In addition to the SRF program and the Georgia Fund program, other funding sources are available, grants and loans from the Rural Economic and Community Development Administration (RECD), the Appalachian Regional Commission, and various programs administered by the Georgia Department of Community Affairs. Table 7-1 lists the major funding sources utilized by Georgia communities in 2004-2005 for wastewater treatment system and CSO control construction and improvements.

TABLE 7-1
Municipal Facility Sources of Investment
2004-2005

SRF & GEFA Loans	$132,706,000
Local or Federal	$609,493,293
TOTAL	**$742,200,000**

Of the twenty-two wastewater treatment projects funded by SRF/GEFA loans during 2004-2005, nine were for upgrades of existing systems. The twenty-two projects represented 123.7 million gallons per day of treatment capacity.

Upgrading the level of wastewater treatment produces direct benefits by reducing pollutant discharges to Georgia streams, rivers, and lakes/reservoirs. The most widely used measure of municipal pollution is the extent to which the organic content of treated wastewater depletes oxygen in the receiving water and reduces the oxygen available to fish and aquatic life. In 2005, of the nearly 1.7 million pounds per day of oxygen demanding pollutants produced by municipalities, approximately 95% was removed by municipal water pollution control plants.

GEFA Implementation Unit. The Metropolitan North Georgia Water Planning District (District) was created on April 5, 2001 (2001 S.B. 130) as a planning entity dedicated to developing comprehensive regional and watershed-specific plans to be implemented by local governments in the District.

The enabling legislation required the District to develop plans for stormwater management, wastewater treatment, and water supply and conservation in its 16-county area that includes Bartow, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Fulton, Forsyth, Gwinnett, Hall, Henry, Paulding, Rockdale and Walton Counties. These plans are designed to protect water quality and public water supplies, protect recreational values of the waters, and to minimize potential adverse impacts of development on waters in and downstream of the region.

Limited water resources combined with the region's growth places the District in a unique position relative to other areas in Georgia. With a finite water resource and a population of nearly 4 million and growing, the need to carefully and cooperatively manage and protect Metropolitan Atlanta's rivers and streams has become a priority.

The EPD was charged with the enforcement of these plans. SB 130 states that the EPD Director shall not approve any application by a local government in the District to issue, modify, or renew a permit, if such permit would allow an increase in the permitted water withdrawal, public water system capacity, or waste-water treatment system capacity of such local government, or any NPDES Phase I or Phase II General Stormwater permit; unless such local government is in compliance with the applicable provisions of the plan, or the Director certifies that such local government is making good faith efforts to come into compliance.

EPD, upon application for a permit for an increase in the water withdrawal, public water system capacity, or wastewater treatment system capacity, or renewal of any NPDES Phase I or Phase II General Stormwater permit, will conduct an audit to determine whether the local government is in compliance with the District Plans. This audit process was initiated in the fall of 2005 and at present there are 2 EPD associates to perform audits of the 109 local governments affected.

Georgia's Land Conservation Program

On April 14, 2005, Governor Sonny Perdue signed House Bill 98, creating the Land Conservation Program. The act created a flexible framework within which cities and counties, the Department of Natural Resources, other state and federal agencies, and private partners can protect the state's valuable natural resources. The Land Conservation Program will protect Georgia's valued resources by developing a process that will strategically align the state's conservation needs with the ability to steward the land through public/private partnerships.

The land conservation goals set forth in the Act include: water quality protection for rivers, streams, and lakes; flood protection; wetlands protection; reduction of

erosion through protection of steep slopes, erodible soils, and stream banks; protection of riparian buffers, natural habitats and corridors for native plant and animal species; protection of prime agricultural and forestry lands; protection of cultural sites, heritage corridors, and archaeological and historic resources; scenic protection; provision of recreation and outdoor activities; and connection of existing or planned areas.

Funding available for 2005-2006 is $100 million: $55 million from the Clean Water State Revolving Fund; $13,000 from the Land Conservation Grant Program; $25 million pledged from a private foundation for grants; and $20 million in bond funds for state purchases.

In 2005, the Land Conservation Program acquired through purchase, easement, lease or donation more than 13,728 acres. Of that acreage, 3,649 acres adjoined existing tracts in Jeff Davis and Coffee Counties, and will protect 3.5 miles of Ocmulgee River frontage. With the addition of these tracts into the program, the State of Georgia protects more than 13,000 contiguous acres. Funds came from a variety of sources including U.S. Forest Service Forest Legacy Grant, The Nature Conservancy (TNC), and state bond funds.

An additional 10,079 acres were protected on the Altamaha River in Wayne and Glynn Counties. These tracts contain tidal swamp forests, bottomland forests and steep river bluff habitats as well as pine uplands. Acquisition of these tracts will protect 5.8 miles of river frontage at Clayhole Swamp and 8.5 miles of river frontage at Penholoway Swamp along the scenic Altamaha River. Funds came from U.S. Fish and Wildlife Grants, private donations from TNC, Ducks Unlimited, and National Wild Turkey Federation, matching DNR non-game, timber revenue, and state bond funds for a total purchase price of $13.2 million.

National Pollutant Discharge Elimination System (NPDES) Permit Program

The NPDES permit program provides a basis for municipal and industrial discharge permits, monitoring compliance with limitations, and appropriate enforcement action for violations.

In 2004-2005, a significant amount of personnel time was allocated to the reissuance of NPDES permits. Permits were issued, modified or reissued for 208 municipal and private discharges and for 150 industrial discharges. In addition, 55 private dischargers were covered under general permit No. GA0550000. In contrast to many other areas in the nation, Georgia had a very small backlog of permits to be issued.

In addition to permits for point source discharges, the GAEPD has developed and implemented a permit system for land application systems. Land application systems for final disposal of treated wastewaters have been encouraged in Georgia. Land application systems are used as alternatives to advanced levels of treatment or as the only alternative in some environmentally sensitive areas. A total of 203 (municipal and private) and 55 (industrial and Federal) permits for land application systems were in effect in 2005.

Concentrated Animal Feeding Operations

Georgia has over 4000 livestock and poultry farms. On June 10, 1999, Georgia adopted Rule 391-3-6-.20 "Swine Feeding Operation Permit Requirements". On January 24, 2001, Georgia adopted rule 391-3-6-.21, "Animal (Non-Swine) Feeding Operation Permit Requirements." These actions followed three years of stakeholder input, public meetings, hearings and Georgia Board of Natural Resources deliberations and resulted in State rules that equaled or exceeded Federal regulations at that time. The Georgia rules required that medium size feeding operations with more than 300 animal units (AU) but less than 1000 AU (1000 AU equals 1000 beef cows, or 700 dairy cows, or 2500 swine, etc.) must apply for a wastewater permit under Georgia's Land Application System (LAS) permitting program. Large animal feeding operations with more than 1000 AU must apply for a wastewater permit under the Federal National Pollutant Discharge Elimination System (NPDES) program. EPD has been delegated authority to administer the NPDES program in Georgia by the U.S. Environmental Protection Agency (EPA). Consequently, 173 medium size farms received State LAS permits and 57 large farms received Federal NPDES concentrated animal feeding operation (CAFO) permits.

On December 15, 2002, EPA promulgated a greatly expanded NPDES permit regulation and effluent limitation guideline for CAFOs, 40 CFR 122 and 40 CFR 412. Dry manure poultry operations larger than 125,000 broilers or 82,000 layers were added, as well as other changes. In order to implement the new Federal rule, the Georgia EPD completed necessary State rule amendments on September 15, 2003. Dry litter poultry and swine nursery permit applications were due by October 31, 2005. Permits are to be issued and nutrient management plans implemented for dry litter poultry and swine nurseries by October 31, 2006. It is estimated that there are a minimum of 600 dry manure poultry farms which had to submit NPDES CAFO permit applications by October 31, 2005. The Georgia EPD has contracted with the Georgia Department of Agriculture Livestock/Poultry Section (GDA) for inspections, complaint investigations, nutrient management plan reviews and permit administrative support.

The GDA has already processed over 500 NPDES applications from dry manure poultry operations. However, the EPA CAFO regulation was successfully appealed on February 28, 2005 [decision by the Second Circuit Court of Appeals issued in Waterkeeper v. EPA, 399 F.3d 486 (2nd Cir. 2005)]. That CAFO regulation contains the requirement that by February 13, 2006, all newly defined CAFOs must apply for an NPDES permit. The CAFO rule also requires that all CAFOs develop and implement a nutrient management plan by December 31, 2006. The EPA is in the process of developing options for revising their CAFO regulation to comply with the Second Circuit Court of Appeals' decision and has extended both the permit application date and the nutrient management plan due date to July 31, 2007. In response to many inquiries from Georgia growers, the Georgia Attorney General reviewed the State animal feeding rules and found that our deadlines for permit application submittal and nutrient management plan implementation are enforceable irrespective of changes in the EPA CAFO regulation. However, EPD will defer issuing permits where possible in order to allow the Georgia Board of Natural Resources time to reconsider its rules in light of revisions that the EPA may make.

Combined Sewer Overflows

The GAEPD has issued NPDES Permits to the three cities in Georgia that have Combined Sewer Overflows (CSOs) in their wastewater collection systems (Albany, Atlanta and Columbus). The permits require that the CSO must not cause violations of Georgia Water Quality Control Standards. In addition, the CSOs must be controlled to prevent the following conditions for waters downstream of the CSO:

- materials which settle to form sludge deposits that become putrescent, unsightly or to interfere with legitimate water uses;

- oil, scum and floating debris in amounts sufficient to be unsightly or to interfere with legitimate water uses;

- materials which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses;

- toxic, corrosive, acidic and caustic substances in amounts, concentrations or combinations which are harmful to humans, animals or aquatic life.

In 1998 the City of Atlanta signed a Consent Decree that requires a long-term control plan be implemented to remediate the overflow from combined sewers in 2007. The Consent Decree stipulated, among other things, the development and

implementation of short-term remedial measures to improve operations, maintenance and treatment performance of the existing CSO facilities. Some of the other tasks required by the Consent Decree include: installation of warning signs along the streams receiving CSO discharges, a one-time stream cleanup, greenway acquisition plan, and creating Maintenance, Operations, and Management Systems (MOMS) Plans to provide guidance to City personnel regarding the operations and maintenance requirements of each of the City's CSO facilities as well as management strategies to control CSOs.

The City of Atlanta submitted their long-term control plan in April 2001. The selected option calls for 27% sewer separation including the elimination of two CSO facilities, additional storage for the eastside CSOs to an upgraded CSO treatment facility at the current Intrenchment Creek facility and a tunnel connecting the westside CSOs to a new CSO treatment facility on the Chattahoochee River near the R. M. Clayton Water Reclamation Center. November 7, 2007 is the date in the Consent Decree for compliance with water quality standards.

Compliance and Enforcement

The Georgia Water Quality Control Act requires that every point source discharge obtain a NPDES permit, and that zero discharge systems obtain a Land Application System Permit from the GAEPD which specifies allowable discharge limits for the receiving streams or land application sites. Insuring compliance with permit limitations is an important part of the Georgia water pollution control program. Staff review discharge and groundwater monitoring reports, inspect water pollution control plants, sample effluents, investigate citizen complaints, provide on-site technical assistance and, if necessary, initiate enforcement action.

As of December 2005, of the 125 major municipal water pollution control plants (facilities with design flow >1.0 mgd), six were in significant noncompliance with the final limitations. Theses six facilities are under compliance schedules and/or enforcement actions to resolve the noncompliance, or implementing infiltration/ inflow strategies which will allow compliance at the plant to be achieved. Enforcement action has been taken by the GAEPD to insure problems are alleviated.

Data evaluations (using annual reports, GAEPD sampling and biomonitoring results) were performed on NPDES permitted municipal facilities to determine the need to reopen specific permits for inclusion of numerical limits and monitoring for appropriate toxic pollutants.

Increased emphasis was placed on the industrial pretreatment programs for municipalities to ensure that the cities comply with the new requirements for pretreatment established in the November 1988 Amendments to the Federal General Pretreatment Regulations (40 CFR Part 403).

Industries in Georgia achieved a high degree of compliance in 2004-2005. The forty major industrial facilities were in compliance about 98% of the time during 2004-2005.

The GAEPD utilizes all reasonable means to obtain compliance, including technical assistance, noncompliance notification letters, conferences, consent orders, administrative orders, and civil penalties. Emphasis is placed on achieving compliance through cooperative action. However, compliance cannot always be achieved in a cooperative manner. The Director of the GAEPD has the authority to negotiate consent orders or issue administrative orders. In 2004-2005, 768 Orders were issued and approximately of $3,200,000 in negotiated settlements was collected.

Storm water compliance for municipalities and industries is most often reached through education and inspections. The vast majority of storm water enforcement Orders are used in connection with construction activities. In 2004-2005 a total of 339 stormwater Orders were issued and a total of $1,073,312 in negotiated settlements was collected.

Zero Tolerance

In January 1998, the Georgia Board of Natural Resources adopted a resolution requiring that regulatory initiatives be developed to ensure polluters are identified, and that appropriate enforcement action is taken to correct problems. The resolution also directed EPD to provide the "best quality of effort possible in enforcing Georgia's environmental laws". High growth areas that have been identified as in need of enhanced protection include the Chattahoochee River Basin (from the headwaters through Troup County), Coosa River Basin, Tallapoosa River Basin, and the greater metropolitan Atlanta area. EPD developed a "zero tolerance" strategy for these identified geographic areas. This strategy requires enforcement action on any and all noncompliance issues. The strategy includes simple orders (Expedited Enforcement Compliance Order and Settlement Agreement) with a directive to correct the cause of noncompliance with a monetary penalty for isolated, minor violations, and more complex orders (consent orders, administrative orders, emergency orders) with conditions and higher monetary penalties for chronic and/or major violations. In addition to the enforcement strategy, inspections and surveillance activities were also increased.

Storm Water Management

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

Phase I of the Federal Regulations set specific application submittal requirements for large (population 250,000 or more) and medium (population 100,000 to 250,000) municipal separate storm sewer systems (MS4). The GAEPD has determined that the metropolitan Atlanta area is a large municipal system as defined in the regulations. Clayton, Cobb, DeKalb, Fulton and Gwinnett Counties and all the incorporated cities within these counties were required to comply with the application submittal target dates for a large municipal area. Forty-five individual storm water permits were issued to the Atlanta area municipalities on June 15, 1994 and reissued in 1999 and 2004.

Augusta, Macon, Savannah, Columbus, the counties surrounding these cities and any other incorporated cities within these counties were identified as medium municipal systems as defined in the storm water regulations. Thirteen individual storm water permits were issued to the medium municipal systems in April and May , 1995. These permits were reissued in April 2000 and 2005.

The storm water permits for large and medium municipal systems require the submittal of Annual Reports to GAEPD. Each year, the Georgia storm water permitting program reviews the Annual Reports from the large and medium municipalities. Among other things, the Annual Report includes a detailed description of the municipality's implementation of its Storm Water Management Program. The GAEPD provides comments on the Annual Reports to the MS4 permittees, noting areas of noncompliance and recommending improvements to the local Storm Water Management Programs.

On December 8, 1999 USEPA promulgated the Phase II Rules for Storm Water. Phase II requires NPDES permitting and the development of Storm Water Management Programs for a large number of smaller cities and counties.

Construction sites from 1 to 5 acres and municipally-owned industrial facilities will also be regulated.

Phase II regulations for MS4s required permit coverage for all municipalities with a population less than 100,000 and located within an urbanized area, as defined by the latest Decennial census. In addition, EPD was required to develop criteria to designate any additional MS4s which had the potential to contribute to adverse water quality impacts. In December 2002, EPD issued an NPDES General Permit which covered 84 Phase II MS4s, including 55 cities and 29 counties. The NPDES General Permit does not require any monitoring or contain specific effluent limitations. Instead, each Phase II MS4 permittee is required to institute best management practices that will control stormwater pollution. The Phase II permittees were required to submit a Notice of Intent (NOI) for coverage under the NPDES Permit by March 10, 2003. As part of the NOI, the MS4 was required to develop a SWMP that included best management practices in six different areas or minimum control measures. These six minimum control measures are Public Education, Public Involvement, Illicit Discharge Detection and Elimination, Construction Site Stormwater Runoff Control, Post-Construction Storm Water Management, and Pollution Prevention.

The GAEPD has issued general permits for the eleven industrial subcategories defined in the Phase I Federal Storm Water Regulations. During 1993, the GAEPD issued a general NPDES permit (GAR000000) that regulates the discharge of storm water from 10 categories of industrial activity. This permit was reissued in 1998. The permit was administratively extended in 2003, with approximately 3500 facilities retaining coverage. Multiple stakeholder meetings were held in the following two years, leading to a new permit issuance in March 2005. This permit was appealed in April 2005 by one industry and several environmental groups. Many months of negotiation meetings are expected to result in a new draft permit in Spring 2006.

A second general NPDES permit that would regulate storm water discharges from construction activities was issued by GAEPD and subsequently appealed in 1992, 1994, 1995, 1996 and 1999. Settlement negotiations involving the regulated community who filed the three petitions, several environmental organizations, GAEPD, and a professional facilitator began in October 1999. After months of negotiation, GAEPD issued a revised general NPDES permit GAR100000 for construction activities on June 12, 2000. The permit became effective on August 1, 2000. That permit regulated storm water discharges associated with land disturbances of five acres or greater. A three-tiered permitting structure allowed a differentiation of responsibility between permittees.

