CHAPTER 6

# Public Health & Aquatic Life Issues

**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 2010, 51.6% of recommendations for fish tested in Georgia waters were for No Restriction, 31% were to Limit Consumption to One Meal Per Week, 13.4% were to Limit Consumption to One Meal Per Month, and 4% was Do Not Eat Advisories. 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.

**Fish Consumption Guidelines**
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.

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.

**TABLE 6-1. PARAMETERS FOR FISH TISSUE TESTING**

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

**Mercury in Fish Trend Project**
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 relevance 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

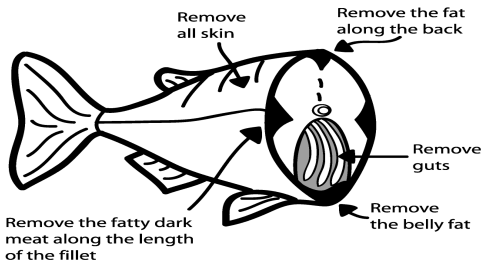
individual fish muscle tissue are analyzed for mercury and other metals.

Mercury is a naturally occurring metal that cycles between the land, water, and the air. As mercury cycles through the environment it is absorbed and ingested by plants and animals. It is not known where the mercury in Georgia's fish originates. Mercury may be present due to mercury content in natural environments such as in South Georgia swamps, from municipal or industrial sources, or from fossil fuel uses. It has been shown that mercury contamination is related to global atmospheric transport. The EPA has evaluated the sources of mercury loading to several river basins in Georgia as part of TMDL development, and has determined that 99% or greater of the total mercury loading to these waters occurs via atmospheric deposition.

States across the southeast and the nation have detected mercury in fish at levels that have resulted in limits on fish consumption. In 1995, the USEPA updated guidance on mercury, which documented increased risks of consuming fish with mercury. The DNR reassessed all mercury data and added consumption guidelines in 1996 for a number of lakes and streams, which had no restrictions in 1995. The Georgia guidance for 2010 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 2008-2009 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 consumption of fish. The USEPA criterion represents a national approach to address what mercury concentration 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.

**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 Child-bearing Age and Children** In 2003, new approaches to spatial analyses were used to assess fish tissue contaminants by species and trophic level, and across distinct geographic areas including hydrologic unit codes, river basins, and hydrogeologic provinces of Georgia. The analyses were used to generate simple brochures with specific information targeting women of child-bearing age and children for distribution through health and nutrition related outlets. Brochures were generated for four distinct areas of Georgia, and English versions were released in November 2003, followed by publication of Spanish brochures in March of 2004. The College of Family and Consumer Sciences, Cooperative Extension Services, University of Georgia and the Chemical Hazards Program, Georgia Division of Public Health collaborated in the development of the brochures. The information will be updated as needed, and all brochures are currently available on the DNR website.

**Recreational Public Beach Monitoring**
The U.S. Army Corps of Engineers conducts fecal 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**

Georgia's one hundred linear mile coastline contains approximately 500,000 acres of potential shellfish habitat. Most shellfish in Georgia grows in the narrow intertidal zone and are exposed between high water and low water tide periods. Only a limited amount of that area, however actually produces viable shellfish populations. Lack of suitable cultch, tidal amplitudes, disease, littoral slope, and other unique geomorphologic features contribute to the limited occurrence of natural shellfish resources along the Georgia Coast.

The Coastal Resources Division currently monitors and maintains five shellfish growing areas comprised of commercial leases and public recreational harvest areas. Shellfish waters on the Georgia coast are classified as "Approved" or "Prohibited" in accordance with the criteria of the National Shellfish Sanitation Program. Specific zones within shellfish growing areas may be closed to shell fishing because of the proximity to a marina or a municipal or industrial discharge. Georgia maintains approximately 33,000 acres approved for the harvest of shellfish for commercial and/or personal consumption. Only those areas designated as Public Recreational Harvest or those areas under commercial lease are classified as "Approved for shellfish harvest". Shellfish growing area waters are monitored regularly to ensure that these areas remain in compliance with the FDA fecal coliform thresholds. All other waters of the state are classified as "Prohibited", and are closed to the taking of shellfish. It is important to note that, even though some of these areas could potentially meet the criteria to allow for harvesting, they have been classified as "Prohibited" due to the lack of available water quality data.

**Cyanobacteria (Blue-Green Algae) Blooms**

Cyanobacteria blooms are an increasing concern for Georgia's citizens. Cyanobacteria occur naturally in low abundance in Georgia's lakes and reservoirs. However, eutrophication results in conditions that are favorable for cyanobacteria growth. Cyanobacteria blooms can cause a variety of water quality issues including, the potential to produce toxins and taste-and-odor compounds. These compounds are produced naturally by cyanobacteria, but their function or what causes their production is still currently unknown. EPD is in the process of developing a means to better detect blooms, assess whether toxins are present, and better inform the public on this issue.

## TABLE 6-2
## NO CONSUMPTION RESTRICTIONS - 2010

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

## TABLE 6-3. FISH CONSUMPTION GUIDANCE FOR LAKES – 2010

| 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, Bluegill | LMB > 12" | CCF > 16" |
| Rabun | LMB 12-16", Bluegill, White catfish < 16" | White catfish & LMB > 16" | |
| Reed Bingham S.P. | | | LMB > 12"Catfish > 16" |
| Richard B. Russell | Crappie, Bluegill, White perch, Catfish | LMB > 12" | |
| Seminole | CCF, Spotted sucker, Blk crappie, Redear | LMB > 12" | |

| LAKES | NO RESTRICTIONS | 1 MEAL/ WEEK | 1 MEAL/ MONTH |
|---|---|---|---|
| So. Slappy Blvd. Offramp (Albany) | Bluegill | Largemouth bass 12-16" | Largemouth bass > 16" |
| Stone Mountain | Catfish | LMB > 16" | |
| Tobesofkee | CCF | LMB > 16" | |
| Tugalo | 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. FISH CONSUMPTION GUIDANCE FOR RIVERS, CREEKS AND ESTUARINE SYSTEMS – 2010

| 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 | |
| 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 | |

| RIVERS/CREEKS | NO RESTRICTIONS | 1 MEAL PER WEEK | 1 MEAL PER MONTH |
|---|---|---|---|
| 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 | |
| Flint River (Dougherty/Mitchell/Baker Co.) | Sucker, Flathead Catfish <16” | LMB, Flathead Catfish 16-30” | Flathead Catfish >30” |
| Gum Creek (Crisp Co.) | Carp | LMB | |
| Holly Creek (Murray County) | | Blacktail redhorse | |
| 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 |

| RIVERS/CREEKS | NO RESTRICTIONS | 1 MEAL PER WEEK | 1 MEAL PER MONTH |
|---|---|---|---|
| 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 | |
| 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 Cr., Gibson Cr.) | | 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, Spotted Seatrout | | | |
| Hayner's Creek (Savannah) | Blue crab | | | |
| North Newport River | Striped Mullet | Blue Crab | | |
| Savannah Estuary | Striped mullet | | Striped bass >=27" | |
| St. Simon's Sound | Tripletail | | | |
| * 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.<br>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 which was established in 1972. Early efforts by the Board in the late 1960's and early 1970's included documenting water quality conditions, cleanup of targeted pollution problems and the establishment of water use classifications and water quality standards. Trend monitoring efforts were initiated and a modest State construction grants program was implemented.

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

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

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

In the late 1980s and early 1990s, the Georgia General Assembly passed a number of laws that set much of the agenda for the GAEPD in the early 1990s. Laws such as the Growth Strategies Act which helps protect sensitive watersheds, wetlands, and groundwater recharge areas and the ban on high phosphate detergents to reduce nutrient loading to rivers and lakes were enacted. Legislation was passed in 1990 that required the GAEPD to conduct comprehensive studies of major publicly owned lakes and establish specific water quality standards for each lake. In addition in 1991 the General Assembly passed a law requiring a phosphorus limit of 0.75 mg/l for all major point sources discharging to the Chattahoochee River between Buford Dam and West Point Lake. Major river corridors were accorded additional protections with laws passed in 1991. Also in 1991, the General Assembly passed the Georgia Environmental Policy Act that requires an environmental effects report be developed for major State funded projects. In 1992, the General Assembly passed the River Basin Management Planning Act that required the GAEPD develop and implement plans for water protection for each major river basin in Georgia.

In 2004, the General Assembly passed the Statewide Comprehensive Water Management Planning Act. This legislation replaced the river basin management planning legislation and charged the EPD with the responsibility of developing a comprehensive statewide water management plan for Georgia in accordance with the following policy statement: "Georgia manages water resources in a sustainable manner to support the state's economy, protect public health and natural systems, and to enhance the quality of life for all citizens."

In 2010-2011 high priority was placed on Comprehensive Statewide Water Management Planning, monitoring and assessment, water quality modeling and TMDL development, TMDL implementation, 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. Significant work was also done by Alabama, Florida and Georgia in cooperation with the Corps of Engineers to conduct studies of the Apalachicola/ Chattahoochee/Flint and Alabama/Coosa/Tallapoosa River Basins to facilitate efforts to develop agreements regarding water allocations. The GAEPD supports these projects to avoid duplication of effort and to effectively leverage resources to accomplish watershed protection in interstate river basins.

