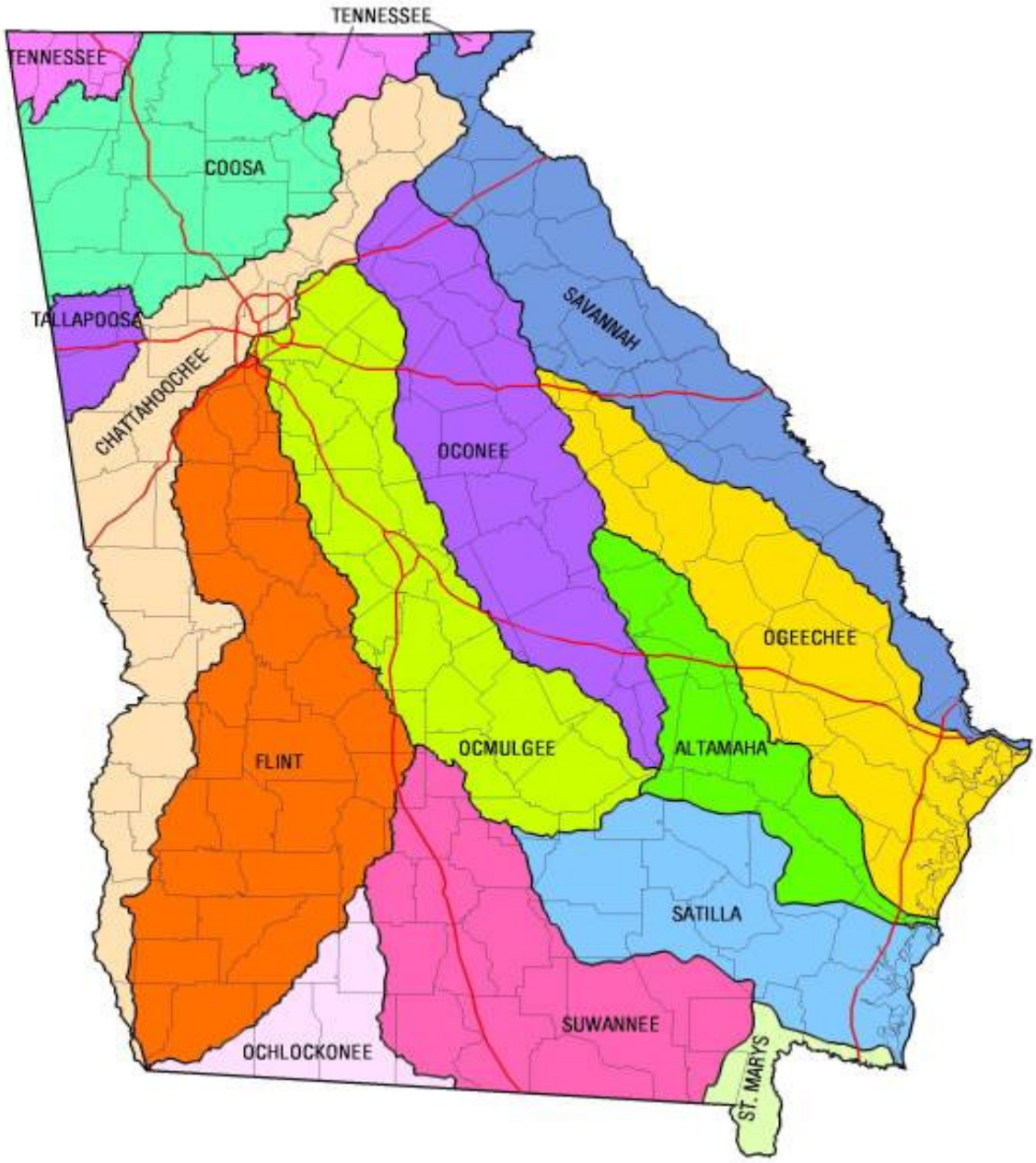
WATER QUALITY IN GEORGIA 2006-2007



Georgia Department of Natural Resources
Environmental Protection Division

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

WATER QUALITY IN GEORGIA 2006-2007

Preface

This report was prepared by the Georgia Environmental Protection Division GAEPD, Department of Natural Resources, as required by Section 305(b) of Public Law 92-500 (the Clean Water Act) and as a public information document. It represents a synoptic extraction of the EPD files and, in certain cases; information has been presented in summary form from those files. The reader is therefore advised to use this condensed information with the knowledge that it is a summary document and more detailed information is available in the EPD files.

This report covers a two-year period, January 1, 2006 through December 31, 2007. Comments or questions related to the content of this report are invited and should be addressed to:

Environmental Protection Division
Georgia Department of Natural Resources
Watershed Protection Branch
4220 International Parkway
Suite 101
Atlanta, Georgia 30354

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Chapter 1
Executive Summary

Purpose
The Georgia Environmental Protection Division (GAEPD) of the Department of Natural Resources (DNR) 2006-2007, prepared this report, Water Quality in Georgia. 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. This report describes water quality conditions of navigable waters across the State. The USEPA uses the individual State reports 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.

Watershed Protection In Georgia
The GAEPD is 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.

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.

Watershed Protection Programs

Background. Georgia is rich in water resources. The State has approximately 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. The State also 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, 1999-2002, and 2007-2008 serve as reminders that water resources cannot be taken for granted and sound regulatory programs are necessary to protect the resources.

In 2006-2007, 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 as 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 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 standards, monitoring programs, and information on assessments of Georgia's waters are discussed in Chapter 3.

Water Quality Modeling/Wasteload Allocation/TMDL Development. In 2006-2007, 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 Ochlockonee, Suwannee, Satilla, and St. Marys River Basins. These TMDLs were finalized by EPD and approved by the EPA in 2006. TMDLs were also developed by EPD for listed waters in the Oconee, Ocmulgee and Altamaha River Basins and approved by the EPA in 2006. In addition, the dissolved oxygen TMDLs for listed waters in the Savannah and Ogeechee River Basins were revised and TMDLs were developed by EPD for listed waters in the Chattahoochee and Flint River Basins and publicly noticed in 2007. The Savannah and Ogeechee DO TMDLs were finalized and approved by EPA in 2007 and the other TMDLs will be finalized and submitted to the EPA for approval in 2008. This work is discussed in Chapter 3. Over the two-year period, more than 276 TMDLs were developed and 26 were revised. To date more than 1400 TMDLs have been developed or revised for 303(d) listed waters in Georgia.

TMDL Implementation Plan Development. In 2006, a total of 147 TMDL implementation plans and revisions were developed for TMDLs in the Coosa, Tallapoosa and Tennessee River Basins. Another 114 plans and revisions for TMDLs in the Savannah and Ogeechee River Basins were initiated in 2007 and 46 are scheduled for completion in 2008 for the Ochlockonee, Suwannee, Satilla, and St. Marys River Basins. To date a total of 1115 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 2006-2007 more than 266 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 watershed 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 and all the municipalities within the District. 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.

NPDES Permitting and Enforcement. A considerable amount of time was allocated to treated wastewater discharge permit reissuance activities in 2006-2007. NPDES permits were modified or reissued to 315 municipal/private dischargers and to 75 industrial dischargers. In addition, 70 private dischargers were covered under general permit No. GA550000.

Compliance and enforcement activities continued to receive significant attention in 2006-2007. By the end of 2007, of 138 major municipal discharges, 123 facilities were in general compliance with final limitations. The remaining 15 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, 36 facilities were achieving permit compliance at the end of 2007.

The GAEPD utilizes all reasonable means to attain compliance, including technical assistance, noncompliance notification letters, conferences, consent 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 2006-2007, 613 Orders were issued and a total of $2,123,000 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 2006-2007 a total of 449 stormwater Orders were issued and a total of $2,376,883 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 2006-2007 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 2006-2007 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 and has been designated as the 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 nonpoint source goals and implementation strategies are delineated in the State's Nonpoint Source Management Program. The Program is an inventory of the full breadth of current nonpoint source management activities (regulatory and non-regulatory) in Georgia. 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.

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 of $4.5 million are made available annually to public agencies in Georgia. 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 2007, GAEPD reissued the NPDES General Permit for Phase II MS4s, and this permit currently regulates 86 cities and counties.

In 1993, a general NPDES permit for storm water associated with industrial activity was issued. This permit was most recently reissued in 2006, with approximately 2000 facilities retaining coverage. In addition, 350 industrial activity facilities have submitted an Industrial No Exposure Exclusion Certification Form.

Erosion and Sediment Control. The Georgia Erosion and Sedimentation Act was signed into law in 1975, and has been amended several times. 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 1 acre and greater. Erosion, Sedimentation & Pollution Control Plans must be reviewed and approved by the Soil and Water Conservation District or the local issuing authority before the land disturbing activity can issue permit. 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.

After several years of legal challenges, the NPDES General Permit for storm water from construction activities was successfully 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 distinct permits; Stand Alone, Infrastructure and Common Development, and required coverage for projects disturbing one acre or more. The three general permits expire on July 31, 2008. Stakeholder meetings will be held in early 2008 to facilitate the re-issuance of the permits.

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, required 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. Local issuing authorities were required to amend their local ordinances to implement the changes in the Act by July 1, 2004. Senate Bill 460 amended the Act 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 Sedimentation Control Rules to implement the new criteria. These amendments were effective on January 10, 2005. The Act was again amended in 2007 to give subcontrators an additional year to become certified under the mandatory training and certification program. Storm water management and erosion and sediment control are discussed in Chapter 7.

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, detergents and a variety of other pollutants being washed into rivers and lakes by stormwater. Even stormwater runoff itself, if rate and volume is unmitigated, can be extremely detrimental to aquatic habitat and hydrologic systems. Nonpoint source 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 green infrastructure, 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 structural practices, low impact development, 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 what we do on the land has a direct impact on water quality. Adding more pavement and other impervious surfaces, littering, driving cars which drip oils and antifreeze, applying fertilizers and other activities and behaviors all contribute 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 State-wide Water Management Planning

Status of the State-wide Water Management Plan
The Environmental Protection Division of the Georgia Department of Natural Resources, with the help of numerous stakeholders, produced and submitted to the Georgia Water Council an initial draft of the statewide water plan, "Georgia's Water Resources: A Blueprint for the Future" on June 28, 2007. The Water Council approved the release of the initial draft and established a portal for public input at its website. EPD staff reviewed and summarized the initial input for the Water Council at its August, 2007 meeting. The Council discussed and approved a number of revisions to the initial plan. A second draft of the plan was prepared and noticed for public input on September 13, 2007.

The Water Council hosted thirteen public hearings across Georgia in November 2007 to solicit public comment on the draft water plan. A working group of Water Council designees reviewed each comment submitted and made recommendations for revisions to the Water Council. The Water Council considered and acted on recommendations from the designees and deliberated on individual member suggestions. The Council voted on each proposed change and each change approved by the Council was made in the draft plan.

A third draft of the plan was completed and noticed for public comment on December 5, 2007. The Water Council hosted six public meetings to discuss the revised water plan and solicit public input. The Water Council designees reviewed comments received and provided recommendations for changes to the Water Council. The Council reviewed the designee recommendations, discussed individual member suggestions and a vote was taken regarding each proposed change. Changes approved by the Water Council were made and a final draft of the plan was prepared and approved by the Water Council on January 8, 2008. This proposed plan, "Georgia Comprehensive State-wide Water Management Plan", was transmitted to the Georgia General Assembly for consideration on January 14, the first day of the 2008 regular session. A copy of the plan is available at www.georgiawatercouncil.org.

The Georgia General Assembly debated the provisions of the January 8, 2008 Water Council draft of the statewide water plan. Both chambers approved the plan on February 5. Governor Perdue signed HR1022, the Statewide Water Plan, on February 6, 2008. In signing the resolution, one of the Governor's comments was as follows; "Water management is one of the most critical issues facing Georgia today. This plan was created by an inclusive process, allowing all parties to contribute and offer their solutions – from local governments to business owners to the agricultural community and the general public. Georgia now has a comprehensive, statewide plan for managing and conserving this precious resource."

The following paragraphs provide information on the legislation passed by the Georgia General Assembly in 2004 that initiated the planning process and on the plan signed into law by Governor Purdue on February 6, 2008.

Background
Georgia's future relies on the protection and sustainable management of the state's limited water resources. In 2004 the Georgia General Assembly passed the "Comprehensive State-wide Water Management Planning Act" which called for the development of a statewide water management plan. The legislation created a framework for developing Georgia's first comprehensive statewide water management plan by providing a vision for water management in Georgia, guiding

principles for plan development and the assignment of responsibility for developing the plan. The planning act can be found at the Georgia Water Council website: www.georgiawatercouncil.org.

Vision. The legislation established the following vision for water planning in Georgia:

"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".

Guiding Principles. The Act identified the following 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 and 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.

Responsibility. The legislation assigned the responsibility for developing the draft plan to the Georgia Environmental Protection Division of the Department of Natural Resources and established a planning oversight committee, the Georgia Water Council. The Water Council is composed of legislators, legislative appointees, and state agency heads that have water related responsibilities. The Water Council worked with the EPD in developing planning objectives and tools, and reviewed and approved the plan for recommendation to the General Assembly.

An additional framing element established for the state water planning process by the General Assembly required that the state water plan be developed within the context of existing laws and regulations. State and federal statutes and rules form the foundation for Georgia's water management programs. Two goals that resonate throughout federal and state statutes can be summarized as follows:

- 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 these goals with the increasing demands for water for all purposes requires a comprehensive approach to planning and managing water resources. The statewide water planning process provided an opportunity for Georgians to evaluate and adjust water policies to achieve sustainable management of water resources.

The EPD and the Georgia Water Council initiated work on the Comprehensive Statewide Water Management Plan shortly after the 2004 legislation was signed Governor Perdue. The legislation called for the Environmental Protection Division to submit a draft initial plan to the Water Council for review no later than July 1, 2007 and for the Water Council to provide input on the draft plan, modify the plan if necessary, approve the final plan and recommend a plan not later than the first day of the regular session of the 2008 General Assembly.

Stakeholder Participation
The process used to develop the statewide plan provided 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 for involvement in the statewide water plan development included oversight 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 related tools and options, and by participating in Water Council Town Hall meetings and public hearings and public meetings on the draft plan.

Georgia Water Council. As noted above, the 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 membership and news regarding the work of the Council is available at www.georgiawatercouncil.org.

Statewide Advisory Committee (SAC). EPD convened a 32 member State Advisory Committee comprised of state-level representation of organizations such as associations of local governments, agricultural interests, forestry and mining interests, along with economic development representatives and recreation and environmental groups. The SAC provided 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 were 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 was primarily composed of representatives of organizations that have statewide constituencies and interest. The state advisory committee was 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. The membership along with the policy

options packages presented to the SAC, along with meeting summaries were posted at www.georgiawaterplanning.org.

Technical Advisory Committees (TAC) provided early input, when needed, by answering specific technical questions needed to inform water policy options. TAC members brought a broad range of scientific, technical, and practical experience to EPD during the planning process. The technical advisory committees worked with EPD associates to build the scientific and technical foundation upon which policy options were developed. TACs were convened to address technical questions related to water conservation, water reuse, target flow regimes, and onsite sewage management systems.

Basin Advisory Committees (BACs). Seven BACs were formed: Chattahoochee; Coosa, Tallapoosa, Tennessee; Flint, Ochlockonee; Oconee, Ocmulgee, Altamaha; Satilla, Suwannee, St. Marys; Savannah, Ogeechee; and an overlay that mirrored the boundaries of the Metropolitan North Georgia Water Planning District. The BACs, with 20 to 30 members per committee, represented a cross-section of entities with water resources management interests, including cities and counties, water providers, environmental groups, recreation interests, economic development groups, and representatives from the forestry, industrial, mining and agricultural sectors. The committees were convened six times to review information developed by EPD and provide a regional perspective on proposed policy options and management practices. The "regional" perspectives and input on water management objectives and potential policy tools and/or options. The names of those appointed to the BACs along with each policy options package presented to the BACs, and meeting summaries, were posted at www.georgiawaterplanning.org.

Developing the Draft Comprehensive State-wide Water Management Plan

The work on the draft water plan was completed generally in accordance with the schedule shown in Figure 1. The process of preparing the initial draft plan involved the preparation of draft policies for each of four management objectives: minimizing withdrawals, maximizing returns, meeting instream and offstream demands, and protecting water quality. The draft policy options were drafted by the EPD, drawing on research from the Carl Vinson Institute of Government at the University of Georgia, and presented to each basin advisory committee for review and input. The input from the BACs was considered and appropriate changes were made in the policy option packages. The revised policy option package was then presented to the State Advisory Committee for review and comment. The input from the SAC was considered and changes were made in the policy option packages. Each of the policy option packages were then presented to the public for input at a series of Town Hall Meetings hosted by the Water Council across the state. Based on input from the Town Hall Meetings the policy option packages were revised once again and a final set of policy options emerged for each of the management planning priorities. The policy options packages served as the basis for the initial draft comprehensive statewide water plan presented to the Water Council by the EPD on June 28, 2007.

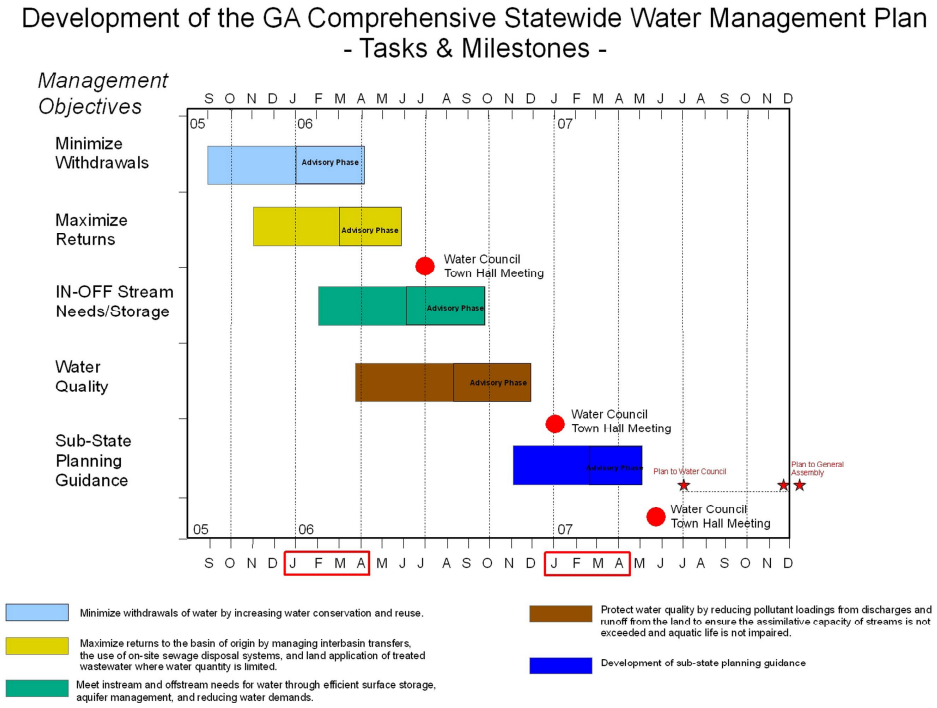


FIGURE 1. TASKS AND MILESTONES

Major Elements of the Georgia Comprehensive State-wide Water Management Plan

The plan builds upon Georgia's current statutory framework to create a more integrated water management policy consistent with the vision and guiding principles presented in O.C.G.A. § 12-5-522. Figure 2 depicts the overall approach to integrated water management laid out in the statewide water management plan. The process is a cycle, rather than a one-time plan. Based on current state laws and policies, the cycle has four major steps that will be addressed in regional planning conducted following the provisions of the plan.

1. The cycle begins with completion of a set of water resource assessments by EPD. These assessments will define the capabilities of Georgia's water resources in terms of water supply and capacity to assimilate pollution.
2. A regional water planning council will then be responsible for using regional population and employment estimates to forecast needs for water and assimilative capacity within a water-planning region.
3. A regional water development and conservation plan will be prepared by EPD and by regional water planning councils. The plan will identify the management practices to be employed to ensure that the forecasted regional water and wastewater needs can be met without exceeding the water quantity and water quality capacities identified in the resource assessments. This process provides the opportunity for regional planning councils to select the management practices that best fit the resource conditions and uses in different regions throughout the state. In some situations, the regional water plan may identify management practices that will supplement the resource capacities in a manner that conforms to policies

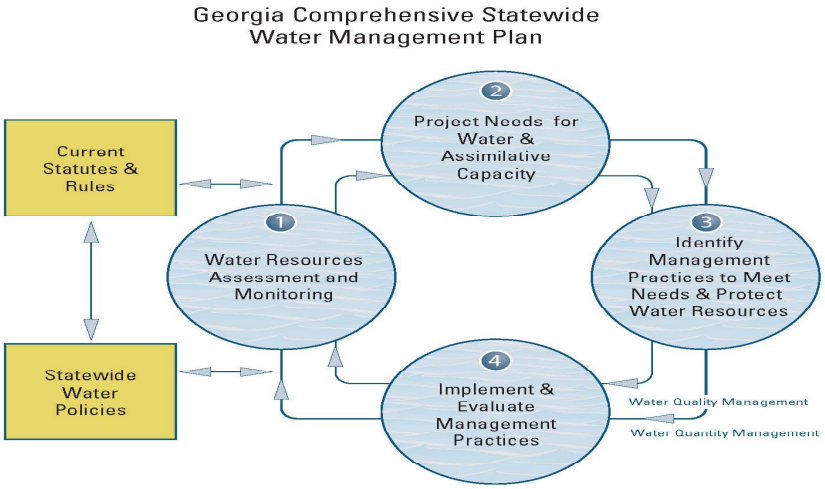


FIGURE 2. GEORGIA COMPREHENSIVE STATEWIDE WATER MANAGEMENT PLANNING PROCESS

4. Criteria presented in the statewide plan. The regional water management plans will be reviewed by the EPD, and if they are consistent with established guidance, adopted by EPD.
5. Once adopted, the water users in the water-planning region would implement the plans and EPD will make water-permitting decisions based on the plans.

