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Chapter 9

Section 9.3

GDNR 2005 to SNC 2000b

GDNR 2005

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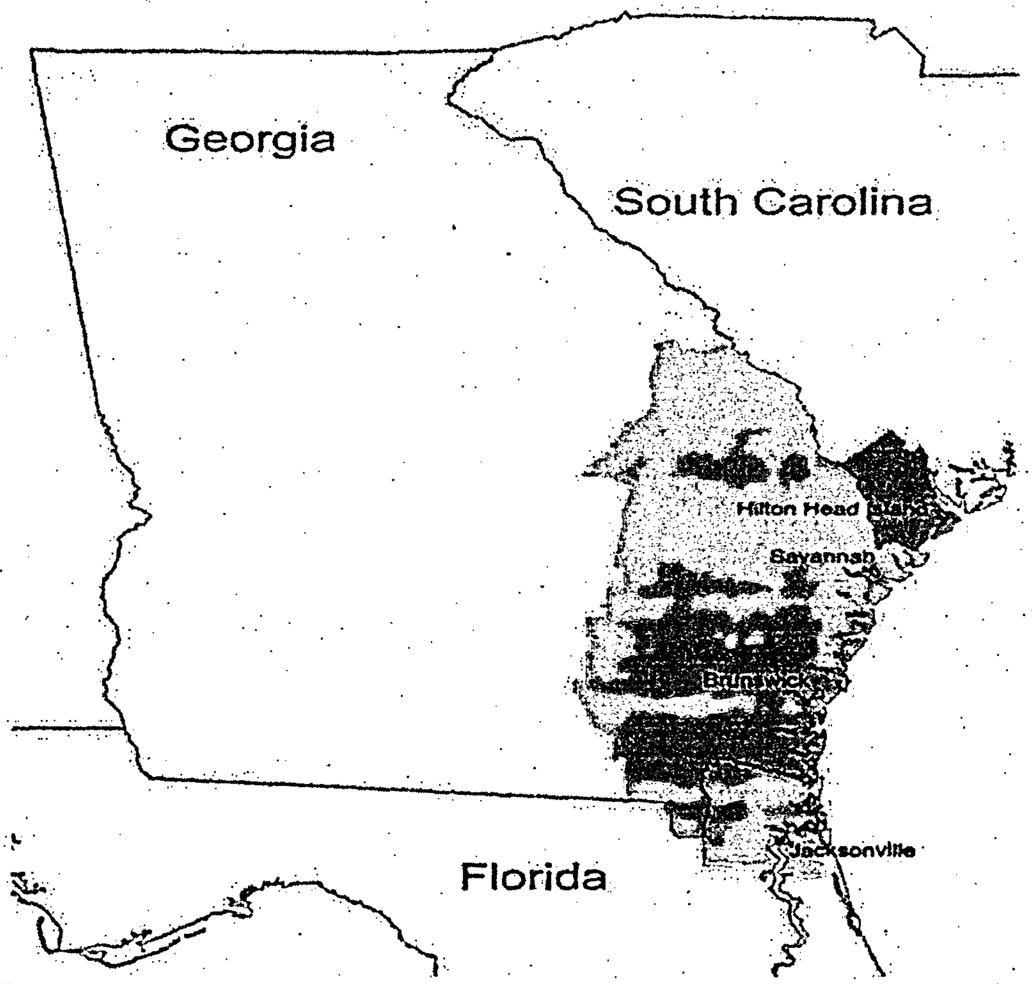
Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion



December, 2005

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Purpose and Scope of the Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion

The 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 (Figure 1). The Plan is designed to support the continued growth and development of coastal Georgia while implementing sustainable water resource management.

The Plan replaces the "Interim Strategy for Managing Salt Water Intrusion in the Upper Floridan Aquifer of Southeast Georgia" http://www.ganet.org/dnr/environ/techguide_files/wrb/interim.htm, 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Coastal Sound Science Initiative (CSSI), the Plan will guide EPD water resource management decisions and actions until superceded by the adoption of the General Assembly of a Comprehensive State-wide Water Management Plan in 2008.

The primary focus of the Plan is on stabilizing or reversing the intrusion of salt water into the Upper Floridan aquifer, which is a dominant water supply source shared by coastal Georgia and neighboring areas of South Carolina and Florida. 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 Plan also incorporates policies and actions needed to begin solving the wastewater discharge limitations that have become evident as coastal Georgia continues to grow.

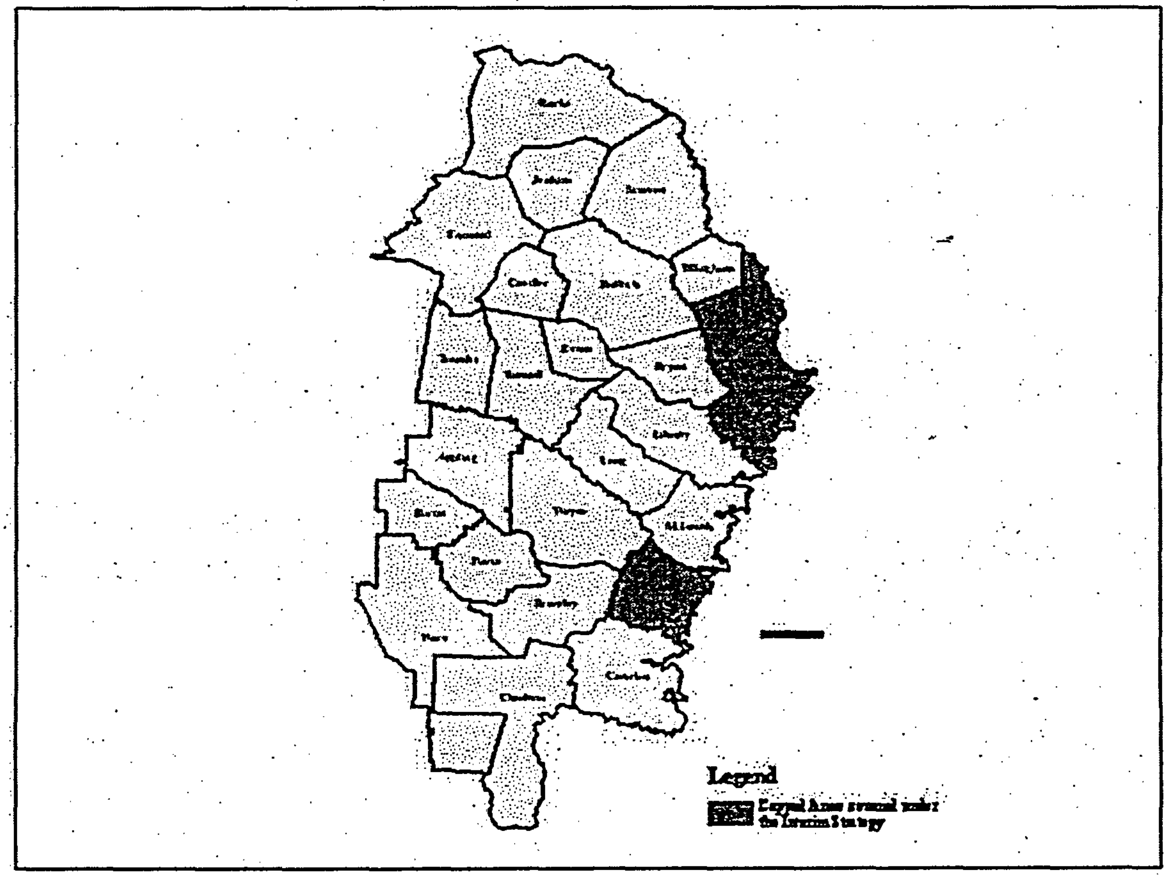


Figure 1: Counties covered under the Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion.

Guiding Principles of the Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion

The Comprehensive State-wide Water Management Planning Act (the Water Planning Act), passed by the General Assembly and signed into law by Governor Perdue in 2004, defines general policy and guiding principles for water resource management that guide this Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion. The incorporation of these policies and guiding principles into this Plan will facilitate its alignment with the Comprehensive State-wide Water Management Plan to be adopted in 2008.

The Water Planning Act provides the following policy statement:

"*Georgia manages water resources in a sustainable manner to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.*"
It also sets forth the following guiding principle:

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

This Plan for managing coastal Georgia salt water intrusion, withdrawal permitting, and wastewater management reflects the State's goal of sustainable use of both groundwater and surface waters, it supports regional economic growth and development, and contributes to protecting the short-term and long-term health of both the public and natural systems. It is based on the best available scientific data and information on the stresses on the water resources within the region. This Plan guides forward progress during the next several years as Georgia's first Comprehensive State-wide Water Management Plan is prepared and adopted. As such, it is a step toward regional economic prosperity unfettered by water management practices that may have been more useful in the region's past than they are apt to be in the region's future; it offers a basis for cooperation with our South Carolina neighbors with whom we share the region's waters; and it supports Georgia's goal to leave future generations with water resources not compromised by our failure to be bold, creative, and assertive in our efforts to preserve and protect their water resources and natural environment.

Background on the Interim Strategy and the Coastal Sound Science Initiative

Prior to the industrial development and population growth of the first half of the 20th century in the coastal region of Georgia (and Florida and South Carolina), groundwater in Georgia's *aquifers* flowed from *recharge areas* in an east-southeast direction, extending in a broad arc from Valdosta to Waynesboro, eventually discharging offshore. After World War II as the region developed, centers of groundwater pumpage formed in Georgia around Savannah/Chatham County, Brunswick, Jesup, Riceboro, St. Marys; Hilton Head, South Carolina, and the Jacksonville-Fernandina Beach area of Florida. The bulk of the groundwater pumped is from what is now known as the Upper Floridan aquifer, which is a porous limestone geologic formation having extremely high productivity. At these pumping centers, *cones of depression* formed in the *potentiometric surface* and flow directions changed. Groundwater containing salt began to flow toward or into the Savannah-Hilton Head, Brunswick, and Jacksonville-Fernandina Beach pumping centers.

Salt is a naturally occurring mineral. At high concentrations salt makes water unpalatable to drink. The United States Environmental Protection Agency (EPA) has established secondary drinking water standards of 500 milligrams per liter (mg/l) for total dissolved solids and of 250 mg/l for the chloride ion. Since chlorides are relatively simple to measure, studies of salt water intrusion often use chlorides as a surrogate for measurements of salinity. Water having chloride levels of less than 250 mg/l is considered palatable to drink (assuming there are no other deleterious constituents exceeding other drinking water standards).

Since the early 1960's, the problem of salt water intrusion into coastal Georgia aquifers has been recognized (see Counts and Donsky, 1963). While the problem was first recognized in the Savannah-Hilton Head area, groundwater monitoring by the United States Geological Survey

(USGS), on behalf of the precursor agency of the Georgia Environmental Protection Division (EPD), indicated the presence of elevated chloride levels in Upper Floridan aquifer wells at Brunswick (Wait, 1965). Shortly thereafter, some water supply wells on the Brunswick peninsula had to be abandoned due to high chloride concentrations.

In the 1970's and 1980's additional hydrogeological studies were performed, monitoring wells constructed, and water resources alternative to the Upper Floridan aquifer were identified. As the salt water intrusion problem became more evident, efforts to conserve water and utilize alternative water supply sources followed. Conservation efforts resulted, for example, in a reduction in industrial pumpage from the Upper Floridan aquifer in Brunswick of about 30 million gallons per day (mgd) - from about 95 mgd to about 65 mgd. The City of Savannah expanded it's Industrial & Domestic (I&D) surface water treatment plant in 1998 - at considerable cost – to 62.5 mgd so that much of its future water needs could be supplied by surface water from the Savannah River rather than groundwater. Similarly, several golf courses in Chatham and Glynn counties substituted Miocene Aquifer wells for their Upper Floridan wells. South Carolina also promoted conservation and the use of alternative water supplies resulting in a reduction of Upper Floridan aquifer water use on Hilton Head of 5 mgd between 1997 and 2001, with current pumpage being on the order of 9.77 mgd.

Between 1985-1995, a series of events demonstrated that Georgia needed to aggressively develop a plan to address intrusion of salt water in coastal areas. These events included:

- Gradually increasing – with time - chloride concentrations in monitoring wells on the northern end of Hilton Head Island, and expansion of the salt water plume in the general direction of the Savannah/Chatham County pumping center.
- Gradually increasing – with time - chloride concentrations in monitoring wells at Brunswick.
- Declining water levels in monitoring wells in many parts of the coastal region.
- Substantial increases in irrigation pumpage from the Upper Floridan aquifer, particularly in the counties northwest of the coastal tier. For example, there was a 74% increase in irrigation pumpage in Tattnall County between 1980 and 1997.
- Substantial increases in the population of coastal Georgia, with corresponding increases in demands for water for public supply.
- Mathematical models of the region's aquifers showed that pumpage from one aquifer could impact other aquifers as well as surface water stream flows. Modeling also suggested that pumpage in areas distant from locations where salt water was entering the Upper Floridan aquifer could influence the rates of intrusion.
- Aquifer mapping showed that all of Georgia's aquifers were finite and exhaustible.

In 1995, EPD embarked on a public education program – through a series of public meetings - to inform the residents of coastal Georgia of the salt water problem, and to solicit comments that might aide development of a plan for managing the problem. During the course of these meetings, it became apparent that the technical information needed to effectively deal with the problem was inadequate and that a solution to the salt water intrusion problem could not be addressed until additional scientific studies had been designed, funded, and completed.

After evaluating hundreds of verbal and written comments, in 1997 - with the concurrence of a Joint Senate-House subcommittee of the Georgia General Assembly – EPD embarked on a two-stage approach to resolve the salt water intrusion problem. The first stage consisted of the development of an "Interim Strategy for Managing Salt Water Intrusion in the Upper Floridan Aquifer of Southeast Georgia" –covering a 24-county area of coastal Georgia (refer to Figure 1) – that described how EPD would address groundwater withdrawal permitting during the period 1997-2005. The Interim Strategy instituted a moratorium on groundwater withdrawal permits for the Upper Floridan aquifer for municipal, industrial and agricultural uses within the 24-county area. The second stage, called the Coastal Sound Science Initiative (CSSI), included definition and execution of an array of scientific and engineering investigations intended to generate the data and information required to guide development of a more well-founded plan for managing salt water intrusion. Almost $18 million in funding for the scientific studies came from the three states (Georgia, South Carolina, and Florida), Glynn County, and four paper companies in coastal Georgia. The Interim Strategy went into effect on April 23, 1997 and the first monies became available for the Coastal Sound Science Initiative with the FY 1998 Georgia State Budget.

Funding Sources for the Sound Science Initiative

State (Georgia) Appropriations	$10,458, 000 (Sound Science Initiative)
	$800,000 (County Water Supply Plans)
U.S. Geological Survey Contributions (estimated)	$ 1,750,000
South Carolina Contributions	$1,000,000
Florida Contributions	$500,000
Glynn County Contributions	$200,000
Paper Companies Contributions	$3,260,415*
TOTAL	$17,968,415

* *Each of the four coastal Georgia paper companies agreed to contribute $1,000,000 over the course of the Sound Science Initiative; however, Durango entered into bankruptcy and ceased making contributions. This resulted in a shortfall of $739,585.*

The Joint Senate-House Study Committee also established a Technical Advisory Committee charged with developing the methodology and scope of the scientific studies.

The Interim Strategy and the CSSI were focused on the issue of salt water intrusion. The original goals of the Interim Strategy were: a) to stop the encroachment of salt water before municipal groundwater supplies at Hilton Head Island and Savannah/Chatham County were contaminated; and b) to prevent the existing salt water intrusion at Brunswick from worsening. The CSSI was designed to answer the following seven sets of specific questions:

1) Where is salt water entering the Upper Floridan aquifer and why is salt water entering at these locations? Are there any other likely areas where salt water is entering the aquifer that we do not know about?

2) How fast is salt water traveling under current and future pumping conditions? How does pumping affect the rate and direction of salt water travel? What is the life expectancy of the aquifer?

3) Other than Savannah and Brunswick, are there any other areas in coastal Georgia where salt water intrusion can be expected? When will Upper Floridan wells in Georgia, Florida, and South Carolina no longer meet drinking water standards?

4) Can areas having minimal impact on salt water intrusion be identified and what amount of water can be obtained from them? Does pumping in some parts of coastal Georgia not affect salt water intrusion?

5) What are the other fresh water sources in coastal Georgia and what amount of water can be obtained from them? What would be the approximate costs of these sources of water alternatives to the Upper Floridan aquifer?

6) What are the current data gaps and what additional data are needed? How should existing and future data be organized, integrated, and made available to the public? Can a long term monitoring system be established so that changes in salt water intrusion can be measured? How much water is used by industry, municipal governments, agriculture, and other users and where do these uses occur?

7) What engineered solutions can be used to prevent salt water from reaching Savannah and the uncontaminated parts of Hilton Head Island or expanding in Brunswick to uncontaminated areas? How can the salt water intrusion problem be stopped and about how much will it cost?

Summary of Findings of the Coastal Sound Science Initiative

Under the guidance of the Technical Advisory Committee, the CSSI has published approximately 45 peer-reviewed reports, and several additional reports are currently under review. A bibliography of these reports and related technical resources is available at http://www.gadnr.org/cws/. The following summarizes principal findings in a brief format that answers the specific questions posed by the CSSI.

Where are the known locations where salt water is entering the Upper Floridan aquifer and why is salt water entering at these locations? Are there any other areas where salt water is entering the aquifer that we do not know about?

When the Interim Strategy and Coastal Sound Science Initiative began in 1997 two intrusion processes were postulated: first, that a wedge of salt water originating in Port Royal Sound was moving through breaches (i.e., windows) in the *confining unit* overlying the Upper Floridan aquifer, then directly entering the aquifer and subsequently moving down-gradient beneath Hilton Head Island in the general direction of Savannah; and second, that salt water originating in the highly saline and higher pressured *Fernandina Permeable Zone*, which underlies the Lower Floridan aquifer in the Brunswick area, was moving upward through geologic fractures into the less pressurized Upper Floridan aquifer. Based on the information gathered as part of the Sound Science Initiative, the process postulated for the Brunswick area is essentially unchanged. However, the process postulated for northern end of Hilton Head Island has been found to be only partly correct. Further, a third, new process has been identified with the area of most concern being offshore and east of Hilton Head Island and northeast of Tybee Island. This third process involves the downward leakage of salt water through the confining unit. The three known locations and processes of salt water intrusion are:

1. Salt water is entering the Upper Floridan aquifer along the northern shore of Hilton Head Island, Pinckney Island, and the Colleton River (see Figure 2.). Here three distinct salt water plumes have been mapped, and they extend several miles inland. Rather than a laterally moving wedge of salt water entering the aquifer through "windows" in Port Royal Sound, the salt water entering the aquifer is by virtue of downward leakage in geographically-restricted, localized – perhaps ancient sinkholes or river channels - areas where the confining unit is thin or absent. The three plumes each appear to behave differently due to locally varying hydrogeologic conditions.

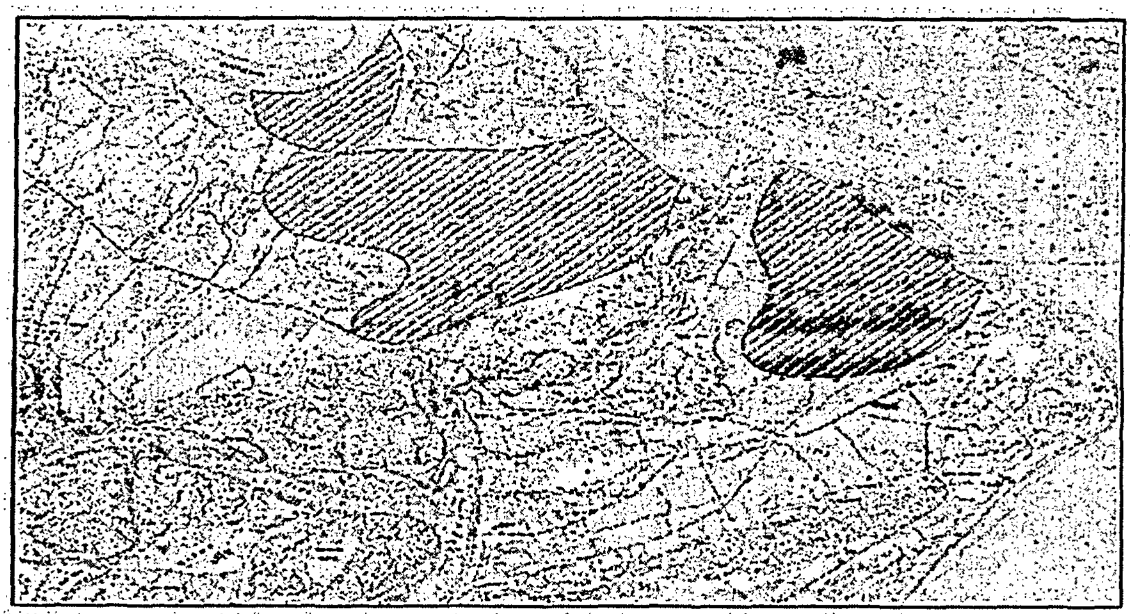


Figure 2: Current configuration of salt water plumes at northern end of Hilton Head Island

2. Studies performed as part of the Coastal Sound Science Initiative indicate that downward leakage of salt water through the confining unit is taking place. The rate of such leakage

is a function of a combination of factors including the confining unit's *vertical hydraulic conductivity,* the confining unit's thickness, and the vertical hydraulic gradient. Any area overlain by salt water is potentially susceptible to salt water intrusion; however, areas in proximity to thinner parts of the confining unit, in conjunction with other favorable hydrogeologic conditions, are most susceptible. Seismic studies show that east of Hilton Head and northeast of Tybee Island, the confining unit is thin and more susceptible to downward vertical leakage of salt water into the aquifer. Figure 3 shows an A – A' trace from the northern tip of Tybee Island to a point some 15 miles northeast of Tybee Island. A cross section down through the Upper Floridan aquifer for this trace is shown in Figure 4. The cross section of the A - A' trace shows that the upper confining unit begins to significantly thin at approximately the 2-mile mark, and gets progressively thinner at the 7-mile mark before a slight recovery. After the 10-mile mark the thinning gets more pronounced toward the 15-mile mark.

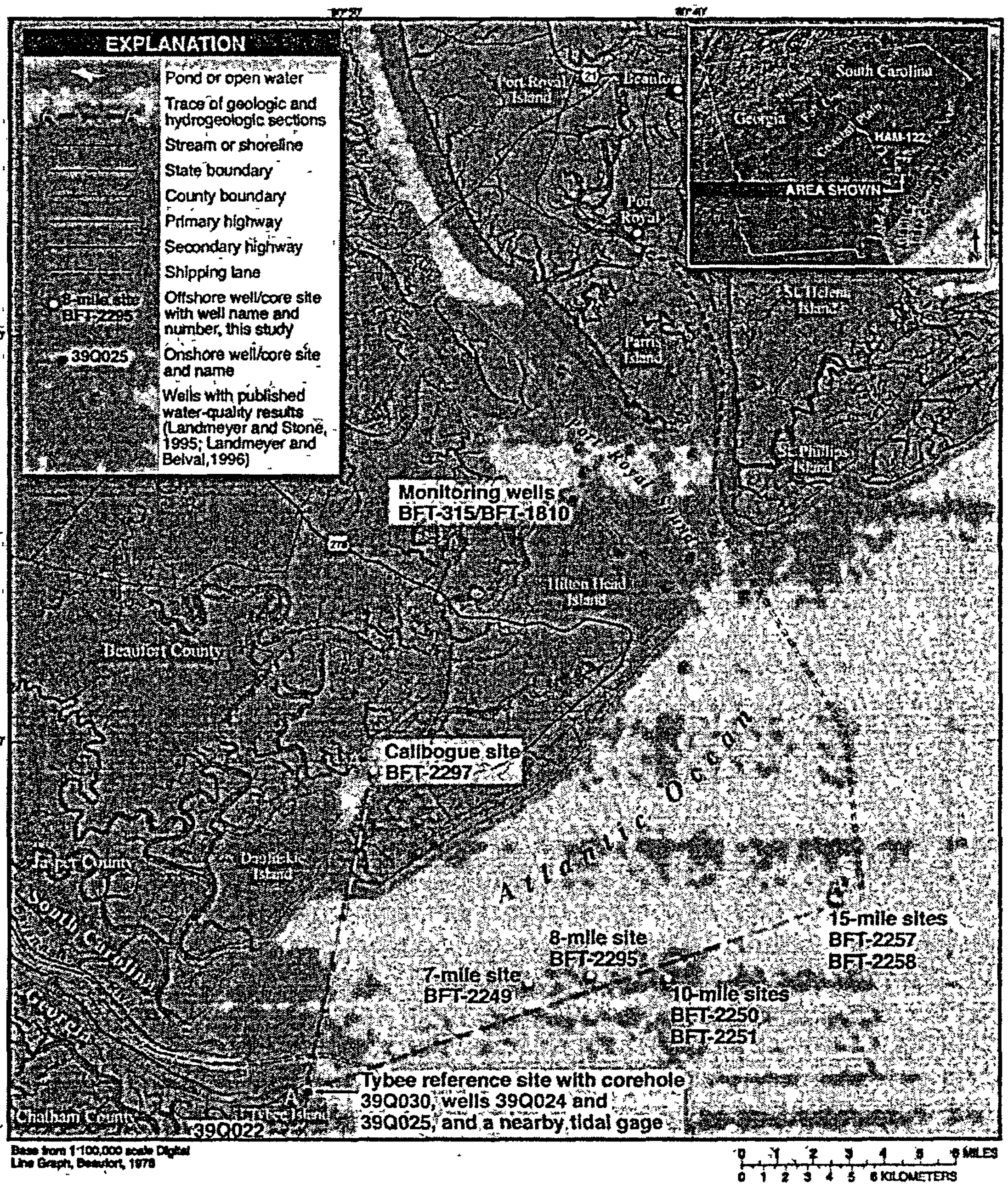


Figure 3: A – A' Trace from Tybee Island

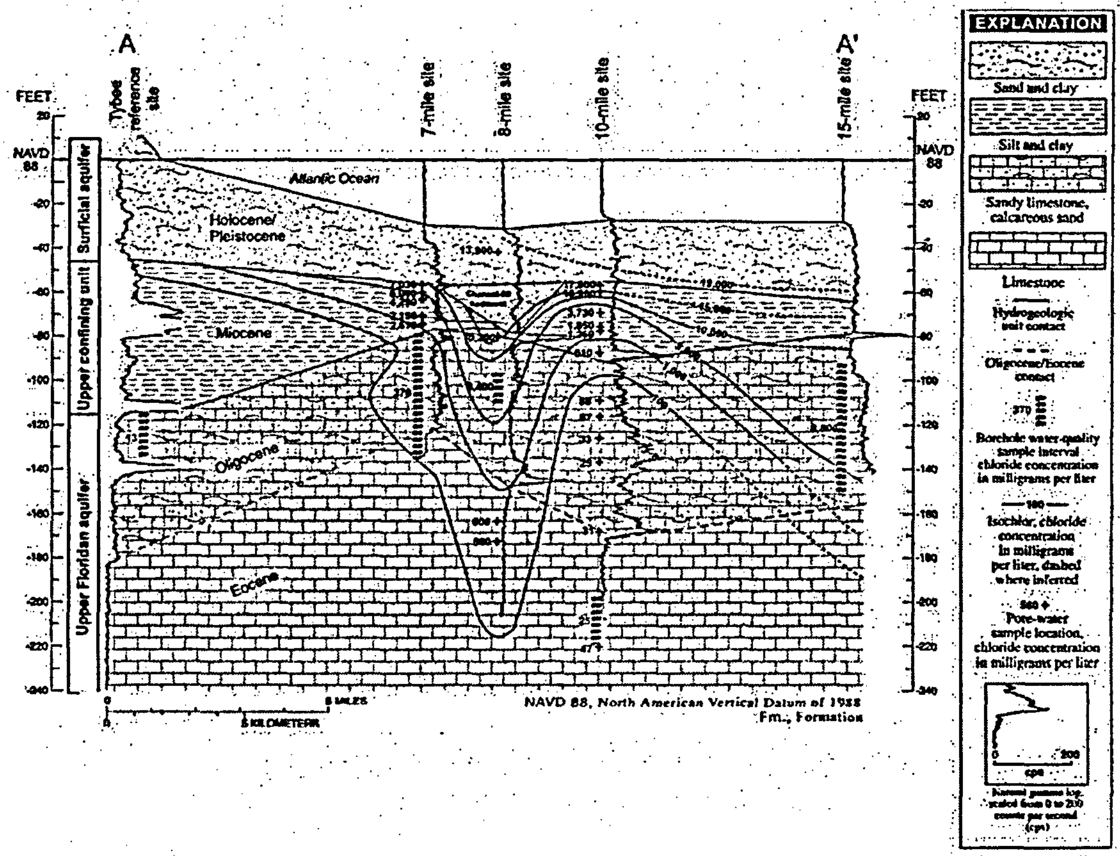
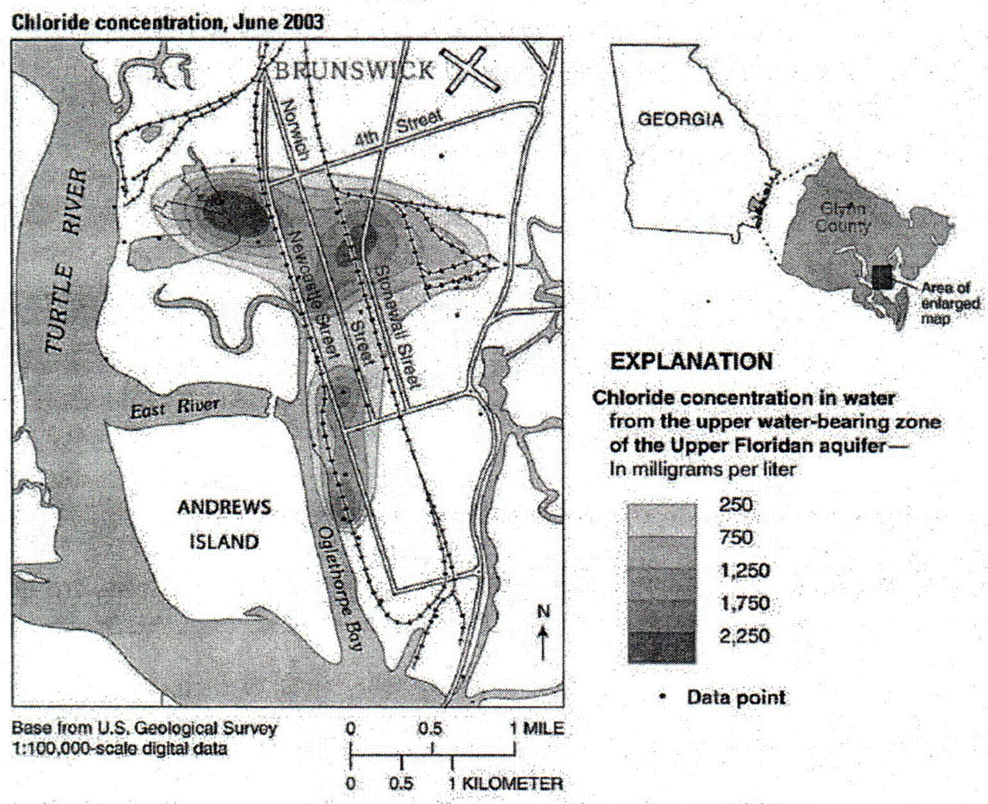


Figure 4: Cross-section of aquifers along A – A' Trace from Tybee Island

Studies of core samples where the confining unit is thin indicate that, in response to the reduced aquifer pressure in the cone of depression, salt water has migrated through the confining unit and can be detected in aquifer water. However, this newly identified process has not been fully characterized in geographic extent or risk of contamination of the aquifer. Corroboration of this process is provided by core samples taken during United States Corp of Engineer studies evaluating the effect of deepening of the Savannah Harbor ship channel. Deepening of the ship channel will thin the confining unit and potentially decrease the time period required for salt water to migrate into the aquifer in the vicinity of Tybee Island.

3. At Brunswick a T-shaped plume (see Figure 5) has developed since the 1960's, but it had remained relatively stable since the mid-1980's. The originally proposed process of saline brines moving upward along geologic fractures from the Fernandina Permeable Zone to the lower pressured Upper Floridan aquifer appears to be correct.



(Modified from Leeth and others, 2005, Ground-Water Conditions and Studies in Georgia, 2002–2003: Reston, Va., U.S. Geological Survey Scientific Investigations Report 2005-5065, 128 p.

Figure 5: Chloride plume configuration, Brunswick, Georgia

Aquifer mapping and offshore geophysical studies demonstrate that salt water intrusion into the Upper Floridan aquifer of coastal Georgia under current and reasonably expected pumping conditions appears to be restricted to the known location of plumes under Hilton Head Island, the general area where the confining unit is thin offshore of Tybee Island, and beneath Brunswick.

How fast is the salt water traveling?

Model simulation indicates that the largest of the three salt water plumes in the vicinity of Hilton Head Island has moved to the south/southwest by about 2 miles since the mid 1960's, when intrusion into the aquifer is first estimated to have occurred. Modeling suggests that if current pumping rates are maintained through the 21st century (i.e., 2000 and 2100), the rate of movement of this plume will be about 130 feet per year. Offshore investigations indicate that some salt water has migrated into the Upper Floridan aquifer in an area 7-10 miles northeast of Tybee Island. Modeling also suggests that a plume in this offshore area will develop by the year 2100 and will enlarge to the west and southwest in response to pumping in the Savannah-Hilton Head area. Monitoring data indicate that the plume at Brunswick is stable and is not moving laterally.

How does pumping affect the rate and direction of salt water travel?

Modeling shows that increases/decreases in pumping from the Upper Floridan aquifer in pumping at or near the centers of Savannah and Hilton Head Island (including southern Beaufort County) will change the potentiometric gradient in these areas and thus change salt water intrusion velocities. Pumping at centers near Savannah and Hilton Head interact to influence salt water intrusion. Increased pumping will accelerate intrusion velocities and decreased pumping will decelerate intrusion velocities in the vicinity of the northern end of Hilton Head as well as the broad area offshore from Hilton Head and Tybee Islands. Modeling shows that if all pumping near Savannah were to cease, salt water would still migrate into the aquifer in response to pumping on Hilton Head. Modeling indicates that pumping outside these centers will have insignificant impact on the rate or development of salt water intrusion at Savannah or Hilton Head.

While the "T-shaped" plume at Brunswick is stable under current pumping conditions, increases or decreases in pumping in the immediate vicinity of the plume would cause the plume to enlarge/decrease in size. This is particularly true in the vicinity of the City of Brunswick's Coffin Park well. Pumping in Glynn County away from the "T-shaped" plume would have little impact on the size or the configuration of the plume.

Continued monitoring in the vicinity of the plumes is critical for effective management of the groundwater resources in the Savannah-Hilton Head and Brunswick areas.

What is the life expectancy of the aquifer?

Modeling shows that under year 2000 pumping conditions, many decades will elapse before the known locations of salt water intrusion will affect Upper Floridan aquifer wells in Georgia. If the plumes in the vicinity of the northern end of Hilton Head Island and offshore from Hilton Head and Tybee Island continue to expand at the simulated 1965-2004 rate, then salt water will not be a problem in Georgia for more than 100 years. However, some wells on Hilton Head have already been contaminated; and under current pumping others will be affected in the next several decades. As long as the plume at Brunswick remains stable, then the current wells should not be affected.

Modeling of the Upper Floridan aquifer also shows that large increases in groundwater withdrawals in the farming region north of the *Gulf Trough* would dewater the aquifer and may impact some surface water bodies. This is an environmental issue not related to salt water intrusion that, nevertheless, warrants further consideration and study.

Other than Savannah and Brunswick, are there any other areas in coastal Georgia where salt water intrusion can be reasonably expected?

With the exception of the known areas at Hilton Head and Brunswick, and the newly identified area offshore of Tybee Island, there is no evidence that the aquifer's upper confining unit at or near other areas near Georgia's mainland is under immediate threat of leakage or of being breached under current or foreseeable pumping conditions. Further, other than the Brunswick peninsula, there is no evidence that there are geologic fractures that extend from the Upper Floridan aquifer into the Fernandina Permeable Zone.

When will Georgia, South Carolina, and Florida drinking water wells in the Upper Floridan aquifer no longer meet drinking water standards?

Some wells in South Carolina have already become contaminated and others may become contaminated in the next few decades as the plume expands. There is no evidence of near-term threats to the Upper Floridan wells in the Savannah pumping center under current and foreseeable pumping conditions. Some wells within the plume at Brunswick have previously been abandoned because of contamination, but wells distant from the current stable "T-shaped" plume should not be affected as long as plume stability is maintained. The study sheds no light on conditions of wells in Florida.

Can areas having minimal impact on salt water intrusion be identified and separated from areas having significant impact?

Yes, under simulated year 2000 conditions - and reasonably anticipated future pumping conditions - only those areas in the vicinity of the Savannah-Hilton Head pumping center where the potentiometric surface is below sea level will experience a significant salt water intrusion impact. In the Brunswick area, creating and maintaining a "no new pumping" setback or buffer around the "T-shaped" plume will diminish – or eliminate - the impact of pumping on the size and configuration of this plume. The exact configuration of the buffer from the "T-shaped" plume still needs to be defined. Pumping from the Upper Floridan aquifer in other areas under current and anticipated future will have less impact on salt water intrusion.

Can some or portions of counties be eliminated from the final permitting strategy?

The 24-county region will not require a uniform set of permitting strategies to address salt water intrusion. As described in this Plan, EPD proposes to subdivide the 24-county area into three sub-regions; namely (1) a sub-region consisting of all of Bryan, Chatham and Liberty counties and that portion of Effingham County lying south of Highway 119 (Figure 6); (2) a Glynn County sub-region, and (3) the remaining 19 counties and the portion of Effingham County lying north of Highway 119.

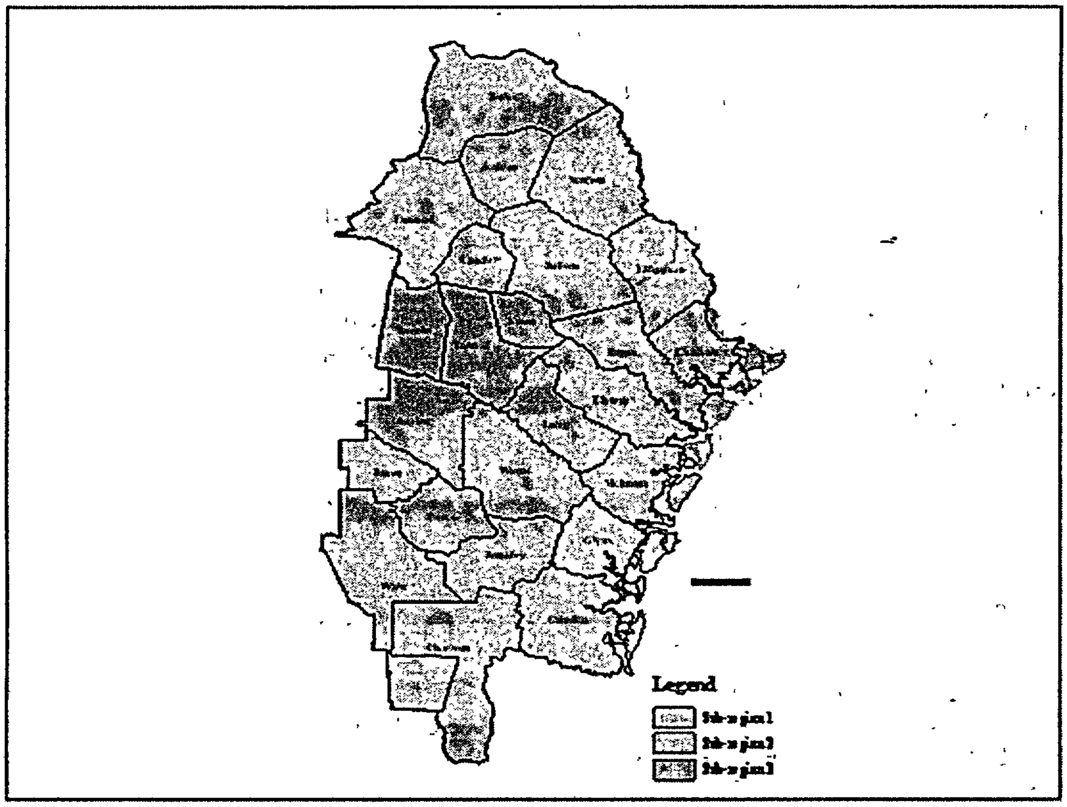


Figure 6: Sub-regions associated with the Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion

What are the other fresh water resources of coastal Georgia and what amounts of water can be obtained from them?

The best source of additional fresh water is conservation, particularly irrigation conservation. There are opportunities in using reclaimed water, particularly for lawn and golf course irrigation.

The rivers that drain the Piedmont (i.e., the Savannah, the Altamaha, and the Ogeechee) offer fresh water resources. The Ogeechee River however experiences periodic low flows and is not a viable water supply source on a year-round basis. For the most part the flow regimes of the Savannah and Altamaha rivers do not reflect significant low flow intervals, and are generally much more reliable sources than the Ogeechee. However, with regard to the Savannah River, two factors could dampen the reliability of this surface water source. First, during extended drought periods, flows in the lower river are largely controlled by the operation of large federal reservoirs in the upland reaches of the basin – in accordance with agreed upon reduced reservoir releases as reflected in a drought management plan adopted by South Carolina, Georgia, and the Corps of Engineers. The drought-related controlled flows in the lower reaches of the river could therefore be substantially less what might otherwise occur during droughts. Second, unexpected episodic events at the Savannah River Site could conceivably compromise the quality of the waters of the lower river, and render the source temporarily less desirable as a water supply source.

In the Glynn County area, the Miocene-aged Brunswick Aquifer System is a secondary source of groundwater. In the Chatham-Bryan County area, the Lower Floridan aquifer also is a secondary source of groundwater; there is, however, leakage between the Upper Floridan aquifer and the Lower Floridan aquifer. Some Lower Floridan aquifer wells may require treatment for naturally occurring higher dissolved solids concentrations (chloride and sulfate).

What would be the approximate costs of these alternate sources of water?

Extending the life of current water supplies through a water conservation program has been widely shown to be an inexpensive water supply option. Water reclamation as a source of golf course irrigation currently is taking place on Hilton Head Island, as well as in Savannah and a number of communities in northern Florida. Reclaimed water involves a relatively high level of treatment, in addition to the cost of laying new reuse water lines. This option would take some time to fully implement. A water supply conservation and/or water reuse plan has not been developed for the coastal area, so specific cost figures are not available at this time.