The NPDES permit that regulates storm water discharges from construction activities was reissued by GAEPD on August 13, 2003. The permit was re-issued as three permits: Stand Alone, Infrastructure and Common Development, and required coverage for projects disturbing one acre or more. Changes to the permit included a reduction in monitoring requirements, and the addition of a plan submittal requirement for projects located in areas that do not have a local issuing authority or are exempt from local issuing authority ordinances. The re-issuance of the permit was facilitated by the Storm Water General Permit Advisory Committee (GPAC) who had been holding regular meetings since November 2000 to discuss permit issues. GPAC was comprised of those parties who were involved in the 1999 settlement negotiations, as well as additional stakeholders such as Georgia DOT. GPAC was tasked with recommending appropriate changes to the current permit, and examining how Phase II NPDES permitting for sites disturbing between one acre and five acres would be incorporated into the permits. The construction permits require permittees to implement best management practices, conduct inspections, and sample storm water leaving their site after certain rainfall events. Approximately 6,600 primary NOIs and 15,000 NOIs have been received by GAEPD as of September 30, 2005.

The Erosion and Sedimentation Control Technical Study Committee (Dirt II) was formed in 1996. Dirt II developed a two-phase mission statement. The first phase involved developing practical guidance for project site management and erosion and sediment control techniques with an emphasis on protecting water quality. The second phase focused on determining how best to meet turbidity levels recommended in previous “Dirt I” report. This involved an evaluation of new and emerging engineering tools, “state of the practice” erosion and sediment control devices and techniques, and resultant performance levels for both under various site and rainfall scenarios. The Dirt II Committee, whose efforts were partially funded by a $400,000 state grant, presented their findings and recommendations in a final report published by the Chattahoochee-Flint Regional Development Center in July 2001.

An important component of storm water management in Georgia is information exchange/technology transfer. GAEPD staff participated in many meetings and seminars throughout Georgia in an effort to disseminate information concerning Georgia’s storm water requirements to the regulated community. In addition, staff from the central Atlanta office conducted inspections at approximately 85 industrial facilities to assess compliance with the industrial general storm water permit during 2004-2005. Approximately 12 of these inspections involved coordination with GAEPD Regional Office personnel.

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

Erosion and Sedimentation Control

The Erosion and Sedimentation Act (Act) was signed into law in April 1975. This legislation was the result of over five years of work, debate, and legislative compromise. Agencies and groups that coordinated their efforts to this end included the Georgia Association of Conservation Districts, the State Soil and Water Conservation Commission, and the GAEPD.

The intent of the Act is to establish a statewide and comprehensive program for erosion and sedimentation control to conserve and protect air, water and land resources of the State. The Act provides a mechanism for controlling erosion and sedimentation as related to certain land disturbing activities. Land disturbing activities are any activities which may result in soil erosion and the movement of sediments into State waters and onto lands within the State. Such activities may include, but are not limited to, clearing, dredging, grading, excavating, transporting, and filling of land. Activities not regulated under the Act include surface mining, construction of single family homes being constructed by the owner or under contract to an owner, and minor activities such as home landscaping and gardening.

Implementation of the Act involves local units of governments and State agencies. The Act provides for municipalities and Counties to adopt local ordinances and to become delegated “Issuing Authorities”. The GAEPD delegates local “Issuing Authority” and administers the GAEPD rules where there is no local authority, and oversees local program implementation. Currently 212 municipalities and 119 counties have adopted ordinances, which have been reviewed by the GAEPD for compliance with the Act.

The Erosion and Sediment Control Overview Council (Council) was created in accordance with Senate Bill 524, which amended the Georgia Erosion and Sedimentation Act in May 2000. The Council was tasked with developing recommendations governing the preparation of plans and the installation and maintenance of best management practices for erosion and sediment control for Georgia Department of Transportation (DOT) projects. The Erosion and Sediment Control Overview Council did not meet during 2004 or 2005.

House Bill 1426 was the second of the two amendments to the Act passed during the 2000 session. This amendment made changes to the stream buffer minimum requirements and required that the Georgia Board of Natural Resources establish new rules for the implementation of these changes. Other changes were the establishment of stop work procedures and minimum mandatory penalties for violations.

House Bill 285 was passed during the 2003 legislative session. The legislation amended the Georgia Erosion and Sedimentation Act to create an integrated permitting program for erosion and sedimentation control for land disturbing activities of one acre or greater, thereby standardizing the requirements for local Land Disturbing Activity Permits and the NPDES Construction Storm Water Permits. The legislation incorporated feedback from the Erosion and Sediment Control Overview Council, recommendations from an Erosion and Sedimentation Program Performance Audit of September 2001, and information from various erosion and sedimentation committees. The amendment to the Act required that the Georgia Board of Natural Resources establish new rules to implement the changes to the Act, created Georgia's first NPDES permit fee system, and established training and education requirements for individuals involved in land development design, review, permitting, construction, monitoring or inspection of any land disturbing activity. The changes to the Act included elimination of Land Disturbing Activity Permits for jurisdictions that do not have a local issuing authority, requirement of a site visit by the plan preparer before creation of a erosion and sedimentation plan, replaced mandatory penalties with mandatory stop work orders for three specific types of violations, changes to permit exemptions, and reduction of the minimum permitting acreage limit from 1.1 project acres to 1.0 disturbed acres.

Senate Bill 460 was passed during the 2004 legislative session. The legislation amended the Georgia Erosion and Sedimentation Act to add three new criteria under which the EPD director can consider stream buffer variances. The legislation also required The Georgia Board of Natural Resources to adopt amendments to the Erosion and Control Rules to implement the new criteria. In December 2004, the Georgia Board of Natural Resources adopted amendments to the Erosion and Sedimentation Control Rules. These amendments, which went into effect on January 10, 2005, established three new criteria, deleted one existing criteria, and amended another criteria for the consideration of stream bank buffer variances. Also amended were the procedures for the review of stream buffer variances to implement the changes to the criteria.

During the 2004-2005 period, the GAEPD decertified as issuing authorities 8 counties and 14 cities. Nine of the cities and 8 of the counties requested decertification. Four of the cities were decertified because they did not update

their local ordinances in response to the 2003 changes to the Act. One city had its certification revoked for poor implementation of its erosion and sedimentation program. During this same period, 6 cities and 1 county were certified as local issuing authorities.

The GAEPD issued 52 stream buffer variances under the new rules established by Senate Bill 460 which went into effect on January 10, 2005.

GAEPD's Erosion and Sedimentation Control Program was audited by the State Department of Audits in 2001. Their September 2001 report made several recommendations to improve the program. The primary recommendation is for better implementation of the program at the state and local level, particularly in the area of enforcement. The statutory, regulatory and permit changes that have occurred since that time have addressed the recommendations in the audit report.

Nonpoint Source Management Program

Nonpoint sources of water pollution are both diffuse in nature and difficult to define. 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 or 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 and ground waters. Habitat alteration (e.g., removal of riparian vegetation) and hydrological modification (e.g., channelization, bridge construction) can cause adverse effects on the biological and physical integrity of surface waters and are also treated as nonpoint sources of pollution.

The diffuse nature of nonpoint sources (e.g., agriculture, construction, mining, silviculture, urban runoff) and the variety of pollutants generated by them create a challenge for their effective control. Although progress has been made in the protection and enhancement of water quality, much work is still needed to identify nonpoint source management strategies that are both effective and economically achievable under a wide range of conditions.

The control of dominant point source problems has allowed the GAEPD to place increasing emphasis on the prevention, control and abatement of nonpoint sources of pollution. The GAEPD is responsible for administering and enforcing laws to protect the waters of the State, defined to include surface and ground water. Consequently, the GAEPD has been designated as the administering or lead agency for implementing the State's *Nonpoint Source Management Program*. This 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, non-governmental organizations and individual citizens.

The Georgia Soil and Water Conservation Commission (GSWCC) have been designated by the GAEPD as the lead agency for implementing the agricultural component of the State's *Nonpoint Source Management Program*. Similarly, the Georgia Forestry Commission (GFC) has been designated as the lead agency for implementing the silvicultural component of the State's *Nonpoint Source Management Program*, and the Department of Community Affairs (DCA) has been designated the lead agency and point of contact for urban/rural nonpoint source pollution.

Georgia's initial *Nonpoint Source Assessment Report* was completed in compliance with the Federal Clean Water Act and approved by the USEPA in January 1990. This report, *Water Quality in Georgia 2000-2001*, as required by Section 305(b) of Public Law 92-500, serves as the current process to update the *Nonpoint Source Assessment Report*.

The revision of the State's *Nonpoint Source Management Program* in FFY 2000 met the requirements for funding under Section 319(b) of the Federal Clean Water Act and delineated short and long-term goals and implementation strategies. Just as important, it is also an information resource for the wide range of stakeholders across the State involved in the prevention, control and abatement of nonpoint sources of pollution. It was developed as an inventory of the full breadth of nonpoint source management (regulatory and non-regulatory) in Georgia, including activities for the time period FFY 2000 through FFY 2004.

Currently, the State is in the process of revising the *Nonpoint Source Management Program* to update the goals, activities and implementation strategies of the Program. The plan update will focus on the comprehensive categories of nonpoint sources of pollution identified by the USEPA: Agriculture, Silviculture, Construction, Urban Runoff, Hydrologic/Habitat Modification, Land Disposal, Resource Extraction and Other Nonpoint Sources, and will be developed through a consultation process, incorporating input from a wide range of stakeholders involved in nonpoint source management activities throughout the State: local, regional, State and Federal agencies, as well as private, non-governmental organizations. This process will encourage intergovernmental resource sharing and increased stakeholder involvement. This revision of the State's *Nonpoint Source Management Program* will establish new partnerships and strengthened existing partnerships in the development and implementation of nonpoint source strategies.

Local governments, regional development centers, private non-governmental organizations and the general public have a critical role in developing and implementing nonpoint source management strategies. The State continues to expand its role in facilitating and supporting local and regional nonpoint source management activities. The GAEPD is currently in the process of forming a Statewide Nonpoint Source Task Force to assist in the direction and focus of the State's nonpoint source activities. The Task Force is assembled from a variety of stakeholder groups. The initial meeting of the Urban/Rural NPS Task Force Technical Advisory Committee has begun to meet to address specific nonpoint source issues or concerns. Additional Technical Advisory committees will be formed to address additional issues or concerns (agriculture, silvilculture, habitat/hydrologic modification, etc.)

Under Section 319(h) of the Federal Clean Water Act, the USEPA awards a Nonpoint Source Implementation Grant to the GAEPD to fund eligible projects that support the implementation of the State's *Nonpoint Source Management Program*. Section 319(h) Grant funds for the prevention, control and/or abatement of nonpoint sources of pollution are made available annually to public agencies in Georgia. Section 319(h) of the Clean Water Act provides grants to the States to implement nonpoint source projects. The funds are distributed via competitive process to public agencies and governmental agencies. Receiving agencies are required to show substantial local commitment by providing at least 40% of the total project cost in local match or in-kind efforts. Priorities for projects include projects implementing the nonpoint source components of TMDL implementation plans, or projects addressing the violated criteria of listed streams. Education, demonstration, and technical assistance projects are also eligible for funding, subject to restrictions. In FY 04, Georgia's Section 319(h) grant project funded 17 projects for over $3.8 million, and 9 projects for over $4 million. For FY06, Georgia is poised to award over $3 million to local governments and agencies to support streambank restoration, watershed planning, TMDL implementation, and support of Georgia's Coastal Nonpoint Source Management Program.

Currently, Georgia's Nonpoint Source Program administers more than 130 Section 319(h) projects, totaling more than $35 million dollars in funds awarded to cooperating agencies. Projects activities include implementing TMDL implementation plans and Watershed Management Plans, watershed planning, monitoring and assessment, enforcement, technical assistance, and information and education.

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criteria of listed streams. Education, demonstration, and technical assistance projects are also eligible for funding, subject to restrictions.

The GAEPD uses a competitive process to ensure that the most appropriate projects are selected for funding. In accordance with the Fair and Open Grant Act, the GAEPD publishes a description of the Section 319(h) Nonpoint Source Implementation Grant Program with the Secretary of State prior to disbursement of any grant funds. In accordance with the provisions of O.C.G.A. 28-5-122, the grant description filed with the Secretary of State includes information regarding the general scope and purpose of the grant program, general terms and conditions of the grant, eligible recipients of the grant, criteria for the award, and directions and deadlines for applications.

Section 319(h) Grant projects must specifically identify the nonpoint sources of pollution being addressed and the activities proposed to prevent, control and/or abate these nonpoint sources of pollution. Types of activities which are eligible include: regulatory or non-regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, watershed projects, demonstration projects, update and refinement of nonpoint source programs and assessments, monitoring to assess the success of specific nonpoint source implementation projects, urban stormwater control activities not specifically required by a draft or final NPDES permit, and certain ground water activities. Lake protection and restoration activities are eligible provided that they are not used for *in-lake* work such as aquatic macrophyte harvesting or dredging unless the nonpoint sources of pollution will be remediated.

Eligible recipients of Section 319(h) Nonpoint Source Implementation Grant funds include local, regional and State units of government, local authorities which operate local government service delivery programs, regional development centers, local school systems, State colleges and universities, and State agencies. Local governments must have Qualified Local Government status, in compliance with the requirements of the Georgia Planning Act of 1989 and Service Delivery Strategy Law of 1997.

Priority is given to project proposals which implement the nonpoint source components of Total Maximum Daily Loads that have been approved under Section 303(d) of the Federal Clean Water Act; develop and/or implement the nonpoint source components of Watershed Restoration Action Strategies; and implement action to alleviate the criterion violations identified in the Section 305(b) and Section 303(d) lists of waters which are partially or not supporting designated or beneficial uses due to nonpoint sources of pollution.

In addition, priority is given to projects that encompass or support a watershed management approach and result in measurable improvements in water quality. A watershed approach is a strategy for effectively protecting and restoring aquatic ecosystems and protecting human health. Major features of a watershed management approach are: targeting priority problems, promoting a high level of stakeholder involvement, integrated solutions that make use of the expertise and authority of multiple agencies, and measuring success through monitoring and other data gathering. The application of increased Section 319(h) Grant funds to focus on solving nonpoint source pollution problems will enable the State to make great strides in achieving water quality goals.

Agriculture

Georgia's Agriculture Nonpoint Source Management Program is implemented through a statewide non-regulatory approach. Benefits have accrued to Georgia as a result of voluntarily installed best management practices and the implementation of conservation incentive programs. These voluntary programs are enhanced by numerous financial, technical assistance, education, demonstration, and research activities delineated in the State's *Nonpoint Source Management Program*. Implementation of the Agriculture Nonpoint Source Management Program supports Georgia's River Basin Management Planning process as a critical State initiative to identify priority waters and to target nonpoint source management activities.

Agriculture nonpoint source pollution prevention opportunities can be broken down into handling of animal waste runoff, soil erosion, nutrients, pesticides, and agrichemicals. Water quality degradation and soil erosion can often be limited or prevented through the implementation of proven techniques. Georgia's Agriculture Nonpoint Source Management Program supports BMP demonstration projects, technical assistance, and research activities to explore and promote these techniques. Nutrient management plans and land application of effluent can improve soil and maintain water quality. This is an expanding area of research and demonstration in the specialized aquaculture segment and the traditional poultry, swine, and beef production sectors of the agriculture industry. Precision farming, integrated pest management (IPM), and other best management practices can often be used to decrease the need for agrichemical inputs and to increase their effectiveness on cropping systems. Many improved methods of storing and handling agrichemicals are based firmly in the principles of reducing risk of environmental contamination. Georgia has growing programs in pesticide container recycling, outdated pesticide collection, and self-administered risk assessment consistent with the goals of pollution prevention in agricultural production and management. Agriculture nonpoint source management efforts that maintain or improve environmental quality, focus on

pollution prevention, and demonstrate techniques for economic viability will continue to guide Georgia toward sustainable agricultural systems.

The statewide non-regulatory approach uses cooperative partnerships with various agencies and a variety of activities and programs. Agencies that form the basis of the partnerships include the GSWCC (designated lead agency administrating the Agriculture Nonpoint Source Management Program), SWCD, NRCS, UGACAES, CES, FSA, GFC and the GDA. These agencies work closely with Georgia agricultural commodity commissions and organizations such as the GFBF, GAC, RC&D Councils, Cattleman's Association, Milk Producers, Pork Producers Association, Poultry Federation, Goldkist, The Georgia Conservancy, and GWF as well as other producer groups and agriculture support industries to prevent and solve water quality problems. In addition to the agriculture agencies and interest groups, a working partnership with individual land users is the cornerstone of soil and water conservation in Georgia.

The cooperating agencies have specific functions and directions. All have an information, education, and public participation component to support their objective to improve and maintain water quality. Of the agriculture agencies, only the GDA has enforcement authority. The GSWCC works with GAEPD, the enforcement agency for the Georgia Water Quality Control Act, to resolve agricultural water quality complaints, where appropriate. The UGACAES and NRCS produce and distribute numerous brochures and fact sheets dealing with agriculture best management practices and water quality.

A cooperative effort between UGACAES and P^2AD is providing pollution prevention information, education and technical assistance to the farmer and green industry professionals to reduce nonpoint source pollution as a result of fertilizer and pesticide use. The GSWCC, UGACAES, GAEPD and the P^2AD have established the Georgia Farm-A-Syst Program to address the problems of nonpoint source contamination of surface and groundwater from agricultural sources. The overall objective of this program is to develop and test voluntary agricultural self assessment materials to fit the needs and conditions throughout the State. The self assessments, fact sheets, and action plans encourage farmers to become environmentally proactive and to ultimately take steps to prevent nonpoint source pollution. Additional information is available at the national Farm-A-Syst website, www.uwex.edu/farmasyst, with links to the Georgia Farm-A-Syst Program.

The GSWCC has continued to sponsor local demonstration projects, provide farmers with visual demonstrations and information on the use and installation of best management practices, and collect data and generate computer databases on land use, animal units and agricultural BMP implementation. The GSWCC

has published and continues to distribute the following guidebooks for implementing agricultural best management practices to protect the State's waters: *Agricultural Best Management Practices for Protecting Water Quality in Georgia*, *Planning Considerations for Animal Waste Systems*, *A Georgia Guide to Controlling EROSION with Vegetation*, and *Guidelines for Streambank Restoration*.