EPD, in cooperation with federal agencies, local governments, and other partners, will continue to monitor water resources to maintain and update information on the status and condition of the state's waters. This information will support future revisions in resource assessments and management practices. This statewide water plan is intended to guide long-term planning for Georgia's water resources and is not intended to address responses to extreme conditions, like drought, or emergency circumstances that may result. It will be implemented in conjunction with the State Drought Management Plan, the Flint River Drought Protection Act, and other statutes and regulations that guide responses to drought or other emergency circumstances.

CHAPTER 3
Water Quality Monitoring And Assessment

Background

Water Resources Atlas. The river miles and lake acreage estimates are based on the U.S. Geological Survey (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 provides a consistent computerized methodology for summing river miles and lake acreage. 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).

The estimates for Georgia 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 estimates for the number of lakes in Georgia are 11,813 with a total acreage of 425,382. This information is summarized in Table 3-1.

TABLE 3-1
WATER RESOURCES ATLAS

State Population (2006 Estimate)	9,383,941
State Surface Area	57,906 sq.mi.
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 sq.mi.
Miles of Coastline	100
Acres of Freshwater Wetlands	4,500,000 acres
Acres of Tidal Wetlands	384,000 acres

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 is authorized through the Rules and Regulations for Water Quality Control to establish water use classifications and water quality standards for the waters of the State.

For each water use classification, water quality standards or criteria have been developed, which establish the framework used by the Environmental Protection Division to make water use regulatory decisions. All of Georgia's waters are currently classified as fishing, recreation, drinking water, wild river, scenic river, or coastal fishing. Table 3-2 provides a summary of water use classifications and criteria for each use. Georgia's rules and regulations protect all waters for the use of primary contact recreation by having 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).

TABLE 3-2
WATER USE CLASSIFICATIONS AND INSTREAM WATER QUALITY STANDARDS FOR EACH USE

	Bacteria (fecal coliform)		Dissolved Oxygen (other than trout streams)[1]		pH	Chapter 1Temperature (other than trout streams)[1]	
Use Classification	**30-Day Geometric Mean[2] (no./100 ml)**	**Max. (no./100ml)**	**Daily Average (mg/l)**	**Min. (mg/l)**	**Std. Units**	**Max. Rise (°F)**	**Max. (°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					

[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.

Georgia has also adopted 31 numeric standards for protection of aquatic life and 90 numeric standards for the protection of human health. Table 3-3 provides a summary of toxic substance

standards that apply to all waters in Georgia. Georgia has six large publicly owned lakes that have water quality standards. The lakes include West Point, Jackson, Walter F. George, Lanier, Allatoona, and Carter's. Standards were adopted for chlorophyll a, pH, total nitrogen, phosphorus, fecal coliform bacteria, dissolved oxygen, and temperature. Standards for major tributary phosphorus loading were also established. The standards for the six lakes are summarized in Table 3-4.

TABLE 3-3
GEORGIA INSTREAM WATER QUALITY STANDARDS FOR ALL WATERS: TOXIC SUBSTANCES

(Excerpt from Georgia's 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) Freshwater	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 3-4
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
5. 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/
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)(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 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

Water Quality Monitoring Goals. The goal of the watershed 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 that collect samples from groups of stations at specific, fixed locations throughout the year.

The cooperating agencies conduct certain tests in the field and ship stream samples to the GAEPD or UGA 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 sample collection on the Chattahoochee River below Columbus. In addition to monthly stream sampling, a portion of the work with the USGS involves flow monitoring and continuous water quality monitoring at several locations across the State. In 2006, flow monitoring was conducted at the South River off of Klondike Road near Lithonia, GA and continuous water quality monitoring that recorded dissolved oxygen, temperature, pH and conductivity data were 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. Funding from the GAEPD for the South River, Conasauga River and Ocmulgee River sites was discontinued in 2007 and resources redirected to the installation, operation and maintenance for a new continuous water quality monitoring site on the Savannah River.

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 GAEPD Atlanta Office. The Brunswick sampling team conducts monthly sampling at locations across southern Georgia in the Ochlockonee, Suwannee, Satilla, Altamaha, Savannah and Ogeechee River basins. The Atlanta sampling team typically 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 complimenting the rotating basin trend monitoring program.

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 rotating river basin planning schedule. Statewide trend monitoring was continued at the statewide core station locations, along the Chattahoochee in the Atlanta and Columbus areas, and at most continuous monitoring locations. The remainder of the trend monitoring resources was devoted to the basins of focus each year. As a result, more sampling was conducted along the main stem and in the smaller tributaries of each river. Table 3-5 provides the focused monitoring years for Georgia's major river basins since the rotating river basin strategy was employed and the additional special project monitoring initiated in 2005.

TABLE 3-5
MAJOR RIVER BASIN MONITORING GROUPS

Major River Basin Grouping	Focus Year for Water Quality Monitoring
Chattahoochee, Flint	1995; 2000
Coosa, Tallapoosa, Oconee	1996; 2001
Savannah, Ogeechee	1997; 2002
Ochlockonee, Satilla, St. Marys, Suwannee	1998; 2003
Altamaha, Ocmulgee, Oconee	1999; 2004
Coosa, Tallapoosa, Tennessee	2005 – TMDL Modeling Project (Coosa River)
Coosa	2006 – TMDL Modeling Project (Coosa River)
Savannah, Ogeechee	2007 – TMDL Modeling Project (Lake Lanier)
Ochlockonee, Satilla, St. Marys, Suwannee	2008 – TMDL Modeling Project (Carters Lake)

In 2005, water quality monitoring efforts were intensified in locations where data was needed for development of TMDL models. During the calendar years 2005 and 2006, data was collected in the Coosa River Basin to support the development of a Dissolved Oxygen and Temperature model for the Coosa River at the State Line. During 2007 and 2008, additional data collection efforts are being focused on Lake Lanier and Carters Lake for TMDL development of nutrient criteria.

Figure 3 shows the monitoring network stations for the sample collection period 2006-2007. A list of the Statewide trend monitoring network stations, which consists of the "core" stations that are sampled every year, is presented in Table 3-6. Tables 3-7 and 3-8 provide a list of stations and parameters for the 2006 and 2007 rotating basin networks.

FIGURE 3. GEORGIA TREND MONITORING NETWORK STATION LOCATIONS 2006-2007

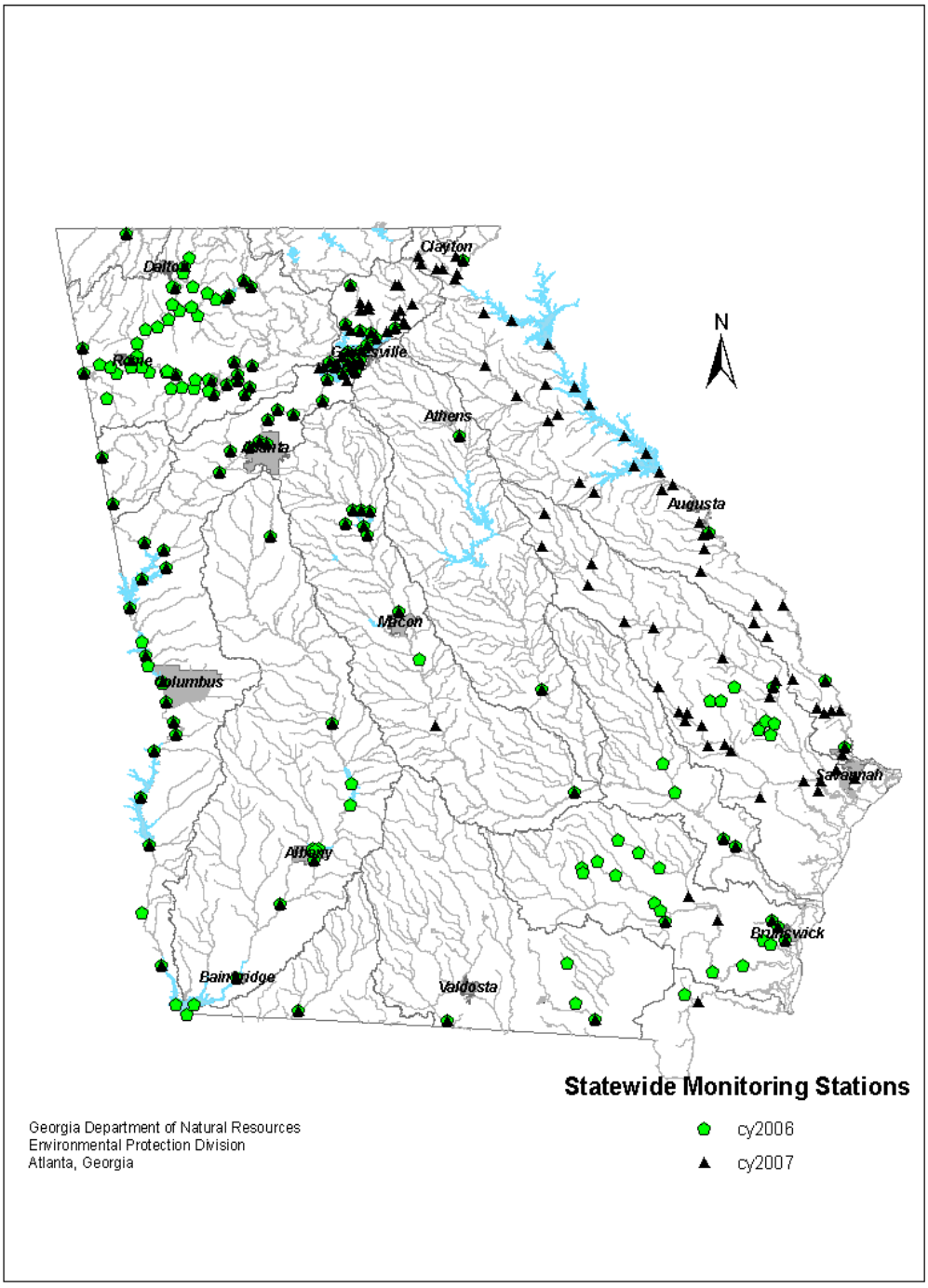


TABLE 3-6
STATEWIDE TREND MONITORING NETWORK (CORE):
RIVERS/STREAMS; LAKES/RESERVOIRS

Rivers and streams stations are sampled monthly for field and chemical parameters every year. Four fecal coliform bacterial samples are collected each calendar quarter to calculate four geometric means. Lakes and reservoir stations are sampled monthly during the "growing season" from April through October.

Station Number	Location	River Basin	Parameters[1]
01001001	Chattooga River - U.S. Highway 76 near Clayton, GA	Savannah	Standard
01011001	Savannah River - 0.5 Mile Downstream from Spirit Creek	Savannah	Standard
01014001	Savannah River - Seaboard Coast Line Railway, North of Clyo	Savannah	Standard
02023001	Ogeechee River - GA Highway 24 nr Oliver, GA	Ogeechee	Standard
03035001	Oconee River at Barnett Shoals Road near Athens, GA	Oconee	Standard
03051001	Oconee River at Interstate Highway 16 near Dublin, GA	Oconee	Standard
04220111	Lake Jackson at confluence of Alcovy River and Yellow/South River Branch	Ocmulgee	Standard
04500001	Lake Jackson - Dam Forebay	Ocmulgee	Standard
05009901	Ocmulgee River - New Macon Water Intake	Ocmulgee	Standard
05015001	Ocmulgee River - 6.0 Miles Downstream from Tobesofkee Creek	Ocmulgee	Standard
05025001	Ocmulgee River - U.S. Highway 341 at Lumber City	Ocmulgee	Standard
06016001	Altamaha River - 6.0 Miles Downstream From Doctortown	Altamaha	Standard
07021001	Satilla River - GA Highways 15 and 121	Satilla	Standard
09001001	Suwannee River - U.S. Highway 441 near Fargo, GA	Suwannee	Standard
09044501	Withlacoochee River at Clyattsville-Nankin Rd nr Clyattsville, GA	Suwannee	Standard
10017001	Ochlockonee River @ Hadley Ferry Rd. nr Calvary, GA	Ochlockonee	Standard
11018001	Flint River at State Road 92 near Griffin, GA	Flint	Standard
11060011	Flint River at SR 26 near Montezuma	Flint	Standard
11090401	Flint River at State Road 234 near Albany, GA	Flint	Standard
11102001	Flint River at State Road 37 at Newton, GA	Flint	Standard
11109001	Flint River at U.S. Highway 27-B near Bainbridge, GA	Flint	Standard
12030141	West Fork Little River at Jess Helton Road near Clermont, GA	Chattahoochee	Standard
12030151	East Fork Little River at Honeysuckle Road near Clermont, GA	Chattahoochee	Standard
12030161	Lake Sidney Lanier - Little River Embayment, Betw M1WC & 3LR	Chattahoochee	Standard
12030171	Wahoo Creek at Ben Parks Road near Murrayville, GA	Chattahoochee	Standard
12030201	Lake Sidney Lanier at Lanier Bridge (State Road 53) on Chattahoochee River	Chattahoochee	Standard
12033201	Dicks Creek at Forest Service Road 144-1 near Neels Gap, GA	Chattahoochee	Standard
12037001	Lake Sidney Lanier at Boling Bridge (State Road 53) on Chestatee River	Chattahoochee	Standard
12038001	Lake Sidney Lanier at Browns Bridge Road (State Road 369)	Chattahoochee	Standard
12038610	Balus Creek at McEver Road near Oakwood, GA	Chattahoochee	Standard
12038651	Lake Sidney Lanier - Flat Creek Embayment, 100' U/S M7FC	Chattahoochee	Standard
12038681	Lake Sidney Lanier - Balus Creek Embayment, 0.34m SE M6FC	Chattahoochee	Standard
12038781	Mud Creek at McEver Road near Flowery Branch, GA	Chattahoochee	Standard
12039601	Sixmile Creek at Burrus Mill Road near Coal Mountain, GA	Chattahoochee	Standard
12038801	Lake Sidney Lanier - Mud Crk Embayment, Betw Marina & Ramp	Chattahoochee	Standard
12039401	Lake Lanier upstream from Flowery Branch Confluence (Midlake)	Chattahoochee	Standard
12039621	Lake Sidney Lanier - Six Mile Creek Embayment, 300' E		Standard

Station Number	Location	River Basin	Parameters[1]
	M9SM	Chattahoochee	
12040001	Lake Sidney Lanier upstream of Buford Dam Forebay	Chattahoochee	Standard
12048001	Chattahoochee River at McGinnis Ferry Road	Chattahoochee	Standard
12055001	Chattahoochee River - DeKalb County Water Intake	Chattahoochee	Standard
12060001	Big Creek at Roswell Water Intake near Roswell, GA	Chattahoochee	Standard
12070001	Chattahoochee River at Cobb County Water Intake near Roswell	Chattahoochee	Standard
12080001	Chattahoochee River - Atlanta Water Intake	Chattahoochee	Standard
12090001	Peachtree Creek at Northside Drive near Atlanta, GA	Chattahoochee	Standard
12106001	Chattahoochee River at Bankhead Highway	Chattahoochee	Standard
12120001	Sweetwater Creek at Interstate Highway 20	Chattahoochee	Standard
12140001	Chattahoochee River - GA Highway 92	Chattahoochee	Standard
12180001	West Point Lake at LaGrange Water Intake near LaGrange, Georgia (aka Chatt. River at Lagrange Intake)	Chattahoochee	Standard
12189001	West Point Lake - Dam Forebay	Chattahoochee	Standard
12210001	Chattahoochee River upstream from Bartlett's Ferry Dam	Chattahoochee	Standard
12212001	Lake Oliver (Columbus Water Intake near Columbus, GA)	Chattahoochee	Standard
12216001	Chattahoochee River - Downstream from Columbus WTF	Chattahoochee	Standard
12218001	Chattahoochee River - Downstream Oswichee Creek	Chattahoochee	Standard
12218501	Chattahoochee River at Hichitee Creek (River Mile 127.6)	Chattahoochee	Standard
12219001	Chattahoochee River at Spur 39 near Omaha, GA (Seaboard RR)	Chattahoochee	Standard
12219101	Lake Walter F. George at U.S. Highway 82 (aka Chatt. River at Hwy 82)	Chattahoochee	Standard
12219501	Lake Walter F. George at Dam Forebay	Chattahoochee	Standard
12230001	Chattahoochee River at State Road 91 near Steam Mill, GA	Chattahoochee	Standard
13010001	Little Tallapoosa River - GA Highway 100 near Bowden, GA	Tallapoosa	Standard
14010051	Conasauga at U.S. Highway 76 near Dalton, GA	Coosa	Standard
14030001	Conasauga River at Tilton Bridge near Tilton, GA	Coosa	Standard
14119301	Carters Lake (CR1) - Upper Lake, Coosawattee Arm	Coosa	Standard
14119401	Carters Lake - Midlake (upstream from Woodring Branch)	Coosa	Standard
14250001	Oostanaula River at Rome Water Intake near Rome, GA	Coosa	Standard
14302001	Lake Allatoona at Etowah River upstream from Sweetwater Creek (Marker 44E/45E)	Coosa	Standard
14304801	Lake Allatoona at Little River upstream from Highway 205	Coosa	Standard
14305801	Lake Allatoona downstream from Kellogg Creek (Markers 18/19E)	Coosa	Standard
14307501	Lake Allatoona at Allatoona Creek Upstream from Interstate 75	Coosa	Standard
14309001	Lake Allatoona Upstream from Dam	Coosa	Standard
14330001	Etowah River at Hardin Bridge (FAS 829) near Euharlee, GA	Coosa	Standard
14450001	Coosa River - GA/Alabama State Line Monitor near Cave Springs	Coosa	Standard
14560001	Chattooga River at Holland-Chattoogaville Rd (FAS1363)	Coosa	Standard
15090001	West Chickamauga Creek - GA Highway 146 near Ringgold, GA	Tennessee	Standard

[1] **Standard field parameters include:** gage height, air temperature, water temperature, dissolved oxygen, pH, conductivity, and turbidity.

Standard chemical parameters include: BOD5, alkalinity, hardness, ammonia, nitrite+nitrate nitrogen, phosphorus, TOC and fecal coliform bacteria.

Standard lakes field, chemical and biological parameters include: 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.

TABLE 3-7
GEORGIA TREND MONITORING NETWORK 2006

Rivers and stream stations are sampled monthly for field and chemical parameters for one calendar year every five years. Four fecal coliform bacterial samples are collected each calendar quarter during the focused monitoring year. Basin lakes and reservoirs are sampled on a five-year rotational schedule. Samples are collected quarterly for non-standard basin lakes and reservoirs within the river basin of focus for the calendar year.

Station Number	Sampling Site	River Basin	Sampling Organization[1]	Water Body Type	Latitude	Longitude
02023431	Mill Creek at Lakeview Rd.	Ogeechee	Bruns WP	Stream	32.4926	-81.7782
02024301	Upper Black Creek at CR 582 (Arcola Rd.)	Ogeechee	Bruns WP	Stream	32.2757	-81.6283
02024311	Iric Branch at CR 588 (Mud Rd.) near Arcola, GA	Ogeechee	Bruns WP	Stream	32.3048	-81.5944
02024321	Pole Branch at CR 588 (Mud Rd.)	Ogeechee	Bruns WP	Stream	32.2934	-81.5480
02024331	Ash Branch at CR 2021 (Kangeter Loop)	Ogeechee	Bruns WP	Stream	32.2325	-81.5702
02024351	Lower Black Creek at CR 582 (Arcola Rd.)	Ogeechee	Bruns WP	Stream	32.2600	-81.6372
02027311	Lotts Creek at Pulaski Road	Ogeechee	Bruns WP	Stream	32.4151	-81.9147
02027321	Wateringhole Branch at Country Club Rd.	Ogeechee	Bruns WP	Stream	32.4149	-81.8482
06010001	Ohoopee River - GA Highway 56	Altamaha	Bruns WP	Stream	32.0783	-82.1775
06011001	Ohoopee River at State Road 178 near Glennville, GA	Altamaha	Bruns WP	Stream	31.9203	-82.1128
06014001	Altamaha River - U.S. Hwy 301 near Doctortown, GA.	Altamaha	Bruns WP	Stream	31.6664	-81.8386
07004001	Turtle River off Hermitage Island	Satilla	Bruns WP	Stream	31.2203	-81.5642
07005201	Turtle River - GA Highway 303	Satilla	Bruns WP	Stream	31.1869	-81.5314
07006101	Little Satilla River at US Hwy 17 near Waverly, GA	Satilla	Bruns WP	Stream	31.1138	-81.6135
07006151	Little Satilla River at Hickory Bluff Boa tramp near Waverly, GA	Satilla	Bruns WP	Stream	31.0924	-81.5670
07016951	Hurricane Creek at CR 552 near Nichols, GA	Satilla	Bruns WP	Stream	31.5087	-82.6349
07016971	Dry Creek at CR 552 (Flying Hawk Rd.) near Nichols, GA	Satilla	Bruns WP	Stream	31.4842	-82.6314
07022601	Little Hurricane Creek at SR 32 near Alma, GA	Satilla	Bruns WP	Stream	31.5449	-82.5447
07022751	Big Branch at Beach Rd. near Alma, GA	Satilla	Bruns WP	Stream	31.4650	-82.4472
07023201	Alabaha River at US Hwy 84 near Blackshear, GA	Satilla	Bruns WP	Stream	31.3163	-82.2257
07023301	Alabaha River at County Road 160 near Blackshear , GA	Satilla	Bruns WP	Stream	31.2744	-82.1906
07024201	Big Satilla Creek @ US Hwy 1 near Baxley, GA.	Satilla	Bruns WP	Stream	31.6583	-82.4322
07024301	Big Satilla Creek at State Road 203 near Baxley, GA	Satilla	Bruns WP	Stream	31.5908	-82.3117