**Water Quality Monitoring**

The goal of the water protection program in Georgia is to effectively manage, regulate, and allocate the water resources of Georgia. In order to achieve this goal, it is necessary to monitor the water resources of the State to establish baseline and trend data, document existing conditions, study impacts of specific discharges, determine improvements resulting from upgraded water pollution control plants, support enforcement actions, establish wasteload allocations for new and existing facilities develop total maximum daily loads (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, 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 2010-2011 in support of the development of wasteload allocations and total maximum daily loads (TMDLs). In 2009, TMDLs were developed for segments on the Georgia 2008 303(d) list for the Ogeechee and Savannah River Basins and these TMDLs were finalized, submitted to EPA and approved in early 2010. In 2010, TMDLs were developed for segments on the Georgia 2010 303(d) list for the Ochlockonee, Satilla, St. Marys, and Suwannee River Basins. These TMDLs were finalized, submitted to EPA and approved in early 2011. In 2011, TMDLs were developed for segments on the 2010 303(d) list for the Altamaha, Ocmulgee, and Oconee River Basins. Over the 2010-2011 period, 46 TMDLs were approved. To date more than 1450 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 source issues are made by the GAEPD in coordination with local governments and industries. Implementation of management practices and activities to address the nonpoint sources of pollution is being conducted through the development of various types of TMDL implementation plans. These types of plans include Tier 2 implementation plans, Watershed Improvement Plans (WIPs), updates to existing plans prepared through contracts with Regional Commissions (RCs) and other public contractors.

The Tier 2 implementation plans initiate public outreach, bring together local stakeholder groups to assess the sources and causes of the impairment, identify appropriate management practices and activities, and set forth a plan of action to monitor progress and achieve the TMDL for each segment impairment. As of 2010 GAEPD no longer completes Tier 2 plans.

The Watershed Improvement Plans build local capacity for watershed management within the State's Water Planning Regions as defined by the "Georgia Comprehensive State-wide Water Management Plan" and lead to the restoration of impaired stream segments. These plans, divided into two one-year contracted phases, fund development of local partnerships, identification of specific pollution sources, initial targeted monitoring and visual field surveys, prioritization of pollution sources and pollution reduction controls, development of schedules, and the final strategy for securing funds to implement restoration activities or BMPs. The final WIPs meet the US EPA 9-Key Elements of watershed planning and NRCS EQIP eligibility priorities, which can lead to additional funding from 319(h) grants and other resources. These plans are also intended to be more of a "road map" in addressing water quality concerns within small watersheds (HUC 10 & 12). The nine key elements provide a solid and consistent framework for watershed-based plans and cover plan components such as assessments, stakeholder involvement, outreach, implementation schedules, milestones and management measures. During 2010-2011, eighteen two year Watershed Improvement Plans were completed and the first year of twelve additional plans was initiated. Each of the twelve Regional Commissions, Northwest

Georgia, Georgia Mountains, Atlanta Regional Commission, Three Rivers, Northeast Georgia, Middle Georgia, Central Savannah River Area, River Valley, Heart of Georgia Altamaha, southwest Georgia, Southern Georgia, and Coastal participated in this program in 2010-2011.

**Clean Water State Revolving and Georgia Fund Loan Programs**

The Clean Water State Revolving Fund (CWSRF) is a federal loan program administered by the Georgia Environmental Finance Authority (GEFA) that provides funding for a variety of wastewater infrastructure and pollution prevention projects. Eligible projects include water quality, water conservation and wastewater treatment projects, such as constructing new wastewater treatment plants, repairing and replacing sewers, stormwater control projects and implementing water conservation projects and programs. The Georgia Fund is a state-funded loan program administered by GEFA for wastewater, water, and solid waste infrastructure improvements. The Georgia Fund program is available to local governments for projects such as sewer and water lines, treatment plants, pumping stations, wells, water storage tanks and water meters. GEFA contracts with GAEPD to provide environmental/engineering review and construction management services for these projects.

Founded in 1985, GEFA offers low-interest loans and grants for projects that improve Georgia's environment, protect its natural resources, and promote economic development. The CWSRF program was initiated in1988 to the full extent allowed by the 1987 amendments to the Clean Water Act. Since 1985, GEFA has approved more than $3 billion for infrastructure improvements and more than 1,400 projects have been funded to date. The Clean Water State Revolving Fund awarded approximately $269.9 million to 54 projects and the Georgia Fund awarded $64.2 million to 50 water quality projects in FY2010-2011. The Construction Management Unit (CMU) of GAEPD currently overviews some 126 projects in various stages of activity with a loan value of $790.7 million.

Under the American Recovery and Reinvestment Act (ARRA) in FY2010, GEFA awarded $84.3 million in CWSRF contracts to 38 local governments. Georgia was recognized as the first state in the nation to start construction on 100% of its CWSRF-ARRA contracts. Communities used these funds to fund new/expanded treatment plants (including energy efficiency improvements), large-diameter tunnels, biogas cogeneration facilities, sewer lines, sewer rehabilitation, pervious pavements, and even a low-flow toilet rebate program. Because of the need to start construction in a relatively short time period, it was observed that the preponderance of the projects were either sewer lines or sewer rehabilitation. All of the CWSRF-ARRA construction funds have now been expended. ARRA brought several new elements to CWSRF program such as loan subsidization, extensive Davis-Bacon Act and Buy American monitoring and documentation requirements, jobs reporting requirements for the communities, and significant additional federal overview activities. Going forward, it appears that only the loan subsidization and the new Davis-Bacon Act expectations will remain a part of the "base" CWSRF program.

**Metro District Planning**

The Metropolitan North Georgia Water Planning District (District) updated the comprehensive regional and watershed-specific plans to be implemented by local governments in the District in 2009.

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, the need to carefully and cooperatively manage and protect Metropolitan Atlanta's rivers and streams has become a priority.

GAEPD is charged with the enforcement of the District plans. State law prohibits the Director from approving 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.

GAEPD conducts audits to determine whether local governments are 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 protects Georgia's valued resources by strategically aligning 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.

During 2010-2011, the Land Conservation Program funded 150 projects, protecting 90,000 acres of land through state income tax credits, fee-title land purchases and micro-grants for state-held conservation easements acquisitions. To date, the Program has completed a total of 392 projects covering 222,848 acres in 113 counties. Funded projects include urban nature preserves, rural farmlands, coastal wetlands, wildlife management areas, and historical sites.

Monies from the Clean Water State Revolving Fund comprise an important funding option for the Land Conservation Program. The Program completed eleven loans using $11 million to preserve 5,600 acres. One property on the Etowah River has been protected using SRF funds since 2009.

Funds came from a variety of sources including federal, conservation programs, local governments, private organizations like The Nature Conservancy (TNC) and other state funding sources.

**National Pollutant Discharge Elimination System (NPDES) Permit Program**
The Federal Clean Water Act requires NPDES permits for point source wastewater dischargers, compliance monitoring for those permits and appropriate enforcement action for violations of the permits.

In 2010-2011, NPDES permits were issued, modified or reissued for 164 municipal and private discharges and for 148 industrial discharges.

In addition to permits for point source wastewater discharges, the GAEPD has developed and implemented a permit system for land application systems. Land application systems are used as alternatives to surface water discharges when appropriate. A total of 64 (municipal and private) and 16 (industrial and Federal) permits for land application systems were issued, reissued or modified in 2010-2011.

**Concentrated Animal Feeding Operations**
The 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).

There are currently 812 farms which require general LAS or NPDES permits. That includes approximately 157 large farms with liquid manure handling systems. Of these, 43 have federal NPDES concentrated animal feeding operation (CAFO) permits and 114 have state LAS permits. These farms, with their liquid waste lagoons and spray fields, are important managers of water resources. Also included are 655 large dry manure (chicken litter) poultry farms which require NPDES CAFO permits. 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). 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.

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. Projects using Section 319(h) funds that install agricultural BMPS are required to complete a CNMP. For 2010-2011, 9 projects will require CNMPs which could equal up to 50 CNMPS prepared around the State.

**Combined Sewer Overflows**
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). A CSO is a sewer system that is designed to collect rainwater runoff, domestic sewage and industrial wastewater in the same pipe. The permits require that the CSO must not cause violations of Georgia Water Quality Control Standards.

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. 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.

**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. The permits specify 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 2011, of the 164 major municipal water pollution control plants (facilities with design flow equal to or greater than 1.0 mgd), four were in significant noncompliance with the final limitations. These four 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 applicable requirements for pretreatment.

Industries in Georgia achieved a high degree of compliance in 2010-2011. The thirty-nine major industrial facilities were in compliance at the end of 2011.

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 fiscal year 2010 and 2011, 357 Orders addressing wastewater issues were issued and approximately $2,192,634 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 2010-20011 a total of 168 stormwater Orders were issued and a total of $954,616 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.

**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, 2004 and 2009.

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, 2005 and 2010.