There is excess fresh water capacity at the current Savannah I & D plant, which could be utilized without additional capital investment in plant infrastructure. A study conducted as part of the Sound Science Initiative indicates that the cost of development of new surface water supply options will be about five times the cost of new groundwater supply options on a per-gallon basis.

Miocene-aged wells would need to be screened and developed, with lower well yields, and greater draw downs. This would mean that drilling and pumping costs would be higher than Upper Floridan aquifer wells. Lower Floridan aquifer wells would be considerably deeper and yields would be lower. This also would mean that drilling and pumping costs would be higher. In addition, water from some Lower Floridan aquifer wells may require treatment. Such costs, however, would have to be developed on a site-by-site basis. Other than higher drilling, pumping costs, and possible treatment costs, development costs for these two aquifers would not differ significantly from Upper Floridan well costs.

What are the current data gaps and what additional data are needed?

The Sound Science Initiative had a limited and well-defined scope of work. With the exception of some engineering analyses that were not performed, all defined studies were completed. Modeling needs to continue in those areas where salt water is entering the aquifers, and the models need to be updated as new wells come on line or new studies are completed. Further, established monitoring programs need to be continued in order to better define and track plume migration and pumping impacts.

The Corps of Engineers has collected a substantial amount of information and data relative to the susceptibility of the Upper Floridan aquifer to salt water intrusion due to proposed deepening of the Savannah Harbor. This information and data need to be incorporated into the model development assumptions and the groundwater models developed by USGS. Additionally, a finer resolution model grid needs to be employed in the offshore area. Improved agricultural water-use estimates after 2000 also need to be incorporated into groundwater models.

How should existing and future data be organized, integrated, and made available to the public.

The USGS has developed a web site (http://ga.water.usgs.gov) that provides information and data from monitoring wells in coastal Georgia and the Sound Science Initiative. This site contains links to downloadable copies of various reports. This web site should be maintained and updated as additional publications are prepared and as new monitoring data become available.

During the course of a series of EPD-sponsored public meetings that were held in coastal Georgia counties during August 2005, there was support for an EPD web site dedicated to coastal Georgia water resources. The web site now exists (http://www.gadnr.org/cws) and has appropriate links to USGS web sites that have technical reports as well as monitoring data.

Can a long-term monitoring system be established so that changes in salt water intrusion can be measured?

Yes, the framework for such a system, including an "early-warning" system, has been established in Georgia and should be maintained. A comprehensive groundwater monitoring network has been established in South Carolina, and it too should be maintained.

How much water is used by industry, municipal governments, agriculture, and other users and where do these uses occur?

A water use program for the coastal region of Georgia has been established and is being maintained by the USGS.

What engineered solutions can be used to prevent salt water from reaching Savannah and uncontaminated parts of Hilton Head Island or expanding in Brunswick to uncontaminated areas.

Because of the aquifer's high porosity and high hydraulic conductivity, there are no physical or hydraulic barriers that will permanently prevent/stop salt water intrusion.

The only way to truly stop the intrusion is to return to the pumping conditions that existed in the early part of the 20th century. Modeling indicates that if all the pumpage in the vicinity of Chatham County had never occurred, Hilton Head would still experience salt water intrusion, albeit it more slowly, due the Island's own pumpage. As long as pumpage in the vicinity of the "T-shaped" plume at Brunswick remains constant and a "no new pumping" buffer is created and maintained, this plume should not expand into uncontaminated areas. In both the areas, however, intrusion velocities can be slowed by reductions in pumping.

Because the cone of depression at Brunswick is relatively small (i.e., having a radius of some 1 ½ miles), relocation of well fields outside of the cone to dampen the depth of the cone appears to be more viable than in the Savannah vicinity where the cone radius is on the order of 30 miles. Also in the Savannah vicinity, relocation of wells would involve other governmental entities.

Sub-Regional Management Areas

The Coastal Georgia Water & Wastewater Permitting Plan for Managing Salt Water Intrusion establishes three sub-regions for purposes of implementing region-specific policies and permitting requirements to abate salt water intrusion, manage wastewater and implement water conservation and reuse practices. The three sub-regions are:

Sub-region 1:	Chatham, Bryan and Liberty Counties, and that portion of Effingham County south of Highway 119
Sub-region 2:	Glynn County
Sub-region 3:	The remaining 19 counties within the 24 county coastal area, and that portion of Effingham County north of Highway 119

These sub-regions are defined based on their varying vulnerability for or contribution to salt water intrusion as determined by the CSSI. Sub-region 1 (Chatham, Bryan, Liberty, and part of Effingham Counties) overlays the cone of depression that extends into South Carolina. The Gulf Trough bisects Effingham County roughly in a line defined by the location of Highway 119. The Gulf Trough is a feature of the aquifer whose low permeability acts as a barrier to the development of the cone of depression toward the northwest. Groundwater pumping on the northern side of the Gulf Trough has insignificant influence on the cone of depression. In Sub-region 2, Glynn County, salt water intrusion is caused by very localized pumping that does not contribute significantly to the development or extent of the cone of depression underlying Sub-region 1. The remaining 19 counties contained in Sub-region 3 do not contribute significantly to the development or extent of salt water intrusion at Savannah-Hilton Head or Brunswick (see Figure 6).

Described below is a set of water management elements unique to each sub-regional area and pertinent to the issues and influencing factors within that area.

Elements of the Management Plan for the Effingham-Chatham-Bryan-Liberty Sub-region

Sub-Region 1: Chatham-Bryan-Liberty-Effingham (partial) Counties

No net increases in total permitted withdrawals from the Upper Floridan aquifer: The management goal for Sub-region 1 is to restrict withdrawals from the Upper Florida aquifer in the sub-region to current permitted levels, and to begin implementing practices that would reduce actual withdrawals through time. An additional goal is to, through actions taken as permits are renewed, create opportunities for additional municipal withdrawals from the Upper Floridan aquifer through reductions in unused capacity.

Conservation and Reuse: Employ aggressive and practical measures that will ensure efficient and effective use of those quantities of water that must be removed from our water systems to meet human needs.

Justification of Need: Ensure that each gallon of water sought under any permit application is justified using clear and consistent criteria.

Diversification of Sources: Where surface water sources are reasonably available, sole reliance on either groundwater or surface water is not desirable, and the combination of blended surface water and groundwater will be required to meet area-wide water demands. Through such a 'blending' of both types of sources to meet area-wide needs, preserving and protecting the water resources becomes a more reachable goal. Allow additional withdrawals from the Lower Floridan aquifer consistent with technical guidance provided by EPD.

Monitoring: Continuously monitor the reactions of the Floridan aquifer as management actions are implemented; determine the extent to which the management actions require additions and modification to achieve aquifer management goals.

Major Water Resources Issues in Sub-region 1

Salt Water Intrusion Influences

Scientific investigations have conclusively shown that withdrawals from the Upper Floridan aquifer - which have grown over the past 60+ years in this sub-region - are major contributors to reducing aquifer water levels by more than 100 feet in areas within Chatham County to water levels reductions of 10-20 feet in counties more than 75 miles inland from Georgia's coast (see Figure 7). The depth of this 'cone of depression' is influenced most by withdrawals – from the aquifer – that occur in or near the so-called 'center of the cone' in the Chatham County area, but the cone of depression is dynamic and takes on different characteristics with changes in the timing, location, and amounts of withdrawal from the aquifer. The size and shape of the cone is very sensitive to where withdrawals occur within the aquifer and the amount of each withdrawal. Withdrawals of a lower magnitude in some areas of the aquifer could have more pronounced influences on the size and shape of the cone than other lesser withdrawals placed elsewhere within or near the current cone. However, Upper Floridan aquifer withdrawal activities throughout this dynamic cone impact the cone's shape and other characteristics. It is impractical to restrict any and all future uses of the Upper Floridan aquifer that might have some small measure of impact on this dynamic cone of depression. It is, however, quite practical to describe a smaller area where aquifer withdrawals have the greatest impact on movement of the cone and circumstances that are affected by this movement. For purposes of managing present and future uses of the aquifer in Georgia, this smaller area is here taken as the area underlying all of Chatham, Bryan, and Liberty counties, and the area south of Georgia Highway 119 in Effingham County (see Figure 6).

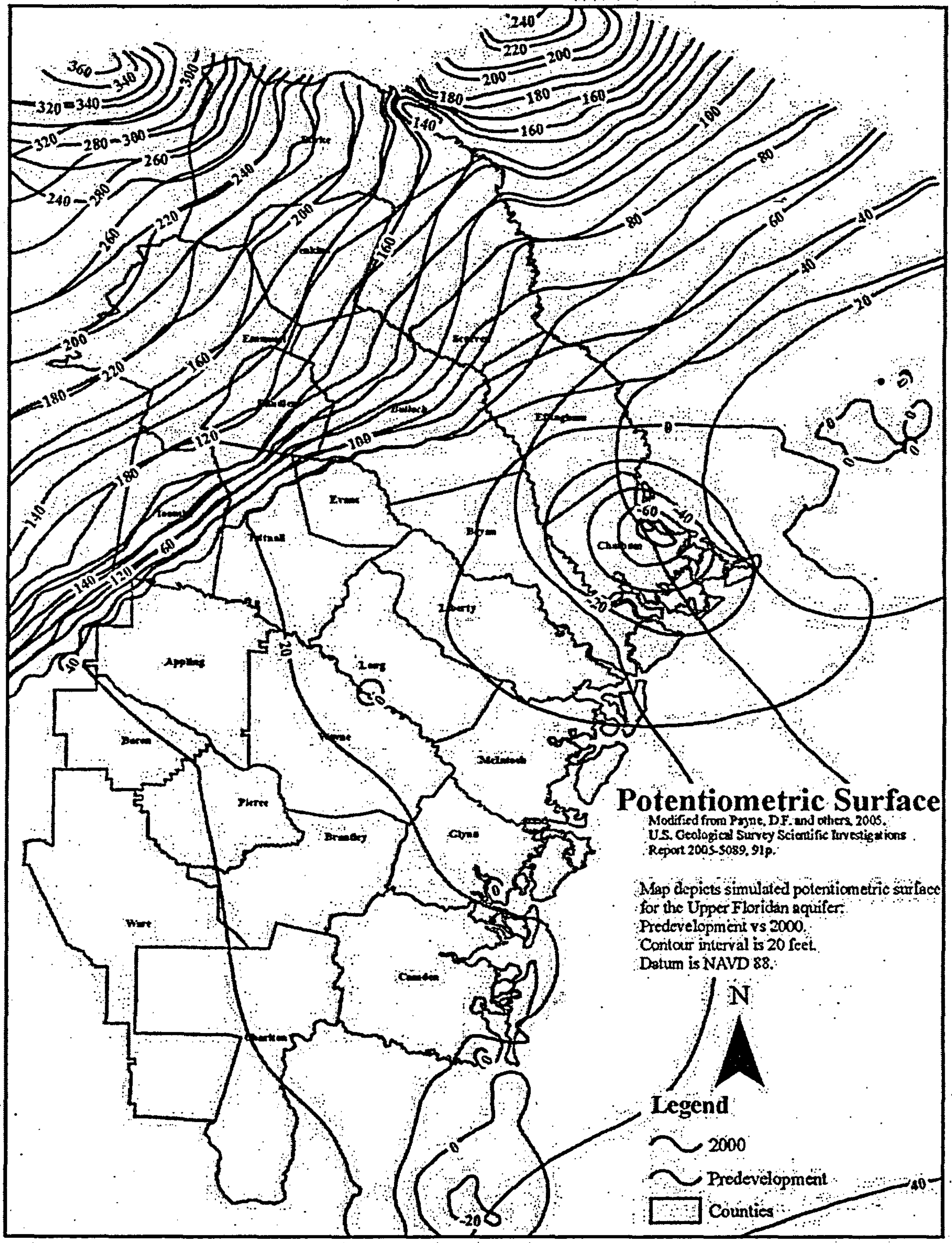


Figure 7: Potentiometric Surface map of Upper Floridan aquifer

This cone of depression induces a hydraulic gradient that contributes to the spread of three distinct salt water plumes at the northern end of Hilton Head Island, South Carolina. Withdrawal activities from the center of the cone, then toward its eastern extremity, are likely to most affect the shape of the cone's hydraulic gradient in the vicinity of the salt water plumes at the northern end of Hilton Head Island. Modeling studies show that a separate cone of depression created by South Carolina's withdrawals from the Upper Floridan aquifer have a much more significant impact on the movement of these salt water plumes than the impact induced by the cone of the depression created by Georgia's withdrawals from the aquifer. As these salt water plumes expand in South Carolina, they move into areas where domestic and municipal wells are located, and the water in these wells may become undrinkable because of elevated chloride concentrations. Water from municipal wells in these areas can only be rendered drinkable with higher – and generally more expensive – stages of treatment to reduce chloride concentrations to acceptable levels.

This cone of depression creates a downward hydraulic gradient that influences the rate at which salty water migrates <u>downward</u> through the upper confining layer and into the Upper Floridan aquifer in areas where the confining unit is thin or absent. Studies done by the USGS and the US Army Corps of Engineers indicate that salt water is migrating through the confining unit overlaying the Upper Floridan aquifer offshore and in the Savannah area. Although much of this salty water is diluted by freshwater from the Upper Floridan aquifer, it is possible that in the future this salty water may impact wells at Tybee Island, which is located within the cone of depression in an area where the ancient Savannah River channel has thinned the overlying confining unit.

<u>Population/Economic Growth & Water Supply Diversity</u>
Within coastal Georgia, sub-region 1 will experience the highest rates of growth in population during the next 25 years. This growth is likely to be widely distributed over all the political jurisdictions within the sub-region, and will dramatically increase the stresses on the area's current highly fragmented array of smaller and larger water and wastewater management systems. With the exception of the City of Savannah, which had the financial capability to construct the Savannah I&D plant to supply water from the Savannah River, most smaller communities rely, or prefer to rely, on water supplied from the Upper Floridan aquifer. Surface water supply from the Savannah River, and groundwater from the Upper Floridan cannot be relied on as exclusive sources for communities in Effingham or Chatham Counties.

The groundwater and surface water resources of the sub-region are best managed for the collective well being of the entire sub-region. In the future the area's economic vibrancy and growth patterns will almost assuredly take on sub-regional characteristics that reflect the rich diversity of local jurisdictions, while taking advantage of the area's collective attributes. Reasonable and sustainable management of the waters of the region to support this expected growth is best done equitably.

<u>Inequity of Cost-Advantage of Groundwater</u>
A major impediment in this sub-region to the state's ability to effectively manage these resources is the fact that the "at the tap" cost of a unit volume of water taken from the Upper Floridan aquifer is currently much less than that of a comparable volume of water taken from a surface water source. This cost advantage of groundwater is reflected in the prices charged by various water utilities within the sub-region, and affects the extent to which water providers are willing

to consider utilizing surface water sources to meet future needs. Unrestricted access to the waters of the Upper Floridan aquifer is clearly the cheapest way to meet the water needs of the sub-region, and will not likely result in near-term harm to the quality of the Upper Floridan aquifer in Georgia as it relates to salt water. However, as stated in preceding sections, such unrestricted access will, to the extent the cone of depression created by Georgia's pumping within the sub-region has been conclusively shown to influence enlargement of salt water plumes on Hilton Head, exacerbate South Carolina's attempts to manage its water supply system in the face of salt water movement along the northern end of Hilton Head Island. This cost advantage therefore adversely affects the state's ability to sustainably manage the water resources in the sub-region, and is not likely in the long-term best interest of broad scale economic development within the sub-region. The sub-region's economic future is closely linked to the effective management of the sub-region's water resources - both groundwater and surface water; management that will ensure a dependable and sustainable water supply. Harmonious economic development in the sub-region is also facilitated by the adoption and implementation of water management strategies that recognize the link between Georgia's use of water and the availability of safe and dependable water supplies for South Carolina.

The challenge therefore is to address future dependability and sustainability concerns, to support region-wide economic development in a manner not prejudiced by the cost advantage of groundwater over surface water, and to complement other elements of the Management Plan intended to address Georgia's influence on salt water plume movement at the northern tip of Hilton Head. The sub-region would likely benefit from a regional discussion of gradual creation of a "one-price system" mechanism for categories of finished water sold within the sub-region.

Wastewater

Assimilative capacity in area streams will be strained all across the sub-region as the population grows. This will be particularly evident in the area of the Savannah Harbor and environs upstream. The amount of oxygen demanding substances in the waters being discharged to the Savannah River and its tributaries below Augusta is of great concern even under current conditions. Since the mid-1990's EPD has not issued discharge permits that would increase the point source loadings of oxygen demanding substances to the Savannah Harbor and streams upland that send their discharge to the Harbor. The policy has been based on field and modeling work completed by EPD in the 1980's to determine the dissolved oxygen assimilative capacity of the harbor and the lower Savannah River. In 1994 EPA took issue with EPD's assessment of the dissolved oxygen standard established by EPD, and in August of 2004 EPA public noticed its draft dissolved oxygen Total Maximum Daily Load (TMDL) for Savannah Harbor. The TMDL includes two scenarios; one using the existing Georgia EPD criterion for dissolved oxygen (which was been disapproved by EPA in 1994), and one using a criterion recommended by EPA. Using the disapproved Georgia criterion, the DO TMDL would establish a 100% reduction of oxygen-demanding substances from all NPDES regulated discharges in the watershed (from the Thurmond Dam near Augusta, Georgia to the Savannah Harbor) in order to attain the existing, applicable site-specific dissolved oxygen criterion. Using EPA's alternative dissolved oxygen criterion mentioned in EPA's public notice would require a 30% reduction in the total load of oxygen demanding substances currently being discharged (as measured during the summer of 1999) by NPDES regulated sources. Any new criterion for dissolved oxygen proposed by EPA or the State will face serious scrutiny by industry, local governments, endangered species advocates, environmental groups, port authorities, Federal agencies, and the State of South Carolina.

Management Goals

<u>*Manage Influence of Georgia's Withdrawals on Hilton Head Plumes*</u>

The management actions in Sub-region 1 are largely founded on the best available scientific explanation of the relationship between past and current Upper Floridan aquifer water withdrawals in Georgia, and the existence and movement of salt water plumes in the vicinity of the northern end of Hilton Head Island. The management actions in the sub-region are also founded on the best available data and information that relate Upper Floridan aquifer withdrawals to the diffuse movement of salty water downward through the thinnest potions of the upper confining layer as the aquifer reaches seaward. One goal of management actions in this sub-region is, therefore, to restrict future permitted uses of the Upper Floridan aquifer in ways that best reflect our scientific findings related to these relationships. Another goal is to try to ensure that management actions best reflect a practical appreciation of the extent to which water users in the sub-region have in the past committed extensive financial resources to development and operation of water infrastructure; water infrastructure that will undoubtedly continue to be essential to meeting present and future water needs in the sub-region. Significant attention is therefore given to measures directed at water use efficiency, reallocation of excess permitted capacity, reuse of reclaimed water where appropriate and technically feasible, and the sustainable and diversified use of all reasonably available water sources.

There are several actions that Georgia could take that would reduce the extent and/or location of the cone of depression without an absolute reduction in the quantity of water taken from the aquifer in the sub-region. Such actions could reduce gradients that influence the spread of the salt water plumes. For example, reduction of the amount of water withdrawn from the aquifer in those areas where such withdrawals exert the greatest influence on the cone of depression, and subsequent relocation of these withdrawals to less sensitive areas, could result in gradual dampening of the cone. This could result in a corresponding decrease in the extent to which Georgia's withdrawals exert an influence on the plume growth at Hilton Head and downward migration through the overlying confining unit. Dispersing large, concentrated withdrawals from the Upper Floridan aquifer to a number of more diffuse locations within the sub-region could also dampen gradients created by the cone of depression, and result in a corresponding decrease in the impact of Georgia pumping on salt water plumes at Hilton Head. Additionally, some shifting of current and future withdrawal quantities several miles to – and beyond - the western and northern extremities of the sub-region would decrease Georgia's influence on Hilton Head salt water plumes. Finally, moving existing supply wells at Tybee Island landward from the Savannah River channel would reduce the likelihood that salt water would contaminate the Tybee Island wells. None of these options have been included as elements of the current Plan, but they all deserve continued discussion. At some later date some or all could potentially be added to the Plan.

Meet Reasonable Future Water Needs

Reasonable use of Georgia's water resources is a right accorded to Georgia's citizens by Georgia Code. As the protector of that right, the state is responsible for managing those resources in a way that ensures Georgians have access to reasonable quantities of water both now and into the future. To better avail citizens to the right to reasonable use, the Plan focuses on actions designed to ensure that forecasts of water needs by various entities within the region be done in accordance with a standardized protocol; and that reasonable and consistent actions be taken by all permit applicants to implement aggressive water conservation programs; and that future water supplies come from a combination of groundwater and surface water sources; and future water sources include the use of reclaimed water to the maximum practical extent.

Ensure Equitable Access

Assuring equitable access to limited water supplies within the confines of current local water and wastewater management mechanisms requires that the state consider a number of factors. Among them are: 1) past and current investments in water and wastewater infrastructure; 2) access, opportunity, and cost of exploiting all water sources; and 3) leveraging opportunities that could expand sub-regional water and wastewater management opportunities. The Plan therefore focuses on strategies designed to identify and distribute excess Floridan aquifer permitted capacity, and on measures directed at ensuring that already developed surface water sources are utilized in a fair and equitable fashion.

Wastewater

The management goal here is to avoid wastewater discharge permit actions that would increase the mass of oxygen-demanding substances discharged into waters eventually flowing into the Savannah Harbor. EPD will therefore continue its long-standing policy of only approving wastewater solutions that do not increase permitted point source discharges of oxygen-demanding substances into the affected waters.

Sub-region 1 Key Elements

No Net Increase in Permitted Withdrawals

The following elements are central to Georgia 'no net increase' approach to managing the use of water in the 4-county Effingham-Chatham-Bryan-Liberty sub-region.

- The amount of withdrawals provided under renewals of current permits will be based on the conditions set forth in the remainder of this section, including those conditions set out in the 'Conservation', 'Justification of Need', Equity', and 'Monitoring' sections of this document.

- No NET increases in permitted withdrawals will be allowed in the future, from the Upper Floridan aquifer within the sub-region. Total permitted withdrawals from the Upper Floridan aquifer within the sub-region is a monthly average of approximately 130 million gallons per day (mgd). In the future total withdrawals from the Upper and Lower Floridan aquifer within the sub-region will not be allowed to exceed this 130 mgd monthly average. Additionally, EPD will require, via withdrawal permit conditions, water conservation actions that will result in reduction in actual withdrawals from the aquifer.

- Some current users of the Upper Floridan aquifer in this sub-region have withdrawal permit limits that comfortably exceed demonstrated needs. Reductions in some of these permit limits will yield sufficient quantities to allow EPD to issue Floridan aquifer withdrawal permits to municipalities within the sub-region that have sought Floridan aquifer withdrawal permits over the period of the Interim Strategy. Such reductions are necessary if the 'no net increase' policy is to be effective. Additional aquifer savings in the sub-region are expected to come as conservation and reuse programs (described below), are implemented over time.

- Applications for new municipal withdrawals from the Upper Floridan aquifer within the sub-region will be allowed only when such withdrawals meet the requirements identified in this document, and are consistent with managing the resource under the 'no net increase' policy.

- Applicants for new municipal withdrawals from the Upper Floridan aquifer within the sub-region will be required to connect to available surface water sources.

Conservation and Reuse

The system of laws governing water permitting decisions in Georgia is founded on the principle of 'reasonable use' of state waters to meet the 'reasonable needs' of those seeking to use those waters. Our statutes provide that the state not allow the meeting of these needs to have "...unreasonably adverse effects upon other water uses in the area." Our statutes mandate that the state make these 'reasonableness' decisions within the context of the capability of the water sources and present and future needs of other uses of the waters. Regarding the capability of the water sources within the sub-region, it is clear from the work conducted under the Coastal Science Initiative that while the major groundwater resource in the region (i.e., the Upper Florida aquifer) is quite capable of supplying ample supplies of fresh water to the region for a great number of years to come, permitting unrestricted use of that source within certain areas will contribute to unreasonable adverse effects on other users and uses. Regarding the future demands expected to be placed on the region's water sources, it is clear from all available forecasts of the sub-region's future needs that demand on the water resources will increase quite substantially.

Because of these circumstances, in determining 'reasonableness of need' the state henceforth will attach a higher degree of importance in this sub-region to the extent to which users of the sub-region's waters employ practices that are intended to minimize the volume of water withdrawn to meet specific needs. The state will also attach more importance to assuring that measures are implemented that result in the efficient use of all water withdrawn. Toward these ends a series of water conservation and efficiency actions will be required of water users within the sub-region. Some of these prescribed actions build upon the success many of the sub-region's water utilities have had in implementing conservation practices, particularly since 1997. Other actions described below are based upon federal guidance documents and national research that apply to this area of the state.

- *Industrial Water Use*

Many industrial processes demand high volumes of water, including washing and rinsing, heating and cooling, shop clean-up and outdoor water use. No two operations are alike; therefore, it is critical that a water audit be performed to assess the facility's system and identify potential for water savings. For all current industrial permit holders seeking to renew their withdrawal permits, conditions will be placed in such permits to set a schedule for completion of the items described below. Additionally, the permit conditions will require that withdrawal permit limits in the renewed permits be revisited and revised after EPD completes its review of the elements submitted in accordance with the items described below.

1. Each industrial water user will perform an audit of the facility's water system and identify locations where practices can be employed to conserve water.

2. Each industrial water user will adopt an industrial leak detection and repair program under guidance and assistance to be provided by the Pollution Prevention and Assistance Division of the Georgia Department of Natural Resources.

3. All industrial water users will adopt a metering, meter calibration, and repair and replacement program to be approved by the Georgia Environmental Protection Division.

4. All industrial permit holders, who do not produce a food product, shall conduct a reuse feasibility study for an alternate water source (i.e. reclaimed water or surface water) as a substitute for ground water used for operational practices (such as washing, cooling, etc...). This assessment will be conducted using guidance to be provided by Georgia Environmental Protection Division.

5. All industrial water uses will maximize the use of recycled or reclaimed water to supply their internal operation needs as well as their outdoor watering requirements.

- *Public and Private Domestic Water Providers*

Public and private domestic water providers constitute the majority of the water use in Effingham, Chatham, Bryan and Liberty Sub-region. Over time it is possible to significantly reduce residential per capita water use. Already, many communities are targeting household water use through educational campaigns, metering and retrofit programs. For all current public and private domestic water withdrawal permit holders seeking to renew their withdrawal permits, conditions will be placed in such permits to set a schedule for completion of the items described below. Reductions in actual withdrawals from the aquifer are expected through implementation of these conditions. Additionally, the permit conditions will require that withdrawal permit limits in the renewed permits be revisited and revised after EPD completes its review of the elements submitted in accordance with the items described below.

Public and private water providers will develop or expand their water conservation program to include, but not be limited to, the following elements:

1. Each water utility serving water customers (residential, commercial, institutional, and industrial) will develop a water conservation education program (including both school and public information programs) assistance to be provided by the Georgia Department of Natural Resources and the Georgia Department of Community Affairs.

2. All public and private water providers will adopt and implement a conservation-oriented rate structure. The rate structure must be developed using guidelines to be provided by the Georgia Environmental Protection Division. Water wholesalers must ensure that all municipal customers have adopted conservation-oriented rate structures.

3 Each water provider and its customers (residential, commercial and industrial) will adopt a policy requiring all of its water customers to abide by the outdoor watering schedule adopted by the Board of Natural Resources (in the Drought Management plan of 2003), or an alternate outdoor watering schedule approved by the Georgia Environmental Protection Division. In Effingham, Chatham, Bryan, and Liberty Sub-region, the local governments will enhance the outdoor watering schedule to include a volume or time limitation.

4. All public and private domestic water providers will submit to EPD a schedule for conducting a reuse feasibility study for alternate water sources (i.e. reclaimed water or surface water) as a substitute for ground water used for outdoor watering purposes. This assessment will be conducted using guidance to be provided by the Georgia Environmental Protection Division.

5. All public and private domestic water providers will adopt a meter calibration, repair, and replacement program to be approved by the Georgia Environmental Protection Division prior to issuance of the permit. This program is to include:

a. A program and schedule for installing meters for all wells and connections that are not currently metered.
b. Annual calibration for meters for those users representing at least the top 10% of water users.

6. All local governments within the sub-region will adopt ordinances requiring all new developments served by public and private sewage services to install purple pipe reuse lines.

7. Each water utility serving municipal customers will adopt a water loss control program using guidance provided by Georgia Environmental Protection Division. All providers in the sub-region will implement the water loss control program.

   a. EPD will use the International Water Association methodology as endorsed by the American Water Works Association.
   b. In addition, the sub-area will meter all fire hydrant flushing events.

Many of the elements listed above can be accomplished through participation in area wide, regional, or aquifer-wide public water conservation program where plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

- *Agricultural Water Users*

1. Enhance partnerships between EPD, the Wildlife Resources Division (WRD), the Natural Resources Conservation Service (NRCS), the Soil and Water Conservation Service (SWCC), the Extension Service and other entities in the area to develop messages about the importance of implementing efficient irrigation practices and reducing water withdrawals. Refine and target initial educational efforts to the Effingham, Chatham, Bryan and Liberty Sub-region and the Glynn County Sub-region and then extend educational efforts to the remaining 19 county area.

2. Permittees will be required to install water meters and report annual water use on forms provided by the Georgia Environmental Protection Division, developed in conjunction with the SWCC metering program, using standard methodology approved by the Director.

3. EPD will partner with NRCS and SWCC and other interested parties to develop a program to help irrigators identify and fix leaks and eliminate off-target application. Program development should include the irrigation manufacturers and providers in Southwest Georgia. Initially the program should target the largest irrigation water users in the sub-region, then expand to the other irrigation users.

4. EPD will use information collected and compiled by the SWCC through the water metering program. This information will help EPD and other state and federal agencies to identify target areas where enhanced water conservation practices are needed. This type

of monitoring can help target education and outreach and financial assistance programs most appropriately.

5. EPD will work with other state and federal agencies to develop a process for determining success of water conservation practices. This process should be built around the research currently being conducted by the SWCC and used to identify those areas that need additional resources for more conservation implementation and/or education efforts.

6. To eliminate water loss and water waste, all new farm permits will be required to use cost/effective, water efficient irrigation technology. These technologies will include, but not be limited to, end gun shutoffs and sprays on drops. Also new, modified, or transferred water withdrawal permit applicants will be advised to implement technology to minimize runoff and control evaporative loss of water. Practices and technology that qualify as water efficient will be identified by EPD and others by December 31, 2006 and periodically reviewed to ensure information is up to date.

7. No new traveler irrigation systems will be allowed in the Effingham, Chatham, Bryan and Liberty Sub-region.

8. All new, modified or transferred water withdrawal permit applicants, who do not produce a food product, will conduct a reuse feasibility study for reclaimed water as a substitute for ground water.

- *Golf Course Water Use*

1. Golf course water uses in the sub-region that hold a non-farm water use withdrawal permit – as defined by statute - will conduct a study of the feasibility of using reclaimed water as a substitute for Upper Floridan aquifer water. The results of this feasibility study will be included in the application for renewal of the non-farm water use withdrawal permit. Upon completion of review of each such renewal application, EPD shall set a schedule for such golf courses to convert to the use of reclaimed water or other non-Upper Floridan aquifer water for irrigation purposes.

2. As withdrawal permits are issued and/or renewed for golf courses in the sub-region, a condition will be placed in the terms of the permit setting a schedule for implementation of Best Management Practices (BMPs) developed and agreed to in the Memorandum of Agreement (MOA) adopted by Georgia Golf Course Superintendents Association and the EPD on May 14, 2004..

Justification of Need

The principle of 'reasonable use' is at the heart of Georgia's statutes governing water permitting decisions. It is important for the state to fully consider the extent to which 'reasonable use' is reflected in the each water withdrawal application. This consideration is critically important when data show that increased use of a limited water resource within a region will compromise the quality and quantity of water available to other near-term users and uses of that water resource. Clearly this is the circumstance that surrounds use of the waters of the Floridan aquifer in this sub-region.

- *Industrial Water Use*
  1. As EPD issues renewed industrial withdrawal permits, the withdrawal limits will reflect water demands that demonstrate reasonable use after considerations of water savings opportunities generated by application of the water conservation strategies outlined above.

- *Public and Private Domestic Water Providers*
  1. By September 30, 2006, EPD will develop – in conjunction with the Georgia Municipal Association, the Association of County Commissioners of Georgia, and the Association of Regional Development Centers – and distribute a municipal water demand forecasting protocol to be employed by ALL municipalities within the 24-county area as part of the 'justification of need' for withdrawal quantities cited in ALL applications for new, modified, and renewed municipal water withdrawal permits.

  2. As EPD issues new, modified, and renewed municipal withdrawal permits, the withdrawal limits will reflect water demands that demonstrate reasonable use as largely determined by use of this demand forecasting protocol.

- *Golf Course Water Use*
  1. EPD will develop and distribute – in conjunction with the Georgia Golf Course Superintendents Association – a guide for forecasting golf course irrigation water needs. In justifying need, ALL golf courses that meet the statutory definition of non-farm water uses in the sub-region will employ for forecasting irrigation water needs by. This guide will also be used for forecasting irrigation water needs by all NEW golf courses within the sub-region that meet the statutory definition of new farm use golf courses in support of applications few renewed and/or new irrigation permits. EPD will only consider golf course irrigation water allocations that are supported by the forecasts derived from use of this guide.

Monitoring

Groundwater and surface water monitoring networks have been established for coastal Georgia and currently are being maintained by the USGS. Water level data are collected from the groundwater monitoring stations, stream flow data from the surface water stations. Once a year grab samples are collected from wells on Tybee Island, Fort Pulaski, and Skidaway Island and analyzed for chloride concentration. Subject to the availability of funds, all existing water level, stream flow, and water quality monitoring stations will be maintained.

Beneath the Savannah River channel offshore of Tybee Island, pore water concentrations as high as 500 milligrams per liter have been measured in the lower portion of the confining unit near the top of the Upper Floridan aquifer. To track changes in chloride concentration and water levels that could indicate salt water contamination, an early warning "real time" system at Tybee Island needs to be established.

South Carolina Department of Health and Environmental Control maintains a groundwater monitoring network in the vicinity of the northern end of Hilton Head Island. It is expected that this monitoring network will be maintained.

Elements of the Management Plan for the Glynn County Sub-region

Sub-region 2: Glynn County

Avoidance: The management goal for Sub-region 2 is to manage withdrawals from the Upper Florida aquifer in such a manner so that the current configuration of the "t-shaped" plume does not change to any great extent. No new wells will be permitted within the area of the plume, nor within a setback from the plume.

Conservation and Reuse: Employ aggressive and practical measures that will ensure efficient and effective use of those quantities of water that must be removed from our water systems to meet human needs.

Justification of Need: Ensure that each gallon of water sought under any permit application is justified using clear and consistent criteria.

Monitoring: Continuously monitor the reactions of the Floridan aquifer as management actions are implemented; determine the extent to which the management actions require additions and modification to achieve aquifer management goals.

Major Water Resources Issues in Sub-region 2

Salt Water Intrusion

In Glynn County salty water is entering the Lower and Upper Floridan aquifer from the so-called Fernandina Permeable Zone with lies beneath the lower confining unit of the Lower Floridan aquifer. The saline water within the Fernandina Permeable Zone travels upwards into the Lower and Upper Floridan aquifer due to a couple of factors. First, there are fractures in the confining units between the Fernandina Permeable Zone and the Lower Florida, as well as within the semi-confining unit between the Lower Floridan and Upper Floridan. These fractures provide a pathway for the saline water from the Fernandina Permeable Zone to travel upward. Second, over the middle decades of the 20th century there was a gradual increase in withdrawals from Upper Floridan aquifer in Glynn County. These withdrawals decreased the residual water pressure in the aquifer, which when combined with the existence of the fractures in confining units, resulted in the upward movement of the salty water.

Population/Economic Growth & Water Supply

Glynn County is expected the experience moderate population growth over the next several decades. Indeed circumstances could arise that would result is growth well beyond that which might be reasonable to anticipate today. Wherever along the spectrum of possible growth scenarios the County actually falls in the coming decades, it is reasonable to expect that the present and future water needs of the County, as well as municipalities and industries therein, will continue to largely be reliant on the waters of the Upper Floridan aquifer.

The two major municipal water suppliers within Glynn County are the County itself and the City of Brunswick. Added to this is the fact that many private water service providers are filling service vacuums in faster growing areas of Glynn County. The County has a fair amount of excess withdrawal permitted capacity in some areas; the City too has some excess withdrawal capacity, but less. Viewed collectively, there is likely sufficient water to meet most, if not all, of the reasonably foreseeable municipal growth in water and wastewater services demands within the county over the next couple of decades.

Wastewater

With regard to wastewater, the City has a fairly sizable amount of excess wastewater treatment capacity in some locations; the County on the other hand is pressed for wastewater treatment capacity (more in some areas than others). State and local efforts to manage the sub-region's water resources to maintain the stability of the T-shaped plume could potentially be aided by continuation of discussions between the County and City toward development of a county-wide water and sewer authority. Such an authority would also likely result in a sizable reduction in future water demands that would otherwise be placed on the water resources in the sub-region (including the Upper Floridan aquifer), and a cost-effective county-wide water and sewer infrastructure with which to address the growth needs.

Management Goals

Avoidance

Monitoring data have shown that the T-shaped salt water plume in Glynn County (Figure 8) has not demonstrated appreciable advancement for more than 20 years. This stability is owed to reductions in the quantity of water withdrawn from wells located within the Upper Floridan aquifer within the plume area. Industrial users have been particularly effective, and the City of Brunswick has more recently also implemented effective water conservation and leak detention/prevention programs. Since the early 1980's actual withdrawals have decreased by 30 mgd. Restricting the siting of new wells to points well removed from locations that would influence expansion of the plume has also greatly aided the stability of the plume.

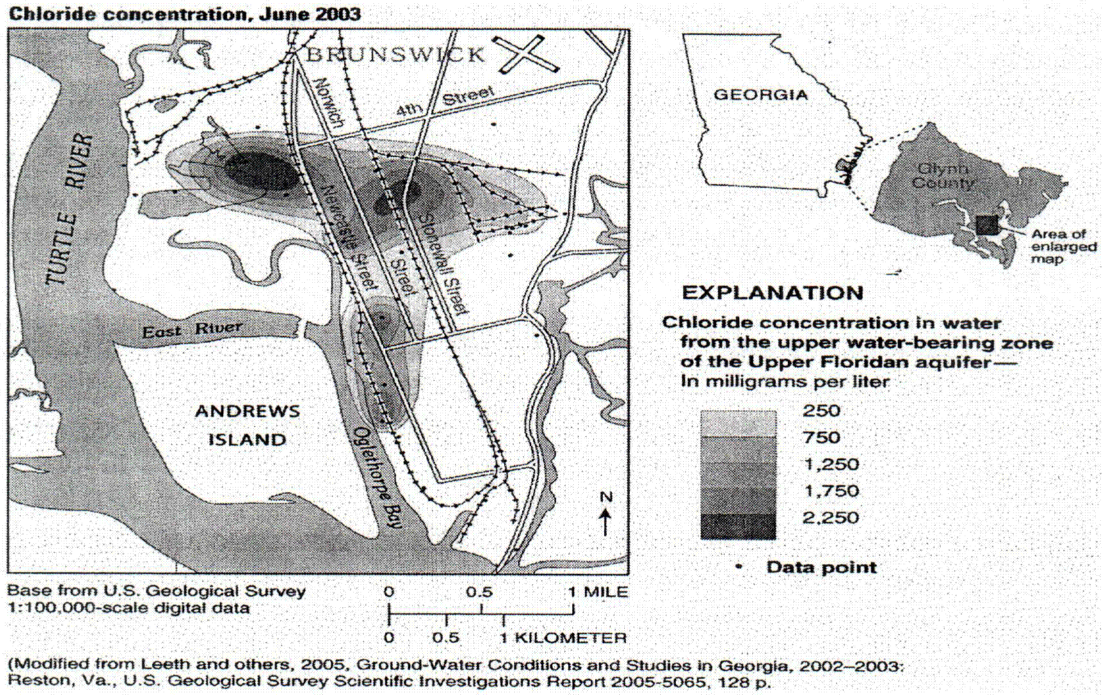


Figure 8: T-shaped plume beneath Brunswick, Georgia

Meet Reasonable Future Water Needs

Reasonable use of Georgia's water resources is a right accorded to Georgia's citizens by Georgia Code. As the protector of that right, the state is responsible for managing those resources in a way that ensures Georgians have access to reasonable quantities of water both now and into the future. To better avail citizens to the right to reasonable use, the Plan focuses on actions designed to ensure that forecasts of water needs by various entities within the region be done in accordance with a standardized protocol; and that reasonable and consistent actions be taken by all permit applicants to implement aggressive water conservation programs; and that future water supplies come from a combination of groundwater and surface water sources; and future water sources include the use of reclaimed water to the maximum practical extent.

Sub-region 2 Key Elements

Avoid Increasing Size and Shape of Current Plume

The following elements are central to managing the use of water in the Glynn County sub-region.

- The amount of withdrawals provided under renewals of current permits will be based on the conditions set forth in the remainder of this section, including those conditions set out in the 'Conservation and Reuse', 'Justification of Need', and 'Monitoring' sections of this document.

- No increases in permitted withdrawal quantities of industrial users of the Upper Floridan aquifer currently within the limits of the salt water plume.

- No approval of any new applications that site Upper Floridan aquifer wells within the current salt water plume boundary.

- Establish a buffer zone around the plume boundary area and require all new applicants to drill wells outside buffer limits.

Conservation and Reuse

In the Glynn County sub-region the state will attach a higher degree of importance to the extent to which users of the sub-region's waters employ practices that are intended to minimize the volume of water withdrawn to meet specific needs. The state will also attach more importance to assuring that measures are implemented that result in the efficient use of all water withdrawn. Toward these ends, a series of water conservation and efficiency actions will be required of water users within the sub-region. Some of these prescribed actions build upon the success many of the sub-region's water utilities have had in implementing conservation practices. Other actions described below are based upon federal guidance documents and national research that apply to this area of the state.

- *Industrial Water Use*

Many industrial processes demand high volumes of water, including washing and rinsing, heating and cooling, shop clean-up and outdoor water use. No two operations are alike; therefore, it is critical that a water audit be performed to assess the facility's system and identify potential for water savings. For all current industrial permit holders seeking to renew their withdrawal permits, conditions will be placed in such permits to set a schedule for completion of the items described below. Additionally, the permit conditions will require that withdrawal permit limits in the renewed permits be revisited and revised after EPD completes its review of the elements submitted in accordance with the items described below.