Station Number	Sampling Site	River Basin	Sampling Organization[1]	Water Body Type	Latitude	Longitude
07024501	Big Satilla Creek @ SR 121 near Blackshear, GA.	Satilla	Bruns WP	Stream	31.5065	-82.1997
07027001	Satilla River at State Road 252 near Burntfort, GA	Satilla	Bruns WP	Stream	30.9456	-81.8994
07028001	Satilla River at U.S. Highway 17 at Woodbine, GA	Satilla	Bruns WP	Stream	30.9744	-81.7258
08009851	Spanish Creek at Post Road near Folkston, GA	St. Marys	Bruns WP	Stream	30.8224	-82.0547
09000421	Tatum Creek at CR 37 (Clarence Smith Rd.) near Homerville, GA	Suwannee	Bruns WP	Stream	30.9934	-82.7175
09001551	Big Branch at Colon Road near Fargo. GA	Suwannee	Bruns WP	Stream	30.7749	-82.6692
11061741	Lake Blackshear – Midlake	Flint	Atl WP	Lake	31.9665	-83.9342
11062601	Lake Blackshear - Dam Forebay	Flint	Atl WP	Lake	31.8479	-83.9394
11063101	Flint River Reservoir - Midlake, Flint River Arm	Flint	Atl WP	Lake	31.6085	-84.1190
11069001	Lake Worth (original) - Above Hwy 91 Bridge / Diversion Dam (aka Lake Chehaw)	Flint	Atl WP	Lake	31.6109	-84.1500
11088001	Flint River Reservoir (Lake Worth) - Dam Forebay	Flint	Atl WP	Lake	31.6033	-84.1365
11700051	Lake Seminole - Flint River Arm @ Spring Creek	Flint	Atl WP	Lake	30.7627	-84.8171
12201921	Lake Harding - Upper Lake (Chattahoochee Arm)	Chattahoochee	Atl WP	Lake	32.7379	-85.1125
12211301	Goat Rock Lake - Dam Forebay	Chattahoochee	Atl WP	Lake	32.6112	-85.0794
12212501	Lake Oliver - Dam Forebay	Chattahoochee	Atl WP	Lake	32.5160	-85.0009
12219791	Lake Andrews - Dam Forebay	Chattahoochee	Atl WP	Lake	31.2632	-85.1130
12650001	Lake Seminole - Chattahoochee Arm, Lower	Chattahoochee	Atl WP	Lake	30.7662	-84.9201
12900001	Lake Seminole - Dam Forebay	Chattahoochee	Atl WP	Lake	30.7115	-84.8647
14009001	Conasauga River at SR 286 near Eton, GA	Coosa	Atl WP	Stream	34.8278	-84.8508
14015501	Coahulla Creek at Keiths Mill Rd (FAS 2354) East Of Dalton	Coosa	Atl WP	Stream	34.7433	-84.8806
14020501	Holly Creek at GA Highway 225 near Chatsworth, GA	Coosa	Atl WP	Stream	34.6719	-84.8247
14030101	Swamp Creek at Old Tilton Road at Tilton, GA	Coosa	Atl WP	Stream	34.6675	-84.9431
14120001	Coosawattee River at U.S. Highway 411 near Carters, GA	Coosa	Atl WP	Stream	34.6036	-84.6956
14120201	Sugar Creek at Coniston Road near Carters, GA	Coosa	Atl WP	Stream	34.6367	-84.7422
14125501	Salacoa Creek at Lovebridge Road NE near Redbud, GA	Coosa	Atl WP	Stream	34.5167	-84.7972
14126001	Coosawattee River at Owens Gin Rd. near Pine Chapel, GA	Coosa	Atl WP	Stream	34.5642	-84.8331
14130001	Coosawattee River at State Road 225 near Calhoun, GA	Coosa	Atl WP	Stream	34.5411	-84.9008

Station Number	Sampling Site	River Basin	Sampling Organization[1]	Water Body Type	Latitude	Longitude
14220001	Oostanaula River at U.S. Highway 41 near Resaca, GA	Coosa	Atl WP	Stream	34.5783	-84.9414
14230021	Oothkalooga Creek at SR53 Spur at Calhoun, GA	Coosa	Atl WP	Stream	34.4956	-84.9653
14232101	Oostanaula River at Reeves Station Road near Calhoun, GA	Coosa	Atl WP	Stream	34.4511	-85.0283
14234001	Johns Creek at State Road 156 near Curryville, GA	Coosa	Atl WP	Stream	34.4412	-85.0953
14239001	Armuchee Creek at Old Dalton Road near Rome, GA	Coosa	Atl WP	Stream	34.3608	-85.1403
14240001	Oostanaula River - 4.5 Miles U/S From Rome (Coker's Farm)	Coosa	Atl WP	Stream	34.2983	-85.1381
14310001	Etowah River - 0.75 Mile Downstream From Allatoona Dam	Coosa	Atl WP	Stream	34.1631	-84.7411
14317201	Etowah River at Douthit Ferry Road near Cartersville, GA	Coosa	Atl WP	Stream	34.1203	-84.8197
14317451	Pettit Creek at CR450 near Cartersville, GA	Coosa	Atl WP	Stream	34.1653	-84.8164
14326011	Raccoon Creek at Picklesville Road near Stilesboro, GA	Coosa	Atl WP	Stream	34.1244	-84.8919
14326501	Pumpkinvine Creek at SR293 near Emerson, GA	Coosa	Atl WP	Stream	34.1011	-84.7375
14329501	Euharlee Creek at County Road 32 near Stilesboro, GA	Coosa	Atl WP	Stream	34.1186	-84.9483
14340001	Etowah River - U.S. Highway 411 Near Kingston	Coosa	Atl WP	Stream	34.2088	-84.9785
14340201	Two Run Creek at Reynolds Bridge Road near Kingston, GA	Coosa	Atl WP	Stream	34.2152	-84.9686
14340991	Spring Creek at State Road 20 near Rome, GA	Coosa	Atl WP	Stream	34.2061	-85.0749
14346001	Etowah River at SR1 Loop near Rome, GA	Coosa	Atl WP	Stream	34.2322	-85.1169
14357551	Silver Creek at Crescent Avenue near Rome, GA	Coosa	Atl WP	Stream	34.2328	-85.1781
14400001	Coosa River - Mayo's Bar On Upstream End Of Lock	Coosa	Atl WP	Stream	34.2003	-85.2567
14403901	Beech Creek at Mays Bridge Road SW near Rome, GA	Coosa	Atl WP	Stream	34.2332	-85.2933
14410001	Coosa River at State Road 100 near Coosa, GA	Coosa	Atl WP	Stream	34.2486	-85.3556
14425001	Cedar Creek - Cave Spring Road near Cedartown, GA	Coosa	Atl WP	Stream	34.0606	-85.3138

[1] **Sampling Organization: Atl WP = GAEPD Atlanta office; Bruns WP = GAEPD Brunswick Regional office; USGS = U.S. Geological Survey.**

Standard field parameters include: gage height, air temperature, water temperature, dissolved oxygen, pH, conductivity, turbidity.

Standard chemical parameters include: BOD5, alkalinity, hardness, ammonia, nitrite+nitrate nitrogen, phosphorus, TOC and fecal coliform bacteria.

Basin lakes field and chemical parameters include: 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.

TABLE 3-8
GEORGIA TREND MONITORING NETWORK 2007

Rivers and streams stations are sampled monthly for field and chemical parameters for one calendar year every five years. Four fecal coliform bacterial samples are collected each calendar quarter during the focused monitoring year. Basin lakes and reservoirs are sampled on a five-year rotational schedule. Samples are collected quarterly for non-standard basin lakes and reservoirs within the river basin of focus for the calendar year.

Station Number	Sampling Site	River Basin	Sampling Organization[1]	Water Body Type	Latitude	Longitude
01002001	Stekoa Creek - FAS 881 Near Chechero, GA	Savannah	USGS	Stream	34.8353	-83.3469
01003051	Lake Burton - 1/4 mile South of Burton Island (aka Tallulah River)	Savannah	Atl WP	Lake	34.8352	-83.5538
01003101	Lake Burton - Dam pool (aka Tallulah River u/s Lake Burton Dam)	Savannah	Atl WP	Lake	34.7953	-83.5401
01003151	Lake Rabun - Approx. 4.5 mi u/s Dam (Mid Lake)	Savannah	Atl WP	Lake	34.7635	-83.4558
01003201	Lake Rabun - Dam pool (aka Tallulah River - Upstream From Mathis Dam)	Savannah	Atl WP	Lake	34.7647	-83.4178
01003251	Lake Tugaloo - u/s Tugaloo Lake Rd (aka Bull Sluice Rd.)	Savannah	Atl WP	Lake	34.7378	-83.3406
01003301	Lake Tugaloo - Upstream From Tugaloo Dam	Savannah	Atl WP	Lake	34.7150	-83.3517
01003521	Eastanollee Creek at Tower Road nr Avalon, GA	Savannah	USGS	Stream	34.5260	-83.1855
01003601	Lake Hartwell @ Interstate 85	Savannah	Atl WP	Lake	34.4842	-83.0298
01003731	Lake Hartwell - Dam Forebay	Savannah	Atl WP	Lake	34.3587	-82.8244
01004501	Lake Russell Between Markers 42 and 44 (Mid Lake)	Savannah	Atl WP	Lake	34.1278	-82.6736
01004801	Beaverdam Creek at Road S985 (Ruckersville Road) near Elberton, GA	Savannah	USGS	Stream	34.1413	-82.8405
01005101	Lake Richard B. Russell - Dam Forebay	Savannah	Atl WP	Lake	34.0263	-82.5942
01007351	Hudson River at US Hwy 29 near Fort Lamar, GA	Savannah	USGS	Stream	34.2397	-83.1792
01007471	Broad River at State Road 72 nr Carlton, GA	Savannah	USGS	Stream	34.0733	-83.0033
01007951	Long Creek @ Wilkes Co. Rd 109 (Pete Johnson Rd) nr Tignall	Savannah	USGS	Stream	33.9414	-82.8241
01008001	Broad River - GA Highway 17	Savannah	USGS	Stream	33.9725	-82.7709
01008301	Clarks Hill Lake- Savannah River At U.S. Highway 378	Savannah	Atl WP	Lake	33.8579	-82.3996
01008401	Clarks Hill Lake- Savannah River At Dordon Crk.	Savannah	Atl WP	Lake	33.7659	-82.2718
01008491	Little River at SR 80 near Washington, GA	Savannah	USGS	Stream	33.6083	-82.6486
01008551	Middle Creek @ Wrightsboro Rd. near Wrightsboro, GA	Savannah	USGS	Stream	33.5498	-82.5643
01008601	Clarks Hill Lake - Little River at Hwy 47	Savannah	Atl WP	Lake	33.6927	-82.3388

Station Number	Sampling Site	River Basin	Sampling Organization[1]	Water Body Type	Latitude	Longitude
01008701	Clarks Hill Lake - Dam Forebay	Savannah	Atl WP	Lake	33.6627	-82.1985
01008901	Uchee Creek @ State Road 104 near Evans, GA	Savannah	USGS	Stream	33.5669	-82.1834
01008951	Savannah River at State Road 28 near Evans, GA	Savannah	USGS	Stream	33.5928	-82.1233
01009961	Butler Creek at SR56 Spur at Augusta, GA	Savannah	USGS	Stream	33.3894	-81.9728
01010701	Spirit Creek at State Road 56 near McBean, GA	Savannah	USGS	Stream	33.3184	-81.9551
01011201	McBean Creek at State Road 56 at McBean, GA	Savannah	USGS	Stream	33.2414	-81.9474
01012001	Savannah River - U.S. Highway 301	Savannah	USGS	Stream	32.9389	-81.5028
01012801	Brier Creek at State Road 56 near Waynesboro, GA	Savannah	USGS	Stream	33.1182	-81.9637
01013001	Brier Creek – Millhaven	Savannah	USGS	Stream	32.9333	-81.6514
01013341	Beaverdam Creek at Beaverdam Rd. at Bascom, GA	Savannah	USGS	Stream	32.8408	-81.6633
01013501	Buck Creek - Brannens Bridge Road (S1321) nr Sylvania, GA	Savannah	USGS	Stream	32.7689	-81.5872
01014151	Devils Branch at Pitts Rd. near Oliver, GA	Savannah	Bruns WP	Stream	32.5364	-81.4442
01014351	Jacks Branch at Early Street, Springfield, GA	Savannah	Bruns WP	Stream	32.3794	-81.3097
01014471	Ebenezer Creek at Log Landing Rd.	Savannah	Bruns WP	Stream	32.3500	-81.2675
01014481	Ebenezer Creek at Long Bridge Road (CR 307) near Stillwell, GA	Savannah	Bruns WP	Stream	32.3646	-81.2308
01014611	Lockner Creek at Old Augusta Rd. (CR284) near Rincon, GA	Savannah	Bruns WP	Stream	32.3608	-81.1795
01016381	Pipemakers Canal at US Hwy 21 at Savannah, GA	Savannah	Bruns WP	Stream	32.1213	-81.1676
02001501	Ogeechee River at Hancock County Road 28 near Powelton, GA	Ogeechee	USGS	Stream	33.4374	-82.8461
02004501	Little Ogeechee River at Road S1098 near Culverton, GA	Ogeechee	USGS	Stream	33.2571	-82.8578
02008001	Ogeechee River at State Road 88 near Grange, GA	Ogeechee	USGS	Stream	33.0439	-82.6044
02008701	Rocky Comfort Creek at Fred Williams Road near Edgehill, GA	Ogeechee	USGS	Stream	33.1592	-82.5829
02011771	Williamson Swamp Creek at U.S. Highway 1 East at Wadley, GA	Ogeechee	USGS	Stream	32.8498	-82.3974
02011801	Ogeechee River at State Road 56 at Midville, GA	Ogeechee	USGS	Stream	32.8140	-82.2355
02019101	Ogeechee River at Rocky Ford Road nr Rocky Ford, GA	Ogeechee	USGS	Stream	32.6494	-81.8409
02023421	Ogeechee Creek at State Road 17 at Oliver, GA	Ogeechee	Bruns WP	Stream	32.5244	-81.5397
02023451	Mill Creek at Bulloch County Road 386 Old River Road near Brooklet,	Ogeechee	Bruns WP	Stream	32.4384	-81.5786
02024251	Ogeechee River at U.S. Hwy 17	Ogeechee	Bruns WP	Stream	31.9782	-81.2887
02025001	Canoochee River at State Road 192 near Stillmore, GA	Ogeechee	USGS	Stream	32.4942	-82.2052
02025151	Sterling Creek at Timber Trail, Richmond Hill, GA.	Ogeechee	Bruns WP	Stream	31.9280	-81.3016

Station Number	Sampling Site	River Basin	Sampling Organization[1]	Water Body Type	Latitude	Longitude
02025901	Canoochee River at SR 121 near Metter, GA.	Ogeechee	Bruns WP	Stream	32.3559	-82.0899
02026001	Fifteenmile Creek at Candler County Road 28 near Metter, GA	Ogeechee	Bruns WP	Stream	32.3473	-82.0434
02026111	Wolfe Creek @ SR129 near Metter, GA	Ogeechee	Bruns WP	Stream	32.3087	-82.0524
02026201	Tenmile Creek at Road S2242 (Adabelle Road) near Excelsior, GA	Ogeechee	Bruns WP	Stream	32.2797	-81.9616
02026801	Cedar Creek at State Road 129 at Claxton, GA	Ogeechee	Bruns WP	Stream	32.1743	-81.9223
02027201	Canoochee River - Daisy Nevils Rd. near Daisy, GA	Ogeechee	Bruns WP	Stream	32.1786	-81.8289
02028101	Bull Creek at Road S2664 (Sunbury Road) near Daisy, GA	Ogeechee	Bruns WP	Stream	32.1441	-81.7935
02029101	Taylors Creek at SR119/144 near Hinesville, GA	Ogeechee	Bruns WP	Stream	31.8935	-81.6324
02029501	Canoochee River - GA Highway 67	Ogeechee	Bruns WP	Stream	31.9831	-81.3853
02148001	Salt Creek at US Hwy 17 at Savannah, GA	Ogeechee	Bruns WP	Stream	32.0399	-81.2037
02160001	Casey Canal South at Montgomery Cross Road at Savannah, GA	Ogeechee	Bruns WP	Stream	31.9924	-81.1019
06014001	Altamaha River - U.S. Hwy 301 near Doctortown, GA.	Altamaha	Bruns WP	Stream	31.6664	-81.8386
07004001	Turtle River off Hermitage Island	Satilla	Bruns WP	Stream	31.2203	-81.5642
07005201	Turtle River – GA Highway 303	Satilla	Bruns WP	Stream	31.1869	-81.5314
07025201	Little Satilla River at SR32 near Hortense, GA	Satilla	Bruns WP	Stream	31.3512	-82.0336
07026001	Satilla River - U.S. Highway 82 nr Atkinson, GA (formerly identified as Hwy 84)	Satilla	Bruns WP	Stream	31.2211	-81.8675
08010001	Saint Marys River - U.S. Highway 301 near Folkston, GA	St. Marys	Bruns WP	Stream	30.7764	-81.9789
1200010101	Chattahoochee River at Bottom Road near Helen, GA	Chattahoochee	Atl WP	Stream	34.6782	-83.6856
1200010501	Chestatee River at Roy Grindle Road (CR 49) near Dahlonega, GA	Chattahoochee	Atl WP	Stream	34.5788	-83.8880
1200010502	Shoal Creek at Ashbury Mill Road near Cleveland, GA	Chattahoochee	Atl WP	Stream	34.5506	-83.8347
1200010503	Tesnatee Creek at Gene Nix Road near Cleveland, GA	Chattahoochee	Atl WP	Stream	34.5685	-83.8358
1200010601	Chestatee River at Copper Mines Road (CR 41) near Dahlonega, GA	Chattahoochee	Atl WP	Stream	34.5438	-83.8871
1200010602	Baldridge Creek at Pilgrim Mill Road near Cumming, GA	Chattahoochee	Atl WP	Stream	34.2319	-84.0917
1200010603	Sawnee Creek at Pilgrim Mill Road near Cumming, GA	Chattahoochee	Atl WP	Stream	34.2245	-84.1149
1200010604	Four Mile Creek at Browns Bridge Road near Cumming, GA	Chattahoochee	Atl WP	Stream	34.2494	-84.0120
1200010605	Two Mile Creek at Wallace Ford Road near Cumming, GA	Chattahoochee	Atl WP	Stream	34.2859	-83.9872
12015101	Chattahoochee River at Bottom Road near Helen, GA	Chattahoochee	Atl WP	Stream	34.6782	-83.6856
12016501	Sautee Creek at SR17/255 (Sky Lake Rd.) near Helen, GA	Chattahoochee	Atl WP	Stream	34.6789	-83.6683
12028001	Soquee River at State Road 105 near Demorest, GA	Chattahoochee	Atl WP	Stream	34.5731	-83.5908

Station Number	Sampling Site	River Basin	Sampling Organization[1]	Water Body Type	Latitude	Longitude
12030025	Mossy Creek at New Bridge Road nr Clermont, GA	Chattahoochee	Atl WP	Stream	34.5134	-83.6855
12030031	Mud Creek at Crane Mill Road nr Alto, GA	Chattahoochee	Atl WP	Stream	34.4828	-83.6387
12030041	Little Mud Creek at Coon Creek Road nr Alto, GA	Chattahoochee	Atl WP	Stream	34.4673	-83.6323
12030103	Flat Creek - Glade Farm Road near Lula, GA	Chattahoochee	Atl WP	Stream	34.4233	-83.7369
12030141	West Fork Little River at Jess Helton Road near Clermont, GA	Chattahoochee	Atl WP	Stream	34.4153	-83.8213
12030151	East Fork Little River at Honeysuckle Road near Clermont, GA	Chattahoochee	Atl WP	Stream	34.3941	-83.7979
12030171	Wahoo Creek at Ben Parks Road near Murrayville, GA	Chattahoochee	Atl WP	Stream	34.4348	-83.8862
12030301	White Creek at New Bridge Road near Demorest, GA	Chattahoochee	Atl WP	Stream	34.5426	-83.6597
12033901	Chestatee River at Roy Grindle Road (CR 49) near Dahlonega, GA	Chattahoochee	Atl WP	Stream	34.5788	-83.8880
12034101	Chestatee River at Copper Mines Road near Dahlonega, GA	Chattahoochee	Atl WP	Stream	34.5438	-83.8871
12034401	Shoal Creek at Ashbury Mill Road near Cleveland, GA	Chattahoochee	Atl WP	Stream	34.5506	-83.8347
12034691	Testnatee Creek at Gene Nix Road near Cleveland, GA	Chattahoochee	Atl WP	Stream	34.5685	-83.8358
12036001	Yellow Creek at Yellow Creek Road (CR158) near Murrayville, GA	Chattahoochee	Atl WP	Stream	34.4305	-83.9395
12038610	Balus Creek at McEver Road near Oakwood, GA	Chattahoochee	Atl WP	Stream	34.2504	-83.8929
12038781	Mud Creek at McEver Road near Flowery Branch, GA	Chattahoochee	Atl WP	Stream	34.2059	-83.9148
12039001	Two Mile Creek at Wallace Wood Road near Cumming, GA	Chattahoochee	Atl WP	Stream	34.2859	-83.9872
12039501	Big Creek At McEver Road near Buford, GA	Chattahoochee	Atl WP	Stream	34.1606	-83.9622
12039601	Sixmile Creek at Burrus Mill Road near Coal Mountain, GA	Chattahoochee	Atl WP	Stream	34.2591	-84.0578
12039801	Bald Ridge Creek at Pilgrim Mill Road near Cumming, GA	Chattahoochee	Atl WP	Stream	34.2319	-84.0917
12039811	Four Mile Creek at Browns Bridge Road near Cumming, GA	Chattahoochee	Atl WP	Stream	34.2494	-84.0120
12039831	Sawnee Creek at Pilgrim Mill Road near Cumming, GA	Chattahoochee	Atl WP	Stream	34.2245	-84.1149

[1] **Sampling Organization: Atl WP = GAEPD Atlanta office; Bruns WP = GAEPD Brunswick Regional office; USGS = U.S. Geological Survey.**

Standard field parameters include: gage height, air temperature, water temperature, dissolved oxygen, pH, conductivity, turbidity.

Standard chemical parameters include: BOD5, alkalinity, hardness, ammonia, nitrite+nitrate nitrogen, phosphorus, TOC and fecal coliform bacteria.

Basin lakes field and chemical parameters include: 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.

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. In 2007, the GAEPD utilized macroinvertebrate biological data in addition to fish data for assessing the biotic integrity of wadeable streams in Georgia. Waters assessed as meeting or not meeting its designated uses based on fish and/or macroinvertebrate were included in Georgia's 2008 305(b)/303(d) List of Waters.