Since 1990, approximately $11,650,000 in Section 319(h) Grant monies have been used to fund agricultural water quality demonstration projects in Georgia. In addition to the minimum 40% required non-federal in-kind match, the NRCS has contributed hundreds of hours of time worth many millions of dollars in technical assistance to support these projects. The UGACAES, GSWCC, FSA, GFC and other agencies have also contributed significant technical assistance to support these projects. These projects offer solutions, as well as financial and technical implementation assistance, in identified priority watersheds.

The 2002 Farm Bill contains conservation provisions that will have far reaching impacts on the protection of water quality from nonpoint source pollution in Georgia. The conservation provisions seek to improve the flexibility and efficiency of existing programs by diversifying agency participation in the delivery of conservation programs that protect water quality and related natural resources.

2002 Farm Bill Programs under NRCS supervision include the Forestry Incentive Program (FIP), Wetland Reserve Program (WRP),the Environmental Quality Incentives Program (EQIP),the Wildlife Habitats Incentives Program (WHIP), the Conservation Reserve Program (CRP),the Farmland Protection Program and the new conservation Security Program (CSP). Collectively these programs, described more fully in the State's *Nonpoint Source Management Program*, will continue to have a significant and positive impact on Georgia's natural resources.

The conservation program delivery process initiated by the Bill will cause a number of positive events to occur at the local, state, regional, and national levels. The Bill focuses first and foremost on resource concerns and considers conservation programs as tools with which to address the identified concerns. Multiple agencies, therefore, can take advantage of their common goals to protect and improve the natural resources of this State. Programs in the Bill seek to address high priority environmental protection goals through the cooperative work of Federal, State, and local agencies, as well as an active State Technical Committee. This cooperative effort will continue to identify and set resource concern priorities thereby establishing Georgia's agricultural priority environmental protection goals. Applying common goals to address resource

concerns in many of Georgia's geographic settings, which vary greatly, will encourage multiple agencies to find common solutions to resource impairment.

The Federal cost-share programs in the Bill will bring millions of dollars to Georgia. By requiring priority areas to be identified and ranked, conservation assistance will maximize the environmental benefit per dollar expended. Therefore, capital funding and technical expertise can be leveraged to enhance ongoing State and local efforts to more efficiently manage our natural resources.

Another benefit arising from this new process is the focus on the locally led conservation program delivery process, which should lead to a higher rate of landowner participation. Under a voluntary approach, the programs can only be effective to the extent that they are used. The process will result in a sense of ownership at the local level arising from local identification of local resource concerns, needs, and goals. Landowners will better understand the impact of their actions on their communities and will be better equipped to comply with environmental regulations, including the nonpoint source components of approved TMDLs.

The Environmental Quality Incentive Program (EQIP) is a voluntary conservation program that promotes environmental quality to producers and helps farmers and ranchers reduce soil erosion, improve water use efficiency and protect grazing land by installing conservation practices that protect natural resources. EQIP provides technical, financial and educational assistance.

NRCS is the lead agency for EQIP and works with many State and local partners to identify local priorities and recommend priority areas and program policy. In 2003, the EQIP program provided over $10 million in incentive payments and cost-sharing for conservation practices through 720 contracts. Requests for funds were more than four times the available funds. In 2004, more than $12 million dollars in cost-share funds were available for implementation in Georgia.

In 2005, the EQIP program provided over $10 million in incentive payments and cost-sharing for conservation practices covering more than 200,000 acres, including 400,000 linear feet of fencing, 140,000 acres of heavy use protection, and 4,500 stream crossings. In 2006, $14.3 million in EQIP cost-share funds will be available for implementation in Georgia, and more than $21 million dollars in overall Farm Bill programs.

The Conservation Security Program (CSP) is a voluntary conservation program that supports ongoing stewardship of working agricultural lands by providing payments for maintaining and enhancing natural resources. CSP identifies and rewards those farmers who are meeting the highest standards of conservation

and environmental management on their operations. In addition, CSP creates powerful incentives for other producers to meet those same standards of conservation performance. Through these rewards and incentives, CSP builds a foundation of conservation that provides current and future benefits to the public.

The Natural Resources Conservation Service (NRCS) uses watersheds to determine CSP participation as a best science-based way to group together producers working on similar environmental issues. As CSP grows, more watersheds will be added to the areas eligible for sign up each year.

For 2004, Georgia's Little River Watershed, part of the Suwannee River Basin was targeted. 37 contracts were approved for the Little River Watershed, covering more than 32,000 acres. A total of $915,928 in payments were approved, averaging $25,000 per contract.

Five contiguous watersheds were selected to participate in 2005: the Middle Flint, Ichaway-nochaway, Kinchafoonee-Muckalee, Little, and Upper Ochlockonee Watersheds. 111 contracts were approved in the five watershed area, including management practices to address water quality, nutrients, soil quality, and wildlife habitat. More than $2.8 million in payments were approved, averaging $25,000 per contract. Georgia's CSP watersheds for 2006 will be the Withlacoochee and Little Ocmulgee.

Watersheds that are selected to participate contain a variety of land uses and input intensities, have high-priority resource issues to be addressed, including issues that meet State priorities, have a history of good land stewardship on the part of landowners, and have the technical tools necessary to streamline program implementation. Watersheds also were evaluated from a national perspective regarding regional resource issues. Additional information may be found at: www.nrcs.usda.gov/programs/csp/

Silviculture

The Georgia Forestry Commission has been an integral partner with the GAEPD since 1977, committed to protect and maintain the integrity and quality of the State's waters. The GAEPD designated the Georgia Forestry Commission (GFC) as the lead agency for the silviculture portion of the State's *Nonpoint Source Management Program*. The Silviculture Nonpoint Source Management Program is managed and implemented by the GFC, with the support of the forestry industry, for the voluntary implementation of best management practices.

This program is managed by a Statewide Water Quality Coordinator and 12 foresters serving as District Water Quality Coordinators. The GFC Statewide and

District Water Quality Coordinators have received specialized training in erosion and sediment control, forest road layout and construction, stream habitat assessment and wetland delineation. The Statewide and District Water Quality Coordinators provide local and statewide training to forest community through workshops, field demonstrations, presentations, management advice to landowners and distribution of *Georgia's Best Management Practices for Forestry* manual and brochures.

The GFC also investigates and mediates complaints involving forestry operations. After notifying the landowner, the GFC District Coordinators conduct field inspections to determine if best management practices were followed, if the potential for water quality problems exists, if a contract was used and who purchased the timber. If a written contract was executed, the GFC District Coordinators will verify if the contractual agreement contains a clause specifying the implementation of BMP. If problems do exist, the GFC District Coordinator will work with the timber buyer and/or logger on behalf of the landowner to correct the problems. Complaints usually involve logging debris left in streams and are resolved without involving the GAEPD. However, the GFC is not a regulatory authority. Therefore, in situations when the GFC cannot get satisfactory compliance, the case is turned over to the GAEPD for enforcement action as provided under the Georgia Water Quality Control Act.

The State Board of Registration for Foresters has adopted procedures to sanction or revoke the licenses of registered foresters involved in unresolved complaints where actions or lack of supervision to implement best management practices have resulted in violations of the Board's land ethic criterion, Georgia Water Quality Control Act, or Federal wetlands regulations.

A long-term goal of Georgia's Nonpoint Source Management Program is to achieve 100% compliance in implementation of recommended Best Management Practices for silviculture. Since 1981, partner agencies in Georgia have been promoting silviculture BMPs to protect water quality in their educational programs. To determine the success of educational programs, and the effectiveness of recommended BMPs, the GFC (with financial support from Section 319(h) funds) conducts a biennial Statewide BMP Compliance Survey. The survey assesses the application of best management practices by logging operations.

In 2002, the GFC completed a biennual standardized survey of BMP compliance, including the rates of BMP implementation, units (areas, miles, crossings) in BMP compliance, effectiveness of BMPs, and areas to target for future BMP training. Overall BMP compliance was 99.1% (out of 49,452 acres evaluated.) This is a one percent increase from the 1998 survey, and more than seven

percent increase from the 1992 survey. Out of the 12,195 applicable, individual BMPs evaluated, 86% were implemented, a seven percent increase from the 1998 survey, and a nearly 20% increase from 1992. Out of the 226 miles of streams evaluated, more than 94% were found to have no impacts or impairments from forestry practices. The results from the biennial Statewide BMP Compliance Surveys will be used to update and revise the Silviculture Nonpoint Source Management Program.

The survey results for 2004 increased overall BMP compliance to 99.4% (out of 43,947 acres evaluated.) This is a point three (0.3) percent increase from the 2002 survey. Out of the 12,093 applicable, individual BMPs evaluated, 89.8% were implemented, a three point nine (3.9) percent increase from the 2002 survey. Out of the 234.68 miles of streams evaluated, more than 95.9% were found to have no impacts or impairments from forestry practices. This is an improvement of 1.7% from the 2002 survey. The results from the biennial Statewide BMP Compliance Surveys will be used to update and revise the Silviculture Nonpoint Source Management Program.

Currently, silviculture BMP compliance is estimated to be at more than 99%. As of this report, the Georgia Forestry Commission has instructed over 3,000 individuals in proper BMP uses. In addition, the Georgia Forestry Commission has addressed and resolved over 75 different logging complaints, and has conducted more than 150 one-to-one conferences with silviculture workers and professionals on-site or in the field.

The Georgia Forestry Association (GFA) and the forestry industry have played a significant role in encouraging the voluntary implementation of BMPs in Georgia. The forest industry has initiated numerous education workshops and training programs. The American Forest and Paper Association (AFPA) has adopted the Sustainable Forestry Initiative Program. The objective of the Sustainable Forestry Initiative Program is to induce and promote a proactive approach to forest management, including the protection of water resources. Two pertinent aspects of this program are: 1) A continuing series of 2½ day Master Timber Harvester Workshops with a component devoted to the protection of water resources and the implementation of best management practices, and 2) A Land Owner Outreach Program which endeavors to deliver information about forestry management and the protection of water resources to forest land owners.

Urban Runoff

The 1990 report of the Community Stream Management Task Force, *We All Live Downstream*, established a road map for urban runoff nonpoint source management in Georgia. The task force was convened in 1988 to assist the

Georgia Department of Natural Resources with impacts on urban streams. The task force's report emphasized the importance of cooperative partnerships and building working relationships between the units of government responsible for land and water quality management. Educational, management, and support strategies were recommended to help move toward an integrated structure which would allow continued evolution of intergovernmental and private sector structures and promote development of urban stream management activities over time.

The task force recognized two major impediments to effective management of urban water bodies. The first is the division between statutory responsibilities for management of water quality, granted to GAEPD, and local governments' constitutional responsibility for management of the land activities that affect urban waterbodies. The second impediment is the diffuse nature of nonpoint source pollution and the variety of activities that may contribute to impacts from urban runoff. They concluded that urban runoff nonpoint source management 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.

Since publication of *We All Live Downstream*, urban runoff nonpoint source management in Georgia has continued to evolve. Consistent with the multiple sources of urban runoff, the management systems have multiple focuses. Some programs focus on specific sources of urban runoff, targeting implementation of structural and/or management BMPs on individual sites or systemwide. Other programs treat corridors along waterbodies as a management unit to prevent or control the impacts of urban runoff on urban streams. Additional programs focus on comprehensive watershed management. This approach, which considers the impacts of all the land draining into a waterbody and incorporates integrated management techniques, is particularly critical to protecting and enhancing the quality of urban streams. Urban waterbodies cannot be effectively managed without controlling the adverse impacts of activities in their watersheds.

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. GAEPD is implementing programs which go beyond traditional regulation, providing the regulated community with greater flexibility and responsibility for determining management practices. The GAEPD is also expanding its role in facilitation and support of local watershed management efforts.

In this next decade, water resource management and the regulatory issues pertaining to water will be the most critical environmental issues faced by many local governments. Unlike many of the environmental issues local governments have faced in the past, water issues must be addressed on a regional or watershed basis to be truly effective. The major urban/industrial region of the State is highly dependent upon limited surface water resources found in the northern portion of the State. With limited storage capacity and limited ground water resources in this region, it is imperative that these limited water resources be used wisely and their quality be maintained. In South Georgia, groundwater resources must be managed carefully to prevent contamination and salt water intrusion from excess water withdrawals. A stable, reliable framework and clearinghouse for regional cooperation, information sharing, and technical assistance is needed to prepare local governments and citizens to meet these challenges. The Georgia Department of Community Affairs' Urban Nonpoint Source Management Program will fulfill this need.

Georgia Department of Community Affairs (DCA) is the lead partner and point of contact for urban nonpoint source pollution. As a lead partner with GAEPD, and utilizing Section 319(h) Grant funds, Georgia DCA is developing an Urban Nonpoint Source Management Program to foster regional watershed approaches to protect and enhance water quality. The Program will establish a single point of contact for local governments to use when they are seeking state or federal support to address issues related to water quality in their community. As an information and networking center, the Program will provide water resources tools, one-on-one technical assistance, and workshops to address regional water quality issues to more than 2,500 local elected officials currently serving 159 counties and 532 cities. The Urban Nonpoint Source Management Program will also provide tools to link land-use and water quality in land-use planning, promote smart growth principles, and provide public education materials and programs on protecting water resources. DCA has recently completed an intensive and creative technical assistance period (charrette) with Tybee Island. This charrette helped Tybee island to create a plan for managing stormwater, and urban runoff. DCA completed the charrette March 14, 2005.

Additionally, an array of programs to manage urban runoff are under development or being implemented in a variety of locales. Catalysts which contribute to more comprehensive management of urban waterbodies include public interest groups, local governments, regional development centers, State agencies, and State laws and regulations (e.g., Metropolitan Rivers Protection Act, Georgia Planning Act Part V Standards). The development and implementation of Total Maximum Daily Loads for waterbodies not meeting water quality standards will continue to spur local and regional watershed management initiatives.

Other initiatives have been implemented to further statewide coordination and implementation of urban runoff best management practices. The Atlanta Regional Commission (ARC) and the GAEPD published the *Georgia Stormwater Management Manual – Volume 1, Stormwater Policy Guide and Volume 2, Technical Handbook* in August 2001. This guidance manual for developers and local governments illustrates proper design of best management practices for controlling stormwater and nonpoint source pollution in urban areas in Georgia.

The University of Georgia's Marine Extension Service (MAREX) has partnered with local government officials to improve water quality through the Nonpoint Education for Municipal Officials (NEMO) program, part of the national Nonpoint Education for Municipal Officials (NEMO) network. The project is funded with a Coastal Incentive grant funds, and is also working closely with the Department of Community Affairs on their overall Statewide nonpoint source education efforts. MAREX provides educational programming, applied research, and technical assistance to communities along Georgia's coast

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The GAEPD and the University of Georgia School of Environmental Design developed land development code recommendations for incorporation into existing and/or new local government ordinances. The document, *Land Development Provisions to Protect Georgia Water Quality*, describes provisions that could be modified in or added to local development regulations to better protect water quality. This report also includes two sections introducing the problem of runoff water quality and its relationship to urban development. This document is intended to serve as a partial "menu" from which each municipality can select appropriate provisions and adapt them to the local conditions. Municipal ordinances where these provisions could be used include zoning and subdivision ordinances, erosion and sedimentation control codes, stormwater management ordinances and design standards documents.

In cooperation with the ARC, the GAEPD has also produced and distributed the reports, *Protecting Community Streams: A Guidebook for Local Governments in Georgia* and *Urban Streams Assessment and Evaluation Guidelines*. The guidebooks outline actions that a local community can undertake to protect its

healthy streams and restore its degraded streams. The guidebooks provide details of where and how to collect information on stream water quality, how to evaluate the quality of a community's streams, what protection measures should be considered and how all of this can be put together in an integrated planning and management program. The guidebooks are intended for use by government officials, public works departments, planning departments and drainage departments, but are also useful resources to any individual or community group interested in stream protection. The focus of the guidebooks is not only the stream and the stream's edge but the entire land area of watershed that drains into the stream. Streams are best protected through careful development of the land that they drain.

To a large extent, however, the conclusions of the Community Stream Management Task Force (CSMTF) still hold. The division between the State's responsibilities for water quality management and local responsibility for land management, as well as the variety of activities and sources which contribute to urban runoff problems, continue to pose challenges for management of nonpoint sources.

The water quality in an urban and/or developing watershed is the result of both point source discharges and the impact of diverse land activities in the drainage basin (i.e., nonpoint sources). Activities which can alter the integrity of urban waterbodies include habitat alteration, hydrological modification, erosion and sedimentation associated with land disturbing activities, stormwater runoff, combined sewer overflows, illicit discharges, improper storage and/or disposal of deleterious materials, and intermittent failure of sewerage systems. In a more recent assessment, studies reviewed by the CSMTF indicated that waterbodies throughout the State are threatened by the effects of urban development. During urbanization, pervious, vegetated ground is converted to impervious, unvegetated land. Land imperviousness in urban areas - as rooftops, roads, parking lots, and sidewalks - can range from 35% in lightly urbanized areas to nearly 100% in heavily urbanized areas. Increases in pollutant loading generated from human activities are associated with urbanization, and imperviousness results in increased stormwater volumes and altered hydrology in urban areas.

While the State has statutory responsibilities for water resources, local governments have the constitutional authority for the management of land activities. Therefore, it is necessary to forge cooperative partnerships between the State, local and regional governments, business and industry, and the general public. Watershed planning and management initiatives are necessary to identify local problems, implement corrective actions and coordinate the efforts of cooperating agencies.