1. Each industrial water user will perform an audit of the facility's water system and identify locations where practices can be employed to conserve water.

2. Each industrial water user will adopt an industrial leak detection and repair program under guidance and assistance to be provided by the Pollution Prevention and Assistance Division of the Georgia Department of Natural Resources.

3. All industrial water users will adopt a metering, meter calibration, and repair and replacement program to be approved by the Georgia Environmental Protection Division.

4. All industrial permit holders, who do not produce a food product, shall conduct a reuse feasibility study for an alternate water source (i.e. reclaimed water or surface water) as a substitute for ground water used for operational practices (such as washing, cooling, etc...). This assessment will be conducted using guidance to be provided by Georgia Environmental Protection Division.

5. All industrial water uses will maximize the use of recycled or reclaimed water to supply their internal operation needs as well as their outdoor watering requirements.

- *Public and Private Domestic Water Providers*

All current public and private domestic water withdrawal permit holders seeking to renew their withdrawal permits, conditions will be placed in such permits to set a schedule for completion of the items described below. Additionally, the permit conditions will require that withdrawal permit limits in the renewed permits be revisited and revised after EPD completes its review of the elements submitted in accordance with the items described below.

1. Each water utility serving water customers (residential, commercial, institutional, and industrial) will develop a water conservation education program (including both school and public information programs) assistance to be provided by the Georgia Department of Natural Resources and the Georgia Department of Community Affairs.

2. All public and private domestic water providers will adopt and implement a conservation-oriented rate structure. The pricing structure must be developed using the guidelines to be provided by the EPD. Water wholesalers must ensure that all municipal customers have adopted conservation-oriented rate structures.

3. Each water provider and its customers (residential, commercial and industrial) will adopt a policy requiring all of its water customers to abide by the outdoor watering schedule adopted by the Board of Natural Resources (in the Drought Management plan of 2003), or an alternate outdoor watering schedule approved by the EPD. In the Glynn County sub-region, the local governments will enhance the outdoor watering schedule to include a volume or time limitation.

4. All public and private domestic water providers will submit to EPD a schedule for conducting a reuse feasibility study for alternate water sources (i.e. reclaimed water or surface water) as a substitute for groundwater used for outdoor watering purposes. This assessment will be conducted using guidance to be provided by the EPD.

5. All public and private domestic water providers will adopt a meter calibration, repair, and replacement program to be approved by the EPD prior to issuance of the permit. This program is to include:
   a. A program and schedule for installing meters for all wells and connections that are not currently metered.
   b. Annual calibration for meters for those users representing at least the top 10% of water users.

6. All local governments within the sub-region will adopt ordinances requiring all new developments served by public and private sewage services to install purple pipe reuse lines.

7. Each water utility serving municipal customers will adopt a water loss control program using guidance provided by the EPD. All providers in the sub-region will implement the water loss control program.
    a. EPD will use the International Water Association methodology as endorsed by the American Water Works Association.
    b. In addition, the sub-area will meter all fire hydrant flushing events.

Many of the elements listed above can be accomplished through participation in regional water conservation program where plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

<u>*Agricultural Water Users*</u>

1. Enhance partnerships between EPD, the Wildlife Resources Division (WRD), the Natural Resources Conservation Service (NRCS), the Soil and Water Conservation Service (SWCC), the Extension Service and other entities in the area to develop messages about the importance of implementing efficient irrigation practices and reducing water withdrawals.

2. Permittees will be required to install water meters and report annual water use on forms provided by the Georgia Environmental Protection Division, developed in conjunction with the SWCC metering program, using standard methodology approved by the Director.

3. EPD will partner with NRCS and SWCC and other interested parties to develop a program to help irrigators identify and fix leaks and eliminate off-target application. Program development should include the irrigation manufacturers and providers in Southwest Georgia. Initially the program should target the largest irrigation water users in the basin and then expand to the other irrigation users.

4. EPD will use information collected and compiled by the SWCC through the water metering program. This information will help EPD and other state and federal agencies to identify target areas where enhanced water conservation practices are needed. This type of monitoring can help target education and outreach and financial assistance programs most appropriately.

5. EPD will work with other state and federal agencies to develop a process for determining success of water conservation practices. This process should be built around the research currently being conducted by the SWCC and used to identify those areas that need additional resources for more conservation implementation and/or education efforts.

6. To eliminate water loss and water waste, all new farm permits will be required to use cost/effective, water efficient irrigation technology. These technologies will include, but not be limited to, end gun shutoffs and sprays on drops. Also new, modified, or transferred water withdrawal permit applicants will be advised to implement technology to minimize runoff and control evaporative loss of water. Practices and technology that

qualify as water efficient will be identified by EPD and others by December 31, 2006 and periodically reviewed to ensure information is up to date.

7. No new traveler irrigation systems will be allowed in the Glynn County sub-region.

8. All new, modified or transferred water withdrawal permit applicants, who do not produce a food product, will conduct a reuse feasibility study for reclaimed water as a substitute for ground water.

9. Those operations not required to obtain a permit must register with the EPD and show proof that the approved water-conserving irrigation technology and practices will be used.

- *Golf Course Water Use*

1. Golf course water uses in the sub-region that hold a non-farm water use withdrawal permit – as defined by statute - will conduct a study of the feasibility of using reclaimed water as a substitute for Upper Floridan aquifer water. The results of this feasibility study will be included in the application for renewal of the non-farm water use withdrawal permit. Upon completion of review of each such renewal application, EPD shall set a schedule for such golf courses to convert to the use of reclaimed water or other non-Upper Floridan aquifer water for irrigation purposes.

2. As withdrawal permits are issued and/or renewed for golf courses in the sub-region, a condition will be placed in the terms of the permit setting a schedule for implementation of Best Management Practices (BMPs) developed and agreed to in the Memorandum of Agreement (MOA) adopted by Georgia Golf Course Superintendents Association and the EPD on May 14, 2004.

Justification of Need

The principle of 'reasonable use' is at the heart of Georgia's statutes governing water permitting decisions. It is important for the state to fully consider the extent to which 'reasonable use' is reflected in each water withdrawal application. This consideration is critically important when data show that increased use of a limited water resource within a region will compromise the quality and quantity of water available to other near-term users and uses of that water resource.

- *Industrial Water Use*

  As EPD issues renewed industrial withdrawal permits, the withdrawal limits will reflect water demands that demonstrate reasonable use after considerations of water savings opportunities generated by application of the water conservation strategies outlined above.

- *Public and Private Domestic Water Providers*
  1. By September 30, 2006, EPD will develop – in conjunction with the Georgia Municipal Association, the Association of County Commissioners of Georgia, and the Association of Regional Development Centers – and distribute a municipal water demand forecasting protocol to be employed by ALL municipalities within the 24-county area as part of the 'justification of need' for withdrawal quantities cited in ALL applications for new, modified, and renewed municipal water withdrawal permits.

  2. As EPD issues new, modified, and renewed municipal withdrawal permits, the withdrawal limits will reflect water demands that demonstrate reasonable use as largely determined by use of this demand forecasting protocol.

- *Golf Courses*
  1. EPD will develop and distribute – in conjunction with the Georgia Golf Course Superintendents Association – a guide for forecasting golf course irrigation water needs. In justifying need, ALL golf courses that meet the statutory definition of non-farm water uses in the sub-region will employ for forecasting irrigation water needs by. EPD will only consider golf course irrigation water allocations that are supported by the forecasts derived from use of this guide.

Monitoring

Since 1959, the USGS has conducted a cooperative water-resources investigative program at Brunswick. The program resulted from the noticeable impact of salt water contamination in the Upper Floridan aquifer during the mid-1950's, and features well networks that continuously monitor groundwater levels and annually sample wells for chloride concentration. Recently the program has included projects to better define the mechanisms of groundwater flow and the movement of salt water in the Floridan aquifer system as well as an assessment of alternative sources of water supply. It is EPD's expectation that the USGS/City of Brunswick cooperative agreement will continue.

Monitoring wells at Koch Cellulose and Southside Baptist Church (both in Brunswick) were utilized to delineate the outer edge of the salt water plume in these vicinities; however these wells are no longer being monitored. When funding allows, EPD will opt to restart monitoring at these wells. Additionally, the Perry Park production well (near the eastern edge of the plume) has been taken offline due to chloride contamination. It would likewise be appropriate to include this well as part of the monitoring network when funds permit.

Taken together, operation of the aforementioned monitoring sites will alert the state and the region to any significant shifting of the plume.

Elements of Management Plan for the 19-County Sub-region

Sub-region 3: 19 counties plus northern half of Effingham County north of Highway 119

Conservation and Reuse: Employ aggressive and practical measures that will ensure efficient and effective use of those quantities of water that must be removed from our water systems to meet human needs.

Justification of Need: Ensure that each gallon of water sought under any permit application is justified using clear and consistent criteria.

Monitoring: Continuously monitor the reactions of the Floridan aquifer as management actions are implemented; determine the extent to which the management actions require additions and modification to achieve aquifer management goals.

Major Water Resources Issues in Sub-region 3

Potential Decrease in Water Levels

While not yet an issue of concern, mathematical modeling of the Upper Floridan aquifer shows that large – and as yet unanticipated - increases in groundwater withdrawals in the farming region north of the so-called Gulf Trough would significantly reduce the residual water pressure in the Upper Floridan aquifer. If this unanticipated circumstance were to develop, some surface water bodies could be adversely impacted. This is an environmental issue not related to salt water intrusion but warrants further consideration and study.

Management Goals

Meet Reasonable Future Water Needs

Reasonable use of Georgia's water resources is a right accorded to Georgia's citizens by Georgia Code. As the protector of that right, the state is responsible for managing those resources in a way that ensures Georgians have access to reasonable quantities of water both now and into the future. To better avail citizens to the right to reasonable use, the Plan focuses on actions designed to ensure that forecasts of water needs by various entities within the region be done in accordance with a standardized protocol; and that reasonable and consistent actions be taken by all permit applicants to implement aggressive water conservation programs; and that future water supplies come from a combination of groundwater and surface water sources; and future water sources include the use of reclaimed water to the maximum practical extent.

Sub-region 3 Key Elements

The following elements are central to managing the use of water in the 19-County sub-region.

- The amount of withdrawals provided under renewals of current permits will be based on the conditions set forth in the remainder of this section, including those conditions set out in the 'Conservation and Reuse', 'Justification of Need', and 'Monitoring' sections of this document.

Conservation and Reuse

As in the other sub-regions, in the 19-county area the state through its permitting will emphasize the degree of importance to the extent to which users of the sub-region's waters employ practices that are intended to minimize the volume of water withdrawn to meet specific needs, and will attach more importance to assuring that measures are implemented that result in the efficient use of all water withdrawn. A series of water conservation and efficiency actions will be required of water users within the sub-region.

- *Industrial Water Use*

Many industrial processes demand high volumes of water, including washing and rinsing, heating and cooling, shop clean-up and outdoor water use. No two operations are alike; therefore, it is critical that a water audit be performed to assess the facility's system and identify potential for water savings. For all current industrial permit holders seeking to renew their withdrawal permits, conditions will be placed in such permits to set a schedule for completion of the items described below. Additionally, the permit conditions will require that withdrawal permit limits in the renewed permits be revisited and revised after EPD completes its review of the elements submitted in accordance with the items described below.

1. Each industrial water user will perform an audit of the facility's water system and identify locations where practices can be employed to conserve water.

2. Each industrial water user will adopt an industrial leak detection and repair program under guidance and assistance to be provided by the Pollution Prevention and Assistance Division of the Georgia Department of Natural Resources.

3. All industrial water users will adopt a metering, meter calibration, and repair and replacement program to be approved by the Georgia Environmental Protection Division.

4. All industrial permit holders, who do not produce a food product, shall conduct a reuse feasibility study for an alternate water source (i.e. reclaimed water or surface water) as a substitute for ground water used for operational practices (such as washing, cooling, etc...). This assessment will be conducted using guidance to be provided by Georgia Environmental Protection Division.

All industrial water uses will maximize the use of recycled or reclaimed water to supply their internal operation needs as well as their outdoor watering requirements.

- *Public and Private Domestic Water Providers*

All current public and private domestic water withdrawal permit holders seeking to renew their withdrawal permits, conditions will be placed in such permits to set a schedule for completion of the items described below. Additionally, the permit conditions will require that withdrawal permit limits in the renewed permits be revisited and revised after EPD completes its review of the elements submitted in accordance with the items described below.

1. Each water utility serving water customers (residential, commercial, institutional, and industrial) will develop a water conservation education program (including both school and public information programs) assistance to be provided by the Georgia Department of Natural Resources and the Georgia Department of Community Affairs.

2. All public and private water provider will adopt and implement a conservation-oriented rate structure. The pricing structure must be developed using the guidelines to be provided by the Georgia Environmental Protection Division. Water wholesalers must ensure that all municipal customers have adopted conservation-oriented rate structures.

3. Each water provider and its customers (residential, commercial and industrial) will adopt a policy requiring all of its water customers to abide by the outdoor watering schedule adopted by the Board of Natural Resources (in the Drought Management plan of 2003), or an alternate outdoor watering schedule approved by the EPD.

4. All public and private domestic water providers will submit to EPD a schedule for conducting a reuse feasibility study for alternate water sources (i.e. reclaimed water or surface water) as a substitute for ground water used for outdoor watering purposes. This assessment will be conducted using guidance to be provided by the EPD.

5. All public and private domestic water providers will adopt a meter calibration, repair, and replacement program to be approved by the EPD prior to issuance of the permit. This program is to include a plan and schedule for installing meters for all wells and connections that are not currently metered.

6. Each water utility serving municipal customers will adopt a water loss control program using guidance provided by EPD.
    a. EPD will use the International Water Association methodology as endorsed by the American Water Works Association.

Many of the elements listed above can be accomplished through participation in area wide, regional, or aquifer-wide public water conservation program where plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

- *Agricultural Water Users*

1. Enhance partnerships between EPD, Wildlife Resources Division (WRD), Natural Resources Conservation Service (NRCS), Soil and Water Conservation Commission (SWCC), FVSC, the Extension Service of the University of Georgia, and other

appropriate entities in the sub-region to develop outreach messages pertaining to the importance of implementing efficient irrigation practices and reducing water withdrawals. Refine and target initial educational efforts to the Effingham, Chatham, Bryan and Liberty Sub-region and the Glynn County Sub-region and then extend educational efforts to the remaining 19 county area.

2. EPD will partner with NRCS and SWCC and other interested parties to develop a program to help irrigators identify and fix leaks and eliminate off-target application. Program development should include the irrigation manufacturers and providers in Southwest Georgia. Initially the program should target the largest irrigation water users in the basin and then expand to the other irrigation users.

3. EPD will use information collected and compiled by the SWCC through the water metering program. This information will help EPD and other state and federal agencies to identify target areas where enhanced water conservation practices are needed. This type of monitoring can help target education and outreach and financial assistance programs most appropriately.

4. EPD will work with other state and federal agencies to develop a process for determining success of water conservation practices. This process should be built around the research currently being conducted by the SWCC and used to identify those areas that need additional resources for more conservation implementation and/or education efforts.

- *Golf Course Water Use*
  1. As withdrawal permits are issued for golf courses in the sub-region, a condition will be placed in the terms of the permit setting a schedule for implementation of Best Management Practices (BMPs) developed and agreed to in the Memorandum of Agreement (MOA) adopted by Georgia Golf Course Superintendents Association and the EPD on May 14, 2004.

Justification of Need

It is important for the state to fully consider the extent to which 'reasonable use' is reflected in each water withdrawal application.

- *Industrial Water Use*

  As EPD issues renewed industrial withdrawal permits, the withdrawal limits will reflect water demands that demonstrate reasonable use after considerations of water savings opportunities generated by application of the water conservation strategies outlined above.

- *Public and Private Domestic Water Providers*
  1. By September 30, 2006, EPD will develop – in conjunction with the Georgia Municipal Association, the Association of County Commissioners of Georgia, and the Association of Regional Development Centers – and distribute a municipal water demand forecasting

protocol to be employed by ALL municipalities within the 24-county area as part of the 'justification of need' for withdrawal quantities cited in ALL applications for new, modified, and renewed municipal water withdrawal permits.

2. As EPD issues new, modified, and renewed municipal withdrawal permits, the withdrawal limits will reflect water demands that reflect reasonable use as largely determined by use of this demand forecasting protocol.

- *Golf Courses*
  1. EPD will develop and distribute – in conjunction with the Georgia Golf Course Superintendents Association – a guide for forecasting golf course irrigation water needs. This guide will also be used for forecasting irrigation water needs by all NEW golf courses within the sub-region that meet the statutory definition of new farm use golf courses in support of applications few renewed and/or new irrigation permits. EPD will only consider golf course irrigation water allocations that are supported by the forecasts derived from use of this guide.

Monitoring

All existing groundwater monitoring wells and all existing surface water gauging stations should be maintained. There is no need for chloride monitoring in Sub-region 3.

APPENDIX A

GLOSSARY AND REFERENCES

GLOSSARY

Aquifer:
Rock or sediment in a formation or a group of formations, or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water to a well. A confined aquifer is an aquifer that is overlain by a unit (or bed).

Breakthrough:
This occurs when the concentration of salty water leaking through the confining unit into the aquifer exceeds 250 mg/l of chlorides.

Cone of Depression (or pumping cone):
The area around a discharging well (or group of wells), where the hydraulic head in the aquifer has been lowered by pumping.

Confining Unit:
A rock or sediment that has significantly lower permeability than the aquifer. In coastal Georgia the permeable Upper Floridan Aquifer is overlain by the much less permeable Miocene strata.

Fernandina Permeable Zone:
A geologic formation underlying the Floridan Aquifer, which is characterized by highly saline water.

Gulf Trough:
This is a subsurface geologic feature in which the sediments are finer-grained and have lower permeability. The feature acts as an impediment to ground-water flow.

Potentiometric Surface:
A surface that represents the level in which water will rise in tightly cased wells. If the water level rises above the top of the aquifer, the well is referred to as an artesian aquifer.

Recharge Areas:
An area in which there is a downward component of hydraulic head in the aquifer. In general, the term refers to geographic areas where the aquifer is recharged from precipitation. It is important to note that aquifers also may be recharged from lateral flow and leakage from overlying and underlying materials.

Vertical Hydraulic Conductivity:
A mathematical coefficient that is a measure of the vertical rate of movement of water through a permeable material.

REFERENCES CITED

Counts, H.B., and Donsky, Ellis, 1963, Salt-water encroachment, geology, and ground-water resources of Savannah area, Georgia and South Carolina: U. S. Geological Survey Water Supply Paper 1611, 100 p.

Wait, R. L., 1965, Geology and occurrence of fresh and brackish water in Glynn County, Georgia: U. S. Geological Survey Water-Supply Paper 1613-E, 94 p.

APPENDIX B

UPPER FLORIDAN
TECHNICAL ADVISORY COMMITTEE

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Mr. Gerald DeWitt	Rayonier Corporation
Mr. Brent Hanson	Gillman Paper Company Durango Paper Company
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Dr. William Segars	Georgia Farm Bureau
Mr. James Durrett Ms Patricia McIntosh	Georgia Conservancy
Mr. William Francis	City of Brunswick
Mr. Camille Ransom	S.C. Dept. of Health and Environmental Control

APPENDIX C

Public Participation Process

Prior to developing the draft management plan, EPD solicited public comments regarding the salt water intrusion occurring in the Upper Floridan aquifer. The results of the Coastal Sound Science Initiative (CSSI), a series of field investigations and scientific modeling efforts, were presented at four public meetings during the first two weeks of August 2005. The meetings provided the public an opportunity to offer comments on the scientific results, and to provide input on directions for management of the area's water resources. Written comments were also sought, with a dedicated link for input set up on the EPD website. Taken together, the comments obtained from the public meetings, written statements submitted following the meetings, and the scientific and technical results of the CSSI, provided the starting point fro development of this draft water management plan.

Public meetings were held in Jesup on August 2nd, Kingsland on August 4th, Statesboro on August 8th, Pooler on August 9th, and Brunswick on August 11th. Over 190 people participated in the meetings. Each of the public meetings opened with presentations summarizing the seven years of scientific and technical work that comprise the CSSI. Participants were then asked to respond to two questions: Of the information presented tonight, what do you think are the most important findings or conclusions?

1. The Sound Science Initiative provides a scientific foundation for the management plan being developed to replace the interim salt water intrusion management strategy.

2. Do the results you've heard tonight point to any specific directions for that management plan?

Responses to the first question can be summarized in the following general categories:

1. *Mechanisms of salt water intrusion*. Comments in this category highlighted both conclusions and uncertainties about the mechanisms of salt water intrusion.

2. *Timeline for migration of Hilton Head plumes*. Some commentators highlighted the conclusion that risk of contamination in the Savannah area is long-term, while others concluded that, despite the projected timeframe for migration of the Hilton Head plumes, there is a responsibility to take action now to protect the resource in the future.

3. *Localized cause-effect*. This category of comments concerned the cause-effect relationships apparent in study results, with a number of respondents highlighting the conclusion that the causes of salt water intrusion are more localized than initially suspected.

4. *Better understanding of the system*. The fourth category of comments includes positive assessments of the overall results of the CSSI and improved understanding of groundwater conditions in coastal Georgia.

5. *Additional information needs*. Some comments highlighted the information gaps that should be addressed in the future.

Management-Related Conclusions
Comments in this category included a range of specific management approaches or strategies. The vast majority of responses to the second question could be divided into four categories:

1. *Alternate sources of water*. The majority of responses to the second question focused on surface water sources, conservation and reuse, and other aquifers as alternate sources of water.

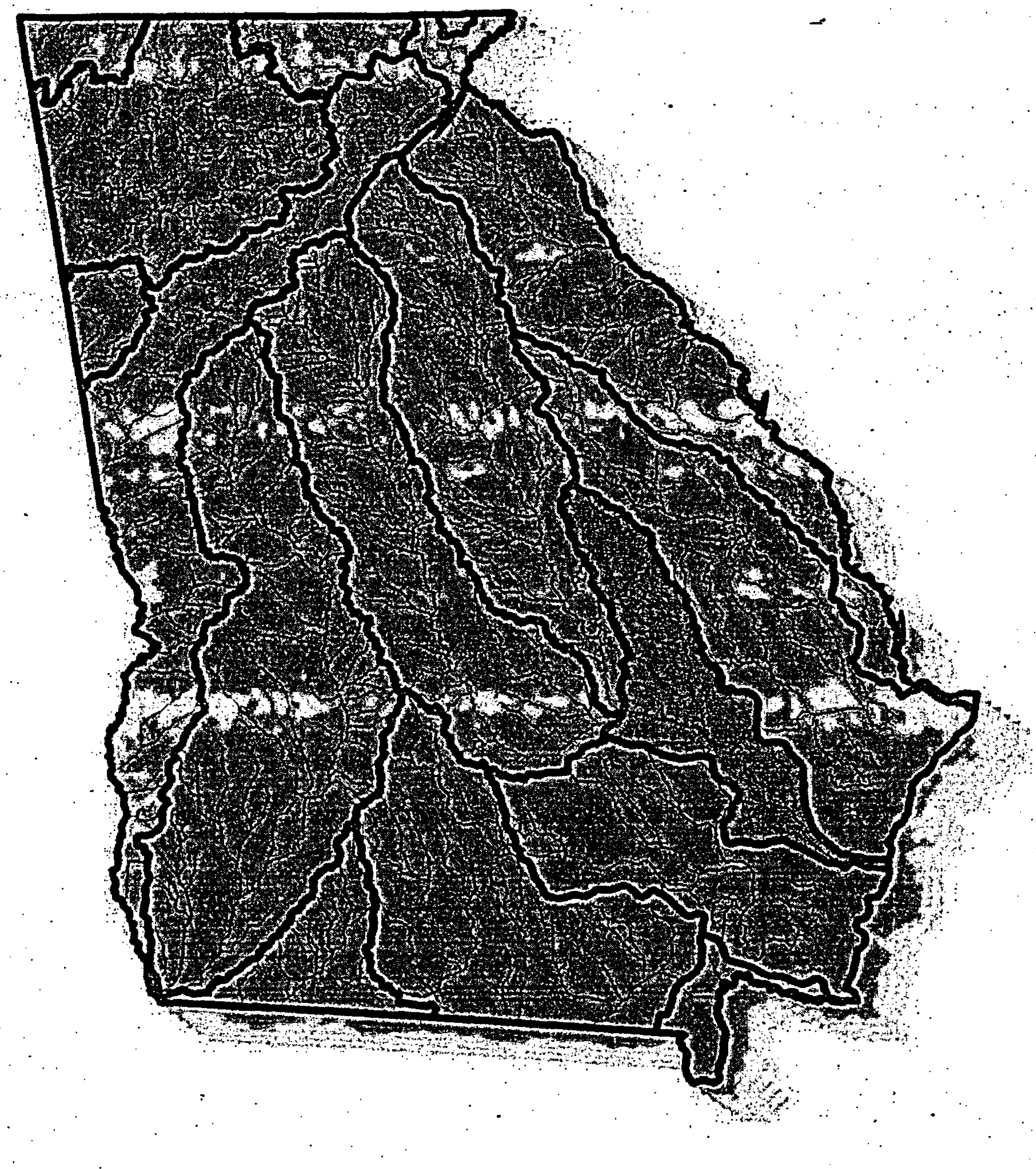
2. *Geographic targeting*. A number of respondents recommended reducing the capped area and focusing management strategies on known problem areas.

3. *Adaptive management of interconnected resources*. A number of comments addressed information gaps, uncertainties, and the need for adaptive management of coastal water resources as a whole.

General comments and guidance
A number of comments provided wide-ranging guidance and goals for the management strategy. Detailed written comments from the public meetings are available on the Coastal Water Study page on the EPD website (www.gadnr.org/cws/).

Following completion of the draft plan for managing salt water intrusion and water withdrawals in the 24-county region, another round of public meetings will be scheduled during the first two weeks of January 2006. There will be a 30-day public comment period on the Draft Plan. EPD will review the comments and prepare a revised document. EPD intends to present the Management Plan to the Department of Natural Resources Board early in 2006.

Altamaha River Basin Management Plan 2003



Georgia Department of Natural Resources
Environmental Protection Division

Georgia River Basin Management Planning Vision, Mission, and Goals

What is the VISION for the Georgia RBMP Approach?

Clean water to drink, clean water for aquatic life, and clean water for recreation, in adequate amounts to support all these uses in all river basins in the State of Georgia.

What is the RBMP MISSION?

To develop and implement a river basin planning program to protect, enhance, and restore the waters of the State of Georgia, that will provide for effective monitoring, allocation, use, regulation, and management of water resources.

[Established January 1994 by a joint basin advisory committee workgroup.]

What are the GOALS to Guide RBMP?

1) To meet or exceed local, state, and federal laws, rules, and regulations, and be consistent with other applicable plans.
2) To identify existing and future water quality issues, emphasizing nonpoint sources of pollution.
3) To propose water quality improvement practices encouraging local involvement to reduce pollution, and monitor and protect water quality.
4) To involve all interested citizens and appropriate organizations in plan development and implementation.
5) To coordinate with other river plans and regional planning.
6) To facilitate local, state, and federal activities to monitor and protect water quality.
7) To identify existing and potential water availability problems and to coordinate development of alternatives.
8) To provide for education of the general public on matters involving the environment and ecological concerns specific to each river basin.
9) To provide for improving aquatic habitat and exploring the feasibility of re-establishing native species of fish.
10) To provide for restoring and protecting wildlife habitat.
11) To provide for recreational benefits.
12) To identify and protect flood prone areas within each river basin, and encourage local and state compliance with federal flood plain management guidelines.

[Established January 1994 by a joint basin advisory committee workgroup.]

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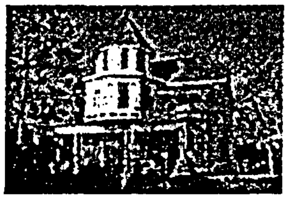
Sect 9.3



Garden Path Inn

Columbia, Alabama

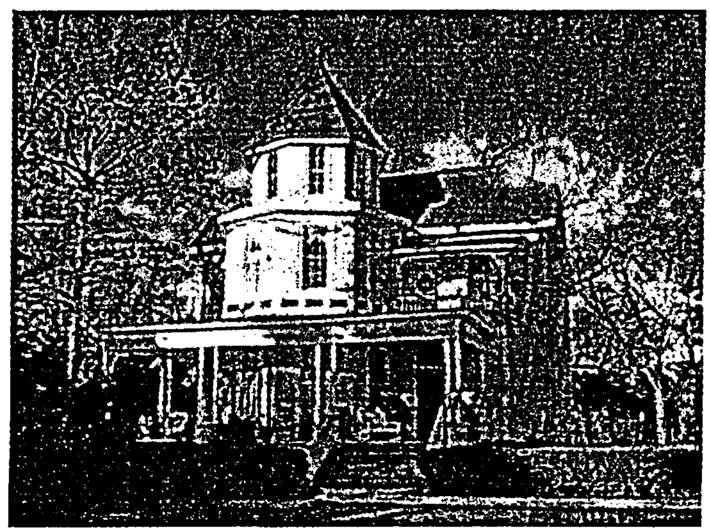
1890 Queen Anne Victorian located in the River Heritage Region of southeast Alabama, just a short drive to Dothan.

Contact Info | Email this page to a Friend | Click to see a map | Additional Pages... GO

Introduction

For I know the plans I have for you declares the LORD, plans to prosper you and not to harm you, plans to give you a hope and a future. Jeremiah 29:11

The Garden Path Inn is located in the historic Purcell-Killingsworth House located in Columbia, Alabama. The house, a Queen Anne Victorian, was originally constructed in 1890. Over the last 11 months we have been completing an **extensive renovation** of the home for the purpose of operating a Bed and Breakfast and dining by reservation. The Inn has three guestrooms upstairs, each with a luxurious king-sized bed and private bath. The nightly rate includes a southern style breakfast for up to two people the next morning. There are two dining rooms located in the Inn. We are also available for special events such as group dining by reservation, reunions, business meetings, luncheons, bridal showers, baby showers, teas, etc.



Nightly Rates	
Sunday - Thursday	$65 plus tax
Friday - Saturday	$75 plus tax

- Discounts are available for Pastors and Ministry Leaders.

V-447

- Gift Certificates are available.
- We also offer special packages which include dinner the evening of your stay, breakfast the next morning, and can make arrangements for flowers or gift baskets for that special occasion.
- For the romantically challenged we can help arrange a birthday or anniversary evening or get away for that special someone.
- Regretfully, we do not have an elevator or wheel chair access.

The Harrison Room	*The Elizabeth Room*
The Harrison Room, located on the main floor, is our Victorian style Dining Room decorated in deep reds with teapot accents.	The Elizabeth Room is perfect for ladies luncheons, teas, baby showers, and bridal showers. Pink and green are the featured colors with rose accents. This room is located on the 2nd floor in the octagonal turret room.

Upstairs commons areas include: Color TV, coffee bar, refreshments, sitting area. After dinner relax in the parlor on comfortable couches and chairs or play board games and enjoy your evening.

In everything we do at the Garden Path Inn we strive to give God all the Glory and Honor. It is because of HIM that we exist and have our being. Our heart's desire is to be a place of rest, refuge, and ministry for our guests.

Click-on these pages for more information:

| Guest Rooms/Rates | Full Southern Style Dinner | Area Information |

back to top of this page

Garden Path Inn
305 North Main Street
Columbia, Alabama 36319
(334) 696-2304
email: gnorman@centurytel.net
Gary & Diane Norman, Innkeepers

Other Areas of Bed & Breakfast Inns ONLINE

Alabama Directory | Columbia
Inns on the National Register of Historic Places

GDOT 2005

STATE TRANSPORTATION IMPROVEMENT PROGRAM
9/21/2005
DOT DISTRICT: 5

All

Project / Descp	Phase	Fund	Year	Federal	State	Other	Total
Project: 0003892 *Type Work:* Landscaping *Descp:* WILDFLOWER PROGRAM PHASE 2 - DISTRICT 5 *Length:* 0.00	CST	STP	LUMP	$80,000	$20,000	$0	$100,000

Lump Sum Project

Project / Descp	Phase	Fund	Year	Federal	State	Other	Total
Project: 0007258 *Type Work:* Rumble Strips *Descp:* EDGE LINE RUMBLE STRIPS @ SEVERAL SR LOCATIONS IN DISTRICT 5 *Length:* 0.00	PE	STP	Underway				
	CST	STP	LUMP	$1,141,000	$0	$0	$1,141,000

Lump Sum Project

Project / Descp	Phase	Fund	Year	Federal	State	Other	Total
Project: T000969 *Type Work:* Transit Projects *Descp:* FY 2006 SECTION 5311 CAPITAL FOR DOT DISTRICT 5 *Length:* 0.00	CST	Transit	2006	$137,920	$17,240	$17,240	$172,400
Project: T001202 *Type Work:* Transit Projects *Descp:* FY 2007 SECTION 5311 CAPITAL FOR DOT DISTRICT 5 *Length:* 0.00	CST	Transit	2007	$187,200	$23,400	$23,400	$234,000
Project: T001462 *Type Work:* Transit Projects *Descp:* FY 2008 SECTION 5311 CAPITAL FOR DOT DISTRICT 5 *Length:* 0.00	CST	Transit	2008	$154,400	$19,300	$19,300	$193,000

All Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
T000969	2006	CST	Transit	$137,920	$17,240	$17,240	$172,400
T001202	2007	CST	Transit	$187,200	$23,400	$23,400	$234,000
T001462	2008	CST	Transit	$154,400	$19,300	$19,300	$193,000
				$479,520	$59,940	$59,940	$599,400

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Appling

Project: 0001218 *Type Work:* Replace Bridge
Descp: SR 4/US 1 @BLACK WATER & SWEET WATER CKS S OF BAXLEY
Lanes: Exist. 2 *Prop.* 4 *Length:* 1.00

Phase	Fund	Year	Federal	State	Other	Total
PE	NHS	Underway				
CST	Bridge	2007	$1,116,000	$279,000	$0	$1,395,000

Project: 0006528 *Type Work:* Sidewalks
Descp: SURRENCY'S SIDEWALK IMPROVEMENT PROJECT
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	2006	$132,800	$0	$33,200	$166,000

Project: 522300- *Type Work:* Widening
Descp: SR 4/US 1 FM BACON CL TO N OF SR 15/BAXLEY INCL 3-BRIDGES
Lanes: Exist. 2 *Prop.* 4 *Length:* 9.10

Phase	Fund	Year	Federal	State	Other	Total
PE	State	Underway				
PE	Bond	Underway				
ROW	Bond	Underway				
CST	Bond	2007	$0	$23,382,000	$0	$23,382,000

Appling Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0001218	2007	CST	Bridge	$1,116,000	$279,000	$0	$1,395,000
0006528	2006	CST	STP	$132,800	$0	$33,200	$166,000
522300-	2007	CST	Bond	$0	$23,382,000	$0	$23,382,000
				$1,248,800	$23,661,000	$33,200	$24,943,000

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Bacon

Project: 0006455 Type Work: Signals	Phase	Fund	Year	Federal	State	Other	Total
Descp: UPGRADE TRAFFIC SIGNALS ON SEV SR @	PE	STP	Underway				
VARIOUS LOCS IN DIST 5	CST	STP	LUMP	$1,280,000	$320,000	$0	$1,600,000
Length: 0.00							

Lump Sum Project *Multi County Project*

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Brantley

Project / Descp	Phase	Fund	Year	Federal	State	Other	Total
Project: 0006455 *Type Work:* Signals *Descp:* UPGRADE TRAFFIC SIGNALS ON SEV SR @ VARIOUS LOCS IN DIST 5 *Length:* 0.00	PE	STP	Underway				
	CST	STP	LUMP	$1,280,000	$320,000	$0	$1,600,000

Lump Sum Project ***Multi County Project***

Project / Descp	Phase	Fund	Year	Federal	State	Other	Total
Project: 0007275 *Type Work:* RRX Warning Device *Descp:* CR 224/KNOX STREET @ CSX #637241B *Length:* 0.40	CST	STP	LUMP	$140,000	$0	$0	$140,000

Lump Sum Project

Project / Descp	Phase	Fund	Year	Federal	State	Other	Total
Project: M003080 *Type Work:* Bridges *Descp:* SR 520/US 82@BIG CREEK &@SATILLA RIVER OVERFLOW-BRIDGE REHAB *Length:* 0.80	PE	STP	LUMP	$48,000	$12,000	$0	$60,000
	CST	STP	LUMP	$640,000	$160,000	$0	$800,000

Lump Sum Project

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Bryan

Project: 0002201 Type Work: Lighting
Descp: I-95 @ SR 144 INTERCHANGE LIGHTING
Length: 0.40
Lump Sum Project

Phase	Fund	Year	Federal	State	Other	Total
CST	NHS	LUMP	$76,800	$19,200	$109,000	$205,000

Project: 0006456 Type Work: Signals
Descp: UPGRADE TRAFFIC SIGNALS @ VARIOUS LOC IN BRYAN/CHATHAM
Length: 0.00
Lump Sum Project *Multi County Project*

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
CST	STP	LUMP	$336,000	$84,000	$0	$420,000

Project: 0006941 Type Work: Special Studies
Descp: I-95 @ CR 9/BELFAST SIDING ROAD - IJR STUDY
Length: 0.40
Lump Sum Project

Phase	Fund	Year	Federal	State	Other	Total
PE	40450	LUMP	$0	$100,000	$0	$100,000

Project: M003079 Type Work: Bridges
Descp: I-16 @ CR 12; I-95 @ CR 90; I-95 @ CSX RR - BRIDGE REHAB
Length: 1.20
Lump Sum Project

Phase	Fund	Year	Federal	State	Other	Total
PE	IM	LUMP	$40,500	$4,500	$0	$45,000
CST	IM	LUMP	$540,000	$60,000	$0	$600,000

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Bulloch

Project: 0003091 *Type Work:* Replace Bridge
Descp: CR 145/CYPRESS LAKE RD@WATERINGHOLE BRANCH 5MI SW/STATESBORO
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Local	LOCL	$0	$0	$10,000	$10,000
CST	Bridge	2006	$819,200	$204,800	$0	$1,024,000

Project: 0003092 *Type Work:* Replace Bridge
Descp: CR 577/FAS 733 @ LOWER BLACK CREEK 6 MI S OF BROOKLET
Length: 0.20

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Local	LOCL	$0	$0	$5,500	$5,500
CST	Bridge	2006	$597,600	$149,400	$0	$747,000

Project: 0005829 *Type Work:* Widening
Descp: SR 26/US 80 FM 5LN @ CR 491 TO CR 423/OLD LEE FIELD RD
Lanes: Exist. 2 *Prop.* 4 *Length:* 3.10

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	2007	$2,400,000	$600,000	$0	$3,000,000
CST	STP	After 2008				

Project: 0006077 *Type Work:* Intersection Improvement
Descp: SR 46 @ SR 67
Length: 2.81

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	LUMP	$58,500	$6,500	$0	$65,000
CST	STP	LUMP	$775,800	$86,200	$0	$862,000

Lump Sum Project

Project: 0006091 *Type Work:* RRX Warning Device
Descp: CS 656/EAST JONES AVE @ NS #620196H
Length: 0.20

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$170,000	$0	$0	$170,000

Lump Sum Project

Project: 0006631 *Type Work:* Streetscapes
Descp: STATESBORO DOWNTOWN STREETSCAPE ENHANCEMENT - PHASE I
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$530,400	$0	$132,600	$663,000

Lump Sum Project

Project: 0006632 *Type Work:* Multi-use Trail
Descp: S & S GREENWAY
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$528,800	$0	$132,200	$661,000

Lump Sum Project

Project: 521970- *Type Work:* Widening
Descp: SR 26/STATESBORO FM SR 67/73/US 301 TO CS 802/BRANNEN ST
Lanes: Exist. 4 *Prop.* 5 *Length:* 1.87

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	2007	$323,200	$80,800	$0	$404,000
CST	STP	After 2008				

Project: 522460- *Type Work:* Widening
Descp: SR 67 FM I-16 TO STATESBORO BYPASS
Lanes: Exist. 2 *Prop.* 4 *Length:* 10.85

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	2007	$3,332,800	$833,200	$0	$4,166,000
CST	STP	After 2008				

Project: 522640- *Type Work:* Widening
Descp: SR 1018/E. STATESBORO BYP FROM SR 73/US 25 TO SR 73/US 301
Lanes: Exist. 2 *Prop.* 4 *Length:* 6.85

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	Underway				
CST	STP	2006	$6,824,000	$1,706,000	$0	$8,530,000

Project: T001586 *Type Work:* Airport
Descp: SITE PREPARATION FOR T-HANGAR LOCATION
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	ASFE	2006	$48,512	$1,304	$1,330	$51,146

STATE TRANSPORTATION IMPROVEMENT PROGRAM
9/21/2005
DOT DISTRICT: 5

Bulloch Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0003091	2006	CST	Bridge	$819,200	$204,800	$0	$1,024,000
0003092	2006	CST	Bridge	$597,600	$149,400	$0	$747,000
0005829	2007	ROW	STP	$2,400,000	$600,000	$0	$3,000,000
521970-	2007	ROW	STP	$323,200	$80,800	$0	$404,000
522460-	2007	ROW	STP	$3,332,800	$833,200	$0	$4,166,000
522640-	2006	CST	STP	$6,824,000	$1,706,000	$0	$8,530,000
T001586	2006	CST	ASFE	$48,512	$1,304	$1,330	$51,146
				$14,345,312	$3,575,504	$1,330	$17,922,146

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Camden

Project: 0000689 Type Work: Rest Area
Descp: I-95 RECONSTRUCTION OF THE NORTH BOUND WELCOME CENTER
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
PE	IM	Underway				
ROW	IM	2006	$152,100	$16,900	$0	$169,000
CST	IM	After 2008				

Project: 0002861 Type Work: Interchange
Descp: SR 40 ADD LEFT TURN STORAGE LANE @ I-95 INTERCHANGE
Length: 1.30

Phase	Fund	Year	Federal	State	Other	Total
PE	NHS	2006	$120,000	$30,000	$0	$150,000
ROW	NHS	After 2008				
CST	NHS	After 2008				

Project: 0005897 Type Work: RRX Warning Device
Descp: CR 200/LAKES BLVD @ SM #000036C
Length: 0.00

Lump Sum Project

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$175,000	$0	$0	$175,000

Project: 0006455 Type Work: Signals
Descp: UPGRADE TRAFFIC SIGNALS ON SEV SR @ VARIOUS LOCS IN DIST 5
Length: 0.00

Lump Sum Project *Multi County Project*

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
CST	STP	LUMP	$1,280,000	$320,000	$0	$1,600,000

Project: 0006701 Type Work: Pavement Rehab
Descp: ST MARY'S ROAD PAVING PROJECT
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	Demo	2007	$100,000	$0	$0	$100,000

Project: 511430- Type Work: Interchange
Descp: I-95 NEW INTERCHANGE @ CR 138/HORSE STAMP CHURCH ROAD
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
PE	Demo	2006	$1,984,000	$0	$496,000	$2,480,000
PE	NHS	Underway				
PE	STP	2006	$992,000	$0	$248,000	$1,240,000
ROW	Local	LOCL	$0	$0	$585,600	$585,600
CST	NHS	After 2008				

Project: 522080- Type Work: Widening
Descp: SR 40 FM W OF CR 61 TO SR 25/US 17
Lanes: Exist. 2 Prop. 4 Length: 3.50

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	2007	$480,000	$120,000	$0	$600,000
CST	STP	After 2008				

Project: M003297 Type Work: Shoulder Work
Descp: CAMDEN & TATNALL CO SR 40 & SR 147 SHOULDER PAVING
Length: 14.00

Multi County Project

Phase	Fund	Year	Federal	State	Other	Total
CST	State	2006	$0	$306,517	$0	$306,517

Camden Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0000689	2006	ROW	IM	$152,100	$16,900	$0	$169,000
0002861	2006	PE	NHS	$120,000	$30,000	$0	$150,000
0006701	2007	CST	Demo	$100,000	$0	$0	$100,000
511430-	2006	PE	Demo	$1,984,000	$0	$496,000	$2,480,000
511430-	2006	PE	STP	$992,000	$0	$248,000	$1,240,000
522080-	2007	ROW	STP	$480,000	$120,000	$0	$600,000
M003297	2006	CST	State	$0	$110,346	$0	$110,346
				$3,828,100	$277,246	$744,000	$4,849,346

*E: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in ple counties.