Lake Monitoring. The GAEPD has maintained monitoring programs for Georgia's public lakes since the late 1960's. Currently, Georgia has six major lakes that have standard criteria approved by legislature, which include: Sydney Lanier, Allatoona, West Point, Walter F. George, Jackson and Carters. These lakes are sampled every year from April to October when primary productivity is highest. All other major lakes are sampled according to a basin rotation schedule. Lakes in the basin rotation schedule are sampled once per quarter in accordance with which basin is targeted that year. In 2005, the basins of focus were the Coosa, Tallapoosa, and Tennessee. Lakes sampled in this rotation were Blue Ridge, Nottely, and Chatuge. Lakes in the Chattahoochee and Flint basins were targeted in 2006. These lakes included Goats Rock, Seminole, Blackshear, and Worth. Lakes in the Savannah and Ogeechee basins were targeted in 2007, and included Rabun, Burton, Tugalo, Hartwell, Clarks Hill and Russell. 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.

In 2007, Georgia participated in a USEPA's National Lakes Assessment Survey. Sampling sites were randomly selected nationally and each state was given the opportunity to participate in sampling sites selected within their respective states. Fourteen randomly selected lakes were identified in Georgia and were sampled by the GAEPD using the USEPA's national lake sampling protocol from May through September. Data obtained from the survey will be assessed by the USEPA and conclusions will be published in a report on the quality of the Nation's Lake waters between 2008 and 2009.

Lake Lanier and its watershed were sampled heavily during 2007 due to three segments being listed on the 2006 303(d) List of Waters for chlorophyll-a. This project consisted of sampling of 27 tributaries in the watershed twice a month, 10 sites on the main body of the lake, and 5 continuous monitors in the lake. Data collected during this intensive evaluation will be used for TMDL modeling for development of nutrient criteria for Lake Lanier.

The monitoring of major lakes (> 500 acres) since 1984 has continued to use Carlson's Trophic State Index (TTSI) as a tool to mark trophic state trends. Three measures are 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. The major lakes listed in Table 3-9 are ranked according to the TTSI. Work on major lakes is conducted as a part of the basin rotation or lakes standards monitoring projects. Data are either from the second quarter or May for basin or standards lakes, respectively.

TABLE 3-9
MAJOR LAKES RANKED BY SUM OF TROPHIC STATE INDEX VALUES (2003-2007)

Major Lake	TTSI Ranking	Major Lake	TTSI Ranking	Major Lake	TTSI Ranking
Banks (2003)	184	Oliver (2006)	162	Tugalo (2007)	143
Carters (2007)*	181	Nottely (2005)	161	Chatuge (2005)	143
Worth (2006)	178	Oconee (2004)	159	Sinclair (2004)	140
Tobesofkee (2004)	175	Blackshear (2006)	157	Hartwell (2007)	139
Seminole (2006)	172	Jackson (2007)	156	Blue Ridge (2005)	139
Walter F. George (2007)	171	Russell (2007)	152	Rabun (2007)	138
West Point (2007)	167	Lanier (2007)	152	Juliette (2004)	137
Goat Rock (2006)	165	Harding (2006)	151	Clarks Hill (2007)	133
High Falls (2004)	162	Allatoona (2007)	149	Burton (2007)	128

*Carters Lake does not have a dam pool site due to the pump-back activity from the re-regulation reservoir. Data listed is from the mid-lake station.

Fish Tissue Monitoring. This general contaminants 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 typically 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 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*. The first risk-based consumption guidance was published in 1995. As part of the implementation of the Federal Clean Air Mercury Rule (CAMR), it was recognized that a more rigorous monitoring program of mercury in fish tissue would be required to support trend analysis and the efficacy of future reductions in air mercury emissions. A subproject was designed and implemented in 2006 consisting of 22 fish mercury trend stations, which will be monitored annually. Nineteen stations are fresh water and 3 are estuarine. As no new resources were provided in support of the mercury in fish trend monitoring, the general contaminants program has been reduced. The mercury in fish trend monitoring sites is provided in Table 3-10.

TABLE 3-10
MERCURY IN FISH TREND MONITORING STATIONS

Antioch Lake at Rocky Mtn. PFA	Flint River below Ichawaynochaway Creek
Oostanaula River at Georgia Hwy. 140	Lake Kolomoki at Kolomoki State Park
Lake Acworth	Satilla River below U.S. Hwy. 82
Lake Tugalo	Okefenokee Swamp National Wildlife Refuge
Bear Creek Reservoir	Banks Lake National Wildlife Refuge
Randy Pointer Lake (Black Shoals Reservoir)	Savannah River at U.S. Hwy. 301
Chattahoochee River below Morgan Falls	Savannah River at I-95
Chattahoochee River Below Franklin	Ogeechee River at Ga. Hwy. 204
Lake Tobesofkee	Wassaw Sound
Ocmulgee River below Macon at Ga. Hwy. 96	Altamaha Delta and Sound
Lake Andrews	St. Andrews Sound

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. Continued work is performed on a site-specific basis and as part of the rotating river basin monitoring program.

Aquatic Toxicity Testing. Biomonitoring requirements are currently addressed in all municipal and industrial NPDES permits. In January 1995, the GAEPD issued approved NPDES Reasonable Potential Procedures that further delineate required conditions for conducting whole effluent toxicity (WET) testing for municipal and industrial discharges. The Reasonable Potential Procedures were updated in 2001 and the GAEPD additionally developed a WET Strategy that provided more detail as to how the State would determine which facilities needed a WET limit in their permit. This strategy outlined minimum data requirements for different types of facilities. The GAEPD conducted aquatic toxicity tests on municipal and industrial water pollution control plant effluents from 1985 through 1997. Funding for GAEPD's aquatic toxicity testing laboratory was redirected to TMDL monitoring and the toxicity testing requirements were turned over to the individual permittees.

Coastal Monitoring. The Coastal Resources Division (CRD) conducts the majority of coastal monitoring. 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 2006-2007. The results were used, in part, to verify the validity of permittee self-monitoring data and as supporting evidence, as applicable, in enforcement actions. This work

follows the major river basin rotation strategy. Compliance sampling in 2006 was focused in the Coosa River basin and in 2007 in the Savannah and Ogeechee River basins.

Surface Water Quality Summary

Data Assessment. Water quality data are assessed to determine if standards are met and if the water body supports its designated or classified water use. If monitoring data show that standards are not achieved, the water body is said to be 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 3-11 provides a list of agencies that contributed data for use in assessing water quality in this report.

TABLE 3-11
CONTRIBUTORS OF WATER QUALITY DATA FOR ASSESSMENT OF GEORGIA WATERS

GAEPD Ambient Monitoring Unit	City of Gainesville
GAEPD Watershed Planning and Monitoring Program	Tyson Foods, Inc
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
Forsyth County	

Appendix A includes an integrated list of waters for which data have been assessed including those that had indications the designated uses for those waters were not fully met and requiring the development of a TMDL for a specific pollutant of concern.

Substantial changes have been made to the format of Georgia's 2008 305(b)/303(d) List of Waters assessed from earlier listing years. The USEPA has required States to move to a five-part categorization of their waters. The GAEPD adopted the five-part categorization method with the 2008 305(b)/303(d) report. Assessed waters were placed into the five categories as described below:

Category 1 – Data indicate that waters are meeting their designated use(s). The placement of a water body in Category 1 is comparable to a water body having been on the "supporting" list in previous 305(b)/303(d) lists.

Category 2 – A water has more than one designated use and data indicate that at least one designated use is being met, but there is insufficient evidence to determine that all uses are being met. GAEPD did not have a designation similar to Category 2 on previous 305(b)/303(d) lists.

Category 3 – There is insufficient data or other information to make a determination as to whether or not the designated use(s) is being met.

Category 4a – Data indicate that at least one designated use is not being met, but TMDL(s) have been completed for the parameter(s) that are causing a water not to meet its use(s). In GAEPD's previous 305(b)/303(d) lists, a water body that was determined not to be supporting its use, but a TMDL had been completed for the parameter of concern would have been indicated by the presence of the number "3" in the 303(d) column of the report.

Category 4b - Data indicate that at least one designated use is not being met, but there are actions in place (other than a TMDL) that are predicted to lead to compliance with water quality standards. In previous 305(b)/303(d) lists, waters meeting this condition would have been indicated by the presence of the number "2" in the 303(d) column of the report.

Category 4c - Data indicate that at least one designated use is not being met, but a pollutant does not cause the impairment. The Clean Water Act (502(6)) defines a pollutant as dredged spoil, solid waste, incinerator residue, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, salt, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. An example of a situation that may call for a water to be placed in Category 4c is the case of a highly modified stream (such as a stream that has been channelized) and therefore has insufficient habitat to support an acceptable biological community.

Category 5 - Data indicate that at least one designated use is not being met and TMDL(s) need to be completed for one or more pollutants. In previous 305(b)/ 303(d) lists, a water body that was determined not to be supporting its use and for which a TMDL still needed to be completed was indicated by the presence of an "x" in the 303(d) column of the report.

In accordance with Section 303(d) of the Clean Water Act, the 303(d) list is a list of waters not meeting their uses and for which TMDL(s) have not been completed for the parameter(s) of concern. Once the TMDL is completed, the water may still not be supporting its use; however, it is no longer on the 303(d) list. In the new 5-part categorization method, waters that are assessed as "not supporting" their uses will either be placed in Category 4a, 4b, 4c or 5. Only those waters in Category 5 make up the federally mandated 303(d) list.

Georgia's 5-part categorized Integrated List of Waters is organized by river basin to aid the public in identifying waters in their local watershed. Water bodies within a river basin are alphabetized and information is provided on the location, data source, designated water use classification, criterion violated, potential cause, estimates of stream miles, lake acres and square miles of estuaries affected and the assessment category (1-5). For waters within category 5, an entry in the priority column indicates the proposed year for TMDL development for the pollutant of concern.

Another change that occurred with the 2008 List, was the merging of the USEPA's assessed waters with GAEPD's assessed waters. The USEPA's list of assessed waters were presented in a separate list in Appendix B in former *Water Quality in Georgia… Reports*. Beginning with the 2008 List, all waters assessed will be included within the list contained in Appendix A of this report.

Assessment of water quality data during 2006 and 2007 followed Georgia's Listing Methodology for Assessment of Data for the 2008 305(b)/303(d) Integrated List and Report. The following provides a brief overview of the assessment methodology. For more detail, refer to Appendix A.

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 2006-2007 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 in category 5 with a schedule proposed for development of a TMDL for this pollutant of concern.

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 more than 10 percent of the samples had fecal coliform bacterial densities greater than the applicable review criteria (400 or 4,000 MPN/100 ml).

Dissolved Oxygen, pH, Temperature. When available data indicated that these parameters were out of compliance with the State's water quality criteria more than 10% of the time, the waters were evaluated as not supporting the designated use and placed in category 5. Chapter 391-3-6-.03(7) of the Rules and Regulations for Water Quality Control states "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." In cases where data was collected from South Georgia black water streams indicating low pH and DO values which may be natural, those waters were placed in category 3 requiring more data before a determination could be made if the water was meeting its designated use(s).

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 an acute criterion

or if more than one sample was in excess of a chronic criterion, the stream segment was placed in category 5. This is in accordance with USEPA guidance that suggests listing if more than one sample exceeds the criteria in a three-year period. The goal for collecting representative metals data when only a minimal number are collected is to sample in the winter and summer for comparison to water quality standards.

Priority Pollutant/Organic Chemicals. In general, data for priority pollutant/organic chemicals from any one given site are also not frequent as with metals. If more than one sample was in excess of a standard, the stream segment was placed in category 5.

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 were placed in category 5.

Lake-Specific Criteria.

Chlorophyll *a*.: If during the 5-year assessment period, the average exceeds the site-specific growing season criteria 2 (or more) times out of the 5-year assessment period, the lake area representative for that station is assessed as not supporting designated uses and placed in category 5.

Total Nitrogen: Data indicates greater than 10% of the Total Nitrogen values assessed exceed the site-specific criteria, the lake area representative for that station is assessed as not supporting designated uses and placed in category 5.

Fish/Shellfish Guidelines. Following USEPA's guidance for evaluating fish consumption guidelines formation for 305(b)/303(d) use support determinations, waters are placed in category 5 as not supporting if little or no consumption of fish is recommended. For more information, see Georgia's Listing Assessment Methodology for the 2008 List in Appendix A.

A segment or water body was assessed as not supporting its designated uses for mercury in fish tissue if the Trophic-Weighted Residue Value (as described in the October 19, 2001 GAEPD "Protocol"), was in excess of the USEPA water quality criterion (*Water Quality Criterion for the Protection of Human Health: Methyl mercury*, EPA-823-R-01-001, January 2001). The USEPA criteria represents a national approach to address what mercury levels is protective for fishing waters. For mercury, waters were placed in category 5 if the calculated Trophic-Weighted Residue Value was greater than 0.3 µg/g wet weight total mercury. Waters were included in category 1 (supporting designated uses provided 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 that accounts for different contaminant loads in different trophic levels of fish.

Biotic Data. The "Bio-F" and "Bio-M" designation in the "Criterion Violated" column indicates that studies showed a modification of the biotic community for fish ("Bio-F") and/or macroinvertebrate organisms ("Bio-M"). 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 category 5. The GAEPD's macroinvertebrate data indicating "Poor" or "Very Poor" stream health were included in category 5. Waters where additional information was needed to

make a determination of whether a water body was meeting its designated use was placed in category 3.

Evaluation of Use Support. Table 3-12 provides summary information from Appendix A on the total number of stream miles, lake acres, or square miles of estuarine and coastal waters that fall in each assessment category. Separate totals are given for water bodies 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.

TABLE 3-12
EVALUATION OF USE SUPPORT BY WATER BODY TYPE AND ASSESSMENT CATEGORY
2006-2007

	Streams/Rivers (miles)			**Lakes/Reservoirs (acres)**			**Sounds/Harbors (sq. miles)**		
	Assessment Basis			**Assessment Basis**			**Assessment Basis**		
Degree of Use Support	Evaluated	Monitored	Total	Evaluated	Monitored	Total	Evaluated	Monitored	Total
Support	3,139	2,206	5,345	997	210,383	211,380	0	33	33
Not Support	2,045	5,540	7,585	816	129,581	130,397	0	14	14
Assessment Pending	204	565	769	0	58,751	58,751	0	25	25
Total	5,388	8,311	13,699	1,813	398,715	400,528	0	72	72

	Coastal Streams/Rivers (miles)			**Coastal Beaches (miles)**		
	Assessment Basis			**Assessment Basis**		
Degree of Use Support	Evaluated	Monitored	Total	Evaluated	Monitored	Total
Support	0	134	134	0	30	30
Not Support	1	42	43	0	4	4
Assessment Pending	23	152	175	0	0	0
Total	24	328	352	0	34	34

Assessment of Causes of Nonsupport of Designated Uses. There are many potential pollutants that may interfere with the designated use of rivers, streams, lakes, estuarine, and coastal waters. These can be termed the causes of use nonsupport. Based on information presented in Appendix A, Table 3-13 summarizes the parameters of concern or the causes which contributed to nonsupport of water quality standards or designated uses of a particular water body type.

TABLE 3-13
CAUSES OF NONSUPPORT OF DESIGNATED USES BY WATER BODY TYPE
2006-2007

Cause Category	Rivers/Streams (miles) Contributions to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Fish Guidance	896	602
Toxicity	0	39
Pesticides	0	0
Priority Organics	1	3
Metals	3	23
Ammonia	0	0
pH	35	243
Dissolved Oxygen	528	752
Temperature	0	26
Pathogens	2,623	1,806
Biota Impacted	1,467	790
Cause Category	**Lakes/Reservoirs (acres) Contributions to Impairment[1]**	
	Major[2]	**Moderate/Minor[3]**
Fish Guidance	96,642	0
Toxicity	0	0
Pesticides	0	0
Priority Organics	0	0
Metals	0	0
pH	0	0
Dissolved Oxygen	0	0
Temperature	650	0
Pathogens	194	0
Chlorophyll *a*	32,911	0
Cause Category	**Sounds/Harbors (sq. miles) Contributions to Impairment[1]**	
	Major[2]	**Moderate/Minor[3]**
Fish Guidance	0	0
Priority Organics	0	0
Metals	0	0
Dissolved Oxygen	14	0
Pathogens	0	0

Cause Category	Coastal Streams (miles) Contributions to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Fish Guidance	2	28
Toxicity	0	0
Pesticides	0	0
Priority Organics	0	2
Metals	0	4
Ammonia	0	0
pH	0	0
Dissolved Oxygen	6	26
Temperature	0	0
Pathogens	5	2
Biota Impacted	0	0
Cause Category	**Coastal Beaches (miles) Contributions to Impairment[1]**	
	Major[2]	**Moderate/Minor[3]**
Fish Guidance	0	0
Priority Organics	0	0
Metals	0	0
Dissolved Oxygen	0	0
Pathogens	4	0

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 12 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 3-14 summarizes information presented in Appendix A concerning the sources of pollutants that prevent achievement of water quality standards and use support in various water bodies in Georgia.

TABLE 3-14
POTENTIAL SOURCES OF NONSUPPORT OF DESIGNATED USES BY WATER BODY TYPE
2006-2007

Cause Category	Rivers/Streams (miles) Contributions to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Industrial Point	0	66
Industrial Nonpoint	17	236
Municipal Point	40	145
Municipal Nonpoint	0	0
Combined Sewer Overflows	0	93
Urban Runoff/ Stormwater	1,634	506
Hydropower (Dam Release)	11	2
Thermal Modification	0	0
Nonpoint Source	5,141	462

Cause Category	Lakes/Reservoirs (acres) Contributions 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	60,594
Nonpoint Source	13,009	60,594

Cause Category	Sounds/Harbors (sq. miles) Contributions to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Industrial Point	0	14
Industrial Nonpoint	0	0
Municipal Point	0	14
Urban Runoff/ Stormwater	0	14
Nonpoint Source	0	10
Marina	0	0

Cause Category	Coastal Streams (miles) Contributions to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Industrial Point	0	28
Industrial Nonpoint	2	7
Municipal Point	0	21
Municipal Nonpoint	0	0
Combined Sewer Overflows	0	0
Urban Runoff/ Stormwater	8	5
Hydropower (Dam Release)	0	0
Thermal Modification	0	0
Nonpoint Source	0	8

Cause Category	Coastal Beaches (miles) Contributions to Impairment[1]	
	Major[2]	Moderate/Minor[3]
Industrial Point	0	0
Industrial Nonpoint	0	0
Municipal Point	0	0
Municipal Nonpoint	0	0
Combined Sewer Overflows	0	0
Urban Runoff/ Stormwater	0	0
Nonpoint Source	4	0

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 12 or Appendix A.

i. 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.

ii. 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.

Assessment of Potential Sources of Nonsupport of Designated Uses. Pollutants that impact water bodies 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.

Priorities for Action. The list of waters in Appendix A includes all waters for which available data was assessed against applicable water quality standards and designated uses were determined to be 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 within the 5-part category assessments are active 305(b) waters. Lakes or reservoirs within these categories provide 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 all waters within category 5. The proposed date for development of a TMDL for category 5 waters is indicated within the priority column of the report.

TMDL Schedules. The rotating river basin approach process provides the framework for the long-term schedule for developing TMDLs for 303(d) listed segments. In 2006, TMDLs were proposed for 303(d) listed waters in the Altamaha, Oconee and Ocmulgee River Basins. The model used for fecal coliform bacteria TMDLs was changed in 2006 from a WCS modeling program to a loading curve modeling method. The fecal coliform bacteria TMDLs were revisited in 2006 using the new modeling program. In 2007, TMDLs were proposed for 303(d) listed waters in the Chattahoochee and Flint River Basins. In addition, a number of dissolved oxygen TMDLs for impaired streams within the Savannah and Ogeechee River Basins were developed.

The list in Appendix A 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 sinkholes, springheads, 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
The USDA Natural Resources Conservation Service, the USFWS National Wetland Inventory, and the state Department of Natural Resources have carried out assessments of wetland resources in Georgia with varying degrees of success. 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 straightforward. 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, 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 measures of Georgia's wetland acreages were 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 timber harvesting altered 455,000 acres. 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. The Coastal Marshlands Protection Committee, a State permitting authority, issues separate permits for alterations to salt marsh and the State's waterbottoms. 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. Land use 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 more than 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, DNR and The Nature Conservancy at Moody Forest Natural Area jointly manage a total of 3,600 acres containing significant floodplain acreage. 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, more than 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
Mayhaw WMA - 45 acres
Rum Creek WMA - 25 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
Oconee WMA - 150 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).

ategories	tal reage	tal etland reage	reage 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) manages Georgia's coastal resources. The CRD's Ecological Services Section administers Georgia's Coastal Management Program and its enforceable authorities, manages Georgia's shellfish harvest program, and conducts water quality monitoring based on specific grants and programmatic requirements. The CRD's Marine Fisheries Section manages Georgia's marine fisheries, balancing the long-term health of fish populations with the needs of those who fish for commercial and recreational purposes. The Section conducts scientific surveys of marine organisms and their habitats; collects harvest and fishing effort information; and assesses, restores and enhances fish habitats; along with other responsibilities. The DNR Wildlife Resources (WRD) and Environmental Protection Divisions (GAEPD) each play additional roles to manage resources in the Georgia coastal environment.

Georgia Coastal Management Program
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 programs that fulfill the guidelines established by the Act. Georgia entered this national framework in 1998 upon the approval of the Georgia Coastal Management Program (GCMP) by the National Oceanic and Atmospheric Administration. Financial assistance under the federal grant to the GCMP has been used, in part, to support the Public Health Water Quality Monitoring Program described below.

The Coastal Management Program has provided guidance and technical assistance to improve coastal water quality in general, and in the development of a Coastal Non-Point Source Control Program in particular. Under the Coastal Zone Management Act Reauthorization Amendments of 1990, Congress added a section entitled "Protecting Coastal Waters." That section directs states with federally approved coastal management programs to develop a Coastal Non-Point Source Program. To that end, the GAEPD is assisting the GCMP in I) 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.