Georgia Project WET (Water Education for Teachers) Program

Nonpoint sources of pollution are diffuse and varied; therefore, prevention, control and abatement of nonpoint source impacts will require action by a wide range of audiences. Effective nonpoint source management must address numerous activities of individuals, businesses, industries and governments that can adversely affect urban and rural waters. In many cases, these groups are unaware of the potential impacts of their activities or the corrective actions which may be taken.

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

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 across the State with over 400 Project WET facilitators trained statewide. In addition, more than 250 Project WET educator workshops have been completed in Georgia with more than 5,200 formal and non-formal educators implementing the Project WET curriculum in Georgia with a substantial number of students – over 600,000 students annually!

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 bi-annual newsletter, is published and distributed to over 4000 educators statewide and nationally. Information is also available on the Georgia Project WET website, www.gaprojectwet.org

Each year, the Georgia Project WET Program partners with the Environmental Education Alliance of Georgia to conduct an Statewide conference and awards ceremony. The 2005 conference, *Keys for Successful Partnerships*, was held at the Unicoi State Park and Lodge near Helen, Georgia with over 250 participants.

During the conference each year, Georgia Project WET announces the *Project WET School of the Year.* Schools are selected based on their efforts to increase awareness about water issues and their commitment to water education. The chosen school receives funding and organizational assistance to host a Water Education Festival at their school. This annual event, *Make a Splash with Project WET,* is a national effort sponsored by Project WET USA and Nestle Waters, Inc. The *Make a Splash with Project WET* water festivals around the country consist of structured learning stations and exhibits where students actively engage in hands-on activities and investigations. More than 50,000 children around the country join together raising awareness about the importance of protecting our water resources. Additional information is available on the International Project WET website, www.projectwetusa.org.

In 2004, Georgia Project WET partnered with the City of Atlanta's Department of Watershed Management to produce *The Urban Watershed: A Supplement to the Project WET Curriculum and Activity Guide.* This supplement includes twelve real-world, engaging activities that have been designed for 4-8th grade students. The activities address topics such as water quality, non-point source pollution, drinking water systems, wastewater systems and impervious surfaces. It is the first curriculum of its kind, focusing on the Chattahoochee River watershed and the unique issues that face an urban watershed. To date, over 65 educators have been trained to implement the curriculum in their classrooms and in the field. In addition, the City of Atlanta was honored with the Public Education Award from the Association of Water Professionals as a result of its part in developing this Urban Supplement to Project WET.

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. The Georgia Project WET Program offers a free River of Words Teacher's Guide for educators with specific information about Georgia's watersheds. In addition, several nature centers throughout Georgia offer *River of Words* field trips for students and teachers.

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 or in San Francisco, California.

Over 20,000 entries are submitted to the *River of Words* contest each year and in 2001– three out of the eight National Grand Prize Winners were from Georgia! Since 1997, eleven students from Georgia have been recognized as National Grand Prize Winners and over 75 students have been selected as National Finalists and Merit Winners. In addition to the students that are recognized Nationally, Georgia Project WET conducts a State judging each year in which approximately 30 students are honored as State winners.

The State and National winners' work display in the *Georgia River of Words Exhibition*. Each year, Georgia Project WET partners with the Atlanta Botanical Garden to conduct the *Georgia River of Words Awards Ceremony* recognizing State and National winners from across the State. The event is a huge success– with over 250 guests from all regions of the State attending each year.

Georgia Adopt-A-Stream Program

The Georgia Adopt-A-Stream Program is a citizen monitoring and stream protection program with two staff positions in the Georgia EPD and over 50 local community and watershed Adopt-A-Stream coordinators. The community and watershed coordinators are a network of college, watershed, or local government -based training centers located throughout Georgia. This network of local coordinators provides training workshops and educational presentations that allow 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 13,000 volunteers participate in 240 individual and over 50 community sponsored Adopt-A-Stream Programs. Volunteers conduct clean ups, stabilize streambanks, monitor waterbodies using biological and chemical methods, and evaluate habitats and watersheds at over 265 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 consist 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 clean-ups, 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.

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. Every two months a newsletter is published and distributed to over 4,500 volunteers statewide with program updates, workshop schedules, and information about available resources. Additional information about the Georgia Adopt-A-Stream Program, watershed investigation and water quality monitoring is available on the *Rivers Alive* website, at www.GaAAS.org. All Georgia Adopt-A-Stream Program activities have been correlated to the Georgia Performance Standards (GPS) for grades K – 12 and certified teachers in Georgia participating in Georgia Adopt-A-Stream Program training workshops will receive Professional Learning Unit (PLU) credits. Additional information about the GPS correlations and PLU credits can be found online. A recent update to the website includes links for viewing volunteer monitoring data and landuse and professional water quality data in a single format via the Internet. Data sharing developments like this website will

improve volunteer monitor's capacity to learn about and protect local water bodies.

In February 2005, Georgia Adopt-A-Stream partnered with the Georgia River Network to present the Watershed Track at their annual conference. This event helped connect citizens with activities that help protect and improve Georgia waters. In March 2005, the Georgia Adopt-A-Stream Program partnered with the Environmental Education Alliance of Georgia to conduct an annual conference and awards ceremony. The 2005 conference, *Georgia Environment - Keys for Successful Partnership*, was held at Unicoi State Park and Lodge, near Helen, Georgia with over 250 participants.

In addition, the Georgia Adopt-A-Stream Program organizes Georgia's annual volunteer river clean up event, *Rivers Alive*, held throughout the month of October. *Rivers Alive* is a statewide event that targets clean-ups across all waterways in the State including streams, rivers, lakes wetlands and coastal waters. The mission of *Rivers Alive* is to create awareness of and involvement in the preservation of Georgia's water resources.

During the 2005 river cleanup, more than 24,500 volunteers cleaned over 2,450 miles of waterways and removed over 680,000 pounds of trash and garbage including refrigerators, couches, a shower stall, televisions, microwaves, tires, shingles and general trash. *Rivers Alive* is an annual event that receives key support in the form of corporate sponsorship for the purchase of t-shirts, watershed posters, bookmarks and educational materials. The cleanup event also provides signs, press releases through public service announcements and advertises on local television stations. In addition to protecting and preserving the State's waterways, *Rivers Alive* cleanup events include diverse activities such as stormdrain stenciling, water quality monitoring and riparian restoration workshops, riverboat tours, wastewater treatment facility tours and environmental education workshops.

The goals for *Rivers Alive* are to have at least 25,000 volunteers with at local events in every county across Georgia. These goals represent increased efforts that will result in cleaner waters in the State. Additional information about *Rivers Alive* is available on the website, www.riversalive.org.

Emergency Response Program

The GAEPD maintains a team of Environmental Emergency Specialists capable of responding to oil or hazardous materials spills 24-hours a day. Each team member is cross-trained to address and enforce all environmental laws administered by the GAEPD. The team members interact at the command level

with local, state and federal agency personnel to ensure the protection of human health and the environment during emergency and post emergency situations. The majority of the team members are located in Atlanta in order to facilitate rapid access to the major interstates. Two additional team members operate out of the Environmental Protection Division office in Savannah to provide rapid response to water quality concerns along the coast of Georgia and to assist the United States Coast Guard Marine Safety Office when needed.

A significant number of reported releases involve discharges to storm sewers. Many citizens and some industries do not understand the distinction between storm and sanitary sewers and intentional discharge to storm sewers occurs all too frequently. A problem which arises several times a year involves the intentional discharge of gasoline to storm sewers, with a resulting buildup of vapors to explosive limits. A relatively small amount of gasoline can result in explosive limits being reached in a storm sewer. The resulting evacuations and industry closures cost the citizens of Georgia hundreds of thousands of dollars each year.

The GAEPD is designated in the Georgia Emergency Operations Plan as the lead state agency in responding to hazardous materials spills. Emergency Response Team members serve in both a technical support and regulatory mode during an incident. The first goal of the Emergency Response Team is to minimize and mitigate harm to human health and the environment. In addition, appropriate enforcement actions including civil penalties are taken with respect to spill incidents. Emergency Response Team members work directly with responsible parties to coordinate all necessary clean-up actions. Team members can provide technical assistance with clean-up techniques, as well as guidance to ensure regulatory compliance.

Environmental Radiation

In 1976, the Georgia Radiation Control Act was amended to provide the GAEPD with responsibility for monitoring of radiation and radioactive materials in the environment. The Environmental Radiation Program was created to implement these responsibilities for environmental monitoring. Since that time, the Program has also been assigned responsibility for implementing the GAEPD lead agency role in radiological emergency planning, preparedness and response, and for analyzing drinking water samples collected pursuant to the Safe Drinking Water Act for the presence of naturally-occurring radioactive materials such as uranium, 226Ra, 228Ra and gross alpha activity.

The Environmental Radiation Program monitors environmental media in the vicinity of nuclear facilities in or bordering Georgia to determine if radioactive

materials are being released into the environment in quantities sufficient to adversely affect the health and safety of the citizens of Georgia or the quality of Georgia's environment. Among the more important of the facilities monitored by the Program are:

- Georgia Power Company Edwin I. Hatch Nuclear Plant, located in Appling County, Georgia;
- Alabama Power Company Joseph M. Farley Nuclear Plant, located in Houston County, Alabama;
- Georgia Power Company Vogtle Electric Generating Plant, located in Burke County, Georgia;
- U.S. Department of Energy Savannah River Site, located in Aiken and Barnwell Counties, South Carolina;
- Naval Submarine Base, Kings Bay, located in Camden County, Georgia;
- Tennessee Valley Authority Sequoyah Nuclear Plant, located in Hamilton County, Tennessee; and
- Duke Power Company Oconee Nuclear Plant, located in Oconee County, South Carolina.

On a routine basis, associates in the Environmental Radiation Program collect samples of groundwater, surface water, stream sediment and/or aquatic species (i.e. fish, shellfish) from each of these facilities. The Program contracts with the Environmental Radiation Laboratory (ERL) at Georgia Tech for laboratory analysis of these samples for natural and man-made radionuclides such as 90Sr, 131I, 137Cs and 3H (tritium).

The results of the GAEPD monitoring around Plant Hatch indicate very little evidence of releases of radioactive materials, with the exception of monitoring related to a 1986 spill of spent fuel pool water, as discussed in the GAEPD Environmental Monitoring Reports. Slightly elevated levels of 60Co, 65Zn, 134Cs, and 137Cs have been detected in fish and river sediment from the Altamaha River downstream to the coastal area near Darien. Slightly elevated levels of 137Cs are observed in vegetation samples from a background station plant cannot be attributed to plant operations, as similar levels are not found at indicator stations closer to the plant. Overall, it appears that Plant Hatch operations have not added significant quantities of radioactive materials to the environment.

The results of the GAEPD monitoring around Plant Farley indicate little evidence of releases of radioactive materials, with the exception of slightly elevated levels of tritium (3H) in surface water and slight traces of 58Co and 60Co in river sediment.

Results of the GAEPD monitoring around SRS and Plant Vogtle show evidence of current and previous releases of radioactive materials from SRS. Elevated levels of tritium (3H) due to airborne and liquid releases are routinely detected in fish, milk, precipitation, surface water and vegetation. Elevated levels of 137Cs and 60Co, attributed to releases from previous SRS operations, are found in sediments from the Savannah River. Elevated 137Cs, gross beta, and 90Sr levels are also found in fish from the Savannah River. Staff of the Environmental Radiation Program are working with SRS personnel on a study of the effects on human health from consumption of contaminated fish. The GAEPD monitoring results also show evidence of current and previous releases of radioactive materials from Plant Vogtle. Slightly elevated concentrations of 54Mn, 58Co, and 60Co have been detected in aquatic vegetation and sediment downstream of Plant Vogtle, and 134Cs has been detected in fish downstream of the plant.

The results of the GAEPD monitoring around Kings Bay indicate little evidence of releases of radioactive materials. Elevated gross beta concentrations in surface water are due to naturally-occurring 40K in sea-water. Overall, it appears that operations at Naval Submarine Base, Kings Bay have not added significant quantities of radioactive materials to the environment.

The results of the GAEPD monitoring around the Sequoyah Nuclear Plant indicate no evidence of releases of radioactive materials.

Results of the GAEPD monitoring around the Oconee Nuclear Plant indicate no evidence of releases of radioactive materials. Elevated gross alpha and gross beta concentrations observed in ground water at one location are due to the presence of 226Ra (naturally-occurring radioactive isotope).

CHAPTER 8

Groundwater, Ground and Surface Water Withdrawals/Availability, and Ground and Surface Water Drinking Water Supplies

Groundwater

Georgia began the development of its Comprehensive State Groundwater Protection Program (CSGWPP) in the 1970s with enactment of the Ground Water Use Act in 1972. By the mid-1980s, groundwater protection and management had been established by incorporation in a variety of environmental laws and the rules. In 1984, the GAEPD published its first Groundwater Management Plan, in which the various regulatory programs dealing with groundwater were integrated.

Most laws providing for protection and management of groundwater are administered by the GAEPD. 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. The GAEPD 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 the GAEPD.

The first version of Georgia's Groundwater Management Plan (1984) has been revised several times to incorporate new laws, rules and technological advances. The current version, Georgia Geologic Survey Circular 11, was published in February, 1998. This document was GAEPD's submission to the USEPA as a "core" CSGWPP. The USEPA approved the submittal in September of 1997. Georgia is now one of approximately 20 percent of the states with an EPA approved CSGWPP.

Groundwater is extremely important to the life, health, and economy of Georgia. For example, in 2002, groundwater made up approximately 20 percent of the public water supply, 100 percent of rural drinking water sources, 58 percent of the irrigation use and 47 percent of the industrial and mining use. Total

groundwater withdrawals in 2002 were approximately 1.26 billion gallons per day. For practical purposes, outside the larger cities of the Piedmont, groundwater is the dominant source of drinking water. The economy of Georgia and the health of millions of persons could be compromised if Georgia's groundwater were to be significantly polluted.

Relatively few cases of ground water contamination adversely affecting public drinking water systems or privately owned drinking water wells have been documented in Georgia, and currently, the vast majority of Georgia's population is not at risk from ground water pollution of drinking water. However, there are various old petroleum underground storage tanks, old landfills and other sites with known ground water contamination which (1) pose a threat to public drinking water systems or individual drinking water wells, or (2) render the existing ground water on or near those sites unusable for drinking water should that use be considered now or in the future. These sites are being addressed primarily through State laws and programs dealing with underground storage tanks, hazardous waste management or hazardous site remediation. Data on the major sources of groundwater contamination are provided in Table 8-1.

The GAEPD's groundwater regulatory programs follow an anti-degradation policy under which regulated activities will not develop into significant threats to the State's groundwater resources. This anti-degradation policy is implemented through three principal elements:

- Pollution prevention,
- Management of groundwater quantity, and
- Monitoring of groundwater quality and quantity.

The prevention of pollution includes (1) the proper siting, construction and operation of environmental facilities and activities through a permitting system, (2) implementation of environmental planning criteria by incorporation in land-use planning by local government, (3) implementation of a Wellhead Protection Program for municipal drinking water wells, (4) detection and mitigation of existing problems, (5) development of other protective standards, as appropriate, where permits are not required, and (6) education of the public to the consequences of groundwater contamination and the need for groundwater protection. Management of groundwater quantity involves allocating the State's groundwater, through a permitting system, so that the resource will be available to present and future generations. Monitoring of groundwater quality and quantity involves continually assessing the resource so that changes, either good or bad, can be identified and corrective action implemented when and where needed. Table 8-2 is a summary of Georgia groundwater protection programs.

TABLE 8-1
MAJOR SOURCES OF GROUND WATER CONTAMINATION

Contaminant Source	Contaminant Source Selection Factors	Contaminants
Agricultural Activities		
Agricultural chemical facilities		
Animal feedlots		
Drainage wells		
Fertilizer applications		
Irrigation practices		
Pesticide applications		
Storage and Treatment Activities		
Land application		
Material stockpiles		
Storage tanks (above ground)		
Storage tanks (underground)*	C, D, F	D
Surface impoundments		
Waste piles		
Waste tailings		
Disposal Activities		
Deep injection wells		
Landfills*	C, D, F	D, G, H
Septic systems*	C	E, K, L
Shallow injection wells		

Contaminant Source	Contaminant Source Selection Factors	Contaminants
Other		
Hazardous waste generators		
Hazardous waste sites*	F	C, H
Industrial facilities*	C, F	C, D, H
Material transfer operations		
Mining and mine drainage		
Pipelines and sewer lines*	F	D
Salt storage and road salting		
Salt water intrusion*	B, C, E, F	G
Spills*	F	D
Transportation of materials		
Urban runoff*	D, E	Variable
Natural iron and manganese* Natural radioactivity	F	H, I

*10 highest-priority sources

Factors used to select each of the contaminant sources.

A. Human health and/or environmental risk (toxicity)
B. Size of the population at risk
C. Location of the sources relative to drinking water sources
D. Number and/or size of contaminant sources
E. Hydrogeologic sensitivity
F. State findings, other findings

Contaminants/classes of contaminants considered to be associated with each of the sources that were checked.