Candler

Project	Type Work	Phase	Fund	Year	Federal	State	Other	Total
Project: 0002841	Replace Bridge	PE	Bridge	Underway				
Descp: CR 223/PORTAL HIGHWAY @ LITTLE STOCKING HEAD CREEK		ROW	Local	LOCL	$0	$0	$10,000	$10,000
Length: 0.63		CST	Bridge	2007	$489,600	$122,400	$0	$612,000

Project	Type Work	Phase	Fund	Year	Federal	State	Other	Total
Project: 0002842	Replace Bridge	PE	Bridge	Underway				
Descp: CR 223/PORTAL HWY @ BIG BRANCH&@LOTTS CREEK 8 MI N OF METTER		ROW	Local	LOCL	$0	$0	$10,000	$10,000
Length: 0.78		CST	Bridge	2007	$1,104,800	$276,200	$0	$1,381,000

Project	Type Work	Phase	Fund	Year	Federal	State	Other	Total
Project: 0006495	RRX Warning Device	CST	STP	LUMP	$150,000	$0	$0	$150,000
Descp: CS 587/MLK JR BLVD @ OGE RR #620236D								
Length: 0.13								

Lump Sum Project

Project	Type Work	Phase	Fund	Year	Federal	State	Other	Total
Project: 0007143	Turn Lanes	PE	STP	LUMP	$9,000	$1,000	$0	$10,000
Descp: SR 23/SR 121 FROM I-16 TO CS 610/LYTELL STREET		ROW	STP	LUMP	$0	$0	$0	$0
Lanes: Exist. 4 *Prop.* 5 *Length:* 0.40		CST	STP	LUMP	$1,080,000	$120,000	$0	$1,200,000

Lump Sum Project

Project	Type Work	Phase	Fund	Year	Federal	State	Other	Total
Project: 0007221	Grade & Drain	PE	STP	2006	$29,600	$7,400	$0	$37,000
Descp: SR 23/SR 121 @CS 559/VERTIA ST & SR 129 @VERTIA ST IN METTER		ROW	STP	2007	$60,000	$15,000	$0	$75,000
Length: 0.80		CST	STP	After 2008				

Candler Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0002841	2007	CST	Bridge	$489,600	$122,400	$0	$612,000
0002842	2007	CST	Bridge	$1,104,800	$276,200	$0	$1,381,000
0007221	2006	PE	STP	$29,600	$7,400	$0	$37,000
0007221	2007	ROW	STP	$60,000	$15,000	$0	$75,000
				$1,684,000	$421,000	$0	$2,105,000

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Charlton

Project: 0002840 *Type Work:* Replace Bridge
Descp: CR 3 @ SPARKMAN CREEK 11 MI SOUTH OF ST. GEORGE
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Local	LOCL	$0	$0	$7,000	$7,000
CST	Bridge	2006	$1,012,000	$253,000	$0	$1,265,000

Project: 0006531 *Type Work:* Streetscapes
Descp: DOWNTOWN CENTER CITY OF FOLKSTON - PHASE II
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	2006	$450,400	$0	$112,600	$563,000

Charlton Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0002840	2006	CST	Bridge	$1,012,000	$253,000	$0	$1,265,000
0006531	2006	CST	STP	$450,400	$0	$112,600	$563,000
				$1,462,400	$253,000	$112,600	$1,828,000

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

DOT DISTRICT: 5

Clinch

Project: 422120- *Type Work:* Widening
Descp: SR 38/US84 FM W OF WOODYARD CK/CLINCH TO W OF GREASY CK/WARE
Lanes: Exist. 2 *Prop.* 4 *Length:* 11.40
Multi County Project

Phase	Fund	Year	Federal	State	Other	Total
PE	State	Underway				
ROW	State	2006	$0	$4,117,000	$0	$4,117,000
CST	State	After 2008				

Clinch Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
422120-	2006	ROW	State	$0	$2,676,050	$0	$2,676,050
				$0	$2,676,050	$0	$2,676,050

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Effingham

Project: 0001824 *Type Work:* New Construction
Descp: RINCON TRUCK BYPASS FM SR 21 NEAR CHATHAM TO SR 275/SR 21
Lanes: Exist. 0 *Prop.* 2 *Length:* 11.25

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	H060	2007	$3,976,400	$994,100	$0	$4,970,500
ROW	STP	After 2008				
CST	STP	After 2008				

Project: 0006482 *Type Work:* RRX Warning Device
Descp: CR 105/BERRYVILLE RD @ CSX #635135L
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$140,000	$0	$0	$140,000

Lump Sum Project

Project: 0006483 *Type Work:* RRX Warning Device
Descp: CS 579/E. JOHNSON STREET @ CSX #635129H
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$140,000	$0	$0	$140,000

Lump Sum Project

Project: 0006636 *Type Work:* Multi-use Trail
Descp: GUYTON'S RAILS TO TRAILS COMMUNITY PROJECT
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$600,000	$0	$150,000	$750,000

Lump Sum Project

Project: 0006962 *Type Work:* New Construction
Descp: SR 119 RELOCATION FROM SR 119 TO SR 21
Lanes: Exist. 0 *Prop.* 2 *Length:* 0.65

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	2007	$136,000	$34,000	$0	$170,000
ROW	STP	After 2008				
CST	STP	After 2008				

Project: 0007277 *Type Work:* RRX Warning Device
Descp: CR 91/MARION AVE @ CSX #635139N
Length: 0.18

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$6,000	$0	$0	$6,000
CST	STP	LUMP	$140,000	$0	$0	$140,000

Lump Sum Project

Project: 0007404 *Type Work:* RRX Consolidation
Descp: CR 115/INDIGO ROAD @ CSX #635134E
Length: 0.46

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$7,000	$0	$0	$7,000
CST	STP	LUMP	$8,000	$0	$0	$8,000

Lump Sum Project

Project: 0007407 *Type Work:* Signals
Descp: SR 21 @ 2ND ST & @ SR 119 | SR 73 @ SMITH ST & @ LONG ST
Length: 1.60

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$36,000	$9,000	$0	$45,000
CST	STP	LUMP	$320,000	$80,000	$0	$400,000

Lump Sum Project ***Multi County Project***

Project: 0007478 *Type Work:* Water Pollution Mitig.
Descp: PARCEL 1W TO MITIGATE PI# 0001824 IN EFFINGHAM COUNTY
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
ROW	STP	LUMP	$3,200,000	$800,000	$0	$4,000,000

Lump Sum Project

Project: 533145- *Type Work:* Replace Bridge
Descp: SR 26/US 80 @ OGEECHEE RIVER OVERFLOW 9 MI S OF GUYTON
Length: 0.23

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Bridge	2007	$10,400	$2,600	$0	$13,000
CST	Bridge	After 2008				

Effingham Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0001824	2007	ROW	H060	$3,976,400	$994,100	$0	$4,970,500
0006962	2007	PE	STP	$136,000	$34,000	$0	$170,000
533145-	2007	ROW	Bridge	$10,400	$2,600	$0	$13,000
				$4,122,800	$1,030,700	$0	$5,153,500

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

STATE TRANSPORTATION IMPROVEMENT PROGRAM
9/21/2005
DOT DISTRICT: 5

Emanuel

	Phase	Fund	Year	Federal	State	Other	Total
Project: 0006109 Type Work: RRX Warning Device							
Descp: CS 818/COLEMAN STREET @ OGE #732673J	CST	STP	LUMP	$135,000	$0	$0	$135,000
Length: 0.20							

Lump Sum Project

	Phase	Fund	Year	Federal	State	Other	Total
Project: 522130- Type Work: Widening							
Descp: SR 4/US 1 FM LYONS CL TO SOUTH CL/OAK PARK	PE	State	Underway				
IN EMANUEL CO	PE	Bond	Underway				
Lanes: Exist. 2 Prop. 4 Length: 9.20	ROW	Bond	2007	$0	$2,750,000	$0	$2,750,000
Multi County Project	CST	Bond	After 2008				

Emanuel Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
522130-	2007	ROW	Bond	$0	$1,457,500	$0	$1,457,500
				$0	$1,457,500	$0	$1,457,500

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Evans

Project: 0002302 *Type Work:* Streetscapes
Descp: CLAXTON STREETSCAPE PROJECT
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	2006	$250,000	$0	$62,500	$312,500

Project: 0006556 *Type Work:* Streetscapes
Descp: CLAXTON TRANSPORTATION & STREETSCAPE PROJECT - PHASE II
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$400,000	$0	$100,000	$500,000

Lump Sum Project

Project: 0007407 *Type Work:* Signals
Descp: SR 21 @ 2ND ST & @ SR 119 | SR 73 @ SMITH ST & @ LONG ST
Length: 1.60

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$36,000	$9,000	$0	$45,000
CST	STP	LUMP	$320,000	$80,000	$0	$400,000

Lump Sum Project *Multi County Project*

Project: 0007437 *Type Work:* RRX Warning Device
Descp: CS 616/CLARK STREET @ GCR #635987P
Length: 0.01

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$6,000	$0	$0	$6,000
CST	STP	LUMP	$140,000	$0	$0	$140,000

Lump Sum Project

Project: 0007438 *Type Work:* RRX Warning Device
Descp: CS 620/COLLEGE STREET @ GCR #635988W
Length: 0.09

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$6,000	$0	$0	$6,000
CST	STP	LUMP	$140,000	$0	$0	$140,000

Lump Sum Project

Project: 522105- *Type Work:* Widening
Descp: SR 30/CLAXTON FM WEST CTY LMTS TO EAST CTY LMTS
Lanes: Exist. 2 *Prop.* 5 *Length:* 1.51

Phase	Fund	Year	Federal	State	Other	Total
PE	State	Underway				
ROW	State	Underway				
ROW	RRBS	2006	$0	$3,982,000	$0	$3,982,000
CST	RRBS	2007	$0	$10,174,000	$0	$10,174,000

Evans Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0002302	2006	CST	STP	$250,000	$0	$62,500	$312,500
522105-	2006	ROW	RRBS	$0	$3,982,000	$0	$3,982,000
522105-	2007	CST	RRBS	$0	$10,174,000	$0	$10,174,000
				$250,000	$14,156,000	$62,500	$14,468,500

NOTE: **Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.**

Jeff Davis

Project: 0001810 Type Work: Railroad Crossing
Descp: SR 19/US 23 OVERPASS @ NORFOLK-SOUTHERN RR GRADE CROSSING
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	2006	$24,000	$6,000	$0	$30,000
ROW	STP	After 2008				
CST	STP	After 2008				

Project: 533175- Type Work: Replace Bridge
Descp: SR 135/US 221 @ TOWN CREEK 2.9 MILES SOUTH OF DENTON
Length: 0.45

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Bridge	Underway				
CST	Bridge	2006	$973,600	$243,400	$0	$1,217,000

Project: 533176- Type Work: Replace Bridge
Descp: SR 135/US 221 @ WHITEHEAD CREEK 1 MILE NORTH OF DENTON
Length: 0.87

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Bridge	2006	$8,000	$2,000	$0	$10,000
CST	Bridge	2007	$1,568,000	$392,000	$0	$1,960,000

Project: 533177- Type Work: Replace Bridge
Descp: SR 135/US 221 @ HURRICANE CREEK 6.8 MI SW OF HAZELHURST
Length: 0.57

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Bridge	Underway				
CST	Bridge	2006	$1,126,400	$281,600	$0	$1,408,000

Project: T001604 Type Work: Airport
Descp: SITE ENVIRONMENTAL STUDIES FOR AIRPORT RUNWAY IMPROVEMENTS
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	ASFE	2006	$9,000	$500	$500	$10,000

Jeff Davis Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0001810	2006	PE	STP	$24,000	$6,000	$0	$30,000
533175-	2006	CST	Bridge	$973,600	$243,400	$0	$1,217,000
533176-	2006	ROW	Bridge	$8,000	$2,000	$0	$10,000
533176-	2007	CST	Bridge	$1,568,000	$392,000	$0	$1,960,000
533177-	2006	CST	Bridge	$1,126,400	$281,600	$0	$1,408,000
T001604	2006	CST	ASFE	$9,000	$500	$500	$10,000
				$3,709,000	$925,500	$500	$4,635,000

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Liberty

Project: 0007408 *Type Work:* Signals

Descp: SR 23; SR 25; SR 30 CONN; SR 144 @ 1 LOC & SR 38 @ 3 LOCS

Length: 2.40

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$61,600	$15,400	$0	$77,000
CST	STP	LUMP	$560,000	$140,000	$0	$700,000

Lump Sum Project *Multi County Project*

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

McIntosh

Project: 0000807 *Type Work:* Bridge Rehab
Descp: SAPELO ISLAND-BEACH RD @ DEAN CREEK(BT REYNOLDS MAN.& BEACH)
Length: 0.04

Phase	Fund	Year	Federal	State	Other	Total
ROW	Local	LOCL	$0	$0	$50,000	$50,000
CST	State	2006	$0	$371,000	$0	$371,000

Project: 0005949 *Type Work:* Multi-use Trail
Descp: SAPELO ISLAND WALKING TRAIL - MCINTOSH COUNTY
Length: 0.11

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$214,400	$0	$53,600	$268,000

Lump Sum Project

Project: 0006540 *Type Work:* Sidewalks
Descp: DARIEN PEDESTRIAN CORRIDOR - PHASE III
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$500,000	$0	$125,000	$625,000

Lump Sum Project

Project: 0007344 *Type Work:* Signals
Descp: SR 25/US 17 @ SR 251 & REALIGN CR 90/DUNBAR STREET
Length: 0.96

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	LUMP	$14,400	$1,600	$0	$16,000
CST	STP	LUMP	$357,300	$39,700	$0	$397,000

Lump Sum Project

Project: 0007417 *Type Work:* Interchange
Descp: I-95 @ CR 16/KING SWAMP ROAD
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
ROW	NHS	2006	$152,000	$38,000	$0	$190,000
CST	NHS	2007	$2,722,400	$680,600	$0	$3,403,000

Project: 0007418 *Type Work:* Interchange
Descp: I-95 @ CR 17/ARDOCK ROAD
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
ROW	NHS	2006	$176,000	$44,000	$0	$220,000
CST	NHS	2007	$2,760,000	$690,000	$0	$3,450,000

Project: 0007419 *Type Work:* Interchange
Descp: I-95 @ CR 21/KING ROAD
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
ROW	NHS	2006	$240,000	$60,000	$0	$300,000
CST	NHS	2007	$3,040,000	$760,000	$0	$3,800,000

Project: 0007420 *Type Work:* Interchange
Descp: I-95 @ SR 57/WIREGRASS TRAIL
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
ROW	NHS	2007	$2,508,000	$627,000	$0	$3,135,000
CST	NHS	2008	$9,392,800	$2,348,200	$0	$11,741,000

Project: 0007421 *Type Work:* Interchange
Descp: I-95 @ SR 251/BRIARDAM ROAD
Length: 0.40

Phase	Fund	Year	Federal	State	Other	Total
ROW	NHS	2007	$3,440,000	$860,000	$0	$4,300,000
CST	NHS	2008	$8,560,000	$2,140,000	$0	$10,700,000

Project: 511110- *Type Work:* Widening
Descp: I-95 FM JUST N OF ALTAMAHA RIVER BR @ GLYNN COUNTY LN
Lanes: Exist. 4 *Prop.* 6 *Length:* 4.12

Phase	Fund	Year	Federal	State	Other	Total
PE	NHS	Underway				
PE	NHS	Underway				
CST	Bond	2006	$0	$20,362,000	$0	$20,362,000

Project: 511112- *Type Work:* Bridge Rehab
Descp: I-95 OVER CHAMPNEYS RVR- BUTLER RVR- DARIEN CK- CATHEAD CK
Lanes: Exist. 2 *Prop.* 6 *Length:* 1.60

Phase	Fund	Year	Federal	State	Other	Total
CST	Bond	2006	$0	$41,950,000	$0	$41,950,000

Project: 511120- *Type Work:* Widening
Descp: I-95 FM 1 MILE NORTH OF SR 251 TO SR 57 -- PHASE 1
Lanes: Exist. 4 *Prop.* 6 *Length:* 9.41

Phase	Fund	Year	Federal	State	Other	Total
PE	NHS	Underway				
PE	NHS	Underway				
ROW	NHS	2006	$9,600	$2,400	$0	$12,000
CST	Bond	2006	$0	$39,063,000	$0	$39,063,000

McIntosh Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0000807	2006	CST	State	$0	$371,000	$0	$371,000
0007417	2006	ROW	NHS	$152,000	$38,000	$0	$190,000
0007417	2007	CST	NHS	$2,722,400	$680,600	$0	$3,403,000
0007418	2006	ROW	NHS	$176,000	$44,000	$0	$220,000
0007418	2007	CST	NHS	$2,760,000	$690,000	$0	$3,450,000
0007419	2006	ROW	NHS	$240,000	$60,000	$0	$300,000
0007419	2007	CST	NHS	$3,040,000	$760,000	$0	$3,800,000
0007420	2007	ROW	NHS	$2,508,000	$627,000	$0	$3,135,000
0007420	2008	CST	NHS	$9,392,800	$2,348,200	$0	$11,741,000
0007421	2007	ROW	NHS	$3,440,000	$860,000	$0	$4,300,000
0007421	2008	CST	NHS	$8,560,000	$2,140,000	$0	$10,700,000
511110-	2006	CST	Bond	$0	$20,362,000	$0	$20,362,000
511112-	2006	CST	Bond	$0	$41,950,000	$0	$41,950,000
511120-	2006	ROW	NHS	$9,600	$2,400	$0	$12,000
511120-	2006	CST	Bond	$0	$39,063,000	$0	$39,063,000
				$33,000,800	$109,996,200	$0	$142,997,000

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Montgomery

Project: 0001366 **Type Work:** Replace Bridge
Descp: SR 30/US 280 @ OCONEE RIVER & OVERFLOWS
Length: 1.30
Multi County Project

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Bridge	2006	$4,000	$1,000	$0	$5,000
CST	Bridge	After 2008				

Project: 0007340 **Type Work:** Realignment
Descp: SR 56 FM TOOMBS COUNTY LINE TO THOMAS CREEK
Length: 0.46
Lump Sum Project

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$9,000	$1,000	$0	$10,000
ROW	STP	LUMP	$17,100	$1,900	$0	$19,000
CST	STP	LUMP	$1,486,800	$165,200	$0	$1,652,000

Project: 0007409 **Type Work:** Signals
Descp: SR 27 WEST @ 2 LOCS; SR 30 @ 2 LOCS & SR 31 @ 1 LOC
Length: 1.40
Lump Sum Project *Multi County Project*

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$44,000	$11,000	$0	$55,000
CST	STP	LUMP	$400,000	$100,000	$0	$500,000

Project: 550610- **Type Work:** Turn Lanes
Descp: SR 292/VIDALIA FM MORN'SIDE - LOWERY WITH RIGHT ON WILSON
Lanes: Exist. 2 **Prop.** 3 **Length:** 1.32
Multi County Project

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	2006	$400,000	$100,000	$0	$500,000
CST	STP	After 2008				

Project: M003207 **Type Work:** Resurface & Maintenance
Descp: MONTGOMERY CO SR 292 DBL SURFACE TREATMENT
Length: 1.86

Phase	Fund	Year	Federal	State	Other	Total
CST	State	2006	$0	$24,687	$0	$24,687

Project: M003311 **Type Work:** Resurface & Maintenance
Descp: SR 298 FM TRUETLEN COUNTY LINE TO SR 297
Length: 1.76
Lump Sum Project *Multi County Project*

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$116,800	$29,200	$0	$146,000

Montgomery Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0001366	2006	ROW	Bridge	$2,000	$500	$0	$2,500
550610-	2006	ROW	STP	$204,000	$51,000	$0	$255,000
M003207	2006	CST	State	$0	$24,687	$0	$24,687
				$206,000	$76,187	$0	$282,187

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Pierce

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: 0001937 *Type Work:* RRX Warning Device *Descp:* CR 218/SANDY BOTTOMS ROAD @ CSX #638163A *Length:* 0.20 ***Lump Sum Project***	CST	STP	LUMP	$145,000	$0	$0	$145,000
Project: 0003087 *Type Work:* Replace Bridge *Descp:* SR 15 @ FISHING CREEK 2 MILES NORTH OF BRISTOL *Length:* 0.50	PE	Bridge	Underway				
	ROW	Bridge	2006	$35,200	$8,800	$0	$44,000
	CST	Bridge	After 2008				
Project: 0003782 *Type Work:* Intersection Improvement *Descp:* SR 38 @ CR 178/HACKELBARNEY ROAD *Length:* 0.32	PE	STP	Underway				
	ROW	Local	LOCL	$0	$0	$100,000	$100,000
	CST	STP	2006	$685,800	$76,200	$0	$762,000
Project: 0007374 *Type Work:* RRX Warning Device *Descp:* CR 351/OAK RIDGE TRAIL @ CSX #637253V *Length:* 0.20 ***Lump Sum Project***	PE	STP	LUMP	$6,000	$0	$0	$6,000
	CST	STP	LUMP	$140,000	$0	$0	$140,000
Project: 0007405 *Type Work:* Signals *Descp:* SR 15 @ 2 LOCS; SR 38 @ 2 LOCS; SR 32 @ 1 LOC IN PIERCE *Length:* 2.00 ***Lump Sum Project***	PE	STP	LUMP	$44,000	$11,000	$0	$55,000
	CST	STP	LUMP	$400,000	$100,000	$0	$500,000

Pierce Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0003087	2006	ROW	Bridge	$35,200	$8,800	$0	$44,000
0003782	2006	CST	STP	$685,800	$76,200	$0	$762,000
				$721,000	$85,000	$0	$806,000

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Tattnall

Project: 0001364 Type Work: Replace Bridge
Descp: SR 56/NAIL BRIDGE @ OHOOPEE RIVER 2 MILES W OF REIDSVILLE
Length: 0.41

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Bridge	2006	$3,200	$800	$0	$4,000
CST	Bridge	After 2008				

Project: 0007408 Type Work: Signals
Descp: SR 23; SR 25; SR 30 CONN; SR 144 @ 1 LOC & SR 38 @ 3 LOCS
Length: 2.40

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$61,600	$15,400	$0	$77,000
CST	STP	LUMP	$560,000	$140,000	$0	$700,000

Lump Sum Project *Multi County Project*

Project: 532640- Type Work: Turn Lanes
Descp: SR 30/US 280 FM SR 56 TO ENTRANCE OF GORDONIA STATE PARK
Lanes: Exist. 2 Prop. 3 Length: 0.68

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	Underway				
ROW	STP	Underway				
CST	STP	2006	$1,132,800	$283,200	$0	$1,416,000

Project: 533120- Type Work: Replace Bridge
Descp: SR 144 @ WATERMELON CREEK 3 MI W OF GLENNVILLE
Length: 0.46

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Bridge	Underway				
CST	Bridge	2006	$829,600	$207,400	$0	$1,037,000

Project: M003297 Type Work: Shoulder Work
Descp: CAMDEN & TATNALL CO SR 40 & SR 147 SHOULDER PAVING
Length: 14.00

Phase	Fund	Year	Federal	State	Other	Total
CST	State	2006	$0	$306,517	$0	$306,517

Multi County Project

Tattnall Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0001364	2006	ROW	Bridge	$3,200	$800	$0	$4,000
532640-	2006	CST	STP	$1,132,800	$283,200	$0	$1,416,000
533120-	2006	CST	Bridge	$829,600	$207,400	$0	$1,037,000
M003297	2006	CST	State	$0	$196,171	$0	$196,171
				$1,965,600	$687,571	$0	$2,653,171

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Telfair

Project	Phase	Fund	Year	Federal	State	Other	Total
Project: 0002366 *Type Work:* Bicycle/Ped. Facility *Descp:* JACKSONVILLE PEDESTRIAN FACILITIES-PHASE II *Length:* 0.00 *Lump Sum Project*	CST	STP	LUMP	$78,940	$0	$19,735	$98,675
Project: 0007409 *Type Work:* Signals *Descp:* SR 27 WEST @ 2 LOCS; SR 30 @ 2 LOCS & SR 31 @ 1 LOC *Length:* 1.40 *Lump Sum Project* *Multi County Project*	PE	STP	LUMP	$44,000	$11,000	$0	$55,000
	CST	STP	LUMP	$400,000	$100,000	$0	$500,000
Project: 531100- *Type Work:* New Construction *Descp:* S MCRAE BYP FM SR 31/US 441 NE TO SR 27/US 341 @ N.MCRAE BYP *Lanes: Exist.* 0 *Prop.* 4 *Length:* 2.55	PE	State	Underway				
	PE	Bond	Underway				
	ROW	Bond	2006	$0	$767,000	$0	$767,000
	CST	Bond	After 2008				
Project: 561470- *Type Work:* New Construction *Descp:* N MCRAE BYP FM US 341/S BYP TO US 441/WHEELER/INCL SIGNALS *Lanes: Exist.* 0 *Prop.* 4 *Length:* 2.80 *Multi County Project*	PE	State	Underway				
	PE	Bond	Underway				
	ROW	State	Underway				
	ROW	Bond	2006	$0	$491,000	$0	$491,000
	CST	Bond	After 2008				

Telfair Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
531100-	2006	ROW	Bond	$0	$767,000	$0	$767,000
561470-	2006	ROW	Bond	$0	$319,150	$0	$319,150
				$0	$1,086,150	$0	$1,086,150

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Toombs

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: 0001365 Type Work: Replace Bridge	PE	Bridge	2006	$240,000	$60,000	$0	$300,000
Descp: SR 4/US 1 @ SWIFT CREEK JUST N OF LYONS CTY LIMIT	ROW	Bridge	After 2008				
Lanes: Exist. 2 Prop. 4 Length: 0.20	CST	Bridge	After 2008				

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: 0003902 Type Work: Intersection Improvement	ROW	STP	LUMP	$88,650	$9,850	$0	$98,500
Descp: SR 4 @ SR 178	CST	STP	LUMP	$148,500	$16,500	$0	$165,000
Length: 0.10							

Lump Sum Project

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: 0006561 Type Work: Multi-use Trail	CST	STP	LUMP	$650,400	$0	$162,600	$813,000
Descp: LYONS RAILS TO TRAILS							
Length: 0.00							

Lump Sum Project

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: 522130- Type Work: Widening	PE	State	Underway				
Descp: SR 4/US 1 FM LYONS CL TO SOUTH CL/OAK PARK IN EMANUEL CO	PE	Bond	Underway				
Lanes: Exist. 2 Prop. 4 Length: 9.20	ROW	Bond	2007	$0	$2,750,000	$0	$2,750,000
Multi County Project	CST	Bond	After 2008				

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: 522200- Type Work: Widening	PE	State	Underway				
Descp: SR 4 LYONS FM S CTY LMTS TO N CTY LMTS/INCL 1-WY PAIR&CLVT	PE	Bond	Underway				
Lanes: Exist. 2 Prop. 4 Length: 3.10	ROW	Bond	2007	$0	$15,940,000	$0	$15,940,000
	CST	Bond	After 2008				

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: 542416- Type Work: Replace Bridge	PE	Bridge	Underway				
Descp: SR 147 @ COBB CREEK 17 MI S OF LYONS	ROW	Bridge	Underway				
Length: 0.49	CST	Bridge	2006	$1,192,000	$298,000	$0	$1,490,000

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: 550610- Type Work: Turn Lanes	PE	STP	Underway				
Descp: SR 292/VIDALIA FM MORN'SIDE - LOWERY WITH RIGHT ON WILSON	ROW	STP	2006	$400,000	$100,000	$0	$500,000
Lanes: Exist. 2 Prop. 3 Length: 1.32	CST	STP	After 2008				
Multi County Project							

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: M003310 Type Work: Resurface & Maintenance	CST	STP	LUMP	$508,000	$127,000	$0	$635,000
Descp: SR 130 FM SR 30 TO SR 4							
Length: 6.20							

Lump Sum Project

Project / Description	Phase	Fund	Year	Federal	State	Other	Total
Project: M003311 Type Work: Resurface & Maintenance	CST	STP	LUMP	$116,800	$29,200	$0	$146,000
Descp: SR 298 FM TRUETLEN COUNTY LINE TO SR 297							
Length: 1.76							

Lump Sum Project *Multi County Project*

Toombs Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0001365	2006	PE	Bridge	$240,000	$60,000	$0	$300,000
522130-	2007	ROW	Bond	$0	$1,292,500	$0	$1,292,500
522200-	2007	ROW	Bond	$0	$15,940,000	$0	$15,940,000
542416-	2006	CST	Bridge	$1,192,000	$298,000	$0	$1,490,000
550610-	2006	ROW	STP	$196,000	$49,000	$0	$245,000
				$1,628,000	$17,639,500	$0	$19,267,500

NOTE: Cost estimates in this section show only the Counties portion of the project; If the totals are different from the list above it is an indication that the project is in multiple counties.

Ware

Project info	Phase	Fund	Year	Federal	State	Other	Total
Project: 0007294 Type Work: RRX Warning Device	PE	STP	LUMP	$6,000	$0	$0	$6,000
Descp: CR 228/JOHNNY MINCHEW ROAD @ CSX #638165N	CST	STP	LUMP	$150,000	$0	$0	$150,000
Length: 0.40							
Lump Sum Project							

Project info	Phase	Fund	Year	Federal	State	Other	Total
Project: 0007406 Type Work: Signals	PE	STP	LUMP	$96,000	$24,000	$0	$120,000
Descp: SR 4BU @ 6 LOCS; SR 38 @ 2 LOCS & SR 520 @3 LOCS IN WARE	CST	STP	LUMP	$880,000	$220,000	$0	$1,100,000
Length: 0.00							
Lump Sum Project							

Project info	Phase	Fund	Year	Federal	State	Other	Total
Project: 422120- Type Work: Widening	PE	State	Underway				
Descp: SR 38/US84 FM W OF WOODYARD CK/CLINCH TO W OF GREASY CK/WARE	ROW	State	2006	$0	$4,117,000	$0	$4,117,000
Lanes: Exist. 2 Prop. 4 Length: 11.40	CST	State	After 2008				
Multi County Project							

Project info	Phase	Fund	Year	Federal	State	Other	Total
Project: 522770- Type Work: Widening	PE	State	Underway				
Descp: SR 38/US 84 FM W OF GREASY BRANCH CK TO W OF CR 88/RUSKIN RD	PE	Bond	Underway				
Lanes: Exist. 2 Prop. 4 Length: 7.40	ROW	State	2007	$0	$1,605,000	$0	$1,605,000
	CST	State	After 2008				

Project info	Phase	Fund	Year	Federal	State	Other	Total
Project: 522780- Type Work: Widening	PE	State	Underway				
Descp: SR 38/US 84 FM W OF CR 88/RUSKIN RD TO E OF SR 53 CONNECTOR	ROW	State	After 2008				
Lanes: Exist. 2 Prop. 4 Length: 5.60	ROW	HPP	2007	$4,100,397	$1,025,099	$0	$5,125,496
	CST	State	After 2008				

Ware Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
422120-	2006	ROW	State	$0	$1,440,950	$0	$1,440,950
522770-	2007	ROW	State	$0	$1,605,000	$0	$1,605,000
522780-	2007	ROW	HPP	$4,100,397	$1,025,099	$0	$5,125,496
				$4,100,397	$4,071,049	$0	$8,171,446

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Wayne

Project: 0006541 **Type Work:** Sidewalks
Descp: ODUM SIDEWALKS & LIGHTING
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	2006	$98,400	$0	$24,600	$123,000

Project: 0006542 **Type Work:** Streetscapes
Descp: SCREVEN STREETSCAPE - SIDEWALK STREETSCAPE ONLY
Length: 0.00

Phase	Fund	Year	Federal	State	Other	Total
CST	STP	LUMP	$300,000	$0	$75,000	$375,000

Lump Sum Project

Project: 0007425 **Type Work:** RRX Warning Device
Descp: CS 628/PALM STREET @ NS #729094W
Length: 0.20

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$6,000	$0	$0	$6,000
CST	STP	LUMP	$135,000	$0	$0	$135,000

Lump Sum Project

Project: 0007433 **Type Work:** RRX Warning Device
Descp: CS 665/SOUTH BRUNSWICK STREET @ CSX #637366B
Length: 0.01

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$6,000	$0	$0	$6,000
CST	STP	2006	$275,000	$0	$0	$275,000

Project: 0007434 **Type Work:** RRX Warning Device
Descp: CR 234/LOUSIANNA ROAD @ CSX #637370R
Length: 0.05

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$6,000	$0	$0	$6,000
CST	STP	2006	$200,000	$0	$0	$200,000

Project: 0007435 **Type Work:** RRX Warning Device
Descp: CR 232/SLOVER ROAD @ CSX #637371X
Length: 0.01

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$6,000	$0	$0	$6,000
CST	STP	2006	$200,000	$0	$0	$200,000

Project: 0007436 **Type Work:** RRX Warning Device
Descp: CR 222/ED HARRELL ROAD @ CSX #637379C
Length: 0.91

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$6,000	$0	$0	$6,000
CST	STP	2006	$200,000	$0	$0	$200,000

Project: 522390- **Type Work:** Widening
Descp: SR 38/US 84 FM SR 203 TO CR 392 @ JESUP
Lanes: Exist. 2 **Prop.** 4 **Length:** 5.10

Phase	Fund	Year	Federal	State	Other	Total
PE	State	Underway				
ROW	RRBS	Underway				
CST	RRBS	2007	$0	$11,129,000	$0	$11,129,000

Project: M003301 **Type Work:** Resurface & Maintenance
Descp: WAYNE CO SR 23 RIDE SHARE PARKLOT CONSTRUCTION
Length: 0.25

Phase	Fund	Year	Federal	State	Other	Total
CST	State	2006	$0	$18,584	$0	$18,584

Wayne Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0006541	2006	CST	STP	$98,400	$0	$24,600	$123,000
0007433	2006	CST	STP	$275,000	$0	$0	$275,000
0007434	2006	CST	STP	$200,000	$0	$0	$200,000
0007435	2006	CST	STP	$200,000	$0	$0	$200,000
0007436	2006	CST	STP	$200,000	$0	$0	$200,000
522390-	2007	CST	RRBS	$0	$11,129,000	$0	$11,129,000
M003301	2006	CST	State	$0	$18,584	$0	$18,584
				$973,400	$11,147,584	$24,600	$12,145,584

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Wheeler

Project: **0001366** *Type Work:* Replace Bridge
Descp: SR 30/US 280 @ OCONEE RIVER & OVERFLOWS
Length: 1.30
Multi County Project

Phase	Fund	Year	Federal	State	Other	Total
PE	Bridge	Underway				
ROW	Bridge	2006	$4,000	$1,000	$0	$5,000
CST	Bridge	After 2008				

Project: **0007409** *Type Work:* Signals
Descp: SR 27 WEST @ 2 LOCS; SR 30 @ 2 LOCS & SR 31 @ 1 LOC
Length: 1.40
Lump Sum Project *Multi County Project*

Phase	Fund	Year	Federal	State	Other	Total
PE	STP	LUMP	$44,000	$11,000	$0	$55,000
CST	STP	LUMP	$400,000	$100,000	$0	$500,000

Project: **561470-** *Type Work:* New Construction
Descp: N MCRAE BYP FM US 341/S BYP TO US 441/WHEELER/INCL SIGNALS
Lanes: Exist. 0 *Prop.* 4 *Length:* 2.80
Multi County Project

Phase	Fund	Year	Federal	State	Other	Total
PE	State	Underway				
PE	Bond	Underway				
ROW	State	Underway				
ROW	Bond	2006	$0	$491,000	$0	$491,000
CST	Bond	After 2008				

Project: **M003146** *Type Work:* Bridge Rehabilitation
Descp: WHEELER CO O/S BRIDGE PILING REPAIR CR 178/OCHWALKEE CR
Length: 0.05

Phase	Fund	Year	Federal	State	Other	Total
CST	PROF	2006	$0	$36,027	$0	$36,027

Project: **M003147** *Type Work:* Bridge Rehabilitation
Descp: WHEELER CO O/S BRIDGE PILING REPAIR CR 178/OCHWALKEE CR
Length: 0.05

Phase	Fund	Year	Federal	State	Other	Total
CST	4433	2006	$0	$36,027	$0	$36,027

Wheeler Totals Summary

(For Non-Lump Sum Projects)

Project PI#	Year	Phase	Fund	Federal	State	Other	Total
0001366	2006	ROW	Bridge	$2,000	$500	$0	$2,500
561470-	2006	ROW	Bond	$0	$171,850	$0	$171,850
M003146	2006	CST	PROF	$0	$36,027	$0	$36,027
M003147	2006	CST	4433	$0	$36,027	$0	$36,027
				$2,000	$244,404	$0	$246,404

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STIP Counties Summary

County	Fed$	State$	Other$	Total
All	$968,910,340	$209,723,673	$39,059,778	$1,217,693,791
Appling	$1,248,800	$23,661,000	$33,200	$24,943,000
Atkinson	$496,800	$5,509,890	$0	$6,006,690
Baker	$835,200	$208,800	$0	$1,044,000
Baldwin	$2,833,200	$60,847,580	$0	$63,680,780
Banks	$387,200	$96,800	$0	$484,000
Barrow	$1,356,800	$339,200	$0	$1,696,000
Bartow	$78,178,700	$19,889,675	$225,000	$98,293,375
Ben Hill	$960,000	$240,000	$0	$1,200,000
Berrien	$463,200	$0	$115,800	$579,000
Bleckley	$2,717,200	$491,800	$0	$3,209,000
Brooks	$2,136,960	$534,240	$0	$2,671,200
Bulloch	$14,345,312	$3,575,504	$1,330	$17,922,146
Burke	$8,000	$2,000	$0	$10,000
Butts	$232,300	$4,218,900	$0	$4,451,200
Calhoun	$30,400	$7,600	$0	$38,000
Camden	$3,828,100	$277,246	$744,000	$4,849,346
Candler	$1,684,000	$421,000	$0	$2,105,000
Carroll	$85,991,360	$10,169,540	$0	$96,160,900
Charlton	$1,462,400	$253,000	$112,600	$1,828,000
Chattahoochee	$759,200	$189,800	$0	$949,000
Chattooga	$1,617,000	$5,107,000	$0	$6,724,000
Clay	$540,000	$17,278,650	$0	$17,818,650
Clinch	$650,000	$11,139,360	$162,500	$11,951,860
Coffee	$1,601,600	$400,400	$0	$2,002,000
Colquitt	$5,371,200	$1,093,800	$0	$6,465,000
Columbia	$7,645,315	$864,035	$0	$8,509,350
Cook	$5,895,200	$158,832,200	$87,600	$164,815,000
Crawford	$200,000	$50,000	$0	$250,000
Crisp	$654,400	$21,355,800	$0	$22,010,200
Dade	$1,628,000	$82,000	$325,000	$2,035,000
Dawson	$1,244,000	$311,000	$0	$1,555,000
Dodge	$4,421,600	$1,105,400	$0	$5,527,000
Dooly	$4,044,800	$986,400	$0	$5,031,200
Early	$368,800	$39,013,200	$0	$39,382,000
Echols	$3,502,400	$875,600	$0	$4,378,000
Effingham	$4,122,800	$1,030,700	$0	$5,153,500
Elbert	$2,822,800	$24,270,294	$93,100	$27,186,194
Emanuel	$783,040	$28,934,870	$0	$29,717,910
Evans	$250,000	$14,156,000	$62,500	$14,468,500
Fannin	$1,854,056	$463,514	$0	$2,317,570
Franklin	$9,882,826	$2,638,396	$1,950	$12,523,172
Gilmer	$3,084,504	$479,634	$3,947	$3,568,085
Glascock	$3,881,600	$970,400	$0	$4,852,000
Gordon	$111,474,360	$25,988,050	$0	$137,462,410

Grady	$1,748,800	$456,167	$0	$2,204,967
Greene	$123,200	$30,800	$0	$154,000
Habersham	$6,389,407	$940,800	$95,302	$7,425,509
Hancock	$2,457,200	$614,300	$0	$3,071,500
Haralson	$63,754,440	$7,109,160	$0	$70,863,600
Harris	$37,903,767	$5,225,942	$0	$43,129,708
Hart	$1,919,474	$360,148	$0	$2,279,622
Jackson	$13,919,232	$3,479,808	$0	$17,399,040
Jasper	$630,400	$157,600	$0	$788,000
Jeff Davis	$3,709,000	$925,500	$500	$4,635,000
Jefferson	$1,752,800	$3,963,590	$0	$5,716,390
Jenkins	$1,897,600	$12,037,400	$0	$13,935,000
Johnson	$105,272	$76,318	$0	$181,590
Jones	$404,800	$101,200	$0	$506,000
Lamar	$2,746,220	$594,480	$0	$3,340,700
Laurens	$2,196,900	$36,288,000	$126,100	$38,611,000
Lee	$3,662,704	$20,771,676	$0	$24,434,380
Lincoln	$481,600	$120,400	$0	$602,000
Lumpkin	$554,400	$138,600	$0	$693,000
Macon	$1,938,000	$484,500	$0	$2,422,500
Madison	$40,000	$8,096,651	$0	$8,136,651
Marion	$2,508,000	$660,627	$0	$3,168,627
McDuffie	$3,969,985	$26,689,665	$0	$30,659,650
McIntosh	$33,000,800	$109,996,200	$0	$142,997,000
Meriwether	$6,095,200	$1,418,200	$105,600	$7,619,000
Miller	$332,000	$14,581,000	$56,000	$14,969,000
Mitchell	$1,496,800	$394,870	$0	$1,891,670
Monroe	$1,980,480	$328,120	$0	$2,308,600
Montgomery	$206,000	$76,187	$0	$282,187
Morgan	$776,000	$5,194,000	$0	$5,970,000
Murray	$5,868,240	$1,293,600	$144,200	$7,306,040
Newton	$8,589,200	$11,697,300	$0	$20,286,500
Oglethorpe	$5,938,624	$1,484,656	$0	$7,423,280
Peach	$2,803,200	$700,800	$0	$3,504,000
Pickens	$283,640	$3,150	$0	$286,790
Pierce	$721,000	$85,000	$0	$806,000
Pike	$1,220,000	$305,000	$0	$1,525,000
Polk	$1,936,378	$25,666,730	$390,550	$27,993,658
Pulaski	$3,364,800	$841,200	$0	$4,206,000
Putnam	$6,285,200	$33,451,300	$0	$39,736,500
Rabun	$3,040,100	$28,635,900	$0	$31,676,000
Randolph	$3,123,200	$7,156,150	$0	$10,279,350
Schley	$860,000	$25,763,000	$0	$26,623,000
Seminole	$1,650,400	$300,000	$112,600	$2,063,000
Stephens	$4,000,000	$32,597,500	$0	$36,597,500
Sumter	$7,164,000	$27,261,000	$0	$34,425,000
Talbot	$1,568,400	$392,100	$0	$1,960,500
Tattnall	$1,965,600	$687,571	$0	$2,653,171

Taylor	$2,860,800	$715,200	$0	$3,576,000
Telfair	$0	$1,086,150	$0	$1,086,150
Terrell	$1,456,800	$364,200	$0	$1,821,000
Thomas	$1,131,200	$282,800	$500	$1,414,500
Tift	$1,799,200	$64,749,800	$0	$66,549,000
Toombs	$1,628,000	$17,639,500	$0	$19,267,500
Towns	$5,445,920	$1,361,480	$0	$6,807,400
Treutlen	$109,760	$27,440	$0	$137,200
Troup	$11,988,963	$1,582,241	$40,000	$13,611,204
Turner	$7,131,500	$64,333,000	$0	$71,464,500
Twiggs	$1,384,320	$346,080	$0	$1,730,400
Union	$843,200	$210,800	$0	$1,054,000
Upson	$1,834,400	$395,100	$0	$2,229,500
Walton	$1,245,600	$311,400	$0	$1,557,000
Ware	$4,100,397	$4,071,049	$0	$8,171,446
Washington	$2,814,728	$27,636,682	$0	$30,451,410
Wayne	$973,400	$11,147,584	$24,600	$12,145,584
Webster	$6,692,800	$1,673,200	$0	$8,366,000
Wheeler	$2,000	$244,404	$0	$246,404
White	$9,455,700	$2,343,300	$0	$11,799,000
Wilkes	$1,693,696	$46,160,314	$0	$47,854,010
Wilkinson	$34,143,810	$31,799,410	$0	$65,943,220
Worth	$1,286,896	$321,724	$0	$1,608,620
STIP Totals	***$1,705,511,325***	***$1,436,520,674***	***$42,124,257***	***$3,184,156,257***

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Georgia Department of Transportation
Fact Sheet

The Governor's Road Improvement Program (GRIP)

Definition

The Governor's Road Improvement Program, commonly referred to as GRIP, is a system of proposed economic developmental highways in Georgia. GRIP was originally adopted in 1989 by the Georgia General Assembly. Georgia law defines the following corridors as the GRIP:

- Appalachian Developmental Highway
- South Georgia Parkway/US 82
- US 319
- Golden Isles Parkway
- Fall Line Freeway
- SR 72
- Savannah River Parkway
- US 19
- US 1/SR 17
- US 27
- US 441
- US 84
- Sunbelt Parkway/SR 133
- Power Alley/US 280
- East-West Highway
- SR 40
- SR 32
- SR 125
- SR 15

GRIP was initiated in 1989 and originally consisted of 14 corridors with 2,690 miles of roadway, including 113 miles of truck access routes. During the 2001 and 2005 Legislative sessions, the General Assembly added new routes, including three truck access routes. The current length of the GRIP system has grown to **3,314 miles**. The total length will continue to vary as alignments, including bypasses and shifts, are determined through the engineering process.