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 which 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 and covers 87 municipalities. In 2009, EPD issued a General NPDES Permit to seven Department of Defense facilities, which were designated as Phase II MS4s. Two of those bases closed in 2011, reducing the number of permitted DOD facilities to five. In 2011, GAEPD issued a Phase II MS4 General Storm Water Permit to the Department of Transportation, which is applicable to post-construction runoff in jurisdictions with MS4 permits. The NPDES General Permits do 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, GAEPD issued NPDES General Permit No. GAR000000 that regulates the discharge of storm water from 10 categories of industrial activity. This permit was reissued in 1998 and 2006, with approximately 2900 facilities retaining coverage. An additional 600 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 226 industrial facilities to assess compliance with the industrial general storm water permit during 2010-2011.

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, minor activities such as home landscaping and gardening, and water supply reservoirs.

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

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 also 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. During the 2010-2011 period, the GAEPD decertified as issuing authorities 4 counties and 8 cities. All twelve requested decertification. During this same period, 26 cities were certified as local issuing authorities.

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 which went into effect January 10, 2005.

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 Georgia Soil and Water Conservation Commission continues to administer the training and certification program. As of September 2011, 68,660 people have been certified and 25,505 re-certified. Senate Bill 155 amended the Act in 2009 to exempt 25-foot buffers along ephemeral streams. This legislation clarified the definition of ephemeral in the Erosion and Sedimentation Rules. The E&S Rules were amended in 2011 to add a new stream buffer variance criteria for projects that pipe or re-route waterways that are not jurisdictional waters of the U. S., and for new infrastructure projects that impact only the buffer and not the stream.

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. The permit was eventually issued on June 12, 2000 and became effective on August 1, 2000, and regulated storm water discharges associated with land disturbances of five acres or greater
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 permits were most recently reissued by GAEPD on August 1, 2008. The 2008 permits added additional requirements for projects that discharge to impaired stream segments and for projects that disturb 50 acres of more at one time.

Approximately 19,000 active NOIs have been received by GAEPD as of September 30, 2011.

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. GAEPD will complete the revision in 2012.

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 FY10 – FY11, Georgia's Section 319(h) grant project funded 50 new projects for over $9 million. For FY12, Georgia is poised to award $3.66 million to local governments and agencies to support streambank restoration, watershed planning, TMDL implementation, and support of Georgia's Coastal Nonpoint Source Management Program.

In 2011, Georgia's Nonpoint Source Program administered more than 100 Section 319(h) projects, totaling more than $26 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 2010-2011, approximately $2.1 million in new Section 319(h) Grant projects were implemented to 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.

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 2010 - 2011, the EQIP program provided over $20 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 2009, 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, there were 221 sites evaluated totaling 27,004 acres. The number of acres in BMP compliance was 99.7%. This is 0.07 percent better than 2007. Out of the 5,776 applicable, individual BMPs evaluated, 94.1% were implemented. This is a 2.35 percent increase from 2007. Out of the 68.97 miles 68.97 miles of streams evaluated, more than 93.8% were found to have no impacts or impairments from forestry practices. This is however, a slight increase from the 2007 survey, which was at nearly 92% no impact.

During the State FY 09, the Georgia Forestry Commission provided 87 BMP talks to approximately 2,073 individuals. In addition, the GFC has addressed and resolved over 88 different logging complaints, and has conducted more than 78 one-to-one conferences with silviculture workers and professionals on-site or in the field. The Georgia Forestry Commission is currently working off of a FY09 319(h) grant and will not conduct another Statewide BMP Compliance Surveys until 2012.

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' Water Resources

Technical Assistance 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 provides technical assistance on many different aspects of water quality management. As an information and networking center, the Program provides water resources tools, one-on-one technical assistance, and workshops to address regional water quality issues to local elected officials currently serving 159 counties and 532 cities. The 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. In an effort to renew NPS assistance efforts, GAEPD provided Section 319(h) funding to DCA in 2011 to augment its technical assistance capabilities.

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 2012. 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.

In 2011, the GAEPD updated its Green Growth Guidelines. These are intended to provide information to local governments on how to grow in a more environmentally sustainable manner. Much of the information is focused on water quality and management measures to address potential impairments.

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.

**Outreach Unit**

The Outreach Unit consists of four primary programs that support the education and involvement of Georgia citizens in activities to protect our waterways from nonpoint source pollution. The four programs,

highlighted below, include Georgia Project WET, River of Words, Georgia Adopt-A-Stream and Rivers Alive. A program manager and four state coordinators provide the leadership necessary to implement the Outreach Unit programs.

**Georgia Project WET (Water Education for Teachers) Program**

In October 1996, 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 mission of Project WET is to reach children, parents, educators, and communities of the world with water education.

The success of the Georgia Project WET Program has been phenomenal. Since 1997, over 10,100 Georgia teachers have been certified as Project WET educators, and over 727 have volunteered to be facilitators and train other adults in their communities.

Certified Project WET instructors receive *The Dragonfly Gazette* twice a year, an electronic newsletter for educators brimming with water education resources and news. Georgia Project WET Program provides educators with resources such as the Enviroscape Nonpoint Source, Wetlands, Stormwater 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. 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. During the conference, Georgia Project WET recognizes a Facilitator, Educator and Organization 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 Organization of the Year can choose to receive either a WET educator workshop for 25 individuals or $400 worth of water education materials to use for workshops or with students.

Georgia Project WET has also 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 4-8$^{th}$ 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 1,388 educators have been trained to implement the curriculum in their classrooms and in the field.

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. 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 25-35 sites per year. In addition, over 70,000 students and teachers each year will view the River of Words exhibit when they visit the Education floor of the Georgia Aquarium.

**Georgia Adopt-A-Stream Program**

The Georgia Adopt-A-Stream Program is a citizen monitoring and stream protection program that focuses on what individuals and communities can do to mitigate nonpoint sources of pollution. The Program consists of two staff positions in the Georgia EPD and over 50 local community and watershed Adopt-A-Stream coordinators. The community and watershed coordinators are a network of college, watershed, or local based training centers located throughout Georgia. The network of local programs provides 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 Georgia 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's objectives are: (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, (3) provide educational resources and technical assistance for addressing nonpoint source pollution problems statewide, and (4) collect and share baseline water quality data.

Currently, thousands of volunteers participate in the 50 community sponsored Adopt-A-Stream Programs. Volunteers conduct clean ups, stabilize streambanks, monitor waterbodies using physical, chemical and biological methods, and evaluate habitats and watersheds at over 300 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.

Volunteers are offered different options of involvement. Each option involves an education and action component on a local waterbody. In addition to water quality monitoring, volunteers are encouraged to engage in habitat improvement, riparian restoration and rain garden construction projects.

The Georgia Adopt-A-Stream Program provides volunteers with additional resources such as the *Getting to Know Your Watershed, Visual Stream Survey*, *Macroinvertebrate and Chemical Stream Monitoring*, *Bacterial Monitoring, Adopt-A-Wetland*, *Adopt-A-Lake*, Amphibian Monitoring 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 5,000 volunteers statewide with program updates and information about available resources. Additional information about the Georgia Adopt-A-Stream Program, watershed investigation and water quality monitoring information 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.

The website Adopt-A-Stream now supports an online database to house all volunteer monitoring water quality data and programmatic information. The website is now "database" driven, with real time stats and graphs automatically generated by the information volunteers submit. Several formats are used to display monitoring data, including charts, graphs and basic GIS using a maps page that displays terrain, topographical and photographic layers. Data sharing developments like this website improve volunteer monitors' capacity to learn about and protect local water bodies. Presently there 200 groups actively monitoring 400 sites.

Georgia Adopt-A-Stream partnered with the Georgia River Network to present the Watershed Track at their annual conference. In another partnership activity with Georgia River Network, Adopt-A-Stream trained citizen monitors and led the scientific monitoring team for Paddle Georgia (a weeklong paddle down a major Georgia waterway). Over 75 sites were tested in 2011 on the Oconee River. These events helped connect citizens with activities that help protect and improve Georgia waters.

The Outreach Unit coordinates Georgia's annual volunteer waterway cleanup event, Rivers Alive, held in late summer through fall. Rivers Alive is a statewide event that includes 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 2011 waterway cleanup, more than 29,000 volunteers cleaned over 1,800 miles of waterways and removed some 660,000 pounds of trash and garbage including motorcycles, cars, televisions, refrigerators, tires, shingles and general trash. Rivers Alive receives key support in the form of corporate sponsorship for the purchase of t-shirts, banners, and other materials to support local organizers. The cleanup events also share educational watershed posters and bookmarks, and public service announcements to advertise in local newspapers and on the radio.

Rivers Alive also produces a how to organize a cleanup guide and a quarterly e-newsletter to provide updated information and helpful cleanup tips for organizers. In addition to protecting and preserving the State's waterways, Rivers Alive cleanup events involve participants in diverse activities such as storm drain stenciling, water quality monitoring and riparian restoration workshops, riverboat tours, wastewater treatment facility tours and general environmental education workshops.

Rivers Alive maintains an online database for registering cleanups and submitting cleanup data. All cleanups are listed on an interactive maps page that shares individual organizer information, including driving directions. The results for each year are displayed on maps and in graphs for each group to view and share. Additional information about Rivers Alive is available on the website, www.RiversAlive.org.

**Emergency Response Network**
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. These core team members are supplemented with additional trained Specialists who serve as part-time Emergency Responders.

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 periodic 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 GAEPD 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).