A. Inorganic pesticides
B. Organic pesticides
C. Halogenated solvents
D. Petroleum compounds
E. Nitrate
F. Fluoride
G. Salinity/brine
H. Metals
I. Radio nuclides
J. Bacteria
K. Protozoa
L. Viruses

TABLE 8-2
SUMMARY OF STATE GROUND WATER PROTECTION PROGRAMS

Programs or Activities	Check (X)	Implementation Status	Responsible State Agency
Active SARA Title III Program	X	Fully Established	GAEPD
Ambient ground water monitoring system	X	Fully Established	GAEPD
Aquifer vulnerability assessment	X	Ongoing	GAEPD
Aquifer mapping	X	Ongoing	GAEPD
Aquifer characterization	X	Ongoing	GAEPD
Comprehensive data management system	X	Ongoing	GAEPD
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)	X	Fully Established	GAEPD
Ground water discharge		Prohibited	
Ground water Best Management Practices	X	Pending	GAEPD
Ground water legislation	X	Fully Established	GAEPD
Ground water classification		Not applicable	
Ground water quality standards	X	Ongoing	GAEPD
Interagency coordination for ground water protection initiatives	X	Fully Established	GAEPD
Nonpoint source controls	X	Pending	GAEPD
Pesticide State Management Plan	X	Fully Established	DOA
Pollution Prevention Program	X	Fully Established	DNR
Resource Conservation and Recovery Act (RCRA) Primacy	X	Fully Established	GAEPD
State Superfund	X	Fully Established	GAEPD
State RCRA Program incorporating more stringent requirements than RCRA Primacy	X	Fully Established	GAEPD
State septic system regulations	X	Fully Established	DHR
Underground storage tank installation requirements	X	Fully Established	GAEPD
Underground Storage Tank Remediation Fund	X	Fully Established	GAEPD
Underground Storage Tank Permit Program		Not applicable	
Underground Injection Control Program	X	Fully Established	GAEPD
Vulnerability assessment for drinking water/wellhead protection	X	Ongoing	GAEPD
Well abandonment regulations	X	Fully Established	GAEPD
Wellhead Protection Program (EPA-approved)	X	Fully Established	GAEPD
Well installation regulations	X	Fully Established	GAEPD

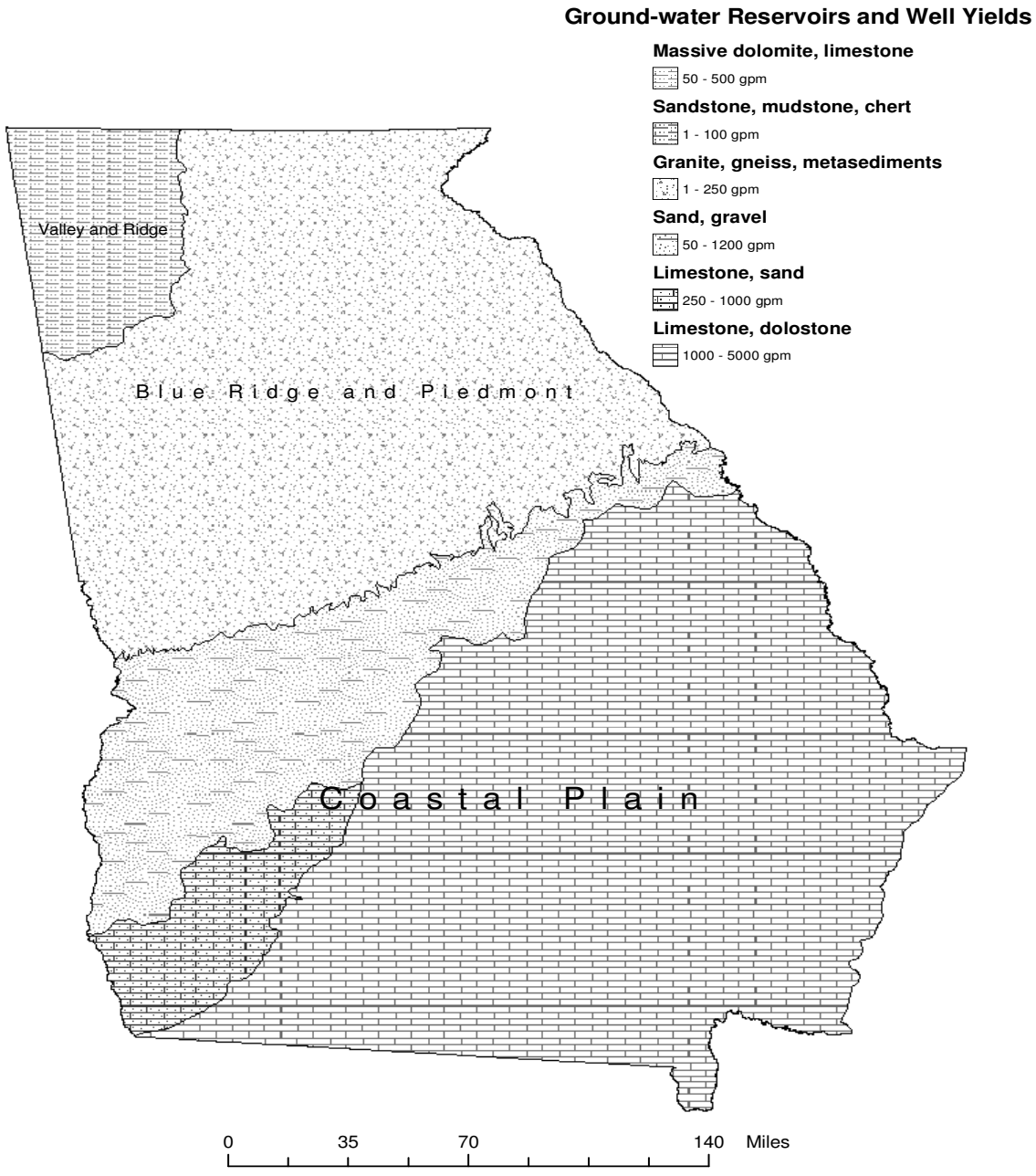
The State of Georgia possesses a groundwater supply that is both abundant and of high quality. Except where aquifers in the Coastal Plain become salty at great depth, all of the State's aquifers are considered as potential sources of drinking water. For the most part, these aquifers are remarkably free of pollution. The aquifers are continuously recharged by precipitation falling within the borders of the State and can, in most places, continue to provide additional water to help meet future water needs. While water from wells is safe to drink without treatment in most areas of Georgia, water to be used for public supply is required to be chlorinated (except for very small systems). Water for domestic use can also be treated if required.

Ambient groundwater quality, as well as the quantity available for development, is related to the geologic character of the aquifers through which it has moved. Georgia's aquifers can, in general, be characterized by the five main hydrologic provinces in the State (Figure 8-1).

In addition to sampling of public drinking water wells as part of the Safe Drinking Water Act and sampling of monitoring wells at permitted facilities, the GAEPD monitors ambient groundwater quality through the Georgia Groundwater Monitoring Network. The Network consists of approximately 100-130 wells, which are sampled periodically (Figure 8-2). Reports of water quality are issued periodically. These wells are located in all of the main aquifers and throughout the State in key areas. This network allows the GAEPD to identify groundwater quality trends before they become a problem. The only adverse trend noted to date is that nitrate, while still a fraction of the USEPA established MCL for drinking water, has slightly increased in concentration in the recharge areas of some Coastal Plain aquifers since 1984. General results of aquifer monitoring data for calendar years 2004 and 2005 are provided in Table 8-3.

To evaluate nitrate/nitrite from non-point sources in the State's groundwater, between 1991 and 1995 the GAEPD sampled over 5000 shallow domestic drinking water wells for nitrate/nitrite. Results indicated that water from 97 percent of the wells had less than 5 ppm nitrate as N, well below the MCL of 10 ppm. Water from less than one percent of the wells exceeded the MCL value. From 1996 through 2005, 968 water samples from Groundwater Monitoring Network wells were analyzed for nitrate/nitrite. Water from 1.2 percent of the samples exceeded the MCL value. In 2003 and 2004, 546 domestic well samples were tested for nitrate as part of the Domestic Well Pesticide Sampling Project. Water from 95 percent of the wells had less than 5 ppm nitrate as N. Water from 1.5 percent of the samples exceeded the MCL value. Nitrate can come from non-point sources such as natural and artificial fertilizer, natural sources, feedlots and animal enclosures. Septic tanks and land application of treated wastewater and sludge are other potential sources of nitrate. The

FIGURE 8-1
HYDROLOGIC PROVINCES OF GEORGIA



GAEPD's extensive sampling program demonstrates that nitrates, from non-point sources, are not a significant contributor to groundwater pollution in Georgia.

Agricultural chemicals are commonly used in the agricultural regions of the State (Figure 8-3). In addition to the Groundwater Monitoring Network and nitrate/ nitrite sampling, the GAEPD has sampled:

- A network of monitoring wells located downgradient from fields where pesticides are routinely applied,
- Domestic drinking water wells for pesticides and nitrates, and
- Agricultural Drainage wells and sinkholes in the agricultural regions of Georgia's Coastal Plain for pesticides.

Only a few pesticides and herbicides have been detected in groundwater in these studies. There is no particular pattern to their occurrence, and most detections have been transient; that is, the chemical is most often no longer present when the well is resampled.

From 1993 through 2000, the GAEPD cooperated with the Georgia Department of Agriculture to sample a network of special monitoring wells located downgradient from fields where pesticides were routinely applied. Pesticides were not detected in any of these monitoring wells, and this project was terminated in 2000. Beginning in 2000, the GAEPD began a five-year statewide screening of water samples from domestic wells for four target pesticides (alachlor, atrazine, metolachlor and simazine). Testing for nitrates was added in August 2003. The GAEPD sampled 3,095 domestic wells in Georgia by the end of the project in 2004. Laboratory analysis confirmed that only eighteen wells (0.58%) contained detectable concentrations of pesticides. Four of these wells (0.13%) contained alachlor at concentrations of 3.5 to 6.2 ppb, which were greater than the public drinking water MCL of 2.0 ppb. All homeowners whose wells tested positive for pesticides were advised of the results and referred to the University of Georgia’s Cooperative Extension Service for assistance. Prudent agricultural use of pesticides does not appear to represent a significant threat to drinking water aquifers in Georgia at this time.

The most extensive contamination of Georgia’s aquifers is from naturally occurring mineral salts (i.e., high total dissolved solids, or TDS levels). Areas generally susceptible to high TDS levels are shown in Figure 8-4. Intensive use of groundwater in the 24 counties of the Georgia coast has caused some groundwater containing high levels of dissolved solids to enter freshwater aquifers either vertically or laterally. Salt-water intrusion into the Upper Floridan Aquifer threatens groundwater supplies in the Hilton Head-Savannah and Brunswick areas. Intrusion rates, however, are quite slow, being more than a hundred years to reach Savannah. The GAEPD has placed limitations on additional withdrawals of groundwater in the affected areas. This has effectively slowed the rate of additional contamination. On April 23, 1997, the GAEPD

FIGURE 8-2
AMBIENT GROUNDWATER MONITORING NETWORK, 2004-2005

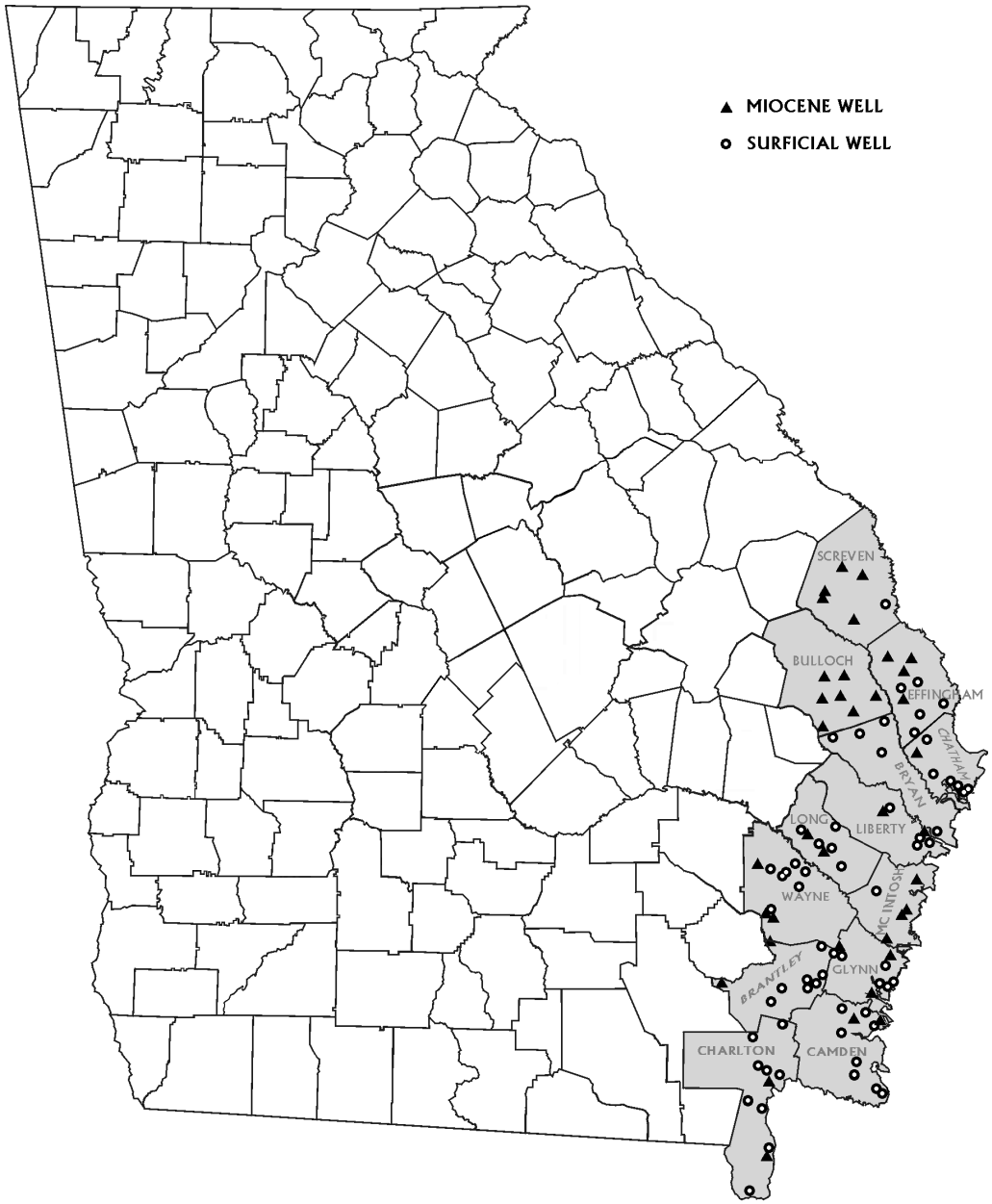


TABLE 8-3
AQUIFER MONITORING DATA FOR CY 2004

Aquifer System	County	No. of Wells	Nitrate Detec-tions,	Pesticide Detec-tions*	Salinity range %	Pest-icide Exceed-ance	Nitrate Exceed-ance	Ocean-front County
MIOCENE (upper and lower Brunswick aquifers)	Brantley	1	0	0	0.00	0	0	No
	Bryan	0	--	--	--	--	--	Yes
	Bulloch	6	1	0	0.00	0	1	No
	Camden	2	0	0	0.01	0	0	Yes
	Charlton	0	--	--	--	--	--	No
	Chatham	0	--	--	--	--	--	Yes
	Effingham	4	0	0	0.00	0	0	No
	Glynn	3	0	0	0.01	0	0	Yes
	Liberty	2	0	0	0.00	0	0	Yes
	Long	0	--	--	--	--	--	No
	McIntosh	3	0	0	0.01	0	0	Yes
	Screven	5	1	0	0	0	0	No
	Wayne	1	0	0	0.00	0	0	No
SURFICIAL	Brantley	4	0	0	0.00-0.01	0	0	No
	Bryan	5	0	0	0.00	0	0	Yes
	Bulloch	0	--	--	--	--	--	No
	Camden	6	0	0	0.00-0.01	0	0	Yes
	Charlton	5	0	0	0.00-0.03	0	0	No
	Chatham	0	--	--	--	--	--	Yes
	Effingham	5	2	0	0.00	0	0	No
	Glynn	4	0	0	0.00-0.01	0	0	Yes
	Liberty	4	0	0	0.00	0	0	Yes
	Long	0	--	--	--	--	--	No
	McIntosh	1	0	0	0.00	0	0	Yes
	Screven	1	0	0	0.00	0	0	No
	Wayne	7	3	0	0.00	0	0	No