Public Health Water Quality Monitoring Program
The CRD conducts water quality monitoring in estuarine and near-shore coastal waters through its Public Health Water Quality Monitoring Program. This Program has four distinct parts. The Shellfish Sanitation and Beach Water Quality Monitoring Programs are concerned with public health. The Nutrient Monitoring Program 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 harvest waters for harmful bacteria that might affect the safety of shellfish for human consumption. Nine (9) harvest areas are designated for 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.

The US Food and Drug Administration's National Shellfish Sanitation Program (NSSP) establishes national standards to 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." Water samples from each approved harvest area are collected by CRD and

analyzed regularly to ensure 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 NSSP.

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

County	Approved	Leased	Public
Chatham	15,351 acres	4,887 acres	1,267 acres
Bryan/Liberty	55,747 acres	1,706 acres	936 acres
McIntosh	50,170 acres	13,756 acres	1,974 acres
Glynn/Camden	37,018 acres	4,855 acres	7,188 acres

Water quality sampling occurs every other month at eighty-four (84) stations in five (5) counties on the coast including Chatham, Liberty, McIntosh, Glynn, and Camden counties. These stations are located to provide representative coverage of all the approved harvest areas along the coast.

Beach Monitoring Program
The Beach Monitoring Program was developed 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 of the bacterial indicator Enterococcus; 3) notify the public when the EPA threshold for Enterococcus has been exceeded; and 4) report the location, monitoring, and notification data to EPA.

Georgia's recreational beaches have been identified and prioritized into three (3) tiers based on their 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 at low probability for potential pollution. Water quality sampling occurs regularly depending upon the tier: Tier 1 beaches are monitored weekly year-round; Tier 2 beaches are monitored monthly from April through November; and Tier 3 beaches are not monitored. Beaches that exceed the threshold for Enterococcus are put under a swimming advisory that is not lifted until the levels of bacteria are sufficiently reduced, based on resampling. Beaches under a permanent swimming advisory are monitored quarterly.

Nutrient Monitoring Program
The Nutrient Monitoring Program assesses nutrient baseline concentrations in coastal 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. CRD has been monitoring nutrients at eighty-four (84) stations along the coast since 2000 to establish trends in nitrite nitrogen, ammonia nitrogen, total dissolved phosphorus, ortho- phosphate, and silicate.

Nutrient samples are collected monthly in the Ogeechee, Altamaha, and St. Marys Rivers at six (6) sites in each river to provide data for the upper estuary/lower salinity environments. Samples are also collected at thirty (30) of the eighty-four (84) shellfish sample sites to provide both nutrient and fecal coliform bacteria data from tidal rivers and sounds. Nutrient data for the lower sounds are collected at twenty-four (24) sites in conjunction with the monthly Ecological Monitoring Survey performed by the Marine Fisheries Section with the Research Vessel ANNA. Altamaha and Doboy Sounds, which are not routinely sampled on the Ecological Monitoring Survey, are also sampled monthly with an additional six (6) sites per sound system.

National Coastal Assessment Program
The National Coastal Assessment Program (NCA) was a five-year pilot study (2000-2006) funded by the U.S. Environmental Protection Agency (EPA) to establish a baseline condition as part of a national survey of

estuarine environmental health. As a participant in the national program, Georgia's NCA Program sampled fifty (50) sites each year throughout 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 selected the sample sites randomly, and data were collected in July and August of each year. The same sampling time frame, sample site design, and protocol were followed by each participating state to generate a comparable "snapshot" of national estuarine conditions.

NCA data are being used nationally by EPA to generate the National Coastal Condition Reports. CRD recently completed a two-year Georgia Coastal Condition Report (2000-2001); an update to this report is currently being drafted to summarize all available data from Georgia's National Coastal Assessment Program.

Coastal Streams, Harbors, and Sounds

This 305(b) report contains information on many coastal streams, harbors, and sounds. Several water bodies have been shown to have low dissolved oxygen (DO) readings over discrete periods of time during an annual cycle. EPD has categorized these streams as needing further assessment. A large percentage of the low dissolved oxygen readings occurred in the late summer and early fall of 2003, a period of prolonged, extreme drought. In addition to the dry conditions, water temperatures and salinities during this period were noted to be well above average for all of the water quality monitoring stations in coastal Georgia. To more accurately represent and report on natural dissolved oxygen levels in coastal water bodies, additional directed effort will be required at each location to increase the general state of knowledge for these estuarine systems.

Coastal Beaches

This report contains information on twenty-seven (27) coastal beaches. Of these, twenty-one (21) are considered to be supporting their designated use of coastal recreation. Six (6) beaches are considered as not supporting their designated use: two (2) are located on Jekyll Island at the St. Andrews picnic area and at Clam Creek; and one (1) beach is on St. Simons Island near Gould's inlet. All three (3) of these beaches are Tier 1 and are sampled weekly year-round. The other three (3) "not supporting" beaches are Tier 2 beaches, which are sampled less frequently. The Kings Ferry beach is located at a small municipal park on the Ogeechee River in Chatham County. Reimold's Pasture is a small island in Buttermilk sound at the mouth of the Altamaha River. The Blythe Island sandbar is located in the South Brunswick River in Glynn County.

None of the listed beaches have an identified point source of pollution. A bacterial source tracking study, Targeted Sampling And Bacterial Source Tracking To Identify Sources Of Fecal Contamination Responsible For Beach Advisories On The Georgia Coast (Hartel, 2006), conducted at St. Simons and Jekyll Island beaches, found that bacteria levels were generally higher in the marsh areas adjacent to the beaches and were attributed to wildlife. Similar results were reported in another study, Combining Targeted Sampling and Fluorometry to Identify Sources of Human Fecal Contamination in Georgia's Coastal Waters (Hartel, 2007), performed at Kings Ferry Beach. No traces of human bacteria were found at any of the sites involved in these studies.

Data Not Included in Assessment

Much of the data used to generate the 305(b)/303(d) list for coastal streams, harbors, and sounds were collected by CRD for the programs as described earlier in this chapter. Other data are used by CRD to address fisheries management or recreational use in specific areas along the coast, but much of these data do not meet the minimum spatial or temporal (frequency) criteria of the GAEPD 2008 listing methodology guidance document and cannot be used to assess the ability of a water body to support its designated use(s). Data from the Georgia National Coastal Assessment (NCA) Program were not included for this listing period. NCA data are based on a probabilistic, random sampling design with only one sample per year at each location. For the purposes of 305(b)/303(d), these data may be used in the future to augment existing data sets.

The state's list of assessed waters for beaches does not contain all the coastal beaches that have been identified and prioritized by CRD. Tier 3 beaches are not monitored, so no data are available for assessment. Tier 3 beaches have few potential pollution sources.

Commercial and Recreational Fisheries

CRD has several projects that produce information used to determine the status of commercially and recreationally important fish, crustaceans, and mollusks. The Ecological Monitoring Survey conducts monthly assessment trawls (blue crabs, shrimp, and beginning in 2003, finfish) in the Wassaw, Ossabaw, Sapelo, St. Simons, St. Andrew and Cumberland estuaries. Data from this survey is used to describe the abundance, size composition, reproductive status of penaeid shrimp and blue crab. 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 estuaries. The Marine Sport fish Population Health Study uses gill and trammel nets to capture finfish in the Wassaw and Altamaha River Delta estuaries.

The Fisheries Dependent Work Unit collects catch and effort information from the recreational and commercial fisheries in cooperation with the National Marine Fisheries Service. Total annual commercial landings in Georgia ranged from 7.03 to 12.84 million pounds of product during the period from 1997 to 2006, with an annual average of 8.76 million pounds. Penaeid shrimps are the most valuable catch in Georgia commercial landings, typically totaling over 13 million dollars (3.51 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 50 years with a recent downward trend due to declining fishing effort. 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 that can produce wide scale kills of white shrimp, and to a suite of environmental variables impacting the salt marsh ecosystem that produce a range of growing conditions. Cold weather kills have been associated with abnormally cold winters in 1984, 1989, and 2000.

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 the Wassaw estuary 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. The annual infection rate in 2007 reached 13.5% but was as high as 82% in particular estuaries (St. Simons) during specific months (October). Research is needed to understand this organism's life cycle and the environmental factors causing it to proliferate in some years but not others.

Trends in the brown shrimp fishery present a different picture. While recent landings and scientific survey 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.

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. Reported annual blue crab (*Callinectes sapidus*) landings in 2006 were above the most recent 10-year average of 3.7 million pounds (2006 = 4.1 million pounds). A severe drought from 1998 to 2002 reduced annual harvest 80% of the long-term average of 7.99 million pounds. The drought resulted in a reduction in the quantity of oligohaline and mesohaline areas within Georgia's estuaries. This effect was more pronounced in estuaries that did not receive direct freshwater inflow from rivers. It is believed this altered salinity profile resulted in (1) higher blue crab predation, (2) increased prevalence of the fatal disease caused by the organism, *Hematodiniun* sp*,* (3) reduction in the quantity of oligohaline nursery habitat, and (4) recruitment failure. In 2007, drought conditions existed in the foothills, piedmont, and upper coastal plain regions of Georgia. However, localized rainfall moderated the severity of the drought along the coast.

Commercial finfish landings fluctuate annually depending on market conditions and the impacts of 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 to be cyclical on a 5-7 year time scale. From 1982 to 1983 the population increased from 92,687 to 201,683. Shad populations were generally stable from 1983-1985 and then declined from 214,928 shad in 1985 to a low of 70,396 fish in 1990. The population then entered a period of increase reaching a peak abundance level of 284,442 in 1996. A statistically significant decrease in commercial fishing effort occurred from 1982 to 1991, however, it does not appear that this decrease in effort was directly related to an increase in American shad abundance. From 1997 through 2002 shad abundance steadily declined to a low of 87,267 fish and by 2006 population numbers had once again increased to an estimated 223,046 fish. Anecdotal evidence indicates that participation in the American shad fishery continues to decline. Apparently, as older fishermen leave, there are few new entrants into the fishery. Since 2001, effort estimates have been collected using a trip ticket system with effort being recorded as the number of trips for both the set and drift gill net fisheries. Effort generally declined from a high of 860 trips in 2001 to a low of 193 trips in 2005. However, in 2006 effort increased to 645 trips and was likely related to the relatively strong shad run that occurred that spring. Regulations have remained fairly constant over the past 15 years. The only modifications were a 15-day season extension in 1983, change in commercial fishing regulations in 1984 to clarify open and closed areas on the Altamaha River, and 15-day season extensions on the Savannah River from 2003-2007. No changes were made to shad sport fishing regulations. While the increases in landings and stock size during the early 1990's and 2000's were 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 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 2006, clam harvest was 45,962 lbs of meat. Oyster harvest in 2006 was only 14,480 lbs of meat – 86% 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 due to deteriorating water quality. Current research is focusing on improvements in stock genetics (growth and appearance enhancements), cultch substrate comparisons, and establishing new populations.

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 water bodies 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 monitored 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 that are frequented by a large number of anglers.

In response to regulatory actions requiring reductions in air emissions of mercury, DNR recognized the need to establish a mercury in fish trend network that would provide a database for evaluating potential changes that may result in fish body burdens. Twenty-two stations were established in 2006 having spatial significance to major air-emission sources in Georgia (coal-fired electric generating units and a chlor-alkali plant), waters with TMDLs for mercury in fish, and near State boundaries for out-of-state sources. Each station has a designated predator species that will be monitored annually. Mercury trend samples of individual fish muscle tissue are analyzed for mercury and other metals. Additional resources were not available to support this initiative and reductions in the general contaminants program were required.

The general contaminants 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. 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.

TABLE 6-1. PARAMETERS FOR FISH TISSUE TESTING

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

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 2007 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. If consumption needs to be limited, or no consumption is recommended, the water is not supporting this use. 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 2002-2008 305(b)/303(d) List for all fish tissue contaminants except mercury. Mercury in fish tissue was assessed and a segment or water body was listed if the trophic-weighted fish community tissue mercury was in excess of the 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 not support list if the calculated trophic-weighted residue value was greater than 0.3 µg/g wet weight total mercury. For contaminants other than mercury (PCBs, dieldrin, DDT/DDD/DDE) waters were placed on the not support list if the assessment indicated any limited or no consumption of fish. The USEPA criterion represents a national approach to address what mercury levels is protective for fishing waters. The existence of risk-based recommendations to reduce consumption was 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 2007, 57.5% of recommendations for fish tested in Georgia waters were for No Restriction, 27.9% were to Limit Consumption to One Meal Per Week, 13.1% were to Limit Consumption to One Meal Per Month, and 1.5% was Do Not Eat Advisories. Eighty-five percent of the recommendations available in 2007 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.

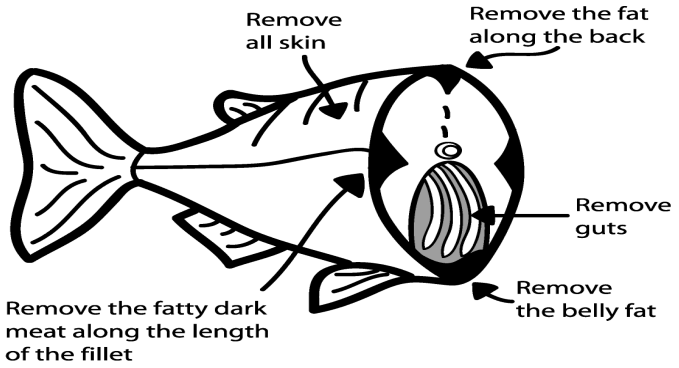
General Guidelines to Reduce Health Risks. The following suggestions may help to reduce the risks of fish consumption:

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 below. 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 Water body 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 that 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-2007 Update* that is reproduced in Appendix C.

Development Of New Risk Communication Tools For Women of Childbearing 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 women of childbearing 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.

Recreational Public Beach Monitoring

coliform monitoring at its reservoir 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 conduct some sampling at the public beaches they operate. The Coastal Resources Division of DNR conducts enterococcus monitoring at public coastal beaches and other recreationally used estuarine locations such as boat ramps and sandbars, and works with the local County Health Department in issuance of swimming advisories.

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 coastlines 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.

TABLE 6-2 NO CONSUMPTION RESTRICTIONS - 2007

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

TABLE 6-3. GUIDELINES FOR LIMITING THE FISH YOU EAT LAKES – 2007

LAKES	NO RESTRICTIONS	1 MEAL/ WEEK	1 MEAL/ MONTH
Albany By-Pass	Redear	LMB, Catfish	Carp
Acworth	Bluegill, LMB < 16"	LMB > 16"	
Allatoona	Carp, Crappie, SPB< 16", LMB 12-16", CCF, White bass < 12", G. redhorse	SPB > 16", LMB > 16", HB >16"	
Andrews	CCF, Spotted Sucker	LMB > 12"	
Banks	Bluegill		LMB > 12"
Bartlett's Ferry	Blk crappie <12", LMB <16", SPB <12"	HB & Striped bass & LMB > 16", CCF, Blk crappie & SPB >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", SPB 12-16"	
Pond N. Bush Field	Bluegill, LMB < 12"	LMB 12-16"	
Chatuge	LMB >12", CCF >12"	SPB 12-16"	
Clarks Hill	CCF, Blk 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)	Blk crappie, HB/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
Hugh M. Gillis PFA	Channel catfish, Bluegill	Largemouth bass 12-16"	
Jackson	Blk crappie, Redear sunfish, Catfish < 16"	Catfish > 16", LMB	
Ken Gardens	<16" Channel catfish, Brown bullhead, Bluegill	Largemouth bass >12"	
Kolomoki (DNR S.P.)	Redear Sunfish	Largemouth Bass > 12"	
Lanier	CCF & Striped bass < 16", Bluegill, Blk crappie White catfish	Striped bass, Carp & CCF > 16", LMB, SPB	
L. Ocmulgee St. Pk.		Brown bullhead 12-16"	LMB > 16"
McDuffie PFA, West	CCF	LMB	
Nottely	CCF, Blk crappie	LMB > 12", Striped bass > 16"	
Oliver	Hybrid bass < 12", CCF < 16", Redear,	LMB > 12"	CCF > 16"

LAKES	NO RESTRICTIONS	1 MEAL/ WEEK	1 MEAL/ MONTH
	Bluegill		
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"	
So. Slappy Blvd. Offramp (Albany)	Bluegill	Largemouth bass 12-16"	Largemouth bass > 16"
Stone Mountain	Catfish	LMB > 16"	
Tobesofkee	CCF	LMB > 16"	
Tugaloo	White catfish 12-16", Bluegill		LMB > 12"
Tribble Mill Park	Blk Crappie, Bluegill, LMB < 12"	LMB 12-16"	
West Point	LMB, Carp, SPB, Crappie, CCF & HB < 16"	CCF & HB > 16"	Striped bass
Worth (Chehaw)	Spotted sucker, Redear	LMB 12-16", Channel catfish > 16"	
Worth (Flint Res.)	CCF > 12"	LMB > 12"	
Yohola (DNR S.P.)	Bluegill	Largemouth Bass > 12”	
Yonah	Bluegill	LMB 12-16”, catfish 12-16”	

Abbreviations used in table: < means "less than", > means "more than", Blk = Black, CCF = Channel catfish, HB = Hybrid bass, LMB = Largemouth bass, SPB = Spotted bass

TABLE 6-4. GUIDELINES FOR LIMITING THE FISH YOU EAT RIVERS/CREEKS AND ESTUARINE SYSTEMS – 2007

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), Striped mullet	Flathead catfish, LMB, CCF	
Apalachee River	CCF	LMB	
Beaver Creek (Taylor Co.)			Yellow bullhead
Brier Creek (Burke Co.)		Spotted sucker	LMB
Canoochee River			LMB, Catfish, Redbreast
Casey Canal	LMB, Bluegill	Striped mullet	
Chattooga River (NE Ga., Rabun County)		Northern Hog Sucker, Silver Redhorse	

RIVERS/CREEKS	NO RESTRICTIONS	1 MEAL PER WEEK	1 MEAL PER MONTH
Chattahoochee River (Helen to Lanier)	CCF	Redeye bass, Bullhead, Redhorse	LMB
Chattahoochee River (Buford Dam to Morgan Falls Dam)	Brown trout, Carp, Rainbow trout, Yellow perch	LMB	
Chattahoochee River (Morgan Falls Dam to Peachtree Creek)	Brown trout, Rainbow trout, LMB, Bluegill	Jumprock sucker	Carp
Chattahoochee River (Peachtree Creek to Pea Creek)	CCF, White sucker	Bluegill, Black bass	Carp
Chattahoochee River (Pea Creek to West Point Lake, below Franklin)	CCF	LMB, Spotted bass	
Chattahoochee River Special Striped Bass (Morgan Falls Dam to West Point Lake)	This striped bass population migrates annually between West Point Lake and Morgan Falls Dam. DNR recommends the general public restrict consumption to one meal per month.		
Chattahoochee River (Oliver Dam to Upatoi Creek)		Bullhead catfish	LMB
Chattahoochee River (West Point dam to I-85)	LMB, Bullheads	Spotted bass	
Chestatee River (below Tesnatee River)	Channel catfish, Redbreast	Spotted Bass	
Chickamauga Creek (West)	Redbreast sunfish	Spotted bass	
Cohulla Creek (Whitfield County)		Blacktail redhorse	
Conasauga River (below Stateline)		Spotted bass	White bass, Buffalo
Coosa River (Rome to Hwy 100, Floyd Co.)		Spotted bass	LMB, Striped bass
	DO NOT EAT SMALLMOUTH BUFFALO		
Coosa River (Hwy 100 to State line, Floyd Co.)	Spotted bass	LMB	Striped bass, CCF, Buffalo
Coosa River Zero River Mile to Stateline	Blue Catfish: < 18” one meal per week; 18-32” one meal per month; and >32” do not eat.		
Coosa River System Special (Coosa, Etowah below Thompson-Weinman dam, Oostanaula)	Special Striped Bass: this population migrates annually between Weiss Lake and the Coosa River system. DNR recommends the general public restrict consumption of fish less than 20 inches to one meal per month, and to not eat any striped bass 20 inches or greater in length.		
Coosawattee River below Carters	Bluegill		Smallmouth buffalo
Etowah River (Dawson County)		Blacktail Redhorse	
Etowah River (above Lake Allatoona)	Golden redhorse	Spotted bass	
Etowah River (below Lake Allatoona dam)	CCF, Bluegill, Striped bass (above Thompson Weinman dam)	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)	CCF	LMB	
Gum Creek (Crisp Co.)	Carp	LMB	
Holly Creek (Murray County)		Blacktail redhorse	

RIVERS/CREEKS	NO RESTRICTIONS	1 MEAL PER WEEK	1 MEAL PER MONTH
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	
Mill Creek (Murray County)		Golden redhorse	
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	
Gum Creek (Crisp Co.)	Carp	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, Flathead catfish < 36"
Savannah River (above & below New Savannah Bluff Lock & Dam)	Redear, Redbreast, Striped mullet	Spotted sucker, LMB	
Savannah River (Chatham/Screven cos.)	CCF, Redear sunfish	LMB, Bluegill	
Savannah River (Effingham Co.)	CCF	White catfish, Redbreast	LMB, Bowfin
Savannah River (Tidal Gate)	Red drum, Striped mullet	White catfish	
Savannah River Special (New Savannah Lock and Dam to Savannah Estuary)	DNR recommends the general public restrict consumption of legal size striped bass 27 inches and larger to one meal per month. Women who are pregnant or nursing and young children may wish to further restrict their consumption due to the variable mercury levels in these striped bass.		
Short Creek (Warren Co.)		Sunfish	
South River (Panola Shoals, Rockdale Co.)		Snail bullhead, Bluegill	
South River (Henry Co., Snapping Shoals)	Silver redhorse, CCF	LMB	
Spring Creek (Seminole/Decatur/Miller cos)		LMB, Spotted sucker, Redear	
St. Marys River (Camden Co.)	Redbreast, Striped mullet		LMB
St. Marys River (Charlton Co.)	Redbreast sunfish		LMB
Sugar Creek (Murray Co.)		Golden redhorse	
Sumac Creek (Murray Co.)		Golden redhorse	
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	

RIVERS/CREEKS	NO RESTRICTIONS	1 MEAL PER WEEK	1 MEAL PER MONTH
Withlacoochee River (Berrien/Lowndes Cos.)		Redbreast sunfish	LMB

ESTUARINE SYSTEMS	NO RESTRICTIONS	1 MEAL PER WEEK	1 MEAL PER MONTH	DO NOT EAT
Turtle River System (Purvis, Gibson Cr.s)		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	Red drum	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, Red drum		Spot	Bivalves *
Back River South of Torras Causeway to St. Simons Sound	Spot, STM, Shrimp, SST, SKF, Blue crab, Red drum	Atlantic croaker		Bivalves *
Floyd Creek	Blue crab, Southern kingfish			
Academy Creek	Blue crab			
Altamaha Estuary	Striped mullet			
Hayner's Creek (Savannah)	Blue crab			
Savannah Estuary	Striped mullet		Striped bass >=27"	

* 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. 1 meal per week for other adults
Over 39 Inches	Do Not Eat

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 that 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, Congress enacted the Federal Water Pollution Control Act of 1972. 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."