## 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 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.

Groundwater is extremely important to the life, health, and economy of Georgia. For example, in 2005, groundwater made up approximately 21.5 percent of the public water supply, 100 percent of rural drinking water sources, 65 percent of the irrigation use and 48 percent of the industrial and mining use. Total estimated groundwater withdrawals in 2005 were approximately 1.2 billion gallons per day. This information is updated every 5 years. 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 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,
- 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, and continue 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. Georgia's aquifers can, in general, be characterized by the five main hydrologic provinces in the State (Figure 8-1). In addition to sampling of public drinking water wells as part of the Safe Drinking Water Act and sampling of monitoring wells at permitted facilities, the GAEPD monitors ambient groundwater quality through the Georgia Groundwater Monitoring Network. From 1984 through January 2004, this network regularly sampled wells and springs, tapping important aquifers throughout the State. From February 2004 through 2010, the network focused on various specialized situations: the Coastal area (102 wells), the Piedmont/Blue Ridge area (120 wells and springs), small public water systems (180 wells and springs, statewide), uranium in ground water (310 wells and springs), and arsenic in ground water in South Georgia (67 wells). In 2011, the network returned to the regular sampling of wells and springs drawing from important aquifers. Figure 8-2 shows locations of stations for the arsenic study and for the important aquifer study sampled during calendar years 2010 and 2011. The Arsenic Monitoring Project sought to address the probable origin and extent of arsenic contamination found in waters from existing and prospective public supply wells in Grady County. Previous studies had suggested that a subsurface geologic feature termed the Gulf Trough, which extends across the State from southern Decatur County to northern Effingham County, was associated with water naturally contaminated with arsenic. The arsenic study concluded that the arsenic contamination was likely natural and likely associated with the Gulf Trough. The study found eight stations giving water with arsenic in excess of the Primary MCL (Table 8-3A). The Important Aquifer study found one well with a uranium exceedance, one well with a lead exceedance, and 30 wells with iron, manganese, or aluminum exceedances (Table 8-3B). Owners of wells giving exceedances were notified, and, if the well was a public supply well or a private drinking water source, a follow-up sampling was done.

One of the purposes of the network is to allow the GAEPD to identify groundwater quality trends before they become problems. The only adverse temporal trend noted to date is that nitrate, while still at very low levels, has slightly increased in concentration in the recharge areas of some Coastal Plain aquifers since 1984. From 1996 through 2009, 1,643 water samples from Groundwater Monitoring Network wells were analyzed for nitrate/nitrite, or during 2005 for nitrate. Water from 1.03 percent of these 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. Results of aquifer monitoring data for calendar years 2008 and 2009 are provided in Tables 8-3 through 8-5.

## 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

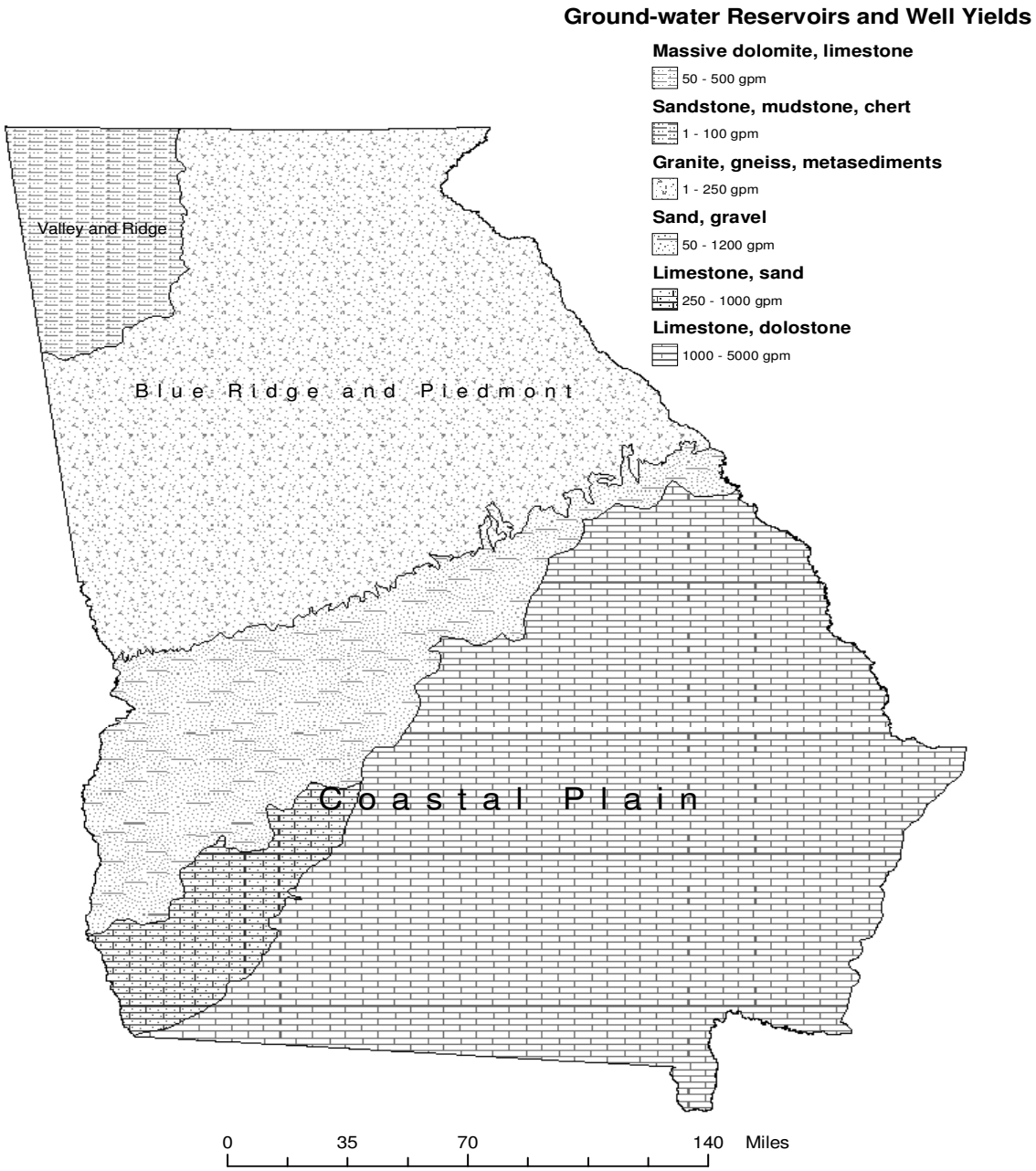
Contaminants/classes of contaminants considered to be associated with each of the sources that were checked.

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

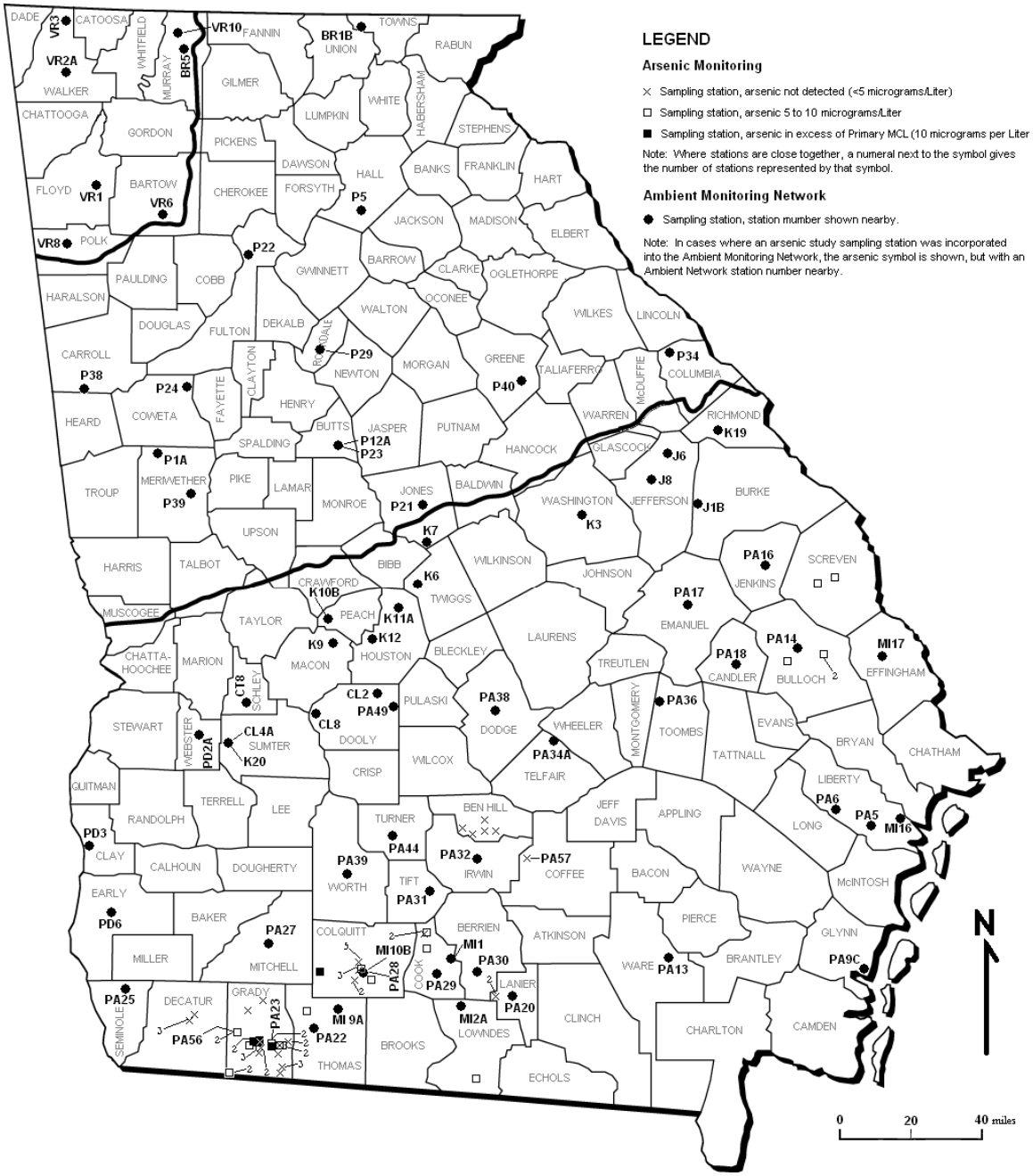
## TABLE 8-2
## SUMMARY OF STATE GROUND WATER PROTECTION PROGRAMS

| 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 | Fully Established | 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 8-1**
## HYDROLOGIC PROVINCES OF GEORGIA