* Pesticides analyzed following EPA Method 525.2

-- No data

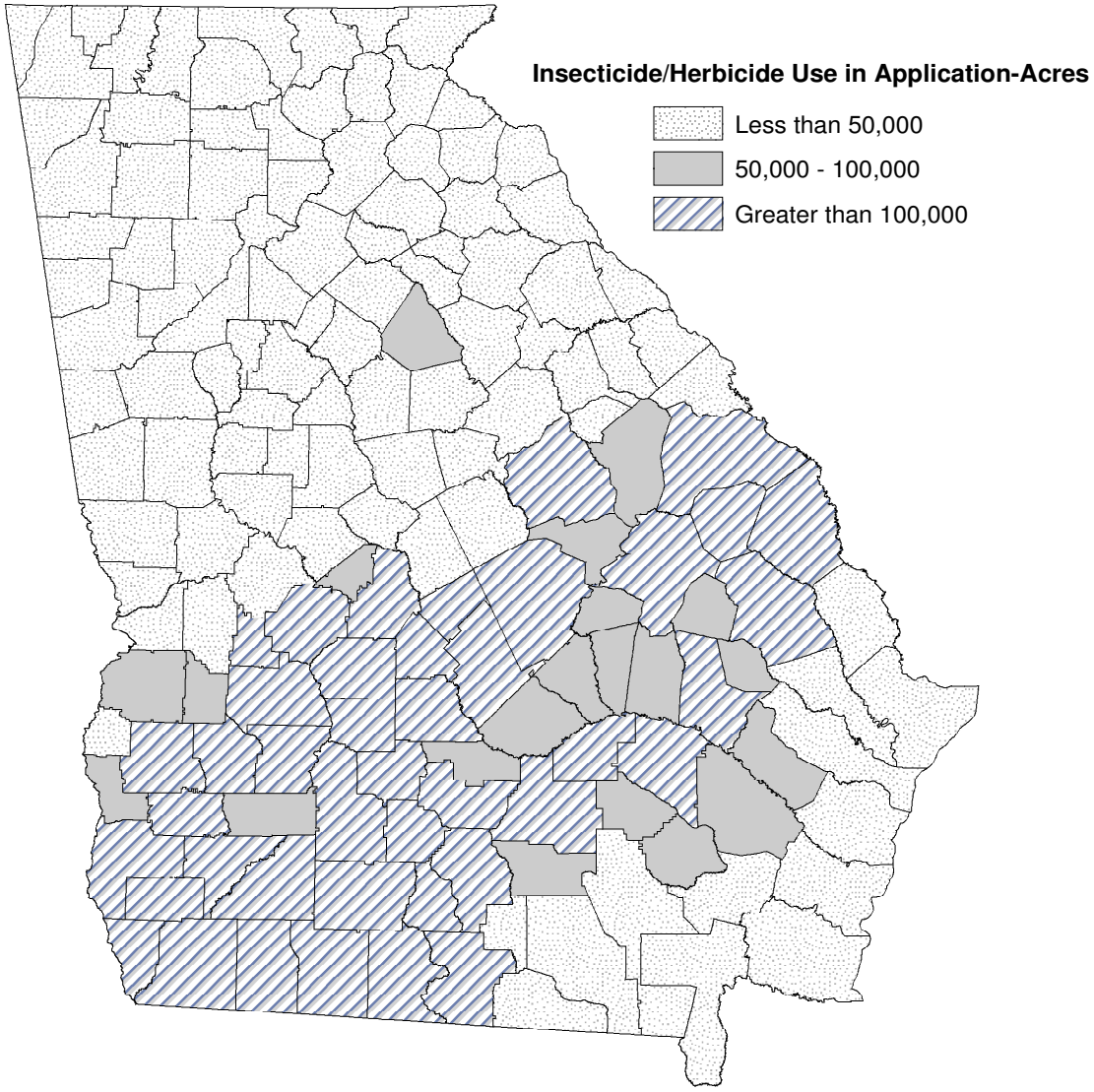
TABLE 8-4
AQUIFER MONITORING DATA FOR CY 2005

Aquifer System	County	No. of Wells	Nitrate Detec-tions,	Pesticide Detec-tions*	Salinity range %	Pest-icide Exceed-ance	Nitrate Exceed-ance	Ocean-front County
MIOCENE (upper and lower Bruswick aquifers)	Brantley	1	0	0	0.00	0	0	No
	Bryan	0	--	--	--	--	--	Yes
	Bulloch	1	0	0	0.00	0	0	No
	Camden	0	--	--	--	--	--	Yes
	Charlton	2	0	0	0.01-0.02	0	0	No
	Chatham	1	0	0	0.00	0	0	Yes
	Effingham	0	--	--	--	--	--	No
	Glynn	0	--	--	--	--	--	Yes
	Liberty	0	--	--	--	--	--	Yes
	Long	2	0	0	0.00	0	0	No
	McIntosh	1	0	0	0.01	0	0	Yes
	Screven	0	--	--	--	--	--	No
	Wayne	2	1	0	0.00	0	0	No
SURFICIAL	Brantley	3	0	0	0.00-0.01	0	0	No
	Bryan	0	--	--	--	--	--	Yes
	Bulloch	0	--	--	--	--	--	Yes
	Camden	2	0	0	0.01	0	0	Yes
	Charlton	5	0	0	0.00-0.03	0	0	No
	Chatham	6	0	0	0.00-0.02	0	0	Yes
	Effingham	0	--	--	--	--	--	No
	Glynn	2	0	0	0.01	0	0	Yes
	Liberty	0	--	--	--	--	--	Yes
	Long	5	2	0	0.00	0	0	No
	McIntosh	0	--	--	--	--	--	Yes
	Screven	0	--	--	--	--	--	No
	Wayne	0	--	--	--	--	--	No

* Pesticides analyzed following EPA Method 525.2.

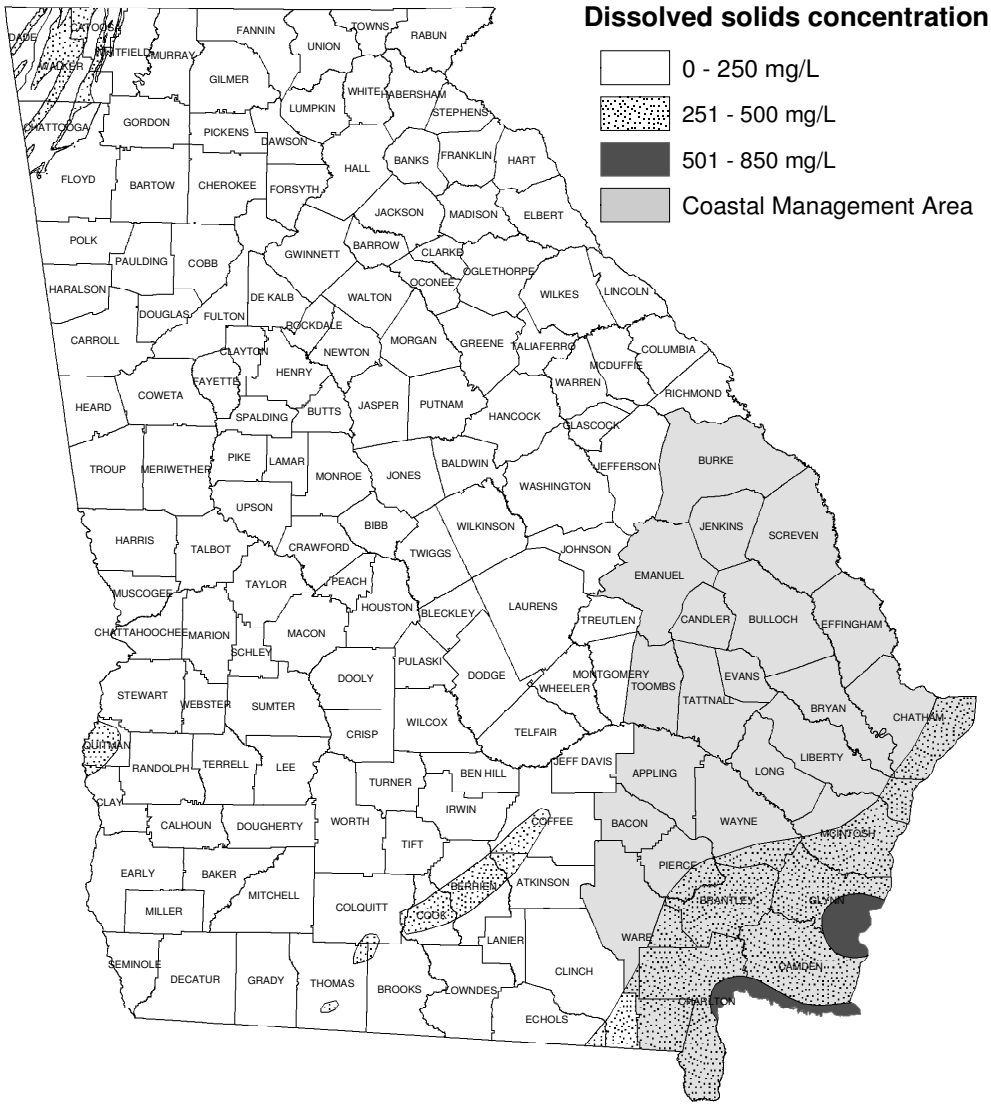
-- No data

FIGURE 8-3
INSECTICIDE/HERBICIDE USE IN GEORGIA, 1980



Note: An application-acre represents one application of insecticide-herbicide to one acre of land. Some crops may require multiple applications.

FIGURE 8-4
AREAS SUSCEPTIBLE TO NATURAL HIGH DISSOLVED SOLIDS AND 24 COUNTY AREA COVERED BY THE INTERIM COASTAL MANAGEMENT



implemented an Interim Strategy to protect the Upper Floridan Aquifer from salt-water intrusion in the 24 coastal counties. The strategy, developed in consultation with South Carolina and Florida, will continue until December 31, 2005 at which time the GAEPD plans to implement a Final Strategy that will (a) stop salt-water intrusion before municipal water supply wells on Hilton Head Island, South Carolina and in Savannah, Georgia are contaminated and (b) prevent an existing salt-water problem at Brunswick, Georgia from worsening. To accomplish this objective, the GAEPD will do the following:

(1) Continue to conduct scientific and feasibility studies to determine with certainty how to permanently stop the salt-water intrusion moving towards Hilton Head Island, South Carolina and Savannah, Georgia and how to prevent the existing salt-water intrusion at Brunswick, Georgia from worsening.

(2) Complete the collation and synthesis of the 24 county water supply plans into one comprehensive coastal area water supply planning document. As required by the Interim Strategy, each of the 24 coastal counties has submitted a planning document detailing current water usage in the county and projecting the quantities of future water use. The counties were to document any potential alternate water supply sources as well. Since each of the counties has already submitted a plan, there is no restriction on this account for any future proposed public water, agriculture or industrial water withdrawal permit.

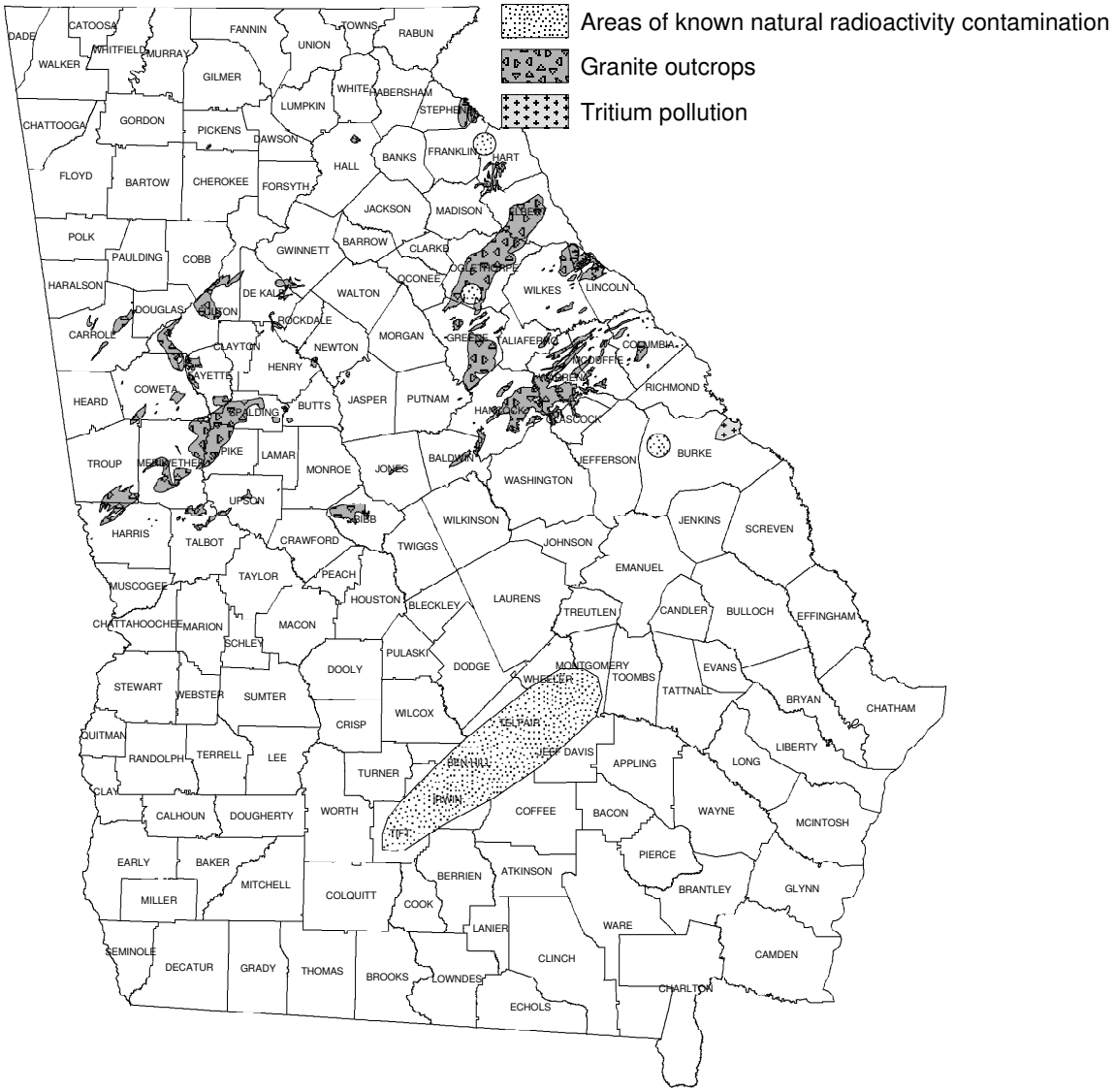
(3) Maintain caps on groundwater use in Glynn County, Chatham County, and portions of Bryan and Effingham counties, to avoid worsening the rate of salt-water intrusion at Hilton Head, Savannah and at Brunswick.

(4) Reduce groundwater use in Chatham County by at least 10 million gallons per day by December 31, 2005 through conservation and substitution of surface water for groundwater. This will be affirmed through reductions in groundwater use permits.

(5) Allow, on an interim basis, increases in groundwater withdrawals in the areas of southeast Georgia that have little impact on salt-water intrusion problems.

(6) Encourage and promote water conservation and reduced groundwater usage wherever feasible, throughout southeast Georgia.

FIGURE 8-5
AREAS SUSCEPTIBLE TO NATURAL AND HUMAN INDUCED RADIATION



Some wells in Georgia produce water containing relatively high levels of naturally occurring iron and manganese. Another natural source of contamination is from radioactive minerals that are a minor rock constituent in some Georgia aquifers. While natural radioactivity may occur anywhere in Georgia (Figure 8-5), the most significant problems have occurred at some locations near the Gulf Trough, a geologic feature of the Floridan Aquifer in the Coastal Plain. Wells can generally be constructed to seal off the rocks producing the radioactive elements to provide safe drinking water. Radon, a radioactive gas produced by the radioactive minerals mentioned above, also has been noted in highly variable amounts in groundwater from some Georgia wells, especially in the Piedmont region. Treatment systems may be used to remove radon from groundwater.

Tritium, a radioactive isotope of hydrogen, was found in 1991 in excess of expected background levels by GAEPD sampling in Burke County aquifers. While the greatest amount of tritium thus far measured is only 15 percent of the USEPA MCL for tritium, the wells in which it has been found lie across the Savannah River from the Savannah River Plant in South Carolina, where tritium was produced for nuclear weapons (Figure 8-5). The tritium does not exceed MCLs for drinking water; therefore it does not represent a health threat to Georgia citizens at the present time. Results of the GAEPD's studies to date indicate the most likely pathway for tritium to be transported from the Savannah River Plant is through the air due to evapo-transpiration of triturated water. The water vapor is condensed to form triturated precipitation over Georgia and reaches the shallow aquifers through normal infiltration and recharge.

Man-made pollution of groundwater can come from a number of sources, such as business and industry, agriculture, and homes (e.g., septic systems). Widespread annual testing of more than 2000 public water supply wells for volatile organic chemicals (VOCs, e.g. solvents and hydrocarbons) is performed by the GAEPD. In 2000-2001, one water system had a VOC level high enough to exceed the MCL and become a violation. The sources of the VOCs most commonly are ill-defined spills and leaks, improper disposal of solvents by nearby businesses, and leaking underground fuel-storage tanks located close to the well. Where such pollution has been identified, alternate sites for wells are generally available or the water can be treated. In 2001, 5 water systems had MTBE, a gasoline additive, in the water at levels higher than 10 ppb. There is currently no MCL for MTBE.

The GAEPD evaluates public groundwater sources (wells and springs) to determine if they have direct surface water influence. Ground Water Under the Direct Influence of Surface Water (GWUDI) is defined as "Water beneath the surface of the ground with: (1) Significant occurrence of insects or other macro organisms, algae, or large diameter protozoa and pathogens such as Giardia

lamblia or Cryptosporidium; and significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH which closely correlate to climatological or surface conditions." Microscopic Particulate Analysis (MPA) is a method of sampling and testing for significant indicators. Hundreds of MPA's have been performed each year since the program began in 1988. All of the known existing sources have been evaluated either on site or from information gathered from our files. Some are being re-evaluated as better information becomes available. Recently the primary focus of the program has been to monitor the nearly 100 public spring sources scattered around the state and to evaluate new wells and spring sources as they enter the source approval process.

On the basis of the information collected during investigations and microscopic analysis of raw water samples since 2002, twenty (20) sources were found to have direct surface water influence. Of these sources, eight (8) successfully removed the influence by taking corrective action, three (3) added treatment in the form of filtration, two (2) were taken out of service, and four (4) were proposed sources and never completed as a drinking water source

Groundwater protection from leaking underground storage tanks was enhanced with the enactment of the Georgia Underground Storage Tank Act in 1988. The program established a financial assurance trust fund and instituted corrective action requirements to clean up leaking underground storage tanks. Through December 31, 2003, confirmed releases have been identified at 10,313 sites and site investigation and corrective action procedures have been completed at 7,079 sites and initiated at the remaining 3,324 sites.

In 1992, the Georgia Legislature enacted the Hazardous Site Response Act to require the notification and control of releases of hazardous materials to soil and groundwater. Currently, there are 537 sites listed on the Georgia Hazardous Site Inventory (HSI). Since the initial publication of the HSI, cleanups and investigations have been completed on 188 sites. 334 Sites have cleanups in progress and 162 sites are under investigation. As with underground storage tanks, Georgia has established a trust fund raised from fees paid by hazardous waste generators for the purpose of cleaning abandoned hazardous waste sites. Using a combination of site assessment, and removal and transportation/disposal contractors, the Hazardous Site Response Program has issued over 100 contracts to investigate and cleanup abandoned sites, of which approximately 60 have been completed.