Purpose

Economic development highways traditionally receive strong support in Georgia. The purpose of the GRIP system explains why :

- **Connectivity** in Rural Georgia: GRIP will connect 95% of Georgia cities with a population of 2,500 or more to the Interstate System and ensure that 98% of all areas in the state will be within 20 miles of a four-lane road.
- Provide **opportunities for growth**: Several studies have provided evidence that GRIP fosters economic development.
- Provide **effective and efficient transportation** for the growing statewide population
- **Safer travel** in rural areas: Accidents occur three times more often on 2-lane highways than on multi-lane divided highways – especially on corridors with the higher travel volumes.

Current GRIP Corridor Statistics

GRIP CORRIDOR	TOTAL LENGTH (miles)	COMPLETE OR UNDER CONSTRUCTION (miles)	COMPLETE OR UNDER CONSTRUCTION (percentage)	CORRIDOR STATUS	REMAINING COST TO COMPLETE (millions)
Appalachian Developmental Highway	60	60	100%	Complete	$0.0
South Georgia Parkway/US 82	262	262	100%	Complete	$0.0
US 319	72	72	100%	Complete Engineering Active Construction	$0.0
Golden Isles Parkway	168	168	100%	Complete Engineering Active Construction	$0.0
Fall Line Freeway	215	170	79%	Active Engineering and Construction	$255.5
SR 72	45	18	40%	Active Engineering and Construction	$130.3
Savannah River Parkway	156	150	96%	Active Engineering and Construction	$12.3
US 19	194	162	84%	Active Engineering and Construction	$83.6
US 1/SR 17	331	133	40%	Active Engineering and Construction	$743.4
US 27	352	290	82%	Active Engineering and Construction	$329.8
US 441	371	187	50%	Active Engineering and Construction	$644.5
US 84	259	229	89%	Active Engineering and Construction	$87.0
Sunbelt Parkway/SR 133	66	0	0%	Active Engineering	$169.1
Power Alley/US 280 (active)	27	0	0%	Active Engineering on 27 miles only	$67.7
Power Alley/US 280 (inactive)	177	0	0%	No Activity	$373.9
SR 32 (active)	44	0	0%	Active Engineering on 44 miles only	$76.5
SR 32 (inactive)	145	13	9%	No Activity	$155.6
SR 40	29	13	45%	Active Engineering	$18.4
East-West Highway	169	0	0%	No Activity	$468.6
SR 15	150	0	0%	No Activity	$330.0
SR 125	22	0	0%	No Activity	$20.7
Subtotals for Original 1989 GRIP Corridors:	**2485**	**1901**	**77%**		**$2,286.5**
Subtotals for Active & Complete GRIP Corridors:	**2651**	**1914**	**72%**		**$2,618.1**
Grand Totals for all GRIP Corridors:	**3314**	**1927**	**58%**		**$3,967.0**

Meeting the Challenge

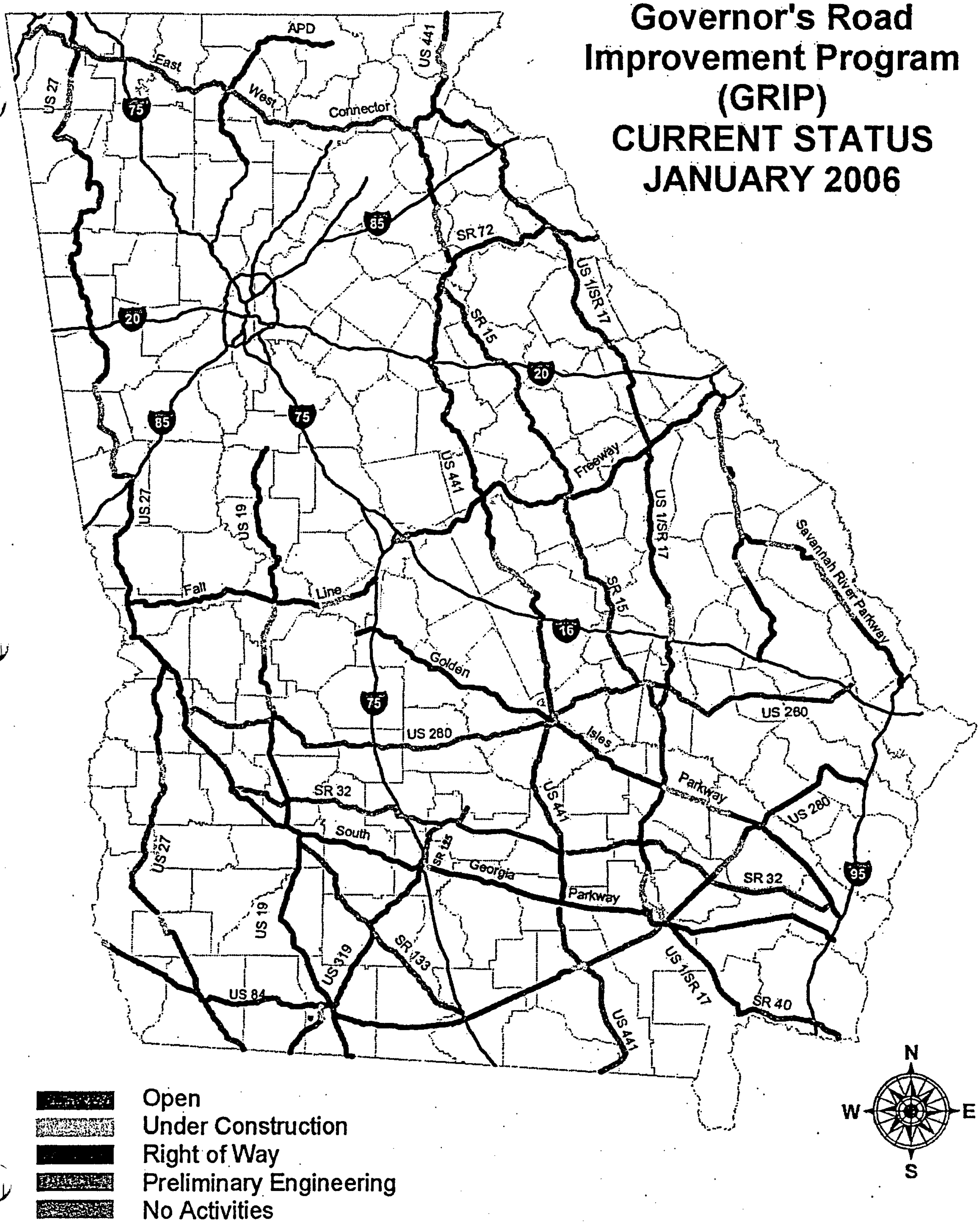
GDOT is striving to complete the construction of the GRIP System. A strategy is in place that recognizes the complexity of each of the three phases of project development:

- ◇Engineering (including environmental studies)
- ◇Right of way acquisition
- ◇Construction

These phases are not generally scheduled for completion in the same year, and in most cases a phase takes several years to complete. Another consideration in scheduling each phase is the availability of funds. A multiple-year funding program to accomplish the planning, design, right of way and construction of the GRIP System is based on these considerations and the past funding history for GRIP projects.

Contact:
Buddy Gratton, Director of Preconstruction – 404-656-5187 or Meg Pirkle, Assistant Director of Preconstruction – 404-651-7455

Governor's Road Improvement Program (GRIP) CURRENT STATUS JANUARY 2006



GDOT 2006a

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Golden Isles Parkway	168	168	100%	Complete Engineering Active Construction	$0.0
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SR 72	45	18	40%	Active Engineering and Construction	$130.3
Savannah River Parkway	156	150	96%	Active Engineering and Construction	$12.3
US 19	194	162	84%	Active Engineering and Construction	$83.6
US 1/SR 17	331	133	40%	Active Engineering and Construction	$743.4
US 27	352	290	82%	Active Engineering and Construction	$329.8
US 441	371	187	50%	Active Engineering and Construction	$644.5
US 84	259	229	89%	Active Engineering and Construction	$87.0
Sunbelt Parkway/SR 133	66	0	0%	Active Engineering	$169.1
Power Alley/US 280 (active)	27	0	0%	Active Engineering on 27 miles only	$67.7
Power Alley/US 280 (inactive)	177	0	0%	No Activity	$373.9
SR 32 (active)	44	0	0%	Active Engineering on 44 miles only	$76.5
SR 32 (inactive)	145	13	9%	No Activity	$155.6
SR 40	29	13	45%	Active Engineering	$18.4
East-West Highway	169	0	0%	No Activity	$468.6
SR 15	150	0	0%	No Activity	$330.0
SR 125	22	0	0%	No Activity	$20.7
Subtotals for Original 1989 GRIP Corridors:	2485	1901	77%		$2,286.5
Subtotals for Active & Complete GRIP Corridors:	2651	1914	72%		$2,618.1
Grand Totals for all GRIP Corridors:	3314	1927	58%		$3,967.0

Meeting the Challenge

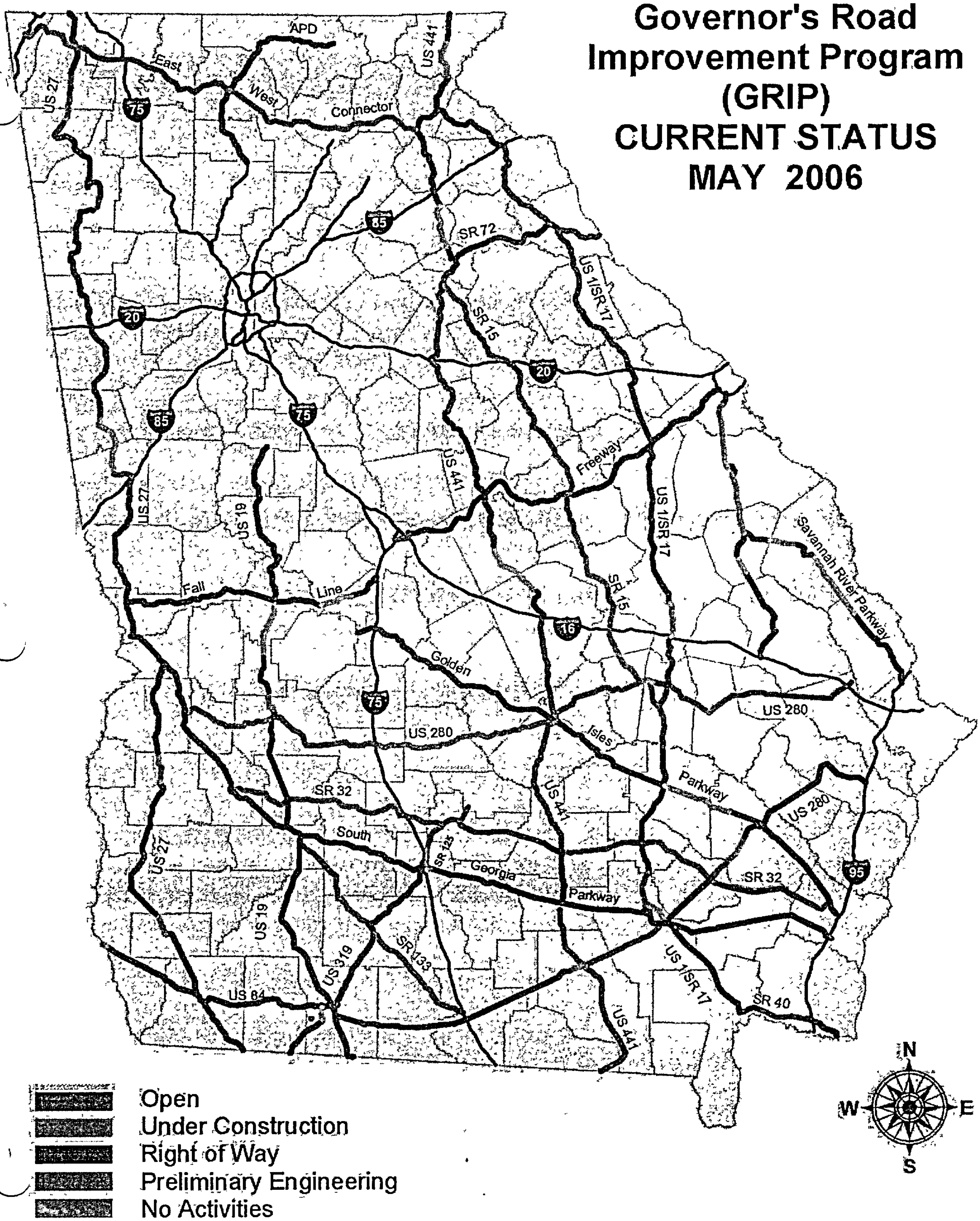
GDOT is striving to complete the construction of the GRIP System. A strategy is in place that recognizes the complexity of each of the three phases of project development:

- ⟐Engineering (including environmental studies)
- ⟐Right of way acquisition
- ⟐Construction

These phases are not generally scheduled for completion in the same year, and in most cases a phase takes several years to complete. Another consideration in scheduling each phase is the availability of funds. A multiple-year funding program to accomplish the planning, design, right of way and construction of the GRIP System is based on these considerations and the past funding history for GRIP projects.

Contact:
Buddy Gratton, Director of Preconstruction – 404-656-5187 or Meg Pirkle, Assistant Director of Preconstruction – 404-651-7455

Governor's Road Improvement Program (GRIP) CURRENT STATUS MAY 2006



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2004 ANNUAL AVERAGE DAILY TRAFFIC (AADT)

County	TC No.	RT	Route	Beg MP	End MP	AADT	Begin Intersection	End Intersection	CTY & TC	RCLINK
APPLING	0101	SR	000400	0.42	8.49	3260	PAT LEWIS RD	DEWY JOHNSON RD	001-0101	0011000400
APPLING	0105	SR	000400	8.65	9.04	13040	CENTRAL ST EXT	PLIER ST	001-0105	0011000400
APPLING	0107	SR	000400	9.20	9.77	14460	TOLLISON ST	TIPPENS ST	001-0107	0011000400
APPLING	0109	SR	000400	9.81	10.01	13660	PARKER ST	IVEY ST	001-0109	0011000400
APPLING	0112	SR	000400	10.03	10.79	9680	LANES BRIDGE RD	TROUPE ST	001-0112	0011000400
APPLING	0114	SR	000400	10.81	15.89	6730	NAILS FERRY RD	HILTON BAXLEY RD	001-0114	0011000400
APPLING	0118	SR	000400	16.63	20.66	5050	ALTAMAHA SCHOOL RD	PLANT HATCH	001-0118	0011000400
APPLING	0121	SR	001500	0.38	5.70	2480	LONG BRANCH RD	HOLLAND RD	001-0121	0011001500
APPLING	0123	SR	001500	6.20	11.75	2090	ALMA RD	ROY BOWEN RD	001-0123	0011001500
APPLING	0125	SR	001500	12.11	16.37	2580	BEN WEAVER RD	REED RD	001-0125	0011001500
APPLING	0127	SR	001500	16.53	19.09	4590	RED OAK RD	FOREST DR	001-0127	0011001500
APPLING	0129	SR	001500	19.36	19.91	6890	SATILLA RD	AUBURN RD	001-0129	0011001500
APPLING	0132	SR	001500	20.12	20.55	9050	LAKEVIEW DR	FAIR ST	001-0132	0011001500
APPLING	0133	SR	001900	0.12	0.12	1630	OLD SR 289	OLD SR 289	001-0133	0011001900
APPLING	0133	SR	001900	0.12	2.11	1630			001-0133	0011001900
APPLING	0134	SR	001900	0.12	2.11	1850		END JEFF DAVIS 161	001-0134	0011001900
APPLING	0136	SR	002700	0.42	0.53	6840	RYAN CROSBY RD	GRAHAM BAPTIST CH RD	001-0136	0011002700
APPLING	0138	SR	002700	1.12	10.00	6230	GRAHAM RD	WESTBERRY RD	001-0138	0011002700
APPLING	0141	SR	002700	10.02	10.82	10360	AZALEA RD	DEAN ST	001-0141	0011002700
APPLING	0143	SR	002700	10.91	11.64	9370	N MAIN ST	CREOSOTE RD	001-0143	0011002700
APPLING	0145	SR	002700	11.98	20.46	4730	ALPINE DR	MAIN ST	001-0145	0011002700
APPLING	0152	SR	002700	20.55	24.57	4430	STILL ST	COUNTY LINE RD	001-0152	0011002700
APPLING	0156	SR	020300	0.27	4.58	1060	RED OAK RD	TOMBERLIN CEMETERY RD	001-0156	0011020300
APPLING	0158	SR	020300	5.05	5.79	1040	BLACKSHEAR HWY	WILKINSON RD	001-0158	0011020300
APPLING	0161	SR	020300	6.52	10.60	1100	JESUP RD	GRIFFIS RD	001-0161	0011020300
APPLING	0163	SR	012100	4.04	6.13	610	CECIL TYRE RD	COLEMAN CREEK	001-0163	0011012100
APPLING	0165	SR	012100	6.35	15.57	1050	JESUP RD	HART ST	001-0165	0011012100
APPLING	0169	SR	012100	15.66	15.83	1120	GOLDEN ISLES HWY	EASON ST	001-0169	0011012100
APPLING	0170	SR	012100	15.86	25.58	860	OLD SURRENCY RD	NO NAME	001-0170	0011012100
APPLING	0172	SR	012100	25.68	26.41	2910	NO NAME	ALTAMAHA RIVER	001-0172	0011012100
APPLING	0176	CR	073900	0.00	1.29	4460	BEN CARTER RD	OLD SURRENCY RD	001-0176	0012073900
APPLING	0178	SR	014400	0.00	6.23	2150	GOLDEN ISLES HWY	NO NAME	001-0178	0011014400
APPLING	0181	SR	014400	6.52	14.57	1530	DOC MCTIER RD	ELLA REDDISH RD	001-0181	0011014400
APPLING	0183	SR	016900	6.52	14.57	890		INB 001 #	001-0183	0011016900
APPLING	0185	CR	053100	0.00	3.99	580	ALMA RD	CAMERON RD	001-0185	0012053100
APPLING	0187	CR	053100	4.01	8.70	790	BOWEN RD	BLACKSHEAR HWY	001-0187	0012053100
APPLING	0189	CR	041700	0.22	9.31	780	LOUISE MORRIS RD	BLACKSHEAR HWY	001-0189	0012041700
APPLING	0194	CR	009000	1.90	2.55	1820	COUNTY FARM RD	THOMAS ST	001-0194	0012009000
APPLING	0196	CR	009000	2.62	3.53	2540	WOODLAWN CH RD	S MAIN ST	001-0196	0012009000
APPLING	0198	CR	057500	0.00	1.00	290	GA HWY 19	COUNTY FARM RD	001-0198	0012057500
APPLING	0198	CR	057500	0.00	2.61	290			001-0198	0012057500
APPLING	0198	CR	057500	0.00	2.61	290		BRS00350 BIG SATIL	001-0198	0012057500

2004 ANNUAL AVERAGE DAILY TRAFFIC (AADT)										
County	TC No.	RT	Route	Beg MP	End MP	AADT	Begin Intersection	End Intersection	CTY & TC	RCLINK
APPLING	0201	CR	057500	2.88	4.72	300	ZOAR RD	NORMAN URSREY RD	001-0201	0012057500
APPLING	0203	CR	057600	0.35	2.25	460	FLETCHER RD	GOLDEN ISLES HWY	001-0203	0012057600
APPLING	0205	CR	056000	0.00	0.51	460	GA HWY 19	HERDON RD	001-0205	0012056000
APPLING	0207	CR	053600	0.00	2.94	510	COUNTY FARM EXT	HUNTER RD	001-0207	0012053600
APPLING	0209	CR	053600	4.38	9.42	1160	BRENDA KAYE YAWN RD	COOK ST	001-0209	0012053600
APPLING	0212	CR	053600	9.54	10.45	3590	SPELL ST	S MAIN ST	001-0212	0012053600
APPLING	0214	CR	053800	0.60	3.85	630	DEWITT SELLERS RD	PINEY BLUFF RD	001-0214	0012053800
APPLING	0216	CR	053800	4.64	10.77	600	GA HWY 4	TEN MILE RD	001-0216	0012053800
APPLING	0218	CR	053700	0.00	6.42	1230	HARDWICK RD	PLEASANT HILL CH RD	001-0218	0012053700
APPLING	0221	CR	053700	6.65	16.49	700	ALTAMAHA SCHOOL RD	HENDRICKS RD	001-0221	0012053700
APPLING	0223	CR	052900	0.00	3.53	320	BLACKSHEAR HWY	LAKE CHAPEL CH RD	001-0223	0012052900
APPLING	0225	CR	053000	0.39	5.59	260	LAKE CHAPEL CH RD	RITCH CH RD	001-0225	0012053000
APPLING	0229	CR	000100	0.00	11.39	560	GA HWY 4	BULLARD CREEK RD	001-0229	0012000100
APPLING	0232	CR	020800	0.00	4.08	220	SURRENCY RD	LEROY SHARPE RD	001-0232	0012020800
APPLING	0234	CR	009000	0.00	0.00	1130	BLACKSHEAR HWY	BLACKSHEAR HWY	001-0234	0012009000
APPLING	0236	CR	009000	0.79	1.16	480	GA HWY 4	GO KART RD	001-0236	0012009000
APPLING	0238	CR	020200	0.91	2.22	1210	LAKEVIEW DR	S MAIN ST	001-0238	0012020200
APPLING	0241	CR	020200	0.00	0.63	2550	BLACKSHEAR HWY	STEPHENS ST	001-0241	0012020200
APPLING	8001	CR	002600	0.00	2.56	560	GOLDEN ISLES HWY	NAILS FERRY RD	001-8001	0012002600
APPLING	8003	CR	005400	0.00	0.96	560	ROSCOE HUTCHINSON RD	CAROL WILLIAMS RD	001-8003	0012005400
APPLING	8005	CR	006400	0.00	3.46	560	VASCO JOHNSON RD	OLD SR 289	001-8005	0012006400
APPLING	8007	CR	008000	0.00	2.33	560	ALLEN NAIL RD	HUNTER RD	001-8007	0012008000
APPLING	8009	CR	010700	0.00	3.53	2540	ALTMAN CEMETERY RD	MT OLIVE CH RD	001-8009	0012010700
APPLING	8011	CR	013900	0.12	4.83	2540	VERA ROBINSON RD	GA HWY 4	001-8011	0012013900
APPLING	8013	CR	016800	0.00	0.15	2540	BOWEN RD SE	BUCK WILLIAMS RD	001-8013	0012016800
APPLING	8017	CR	022300	0.00	3.79	220	SURRENCY RD	MOODY CEMETERY RD	001-8017	0012022300
APPLING	8019	CR	025000	0.26	2.91	220	NEIL EUNICE RD	DEAL RD	001-8019	0012025000
APPLING	8021	CR	028100	0.00	1.30	220	COUNTY LINE RD	ENGLISH LIGHTSEY RD	001-8021	0012028100
APPLING	8025	CR	031700	0.00	4.29	220	LANES BRIDGE RD	OLD SURRENCY HWY	001-8025	0012031700
APPLING	8027	CR	032300	0.00	4.29	220	NORTH END RD	LANES BRIDGE RD	001-8027	0012032300
APPLING	8029	CR	033900	0.00	4.93	220	LANES BRIDGE RD	TEN MILE RD	001-8029	0012033900
APPLING	8031	CR	036400	0.00	1.97	220	TEN MILE RD	NEW EASON BLUFF RD	001-8031	0012036400
APPLING	8033	CR	038700	0.00	5.41	220	GA HWY 4	MOODY RD	001-8033	0012038700
APPLING	8035	CR	044400	0.00	0.84	780	SURRENCY RD	MEMORIAL RD	001-8035	0012044400
APPLING	8037	CR	051300	0.00	0.00	780	HUNTER RD	HUNTER RD	001-8037	0012051300
APPLING	8039	CR	057300	1.51	1.51	460	ALMA RD	ALMA RD	001-8039	0012057300
APPLING	8041	CR	059100	0.00	8.96	460	LANES BRIDGE RD	MOODY RD	001-8041	0012059100
APPLING	8043	CR	063800	0.00	0.69	460	ZOAR RD	CLELAND LN	001-8043	0012063800
ATKINSON	0101	SR	003100	0.34	2.68	2210	RED BLUFF CREEK TRIB	J N CORBITT RD	003-0101	0031003100
ATKINSON	0105	SR	003100	3.29	5.23	2270	JOHNSON SETTLEMENT RD	LITTLE RED BLUFF CREEK TRIB	003-0105	0031003100
ATKINSON	0107	SR	003100	7.20	7.77	4030	HOMERVILLE HWY	LITTLE RED BLUFF CREEK OF	003-0107	0031003100
ATKINSON	0109	SR	003100	8.20	9.01	6130	BOLDEN AVE	RAILROAD AVE	003-0109	0031003100

2004 ANNUAL AVERAGE DAILY TRAFFIC (AADT)

County	TC No.	RT	Route	Beg MP	End MP	AADT	Begin Intersection	End Intersection	CTY & TC	RCLINK
TIFT	0569	CR	008500	0.00	3.54	750	MAIN ST	BABE HALL RD	277-0569	2772008500
TIFT	0571	CR	014700	0.00	1.90	510	WHIDDON MILL RD	TY TY-SYCAMORE RD	277-0571	2772014700
TIFT	0575	CR	021800	0.00	0.46	2540	CARPENTER RD	MELANNA DR	277-0575	2772021800
TIFT	0577	CR	025200	0.00	1.24	3990	CENTRAL AVE	U S 41 HWY	277-0577	2772025200
TIFT	0579	CR	029200	0.00	0.80	2110	FERRY LAKE RD	SOUTH GEORGIA PKWY	277-0579	2772029200
TIFT	0581	CR	029800	0.00	0.48	1250	CARPENTER RD	COVENTRY WAY	277-0581	2772029800
TIFT	0583	CR	029800	0.73	1.72	230	HAROLD PINKY DURHAM HWY	GOLDEN RD	277-0583	2772029800
TIFT	0585	CS	060305	0.00	0.92	930	22ND ST	8TH ST	277-0585	2773060305
TIFT	0587	CS	062305	0.00	0.85	1900	LOVE AVE	FERRY LAKE RD	277-0587	2773062305
TIFT	0589	CS	070705	0.00	1.44	2020	FULWOOD RD	CARMICHAEL DR	277-0589	2773070705
TIFT	0591	CS	071005	0.00	0.87	320	22ND ST	FULWOOD RD	277-0591	2773071005
TIFT	0593	CS	073305	0.00	0.78	920	FERRY LAKE RD	12TH ST	277-0593	2773073305
TIFT	8001	CR	000100	0.00	4.09	470	OLD OCILLA RD	BRANCH RD	277-8001	2772000100
TIFT	8003	CR	001100	0.00	6.26	360	WHIDDON MILL RD	ADAMS RD	277-8003	2772001100
TIFT	8005	CR	003600	0.00	1.47	140	J R WYNN RD	CROMER RD	277-8005	2772003600
TIFT	8007	CR	005700	0.00	2.08	40	TY TY SPARKS RD	W B PARKS RD	277-8007	2772005700
TIFT	8009	CR	008100	0.00	3.29	70	ELLIS BRYAN RD	MITCHELLS STORE RD	277-8009	2772008100
TIFT	8011	CR	010500	0.00	0.40	20	HAROLD TYSON RD	MT OLIVE CH RD	277-8011	2772010500
TIFT	8013	CR	012800	0.00	0.90	80	BECKHAM RD	OMEGA TY TY RD	277-8013	2772012800
TIFT	8015	CR	018600	0.00	0.32	520	WHIDDON MILL RD	WHIDDON MILL RD	277-8015	2772018600
TIFT	8017	CR	021400	0.00	0.99	270	MOORE HWY	RAINWATER RD	277-8017	2772021400
TIFT	8019	CR	023900	0.00	0.17	200	SEVENTEENTH ST	21ST ST	277-8019	2772023900
TIFT	8021	CR	026300	0.00	0.33	160	COLLEGE ST	GOLDEN RD	277-8021	2772026300
TIFT	8023	CR	028700	0.00	0.72	90	CYPRESS ST	7TH ST	277-8023	2772028700
TIFT	8025	CR	030700	0.26	0.43	90	BOWEN MARCHANT RD	WESTOVER RD	277-8025	2772030700
TIFT	8027	CR	034300	0.00	0.47	810	GOLDEN RD	CENTRAL AVE	277-8027	2772034300
TIFT	8029	CR	039200	0.00	0.71	50	GOLDEN RD	GOLDEN RD	277-8029	2772039200
TIFT	8031	CR	040700	0.00	8.34	110	TIFT AVE	HAROLD PINKY DURHAM HWY	277-8031	2772040700
TIFT	8033	CR	051800	0.00	0.08	120	LAKEWOOD AVE	40TH ST	277-8033	2772051800
TIFT	8035	CR	057800	0.00	0.73	170	UPPER TY TY RD	MARCHANT CT	277-8035	2772057800
TIFT	8037	CR	064200	0.00	0.11	400	2ND ST	7TH ST	277-8037	2772064200
TIFT	8039	CS	060105	0.00	2.02	1680	CENTRAL AVE	2ND ST	277-8039	2773060105
TIFT	8041	CS	060805	0.00	1.32	250	OLD OCILLA RD	NO NAME	277-8041	2773060805
TIFT	8043	CS	062405	0.00	0.73	30	OLD OCILLA RD	2ND ST	277-8043	2773062405
TIFT	8045	CS	066305	0.00	0.82	330	2ND ST	14TH ST	277-8045	2773066305
TIFT	8047	CS	068305	0.00	0.49	500	EIGHT ST	KENNEDY RD	277-8047	2773068305
TIFT	8049	CS	069905	0.00	0.51	240	FULWOOD BLVD	DONALDSON ST	277-8049	2773069905
TIFT	8051	CS	072005	0.00	0.26	2940	22ND ST	18TH ST	277-8051	2773072005
TIFT	8053	CS	073805	0.00	0.08	40	MARY ANNE AVE	KENNEDY RD	277-8053	2773073805
TIFT	8055	CS	078805	0.00	0.34	220	GOFF ST	40TH ST	277-8055	2773078805
TIFT	8057	CS	084805	0.00	0.26	80	40TH ST	42ND ST	277-8057	2773084805
TOOMBS	0001	SR	000400	1.87	1.87	4700	BOB CATO CIR	BOB CATO CIR	279-0001	2791000400

2004 ANNUAL AVERAGE DAILY TRAFFIC (AADT)										
County	TC No.	RT	Route	Beg MP	End MP	AADT	Begin Intersection	End Intersection	CTY & TC	RCLINK
TOOMBS	0003	SR	000400	2.12	6.56	3770	SR 147	UNDERWOOD RD	279-0003	2791000400
TOOMBS	0005	SR	000400	7.59	11.22	4690	SR 56	WILLIAMS RD	279-0005	2791000400
TOOMBS	0007	SR	000400	11.99	15.72	3350	SR 15	GREEN OAK RD	279-0007	2791000400
TOOMBS	0009	SR	000400	15.89	17.03	4500	DORSEYL JORDAN RD	REINDEER ST	279-0009	2791000400
TOOMBS	0011	SR	000400	17.48	19.45	5370	DEE MOSLEY RD	BROAD ST	279-0011	2791000400
TOOMBS	0013	SR	000400	19.46	20.41	5330	BROAD ST	PETERSON AVE	279-0013	2791000400
TOOMBS	0015	SR	000400	20.63	22.45	3850	SKYLINE BLVD	RASMANDO RD	279-0015	2791000400
TOOMBS	0017	SR	000400	22.59	25.10	4500	FISHER BARFOOT HIGHWAY	FIVE POINT RD	279-0017	2791000400
TOOMBS	0019	SR	001500	11.99	12.85	2670	STATE ST	COOGAN WILLIAMS RD	279-0019	2791001500
TOOMBS	0021	SR	001500	14.08	18.19	3610	LYONS CENTER RD	CLYDETTE BLVD	279-0021	2791001500
TOOMBS	0023	SR	001500	18.62	19.61	4800	CENTER PL	LOFTON LN	279-0023	2791001500
TOOMBS	0025	SR	001500	19.84	20.16	4970	PINECREST DR	FOURTH ST	279-0025	2791001500
TOOMBS	0027	SR	001500	20.25	20.25	4330	THIRD ST	THIRD ST	279-0027	2791001500
TOOMBS	0029	SR	001500	20.34	20.34	4740	SECOND ST	SECOND ST	279-0029	2791001500
TOOMBS	0031	SR	001500	20.43	20.61	14710	JACKSON ST	LEADER ST	279-0031	2791001500
TOOMBS	0033	SR	001500	20.70	21.11	12940	ADAMS ST	OLD MT VERNON RD	279-0033	2791001500
TOOMBS	0035	SR	001500	21.15	21.56	7900	BRINSON RD	CHARLES ST	279-0035	2791001500
TOOMBS	0037	SR	001500	21.65	21.99	6740	HUDSON DR	SUNSET DR	279-0037	2791001500
TOOMBS	0039	SR	003000	1.81	1.90	16920	JACKSON ST	DURDEN ST	279-0039	2791003000
TOOMBS	0041	SR	003000	1.99	2.41	18590	MOSLEY ST	SMITH ST	279-0041	2791003000
TOOMBS	0043	SR	003000	2.49	4.46	19100	SLAYTON ST	PETE PHILLIPS RD	279-0043	2791003000
TOOMBS	0045	SR	003000	4.80	7.25	14440	PETE PHILLIPS RD	STATE ST	279-0045	2791003000
TOOMBS	0047	SR	003000	7.34	8.79	3700	LANIER ST	OTIS COLLINS RD	279-0047	2791003000
TOOMBS	0049	SR	003000	9.12	11.28	2690	MCLENDON RD	HILLSBORO CEMETERY RD	279-0049	2791003000
TOOMBS	0051	SR	003000	12.37	15.99	2510	CHURCH BRD	ROSE HOLLOW RD	279-0051	2791003000
TOOMBS	0053	SR	005600	0.12	5.98	1460	ERNEST WEBBER RD	JOHNSON CORNER RD	279-0053	2791005600
TOOMBS	0055	SR	005600	6.16	12.97	1990	TOT POWELL RD	CEDAR CROSSING RD	279-0055	2791005600
TOOMBS	0057	SR	005600	13.28	16.72	1880	CEDARWOOD SUB DIV RD	GEO DAVIS RD	279-0057	2791005600
TOOMBS	0059	SR	008600	0.00	7.46	480	VIDALIA RD	NEW THOMPSON FARM RD	279-0059	2791008600
TOOMBS	0061	SR	008600	8.01	10.68	380	PONDEROSA EXPRESS RD	MCLAIN CEMETERY RD	279-0061	2791008600
TOOMBS	0063	SR	008600	11.11	13.20	390	HWY 152	FINNLEYS CEMETERY RD	279-0063	2791008600
TOOMBS	0065	SR	013000	0.43	2.53	2280	BEN JACKSON RD	CEDAR CROSSING	279-0065	2791013000
TOOMBS	0067	SR	013000	2.58	3.68	4060	CEDAR CROSSING	ROCKY CREEK RD	279-0067	2791013000
TOOMBS	0071	SR	013000	3.95	4.33	5400	DARBY CIR	SEVENTH ST	279-0071	2791013000
TOOMBS	0073	SR	013000	4.42	4.60	6410	SIXTH ST	FOURTH ST	279-0073	2791013000
TOOMBS	0075	SR	013000	4.69	4.78	6700	THIRD ST	SECOND ST	279-0075	2791013000
TOOMBS	0077	CS	087711	0.00	0.21	6410	CHURCH ST	FISHER BARFOOT HIGHWAY	279-0077	2793087711
TOOMBS	0079	SR	013000	5.26	5.55	8190	PINE ST	PEACHTREE ST	279-0079	2791013000
TOOMBS	0081	SR	013000	5.63	5.82	12840	NORTH ST	ROOSEVELT ST	279-0081	2791013000
TOOMBS	0083	SR	013000	5.91	7.32	3590	NORTH ST	GREEN ACRES DR	279-0083	2791013000
TOOMBS	0085	SR	013000	7.79	8.70	2330	C V MOSLEY RD	DAVIS RD	279-0085	2791013000
TOOMBS	0087	SR	013000	9.40	11.05	1750	OLD NORMANTOWN RD	STATE ST	279-0087	2791013000