## FIGURE 8-2
## GROUNDWATER MONITORING NETWORK, 2010-2011



## TABLE 8-3A
## SUMMARY OF GROUND-WATER MONITORING RESULTS CY 2010

| | Sixty Seven Arsenic Monitoring Stations | | | | | |
|---|---|---|---|---|---|---|
| | Nitrate/ Nitrite | VOCs | Arsenic | Uranium | Copper or Lead | Fe, Mn, or Al |
| | | | | | | |
| Detections | 35 | 6 | 26 | 7 | 20 | 39 |
| Exceedances | 0 | 1 | 8 | 0 | 0 | 5 |

## TABLE 8-3B
## SUMMARY OF GROUND-WATER MONITORING RESULTS FOR CY 2011

| | Seventy Seven Important Aquifer Monitoring Stations | | | | | |
|---|---|---|---|---|---|---|
| | Nitrate/ Nitrite | VOCs | Arsenic | Uranium | Copper or Lead | Fe, Mn, or Al |
| | | | | | | |
| Detections | 50 | 5 | 1 | 17 | 31 | 45 |
| Exceedances | 0 | 0 | 0 | 1 | 1 | 30 |

## TABLE 8-4
## GROUND-WATER MONITORING DATA FOR CY 2010

| Arsenic Monitoring | | | | | | | |
|---|---|---|---|---|---|---|---|
| County | Number of Stations | Number of Stations Showing: | | | | | |
| | | Nitrate/ Nitrate Detection// Exceedance | VOCs Detection// Exceedance | Arsenic Detection// Exceedance | Uranium Detection// Exceedance | Copper or Lead Detection// Exceedance | Fe, Mn, or Al Detection// Exceedance |
| Ben Hill | 5 | 2 // 0 | 2 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 3 // 1 |
| Bulloch | 3 | 0 // 0 | 0 // 0 | 3 // 0 | 0 // 0 | 0 // 0 | 3 // 0 |
| Coffee | 1 | 0 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 0 // 0 |
| Colquitt | 13 | 4 // 0 | 0 // 0 | 3 // 1 | 0 // 0 | 3 // 0 | 7 // 0 |
| Cook | 4 | 0 // 0 | 1 // 1 | 1 // 0 | 1 // 0 | 3 // 0 | 1 // 0 |
| Decatur | 4 | 4 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 1 // 0 | 1 // 0 |
| Grady | 31 | 21 // 0 | 3 // 0 | 15 // 7 | 6 // 0 | 11 // 0 | 19 // 4 |
| Lanier | 2 | 1 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 1 // 0 |
| Lowndes | 1 | 1 // 0 | 0 // 0 | 1 // 0 | 0 // 0 | 1 // 0 | 1 // 0 |
| Screven | 2 | 1 // 0 | 0 // 0 | 2 // 0 | 0 // 0 | 1 // 0 | 2 // 0 |
| Thomas | 1 | 1 // 0 | 0 // 0 | 1 // 0 | 0 // 0 | 0 // 0 | 1 // 0 |

## TABLE 8-5
## GROUND-WATER MONITORING DATA FOR CY 2011

| Important Aquifer Monitoring | | | | | | | |
|---|---|---|---|---|---|---|---|
| Aquifer | Number of Stations | Number of Stations Showing: | | | | | |
| | | Nitrate/ Nitrate Detection// Exceedance | VOCs Detection// Exceedance | Arsenic Detection// Exceedance | Uranium Detection// Exceedance | Copper or Lead Detection// Exceedance | Fe, Mn, or Al Detection// Exceedance |
| Cretaceous/ Providence | 12 | 8 // 0 | 0 // 0 | 0 // 0 | 1 // 0 | 7 // 1 | 10 // 9 |
| Clayton | 1 | 1 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 1 // 0 | 1 // 1 |
| Claiborne | 3 | 1 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 3 // 3 |
| Jacksonian | 3 | 2 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 1 // 0 | 3 // 3 |

## TABLE 8-5
## GROUND-WATER MONITORING DATA FOR CY 2011, CONTINUED

| Ambient Ground-Water Monitoring | | | | | | | |
|---|---|---|---|---|---|---|---|
| Aquifer | Number of Stations | Number of Stations Showing: | | | | | |
| | | Nitrate/ Nitrate Detection// Exceedance | VOCs Detection// Exceedance | Arsenic Detection// Exceedance | Uranium Detection// Exceedance | Copper or Lead Detection// Exceedance | Fe, Mn, or Al Detection// Exceedance |
| Floridan | 28 | 13 // 0 | 3 // 0 | 1 // 0 | 7 // 0 | 11 // 0 | 14 // 7 |
| Miocene | 6 | 3 // 0 | 0 // 0 | 0 // 0 | 0 // 0 | 2 // 0 | 3 // 1 |
| Piedmont/ Blue Ridge | 18 | 16 // 0 | 1 // 0 | 0 // 0 | 9 // 1 | 8 // 0 | 9 // 5 |
| Valley and Ridge | 6 | 6 // 0 | 1 // 0 | 0 // 0 | 0 // 0 | 1 // 0 | 2 // 1 |

Agricultural chemicals are commonly used in the agricultural regions of the State (Figure 8-3). In order to evaluate the occurrence of agricultural chemicals in groundwater, 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. Prudent agricultural use of pesticides does not appear to represent a significant threat to drinking water aquifers in Georgia at this time.

The most extensive contamination of Georgia's aquifers is from naturally occurring mineral salts (i.e., high total dissolved solids, or TDS levels). Areas generally susceptible to high TDS levels are shown in Figure 8-4. Intensive use of groundwater in the 24 counties of the Georgia coast has caused some groundwater containing high levels of dissolved solids to enter freshwater aquifers either vertically or laterally. Salt-water intrusion into the Upper Floridan Aquifer threatens groundwater supplies in the Hilton Head-Savannah and Brunswick areas. Intrusion rates, however, are quite slow, with salt-contaminated water taking more than a hundred years to reach Savannah. 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.