In 2006-2007 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
Georgia's future relies on the protection and sustainable management of the state's limited water resources. In 2004 the Georgia General Assembly passed the "Comprehensive State-wide Water Management Planning Act" which called for the development of a statewide water management plan. The legislation created a framework for developing Georgia's first comprehensive statewide water management plan by providing a vision for water management in Georgia, guiding principles for plan development and the assignment of responsibility for developing the plan. A copy of the planning act can be found at www.georgiawatercouncil.org.

The Environmental Protection Division of the Georgia Department of Natural Resources, with the help of numerous stakeholders, produced and submitted to the Georgia Water Council an initial draft of the statewide water plan on June 28, 2007. Following several rounds of public input and changes in response to the input, the Georgia Water Council approved the "Georgia Comprehensive State-wide Water Management Plan" on January 8, 2008. The water plan was debated and approved in the 2008 session of the General Assembly and signed by Governor Perdue on February 6, 2008. 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. In addition, GAEPD conducted detailed monitoring of the Lake Lanier Watershed in 2007. Significant work was also performed by the States of 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 2006-2007 in support of the development of wasteload allocations and total maximum daily loads (TMDLs). In 2004, TMDLs were developed and publicly noticed for segments on the Georgia 2002 303(d) list in the Ochlockonee, Suwannee, Satilla, and St. Marys River Basins. These TMDLs were finalized, submitted to and approved by the EPA in 2005. In 2005, TMDLs were developed and publicly noticed for segments on the Georgia 2004 303(d) list for the Oconee, Ocmulgee and Altamaha River Basins. These TMDLS were finalized, submitted to and approved by EPA in 2006. Also in 2006, TMDLs were developed and public noticed for segments on the 2004 303(d) list for waters in the Chattahoochee and Flint River Basins. These TMDLs will be finalized and submitted to EPA for approval in early 2007. Over the 2006-2007 period, more than 276 TMDLs were developed and 26 were revised. To date more than 1400 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 2006, a total of 147 TMDL implementation plans and revisions were developed for TMDLs in the Coosa, Tallapoosa and Tennessee River Basins. Another 114 plans and revisions for TMDLs in the Savannah and Ogeechee River Basins were initiated in 2007 and scheduled for completion in 2008. To date a total of 1115 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 in1988 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 2006-2007 for wastewater treatment system and CSO control construction and improvements.

TABLE 7-1
Municipal Facility Sources of Investment
2006-2007

SRF & GEFA Loans	$265,864,454
Local or Federal	$318,634,217
TOTAL	**$584,498,671**

Of the eighteen wastewater treatment projects funded by SRF/GEFA loans during 2006-2007, seven were for upgrades of existing systems. The eighteen projects represented 169 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 2007, of the nearly 2.5 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 watershed 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 and all the municipalities within the District. 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.

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.

Since inception, the Georgia Land Conservation Council has approved state and local projects totaling approximately 37,771 acres (32 tracts) of land and 25 acres of mineral rights within 29 counties. During 2006-2007, grants and loans were awarded to 9 local governments, which will protect 1,056 acres of land. Land conservation projects have been acquired through fee simple purchase, conservation easement, lease, or donation. To date, six landowners fully donated conservation easements totaling 7,568 acres. Funds came from a variety of sources including U.S. Forest Service Forest Legacy Grant, The Nature Conservancy (TNC), and state bond funds.

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 2006-2007, a significant amount of personnel time was allocated to the reissuance of NPDES permits. Permits were issued, modified or reissued for 315 municipal and private discharges and for 75 industrial discharges. In addition, 70 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 2007.

Concentrated Animal Feeding Operations
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." Georgia rules require medium size animal feeding operations with more than 300 animal units (AU) but less than 1000 AU (1000 AU equals 1000 beef cows, 700 dairy cows, or 2500 swine) to 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. GAEPD has been delegated authority to administer the NPDES program in Georgia by the U.S. Environmental Protection Agency (EPA).

On December 15, 2002, EPA promulgated greatly expanded NPDES permit regulations and effluent limitation guidelines 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 rules, the GAEPD completed necessary State rule amendments on September 15, 2003. Dry litter poultry and swine nursery permit applications were due by October 31, 2005. Where possible, permits were issued and nutrient management plans implemented for dry litter poultry and swine nurseries by October 31, 2006.

The USEPA 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)]. The EPA is in the process of developing options for revising their CAFO regulation to comply with the Second Circuit Court of Appeals' decision. However, the Georgia rules are enforceable irrespective of changes in the USEPA CAFO regulation. GAEPD has deferred issuing permits where allowed in order to give the Georgia Board of Natural Resources time to reconsider its rules if and when the USEPA revisions become available. The Georgia general LAS and NPDES CAFO permits expired on April 30, 2007, but have been administratively extended due to the delays in Federal rule promulgation.

There are currently 741 farms that require general LAS or NPDES permits. That includes approximately 163 large farms with liquid manure handling systems. Of these, 45 have federal NPDES concentrated animal feeding operation (CAFO) permits and 118 have state LAS permits. These farms, with their liquid waste lagoons and spray fields, are important managers of water resources. Also included are 578 large dry manure (chicken litter) poultry farms that require NPDES CAFO permits. The Division would need 10 additional full-time professional staffers to regulate this community. However, it has been deemed more efficient to redirect these regulatory activities to the Georgia Department of Agriculture Livestock/Poultry Section (GDA) where appropriate. Therefore, the GAEPD has contracted with the GDA for inspections, complaint investigations, nutrient management plan reviews, permit administrative support, and enforcement assistance.

An important goal of Georgia's Nonpoint Source Management Program is to encourage and support all animal feeding operations to develop and implement Comprehensive Nutrient Management Plans (CNMPs). Georgia has over 4000 livestock and poultry farms. Cooperating organizations working toward this goal include the GSWCC, GSWCD, GA Milk Producers Association, Georgia Farm Bureau Federation, GA Pork Producers Association, CES, and NRCS. In 2006 more than 200 CNMPs were completed, covering 300,000 acres.

Activities include statewide and watershed-based demonstrations and BMP implementation of Comprehensive Nutrient Planning, lagoon maintenance or decommissioning, irrigation systems, and waste and effluent management systems. The GSWCC, using Section 319(h) Grant funds and local inkind funds have worked in the Upper Chattahoochee and Upper Oconee Watersheds to demonstrate the effectiveness of Comprehensive Nutrient Management Planning. Over the course of these projects numerous CNMPs have been developed with cooperating landowners.

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 which was extended to 2008. 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. The date established for compliance with water quality standards in the Consent Decree has been extended from November 7, 2007 to November 2008.

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 that 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 2007, of the 138 major municipal water pollution control plants (facilities with design flow equal to or greater than 1.0 mgd), eight were in significant noncompliance with the final limitations. These eight 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 2006-2007. The forty-two major industrial facilities were in compliance about 98% of the time during 2006-2007.

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 2006-2007, 613 Orders were issued and approximately of $2,123,000 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 2006-2007 a total of 449 stormwater Orders were issued and a total of $2,376,883 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 all violations of permitted effluent limitations, with the exception of flow, and all sanitary sewer system overflows into the waters of the State. 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 Federal Clean Water Act Amendments of 1987 require NPDES 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 the Phase I Storm Water Regulations on November 16, 1990. GAEPD has developed and implemented a storm water strategy which assures compliance with the Federal Regulations.

The Phase I 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 Phase I 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.

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 also became regulated.

The 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 that had the potential to contribute to adverse water quality impacts. In December 2002, EPD issued NPDES General Permit No. GAG610000 which covers 86 Phase II MS4s, including 57 cities and 29 counties. This Permit was reissued in December 2007. 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. 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 storm water permits for MS4s require the submittal of Annual Reports to GAEPD. Each year, the Georgia storm water permitting program reviews the Annual Reports from all of these 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.

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 NPDES General Permit No. GAR000000 that regulates the discharge of storm water from 10 categories of industrial activities. This permit was reissued in 1998 and 2006, with approximately 2000 facilities retaining coverage. An additional 350 facilities have submitted an Industrial No Exposure Exclusion Certification Form.

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 2006-2007. Approximately 12 of these inspections involved coordination with GAEPD Regional Office personnel.

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

Erosion and Sedimentation Control

The Georgia 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 339 cities and counties have adopted erosion and sediment control ordinances which have been reviewed by the GAEPD for compliance with the Act.

The Erosion and Sediment Control Overview Council (Council) was created bySenate 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 2006 or 2007.

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 its 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.

The Act was amended by House Bill 463 in 2007 to give subcontrators an additional year to meet the training and eduacation requirements established in HB 285. The erosion and sediment

control (E&SC) education and training program provides training to all participants as to the applicable laws, requirements and methods recognized by the State to effectively control erosion and sedimentation. The Georgia Soil and Water Conservation Commission continues to administer the training and certification program. As of September 2007, more than 51,000 people have been certified.

During the 2006-2007 period, the GAEPD decertified as issuing authorities 2 counties and 2 cities. All four requested decertification. During this same period, 6 cities and 2 counties were certified as local issuing authorities. The GAEPD issued a number of stream buffer variances in 2006 and in 2007.

A NPDES general permit that would regulate storm water discharges from construction activities was issued by GAEPD and subsequently appealed in 1992, 1994, 1995, 1996 and 1999. After several months of settlement negotiations involving the regulated community, environmental organizations, GAEPD, and a professional facilitator, GAEPD issued a revised NPDES General Permit GAR100000 for construction activities on June 12, 2000. The permit became effective on August 1, 2000, and 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 general permit for construction activities was reissued by GAEPD on August 13, 2003. The permit was re-issued as three distinct general permits: Stand Alone, Infrastructure and Common Development, and required coverage for projects disturbing one acre or more in accordance with the USEPA Phase II storm water regulations. 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 a Storm Water General Permit Advisory Committee (GPAC), which was comprised of those parties who were involved in the 1999 settlement negotiations, as well as additional stakeholders such as Georgia DOT. The NPDES construction permits require permittees to implement best management practices, conduct inspections, and sample storm water leaving their site after certain rainfall events. Approximately 5,700 active NOIs have been received by GAEPD as of September 30, 2007.

The three construction general permits expire on July 31, 2008. Stakeholder meetings will be held in early 2008 to facilitate the re-issuance of these permits. The GAEPD will continue to regulate storm water runoff from construction sites as a part of the point-source permitting process to protect water quality.

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.

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.

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) has 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 2006-2007*, as required by Section 305(b) of Public Law 92-500, serves as the current process to update the *Nonpoint Source Assessment Report*.

Currently, GAEPD is in the process of revising the State's *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 revision of the State's *Nonpoint Source Management Program* will encourage 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 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. In FY 06 – FY07, Georgia's Section 319(h) grant project funded 30 projects for over $8 million. For FY08, Georgia is poised to award $3.5 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.

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 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.

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.

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.

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 is a critical State initiative to identify priority waters and to target nonpoint source management activities.

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.

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*.

In 2006-2007, approximately $2 million in Section 319(h) Grant monies have been used to fund projects that target agricultural sources of nonpoint source pollution.. 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 Conservation Security Program (CSP). Collectively these programs will continue to have a significant and positive impact on Georgia's natural resources. These Federal cost-share programs 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.

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 2006 - 2007, the EQIP program provided over $24 million in incentive payments and cost-sharing for conservation practices.

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.

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. 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. 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. 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 2007, the GFC completed a 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 99.7% (out of 36,878 acres evaluated). This is 0.26 percent better then 2004. Out of the 9,605 applicable, individual BMPs evaluated, 91.8% were implemented. This is a 2.2 percent increase from 2004. Out of the 129 miles of streams evaluated, more than 92% were found to have no impacts or impairments from forestry practices. This is however, a slight decrease from the 2004 survey, which was at nearly 95% no impacts. The results from the biennial Statewide BMP Compliance Surveys will be used to update and revise the Silviculture Nonpoint Source Management Program.

As of this report, the Georgia Forestry Commission has instructed over 11,135 individuals in proper BMP uses. In addition, the Georgia Forestry Commission continues to address and resolve logging complaints, and to conduct 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 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. During urbanization, pervious, vegetated ground is converted to impervious, unvegetated surfaces such as rooftops, roads, parking lots and sidewalks. 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.

Consistent with the multiple sources of urban runoff, strategies to manage urban runoff 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, cooperative intergovernmental partnerships 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 a key partner and point of contact for urban nonpoint source pollution. 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.

Additionally, an array of programs to manage urban runoff are under development or being implemented in a variety of locales. 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 ARC will be developing Volume 3: Pollution Prevention in 2008-2009. Also, In partnership with GAEPD, ARC, numerous local governments and other stakeholders, the Savannah Metropolitan Planning Commission and the Center for Watershed Protection are currently developing a Coastal Stormwater Supplement to the Georgia Stormwater Management Manual, to specifically address coastal stormwater. The supplement will be complete September 2008.

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.

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

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 550 Project WET facilitators trained statewide. In addition, more than 300 Project WET educator workshops have been completed in Georgia with more than 7,000 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 a Statewide conference and awards ceremony. The 2007 conference was held on Jekyll Island, Georgia with over 250 participants.

During the conference, Georgia Project WET recognizes a Facilitator, Teacher and School of the Year. Awardees are selected based on their efforts to increase awareness about water issues and their commitment to water education. The Project WET School of the Year also receives a Project WET certification workshop for its faculty at no charge.

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. Since its first printing in August of 2005, over 500 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 every year since 1997 Georgia students have been selected as National Grand Prize Winners and/or Finalists. In addition to the students that are recognized Nationally, Georgia Project WET conducts a State judging each year in which approximately 50 students are honored as State winners.

The State and National winners' work is on display in the *Georgia River of Words Exhibition*. Each year, Georgia Project WET partners with the Chattahoochee Nature Center 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. All River of Words state and national winners poetry and art can be found on the project website, www.GaProjectWet.org.

In partnership with the Georgia Center for the Book, Georgia Project WET coordinates an additional River of Words traveling exhibit through the library system, which visits 15-20 sites per year. In addition, over 70,000 students and teachers each year will view the River of Words exhibit when they visit the Georgia Aquarium. Project WET and Georgia Aquarium staff partnered to select 65 River of Words winning entries from Georgia to display on the Education floor of the Aquarium.

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 60 local community and watershed Adopt-A-Stream coordinators. The community and watershed coordinators are a network of college, watershed, or local based training centers located throughout Georgia. This network of local programs provide training workshops and educational presentations that allow the Georgia Adopt-A-Stream Program to be accessible to all areas of the State. In cooperation with the State Coordinators, the programs ensure that volunteers are trained consistently and that the monitoring data is professionally assessed for quality assurance and quality control.

The Georgia Adopt-A-Stream Program objectives supports 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 14,000 volunteers participate in 235 individual and over 60 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 270 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 Educator's Guide* manuals, PowerPoint presentations, and promotional and instructional training videos. Every two months a newsletter is published and distributed to over 4,800 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 website, www.GeorgiaAdoptAStream.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 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.

Once again, Georgia Adopt-A-Stream partnered with the Georgia River Network to present the Watershed Track at their 2007 annual conference. This event helped connect citizens with activities that help protect and improve Georgia waters. In March 2007, the Georgia Adopt-A-Stream Program partnered with the Environmental Education Alliance of Georgia to conduct an annual conference and awards ceremony. The 2007 conference, *Georgia Environment - Keys for Successful Partnership*, was held at Jekyll Island, Georgia with over 250 participants.

In addition, the Georgia Adopt-A-Stream Program organizes Georgia's annual volunteer waterway cleanup 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 2007 waterway cleanup, more than 25,000 volunteers cleaned over 2,300 miles of waterways and removed over 750,000 pounds of trash and garbage including refrigerators, couches, a shower stall, televisions, motorcycles, 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 cleanup events in every watershed 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. 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;

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.

CHAPTER 8

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 2005, groundwater made up approximately 20.5 percent of the public water supply, 100 percent of rural drinking water sources, 65 percent of the irrigation use and 46 percent of the industrial and mining use. Total estimated groundwater withdrawals in 2005 were approximately 1.2 billion gallons per day. For practical purposes, outside the larger cities of Georgia, 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.

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 4).
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 presently consists of over 130 wells, which are sampled periodically (Figure 5). 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 2006 and 2007 are provided in Tables 8-3, 8-4, and 8-5.

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 2007, 1,204 water samples from Groundwater Monitoring Network wells were analyzed for nitrate/nitrite, or during 2005 for nitrate. Water from 1.07 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 GAEPD's extensive sampling program demonstrates that nitrates, from non-point sources, are not a significant contributor to groundwater pollution in Georgia.

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, 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

FIGURE 4. HYDROLOGIC PROVINCES OF GEORGIA

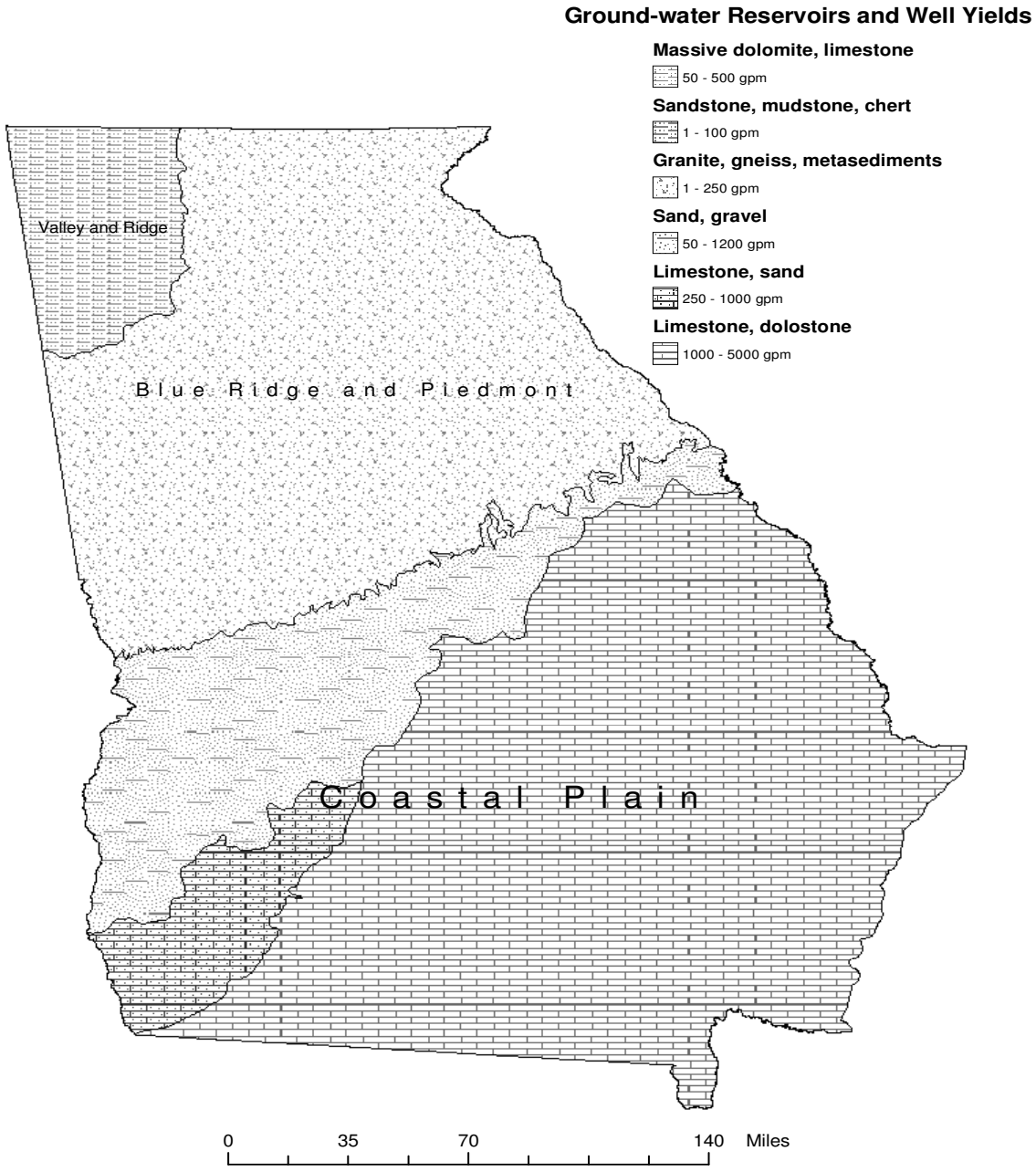


FIGURE 5. AMBIENT GROUNDWATER MONITORING NETWORK, 2006-2007

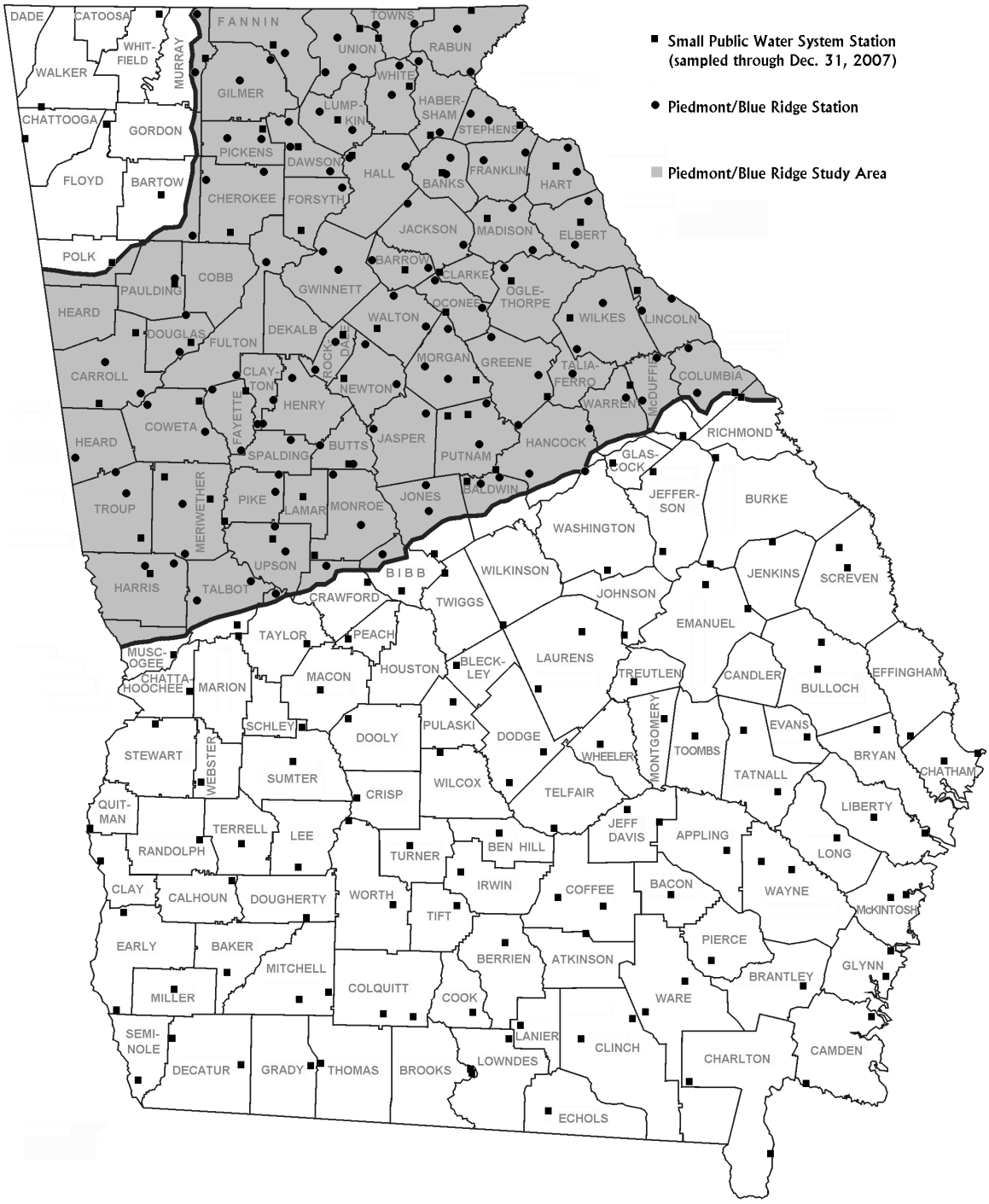


TABLE 8-3A
SUMMARY OF GROUND-WATER MONITORING RESULTS FOR 120 PIEDMONT AND BLUE RIDGE STATIONS FOR CY 2006

	Nitrate/ Nitrite	VOCs (88 Stations Tested)	Uranium	Copper or Lead	Fe, Mn, or Al
Detections	89	8	35	34	86
Exceedances	1	0	1	0	48