2004 ANNUAL AVERAGE DAILY TRAFFIC (AADT)										
County	TC No.	RT	Route	Beg MP	End MP	AADT	Begin Intersection	End Intersection	CTY & TC	RCLINK
TOOMBS	0089	CR	036400	0.79	3.10	440	G SHARPE RD	ROCK SPGS RD	279-0089	2792036400
TOOMBS	0091	CR	036400	3.77	8.55	900	CEDAR CROSSING	BUD JORDAN RD	279-0091	2792036400
TOOMBS	0093	CR	036400	8.92	10.43	1290	OLD RIVER RD	STATE ST	279-0093	2792036400
TOOMBS	0095	SR	014700	0.00	4.84	900	STATE ST	LAURA DIXON RD	279-0095	2791014700
TOOMBS	0097	SR	014700	5.98	8.55	790	HORACE SANDERS RD	SID NEWTON RD	279-0097	2791014700
TOOMBS	0099	SR	014700	9.36	9.36	1550	L P GRINER	L P GRINER	279-0099	2791014700
TOOMBS	0101	SR	017800	9.07	13.35	980	SR 56	ROBERT CLARK RD	279-0101	2791017800
TOOMBS	0103	SR	017800	3.13	8.76	1300	JOHNSON CORNER RD	DOUGLAS GAY RD	279-0103	2791017800
TOOMBS	0105	SR	017800	0.00	2.95	2900	STATE ST	JOE PAGE RD	279-0105	2791017800
TOOMBS	0107	SR	015200	0.54	1.95	3100	MANASSAS RD	SWIFT CREEK	279-0107	2791015200
TOOMBS	0109	SR	015200	2.07	2.07	2600	JOHN WILKES RD	JOHN WILKES RD	279-0109	2791015200
TOOMBS	0111	SR	015200	3.13	6.47	2600	RASMANDO RD	JAMES MCLAIN RD	279-0111	2791015200
TOOMBS	0113	SR	015200	7.02	8.26	2150	SR 86	OHOOPEE R	279-0113	2791015200
TOOMBS	0115	SR	029200	0.08	0.84	5250	WYNN DR	OXLEY BLVD	279-0115	2791029200
TOOMBS	0117	SR	029200	0.91	1.20	7030	DONOVAN ST	LOWERY PL	279-0117	2791029200
TOOMBS	0119	SR	029200	1.51	1.95	9600	ORANGE ST	THOMPSON ST	279-0119	2791029200
TOOMBS	0121	SR	029200	2.32	2.57	12670	FISHER BARFOOT HIGHWAY	SYMONDS ST	279-0121	2791029200
TOOMBS	0123	SR	029200	2.65	3.91	7360	WASHINGTON ST	PAGE LN	279-0123	2791029200
TOOMBS	0125	SR	029200	5.12	7.48	8220	CECIL ANDERSON RD	WASHINGTON ST	279-0125	2791029200
TOOMBS	0127	SR	015200	0.00	0.52	8920	STATE ST	10TH ST	279-0127	2791015200
TOOMBS	0129	SR	029200	8.11	9.27	4210	MANASSAS RD	INDUSTRIAL DR	279-0129	2791029200
TOOMBS	0131	SR	029200	9.53	11.63	2980	WINGE RD	PONDEROSA RD	279-0131	2791029200
TOOMBS	0133	SR	029200	11.76	13.28	1900	OLD DONALD ANDERSON RD	ADAMS HAMMOCK RD	279-0133	2791029200
TOOMBS	0135	SR	029200	13.81	13.81	1880	SR 86	SR 86	279-0135	2791029200
TOOMBS	0137	SR	029700	0.00	0.60	7340	NORTH ST	BRANTLEY RD	279-0137	2791029700
TOOMBS	0139	SR	029700	0.62	1.80	5560	ATLANTIC AVE	CADILLAC DR	279-0139	2791029700
TOOMBS	0141	SR	029700	1.86	3.74	3390	LAKE DR	BLACKSTON RD	279-0141	2791029700
TOOMBS	0143	SR	029700	5.51	9.01	2070	MOSLEY RD	WICKSTROM RD	279-0143	2791029700
TOOMBS	0145	CR	033600	0.31	6.35	700	MCNATT FALL RD	NO NAME	279-0145	2792033600
TOOMBS	0147	CR	033200	0.00	6.04	490	SR 147	SR 56	279-0147	2792033200
TOOMBS	0149	CR	033300	0.00	6.07	820	SR 56	VICTORY DR	279-0149	2792033300
TOOMBS	0151	CR	007800	0.00	3.36	880	NO NAME	GEORGE MORRIS RD	279-0151	2792007800
TOOMBS	0153	CR	007800	3.41	3.94	620	S THOMPSON RD	GEORGE MORRIS CUTOFF RD	279-0153	2792007800
TOOMBS	0155	CR	007800	6.16	11.60	790	LYONS CENTER RD	NO NAME	279-0155	2792007800
TOOMBS	0157	CR	021000	0.00	0.95	1320	STATE ST	BILL BRANCH CIR	279-0157	2792021000
TOOMBS	0159	CR	033700	0.13	1.70	1660	GALBREATH CIR	GEORGE MORRIS RD	279-0159	2792033700
TOOMBS	0161	CR	033700	2.55	3.52	2060	CEDAR CROSSING	TOM MCDONALD RD	279-0161	2792033700
TOOMBS	0163	CR	033700	4.49	9.30	1590	SR 15	P D ONEAL RD	279-0163	2792033700
TOOMBS	0165	CR	033700	9.48	11.28	3330	DEE MOSLEY RD	LIBERTY ST	279-0165	2792033700
TOOMBS	0167	CR	033400	0.00	2.24	710	FISHER BARFOOT HIGHWAY	BROAD ST	279-0167	2792033400
TOOMBS	0169	CR	033500	1.90	2.40	2150	RALPH THOMPSON RD	TAYLOR SPGS RD	279-0169	2792033500
TOOMBS	0171	CS	068911	0.00	0.75	1910	CHURCH ST EXT	2ND ST	279-0171	2793068911

2004 ANNUAL AVERAGE DAILY TRAFFIC (AADT)

County	TC No.	RT	Route	Beg MP	End MP	AADT	Begin Intersection	End Intersection	CTY & TC	RCLINK
TOOMBS	0175	CS	068911	0.84	0.84	3770	1ST ST	1ST ST	279-0175	2793068911
TOOMBS	0177	SR	013000	4.87	4.99	4950	FIRST ST	MAIN ST	279-0177	2791013000
TOOMBS	0183	SR	104200	0.37	0.37	1140	THOMPSON ST	THOMPSON ST	279-0183	2791104200
TOOMBS	0185	SR	104200	0.47	0.56	4650	MCINTOSH ST	JACKSON ST	279-0185	2791104200
TOOMBS	0187	SR	104200	0.66	1.16	4370	DURDEN ST	TRUMAN ST	279-0187	2791104200
TOOMBS	0191	SR	013000	5.17	5.18	2850	THOMPSON ST	THOMPSON ST	279-0191	2791013000
TOOMBS	0193	SR	013000	5.08	5.08	3090	ORANGE ST	ORANGE ST	279-0193	2791013000
TOOMBS	0195	CR	033500	0.00	0.43	2750	FISHER BARFOOT HIGHWAY	PEACHTREE ST	279-0195	2792033500
TOOMBS	0197	CR	033500	0.52	0.78	4610	NORTH ST	PALMER ST	279-0197	2792033500
TOOMBS	0199	CR	033500	0.85	1.08	2410	CLYDE MOSLEY RD	BLUEBERRY CIR	279-0199	2792033500
TOOMBS	0201	CS	061711	0.00	0.10	2650	CURRIE ST	FIRST ST	279-0201	2793061711
TOOMBS	0203	CS	061711	0.12	0.82	2540	PINE ST	PEACOCK ST	279-0203	2793061711
TOOMBS	0207	CS	071511	0.00	1.01	550	MCINTOSH ST	SWIFT CREEK RD	279-0207	2793071511
TOOMBS	0213	CS	063711	0.00	0.09	940	1ST ST	MAIN ST	279-0213	2793063711
TOOMBS	0215	CS	063711	0.10	0.67	660	MAIN ST	TOOMBS ST	279-0215	2793063711
TOOMBS	0217	CR	024800	0.00	3.76	2380	HARDEN CHAPEL RD	PERRYMAN DR	279-0217	2792024800
TOOMBS	0219	CR	024800	3.85	4.04	2100	THIRD ST	1ST ST	279-0219	2792024800
TOOMBS	0220	CS	067311	0.00	0.21	2970	PEACHTREE ST	RHOUNDS DR	279-0220	2793067311
TOOMBS	0221	CS	067311	0.29	0.39	2730	3RD ST	PERRYMAN DR	279-0221	2793067311
TOOMBS	0223	CS	067311	0.48	0.48	1220	5TH ST	5TH ST	279-0223	2793067311
TOOMBS	0225	CS	067411	0.87	1.67	600	SLAYTON ST	SLAYTON ST	279-0225	2793067411
TOOMBS	0227	CS	067411	0.36	0.80	1210	MOSLEY ST	SMITH ST	279-0227	2793067411
TOOMBS	0231	CS	067411	0.08	0.27	330	CHURCH ST	DURDEN ST	279-0231	2793067411
TOOMBS	0269	SR	029800	0.60	0.60	220	MCINTOSH ST	MCINTOSH ST	279-0269	2791029800
TOOMBS	0271	CR	022500	0.00	4.52	290	FISHER BARFOOT HIGHWAY	BLACKSTON RD	279-0271	2792022500
TOOMBS	0273	CS	062211	0.00	0.61	790	MORRIS ST	GRAND ST	279-0273	2793062211
TOOMBS	0275	CS	066011	0.00	1.17	210	1ST ST	BAY ST	279-0275	2793066011
TOOMBS	0277	CS	066111	0.00	2.05	1920	KENWORTH ST	MAPLE DR	279-0277	2793066111
TOOMBS	0279	CS	068811	0.00	0.69	1180	JACKS ST	JACKS ST	279-0279	2793068811
TOOMBS	0281	CS	070311	0.00	0.68	570	PINECREST DR	1ST ST	279-0281	2793070311
TOOMBS	0283	CS	070911	0.00	0.45	2700	1ST ST	6TH AVE	279-0283	2793070911
TOOMBS	0285	CS	073611	0.00	0.47	1130	MAPLE DR	MCNATT ST	279-0285	2793073611
TOOMBS	0287	CS	073911	0.00	1.32	1590	AIMWELL RD	LAUREL DR	279-0287	2793073911
TOOMBS	0289	CS	075311	0.00	0.46	240	CHURCH ST EXT	FOREST HILL CIR	279-0289	2793075311
TOOMBS	0291	CS	076511	0.00	1.24	2080	1ST ST	NO NAME	279-0291	2793076511
TOOMBS	0293	CS	082411	0.00	1.49	1640	LIBERTY ST	CLYDE BLVD	279-0293	2793082411
TOOMBS	8001	CR	000500	0.00	3.57	4370	SR 147	ALBERT DARLEY RD	279-8001	2792000500
TOOMBS	8003	CR	001100	0.00	2.32	4370	PERRY SANDERS CIR	SR 147	279-8003	2792001100
TOOMBS	8007	CR	006500	0.00	2.71	4370	CURRIE RD	TURNER BRIDGE RD	279-8007	2792006500
TOOMBS	8009	CR	009500	0.00	3.04	790	CEDAR CROSSING	PETROSS RD	279-8009	2792009500
TOOMBS	8011	CR	012100	0.00	3.26	790	HARDEN CHAPEL RD	STATE ST	279-8011	2792012100
TOOMBS	8013	CR	014900	0.00	2.27	790	GLENN JAMES RD	VICTORY DR	279-8013	2792014900

2004 ANNUAL AVERAGE DAILY TRAFFIC (AADT)										
County	TC No.	RT	Route	Beg MP	End MP	AADT	Begin Intersection	End Intersection	CTY & TC	RCLINK
TOOMBS	8015	CR	017800	0.00	4.80	790	SR 86	SR 86	279-8015	2792017800
TOOMBS	8017	CR	021800	0.00	2.43	1320	SR 130	LOUIS STARR RD	279-8017	2792021800
TOOMBS	8019	CR	022400	0.00	8.07	1320	BROAD ST	PENDLETON CREEK CH RD	279-8019	2792022400
TOOMBS	8023	CR	033800	0.38	0.38	3330	PETE PHILLIPS DR	PETE PHILLIPS DR	279-8023	2792033800
TOOMBS	8025	CR	041200	0.00	0.00	1290	CEDAR CROSSING TO VIDALIA RD	CEDAR CROSSING TO VIDALIA RD	279-8025	2792041200
TOOMBS	8027	CS	053403	0.00	0.60	1290	LIBERTY ST	LEXINGTON ST	279-8027	2793053403
TOOMBS	8029	CS	061511	0.00	0.65	1290	FIRST ST	ROOSEVELT ST	279-8029	2793061511
TOOMBS	8031	CS	062711	0.00	0.00	790	MCINTOSH ST	MCINTOSH ST	279-8031	2793062711
TOOMBS	8033	CS	065411	0.00	0.32	660	SUNSET DR	1ST ST	279-8033	2793065411
TOOMBS	8035	CS	067011	0.00	0.61	1920	9TH ST	2ND ST	279-8035	2793067011
TOOMBS	8037	CS	068111	0.00	0.38	600	LIBERTY ST	LIBERTY ST	279-8037	2793068111
TOOMBS	8039	CS	070011	0.00	0.36	3770	5TH ST	1ST ST	279-8039	2793070011
TOOMBS	8041	CS	072511	0.00	0.39	550	LIBERTY ST	LIBERTY ST	279-8041	2793072511
TOOMBS	8043	CS	074211	0.00	0.07	1590	S MAPLE DR	N MAPLE DR	279-8043	2793074211
TOOMBS	8045	CS	076411	0.25	1.02	240	HILDA ST	1ST ST	279-8045	2793076411
TOOMBS	8047	CS	079611	0.00	1.30	2080	6TH AVE	6TH AVE	279-8047	2793079611
TOOMBS	8049	CS	081911	0.00	0.58	2080	TESTON LN	MAPLE DR	279-8049	2793081911
TOOMBS	8051	CS	085811	0.00	0.34	1640	FIRST ST	HOUSTON DR	279-8051	2793085811
TOOMBS	8053	CS	088911	0.09	0.27	6410	3RD ST	1ST ST	279-8053	2793088911
TOWNS	0101	SR	051500	0.18	1.58	10520	TOWNSEND MILL RD	DUCKWORTH DR	281-0101	2811051500
TOWNS	0105	SR	051500	1.72	5.06	9720	MURPHY ST	FERMAN GRIBBLE RD	281-0105	2811051500
TOWNS	0109	SR	000200	5.11	9.05	13200	HAYESVILLE RD	OAK RIDGE DR	281-0109	2811000200
TOWNS	0114	SR	000200	9.33	9.78	16510	BELLER RD	WOOD ST	281-0114	2811000200
TOWNS	0116	SR	000200	9.83	10.83	10640	BELL ST	AZALIA DR	281-0116	2811000200
TOWNS	0118	SR	000200	10.93	12.18	9530	ROLLING ACROSS RD	HIAWASSEE RIVER	281-0118	2811000200
TOWNS	0121	SR	000200	12.34	12.34	6370	SUNNY SIDE RD	SUNNY SIDE RD	281-0121	2811000200
TOWNS	0123	SR	000200	12.58	14.59	3920	CLEVELAND HWY	SHALLOWS CREEK RD	281-0123	2811000200
TOWNS	0125	SR	000200	14.96	17.66	3160	CAR MILES RD	STAR LN	281-0125	2811000200
TOWNS	0127	SR	000200	17.77	20.36	1610	UPPER HIGHTOWER RD	POSTED	281-0127	2811000200
TOWNS	0129	SR	001700	2.01	2.49	2640	HIGHSHOALS RD	SOAPSTONE	281-0129	2811001700
TOWNS	0132	SR	001700	2.51	5.09	3220	SR 018000	MILL CREEK	281-0132	2811001700
TOWNS	0134	SR	001700	5.27	8.47	4500	OWL CREEK RD	CLARK DR	281-0134	2811001700
TOWNS	0136	SR	051500	5.12	6.26	8460	HAYESVILLE RD	POSTED	281-0136	2811051500
TOWNS	0138	SR	018000	0.01	5.29	520	TO SR180SP	CLEVELAND HWY	281-0138	2811018000
TOWNS	0143	SR	006600	0.00	0.57	2690	MAIN ST	BRASSTOWN CREEK	281-0143	2811006600
TOWNS	0147	SR	006600	0.75	4.62	1730	BYERS CREEK RD	GILES RD	281-0147	2811006600
TOWNS	0152	SR	007500	12.05	12.73	5600	BELLER RD	OMEGA WAY	281-0152	2811007500
TOWNS	0154	SR	007500	12.96	13.99	5900	MEADOW VIEW RD	UPPER BELL CREEK RD	281-0154	2811007500
TOWNS	0158	SR	007500	14.03	15.57	3240	BELL CREEK	STATE LINE RD	281-0158	2811007500
TOWNS	0161	SR	028800	5.52	5.76	1150	FODDER CREEK RD	HIAWASSEE YOUNG HARRIS RD	281-0161	2811028800
TOWNS	0163	SR	028800	0.00	5.33	920	HIAWASSEE CLAYTON HWY	FODDER CREEK	281-0163	2811028800
TOWNS	0167	SR	033900	0.00	3.55	1390	MURPHY ST	ZELL MILLER MTN PKWY	281-0167	2811033900

JSU 2003

ACT/ACF Tri-State Water Basin Compacts

A Project Supported by Jacksonville State University's Environmental Policy & Information Center

Alabama River at the confluence of the Coosa and Tallapoosa Rivers

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ACT/ACF Main Page
Anniston Star Editorial
Commission News
History of Meetings
ADECA ACF Link
ADECA ACT Link

Recent Developments

JSU's Conroy Receives Army Award for Patriotic Civilian Service

Sept. 9, 2004

Orange Beach, AL - In a presentation during the September 9th Alabama Water Resources Conference in Jacksonville State University EPIC Director, Pete Conroy was awarded for "Patriotic Civilian Service."

The recognition was in association with Conroy's work as US Alternate Federal Commissioner for Alabama-Coosa-Tallapoosa (ACT) River Basin Compact and Apalachicola-Chattahoochee-Flint (ACF) River Basin Compact.

Conroy's service was from 1999 to 2002. In August of 2003, the ACF compact collapsed and more recently in August of 2004 the ACT compact also collapsed.

"The failure of these compacts will go down in history as being golden opportunities now lost," said Conroy. "Especially in consideration of all the legal work that lies ahead, I appreciate the Army taking time to recognize those of us who tried to move the process forward," he said.

Presented by US Army Corps of Engineers Branch Chief Roger Burke and signed by US Army Commanding Brigadier General, Peter T. Madsen, the certificate states:

JACKSONVILLE STATE UNIVERSITY'S
EPIC
ENVIRONMENTAL POLICY & INFORMATION CENTER

Tallapoosa River south of Lake Martin
(Elmore County, Alabama)

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PERC POLICY SERIES
ISSUE NUMBER PS-30
FEBRUARY 2004

"Growing demands . . . will put pressure on limited water resources. But those pressures need not create water crises if individuals are allowed to respond through market processes."

— Terry L. Anderson and Pamela Snyder
Water Markets (1997b, 204)

Averting Water Disputes: A Southeastern Case Study

JODY W. LIPFORD

INTRODUCTION

At midnight on August 31, 2003, time ran out on a proposed agreement among the states of Alabama, Florida, and Georgia to allocate water in the Apalachicola-Chattahoochee-Flint (ACF) river basin. The deal had been thirteen years in the making, but it ended in failure. "It's a true shame that we were as close as we were and couldn't get an agreement," said Alabama's chief negotiator (Shelton 2003b, G1).

It was, indeed, a shame. The collapse of these lengthy negotiations sends the matter to the courts, and the Supreme Court may ultimately decide how the disputed water will be divided.

More broadly, the failure of the state governments to reach agreement reveals that water, long considered plentiful in the southeastern United States, is in danger of becoming a subject of intractable conflict. The failure signals that a water crisis may well emerge in the region unless new approaches to allocating water are adopted.

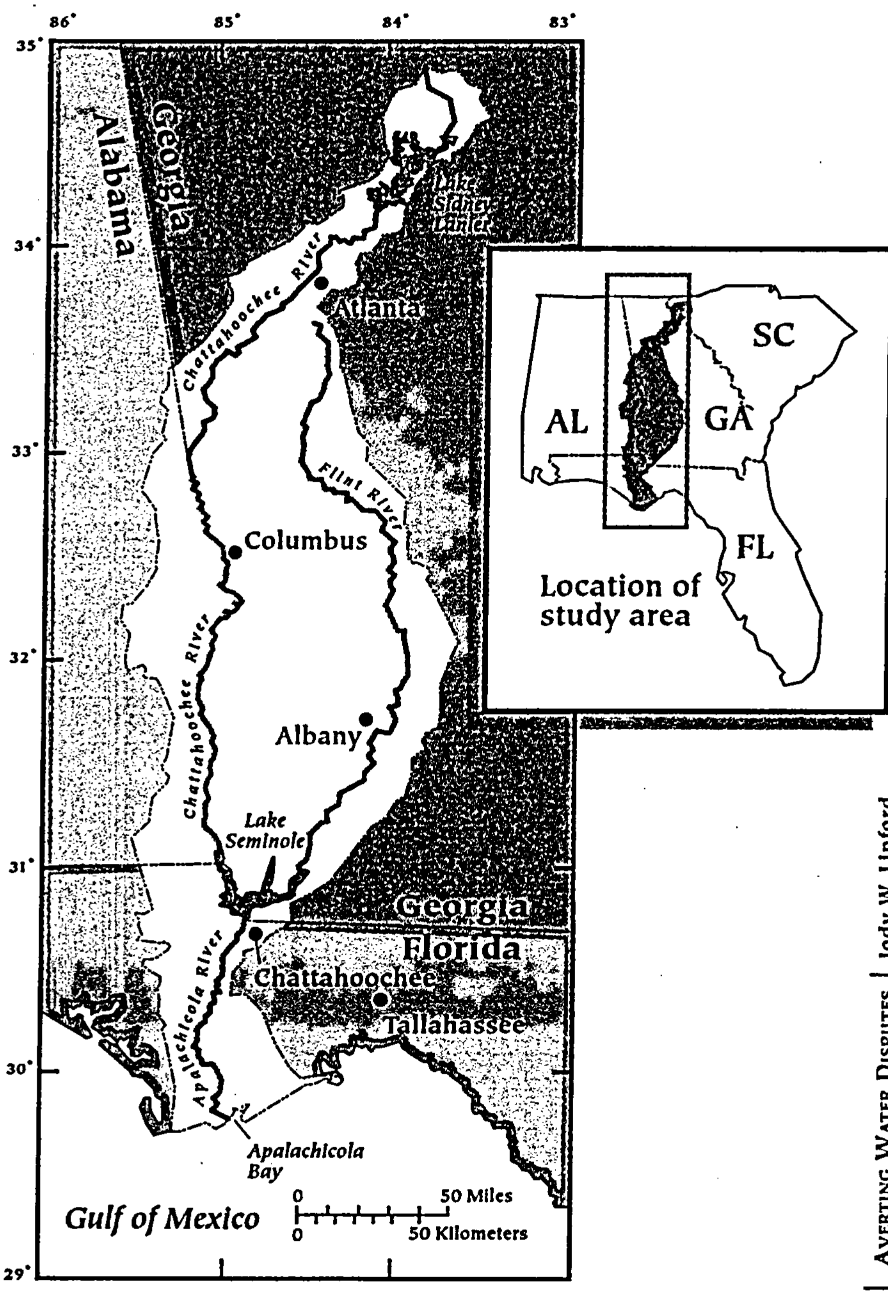
As the population of the Southeast increases, competing demands for water—for municipal use, for recreation, and for hydropower, to name just a few—are growing. Today the problem surfaces in the form of occasional interstate disputes such as this one, but the failure to resolve them casts an ever-longer shadow over the future of water resources in the region. When demands of competing users outstrip supply, there must be ways to ensure that water goes to the users who value it most and that the waterways of the Southeast are not roiled by unending conflict.

This essay will explain the reasons behind the conflict in the Apalachicola-Chattahoochee-Flint river basin, why attempts at resolving it failed, and what alternatives should be considered. It will explain how to allocate water to its most productive uses, restore peace to the areas around these waterways, and avert other conflicts that are emerging, not only in these states but elsewhere in the South.

The Background

As shown on the map in figure 1, the ACF basin drains an area of 19,800 square miles in the states of Georgia, Alabama, and Florida. The basin starts in the headwaters of the Chattahoochee River in northern Georgia, above Atlanta. The Chattahoochee flows through Georgia's Piedmont before turning sharply south, forming the southern half of Georgia's border with Alabama and a notch in Georgia's border with Florida. At the border, it meets the Flint River to form the Apalachicola River, which

Figure 1
Apalachicola-Chattahoochee-Flint (ACF) River Basin



flows through the Florida panhandle into the Gulf of Mexico (U.S. Geological Survey 2000).

Historically in the ACF basin, as in most of the southeastern United States, water has been abundant and has met the many demands for it. The demands include water for domestic, commercial, industrial, hydroelectric, navigational, and recreational uses.

Under riparian water rights—the system of water rights in the eastern part of the United States—landowners can use water that flows adjacent to their property as long as they do not appreciably diminish the quantity or quality of water available to downstream users. But riparian rights were effectively overridden in 1946, when Congress authorized the U.S. Army Corps of Engineers to construct dams for flood control, navigation, and hydroelectricity along the Chattahoochee River.[1] Later, the Corps added water supply and recreation as purposes of the dams and the reservoirs they created (Carriker 2000, 2; Shelton 2003a). These projects transformed the waters of the basin from private property governed by the riparian doctrine to public property.

Today, the waters of the ACF river basin continue to be owned and managed by the federal government through the Army Corps of Engineers. The Corps' managers meet weekly to consider various water needs, such as hydroelectric production, recreation, navigation, and environmental quality (U.S. Army Corps of Engineers 2001). In addition, all requests to increase water withdrawals must be approved by the Corps (Beaverstock 1998, 993).

With the exception of flood control, each of these purposes requires a minimal lake level or river flow rate. Electricity cannot be produced, nor can barges navigate, without sufficient water. Similarly, fish populations require stable lake levels during spawning season. Sufficient flow also dilutes pollution, helping to ensure water quality (U.S. Army Corps of Engineers 2001). The Corps also commonly provides recreational facilities, such as parking areas, boat ramps, and public restrooms. Response to the recreational amenities of the lakes has been heavy, with millions of user-days tallied each year (Jeane 2002, 158). The basin also supplies water for public use. All these competing demands limit the amount of withdrawals that can be made.

Conflicts over Increasingly Scarce Water

For a long time the system of riparian doctrine and public management through the Army Corps of Engineers worked well. In the 1980s and 1990s, however, rapid population growth, particularly in metropolitan Atlanta, combined with recurrent drought led to increased pressure on the ACF river basin's resources.

Atlanta's population grew from 2.2 million in 1980 to 3.0 million in 1990, and then to 4.1 million in 2000. Of 126 metropolitan statistical areas listed by the Census Bureau, only 17 had higher population growth rates from 1980 to 1990, and only eight had higher population growth rates from 1990 to 2000.[2]

Demand for water to satisfy this growing population increased dramatically. Metropolitan Atlanta's water use increased from 289 million gallons per day in 1980 to 459 million gallons per day in 1990, and then to 606 million gallons per day in 2000.[3] Metro Atlanta relies almost exclusively on surface water, over 70 percent of which comes from the Chattahoochee River and Lake Sidney Lanier, the lake formed north of Atlanta by the dam at the headwaters of the Chattahoochee.

Yet the Chattahoochee River and Lake Lanier are ill suited to supplying Atlanta's water needs. The Chattahoochee is the smallest watershed in the country to supply a metropolitan area with the majority of its water (Metro Atlanta Chamber of Commerce and the Regional Business Coalition 2003). The largest share of Atlanta's water use—53.8 percent—is for residential use, while commercial, government, and industrial users take 22.8 percent, 5.6 percent, and 4.2 percent, respectively.[4]

A preliminary study by the Army Corps of Engineers indicates that Atlanta is already approaching, and at times exceeding, water use levels that were not expected until 2030. Whether these findings are accurate or not—the Georgia Environmental Protection Division says the Chattahoochee River and Lake Lanier are sufficient to supply Atlanta through 2030—there is no doubt that future demands on the Chattahoochee River and Lake Lanier will be heavy and growing (Seabrook 2002).

Drought has worsened this pressure on the river basin's waters. During the 1980s and 1990s, the Southeast experienced recurrent and severe droughts. In the most severe drought, rainfall in Atlanta fell by as much as 25 percent, and annual average streamflows along the Apalachicola River fell to less than half their historical norms.[5]

The Crisis Begins

In 1989, recognizing that Atlanta's "finite supply of clean water is looming as a barrier to growth" (Walker 2001, 68), Atlanta and the Army Corps of Engineers proposed to approximately double the water Atlanta drew from Lake Lanier, bringing it to 529 million gallons per day. Without sufficient water, Georgia officials feared the loss of 680,000 jobs and $127 billion in wages through 2010 (*Economist* 1991, 26).

The proposal by Georgia and the Army Corps alarmed the citizens of Alabama. Increased withdrawals from Lake Lanier would reduce flows along the segment of the Chattahoochee River that forms the southern half of Alabama's border with Georgia and would stunt economic development there. So, in 1990 Alabama sued the Army Corps to keep it from allocating more of the ACF river basin's waters to Atlanta.

The state of Florida quickly joined the lawsuit on the side of Alabama, fearing that reduced water flows would harm the oyster-rich Apalachicola Bay farther downstream. The state of Georgia then joined the lawsuit on the side of the Army Corps of Engineers to defend its withdrawal. The stage was set for thirteen years of studies, proposals, counterproposals, and extended deadlines.

These actions reflected unique concerns in each state. Alabama officials worried that Atlanta's withdrawals would stifle Alabama's economic development by limiting water needed for domestic, industrial, and commercial use. Water quality would also suffer, because reduced downstream flows would mean less dilution of polluted upstream water. Atlanta not only uses a large amount of water, but also discharges heavily polluted water back into the Chattahoochee (Beaverstock 1998, 996; Walker 2001, 68–69).[6] If dirtier water came from Atlanta, Alabama might have to raise water cleanup standards for industrial and municipal users, which would be costly and would put Alabama at a competitive disadvantage in attracting economic development (Hull 2000, 3).

From Florida's perspective, the problem was oyster beds. Reduced flows, especially at critical times, and heavier pollution could threaten the Apalachicola Bay's oyster industry, which supplies approximately 10 percent of the country's oysters and employs over 1,000 people. The river is also a commercial source of shrimp, blue crab, and finfish, as well as the home of an important sport fishery and the only commercial source of Tupelo honey. It has been recognized as an Outstanding Florida Water (American Rivers 2002, 34; Apalachicola Bay Chamber of Commerce 2003).

Other factors exacerbated the conflict. For example, recreational users want lakes kept full or nearly full; however, the competing objectives of hydropower and flood control require lakes to be drawn down, typically during summer and winter. Similarly, navigation requires minimal flows that reduce the water in lakes when river levels become too low for barge traffic. Finally, ecosystem preservation requires a pattern of flows that mimics nature's seasonal cycle and may conflict with other demands (Carriker 2000, 2; Hull 2000, 3).

Despite years of negotiation, the states never reached agreement on how to allocate the basin's waters. Because these negotiations failed, the matter will now likely be settled by the Supreme Court.

Constitutional Paths to Solution

Once Alabama took the Corps to court in 1989, the states had several constitutional options to choose from to settle the conflict over water allocation. They could go to Congress for a decision; their suits could reach the Supreme Court; or they could negotiate their own agreement or compact. Neither Congress nor the Supreme Court likes to get involved in interstate water disputes. Moreover, suits reaching the Supreme Court are costly, usually require lengthy negotiations, and yield uncertain outcomes.

For these reasons, the states opted for an interstate water compact. Alabama agreed to deactivate its lawsuit during the negotiation period; the Army Corps of Engineers agreed not to allocate additional water from Lake Lanier to Atlanta; and all parties agreed to a comprehensive study of the water resources in the basin (Carriker 2000, 3–4).[7] In early 1997, all three state legislatures ratified legislation authorizing the negotiation of an ACF River Basin Compact to allocate the basin's waters. These acts were subsequently signed by the three state governors. The U.S. Constitution requires congressional approval of interstate compacts, so in November 1997 Congress approved and President Clinton signed federal authorizing legislation. The goal of the compact was to assign property rights to water in such a way as to be fair and avoid future conflicts. This goal proved elusive, however.

The Failure of the Compact

The federal legislation set an initial deadline for compact negotiations of December 31, 1998, unless the states agreed unanimously to extend that deadline.[8] This deadline proved much too optimistic, as each state presented proposals reflecting its parochial interests. To begin with, Alabama and Florida wanted consumptive uses of water defined and limited.[9] Georgia resisted this approach in favor of one that focused on reservoir levels. Specifically, Georgia wanted the ACF river basin's reservoirs to be kept full or nearly full (Moore 1999, 8), so that Georgia would have enough water to supply Atlanta (Carriker 2000, 14). In return, Georgia offered Alabama and Florida minimum flow guarantees. But Alabama and Florida rejected Georgia's proposal, fearing that the minimum flows might become the norm, in essence reducing the water flowing downstream.

To ensure adequate flows along its border, Alabama argued that the ACF river basin's water should be allocated to meet the original objectives of dam construction. These included navigation (i.e., barge traffic), flood prevention, and hydroelectric production—but not water supply to municipalities or recreation (Carriker 2000, 2; Moore 1999, 9). Florida agreed with Alabama in opposing minimum flows, but also wanted downstream flows to be adjusted to mimic natural flow cycles. Additional problems plagued the negotiations, from definitional questions (e.g., how to define "severe drought") to the choice of the computer model for forecasting river flows and lake levels (Moore 1999, 9–10).

With no agreement forthcoming, the states agreed to extend the deadline till January 1, 2000. Yet the passage of another year did not appreciably advance the negotiations. Once again the states set a one-year deadline, establishing a pattern of deadline extensions that continued until July 22, 2003. At that point, progress seemed to have been made. The three governors signed a Memorandum of Understanding that set a blueprint for water allocation in the ACF river basin. The memorandum authorized water supply for Atlanta from Lake Lanier at 705 million gallons per day and left open the possibility of greater future withdrawals. The memo also established minimum flow requirements downstream from Atlanta, the most important of which was a flow of 5000 cubic feet per second on the Apalachicola River at Chattahoochee, Florida. The deadline for final agreement on the memorandum was August 31, 2003 (Alabama, Florida, and Georgia 2003).

Although Florida governor Jeb Bush signed the memorandum, he and other Florida officials had reservations, which they expressed in an accompanying statement (Struhs 2003). They insisted that minimum flows must not become targets, that Lake Lanier must be managed to deal effectively with drought, and that the governing ACF Commission must have authority to approve any withdrawals from Lake Lanier that exceeded the amount specified in the memorandum.[10]

Ultimately, the states could not reach agreement. Florida feared that minimum flows, which had been less than 5,000 cubic feet per second only twice during the recent droughts (on a mean monthly basis), might become the norm. Thus, Florida officials again raised the issue of Georgia's withdrawals from Lake Lanier. Georgia officials responded by agreeing either to limit Atlanta's withdrawals or to promise minimum flows through the basin, but not both, and accused Florida of trying to micro-manage its waters (Ritchie 2003a, 2003b). As a result, Florida officials refused to accept the Memorandum of Understanding, and the deal collapsed. The states have now reactivated their original lawsuits (Shelton 2003a, C3; 2003b, G1; Ritchie 2003b, A1).[11]

The Allocation of Water

Economists recognize the scarcity of valuable resources. Without prices on these resources, there is not enough to satisfy all who want to use them. In most settings, however, market prices allocate resources, allowing them to move to those users who value them the most. This market process allocates resources to their most productive uses and maximizes society's wealth. In the case of the ACF river basin water, however, market prices do not currently allocate water; it is allocated politically.

Economists also recognize that resources have multiple uses. Water, for example, may be used to generate electricity, aid oyster production, provide wildlife habitat, produce industrial products, provide channel depth for barges, provide recreational opportunities for boaters, skiers, and fishers, or supply households with water for drinking, watering lawns, or filling swimming pools. In the ACF basin, some water is used in each of these ways.

Whether allocation occurs through market prices or other methods, it is rarely all-or-nothing. In the Southeast (and the United States generally), there is ample water to supply basic human needs, such as drinking water. Where conflicts occur, as in the ACF basin, it is over shifting some water, not all water, from one use to another. Simply put, the ACF basin issue is whether more water should be allocated to Atlanta, presenting Alabama and Florida with the prospect of less water but not complete deprivation.

Although compacts have some advantages over congressional or judicial apportionment, they are poorly suited to allocate water in ways that maximize water's productive value to society. Compacts are highly political and confront intractable information problems, and such was the case with the negotiations over the ACF basin's waters.

Interest Groups

Groups with a vested interest in the outcome of the compact influenced the ACF river basin negotiations. Each tried to get more water allocated in its favor, irrespective of water's most productive uses. The influence of these groups introduced conflict, making a workable agreement difficult to achieve. Industrial, environmental, municipal, and political interests all made their voices heard (Moore 1999, 8). The *Atlanta Journal-Constitution* identified political and business leaders of metropolitan Atlanta, environmentalists, and Florida's shellfish and fishing industries as uncompromising interest groups who refused to yield to the demands of other users (Shelton 2003b, G1).

The Apalachicola Bay's oyster industry serves as an example of a small, well-organized interest group with strong influence, since its employment of approximately 1000 people is minimal in a state with total employment of approximately 7.2 million.[12] It should be noted, however, that the industry had support throughout the state of Florida from citizens who wanted the environmental amenities of their state's river to be preserved.

After the agreement failed, some interests, such as the Atlanta Regional Commission and homeowners and businesses on Lakes Lanier and West Point, seemed just as happy. They feared Georgia had compromised too much already.

Information Problems

Even if negotiators could be insulated from interest group influence, they would still face important informational questions. If their goal is to allocate the water to its most productive uses, negotiators must first know how much total water can be allocated and how that will vary over years of normal rainfall and drought. Perhaps most important, they need to determine whether society will benefit more from allocating water to Atlanta's developers, say, or to Florida's oyster producers. And, if they can decide objectively to allocate more water to Florida's oyster producers, they would still have to decide whether the extra water should come from Lake Lanier (thereby maintaining levels at downstream reservoirs) or from downstream reservoirs (thereby maintaining levels at Lake Lanier).

By making these decisions, policy makers are implicitly choosing who will benefit and who will be harmed. A decision to allocate more water to Atlanta lessens development in eastern Alabama and reduces Florida's seafood production. A decision to allocate more water to Alabama and Florida benefits the economies of these states, but curbs Atlanta's economic development. Similarly, a decision to supply downstream users from Lake Lanier diminishes recreational opportunities for users of the lake, while maintaining those opportunities for users of downstream reservoirs; the opposite decision would benefit Lake Lanier's recreational users but harm those who use downstream reservoirs. And even if policy makers could determine water's most productive uses, their decisions would soon be rendered obsolete by changes in the total supply of water, changes in the total demand for water, and marginal changes in allocation necessary to maximize the total productive value of the basin's water resources.

Negotiators did try to obtain answers to some of the technical questions through the use of computer software that forecast future river flows and reservoir levels based on consideration of "historic rainfall patterns over the last fifty-five years" and "anticipated water uses within the basin in a future year, typically 2030 or 2050" (Moore 1999, 8). But historical rainfall patterns are not guaranteed to be repeated. Nor are anticipated water uses easily forecast. Atlanta's rapid population growth and commensurate water use have been dramatically under-predicted by the experts.[13] To compound matters further, different software programs give different estimates and, perhaps not surprisingly, the states have used different modeling programs (Moore 1999, 10).

Practical Problems

Negotiators confronted two other factors that made agreement less likely: (1) The ACF river basin's waters were already fully allocated, and (2) the drought was expected to end soon. That the water wealth of the ACF river basin is already fully allocated made bargaining more contentious, because changes will force redistribution of existing allocations. In contrast, for example, the country's first interstate water compact, the Colorado River Compact of 1922, was negotiated in the arid West, with anticipation of more water from the Boulder Canyon Project Act, which authorized the Hoover Dam and created Lake Mead. Moreover, negotiators knew the 1998-2002 drought was unprecedented and would likely come to an end, reducing pressures on the ACF river basin's waters. These expectations were borne out, as abundant rain fell during the latter half of 2002 and during 2003.[14]

Proposals for Marketing Water

With compact negotiations now in disarray, policy makers must look to other alternatives. An obvious proposal is for Atlanta (and other municipalities in the basin) to charge a price for its water that at least approximates its market value. Ample evidence shows that higher water prices reduce consumption (Anderson and Snyder 1997a, 12–13). At present, water is underpriced in Atlanta, leading to overuse. Even in the most recent drought, the city of Atlanta raised its price to residential users by only 3 percent. For the average residential user, the monthly water bill rose from $16.55 to $17.05. The city plans additional rate hikes through 2004, but these will raise average residential bills by a mere $1.00 per month (Atlanta Bureau of Water 2003). During the drought, rather than raising the price of water further, officials imposed restrictions on outdoor water use that continue to be in effect (Atlanta Regional Commission 2003a; Judd 2000).

Raising water prices to market levels is apparently not politically feasible. This means that the states of Alabama, Florida, and Georgia and the federal government should consider basin-wide proposals to create water markets. Experience with markets in water has shown that they can overcome some of the most difficult challenges of water allocation. They can ensure that water is allocated to its most productive uses and can prevent conflicts among users.

To some, marketing water is still a strange idea. Long accustomed to the notion that water is a commonly owned resource, many readers may doubt that it is feasible to "trade" water and thereby satisfy various interests more readily than through political negotiations. Yet there is a strong precedent for marketing of water. Much of the American West is arid, receiving less than 17 inches of precipitation a year. With water always precious, the West evolved a system of private property rights to water, and with it, water markets. This system, known as the prior appropriation doctrine, resulted from the need to divert water for mining and agriculture. In simplest terms, it allowed a person to divert water from a river or stream on the basis of seniority (or "first in time, first in right"), with the right remaining as long as the individual continued to use the water ("use it or lose it"). Water users could transfer their rights to others. The private provision of water flourished (Anderson and Snyder 1997b, 31–45), and continues to do so, although laws that guide the transfers of water are somewhat antiquated, and restrictions on transfers that made sense in the past do not necessarily encourage efficient use today.

In spite of these restrictions, water trades occur among agricultural users, between agricultural users and cities, and between agricultural users and environmentalists. Even interbasin and interstate trades are common (Anderson and Snyder 1997a, 14–21). In Texas, where both riparian and prior appropriation doctrines are recognized, a system of marketable permits similar to the one described below allocates water along the Rio Grande River (Yoskowitz 2001).

In a fully functioning water market, users pay a market price for water consumed, and that price serves as a rationing mechanism. Those who can put the water to the most productive use, and demonstrate this by willingness to pay, will purchase the water, be they residential developers or oyster producers. Market prices motivate those with relatively less productive opportunities to sell the water to more productive users. Through markets, groups can work out slight or marginal changes that maximize the total value from all uses.

Markets also yield peace among transacting parties. In markets, only the parties considering buying or selling a resource take part in the negotiations. Outside influences from politicians, bureaucrats, or interest groups do not guide the negotiations, as they do in the political process. The terms of exchange, such as the price, must be voluntarily agreed upon for exchange to occur. Any would-be buyer or seller who does not like the price does not have to buy or sell.

In contrast, in the political sphere, resource users often do not pay a price for a resource they consume, or they pay less than the resource's market value. This tends to encourage them to always want more and leads to conflicts among users and a state of perpetual unhappiness for all.

As economists often point out, the foundation for markets is private property rights that are defined—that is, rights with a clearly specified ownership claim; enforced—that is, rights with a claim that is secure; and transferable—that is, rights that may be sold to others. Clearly defined, enforced, and transferable property rights are necessary for exchange. Buyers will not purchase resources if the rights to those resources are uncertain or insecure, but when rights to property are certain, secure, and transferable, markets flourish. Market-based allocation of the ACF river basin's waters would encourage allocation of the basin's waters to their most productive uses and foster peace among users.