Leachate leaking from solid waste landfills is also a potential groundwater pollutant. Georgia has a program, utilizing written protocols, to properly site, construct, operate, and monitor such landfills so that pollution of groundwater will

not become a threat to drinking water supplies. In this regard, the GAEPD has completed a set of maps generated by a Geographic Information System that shows areas geotechnically unsuitable for a municipal solid waste landfill. Maps at the scale of 1:100,000 have been distributed to all of the State's Regional Development Centers. In addition, all permitted solid waste landfills are required to have an approved groundwater monitoring plan and monitoring wells installed in accordance with the GAEPD standards for groundwater monitoring. As of March 2004, there were 112 permitted active (operational) municipal solid waste landfills in Georgia. In addition, 26 landfills have ceased accepting waste and are currently closing the facility. There are 186 landfills in post-closure care (required to conduct groundwater monitoring for 30 years). Of these 324 landfills, 309 are monitoring groundwater with approved systems. The remaining landfills are in the process of installing monitoring systems, and/or are awaiting GAEPD approval.

The GAEPD also actively monitors sites where treated wastewaters are further treated by land application methods. Agricultural drainage wells and other forms of illegal underground injection of wastes are closed under another GAEPD program. The GAEPD identifies non-domestic septic systems in use in the State, collects information on their use, and has implemented the permitting of systems serving more than 20 persons. Very few of the systems are used for the disposal of non-sanitary waste, and the owners of those systems are required to obtain a site specific permit or stop disposing of non-sanitary waste, carry out groundwater pollution studies, and clean up any pollution that was detected. None of these sources represents a significant threat to the quality of Georgia's groundwater at the present time.

The GAEPD has an active Underground Injection Control Program. As of December 31, 2005, the program has issued 267 UIC permits covering 6,649 Class V wells. Most of the permits are for remediation wells for UST sites, petroleum product spills, and hazardous waste sites, or for non-domestic septic systems.

Georgia law requires that water well drillers constructing domestic, irrigation and public water supply wells be licensed and bonded. As of December 31, 2005, Georgia had 247 active licensed water well drillers that are required to follow strict well construction standards. The GAEPD actively pursues and works closely with the Courts to prosecute unlicensed water well contractors. The GAEPD continues to work with various drilling associations and licensed drillers to uphold and enforce the construction standards of the Water Well Standards Act. The GAEPD has taken an active role in informing all licensed drillers of the requirement that all irrigation wells must be permitted, and that such permits must be issued prior to the actual drilling of any irrigation well. All drillers

constructing monitoring wells, engineering and geologic boreholes must be bonded, and the well construction must be performed under the direction of a Professional Engineer or Professional Geologist registered in Georgia. The GAEPD maintains an active file of all bonded drilling companies and makes every attempt to stop the operations of all drillers who fail to maintain a proper bond. The GAEPD issues permits and regulates all oil and gas exploration in the state under the Oil & Gas and Deep Drilling Act.

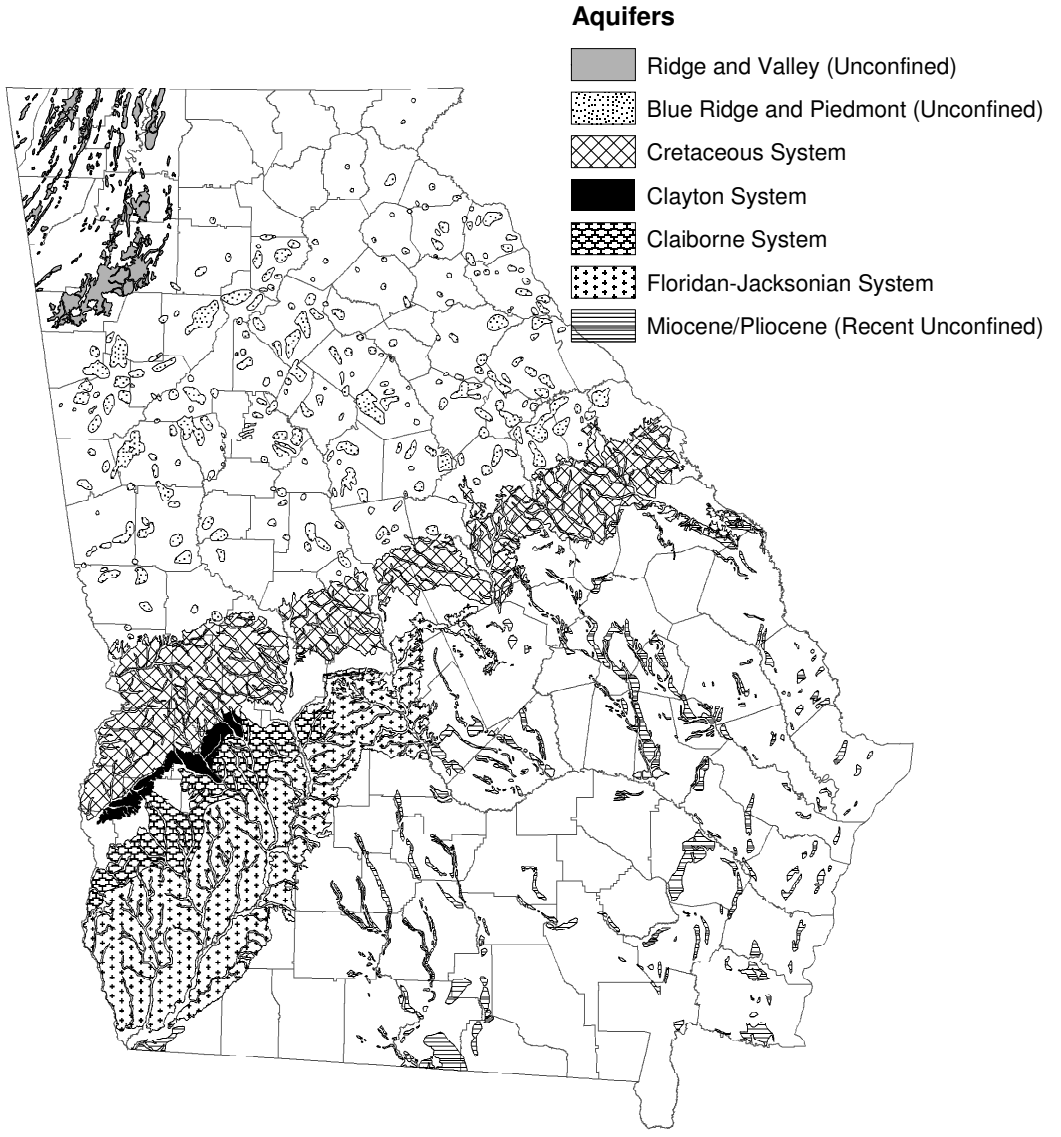
Activities affecting groundwater quality that take place in areas where precipitation is actively recharging groundwater aquifers are more prone to cause pollution of drinking water supplies than those taking place in other areas. In this regard, Georgia was one of the first states to implement a state-wide recharge area protection program. The GAEPD has identified the most significant recharge areas for the main aquifer systems in the State (Figure 8-6). The GAEPD has completed detailed maps showing the relative susceptibility of shallow groundwater to pollution by man's activities at the land surface. These maps at the scale of 1:100,000 have been distributed to the State's Regional Development Centers, and a state-wide map at the scale of 1:500,000 has been published as Hydrologic Atlas 20. In addition, the GAEPD is geologically mapping the recharge zones of important Georgia aquifers at a large scale of 1:24,000.

Recharge areas and areas with higher than average pollution susceptibility are given special consideration in all relevant permit programs. The GAEPD has developed environmental criteria to protect groundwater in significant recharge areas as required by the Georgia Comprehensive Planning Act of 1989. These criteria also reflect the relative pollution susceptibility of the land surface in recharge areas. Local governments are currently incorporating the pollution prevention measures contained in the criteria in developing local land use plans.

Some areas, where recharge to individual wells using the surficial or unconfined aquifers is taking place, are also significant recharge areas. To protect such wells, the GAEPD implemented a Wellhead Protection Program for municipal drinking water wells in 1993. Wells in confined aquifers have a small Wellhead Protection Area, generally 100 feet from the well. Wells using unconfined aquifers have Wellhead Protection Areas extending several hundred to several thousand feet from the well. Wells in karstic areas require even larger protection areas, which are defined using hydrogeologic mapping techniques.

Wellhead Protection Plans have been completed for all 1,642 permitted municipal wells in Georgia. Due to the closure of some municipal wells there are currently 1,619 active municipal ground water wells with Wellhead Protection

FIGURE 8-6
GENERALIZED MAP OF SIGNIFICANT GROUNDWATER RECHARGE AREAS OF GEORGIA



Plans. A ten-year review of plans completed in 1995 will be completed in 2006. The review includes the addition of pertinent well information and an update of potential pollution sources. In addition, the GAEPD is carrying out vulnerability studies for non-municipal public water systems.

Table 8-1 summarizes the sources and nature of groundwater contamination and pollution in Georgia. In Table 8-1, an asterisk indicates that the listed source is one of the 10 highest sources in the state. Of these, the most significant source is salt-water intrusion in the 24 coastal counties. The second most significant source is naturally occurring iron, manganese, and radioactivity. On the otherhand, agricultural applications of pesticides and fertilizers are not significant sources. In 1996, USEPA requested that states report information on the type and number of contaminant sources within a specific reporting area or aquifer. The GAEPD does not collect such information; moreover, such data would be of little practical use in Georgia because of the State's complex hydrogeology and inter-aquifer leakage.

Table 8-2 is a summary of Georgia groundwater protection programs. Georgia, primarily the GAEPD, has delegated authority for all federal environmental programs involving groundwater. In addition, Georgia has several unique groundwater protection statutes that are more stringent than federal statutes. Of the 28 programs, identified by USEPA, only three are not applicable to Georgia: discharges to groundwater are prohibited; the State's hydrogeology is not compatible to classification; and, while managed through construction standards, actual permits for underground storage tanks are not issued.

Table 8-3 summarizes ambient groundwater quality monitoring results for calendar years 2004 and 2005. The data presented were developed from the annual Georgia Groundwater Monitoring Network reports.

The USEPA also has requested that States provide information on groundwater-surface water interactions. Contamination of groundwater by surface water occurred in 1994 when coliform bacteria entered the Upper Floridan Aquifer via sinkholes during flooding on the Flint River in southwest Georgia as a result of Hurricane Alberto. This is the only documented case of a groundwater aquifer in Georgia being contaminated by surface water, and monitoring in 1995 demonstrated that the aquifer was clean. As previously mentioned there are some wells and springs that GAEPD has determined to be under the influence of surface water. There are no documented cases in Georgia of groundwater polluting surface water sources.

Ground and Surface Water Withdrawals (including water availability analysis and conservation planning)

The Water Resources Management Program (WRMP) of the Water Resources Branch currently has three (3) major water withdrawal permitting responsibilities: (a) permitting of municipal and industrial ground water withdrawal facilities; (b) permitting of municipal and industrial surface water withdrawal facilities; and (c) permitting of both surface and groundwater agricultural irrigation water use facilities.

Any person who withdraws more than 100,000 gallons of surface water per day on a monthly average or more than 100,000 gallons of groundwater on any day or uses a 70 gpm pump or larger for agricultural irrigation, must obtain a permit from the GAEPD prior to any such withdrawal. Through the end of December 2003, GAEPD had 285 active municipal and industrial surface water withdrawal permits (180 municipal, 105 industrial), 481 active municipal and industrial groundwater withdrawal permits (281 municipal, 182 industrial, 18 golf course irrigation) and approximately 21,300 agricultural water use permits (encompassing both groundwater and surface water sources). Future efforts will focus on improving long-term permitting, water conservation planning, drought contingency planning and monitoring and enforcement of existing permits.

The Georgia Ground Water Use Act of 1972 requires all non-agricultural groundwater users of more than 100,000 gpd for any purpose to obtain a Ground Water Use Permit from GAEPD. Applicants are required to submit details relating to withdrawal location, historic water use, water demand projections, water conservation, projected water demands, the source aquifer system, and well construction data. A GAEPD issued Ground Water Use Permit identifies both the allowable monthly average and annual average withdrawal rate, permit expiration date, withdrawal purpose, number of wells, and standard and special conditions for resource use. Standard conditions define legislative provisions, permit transfer restrictions and reporting requirements (i.e., semi-annual groundwater use reports); special conditions identify such things as the source aquifer and conditions of well replacement. The objective of groundwater permitting is the same as that defined for surface water permitting.

The 1977 Surface Water Amendments to the Georgia Water Quality Control Act of 1964 require all non-agricultural surface water users of more than 100,000 gallons per day (gpd) on a monthly average (from any Georgia surface water body) to obtain a Surface Water Withdrawal Permit from the GAEPD. These users include persons, municipalities, governmental agencies, industries, military installations, and all other non-agricultural users. The 1977 statute

“grandfathered" all pre-1977 users who could establish the quantity of their use prior to 1977. Under this provision these pre-1977 users were permitted at antecedent withdrawal levels with no minimum flow conditions. Applicants for surface water withdrawal permits are required to submit details relating to withdrawal source, historic water use, water demand projections, water conservation, low flow protection (for non-grandfathered withdrawals), drought contingency, raw water storage, watershed protection, and reservoir management. A GAEPD issued Surface Water Withdrawal Permit identifies withdrawal source and purpose, monthly average and maximum 24-hour withdrawal limits, standard and special conditions for water withdrawal, and Permit expiration date. Standard conditions define legislative provisions, permit transfer restrictions and reporting requirements (i.e., usually annual water use reports); special conditions identify withdrawal specifics such as the requirement for protecting non-depletable flow (NDF). The NDF is that minimum flow required to protect instream uses, (e.g., waste assimilation, fish habitat, and downstream demand). The objective of surface water permitting is to provide a balance between resource protection and resource need.

The 1988 Amendments to both the Ground Water Use Act and the Water Quality Control Act require all agricultural groundwater and surface water users of more than 100,000 gpd on a monthly average to obtain an Agricultural Water Use Permit. “Agricultural Use" is specifically defined as the processing of perishable agricultural products and the irrigation of recreational turf (i.e., golf courses) except in certain areas of the state where recreational turf is considered as an industrial use. These areas are defined for surface water withdrawals as the Chattahoochee River watershed upstream from Peachtree Creek (North Georgia), and for groundwater withdrawals in the coastal counties of Chatham, Effingham, Bryan and Glynn. Applicants for Agricultural Water Use Permits who were able to establish that their use existed prior to July 1, 1988 and whose applications were 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 consideration for protecting the integrity of the resource and the water rights of permitted, grandfathered users. Currently, agricultural users are not required to submit any water use reports. A GAEPD issued Agricultural Water Use Permit identifies among other things the source, the purpose of withdrawal, total design pumping capacity, installation date, acres irrigated, inches of water applied per year, and the location of the withdrawal. Special conditions may identify minimum surface water flow to be protected or the aquifer and depth to which a well is limited. Agricultural Water Use Permits may be transferred and have no expiration date.

Since January, 1992, the states of Alabama, Florida, Georgia, and the United States Army Corps of Engineers - Mobile District have been cooperating partners

in an interstate water resources management study. The study area encompasses the Alabama-Coosa-Tallapoosa River system (shared by Alabama and Georgia), and the Appalachicola-Chattahoochee-Flint River system (shared by the three states). These river basins make up 38 percent of Georgia's total land area, provide drinking water to over 60 percent of Georgia's people, and supply water for more than 35 percent of Georgia's irrigated agriculture. Significant portions of Georgia's industrial production and recreation-based economy are dependent on the water in these basins. The fish and wildlife resources that depend on these waters are also vital to Georgia. The goals of the study include, (a) forecasts of water demands for a myriad of uses in the two river systems through the year 2050; (b) estimates of ability of already developed water sources to meet the projected water demands; and (c) development of a conceptual framework for the basin wide management of the water resources of the two basins in a manner that would maximize the potential of the systems to meet expected water demands. At the end of December, 1997, the study was essentially completed. Work on most of the detailed scopes of work were completed, and the states along with the federal government, had executed river basin compacts for the two basins. The compacts are providing the framework under which the states and the federal government continue to negotiate water allocation formulas that will equitably apportion the waters of these basins. Once these allocation formulas are developed and agreed upon, the state and federal partners will manage the two river systems to comply with the formulas.

Under Georgia's comprehensive water management strategy, permit applicants for more than 100,000 gallons per day of surface water or groundwater for public drinking water have been required for a number of years to develop comprehensive water conservation plans in accordance with GAEPD guidelines. These plans primarily address categories such as system unaccounted-for water (leakage, un-metered use, flushing, etc.), metering, plumbing codes, water shortage planning, water reuse, public education, and so forth. Such plans must be submitted in conjunction with applications for new or increased non-agricultural ground and surface water withdrawals. Key provisions of the plans include the required submittal of water conservation progress reports 5 years after plan approval, the submittal of yearly "unaccounted-for" water reports, and greater emphasis on incorporating water conservation into long-term water demand projections.

Georgia law also requires the use of ultra-low flow plumbing fixtures (1.6 gpm toilets, 2.5 gpm shower heads and 2.0 gpm faucets) for all new construction. Local governments must adopt and enforce these requirements in order to remain eligible for State and Federal grants or loans for water supply and wastewater projects.