TABLE 8-3B
SUMMARY OF GROUND-WATER MONITORING RESULTS FOR 171 SMALL PUBLIC WATER SYSTEM STATIONS FOR CY 2007

	Nitrate/ Nitrite	VOCs	Uranium	Copper or Lead	Fe, Mn, or Al
Detections	91	9	22	34	110
Exceedances	0	0	4	0	61

TABLE 8-4
GROUND-WATER MONITORING DATA FOR CY 2006

Piedmont/Blue Ridge Unconfined Aquifer System Monitoring						
County	No. of Stations	Number of Stations Showing:				
		Nitrate/ Nitrate Detection// Exceedance	VOCs Detection// Exceedance	Uranium Detection// Exceedance	Copper or Lead Detection// Exceedance	Fe, Mn, or Al Detection// Exceedance
Baldwin	2	1 // 0	0 // 0	1 // 0	1 // 0	2 // 2
Banks	2	2 // 0	0 // 0	1 // 0	0 // 0	0 // 0
Barrow	2	2 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Bartow	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Bibb	1	1 // 0	0 // 0	1 // 0	0 // 0	0 // 0
Butts	2	1 // 0	0 // 0	0 // 0	0 // 0	2 // 1
Carroll	2	1 // 0	0 // 0	0 // 0	1 // 0	2 // 1
Cherokee	2	2 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Clayton	2	1 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Columbia	2	2 // 0	0 // 0	1 // 0	1 // 0	1 // 0
Coweta	2	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Crawford	1	1 // 0	NA	1 // 0	0 // 0	1 // 1
Dawson	3	2 // 0	3 // 0	0 // 0	1 // 0	2 // 1
Douglas	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 0
Elbert	2	1 // 0	NA	0 // 0	1 // 0	1 // 0
Fannin	1	0 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Fayette	2	1 // 0	1 // 0	1 // 1	1 // 0	2 // 1
Forsyth	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Franklin	2	0 // 0	NA	2 // 0	0 // 0	2 // 2
Fulton	3	3 // 0	1 // 0	0 // 0	2 // 0	2 // 2
Gilmer	2	2 // 0	0 // 0	0 // 0	1 // 0	2 // 2
Greene	3	3 // 0	0 // 0	1 // 0	1 // 0	1 // 0
Gwinnett	2	1 // 0	1 // 0	1 // 0	0 // 0	2 // 2
Habersham	2	1 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Hall	2	2 // 0	0 // 0	0 // 0	1 // 0	2 // 1
Hancock	2	1 // 0	NA	1 // 0	0 // 0	1 // 1
Harris	2	2 // 0	0 // 0	0 // 0	0 // 0	2 // 2
Hart	2	2 // 0	NA	0 // 0	2 // 0	1 // 1
Heard	1	1 // 0	NA	0 // 0	1 // 0	0 // 0
Henry	2	2 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Jackson	2	2 // 0	1 // 0; 1 NA	2 // 0	0 // 0	1 // 0
Jasper	2	1 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Jones	2	2 // 0	0 // 0	2 // 0	0 // 0	2 // 1

TABLE 8-4
GROUND-WATER MONITORING DATA FOR CY 2006, CONTINUED

Piedmont/Blue Ridge Unconfined Aquifer System Monitoring						
County	No. of Stations	Number of Stations Showing:				
		Nitrate/ Nitrate Detection// Exceedance	VOCs Detection// Exceedance	Uranium Detection// Exceedance	Copper or Lead Detection// Exceedance	Fe, Mn, or Al Detection// Exceedance
Lincoln	2	1 // 0	NA	0 // 0	1 // 0	1 // 1
Lumpkin	2	1 // 0	0 // 0	1 // 0	0 // 0	2 // 1
McDuffie	2	2 // 0	0 // 0	2 // 0	1 // 0	1 // 1
Madison	2	2 // 0	1 // 0; 1 NA	0 // 0	1 // 0	2 // 1
Meriwether	2	1 // 0	NA	0 // 0	1 // 0	1 // 0
Monroe	2	2 // 0	NA	0 // 0	1 // 0	2 // 1
Morgan	3	3 // 0	0 // 0	1 // 0	1 // 0	1 // 1
Murray	2	1 // 0	1 // 0	0 // 0	1 // 0	2 // 0
Newton	2	2 // 0	1 // 0	0 // 0	2 // 0	2 // 1
Oconee	2	2 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Oglethorpe	1	1 // 0	NA	0 // 0	1 // 0	1 // 0
Paulding	1	1 // 0	1 // 0	1 // 0	0 // 0	1 // 1
Pickens	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 2
Pike	2	1 // 0	0 // 0	0 // 0	0 // 0	2 // 2
Putnam	2	2 // 0	NA	0 // 0	1 // 0	2 // 1
Rabun	2	1 // 0	NA	0 // 0	1 // 0	2 // 2
Rockdale	2	2 // 0	0 // 0	1 // 0	2 // 0	2 // 0
Spalding	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Stephens	2	1 // 1	NA	2 // 0	1 // 0	1 // 1
Talbot	2	1 // 0	NA	1 // 0	1 // 0	2 // 2
Taliaferro	1	1 // 0	1 NA	0 // 0	0 // 0	0 // 0
Taylor	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 0
Towns	2	1 // 0	0 // 0	1 // 0	0 // 0	2 // 0
Troup	2	2 // 0	NA	0 // 0	2 // 0	2 // 1
Union	3	2 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Upson	2	1 // 0	0 // 0; 1 NA	0 // 0	1 // 0	1 // 0
Walton	2	2 // 0	1 // 0	0 // 0	1 // 0	1 // 0
Warren	1	0 // 0	1 NA	0 // 0	0 // 0	1 // 0
Washington	1	1 // 0	1 // 0	1 // 0	0 // 0	1 // 1
White	2	1 // 0	0 // 0	1 // 0	1 // 0	1 // 0
Wilkes	2	2 // 0	NA	1 // 0	1 // 0	1 // 1

NA = parameter not analyzed; a dual entry such as 0 // 0; 1 NA in a parameter's column occurs if the parameter was analyzed for samples from some stations but not for those from others.

TABLE 8-5
GROUND-WATER MONITORING DATA FOR CY 2007

Small Public Water System Monitoring						
County	No. of Stations	Number of Stations Showing:				
		Nitrate/ Nitrate Detection// Exceedance	VOCs Detection// Exceedance	Uranium Detection// Exceedance	Copper or Lead Detection// Exceedance	Fe, Mn, or Al Detection// Exceedance
Appling	2	0 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Atkinson	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Bacon	1	0 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Baker	1	1 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Baldwin	1	0 // 0	0 // 0	1 // 1	1 // 0	1 // 1
Banks	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Barrow	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 0
Bartow	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Ben Hill	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Berrien	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Bibb	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Bleckley	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Brantley	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Brooks	2	1 // 0	0 // 0	0 // 0	0 // 0	2 // 0
Bryan	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Bulloch	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 1
Burke	2	1 // 0	0 // 0	0 // 0	0 // 0	2 // 1
Butts	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Calhoun	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Camden	2	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Candler	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Carroll	2	1 // 0	0 // 0	0 // 0	0 // 0	2 // 1
Charlton	2	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Chatham	2	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Chattahoochee	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Chattooga	1	1 // 0	1 // 0	0 // 0	0 // 0	0 // 0
Cherokee	1	1 // 0	1 // 0	0 // 0	0 // 0	1 // 0
Clarke	1	1 // 0	0 // 0	1 // 1	1 // 0	1 // 1
Clay	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Clayton	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Clinch	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 1

TABLE 8-5
GROUND-WATER MONITORING DATA FOR CY 2007, CONTINUED

Small Public Water System Monitoring						
County	No. of Stations	Number of Stations Showing:				
		Nitrate/ Nitrate Detection// Exceedance	VOCs Detection// Exceedance	Uranium Detection// Exceedance	Copper or Lead Detection// Exceedance	Fe, Mn, or Al Detection// Exceedance
Coffee	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 1
Colquitt	2	0 // 0	0 // 0	0 // 0	1 // 0	2 // 0
Columbia	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Cook	1	0 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Coweta	1	1 // 0	0 // 0	1 // 0	0 // 0	0 // 0
Crawford	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Crisp	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Dawson	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 0
Decatur	2	2 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Dodge	2	2 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Dooly	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Dougherty	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Douglas	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 0
Early	2	1 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Echols	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Effingham	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Elbert	1	1 // 0	0 // 0	1 // 0	0 // 0	0 // 0
Emanuel	2	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Evans	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Fannin	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Floyd	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Forsyth	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Gilmer	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Glascock	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Glynn	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 2
Grady	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Greene	1	1 // 0	0 // 0	1 // 1	0 // 0	0 // 0
Habersham	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Hall	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Hancock	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Harris	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1

TABLE 8-5
GROUND-WATER MONITORING DATA FOR CY 2007, CONTINUED

Small Public Water System Monitoring						
County	No. of Stations	Number of Stations Showing:				
		Nitrate/ Nitrate Detection// Exceedance	VOCs Detection// Exceedance	Uranium Detection// Exceedance	Copper or Lead Detection// Exceedance	Fe, Mn, or Al Detection// Exceedance
Hart	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Houston	1	1 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Irwin	1	0 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Jasper	1	0 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Jeff Davis	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Jefferson	2	1 // 0	1 // 0	0 // 0	0 // 0	2 // 2
Jenkins	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Johnson	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Jones	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Lamar	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Lanier	1	0 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Laurens	2	1 // 0	0 // 0	0 // 0	1 // 0	1 // 0
Lee	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Liberty	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 0
Lincoln	1	1 // 0	0 // 0	1 // 0	1 // 0	0 // 0
Long	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Lowndes	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Lumpkin	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
McDuffie	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
McIntosh	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 2
Macon	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Madison	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Marion	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Meriwether	2	2 // 0	0 // 0	0 // 0	1 // 0	2 // 1
Miller	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Mitchell	2	1 // 0	0 // 0	1 // 0	1 // 0	0 // 0
Monroe	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Montgomery	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Morgan	1	1 // 0	0 // 0	1 // 0	1 // 0	0 // 0
Murray	1	1 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Muscogee	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 0

TABLE 8-5
GROUND-WATER MONITORING DATA FOR CY 2007, CONTINUED

Small Public Water System Monitoring						
County	No. of Stations	Number of Stations Showing:				
		Nitrate/ Nitrate Detection// Exceedance	VOCs Detection// Exceedance	Uranium Detection// Exceedance	Copper or Lead Detection// Exceedance	Fe, Mn, or Al Detection// Exceedance
Newton	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Oconee	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Oglethorpe	1	1 // 0	1 // 0	1 // 0	1 // 0	1 // 1
Paulding	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Peach	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 0
Pickens	1	1 // 0	1 // 0	0 // 0	0 // 0	1 // 1
Pierce	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Pike	1	1 // 0	0 // 0	1 // 1	0 // 0	1 // 1
Polk	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Pulaski	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Putnam	1	1 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Quitman	1	1 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Rabun	1	0 // 0	0 // 0	1 // 0	1 // 0	1 // 1
Randolph	1	0 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Richmond	1	1 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Rockdale	1	1 // 0	1 // 0	0 // 0	0 // 0	1 // 1
Screven	2	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Seminole	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Stephens	1	1 // 0	0 // 0	1 // 0	0 // 0	0 // 0
Stewart	1	0 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Sumter	2	2 // 0	1 // 0	0 // 0	2 // 0	2 // 1
Talbot	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Tattnall	2	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Taylor	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Telfair	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Terrell	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Thomas	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Tift	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Toombs	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Towns	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0

TABLE 8-5
GROUND-WATER MONITORING DATA FOR CY 2007, CONTINUED

Small Public Water System Monitoring						
County	No. of Stations	Number of Stations Showing:				
		Nitrate/ Nitrate Detection// Exceedance	VOCs Detection// Exceedance	Uranium Detection// Exceedance	Copper or Lead Detection// Exceedance	Fe, Mn, or Al Detection// Exceedance
Treutlen	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Troup	1	1 // 0	1 // 0	0 // 0	0 // 0	1 // 1
Turner	1	0 // 0	0 // 0	1 // 0	0 // 0	0 // 0
Twiggs	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 0
Union	1	0 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Upson	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Walker	1	1 // 0	0 // 0	0 // 0	1 // 0	1 // 1
Walton	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Ware	2	0 // 0	0 // 0	0 // 0	0 // 0	2 // 0
Warren	1	1 // 0	0 // 0	1 // 0	0 // 0	1 // 1
Washington	1	1 // 0	0 // 0	0 // 0	1 // 0	0 // 0
Wayne	2	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Webster	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Wheeler	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
White	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Whitfield	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Wilcox	1	1 // 0	0 // 0	0 // 0	0 // 0	1 // 0
Wilkes	1	1 // 0	0 // 0	0 // 0	0 // 0	0 // 0
Wilkinson	1	0 // 0	0 // 0	0 // 0	0 // 0	1 // 1
Worth	2	1 // 0	0 // 0	0 // 0	0 // 0	1 // 0

Agricultural chemicals are commonly used in the agricultural regions of the State (Figure 6). 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.

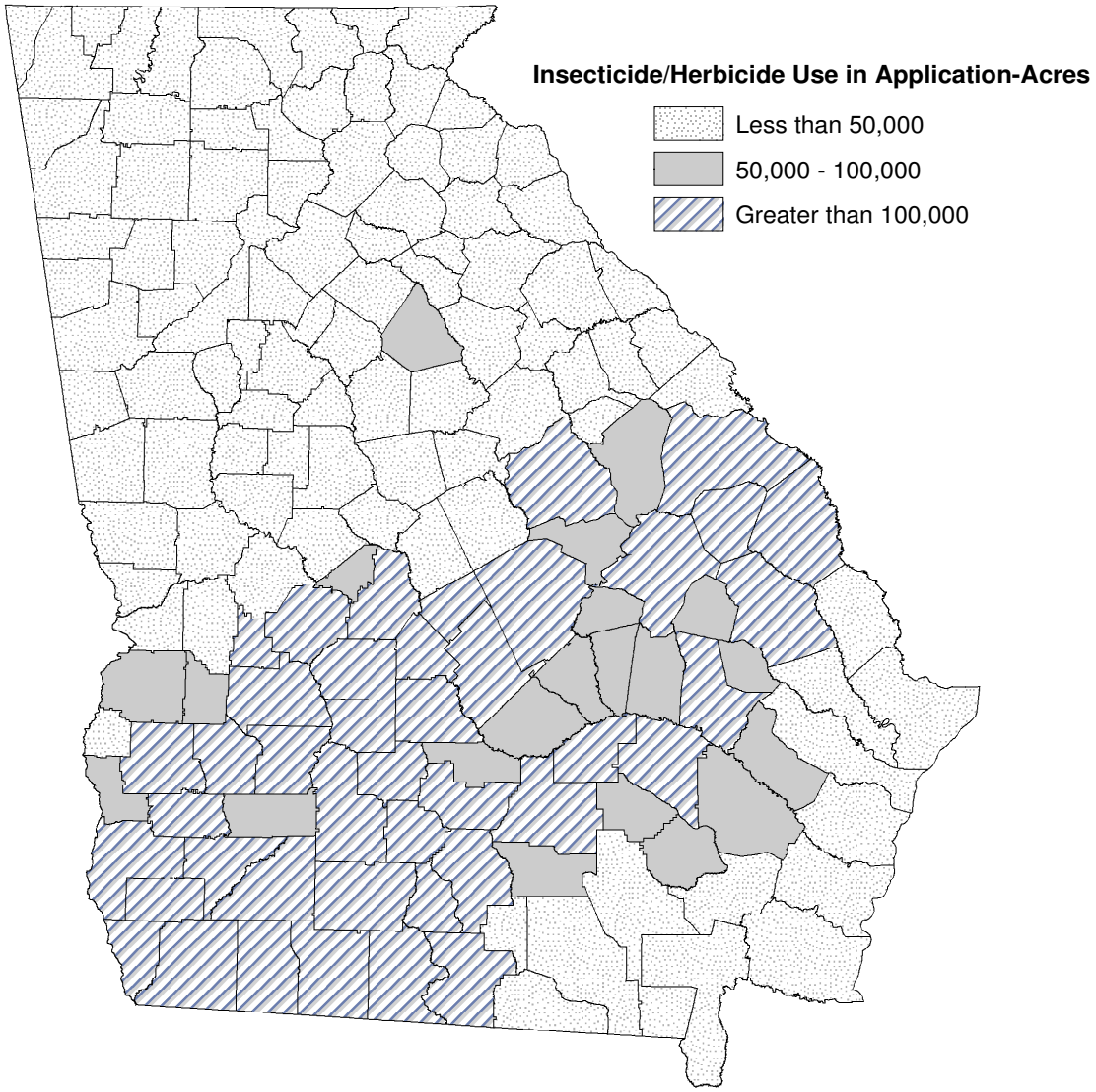
Only a few pesticides and herbicides have been detected in groundwater in these studies. There is no particular pattern to their occurrence, and most detections have been transient; that is, the chemical is most often no longer present when the well is resampled.

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 7. 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 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, continued until June 2006, when the final coastal Plan was adopted for implementation.