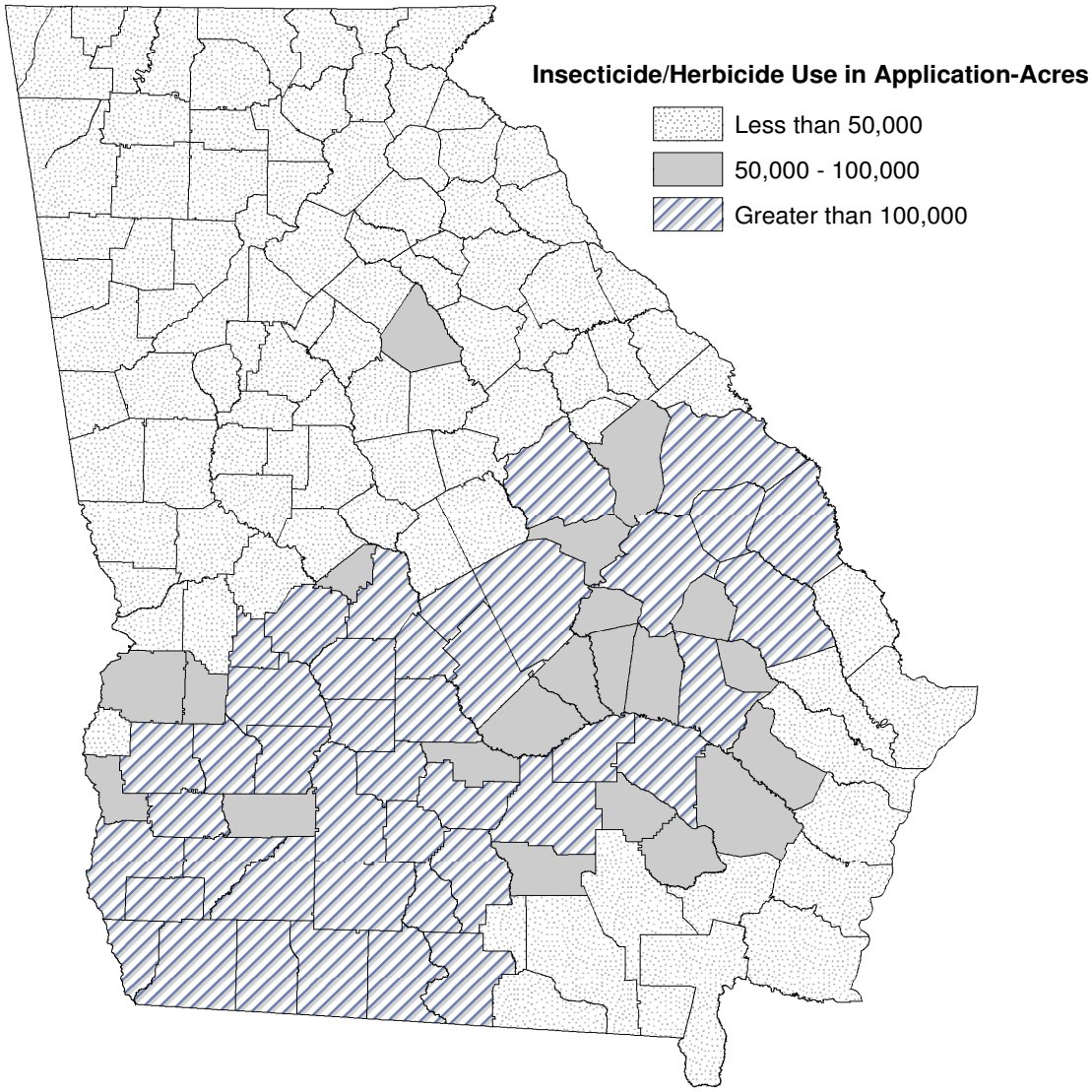
The new and final "Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion" describes the goals, policies, and actions the Environmental Protection Division (EPD) will undertake to manage the water resources of the 24-county area of coastal Georgia. The Plan is designed to 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 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.

The primary focus of the final Plan recognizes the intrusion of salt water into the Upper Floridan aquifer at Hilton Head Island, South Carolina. 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.

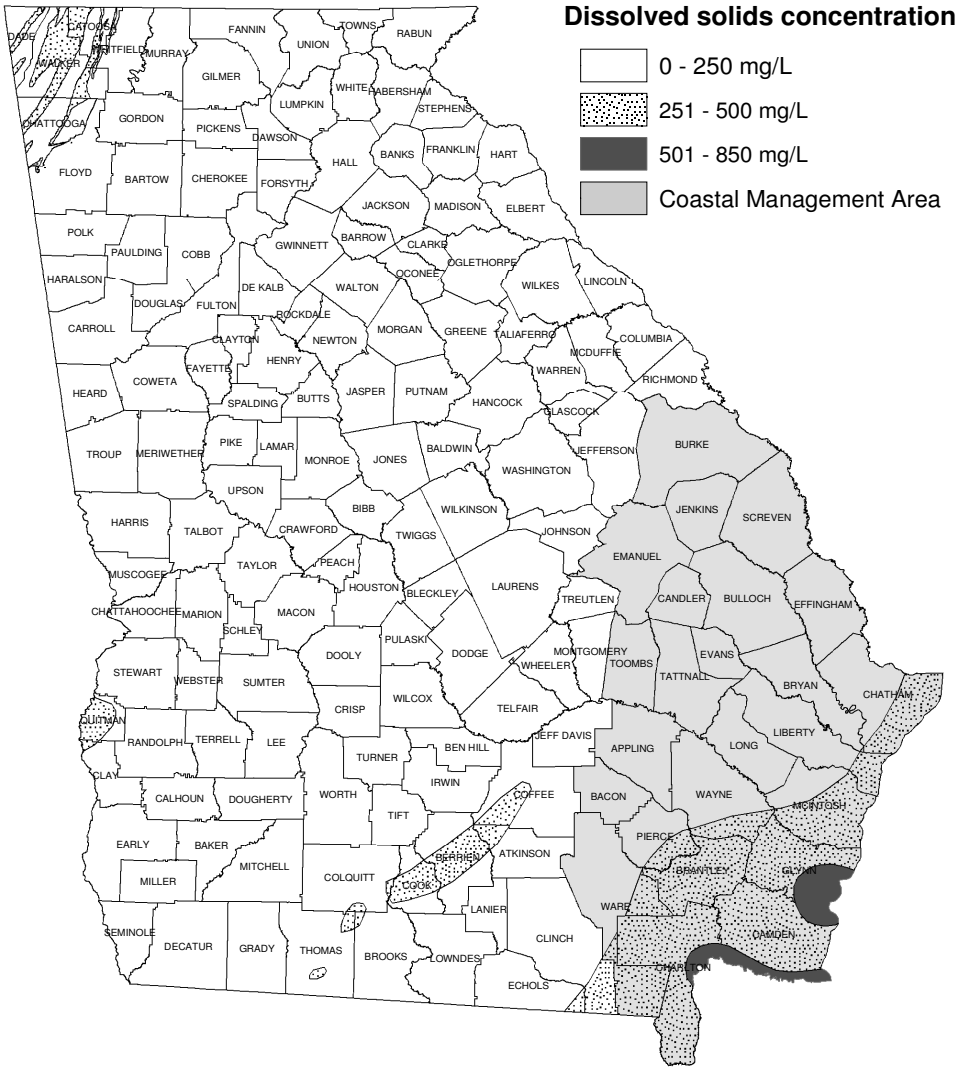
This final Plan for managing coastal Georgia salt water intrusion, withdrawal permitting, and wastewater management reflects the State's goal of sustainable use of both groundwater and surface waters, it supports regional economic growth and development, and contributes to protecting the short-term and long-term health of both the public and natural systems. It is based on the best

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




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

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



available scientific data and information on the stresses on the water resources within the region.

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 that was adopted by the General Assembly in January 2008.

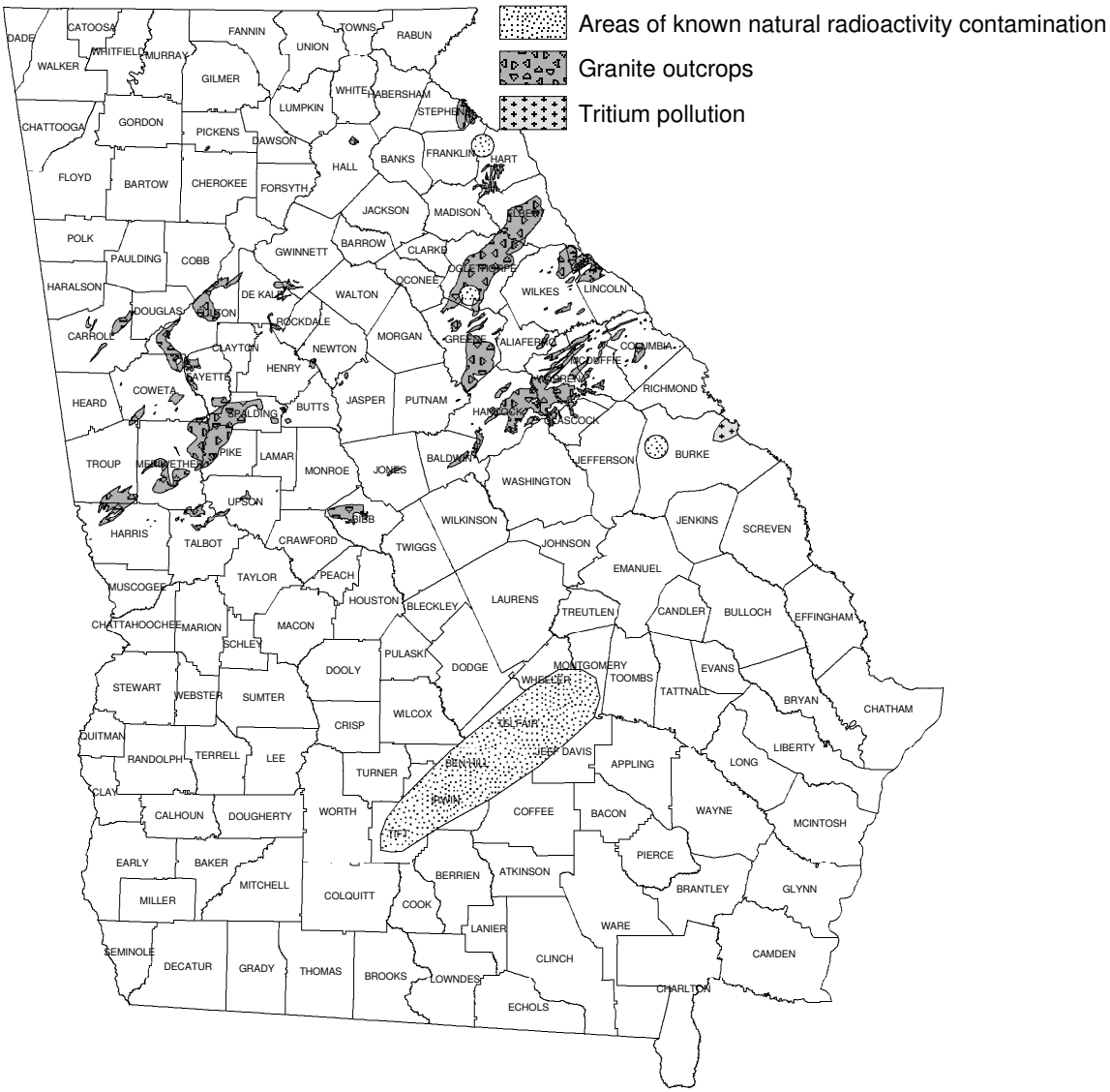
To date the State water plan has completed assessments of the quantity and quality of surface waters in major streams and rivers in Georgia, and the ranges of sustainable yields of prioritized aquifers in Georgia. Most of the aquifers prioritized for determination of ranges of sustainable yield were aquifers within the Coastal Plain physiographic province of Georgia where most groundwater use within the State occurs. Ranges of sustainable yields of Coastal Plain aquifers were determined using finite difference and finite element numerical modeling methods. The range of sustainable yield was determined for the Paleozoic carbonate aquifer in a study basin of the Valley and Ridge physiographic province of northwestern Georgia using finite difference modeling, and ranges of sustainable yield were determined for the crystalline rock aquifer in selected basins in the Piedmont and Blue Ridge physiographic provinces of northern Georgia using basin water budgets.