During times of emergency, the GAEPD Director is authorized to issue orders to protect the quantity and safety of water supplies. In general, municipal water shortage plans follow a phased reduction of water use based on the implementation of restrictions on non-essential water uses such as lawn watering, and so forth. These demand reduction measures typically include odd/even and/or time of day restrictions and progress from voluntary to mandatory with appropriate enforcement procedures. Severe shortages may result in total restriction on all nonessential water use, cut-backs to manufacturing and commercial facilities, and eventual rationing if the shortage becomes critical enough to threaten basic service for human health and sanitation. Water conservation efforts are extremely important to Georgia's future particularly in the north and central regions of the State.

Ground and Surface Drinking Water Supplies

Similar to groundwater, Georgia's surface water sources provide raw water of excellent quality for drinking water supplies. During 2002-2003, no surface water supply system reported an outbreak of waterborne disease. Since the Federal and State Surface Water Treatment Regulations (SWTR) went into effect on June 29, 1993, 227 surface water plants around the state have taken steps to optimize their treatment processes not only to meet the current SWTRs tougher disinfection and turbidity treatment technique requirements, but also to meet more stringent future drinking water regulations. The most recent regulations mandated by the U.S.E.P.A. include the control of disinfection byproducts and the microbial contaminants in drinking water.

The purpose of the new Interim Enhanced Surface Water Treatment Rule (IESWTR) and the Long Term 1 Enhanced Surface Water Treatment Rule is to improve public health protection through the control of microbial contaminants, particularly *Cryptosporidium* (including Giardia and viruses) for those public water systems that use surface water or ground water under the direct influence of surface water. The purpose of the new Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) is to improve public health protection by reducing exposure to disinfection by products in drinking water (total trihalomethanes and haloacetic acids). Stage 1 DBPR applies to all sizes of community and nontransient and noncommunity water systems that add a disinfectant to the drinking water during any part of the treatment process and transient noncommunity water systems that use chlorine dioxide. During 2002-2003, no surface water production systems were required to issue "boil water" advisories to their customers due to significant SWTR treatment technique violations, other than events due to water main breaks. However, several surface and ground water systems that have been monitoring for TTHMs and HAA5s during this period experienced exceedences of the established MCLs.

The Public Water System Supervision Program is designed to ensure that Georgia residents, served by public water systems, are provided high quality and safe drinking water. Its legal basis is the Georgia Safe Drinking Water Act and Rules. As of March 31, 2004, the GAEPD regulates 1,683 community, 249 non-transient, non-community and 553 transient non-community public ground and surface water systems (serving populations greater than 25), each of which must obtain a Permit to Operate from the GAEPD. These permits set forth operational requirements for wells, surface water treatment plants and distribution systems for communities, industries, trailer parks, hotels, restaurants and other public water system owners. Georgia's community and non-transient, non-community public water systems are currently monitored for 92 contaminants. Georgia closely follows the Federal Safe Drinking Water Act and implements the National Primary and Secondary Drinking Water Standards, involving about 92 contaminants (turbidity, 8 microbial or indicator organisms, 20 inorganic, 60 organic, 4 radiological contaminants). Maximum Contaminant Levels (MCLs) are set for 83 contaminants, treatment technique requirements are established for 9 contaminants to protect public health, and secondary standards for 15 contaminants are issued to ensure aesthetic quality.

The program is funded from State and Federal appropriations and grants respectively on a year-to-year basis and a Drinking Water Service Fee (DWSF), which has been in effect since July 1992. The DWSF was necessary to provide the resources to implement testing for (a) lead and copper and (b) Phase II and V Synthetic Organic and Inorganic Chemicals in public water systems. Water system owners who contract with the GAEPD for this testing are billed annually based on the system population. Fees range from $30 per year for a transient non-community system to a maximum of $24,000 per year for a large water system with three or more entry points. Participation in the DWSF is voluntary to the extent that a system may elect to use a public or certified commercial laboratory to analyze their required samples.

Testing for lead and copper in accordance with the Federal Lead and Copper Rule (LCR) began on January 1, 1992. Georgia's 17 largest water systems (population of greater than 50,000) performed two, six-month consecutive rounds of lead and copper monitoring starting January of 1992 and ending December of 1992. During this monitoring period, 6 systems exceeded the action levels for lead, copper, or both. In accordance with the requirements of the LCR, all large systems submitted a corrosion control plan to the GAEPD for approval. The plans were approved by the GAEPD and implemented by the systems. Beginning January of 1997, the large systems started a follow-up monitoring period of two, six-month consecutive rounds. After 1997, several medium systems, due to population increases, moved up to large system status. Of these, one of those

systems had previously exceeded the lead and/or copper action level, but had come back into compliance before achieving large system status. All of the 7 large systems that previously exceeded the lead and/or copper action levels have achieved compliance with the lead and copper action levels. All of the existing 21 large systems, as of September 26, 2002 have either completed all three rounds of reduced monitoring or started triennial monitoring.

The medium size systems, populations of 3,300-50,000, started their two initial, six month consecutive rounds of lead and copper monitoring in July of 1992 and completed them in June of 1993. The systems that did not exceed an action level went into a reduced monitoring phase of the LCR in May of 1995. During this phase the systems are required to collect a reduced number of samples once per year for a period of three years. Beginning June 30, 1999, medium size systems that were eligible started the three-year compliance cycle. As of September 26, 2002, 7 medium systems are exceeding lead and 2 medium systems are exceeding copper. Nine systems that had previously exceeded the lead and/ or copper action level are now on reduced monitoring and five additional systems are on triennial.

Between July of 1993 and June of 1994, the small water systems, populations of 25-3,000 in size, conducted their consecutive rounds of lead and copper monitoring. There are 154 small systems currently exceeding the action levels for lead, copper, or both. These systems will remain in full monitoring until they have completed two consecutive rounds of monitoring without an exceedance, installed corrosion control, and for those exceeding lead, continue to provide public education on an annual basis. There are a total of 300 small systems that had previously exceeded lead and/or copper action levels. Of those 179 are now on reduced monitoring, 119 are on triennial monitoring, and 2 have gone to inactive status.

Monitoring for the 16 inorganic chemicals, 55 volatile organic chemicals and 43 synthetic organic chemicals, pesticides, herbicides and polychlorinated biphenyls continued as the fourth three-year compliance cycle commenced on January 1, 2002. New systems were required to initiate baseline monitoring (quarterly for all organic monitoring and surface water nitrate monitoring, annual for surface water inorganic monitoring and once every three years for groundwater inorganic monitoring).

The fourth three-year compliance period afforded most community and non-community non-transient water systems to reduce their monitoring frequency for the volatile organic and synthetic organic compounds. Public water systems that demonstrated three consecutive years of Volatile Organic Chemical monitoring with none of the 21 regulated VOCs above the Method Detection Level of 0.0005

mg/l were placed on a reduced monitoring frequency of once every three years (2002-2004).

A majority of the community and non-community non-transient water systems completed their quarterly baseline synthetic organic chemical monitoring during the initial 1993-1995 compliance period. For systems with populations less than 3300, SOC monitoring was reduced to one event during the 1996-1998 compliance period. Systems with populations greater than 3300 are required to sample for two quarters during the 1996-1998 compliance period.

In order to reduce the Federal chemical monitoring requirements, the GAEPD conducts vulnerability studies for all public water sources. The studies are conducted to assist the GAEPD with the issuance of chemical monitoring waivers to public water systems. Water sources at low risk to contamination are issued waivers from the chemical monitoring requirements as specified by the Federal Phase II/Phase V regulations. To date, the GAEPD has issued statewide monitoring waivers for asbestos, cyanide, dioxin and most synthetic organic compounds. The GAEPD, however, does continue to monitor a representative number of water systems deemed to be of high vulnerability to contamination for asbestos, cyanide, dioxin and all waived synthetic organic compounds to obtain the chemical data needed to issue and maintain these state-wide waivers. The issuance of waivers from monitoring for the above chemical parameters has saved Georgia's public water systems millions of dollars in monitoring costs over the duration of the waiver terms.

In addition, the GAEPD is also preparing vulnerability studies for individual water sources. These studies include the preparation of countywide and site specific maps of the area immediately surrounding the water source, and a report about the water source. The maps include water wells, potential pollution sources around the wells, cultural information such as roads, and bodies of water. As of December 31, 2003, the GAEPD has prepared site specific maps for approximately 723 privately owned ground water public water systems.

Georgia's Source Water Assessment and Protection Implementation Plan (SWAP) was approved by EPA on April 24, 2000. Based on the 24-month deadline, a granted 18-month regulatory extension and another 12-month extension from the USEPA, Georgia's has until November 2004 to complete all assessments for surface and ground water sources of drinking water. Under SWAP, States must identify the areas that are sources of public drinking water, assess water systems' susceptibility to contamination, and inform the public of the results. The implementation plan was developed with coordinated participation of the Georgia SWAP team, citizens and technical advisory committees and lots of input from interested stakeholders. The plan is tailored

uniquely to Georgia while still satisfying all requirements of the 1996 Federal Safe Drinking Water Act. Due to the overlapping nature of a number of states water supply watersheds, the Division is encouraging regional watershed initiatives. Several watershed related initiatives are underway which will also fulfill SWAP requirements for the surface water system participants. An Alcovy River Basin Watershed Protection Study involving some 15 jurisdictions was completed for three water systems in early 2001. Columbus Water Works hosted a middle-Chattahoochee River Watershed Study involving the drinking water intakes for the cities of LaGrange, West Point, Opelika and Columbus. Source water assessments for these surface water intakes were completed in March 2001. With funding assistance from GAEPD, in December 2001, the Atlanta Regional Commission submitted source water assessments for 27 surface water intakes associated with 17 water systems within the 13 county metro Atlanta area. Other surface water intake initiatives have been completed in the Lake Lanier drainage basin of the upper Chattahoochee River basin, in the upper Oconee River basin, in the Lake Allatoona drainage area, and in the Augusta, Savannah and Macon areas.

GAEPD is preparing all the source water assessments for the privately owned community, non-community, non-transient, and non-community transient ground water systems. Through December 31, 2003, SWAPs have been prepared for approximately 800 privately owned ground water systems.

CHAPTER 9
Major Issues and Challenges

Comprehensive Statewide Water Management Planning

Georgia is one of the fastest growing states in the nation. The burgeoning population places considerable demands on Georgia's ground and surface water resources in terms of water supply, water quality and assimilative capacity. The problems and issues are further complicated by the fact that surface water resources are limited in South Georgia and groundwater resources are limited in North Georgia. In some locations, the freshwater resources are approaching their sustainable limits. Thus, several key issues and challenges to be addressed now and in the future years include (1) minimizing withdrawals of water by increasing conservation, efficiency and ruse, (2) maximizing returns to the basin through reducing interbasin transfers and limiting use of septic tanks and land application of treated wastewater where water is limited, (3) meeting instream and offstream water demands through storage, aquifer management and reducing water demands, (4) protecting water quality by reducing wastewater discharges and runoff from land to below the assimilative capacity of the streams. The implementation of the Comprehensive Statewide Water Management Planning process in Georgia provides a framework for addressing each of the key issues.

Nonpoint Source Pollution

The pollution impact on Georgia streams has radically shifted over the last two decades. Streams are no longer dominated by untreated or partially treated sewage discharges which resulted in little or no oxygen and little or no aquatic life. The sewage is now treated, oxygen levels have returned and fish have followed.

However, another source of pollution is now affecting Georgia streams. That source is referred to as nonpoint and consists of mud, litter, bacteria, pesticides, fertilizers, metals, oils, suds and a variety of other pollutants being washed into rivers and lakes by stormwater. This form of pollution, although somewhat less dramatic than raw sewage, must be reduced and controlled to fully protect Georgia's streams. In addition to structural pollution controls, nonstructural techniques such as pollution prevention and best management practices must be significantly expanded to minimize nonpoint source pollution. These include both watershed protection through planning, zoning, buffer zones, and appropriate

building densities as well as increased use of stormwater retention ponds, street cleaning and perhaps eventual limitations on pesticide and fertilizer usage.

Toxic Substances

The reduction of toxic substances in rivers, lakes, sediment and fish tissue is extremely important in protecting both human health and aquatic life.

The sources of toxic substances are widespread. Stormwater runoff may contain metals or toxic organic chemicals, such as pesticides (chlordane, DDE) or PCBs. Even though the production and use of PCB and chlordane is outlawed, the chemicals still persist in the environment as a result of previous use. One of the primary sources of mercury detected in fish tissue in Georgia and other states may be from atmospheric deposition. Some municipal and industrial treated wastewaters may contain concentrations of metals coming from plumbing (lead, copper, zinc) or industrial processes.

The concern over toxic substances is twofold. First, aquatic life is very sensitive to metals and even small concentrations of metals can cause impairment. Fortunately, metals at low concentrations are not harmful to humans. Second, the contrary is true for carcinogenic organic chemicals. Concentrations of these can accumulate in fish flesh without damage to the fish but may increase a person's cancer risk if the fish are eaten regularly.

The most effective method to reduce the release of toxic substances into rivers is pollution prevention which consists primarily of eliminating or reducing the use of toxic substances or at least reducing the exposure of toxic materials to drinking water, wastewater and stormwater. It is very expensive and difficult to reduce low concentrations of toxic substances in wastewaters by treatment technologies. It is virtually impossible to treat large quantities of stormwater for toxic substance reductions. Therefore, toxic substances must be controlled at the source.

Public Involvement

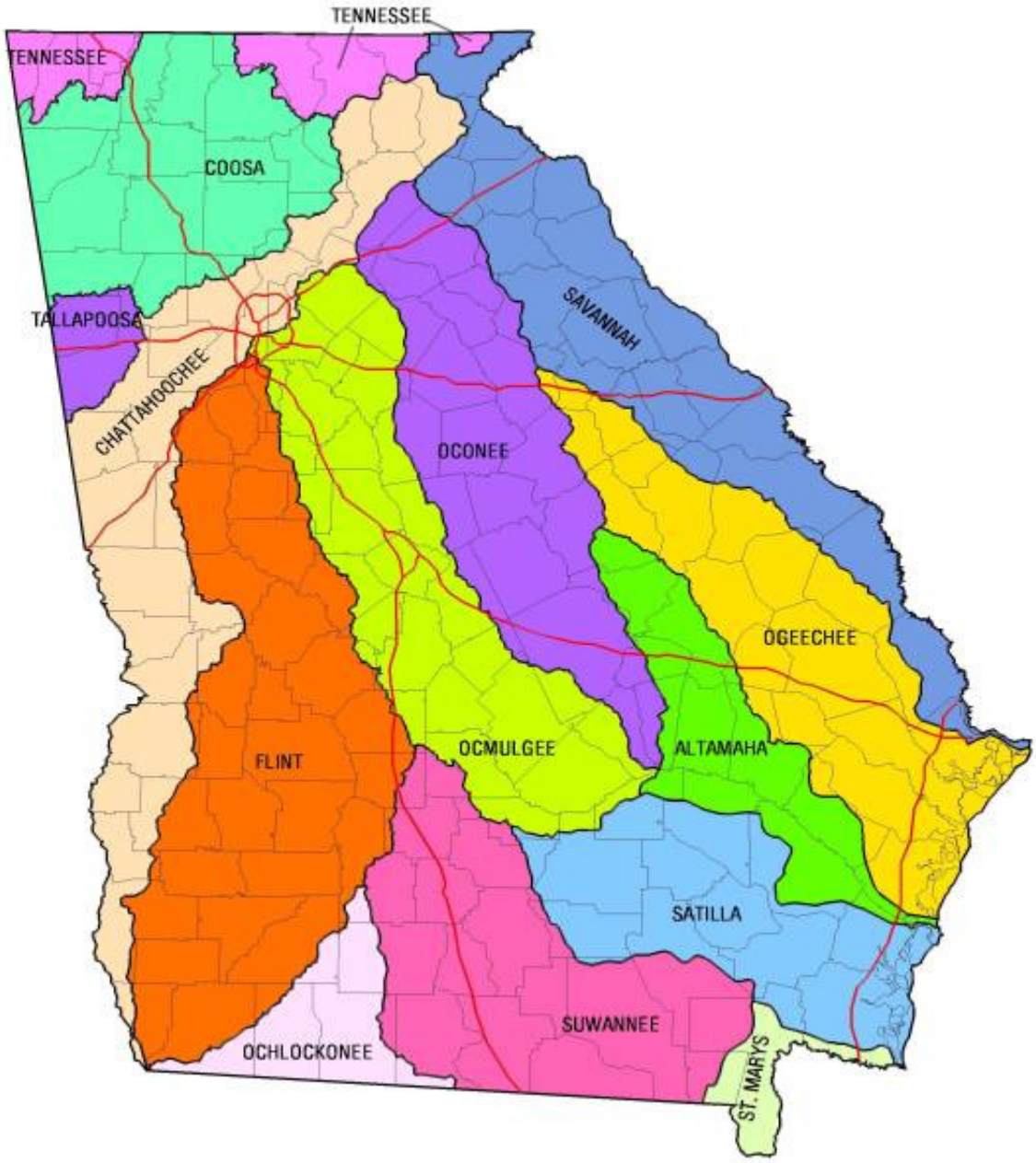
It is clear that local governments and industries, even with well funded efforts, cannot fully address the challenges of nonpoint source pollution control and toxic substances. Citizens must individually and collectively be part of the solution to these challenges.

The main focus is to achieve full public acceptance of the fact that some of everything put on the ground or street ends up in a stream. Individuals are littering, driving cars which drip oils and antifreeze, applying fertilizers and

pesticides and participating in a variety of other activities contributing to toxic and nonpoint source pollution. If streams and lakes are to be pollutant free, then some of the everyday human practices must be modified.

The GAEPD will be emphasizing public involvement; not only in decision-making, but also in direct programs of stream improvement. The first steps are education through Georgia Project WET (Water Education for Teachers) and Adopt-A-Stream programs.

WATER QUALITY IN GEORGIA
2004-2005



Georgia Department of Natural Resources
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