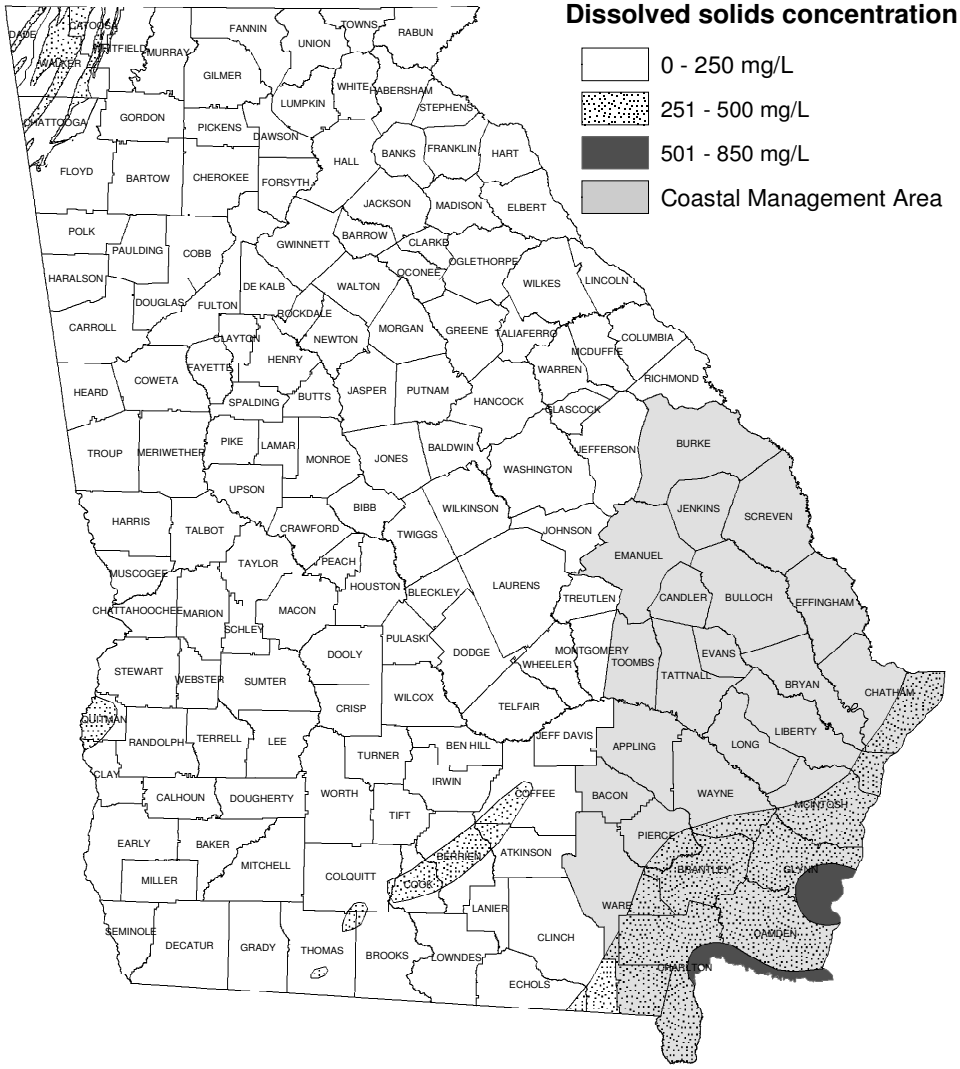
The new and final "Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion" describes the goals, policies, and actions the Environmental Protection Division (EPD) will undertake to manage the water resources of the 24-county area of coastal Georgia. The Plan is designed to support the continued growth and development of coastal Georgia while implementing sustainable water resource management. The final Plan replaces the "Interim Strategy for Managing Salt Water Intrusion in the Upper Floridan Aquifer of Southeast Georgia" and sets forth how EPD will conduct ground and surface water withdrawal permitting, and management and permitting of wastewater discharges. It advances requirements

FIGURE 6. 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 7. AREAS SUSCEPTIBLE TO NATURAL HIGH DISSOLVED SOLIDS AND 24 COUNTY AREA COVERED BY THE INTERIM COASTAL MANAGEMENT STRATEGY



for water conservation, water reclamation and reuse, and wastewater management. Based on the findings of the Coastal Sound Science Initiative (CSSI), the Plan will guide EPD water resource management decisions and actions until superceded by the adoption of the General Assembly of a Comprehensive State-wide Water Management Plan in 2008.

The primary focus of the final Plan is on stabilizing or halting the intrusion of salt water into the Upper Floridan aquifer, which is a dominant water supply source shared by coastal Georgia and neighboring areas of South Carolina and Florida. The Plan recognizes that actions taken to halt the intrusion of additional salt water into the aquifer will not result in the halting of the migration of the salt water that has already entered the aquifer.

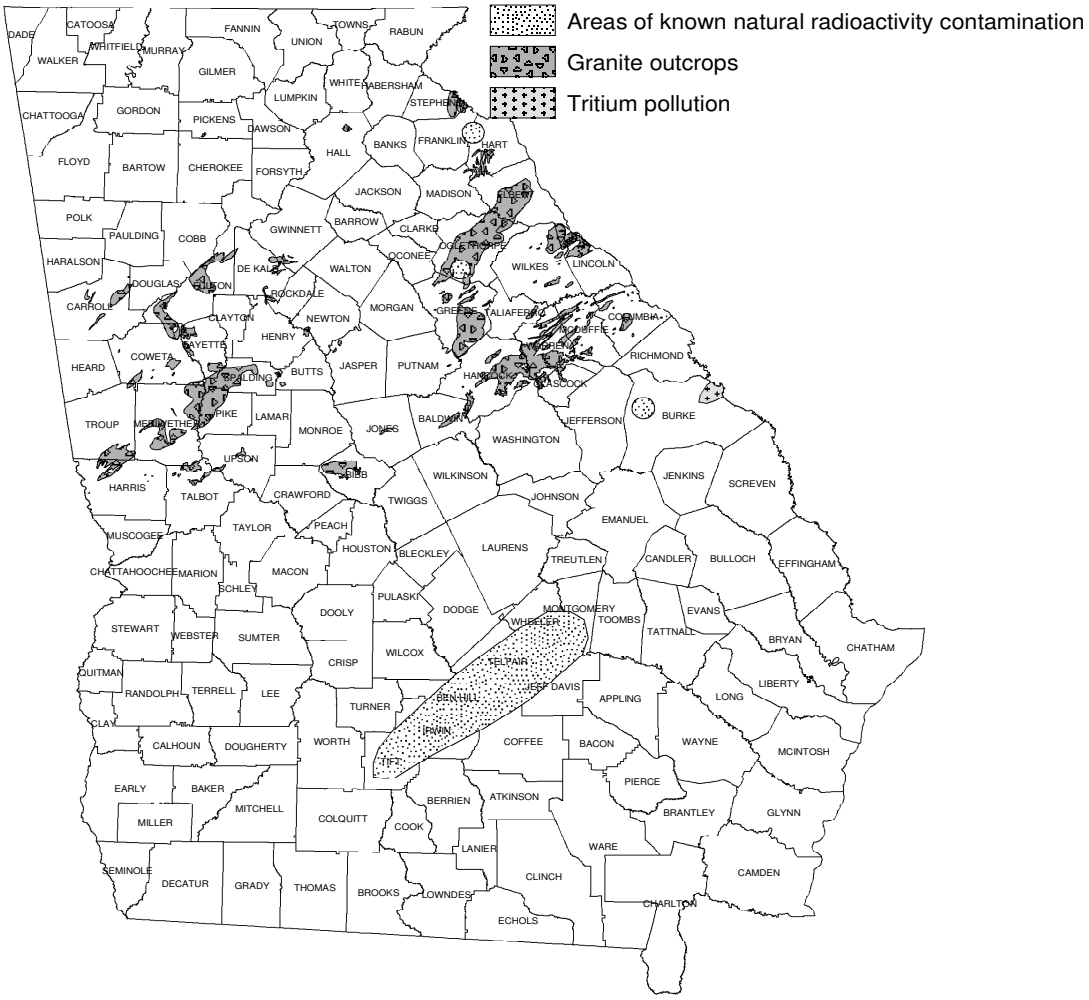
Management strategies that abate the intrusion of salt water are primarily concerned with quantity and supply, but water supply strategies are incomplete without a corresponding array of actions that will address related wastewater issues. The additional water supply available through the water withdrawal permitting conducted under this Plan will increase the amount of wastewater to be discharged into the sensitive ecosystems of coastal Georgia. Therefore, the final Plan also incorporates policies and actions needed to begin solving the wastewater discharge limitations that have become evident as coastal Georgia continues to grow.

The Comprehensive State-wide Water Management Planning Act (the Water Planning Act), passed by the General Assembly and signed into law by Governor Perdue in 2004, defines general policy and guiding principles for water resource management that guide this Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion. The incorporation of these policies and guiding principles into this Plan will facilitate its alignment with the Comprehensive State-wide Water Management Plan to be adopted in 2008. This final Plan for managing coastal Georgia salt water intrusion, withdrawal permitting, and wastewater management reflects the State's goal of sustainable use of both groundwater and surface waters, it supports regional economic growth and development, and contributes to protecting the short-term and long-term health of both the public and natural systems. It is based on the best available scientific data and information on the stresses on the water resources within the region.

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), 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. If the radioactive zones in a well cannot be sealed off, the public water may have to connect to a neighboring permitted public water system(s). Treatment to remove radionuclides and uranium from water is still a problem due to concerns for the disposal of the concentrated residue. 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).

FIGURE 8. AREAS SUSCEPTIBLE TO NATURAL AND HUMAN INDUCED RADIATION



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 public water supply wells for volatile organic chemicals (VOCs, e.g. solvents and hydrocarbons) is performed by the GAEPD. Only a very few water systems have 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.

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.

During the period from July 1, 2002 to June 30, 2006, a total of 327 MPAs were performed on 214 drinking water sources. (154 wells and 60 springs) operated by 130 separate public water systems. Of all the analyzed 214 sources, only 30 wells and 21 springs were declared to be under the direct influence of surface waters. The Division worked with each affected water system and provided technical assistance in identifying and correcting the deficiencies that were contributing to the contamination of the sources. This action assured these systems to maintain technical capacity to stay in compliance with the drinking water standards. Most of the springs were impacted due to faulty containment area and the wells were impacted mainly because of bad casings. All of the affected springs were cleaned, repaired and tested before they were placed back into service. The wells were repaired, abandoned, or pumped to a surface water treatment plant for treatment.

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, 2007, confirmed releases have been identified at 11,766 sites and site investigation and corrective action procedures have been completed at 9,559 sites and initiated at the remaining 2,207 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 566 sites listed on the Georgia Hazardous Site Inventory (HSI). Since the initial

publication of the HSI, cleanups and investigations have been completed on 249 sites. 421 Sites have cleanups in progress and 119 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 160 contracts to investigate and cleanup abandoned sites, of which approximately 125 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 show 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 2008 in Georgia, there were 110 permitted active (operational) waste disposal landfills, including 57 lined and unlined municipal solid waste landfills, 50 construction and demolition landfills, 1 waste-to-energy facility, 1 commercial industrial landfill, and 1 carpet baler facility. In addition, 21 landfills have ceased accepting waste (In-Closure) and are currently closing the facility. There are 140 landfills in post-closure care required to conduct groundwater monitoring for 30 years, including 111 closed landfills, 9 In-Closure landfills, and 20 operating landfills. Of the 350 closed landfills, 307 are monitoring groundwater with approved systems. The remaining landfills are in the process of installing monitoring systems, and/or are awaiting GAEPD approval, or were deferred or not required to install monitoring systems because the facilities closed prior to implementation of EPD monitoring requirements.

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. Relatively 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, 2007, the program has issued 330 UIC permits covering 8,006 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, 2007, 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 9). 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 1,695 permitted municipal wells in Georgia. Due to the closure of some municipal wells there are currently 1,635 active municipal ground water wells with Wellhead Protection Plans. A ten-year review of plans completed in 1996 was completed in 2007. 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 other hand, 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.

FIGURE 9. GENERALIZED MAP OF SIGNIFICANT GROUNDWATER RECHARGE AREAS OF GEORGIA

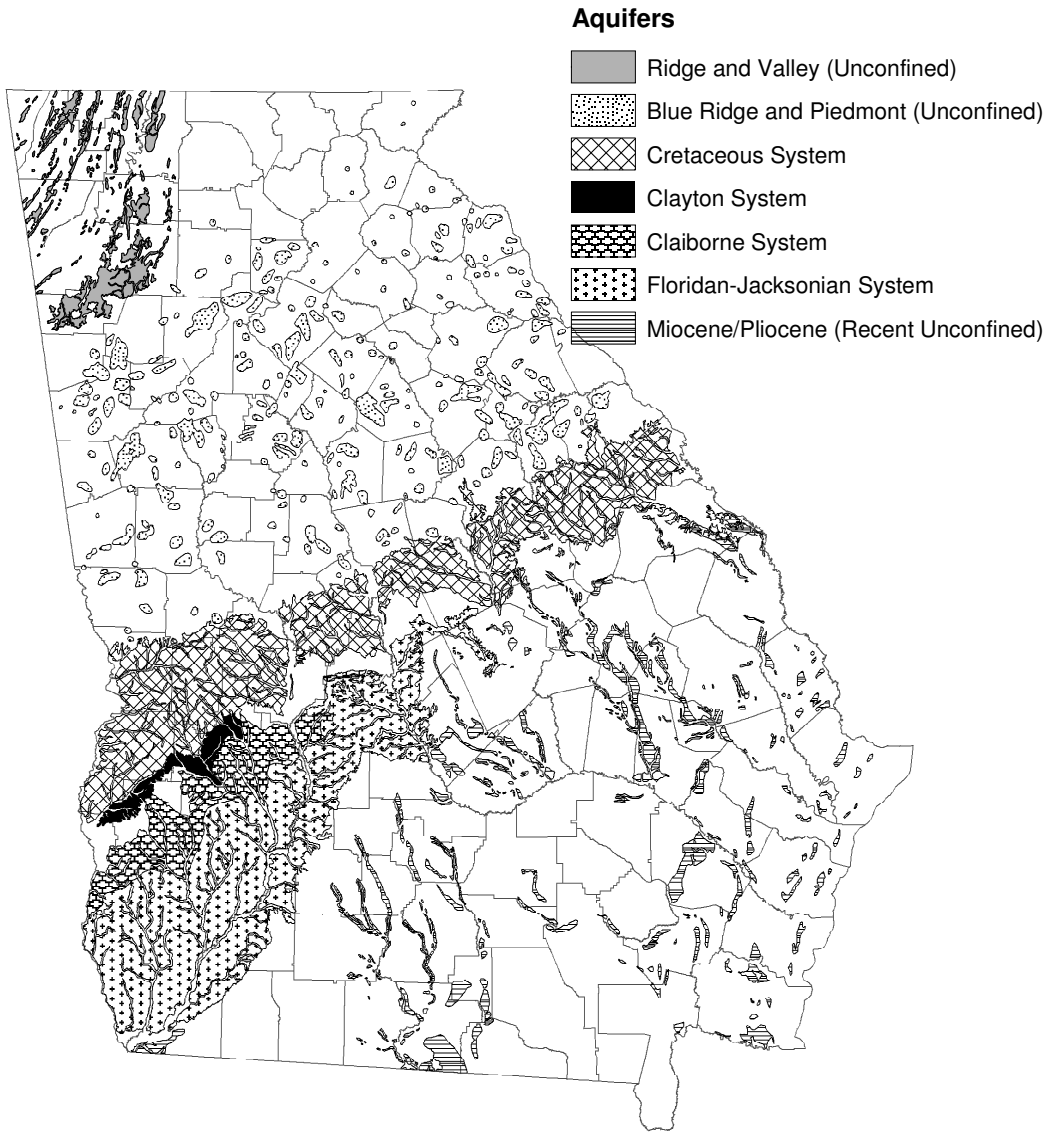


Table 8-2 is a summary of Georgia groundwater protection programs. Georgia, primarily the GAEPD, has delegated authority for all federal environmental programs involving groundwater. In addition, Georgia has several unique groundwater protection statutes that are more stringent than federal statutes. 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. Tables 8-3, 8-4, and 8-5 summarize ambient groundwater quality monitoring results for calendar years 2006 and 2007. 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 Withdrawal Permitting Program of the Watershed Protection 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 2007, GAEPD had 285 active municipal and industrial surface water withdrawal permits (185 municipal, 100 industrial), 469 active groundwater withdrawal permits (276 municipal/public supply, 174 industrial, 19 golf course irrigation) and approximately 22,000 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 2006-2007, 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, approximately 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 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 2006-2007, 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.

LT2 AND STAGE 2 ISSUES

Amendments to the SDWA in 1996 require EPA to develop rules to balance the risks between microbial pathogens and disinfection byproducts (DBPs). The Stage 1 Disinfectants and Disinfection Byproducts Rule and Interim Enhanced Surface Water Treatment Rule, promulgated in December 1998, were the first phase in a rulemaking strategy required by Congress as part of the 1996 Amendments to the Safe Drinking Water Act.

The Long Term 2 Enhanced Surface Water Treatment Rule builds upon earlier rules to address higher risk public water systems for protection measures beyond those required for existing regulations.

The Long Term 2 Enhanced Surface Water Treatment Rule and the Stage 2 Disinfection Byproduct Rule are the second phase of rules required by Congress. These rules strengthen protection against microbial contaminants, especially *Cryptosporidium*, and at the same time, reduce potential health risks of DBPs. These two new regulations went into effect in December 2005. EPD is prepared to fully implement these regulations in Georgia, including the “early Implementation” provisions of the regulations.

The purpose of Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) is to reduce illness linked with the contaminant *Cryptosporidium* and other pathogenic microorganisms in drinking water. The LT2ESWTR will supplement existing regulations by targeting additional *Cryptosporidium* treatment requirements to higher risk systems. This rule also contains provisions to reduce risks from uncovered finished water reservoirs and provisions to ensure that systems maintain microbial protection when they take steps to decrease the formation of disinfection byproducts that result from chemical water treatment.

Current regulations require filtered water systems to reduce source water *Cryptosporidium* levels by 2-log (99 percent). Recent data on *Cryptosporidium* infectivity and occurrence indicate that this treatment requirement is sufficient for most systems, but additional treatment is necessary for certain higher risk systems. These higher risk systems include filtered water systems with high levels of *Cryptosporidium* in their water sources and all unfiltered water systems, which do not treat for *Cryptosporidium*.

The LT2ESWTR is being promulgated simultaneously with the Stage 2 Disinfection Byproduct Rule to address concerns about risk tradeoffs between pathogens and DBPs.

The Stage 2 Disinfection Byproducts Rule will reduce potential cancer and reproductive and developmental health risks from disinfection byproducts (DBPs) in drinking water, which form when disinfectants are used to control microbial pathogens. Over 260 million individuals are exposed to DBPs.

This Stage 2 Disinfection Byproducts Rule strengthens public health protection for customers by tightening compliance monitoring requirements for two groups of DBPs, trihalomethanes (TTHM) and haloacetic acids (HAA5). The rule targets systems with the greatest risk and builds

incrementally on existing rules. This regulation will reduce DBP exposure and related potential health risks and provide more equitable public health protection.

Public Water System Supervision Program
This 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 June 30, 2007, the State of Georgia had approximately 2,462 active PWS serving a population over 8.7 million people. Of the 2,462 public water systems, approximately 70% (1,737) provide water to residential customers. These systems are referred to as CWSs and serve at least 15 service connections used by year-round residents or regularly serve at least 25 year-round residents daily at least 60 days out of the year. Of the 1,737 community water systems, 227 (13%) of them are served by surface water sources and the rest 1,510 (87%) are served by groundwater sources. All public water systems are issued a Permit to Operate a Public Water System, in accordance with the Georgia.

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. On January 12, 2000 EPA published minor revisions to the existing 1991 Lead and Copper Rule. It was called Lead and Copper Minor Rule Revision (LCRMR). The purpose of this revision was to eliminate unnecessary requirements, streamline and reduce burden and also to promote consistent implementation. All systems that are required to monitor for lead and copper are initially required to perform two, six-month consecutive rounds of lead and copper monitoring starting from January–December of the required year, all 19 large systems are still required to maintain a corrosion control plan and has continued to do so.

In 2006, the total number of systems exceeding the action level for lead and copper was 64. Out of the 64 systems, 4 of those systems exceeded both lead and copper (Pb/Cu) including 1 system with a population between 3,301-10,000, 20 exceeded for copper only and 40 exceeded for lead only. Forty-seven of the systems that exceeded were community water systems (population less than 3,300) and 16 were non-transient-non-community water system (population less than 3,300). Ninety-six% of those systems that exceeded either parameter have completed

the required water quality parameter and source water monitoring and all systems have performed the public education requirements.

During 2007, the total number of systems that exceeded the action level for Pb/Cu was 52. hirty-eight of those systems are community water systems with population less than 3,301 and 11 of those systems are non-transient-non-community system with a population less than 3,301). Three systems served a population between 3301-10,000. Out of the 52 systems that exceeded, 4 systems exceeded for both lead and copper, 19 systems exceeded for copper only and 29 systems exceeded for lead only. Ninety-five% of the systems that exceeded has conducted the required water quality parameters and source water monitoring and has also completed the public education requirements. These systems will remain in full monitoring until they have completed two consecutive rounds of monitoring without an exceedance. The number of systems exceeding has dropped tremendously from years past.

Monitoring for the 16 inorganic chemicals, 55 volatile organic chemicals and 43 synthetic organic chemicals, pesticides, herbicides and polychlorinated biphenyls is still required for systems that are considered a public water system. New systems are still 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). There were 3 systems that had results over the MCL for individual volatile organic contaminants in a particular quarter, however these system didn't received a violation due to compliance being based on four consecutive quarters results being higher than the established maximum contaminant level (MCL). The systems however are being monitored quarterly for VOCs.

A majority of Georgia's water systems, which are currently contracted with the State (participating in DWSF) have been issued monitoring waivers for SOCs and therefore are not required to monitor for those contaminants. New sources however, for existing systems are still required to establish base line monitoring for SOCs. After establishing the four quarters baseline monitoring they will be eligible for a waiver.

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 also prepared vulnerability studies for individual water sources. These studies included 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 included water wells, potential pollution sources around the wells, cultural information such as roads, and bodies of water. As of December 31, 2003, the GAEPD had prepared site specific maps for approximately 723 privately owned ground water public water systems. Additional maps have not been completed since the information is included in the SWAP documents.

USEPA approved Georgia's Source Water Assessment and Protection Implementation Plan on May 1, 2000. Georgia's deadline for completion of surface water source water assessments (SWAPs) was November 1, 2003. Georgia's deadline for completion of ground water SWAPs was June 2005 for community systems, December 2005 for non-transient non-community systems, and December 2006 for transient non-community systems.

All scheduled SWAPs have been completed. Currently we are in the process of performing SWAPs on all privately owned groundwater systems. For the privately owned ground water systems, approximately 1,133 source water assessments have been prepared since July 1, 2001 through June 30, 2007. During the current reporting period from July 1, 2006 to June 30, 2007, approximately 19 SWAPs were completed for privately owned community ground water systems; 39 SWAPs for non-transient non-community ground water systems and 42 SWAPs for transient non-community ground water systems. This activity for the privately owned ground water systems will continue until completion.

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 reuse, (2) maximizing returns to the basin by managing interbasin transfers and the 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, and (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 Plan signed into law by Governor Perdue on February 6, 2008 provides Georgia a framework for addressing each of these 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, detergents and a variety of other pollutants being washed into rivers and lakes by stormwater. Even stormwater runoff itself, if rate and volume is unmitigated, can be extremely detrimental to aquatic habitat and hydrological systems. Nonpoint source 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 green infrastructure, 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 structural practices, low impact development, erosion and sedimentation controls, 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 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 what we do on the land has a direct impact on water quality. Adding more pavement and other impervious surfaces, littering, driving cars which drip oils and antifreeze, applying fertilizers and pesticides and other activities and behaviors all contribute 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.