Some wells in Georgia produce water containing relatively high levels of naturally occurring iron and manganese. Another natural source of contamination is from radioactive minerals that are a minor rock constituent in some Georgia aquifers. While natural radioactivity may occur anywhere in Georgia (Figure 8-5), the most significant problems have occurred at some locations near the Gulf Trough, a geologic feature of the Floridan Aquifer in the Coastal Plain. Wells can generally be constructed to seal off the rocks producing the radioactive elements to provide safe drinking water. 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 a problem due to concerns for the disposal of the concentrated residue.

However, certain treatment firms (e.g. Water Remediation Technology, LLC) have arrangements to remove certain radionuclides from ground water and dispose of residues properly. In particular, uranium-rich residues are turned over to processors, which extract the metal. 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

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



Savannah River from the Savannah River produced for nuclear weapons (Figure 8-5).

The tritium does not exceed MCLs for drinking water; therefore it does not represent a health threat to Georgia citizens at the present time. Results of the GAEPD's studies to date indicate the most likely pathway for tritium to be transported from the Savannah River Plant is through the air due to evapo-transpiration of triturated water. The water vapor is condensed to form triturated precipitation over Georgia and reaches the shallow aquifers through normal infiltration and recharge.

Man-made pollution of groundwater can come from a number of sources, such as business and industry, agriculture, and homes (e.g., septic systems). Widespread annual testing of 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. 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.

The GWUDI program has been restructured so that sample analyses are now performed by EPD laboratory personnel instead of Drinking Water Program personnel. Since the EPD lab began processing these samples in September 2009, thirty-two water sources have been analyzed for surface water influence. All were determined to be under some degree of risk of surface water contamination. Results for each source were forwarded to EPD personnel, both at the Regional Office level and at the central Drinking Water Engineering Program in Atlanta, for follow-up.

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, 2009, confirmed releases have been identified at 12,365 sites and site investigation and corrective action procedures have been completed at 10,575 sites and initiated at the remaining 1,790 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 573 sites listed on the Georgia Hazardous Site Inventory (HSI). Since the initial publication of the HSI, cleanups and investigations have been completed on 260 sites. 426 Sites have cleanups in progress and 130 sites are under investigation. No action has been taken on 17 sites. During the previous year there were 9 additions to the inventory and

11 sites were removed. 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 196 contracts to investigate and cleanup abandoned sites, of which approximately 185 have been completed. Eleven contracts/sites remain "open".

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 November 2009 in Georgia, there were 106 permitted active (operational) waste disposal landfills, including 50 lined and 4 unlined municipal solid waste landfills, 48 construction and demolition landfills (26 publicly owned & 22 privately owned), 0 waste-to-energy facility (Montenay Savannah Limited Partnership closed 12/08), 1 commercial industrial landfill, and 1 carpet baler facility. In addition, 5 landfills have ceased accepting waste (In-Closure) and are currently closing the facility and no landfills released from post closure care in FY 2009.
There are 178 landfills in post-closure care required to conduct groundwater monitoring, 1 MSWL landfill (private commercial) ceased accepting waste in FY 09 and 320 SW landfills have an operational status of closed as FY09.

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, 2011, the program has issued 506 UIC permits covering 10,912 Class V wells. Most of the permits are for remediation wells for UST sites, petroleum product spills, hazardous waste sites, or for non-domestic septic systems.

Georgia law requires that water well drillers constructing domestic, irrigation and public water supply wells and all pump installers be licensed and bonded. As of December 31, 2011 Georgia had 261 active licensed water well drillers and 71 certified pump installers and that are required to follow strict well construction and repair standards. The GAEPD actively pursues and works closely with the Courts to prosecute unlicensed water well contractors and uncertified pump installers. The GAEPD continues to work with various drilling associations, licensed drillers, and certified pump installers 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 or engineering and geologic boreholes must be bonded, and such well construction or borings 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 and pump installing companies and makes every attempt to stop the operations of all drillers and pump installers who fail to maintain a proper bond. The GAEPD issues permits and regulates all oil and gas exploration in the state under the Oil & Gas and Deep Drilling Act.

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

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

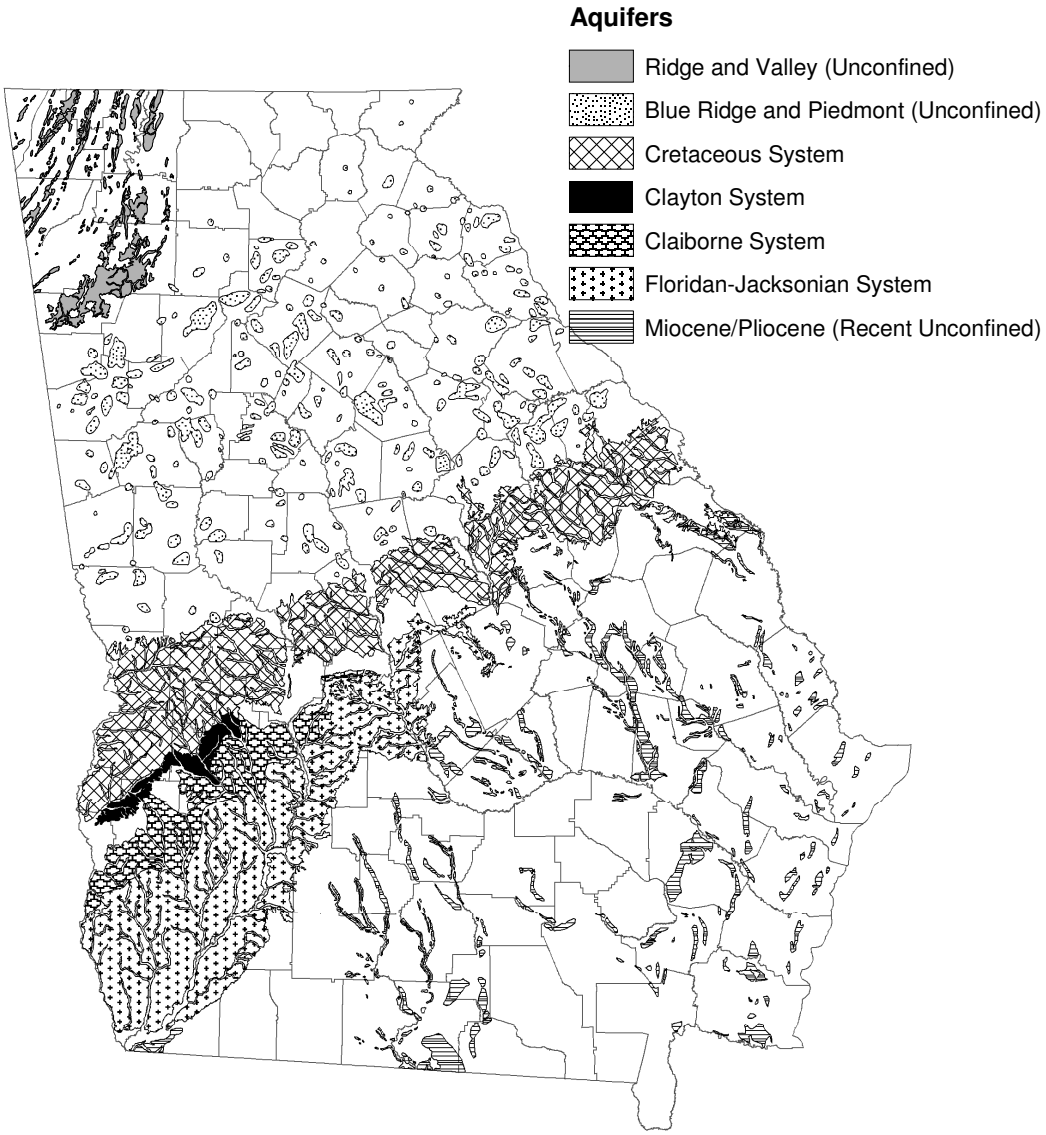
Some areas, where recharge to individual wells using the surficial or unconfined aquifers is taking place, are also significant recharge areas. To protect such wells, the GAEPD implemented a Wellhead Protection Program for municipal drinking water wells in 1993. Wells in confined aquifers have a small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

Wellhead Protection Plans have been completed for all permitted municipal wells in Georgia. There are currently 1,616 active municipal ground water wells with Wellhead Protection Plans. A ten-year review of plans completed in 2000 and 2001 was completed in 2010 and 2011. The review includes the addition of pertinent well information and an update of potential pollution sources. In addition, the GAEPD has carried 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. Agricultural applications of pesticides and fertilizers are not significant sources.