The Army Corps' Role

To understand how markets might work, it is appropriate to begin with the Army Corps of Engineers, which is the effective owner of the water in the ACF basin. At present, the Corps is almost entirely dependent upon congressional appropriations. In the Mobile District in which the ACF river basin is located, the Corps receives some fees for its services, but they represent a small part of the Corps' budget. The fees it receives are either insufficient to cover the costs of its services (as in recreation fees), or the Corps does not retain the revenues (as in the case of revenues from hydropower), or it simply does not charge for the services it provides (as in the case of navigational services, although commercial vessels do pay a fuel tax that is used to fund inland waterway projects).

Since the Corps is supported by taxpayer dollars and cannot receive financial benefit from the services it provides, it has no incentive to determine which competing uses are most productive and thus to adopt market exchange as the way to allocate water in the basin. In an ideal world, the Corps' financing and function would be changed to give it an incentive to allocate scarce water resources to their most productive uses, thereby raising the total wealth generated from the basin's waters. This would happen if the Corps were to retain property rights and management authority over the basin's waters, but taxpayer support of the Corps and its projects were reduced. In exchange, the Corps would be given the authority to charge whatever fees it deemed appropriate for the services it provided and to retain the revenues. For example, the Corps could implement or change fees it charges for hydropower, dredging, water supply, and recreational services. If drought or increased demand raised the relative scarcity of water, the Corps would have the authority to raise fees. Some taxpayer support is justified since the Corps also provides flood control that benefits all users.

Although the Corps' power in Congress is extremely powerful and therefore such a change in the financing of the Corps is unlikely, there is some precedent for this kind of institutional reform of a public agency. In 1996, the Fee Demonstration Program allowed the National Park Service, the Forest Service, the Bureau of Land Management, and the Fish and Wildlife Service to each choose 100 sites that could raise or implement new fees and retain 80 percent of the revenues. Although the Fee Demonstration Program does not intend self-sufficiency for the participating agencies or individual sites, the results from changed incentives are evident, as these agencies have improved services to visitors of public lands by allocating more funds to badly needed repair and maintenance of some of the country's most-valued natural and recreational resources (Fretwell 1999). Like the Fee Demonstration program, reform of the Army Corps of Engineers could begin on a short-term, experimental basis.

With a mandate to balance its budget and the authority to set fees and retain revenues, the Corps would have an incentive to allocate water resources to their most productive uses. If Atlanta developers wanted more water, they would have to pay a price that reflected the value of the water to other users. If it did not, those other users would outbid it. The Corps would also have to take into account the costs of its services. If barge traffic was insufficient to generate revenues to cover the costs of dredging, the Corps would cease to dredge the basin. Through this system, those with the most productive opportunities for the water would be the ones to obtain it. Such allocation would also maximize the Corps' net revenues. Unfortunately, this outcome is not very likely to occur in a political setting.

A System of Marketable Permits

Under current political arrangements, marketable permits seem to be the most promising approach to creating a water market. Marketable permits depend on the assignment of property rights to water. To implement them in the ACF river basin, the Army Corps of Engineers could first establish a daily "water budget," consisting of the total net withdrawals allowed from the basin, based on average daily withdrawals from some past period of consumption. After this global budget is established, the Army Corps of Engineers could grant water allocations to each user based upon average daily use, again from some period of past consumption. Even though hydropower producers, barges, and oyster producers do not strictly divert water, the water they use is "diverted" from the basin into the Gulf of Mexico and therefore should be measured for the allocation. By making the allocations daily, the Corps would allow for seasonal variations in demand and flood control. Permit allocations would be divisible and transferable. And, of course, under no condition could water be allocated in a way that violates federal water use laws.

When the supply of rainfall was abundant, so that water in the basin exceeded the global daily budget, all users could be satisfied without the need to transfer water among users. However, in the case of drought, the Army Corps of Engineers could cut daily permit allowances by an equal percentage for all users. The Corps could then serve as a water broker, facilitating transactions among users, by matching buyers and sellers and helping to negotiate terms of exchange, while charging a fee to cover administrative costs. Similarly, if the demand for water rises to the point that it exceeds the global daily budget, users wanting more water would have to purchase that water from other users.

To see how this might work, consider a simplified example with two users, a lake, and a river running downstream from the lake. Suppose the two users are Atlanta developers and Florida oyster producers, the lake named Lake Lanier, and the river the Chattahoochee. Suppose that for a given day, the water budget for this river basin is 1,000 gallons, allocated between 800 gallons for Atlanta developers and 200 gallons for Florida oyster producers. (Actual quantities would, of course, be in the millions of gallons per day.)

If rainfall allows greater net withdrawals, say to 1,100 gallons, each user's allotment can rise by 10 percent. A drought, however, might reduce net withdrawals to 900 gallons, forcing cuts in permitted allotments to 720 gallons for Atlanta developers and 180 gallons for Florida oyster producers. This is where trading comes in. If Atlanta's developers want to restore their allocation, they must offer to purchase an additional 80 gallons from Florida's oyster producers. If the contracting parties agree, the Army Corps will release less water from Lake Lanier, increasing the amount available to Atlanta's developers and reducing the downstream flow for Florida's oyster producers.

If, in contrast, Florida's oyster producers want to retain a flow of 200 gallons, they will offer to purchase an additional 20 gallons from Atlanta developers. If the parties agree, this time the Army Corps of Engineers will release more water from Lake Lanier, reducing the amount available for Atlanta's developers but increasing the flow for Florida's oyster producers.

One can envision associations of users with similar wants, such as an upstream association of developers and recreational users, and a downstream association of hydroelectric utilities, barges, environmentalists, and oyster producers. At times, association members would benefit by combining funds and sharing costs.

Purchasing water allotments to retire (that is, not use) them should also be allowed. For example, if electric utilities want to increase downstream flows to generate electricity at the same time that recreational users want lake levels held high, as on a summer holiday weekend, the recreational users could purchase water rights from the electric utilities, if the utilities agreed, and retire those rights. Instead of producing revenues through hydropower, the electric utilities would receive payments from recreational users. Similarly, environmentalists might want to purchase and use or retire rights during seasons when fish spawn.[15]

In each of the exchanges described, the amount of water traded would be a small portion, not all of the total allowances. For example, recreational users would likely purchase some, but not all, of the electric utilities' water. Lake levels would fall enough to generate some electricity, but not as much as they would fall if recreational users didn't purchase some of the water rights.[16]

To be effective, these marketable permits must have the key characteristics of property rights: They must be clearly defined, so that each user knows its allocation for each day; enforced, with the Army Corps of Engineers serving as enforcer of the permit allowances through its monitoring of lakes and dams; and transferable, with transfer facilitated by the Army Corps of Engineers serving as broker. With defined, enforced, and transferable property rights, a water market could develop that would ensure an allocation of water to its most productive uses and peace among contracting parties.

As an alternative to water transfers among users at mutually agreed upon prices, the Corps could advance market allocation by establishing a water bank. The Corps could serve as an underwriter that buys and sells water at specified prices, with the spread between these prices used to cover the costs of administering the bank. Such banks have been used in times of drought. For example, water banks were used successfully in 1977 and 1991 in California to cope with drought. In 1991 California offered to purchase water at a price of $125 per acre-foot and to sell water at a price of $175 per acre-foot. The state purchased and sold 400,000 acre-feet of water, mostly to municipal and agricultural users (Anderson and Snyder 1997b, 11–12, 102–103).

In the case of the ACF river basin, the Army Corps of Engineers could assign users daily property rights to flows of water, based on historic use patterns, and then serve as a water banker, standing ready to buy and sell water at specified prices. Depositors could leave water in the basin, and buyers could withdraw it. With price playing an allocative role and with voluntary transactions, the basin's waters would be allocated more efficiently and relations among the ACF river basin's users would become more harmonious.

Implications for the Southeast

Making these kinds of changes in the ACF river basin is critical because water conflicts are brewing throughout the Southeast. Along Georgia's border with South Carolina, a request by Habersham County, Georgia, to withdraw 12.5 million gallons per day from the Savannah River Basin provoked the South Carolina state legislature to introduce resolutions calling on Congress to stop the Army Corps of Engineers from granting the request, which would have transferred water from the Savannah river basin to the ACF basin.[17] In addition, Georgia is involved in a dispute with Alabama over water in the Alabama-Coosa-Tallapoosa river basin. And North Carolina and South Carolina have disputed the flow of water in the Yadkin-Great Pee Dee river basin (Henderson 2002; Libaw 2000; Pompe and Franck 2003). By establishing water markets in the ACF river basin, the states of Alabama, Florida, and Georgia could serve as an example to other southeastern states to help them avoid the conflicts that have for so long plagued the attempts to allocate that basin's waters.

What Chance for Change?

Market reforms offer great potential, but when government is in control, change typically comes about only with crisis. Higher rainfall since the summer of 2002 has diminished the sense of crisis. Does this mean that all hope is lost for market allocation of water in the ACF river basin or elsewhere in the Southeast? Not at all.

By failing to achieve compact resolution, the states of Alabama, Florida, and Georgia, have embarked down the risky path of judicial apportionment. The risk is that the Supreme Court could allocate the ACF river basin's waters in a way that is unsatisfactory to each or all of the states (Erhardt 1992, 226). Because these allocations are not transferable, states with an unsatisfactory allocation would have no way, short of further litigation, to change the allocation. As the states contemplate this possibility, they may find it prudent to drop their lawsuits and pursue a means of allocating water that relies on markets, such as one of the proposals offered in this essay.

Once demand permanently outstrips supply under current arrangements, water in the Southeast will be rationed. The question will be how. Will water be rationed by markets, which promote productive use and harmony among users? Or will it be rationed by political processes that are likely to result in misallocation and conflict? As economic development continues, perhaps plagued by drought, the citizens of the Southeast may choose the efficiency and harmony of markets over the misallocation and contention of politics.

Notes

1. The Army Corps of Engineers has long played a role in the ACF river basin. To facilitate commercial traffic, the Corps began dredging the Chattahoochee River in the 1880s. At present, five Army Corps dams dot the ACF river basin: the Buford dam, which forms Lake Sidney Lanier; the West Point dam, which forms Lake West Point; the Walter F. George dam, which forms Lake Walter F. George; the George W. Andrews dam; and the Jim Woodruff dam, which forms Lake Seminole. Authorization and construction of these dams began in the 1940s, 1950s, and 1960s, and by the 1970s they were all operational (Jeane 2002, 151, 155).

2. See table 30 of U.S. Census Bureau (2002, 32–34).

3. Data supplied by Julia Fanning, U.S. Geological Survey, Atlanta, e-mail correspondence, November 7, 2003.

4. See Atlanta Regional Commission (2003b).

5. For data on streamflow of the Apalachicola River at Chattahoochee, FL, see waterdata.usgs.gov/fl/nwis/annual/calendar_year/?site_no=02358000.

6. In response to federal consent decrees to stop spills of untreated wastewater into the Chattahoochee and to comply with the Clean Water Act, Atlanta is currently trying to raise over $3 billion to renovate its antiquated sewage treatment system.

7. Until the compact was completed, the states agreed to "freeze" water at current use levels. Should increased withdrawals be needed, the states agreed to notify other states in advance (Erhardt 1992, 202). For further details, see Public Law 105-104, Article VII (c).

8. Public Law 105-104, Article VIII (3).

9. Consumptive use, also known as water consumed or water depleted, may be defined as the "part of water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment." The definition also includes "any water withdrawn in the basin and transferred out of the basin for use" (Marella, Fanning, and Mooty 1993, v).

10. Sixty-four percent of the ACF river basin's reservoir capacity is held in Lake Lanier (Ritchie 2003c, A1).

11. Complicating the legal proceedings is a deal struck by Georgia and the Army Corps of Engineers in January 2003 in which metropolitan Atlanta governments agreed to pay the Corps $2.5 million per year towards the operation of Lake Lanier's Buford Dam in exchange for greater withdrawals from the lake. With this deal, metropolitan Atlanta sought not only to obtain additional water, but also to mollify hydropower customers who pay for the dam and who had filed suit against the Corps in 2000 because the Corps had already allocated water from hydropower to supply metropolitan Atlanta. Georgia and the Corps negotiated this deal without informing Alabama or Florida, and set it aside only when Alabama and Florida found out about it and threatened to withdraw from the compact negotiations. This deal, like the initial lawsuits between the states and the Corps, has been reactivated and will have to be settled by the courts (Shelton 2003a; Seabrook 2003).

12. The employment figure is taken from table 602 of U.S. Census Bureau (2002, 393).

13. The *State and Metropolitan Area Data Book, 1997-98* predicted metropolitan Atlanta's 2000 population to be 3.682 million (U.S. Census Bureau 1998). The actual figure was 4.112 million, an error of 430,000 for a prediction published only two years in advance.

14. From July 2002 to August 2003, rainfall exceeded normal levels in Atlanta, Columbus, and Albany, GA by 9.64 inches, 12.21 inches, and 6.57 inches, respectively. Data supplied by Pam Knox,

assistant state climatologist, Georgia State Climatology Office, University of Georgia, Athens, e-mail correspondence, October 15, 2003.

15. Retiring rights requires some ranking among users. If hydropower users have the higher ranking, recreational users would have to purchase rights from them to keep lake levels up. On the other hand, if recreational users had the higher ranking, hydropower users would have to purchase rights from them to drop lake levels. Coase (1960) argues that clearly defined property rights and sufficiently low transactions costs will lead to resources being allocated to their most productive uses.

16. With less water for hydroelectric production, utilities might have to raise prices to their customers.

17. Before this conflict could escalate, Habersham County withdrew its permit request.

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Mayer 1997
Section 9.3

GROUND-WATER RESOURCES OF THE LOWER-MIDDLE CHATTAHOOCHEE RIVER BASIN IN GEORGIA AND ALABAMA, AND MIDDLE FLINT RIVER BASIN IN GEORGIA—*SUBAREA 3* OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT AND ALABAMA-COOSA-TALLAPOOSA RIVER BASINS

U.S. GEOLOGICAL SURVEY

V-433

Prepared in cooperation with the

ALABAMA DEPARTMENT OF ECONOMIC AND COMMUNITY AFFAIRS
OFFICE OF WATER RESOURCES

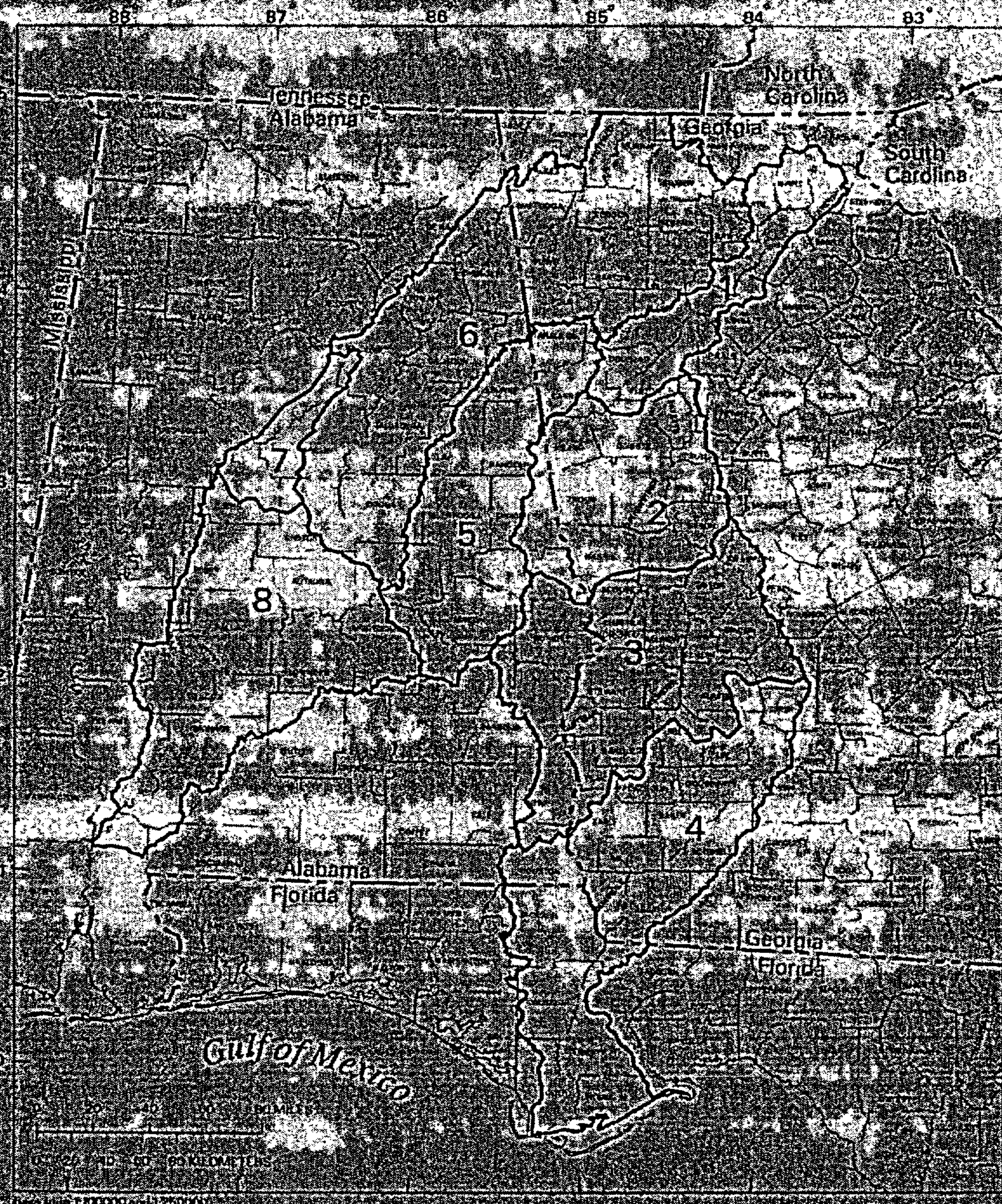
GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

U.S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT

U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

Open-File Report 96-492



Location of subareas in the Apalachicola–Chattahoochee–Flint and Alabama–Coosa–Tallapoosa River basins. Subarea described in this report is shaded.

GROUND-WATER RESOURCES OF THE LOWER-MIDDLE CHATTAHOOCHEE RIVER BASIN IN GEORGIA AND ALABAMA, AND MIDDLE FLINT RIVER BASIN IN GEORGIA—*SUBAREA 3* OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT AND ALABAMA-COOSA-TALLAPOOSA RIVER BASINS

By Gregory C. Mayer

U.S. GEOLOGICAL SURVEY

Open-File Report 96-483

Prepared in cooperation with the

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GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT

Atlanta, Georgia
1997

U.S. DEPARTMENT OF THE INTERIOR

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CONVERSION FACTORS

Multiply	by	to obtain
	Length	
inch (in.)	25.4	millimeter
inch per year (in/yr)	25.4	millimeter per year
foot (ft)	0.3048	meter
square foot (ft^2)	0.0929	square meter
mile (mi)	1.609	kilometer
feet per mile (ft/mi)	0.1894	meter per kilometer
	Area	
acre	4,047	square meter
square mile (mi^2)	2.59	square kilometer
	Volumetric rate and volume	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
	448.831	gallon per minute
	0.6463	million gallons per day
cubic foot per second per square mile ($ft^3/s/mi^2$)	0.01093	cubic meter per second per square kilometer
gallon per minute (gal/min)	6.309×10^{-5}	cubic meter per second
	2.228×10^{-3}	cubic foot per second
	0.06308	liter per second
	1,440	gallon per day
gallon per day (gal/d)	3.785×10^{-3}	cubic meters per day
million gallons per day (Mgal/d)	1.547	cubic foot per second
	63.09	cubic meter per second
	694.44	gallons per minute
gallon per minute per foot of drawdown (gal/min/ft)	1.24×10^{-2}	cubic meters per minute per minute per meter of drawdown
acre-foot	325,900	gallon
	Transmissivity	
foot squared per day (ft^2/d)	0.0929	meter squared per day

Temperature

Temperature in degrees Fahrenheit (° F) can be converted to degrees Celsius as follows:

$$C = 5/9 \times (° F - 32)$$

ABBREVIATIONS AND ACRONYMS

7Q2	7-day, 2-year low flow
ACF	Apalachicola-Chattahoochee-Flint River basin
ACT	Alabama-Coosa-Tallapoosa River basin
ADAPS	Automated Data Processing System
Corps	U.S. Army Corps of Engineers
MOA	Memorandum of Agreement
GWSI	Ground Water Site Inventory database
MOVE.1	Maintenance of Variance Extension, Type 1; computer program (Hirsch, 1982)
RORA	Computer program (Rutledge, 1993)
SWGW	Surface Water-Ground Water; computer program (Mayer and Jones, 1996)
USGS	U.S. Geological Survey

VERTICAL DATUM

Sea Level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NVGD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

GLOSSARY

7Q2—Minimum average stream discharge for 7 consecutive days for a 2-year recurrence interval.

Alluvium—Sediment transported and deposited by flowing water.

Altitude—As used in this report, refers to the distance above sea level.

Anisotropic—Condition having varying hydraulic properties of an aquifer according to flow direction.

Annual—As used in this report, refers to a water year.

Aquifer—A formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian—Synonymous with confined.

Baseflow—That part of the stream discharge that is not attributable to direct runoff from precipitation or melting snow; it is usually sustained by ground-water discharge.

Bedrock—A general term for the consolidated rock that underlies soils or other unconsolidated surficial material.

Clastics—Rocks composed of fragments of older rocks, for example, sandstone.

Colluvium—Heterogeneous aggregates of rock detritus resulting from the transporting action of gravity.

Cone of depression—A depression of the potentiometric surface, often in the shape of an inverted cone, that develops around a well which is being pumped.

Confined aquifer—An aquifer bounded above and below by impermeable beds or by beds of distinctly lower permeability than that of the aquifer itself; ground water in the aquifer is under pressure significantly greater than that of the atmosphere.

Continuous-record gaging station—Complete records of discharge obtained using a continuous stage-recording device through which either instantaneous or mean-daily discharge may be computed for any time, or any period of time, during the period of record.

Crystalline rock—A general term for igneous and metamorphic rocks.

Darcian flow—Flow that is laminar and in which inertia can be neglected.

Dendritic drainage—A branching stream pattern that resembles the branching of trees.

Drought—There is no accepted definition of drought. As used in this report, a period of deficient rainfall extending long enough to cause streamflow to fall to unusually low levels for the period of record.

Evapotranspiration—The combined evaporation of water from the soil surface and transpiration from plants.

Faults—Fractures in the Earth along which there has been displacement parallel to the fault plane.

Foliation—A planar or layered structure in metamorphic rocks that is caused by parallel orientation of minerals or bands of minerals.

Fluvial—Pertaining to the actions of rivers.

Fracture—Breaks in rocks due to intense folding or faulting.

Geologic contact—The boundary surface between one body of rock or sediment and another.

Ground-water recharge—The process of water addition to the saturated zone or the volume of water added by this process.

Head, static—The height above a standard datum of the surface of a column of water (or other liquid) that can be supported by the static pressure at a given point. The static head is the sum of the elevation head and the pressure head.

Head, total—The total head of a liquid at a given point is the sum of three components:
(a) the elevation head, which is equal to the elevation of the point above a datum, (b) the pressure head, which is the height of a column of static water that can be supported by the static pressure at the point, and (c) the velocity head, which is the height to which the kinetic energy of the liquid is capable of lifting the liquid.

GLOSSARY—Continued

Heterogeneous—Pertaining to a substance having different characteristics in differing locations.

Hydraulic conductivity—The capacity of a rock to transmit water. It is expressed as the volume of water that will move through a medium in a unit of time under a unit hydraulic gradient through a unit area measured perpendicular to the direction of flow.

Hydraulic gradient—A change in the static pressure of ground water, expressed in terms of the height of water above a datum, per unit of distance in a given direction.

Hydrograph separation—Division of the stream hydrograph into components of aquifer discharge and surface runoff.

Igneous rock—Rocks which have solidified or crystallized from a hot fluid mass called magma.

Intergranular porosity—Porosity resulting from space between grains.

Intrusive igneous rocks—Masses of igneous rock formed by magma cooling beneath the surface.

Isotropic—Condition in which hydraulic properties of an aquifer are equal in all directions.

Joints—Fractures in rocks, often across bedding planes, along which little or no movement has taken place.

Mafic—Applied to the ferromagnesian minerals or to igneous rocks relatively rich in such minerals.

Mean annual—As used in this report, refers to the average of the annual values for a specified period of record.

Metamorphic rock—Rocks derived from pre-existing rocks by mineralogical, chemical, and structural alterations due to endogenetic processes.

Partial-record gaging station—Is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years.

Permeability—The property of a porous medium to transmit fluids under an hydraulic gradient.

Porosity—The amount of pore space and fracture openings, expressed as the ratio of the volume of pores and openings to the volume of rock.

Potentiometric surface—An imaginary surface representing the static head of ground water and defined by the level to which water will rise in a tightly cased well.

Primary porosity—Porosity due to the soil or rock matrix; the original interstices created when a rock was formed.

Recession index—The number of days required for discharge to decline one complete log cycle.

Regolith—Loose, unconsolidated and weathered rock and soil covering bedrock.

Residuum—The material resulting from the decomposition of rocks in place and consisting of the nearly insoluble material left after all the more readily soluble constituents of the rocks have been removed.

Rock—Any naturally formed consolidated material consisting of two or more minerals.

Run-off—Precipitation that flows from the surface of the land and into streams and rivers.

Saprolite—Surficial deposits produced by the decay of rocks and remaining as residuals.

Secondary openings—Voids produced in rocks subsequent to their formation through processes such as solution, weathering, or movement.

Secondary porosity—Porosity due to such phenomena as dissolution or structurally controlled fracturing.

Soil—The layer of unconsolidated material at the land surface that supports plant growth.

Specific capacity—The rate of discharge of water from the well divided by the related drawdown of the water level within the well.

GLOSSARY—Continued

Specific yield—The ratio of the volume of water which the porous medium after being saturated, will yield by gravity to the volume of the porous medium.

Storage coefficient—The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head (virtually equal to the specific yield in an unconfined aquifer).

Stream discharge—The volume of water flowing past a given point in a stream channel in a given period of time.

Transmissivity—The rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient. It equals the hydraulic conductivity multiplied by the aquifer thickness.

Trellis drainage—A river system resembling a trellis or rectangular pattern and characteristic of areas of folded sedimentary rocks where tributaries cut channels through less resistant beds.

Unconfined aquifer—An aquifer in which the water table is a free surface at atmospheric pressure.

Unit-area discharge—Stream or ground-water discharge divided by the drainage area.

Water table—Upper surface of a zone of saturation under atmospheric pressure.

Water year—The standard water-year used by the U.S. Geological Survey is from October 1 to September 30 of the second calendar year.

GROUND-WATER RESOURCES OF THE LOWER-MIDDLE CHATTAHOOCHEE RIVER BASIN IN GEORGIA AND ALABAMA, AND MIDDLE FLINT RIVER BASIN IN GEORGIA—*SUBAREA 3* OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT AND ALABAMA-COOSA-TALLAPOOSA RIVER BASINS

By Gregory C. Mayer

ABSTRACT

Drought conditions in the 1980's focused attention on the multiple uses of the surface- and ground-water resources in the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) River basins in Georgia, Alabama, and Florida. State and Federal agencies also have proposed projects that would require additional water resources and revise operating practices within the river basins. The existing and proposed water projects create conflicting demands for water by the States and emphasize the problem of water-resource allocation. This study was initiated to describe ground-water availability in the lower-middle Chattahoochee River basin of Georgia and Alabama; and middle Flint River basin of Georgia, Subarea 3 of the ACF and ACT River basins, and to estimate the possible effects of increased ground-water use within the basin.

Subarea 3 encompasses about 6,180 square miles (mi^2) of the Coastal Plain Province in southwestern Georgia and southeastern Alabama. About 55 percent of the area is drained by the Chattahoochee River, with the remainder drained by the Flint River. The drainage area of the Chattahoochee River is divided almost equally between Alabama and Georgia.

Subarea 3 is underlain by complexly interbedded sedimentary strata that dip gently to the southeast, underlying the Floridan aquifer system to the south. The strata comprise numerous porous-media aquifers and confining units that crop out in the northern part of Subarea 3 in generally northeast-trending bands.

The conceptual model described for this study qualitatively subdivides the ground-water flow system into local (shallow), intermediate, and regional (deep) flow regimes. Ground-water discharge to tributaries mainly is from local and intermediate flow regimes and varies seasonally. The regional flow regime probably approximates steady-state conditions and discharges chiefly to major drains such as the Chattahoochee River. Ground-water discharge to major drains originates from all flow regimes.

Mean-annual baseflow is about 1,618 cubic feet per second (ft^3/s) in the Chattahoochee River; and about 1,812 ft^3/s in the Flint River. Of the 1,618 ft^3/s baseflow in the Chattahoochee, about 37 percent is discharge from Alabama and 63 percent is discharge from Georgia. Near the end of the drought of 1954, baseflow was about 579 ft^3/s in the Chattahoochee River; and about 963 ft^3/s in the Flint River. Of the 579 ft^3/s drought baseflow in the Chattahoochee River, about 15 percent was from Alabama and 85 percent from Georgia. Baseflow in Subarea 3 during the drought of 1954 was about 45 percent of mean-annual baseflow. Near the end of the drought of 1986, baseflow was about 449 ft^3/s in the Chattahoochee River and about 498 ft^3/s in the Flint River. Of the 449 ft^3/s baseflow in the Chattahoochee River, about 16 percent was discharge from Alabama and 84 percent was discharge from Georgia. Baseflow in Subarea 3 during the 1986 drought was about 28 percent of mean-annual baseflow.

The potential exists for the development of ground-water resources on a regional scale throughout Subarea 3. Estimated ground-water use in 1990 was about 2.2 percent of the estimated mean-annual baseflow, and ranged from about 4.9 to 8.0 percent of baseflows near the end of the droughts of 1954 and 1986, respectively. Because ground-water use in Subarea 3 represents a relatively minor percentage of ground-water recharge, even a large increase in ground-water use in Subarea 3 in one State is likely to have little effect on ground-water and surface-water occurrence in the other. Indications of long-term ground-water level declines were not observed; however, the number and distribution of observation wells having long-term water-level measurements in Subarea 3 are insufficient to draw conclusions.

INTRODUCTION

Increased and competing demands for water and the droughts of 1980-81, 1986, and 1988 in the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) River basins have focused the attention of water managers and users in Alabama, Florida, and Georgia, on the water resources in the two basins. The ACF-ACT River basins encompass about 42,400 square miles (mi^2) and extend from near the Georgia-Tennessee State line, through most of central and southern Alabama and Georgia and part of the Florida panhandle to the Gulf of Mexico (fig. 1). Ground- and surface-water systems of the ACF-ACT River basins behave as an integrated, dynamic flow system comprised of an interconnected network of aquifers, streams, reservoirs, control structures, floodplains, and estuaries. The degree of hydrologic interaction between ground water and surface water suggests that the water resources be investigated and managed as a single hydrologic entity, to account for the climatic and anthropogenic factors that influence the flow systems.

Recent water projects and resource allocations, and other actions proposed by Federal, State, and local agencies, have resulted in conflicts among the States of Alabama, Florida, and Georgia, and the U.S. Army Corps of Engineers (Corps). The Corps has been given the authority to regulate the Nation's surface waters through the Rivers and Harbors Act of 1927, in accordance with the U.S. House of Representatives Document Number 308, 69th U.S. Congress. Proposed projects designed to increase development and to re-allocate surface-water supplies in Georgia, based on revised operating practices of control structures for flood control, navigation, and hydropower generation, and a proposal to construct a dam and reservoir have met with opposition from Alabama and Florida. As a result, in 1991, the U.S. Congress authorized the Corps to initiate a Comprehensive Study of the ACF-ACT River basins that would "develop the needed basin and water-resources data and recommend an interstate mechanism for resolving issues" (Draft Plan of Study, Comprehensive Study, Alabama-Coosa-Tallapoosa and Apalachicola-Chattahoochee-Flint River basins, prepared by: The Comprehensive Study Technical Coordination Group, July 1991, U.S. Army Corps of Engineers, Mobile District).

In 1992, the Governors of Alabama, Florida, and Georgia; and the U.S. Army, Assistant Secretary for Civil Works, signed a Memorandum of Agreement establishing a partnership to address interstate water-resource issues and promote coordinated systemwide management of water resources. An important part of this process is the Comprehensive Study of the ACF and ACT River basins. Since this signing, the Study Partners defined scopes of work to develop relevant technical information, strategies, and plans, and to recommend a formal coordination mechanism for the long-term, basinwide management and use of water resources needed to meet environmental, public health, and economic needs (U.S. Army Corps of Engineers, written commun., 1993). The U.S. Geological Survey (USGS) was requested to assist in the development of a scope of work for the ground-water-supply element of the Comprehensive Study, and in June 1993, was asked to conduct that study element.

Eight subareas of the ACF-ACT River basins were identified by the Study Partners and the USGS on the basis of hydrologic and physiographic boundaries. Addressing the study at the smaller, subarea scale within the ACF-ACT River basins facilitated evaluation of the ground-water resources on a more detailed scale. This report is one of a series of eight reports that present results of ground-water studies of the eight ACF-ACT subareas.

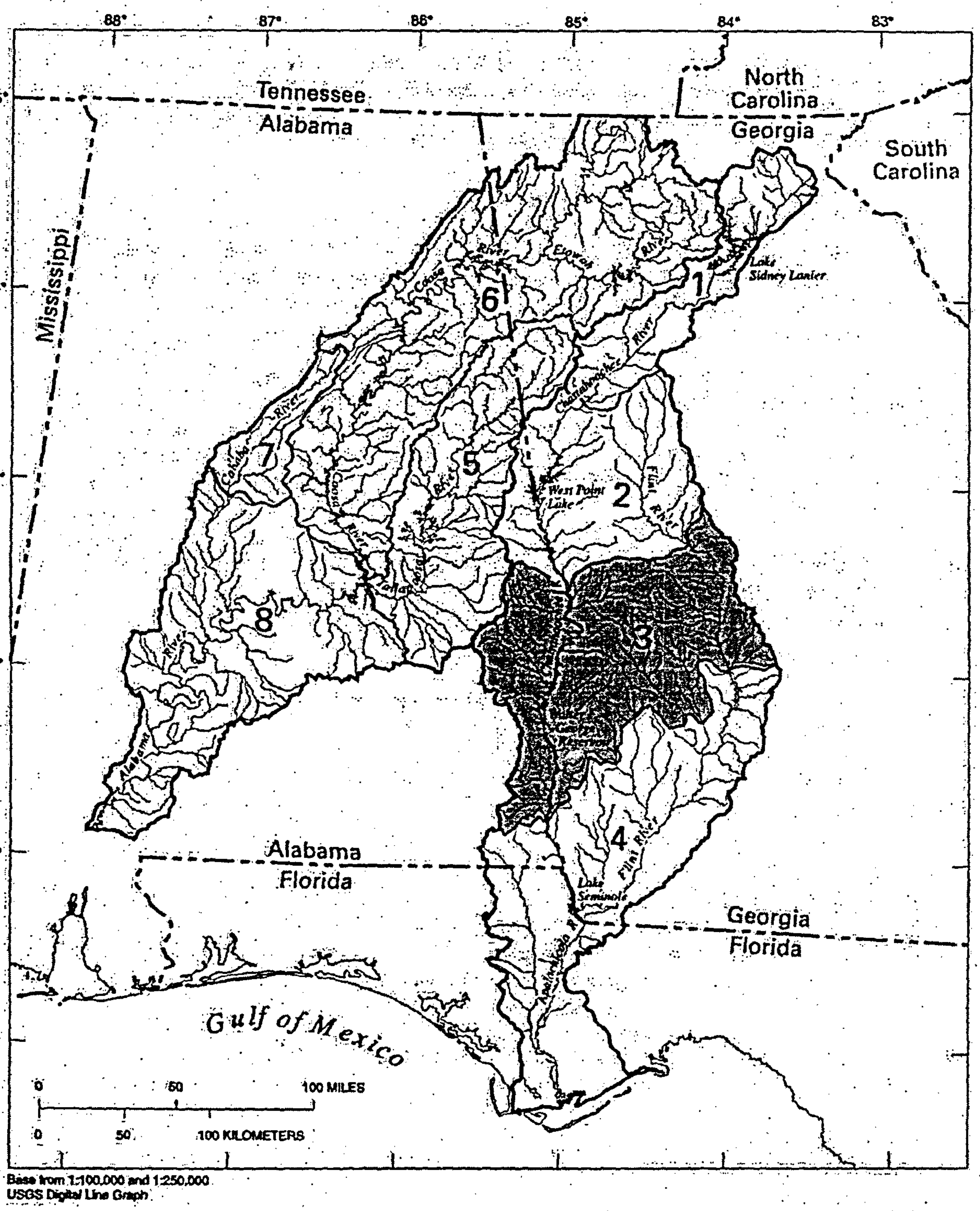


Figure 1. Subareas and major streams in the Apalachicola–Chattahoochee–Flint and Alabama–Coosa–Tallapoosa River basins.

Purpose and Scope

This report describes the ground-water resources of the lower-middle Chattahoochee River basin of Georgia and Alabama, and middle Flint River basin of Georgia—Subarea 3 of the ACF-ACT River basins. The report provides an analysis of ground-water resources that can be used to address resource-allocation alternatives created by existing and proposed uses of the water resources in the river basin. Specific objectives of this study were to:

- describe a conceptual model of ground-water flow and stream-aquifer relations;
- describe the hydrologic setting of Subarea 3;
- quantify mean-annual and drought period ground-water contributions to the Chattahoochee and Flint Rivers from Subarea 3, including separate computations of the contributions from Georgia and from Alabama; and
- describe and evaluate ground-water utilization and general development potential.

Findings contained herein are but one component of a multidiscipline assessment of issues related to the basinwide utilization and management of water. This report is not intended to provide definitive answers regarding the acceptability of ground-water-resource utilization or the potential for additional resource development. Such answers are dependent on the synthesis of results from all components of the Comprehensive Study and on subsequent consideration by the Federal, State, and local water-resource managers responsible for decision making within the basin.

The report scope includes literature and data searches and an assessment of existing geologic data. A conceptual model that describes the hydrologic processes governing the ground- and surface-water flow was developed, and an evaluation of ground-water utilization was made by compiling and evaluating existing hydrologic, geologic, climatologic, and water-use data. Field data were not collected during this study.

Physical Setting of Study Area

Subarea 3 encompasses an area of about 6,180 mi^2, about 75 percent of which is in southwestern Georgia, and about 25 percent of which is in southeastern Alabama. The eastern part is drained by the Flint River and the western part is drained by the Chattahoochee River. In Subarea 3, the drainage area of the Flint River is about 2,810 mi^2, and the drainage area of the Chattahoochee River is about 3,370 mi^2. The drainage area of the Chattahoochee River is almost equally divided between the two States encompassing about 1,670 mi^2 in Alabama and 1,700 mi^2 in Georgia. The Flint River basin lies wholly in Georgia. Subarea 3 is bounded to the north by Subarea 2, and to the south by Subarea 4 (fig. 1). The northwestern part of Subarea 3 is bounded by Subarea 5.

Physiography

Subarea 3 lies almost entirely (95 percent) within the Coastal Plain physiographic province (fig. 2), which extends into Subarea 4 to the south. All of the Georgia part of Subarea 3 is bounded to the north by the Piedmont Province, is highly dissected by streams, and has little level land surface other than floodplains (Clark and Zisa, 1976). Average altitude in Subarea 3 ranges from about 500 feet above sea level in the north to about 100 feet in the south. The physiography of Subarea 3 in Alabama has been described by Kidd (1987) and Scott and Cobb (1988). The part of Subarea 3 north of Uchee Creek in Alabama consists mainly of flat to moderately rolling sandy uplands dissected by deeply-entrenched streams (Kidd, 1989). From Uchee Creek south to about Barbour Creek, the physiography is characterized by sandy cuestas characterized by fairly steep north-facing escarpments and gently to moderately rolling backslopes. Farther south to central Henry County, Ala., the area is dissected by southward and southwestward-flowing streams (Kidd, 1989). The southernmost part of Subarea 3 in Alabama, drained by Omussee Creek, is a relatively flat upland that slopes gently southward except where dissected by streams (Scott and Cobb, 1988).

Climate

The climate in Subarea 3 is moist and temperate, and generally is characterized by short mild winters and hot humid summers. Winter temperatures generally are above freezing, but do occasionally drop below 20 ° F. Summer temperatures commonly are above 90 ° F, and temperatures above 100 ° F are common.

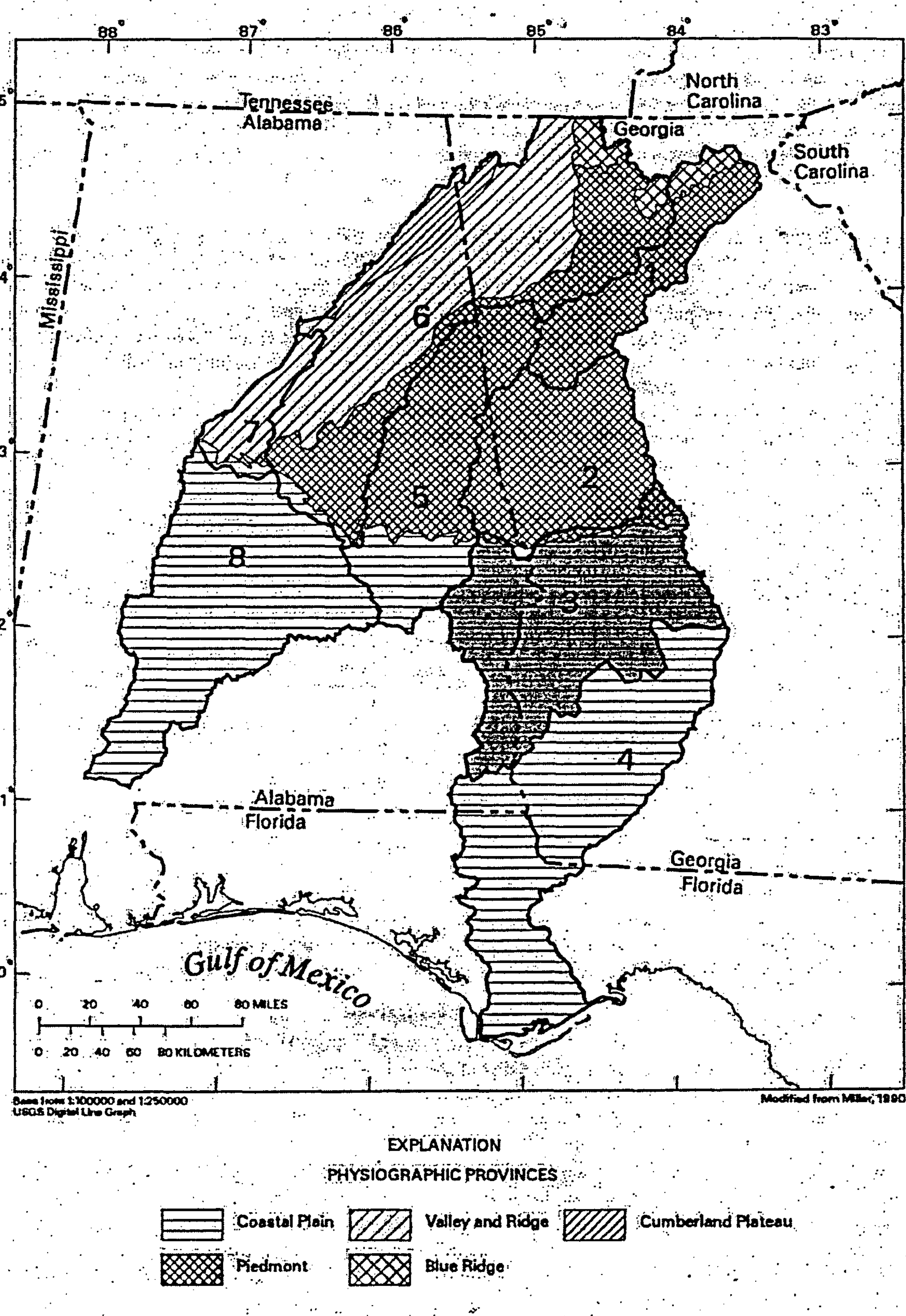


Figure 2. Physiographic provinces and subareas in the Apalachicola–Chattahoochee–Flint and Alabama–Coosa–Tallapoosa River basins.