Table 8-2 is a summary of Georgia groundwater protection programs. Georgia, primarily the GAEPD, has delegated authority for all federal environmental

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



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 2008 and 2009. The data presented were developed from the Georgia Groundwater Monitoring Network reports.

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 2009, GAEPD had 292 active municipal and industrial surface water withdrawal permits (192 municipal, 100 industrial), 483 active groundwater withdrawal permits (287 municipal/public supply, 176 industrial, 20 golf course irrigation permits) 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 Apalachicola-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 2008-2009, 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 140 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 non-transient and non-community water systems that add a disinfectant to the drinking water during any part of the treatment process and transient non-community water systems that use chlorine dioxide. During 2008-2009, 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 exceedances 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*. Based on the initial bin classifications for Cryptosporidium, there are no surface water sources in Georgia that require additional treatment to comply with the LT2ESWTR.

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. For the reporting period ending June 30, 2011, the State of Georgia had approximately 2,484 active public water systems serving a population over 8.4 million people. Based on the latest census figures, this means 87% of the citizens get their drinking water from one of the regulated public water systems in the State. The rest obtain water from their privately owned water sources.

Approximately 72% (1,778 out of the total 2,484 public water systems) provide water to residential customers. These systems are referred to as community water systems and serve at least 15 service connections used by year-round residents or regularly serve at least 25 year-round residents daily. Approximately 13% (224 out of the total 1,778 community water systems) are supplied by surface water sources and the remaining 87% (1,554 CWSs) are served by groundwater sources.

In addition, there are 209 non-transient non-community water systems that regularly serves at least 25 of the same persons over 6 months per year. Examples of these systems are hospitals, day care centers, major shopping centers, children's homes, institutions, factories, office and industrial parks, schools, and etc.
Furthermore, there are 497 transient non-community water systems that do not regularly serve at least 25 of the same persons over six months per year, such as restaurants, highway rest areas, campgrounds, roadside stops, and hotels. With a few exceptions, practically all of the non-transient non-community water systems and the transient non-community water systems use groundwater sources for their drinking water needs. All public water systems are issued a Permit to Operate a Public Water System, in accordance with the Georgia Safe Drinking Water Act and Rules.

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. The DWSF has been expanded in July 2009 to incorporate bacteriological testing, for an additional fee.

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 have continued to do so.

In 2010, the total number of public water systems exceeding the action level for lead and/or copper was 38. Out of the 38 systems, 5 systems were non-transient non-community (NTNC) systems with population less than 3,300, and 32 were community (C) water

systems with population less than 3,300, and 1 system was a large community water system with a population between 50,000-100,000. Of the 5 NTNC systems, 4 exceeded the Lead action level and 1 exceeded the Copper action level. Of the 33 community water systems, 15 exceeded the Lead action level and 18 exceeded the Copper action level. The 1 large community water system was one that exceeded the Lead action level. 71% of these 38 water systems (including the 1 large water system) returned to compliance with the Lead/Copper action levels in the 2 subsequent six-month rounds of monitoring. The other 29% will remain on an increased Lead/Copper monitoring schedule until they have successfully completed two consecutive 6-month rounds of monitoring with no action levels exceeded. 98% of these 38 water systems that exceeded either parameter have completed the required water quality parameter testing and source-water Lead/Copper monitoring, and 100% of the systems exceeding the Lead action level have performed the public education requirements.

During 2011, the total number of systems that exceeded the action level for Lead and/or Copper was 16. 13 of these systems are community water systems with population less than 3,301 and 3 of these systems are non-transient-non-community system with a population less than 3,301. Out of the 16 systems that exceeded, 1 system exceeded for both Lead and Copper, 8 systems exceeded for Copper only and 7 systems exceeded for Lead only. Of the 8 systems that exceeded for Copper, 4 systems had exceeded for Copper in 2010 as well. Of the 7 systems that exceeded for Lead, 2 systems had exceeded for Lead in 2010 as well. So far, 87% of the systems that exceeded either parameter have completed the required water quality parameter testing and source-water Lead/Copper monitoring. Also, 85% of the systems exceeding the Lead action level have completed the public education requirements. All of these 16 systems will remain on an increased Lead/Copper monitoring schedule until they have successfully completed two consecutive 6-month rounds of monitoring with no action levels exceeded.

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. Source Water Assessments (SWAPs) for privately-owned ground water systems are currently being updated as the drinking water permit for each comes up for renewal. During the current reporting period of July 1, 2009 through June 30, 2010, the following number of SWAPs were completed for each type of privately–owned ground water system: 270 community, 28 non-transient non-community, and 135 transient non-community.

## CHAPTER 9
# Major Issues and Challenges

**Comprehensive State and Regional Water Planning**

Georgia is one of the fastest growing states in the nation. Between 2000 and 2010, Georgia gained 1.5 million new residents, ranking 4th nationally. The increasing population places considerable demands on Georgia's ground and surface water resources in terms of water supply, water quality, and assimilative capacity.

In 2004 the Georgia General Assembly passed the "Comprehensive State-wide Water Management Planning Act", O.C.G.A. § 12-5-522, which called for the development of a statewide water management plan. Work was completed on the Statewide Water Plan and the plan was approved by the General Assembly and Governor Perdue in February 2008. In the three years since the adoption of the State Water Plan, more than 30.000 volunteer hours have been contributed and the State has invested $30 million in technical work and activities to support regional water planning. The Councils and the District have developed regional water plans that together provide a roadmap for sustainable use of Georgia's water resources. The Councils submitted initial recommended plans to the GAEPD in May 2011. The plans were publicly noticed and comments received were thoroughly reviewed. Appropriate revisions were made to the initial plans and final recommended regional water plans were submitted to the GAEPD in September 2011. On November 15, 2011, by action of Director Barnes, the GAEPD officially adopted all ten Regional Water Plans.

The regional water plans are not themselves an end. The plans present solutions identified by a cross-section of regional leaders, drawing on regional knowledge and priorities. The plans are based on consistent, statewide forecasts of needs and reflect the best available information on the capacities of Georgia's waters. The tools used to assess the capacities have been tested and refined, and will be further refined as the information for planning and management is improved. The process and results of regional planning, taken together, provide solid footing for plan implementation and the five-year review and revision required by the State Water Plan. It is now time to put the regional water plans into action, building on the progress made through collaboration within and among the Water Planning Councils and the Metro Water District. Water users, water providers, local governments, state agencies, and elected leaders all have an important role in actions to ensure that Georgia's waters are sustainably managed to support the state's economy, protect public health and natural systems, and enhance the quality of life for all citizens.

**Nonpoint Source Pollution**

The pollution impact on Georgia streams has radically shifted over the last several decades. Streams are no longer dominated by untreated or partially treated sewage discharges that 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 affecting Georgia streams is nonpoint sources that include 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 uncontrolled, can be extremely detrimental to aquatic habitat and hydrological systems.

Nonpoint source pollution must be reduced and controlled to fully protect Georgia's streams. In addition to structural pollution controls, the use of nonstructural techniques, should be significantly expanded to minimize nonpoint source pollution. Some controls that should be considered include: green infrastructure, appropriate building densities, low impact development, buffer zones, erosion and sedimentation controls, street cleaning and limitations on pesticide and fertilizer usage. Some of these best management practices can be implemented through local government planning and zoning.

**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 chemicals may 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. Although, 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.

**Nutrients**
Nutrients serve a very important role in our environment. They provide the essential building blocks necessary for growth and development of healthy aquatic ecosystems. However, if not properly managed, nutrients in excessive amounts can have detrimental effects on human health and the environment, creating such water quality problems as excessive growth of macrophytes and phytoplankton, harmful algal blooms, dissolved oxygen depletion, and an imbalance of flora and fauna. In Georgia, site specific nutrient criteria have been adopted for several major lakes and their tributaries. Some of these lakes are currently listed for chlorophyll *a*, which is the primary biological indicator in lakes for nutrient overenrichment. TMDLs, based on watershed modeling, have been completed or are in development to address the nutrient issues for these lakes. Currently, the GAEPD is in the process of collecting the necessary data and information for use in developing nutrient standards for rivers, streams and other waterbodies in Georgia. Determining the relationship of nutrient levels and biological response is necessary in order to develop appropriate nutrient criteria.

**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, nutrients, 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. Human activities that contribute to nonpoint source pollution, nutrients, and toxics, include adding more pavement and other impervious surfaces, littering, driving cars that drip oil and antifreeze, applying fertilizers and pesticides. If streams and lakes are to be pollutant free, then some of the everyday human activities must be modified.

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