Precipitation occurs almost completely as rainfall, and ranges from about 48 inches (in.) in the northeastern to 54 in. in the south-central part of Subarea 3. Rainfall generally increases from the northeast to the southwest (Faye and Mayer, 1990). Abundant rainfall occurs during winter, and gradually increases to a seasonal maximum in February or March. Rainfall intensity normally is greatest during July and August as a result of frequent summer thunderstorms. October and November are the driest months of the year.

Ground-Water Use

The estimated ground-water use in Subarea 3 during 1990 was about 56 million gallons per day (Mgal/d) or about 86 cubic feet per second (ft³/s) (Marella and others, 1993). Of this total, about 40 percent was for public water supply, 13 percent for self-supplied industrial and commercial activities, 40 percent for agricultural use, and about 7 percent for domestic water supply. Ground-water withdrawal in Georgia accounts for approximately 70 percent of the total ground-water use of 56 Mgal/d. Substantially more ground water is used in Georgia than in Alabama, with the exception of public-water supply. Agricultural supply is the largest ground-water use in Georgia. Public water supply is the largest use in Alabama (table 1).

Table 1. Estimated ground-water use, by category, Subarea 3, 1990
[Mgal/d, million gallons per day; ft³/s, cubic feet per second]

State	Public water supply		Self-supplied industrial and commercial		Agricultural		Domestic		Total	
	(Mgal/d)	(ft³/s)	(Mgal/d)	(ft³/s)	(Mgal/d)	(ft³/s)	(Mgal/d)	(ft³/s)	(Mgal/d)	(ft³/s)
Georgia[1/]	9.5	14.7	7.2	11.1	18.7	28.9	3.3	5.1	38.7	59.9
Alabama[2/]	12.6	19.5	0.2	0.3	3.6	5.6	0.5	0.8	16.9	26.1
Subarea total	22.1	34.2	7.4	11.4	22.3	34.5	3.8	5.9	55.6	86.0

[1/]Fanning and others (1992).
[2/]Baker and Mooty (1993).

Ground-water use reported by Fanning and others (1992) and Baker and Mooty (1993) is by county; ground-water use in those counties that are partially in Subarea 3 are reported herein for Subarea 3 only. Ground-water use for public water supply, and self-supplied industrial and commercial uses were determined by using site-specific data. Ground-water pumpage for domestic purposes was determined by subtracting the population served by public supply facilities from the total population of the county or hydrologic unit, then multiplying that number by a water-use coefficient of 75 gallons per day (gal/d) per person. Agricultural ground-water use in Subarea 3 was estimated by multiplying the reported county use by the percentage of the land area of the county in the Chattahoochee and Flint River basins.

Previous Investigations

Geologic and hydrogeologic studies of Subarea 3 have ranged from localized to regional investigations. However, most investigations have addressed in detail relatively small areas, such as a few counties. Studies of a reconnaissance nature cover much larger areas. The science of geology and ground-water hydrogeology is evolutionary and recursive in nature, resulting in the advancement of knowledge and understanding. However, the different times that these advancements occurred, and the areas in which they occurred, led to disparities and differences in the interpretations of the geology and hydrogeology of adjoining areas. Resolving these disparities and differences in adjoining areas is well beyond the scope of this study.

Stephenson and Veatch (1915) described the geology of the Coastal Plain in Georgia by formation, including the areal extent, lithology, stratigraphic position, strike and dip of beds, thickness of rock units, paleontology and structure. Cooke (1943) described the general geology of the Coastal Plain in Georgia. Herrick (1961) advanced the knowledge of the geologic framework of the Coastal Plain in Georgia by publishing detailed lithologic logs. Marsalis and Friddell (1975) provided an overall description of the lithologic units exposed in the Chattahoochee River valley, including discussions of facies changes along strike and down dip. Gibson (1982) described six Paleocene and middle Eocene marine units in eastern Alabama and western Georgia that included discussions of composition, fossil assemblage, and nonmarine and marine transitions.

By the early 1950's, the demand for ground water had increased substantially and numerous investigations of ground-water hydrology were undertaken. As in most ground-water studies, investigation of the geology commonly was a substantial part of these efforts. Wait (1960a,b,c,) described the geology and ground-water resources in Calhoun, Clay, and Terrell Counties, Ga. Owen (1963) used available data to describe ground-water conditions in Lee and Sumter Counties, Ga. Stewart (1974) reported the hydraulic characteristics of the Clayton aquifer determined from aquifer tests performed during the design and construction of the Walter F. George Lock and Dam, in the Ft. Gaines, Ga., area. Pollard and Vorhis (1980) described the geohydrology of the Cretaceous aquifer system in Georgia. Ripy and others (1981) described the hydrogeology of the Clayton and Claiborne aquifers in southwest Georgia. Arora (1984) compiled an atlas of aquifers in the Coastal Plain of Georgia that included isopachs, structure contours, potentiometric surface maps, and cross-sections. McFadden and Perriello (1983) conducted a general study of the Clayton and Claiborne aquifers in southwestern Georgia inclusive of water-level trends, ground-water quality, ground-water use, aquifer geometry, lithologic and hydrologic characteristics, and recharge and discharge mechanisms. Clarke and others (1983, 1984) described and evaluated the effects of water use on the Providence and Clayton aquifers, respectively. Davis (1988) described the stratigraphic and hydrogeologic framework of the Cretaceous, Tertiary, and Quaternary Systems in Alabama to aid in delineating aquifers and confining units within the Alabama Coastal Plain. The geohydrology of southeastern Alabama was described in a series of reports produced by the USGS, in cooperation with the Alabama Department of Environmental Management (Kidd, 1987, 1989; and Scott and Cobb, 1988). Long (1989) compiled water-level, water-use, and water-quality information for the Clayton and Claiborne aquifers in Georgia between 1982-86. Ground-water flow and stream-aquifer relations in the outcrop areas of Coastal Plain sediments in Georgia and adjacent parts of Alabama were quantitatively described by Faye and Mayer (1990).

Recent ground-water levels in eastern Alabama were listed by county by Scott (1960, 1962a,b, 1964), Newton and others (1966), Scott and others (1967, 1968), Newton and others (1968), Newton, McCain and Avrett (1968), Shamburger and others (1968), Davis (1980), Scott and others (1984) and Moffett and others (1985). Potentiometric surfaces of the major aquifers in the Alabama Coastal Plain were described by Williams, DeJarnette, and Planert (1986), Williams, Planert and DeJarnette (1986a,b,c), Miller (1992), Mallory (1993), and Planert, Williams, and DeJarnette (1993).

Thompson and Carter (1955) described streamflow in Georgia near the end of the drought of 1954. Hale and others (1989) described streamflow in Alabama, Georgia, North Carolina, South Carolina, Tennessee, and Virginia during the drought of 1986.

Reports describing methods of estimating streamflow and ground-water discharge to streamflow include Bingham (1982), Hirsch (1982), Hoos (1990), Rorabaugh (1960, 1964), Rutledge (1991, 1992, 1993), and Mayer and Jones (1996). Data collected as part of the ongoing surface-water monitoring program of the USGS are published annually in the reports "Water-Resources Data, Alabama" (or Georgia, respectively). Other reports containing information about the surface- and ground-water resources of the ACF-ACT River basin area are listed in the "Selected References" section of this report.

Surface-Water Station Numbering System

The USGS established a standard identification numbering system for all surface-water stations in 1950. Stations are numbered according to downstream order. Stations on a tributary entering upstream of a main-stream station are numbered before and listed before the main-stream station. No distinction is made between continuous-record and partial-record stations. Each station has a unique eight-digit number that includes a two-digit part number (02 refers to natural drainage into the Eastern Gulf of Mexico) and a six digit downstream order number. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete number for each station includes a two-digit part number "02" plus the downstream-order number, which can be from 6 to 12 digits. All records for a drainage basin, encompassing more than one State, can easily be correlated by part number and arranged in downstream order.

Approach and Methods of Study

This study included several work elements used to appraise the ground-water resources of Subarea 3, including the description of a conceptual model of ground-water flow and stream-aquifer relations, and an assessment of ground-water availability. The approach and methods used to accomplish these tasks included:

- compilation of information and data from pertinent literature, including geologic, ground-water, streamflow, and ground-water use data;
- separation of streamflow hydrographs to estimate mean-annual ground-water contribution to the Chattahoochee and Flint Rivers and their tributaries;
- evaluation of streamflow records and periodic discharge measurements during drought periods to estimate "worst-case" streamflow conditions; and
- comparison of 1990 ground-water use with mean-annual and drought-flow conditions to evaluate ground-water availability.

Literature and data reviews provided information necessary to describe a conceptual model of ground-water/surface-water relations. Much of the conceptual model is based on results of previous investigations by Toth (1962, 1963), Freeze (1966), Freeze and Witherspoon (1966, 1967, 1968), Winter (1976), Faye and Mayer (1990), Heath (1984, 1989), and Miller (1990). These studies suggest that large rivers, such as the Chattahoochee, and their tributaries function as hydraulic drains for ground-water flow, and that during significant droughts, most of the discharge in these streams is contributed by ground water.

Streamflow data were compiled from the USGS Automated Data Processing System (ADAPS) database. Streamflow records from continuous-record and miscellaneous discharge-measurement stations were used for hydrograph-separation analyses and drought streamflow evaluation.

Stream-aquifer relations were quantified using two approaches: (1) the hydrograph-separation method of Rorabaugh (1960, 1964) and Daniel (1976), called the recession-curve-displacement method; and (2) a drought-flow mass-balance analysis of streamflow. The hydrograph-separation method was used to estimate the mean-annual discharge of ground water (baseflow) to the basins. The mean-annual baseflow was used as a base or reference with which to compare and evaluate droughts under "worst-case" conditions. The mass-balance analysis was used to estimate baseflow contributions to the surface-water system during historically significant droughts.

Mean-Annual Baseflow Analysis

Discharge data from continuous-record gaging stations along the Chattahoochee and Flint Rivers and their tributaries were selected for baseflow analysis based on the period of record of unregulated flow. Streamflow representative of low, average, and high years of stream discharge were evaluated by hydrograph-separation methods to estimate annual baseflow. The mean-annual baseflow was then computed as the average baseflow of the three representative flow years.

The selection process for the most representative year of low, average, and high stream discharge involved objective statistical examination of the discharge data, followed by some subjectivity in the final choice of the water year selected. Hydrographs acceptable for separation were characterized by relatively normal distributions of daily stream discharge, small ranges of discharge, and the absence of extremely high, isolated peak stream discharge. For each station, the mean annual stream discharge was computed for the period of record of unregulated flow and used as a reference mean for low-, average-, and high-flow conditions for that station. The mean- and median-annual stream discharge for those water years identified as acceptable were compared to the reference mean. Because extremely high discharge during a water year could greatly influence the mean but not the median (which is similar to the geometric mean for positively skewed data sets, such as discharge), the process of selecting representative water years for low-, average-, and high-flow conditions considered the position of the mean discharge for the selected year relative to the median and the reference mean. The hydrographs for these representative water years were examined and separated. True subjectivity in the selection process entered only at this point, such that, if acceptable hydrographs were available for several years, one year arbitrarily was chosen over the others.

The separation analyses were conducted using the computer program SWGW (Mayer and Jones, 1996) which is an automated version of the recession-curve-displacement method, often referred to as the Rorabaugh or Rorabaugh-Daniel method. SWGW was applied to a water-year period of streamflow data. SWGW utilizes daily mean discharge data collected at unregulated stream-gaging sites and requires at least 10 years of record to accurately estimate a recession index necessary for hydrograph-separation analysis.

The hydrograph-separation method estimates the ground-water component of total streamflow. In general, the streamflow hydrograph can be separated into two components—surface runoff and baseflow (ground-water discharge to streams). Figure 3 shows the graphical output from the SWGW program. Surface runoff is the quick response (peaks) of stream stage to precipitation and nearby overland flow.

Application of the recession-curve-displacement method requires the use of the streamflow recession index. The streamflow recession index is defined as the number of days required for baseflow to decline one order of magnitude (one log cycle), assuming no other additional recharge to the ground-water system. The streamflow recession index is a complex number that reflects the loss of ground water to evapotranspiration (Daniel, 1976) or leakage, and the influence of geologic heterogeneities in the basin (Horton, 1933; Riggs, 1963). The slope of the streamflow recession is affected by evapotranspiration, such that the streamflow recession index varies from a maximum during the major rise period to a minimum during the major recession period (fig. 3). The major rise period of streamflow generally occurs from November through March or April, when precipitation is greatest and evapotranspiration is least. The major recession period occurs during late spring through fall and coincides with a period of lesser precipitation, higher temperature, and greater evapotranspiration (fig. 3). Two recession indices were estimated for streamflow observed at each continuous-record gaging station used in the mean-annual baseflow analysis; one index for the major rise period and one for the major recession period.

Available ground-water-level data indicate that long-term changes in ground-water storage are minimal in Subarea 3. Because long-term storage changes are minimal, mean-annual ground-water discharge, estimated using the hydrograph-separation method, is considered an estimate of minimum mean-annual recharge. Also, aquifers at a regional scale in Subarea 3 are considered, for purposes of analysis, to respond as homogeneous and isotropic media.

Results of the mean-annual baseflow analysis are based on measured and estimated data, and the analytical methods to which they are applied. Drainage areas were measured using the most accurate maps available at the time of delineation (Novak, 1985), and are reported in units of square miles. Drainage areas are reported to the nearest square mile for areas greater than 100 mi^2; to the nearest tenth of a square mile for areas between 10 and 100 mi^2; and to the nearest hundredth of a square mile for areas less than 10 mi^2, if the maps and methods used justify this degree of accuracy (Novak, 1985). Annual stream discharge, the sum of the daily mean stream discharges for a given water year, is reported in units of cubic feet per second, to the nearest cubic foot per second. Daily mean discharge is reported to the nearest tenth of a cubic foot per second for discharge between 1.0 and 9.9 ft^3/s; to the nearest unit for discharge between 10 and 100 ft^3/s; and is reported using three significant figures for discharge equal to or greater than 100 ft^3/s (Novak, 1985).

The accuracy of stream-discharge records depends primarily on: (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements; and (2) the accuracy of measurements of stage and discharge, and the interpretation of records. Accuracy of records of streamflow data used in this report can be found in annually published USGS data reports, for example, Stokes and McFarlane (1994). The accuracy attributed to the records is indicated under "REMARKS" in the annual data reports for each station. "Excellent" means that about 95 percent of the daily discharges are within 5 percent of the true discharge; "good," within 10 percent; and "fair," within 15 percent. Records that do not meet these criteria are rated "poor." The accuracy of streamflow records at a station may vary from year to year. In addition, different accuracies may be attributed to different parts of a given record during a single year (Novak, 1985).

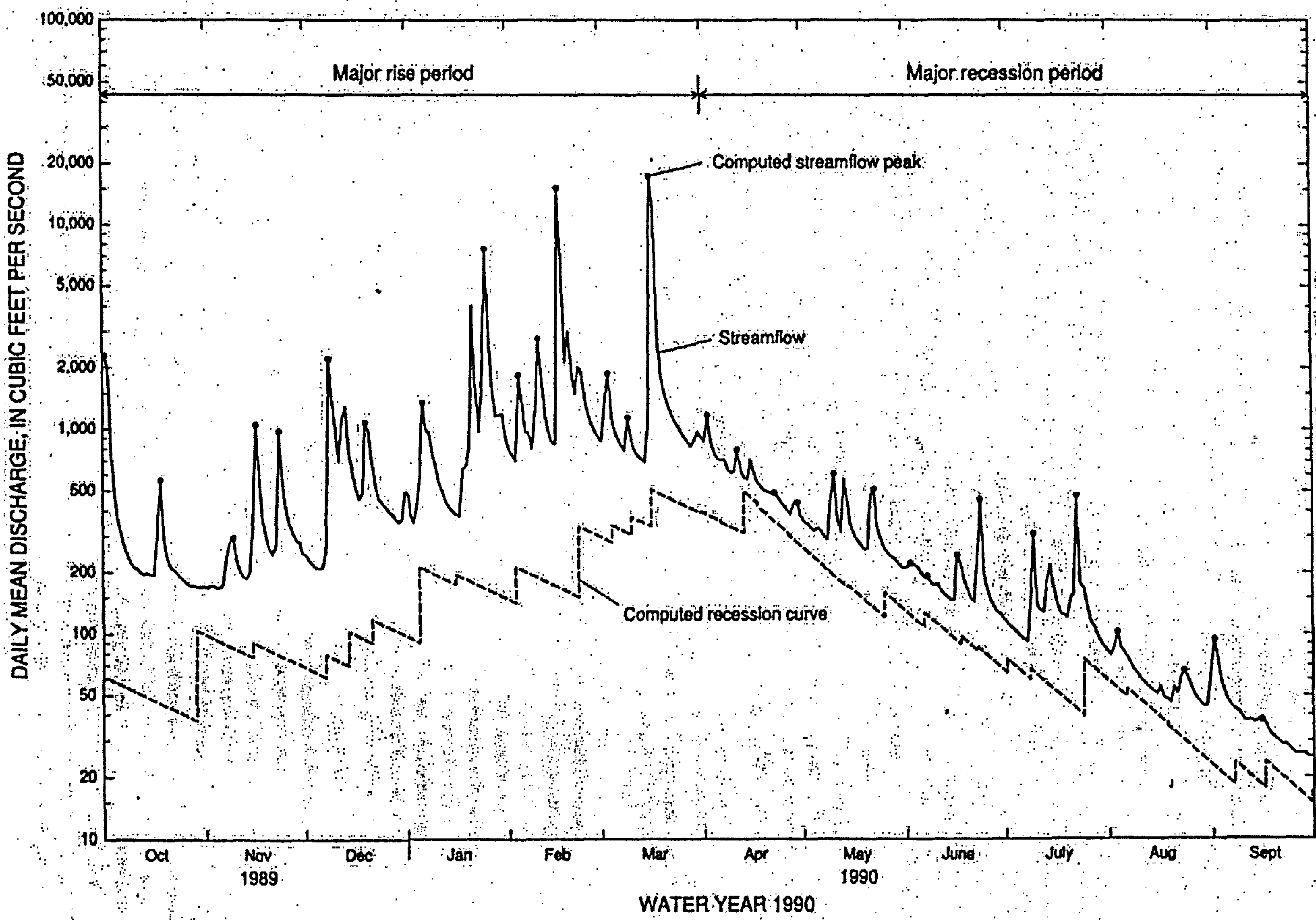


Figure 3. Streamflow hydrograph, separated by program SWGW.

Results of the mean-annual baseflow analyses are inherently uncertain. The hydrograph-separation method of analysis is partly subjective, relying on the input of several user-selected variables. As such, the results of the analyses derived and reported herein, are difficult to independently confirm and are presented as estimates of unknown quality and confidence. However, because the values in this report are used in several water budgets, not only within Subarea 3 but also from subarea to subarea, hydrograph-separation results may be reported to a greater significance than the data and analyses warrant to maintain the numerical balance of the water budget; implication of accuracy to the extent shown is not intended.

Drought-Flow Analysis

Daily mean streamflow data collected at gaging stations during periods of low flow and corresponding periodic measurements of stream discharge collected at partial-record stations were compiled for the drought years 1954 and 1986. These data included nearly concurrent daily measurements of streamflow in the Chattahoochee and Flint Rivers and periodic measurements of tributary discharge.

Standard periods of analyses for drought studies were selected for all ACF-ACT subareas. The period of analysis selected for compiling 1954 drought data was September 15 through November 1, 1954. The selected period for the 1986 drought was July 1 through August 14, 1986. Streamflow during these periods was considered to represent the "worst case" of ground-water storage and availability throughout the ACF-ACT study area. Discharge data for Subarea 3 are sparse during the 1941 drought; therefore, a standard period of analysis was not selected for the entire ACF-ACT study area.

The period of "worst-case" conditions may not include the minimum streamflow that occurred during a drought at a streamflow measurement site. Minimum drought flows typically occur at different times at different stations within large watersheds, such as the Chattahoochee River basin. Rather, the "worst-case" evaluation was designed to describe streamflow during the advanced stages of each drought; thus, providing a near-contemporaneous summary of streamflow conditions during periods of low flow throughout the ACF-ACT study area.

The estimated "worst-case" distribution of Chattahoochee and Flint Rivers streamflow near the end of the 1954 and 1986 drought periods was determined by balancing mass in the stream network in a general downstream direction during a relatively short interval of time. The tributary discharge to the Chattahoochee and Flint Rivers during drought periods was calculated using a unit-area discharge extrapolated to the entire drainage area of the tributary. Unit-area discharges are based on streamflow measurements that generally are inclusive of only part of the tributary drainage, and may not be representative of an average unit-area discharge for the entire tributary drainage.

CONCEPTUAL MODEL OF GROUND-WATER FLOW AND STREAM-AQUIFER RELATIONS

The conceptual model of the ground-water flow and stream-aquifer relations in Subarea 3 is based on previous work done in other areas by Toth (1962, 1963), Freeze (1966), Freeze and Witherspoon (1966, 1967, 1968), Winter (1976), and Faye and Mayer (1990). These studies suggest that recharge originates from precipitation that infiltrates the land surface, chiefly in upland areas, and percolates directly, or leaks downward to the water table. Ground water subsequently flows through the aquifer down the hydraulic gradient and either discharges to a surface-water body or continues downgradient into confined parts of an aquifer. Major elements of this conceptual model include descriptions of flow regimes, stream-aquifer relations, recharge to ground water, and ground-water discharge to streams.

Toth (1963) observed that most ground-water flow systems could be qualitatively subdivided into paths of local (shallow), intermediate, and regional (deep) flow. Local flow regimes are characterized by relatively shallow and short flow paths that extend from a topographic high to an adjacent topographic low. Intermediate flow paths are longer and somewhat deeper than local flow paths and contain at least one local flow path. Regional flow paths (fig. 4) begin at or near the major topographic (drainage) divide and terminate at the regional drain, which is the Chattahoochee River in Subarea 3. Depending on local hydrogeologic conditions, all three flow regimes may not be present everywhere within the subarea.

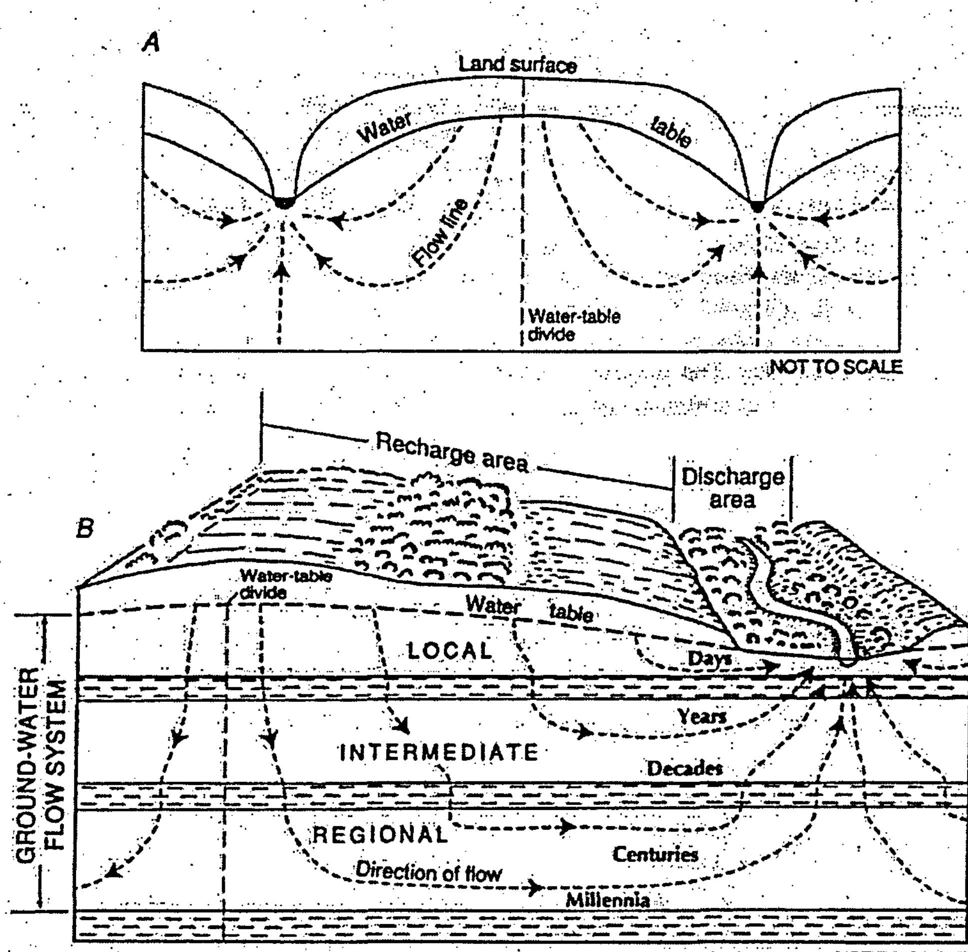


Figure 4. (*A*) Distribution of ground-water flow in an areally extensive, isotropic, homogeneous aquifer system (modified from Hubbert, 1940, and Heath, 1984) and (*B*) example of local, intermediate, and regional ground-water flow (modified from Heath, 1984).

The water table in Subarea 3 probably is a subdued replica of the land-surface topography but generally with less relief. The presence of ground-water flow regimes depends largely on the configuration of the water table, such that recharge occurs in highland areas and discharge occurs in lowland areas. Quantities of recharge to the water table and ground-water discharge to streams are variably distributed throughout the local, intermediate, and regional flow regimes. Local regimes receive the greatest ground-water recharge from the water table and provide the most ground-water discharge to streams. Faye and Mayer (1990) indicated that in the Coastal Plain aquifer system, under natural conditions, as much as 80 percent of the total ground-water recharge, discharges through the local and intermediate ground-water flow regimes to streams tributary to the large drains like the Chattahoochee River. Only about 10 percent of the total recharge discharges through the regional ground-water flow regime directly to the regional drains. The remaining 10 percent discharges to evapotranspiration and to the deeper confined parts of the aquifer system. Ground-water discharge to tributary drainages primarily is from local and intermediate flow regimes; ground-water discharge to regional drains, such as the Chattahoochee River includes contributions from the regional as well as local and intermediate regimes.

Seasonal variation in rainfall affects the local ground-water flow regime most significantly, and affects the regional flow regime least significantly. Generally, regional flow probably approximates steady-state conditions, and long-term recharge to and discharge from this regime will not vary significantly.

HYDROLOGIC SETTING

The hydrologic framework of Subarea 3 contains dynamic hydrologic systems consisting of aquifers, streams, reservoirs, and floodplains. These systems are interconnected and form a single hydrologic entity that is stressed by natural hydrologic and climatic factors and by anthropogenic factors (fig. 5). For this discussion, the hydrologic framework is separated into two systems: the ground-water system and surface-water system.

Ground-Water System

The ground-water system forms as geology and climate interact. Geology primarily determines the aquifer media, as well as the natural quality and quantity of ground water. Climate primarily influences the quantity of ground water.

Geology

A detailed description of the diverse and complex geology of Subarea 3 is beyond the scope of this study; however, a brief description of the geology of the subarea is presented, based on selected published descriptions of various geologic investigations. The "Selected References" section of this report lists selected geologic investigations.

The geologic sequence of Subarea 3 is mainly comprised of older sedimentary units exposed in the northern part of the area that are overlain by younger units that sequentially crop out south of each underlying unit. These geologic units generally dip south-southeastward at about 35 feet per mile from a featheredge at the Fall Line. The Fall Line is a physiographic boundary that generally coincides with the inner margin of Coastal Plain strata, and also approximates the northern boundary of Subarea 3 in Georgia and eastern Alabama.

A small part of Subarea 3 lies within the Piedmont Province (fig. 2) at the northern edge of the study area. The study area was defined this way to accommodate stream-drainage areas and streamflow-measurement sites. The igneous and metamorphic rocks exposed in this small part of the subarea are relatively impermeable and do not comprise a major aquifer in the study area.

The Coastal Plain sediments were deposited during a series of transgressions and regressions of the sea. Accordingly, the rocks represent depositional environments ranging from fluvial to shallow marine, with the exact location of each environment depending upon the relative positions of land masses, shorelines, and streams at a particular point in geologic time. Fluctuating depositional conditions account for the observed variations in sediment lithology in Subarea 3. As such, Coastal Plain sediments are comprised largely of sand and interbedded or lensoidal deposits of clay. Generally, the thickness and areal extent of most clays deposits are relatively small near the inner Coastal Plain margin; also, the distribution of these deposits is local. The thickness and areal extent of laterally continuous deposits of sand and clay progressively increase seaward of the outcrop area (Faye and Mayer, 1990).

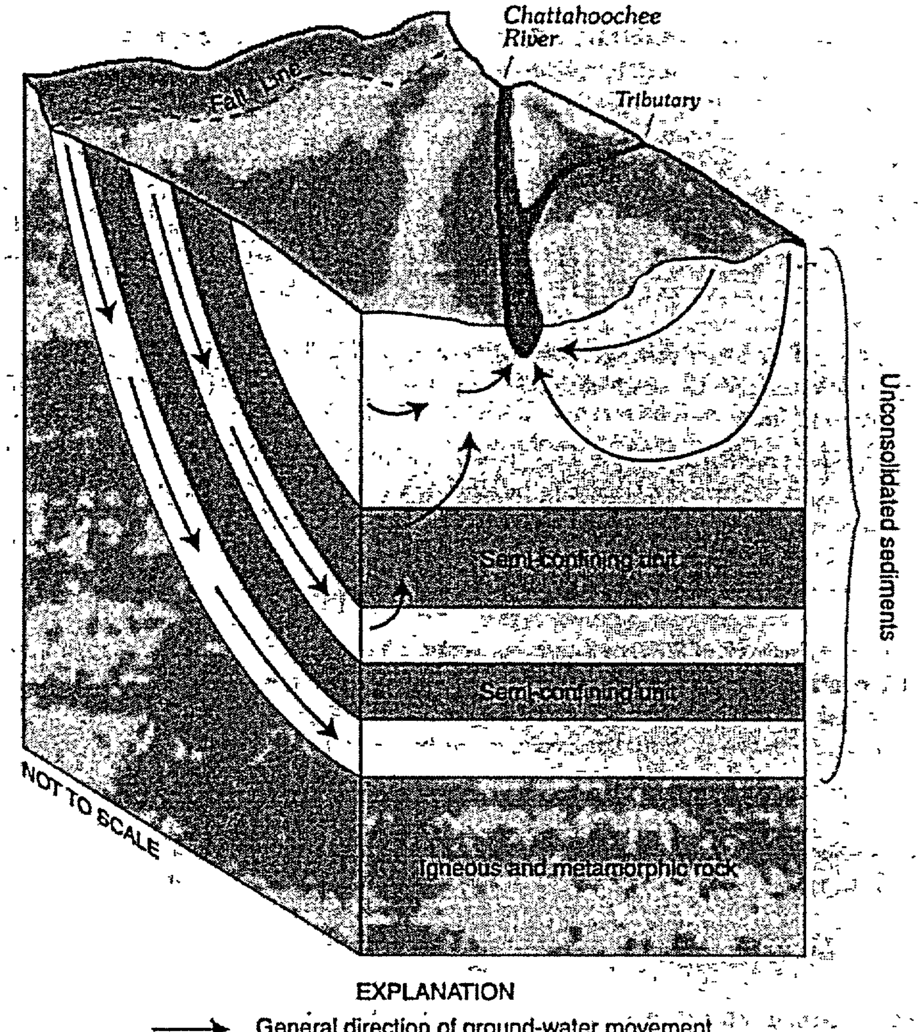


Figure 5. Conceptual ground-water and surface-water systems in Subarea 3: porous-media aquifer in unconsolidated sediments of the Coastal Plain Province.

Discussion of the geology of the western part of Subarea 3 may be found in Monroe (1941), Eargle (1948), Scott (1960, 1962a,b, 1964), Shamberger and others (1968), Newton, Golden, Avrett, and Scott, (1966), Newton, McCain, and Avrett (1968), MacNeil (1946), Toulim and LaMoreaux (1963), Causey and others (1967), and Raymond and Copeland (1987). Discussion of the geology of the eastern part of Subarea 3 may be found in Stephenson and Veatch (1915), Cooke (1943), Herrick (1961), Marsalis and Friddell (1975), Gibson (1982), and Reinhardt and others (1994).

Aquifers

The complexly interbedded Coastal Plain strata that occurs in Subarea 3 contain numerous aquifers and confining units (fig. 6). Much of these strata display significant facies changes, areally and vertically. The facies changes result in a complex physical distribution of hydraulic characteristics. The complexity of this distribution is reflected in the literature, and is also somewhat exacerbated by the area being dissected by a State boundary, which has constrained several rigorous field investigations.

The uppermost aquifer in Subarea 3 is the Floridan aquifer system which occurs in the extreme south-eastern corner. The Floridan aquifer system is thin in this area and is not considered a major aquifer. This boundary of Subarea 3 was selected to incorporate specific streamflow data stations; and consequently, incorporates areas where thin deposits of the Floridan aquifer system occur.

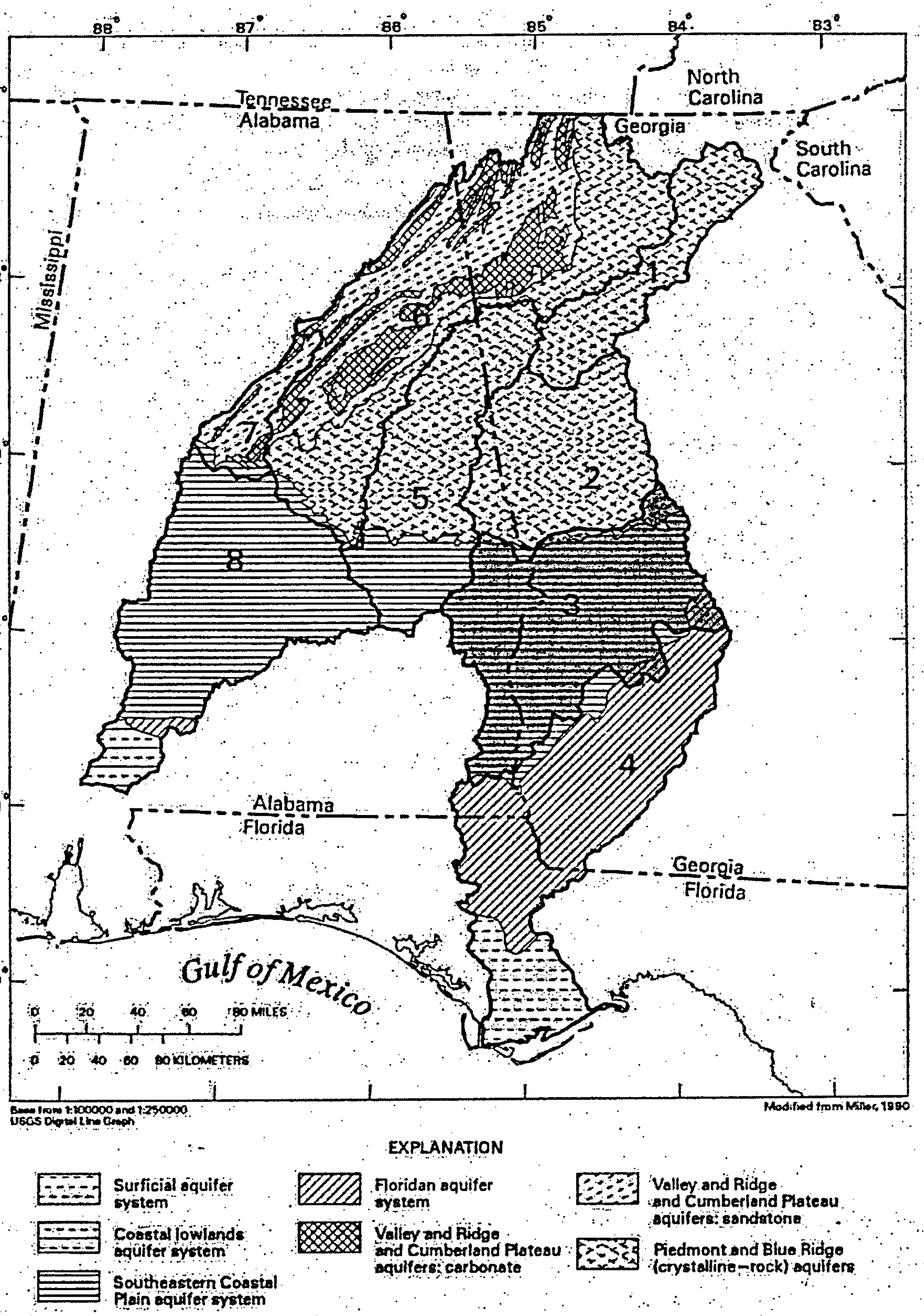


Figure 6. Major aquifers and subareas in the Apalachicola–Chattahoochee–Flint and Alabama–Coosa–Tallapoosa River basins.

The uppermost major aquifer in Subarea 3 is known as the Claiborne aquifer in Georgia (Long, 1989) and the Lisbon aquifer in Alabama (Scott and Cobb, 1988) (table 2). The recharge area generally coincides with the outcrop area, which extends from northern Houston and Henry Counties, Ala., northeast across central Clay and Randolph Counties, Ga., and through southern Webster, Sumter, and Dooly Counties, Ga. The recharge area extends southeast to the approximate edge of Subarea 3 where it is overlain in places by the Floridan aquifer system.

Table 2. Generalized geologic units in Subarea 3, and water-bearing properties, chemical characteristics, and well yields
[—, no available data; >, greater than]

Physiographic province	Geologic age and lithology	Aquifer type	Water-bearing properties and chemical characteristics	Well yield
Coastal Plain	Eocene—calcareous, fossiliferous, glauconitic clayey sands of the Tallahatta Formation and parts of overlying Lisbon and underlying Hatchetigbee Formations	Lisbon aquifer (Alabama); Claiborne aquifer (Georgia); porous media	moderate supply source; calcium bicarbonate type water, generally basic (pH >7) and moderately hard to hard (Long, 1989)	generally less than 100 gallons per minute (DeJarnette, 1989)
Do.	Paleocene—In Alabama, basal part of Tuscahoma Sand, fossiliferous, glauconitic sand zones and sandstone of the underlying Nanafalia Formation; and limestone and calcareous sands of the Clayton Formation; —In Georgia, the middle limestone unit of the Clayton Formation and supra-adjacent sand units.	Nanafalia–Clayton aquifer (Alabama); Clayton aquifer (Georgia); porous media	moderate supply source; calcium bicarbonate type water, moderately hard to hard	about 100 to 700 gallons per minute (Clarke and others, 1984; Scott and Cobb, 1988)
Do.	Upper Cretaceous—In Georgia, very fine to coarse sand of the Providence Sand; —In Alabama, fine-to-coarse grained micaceous, carbonaceous sand and clay layers of the Providence Sand, and sand beds of the Ripley Formation, Cusseta Sand Member; and sand and sandy clay of the Blufftown Formation (Kidd, 1987)	Providence aquifer (Georgia;) Providence–Ripley aquifer (Alabama); porous media	moderate to major supply source; sodium bicarbonate type water, generally soft (Clarke and others, 1983)	generally ranges from 100 to 300 gallons per minute (Clarke and others, 1983; Kidd, 1987)
Do.	Upper Cretaceous—In Georgia, sand, coarse with thinly bedded carbonaceous clay of the Cusseta Sand; —In Alabama, the Cusseta Sand Member is part of the Ripley Formation; and where present, part of the Providence–Ripley aquifer (Raymond and Copeland, 1987)	Cusseta aquifer (Georgia); porous media	moderate supply source; generally sodium bicarbonate type water, possibly slightly acidic (Pollard and Vorhis, 1980)	ranges from 50 to more than 1,000 gallons per minute (Pollard and Vorhis, 1980)
Do.	Upper Cretaceous—In Georgia, medium to coarse quartzite sand of the Blufftown Formation; —In Alabama, sands of the Blufftown Formation comprise the lowest part of the Providence–Ripley aquifer	Blufftown aquifer (Georgia); porous media	marginal supply source, not commonly used alone; sodium bicarbonate type water	—
Do.	Upper Cretaceous—In Georgia and Alabama, fine to very coarse calcareous sand of the Eutaw Formation; —In Georgia, also gravelly, micaceous, arkosic sand of the Tuscaloosa Formation (Pollard and Vorhis, 1980)	Eutaw aquifer; porous media	major source in Alabama; moderate source in Georgia; sodium bicarbonate type water; slightly acidic	range from 250 to more than 600 gallons per minute
Do.	Upper Cretaceous—In Alabama, sand fine-to-very coarse-grained, sandy clay, and sandstone (Kidd, 1987)	Tuscaloosa aquifer; porous media	major source in Alabama	about 150 gallons per minute in Alabama (Kidd, 1987)

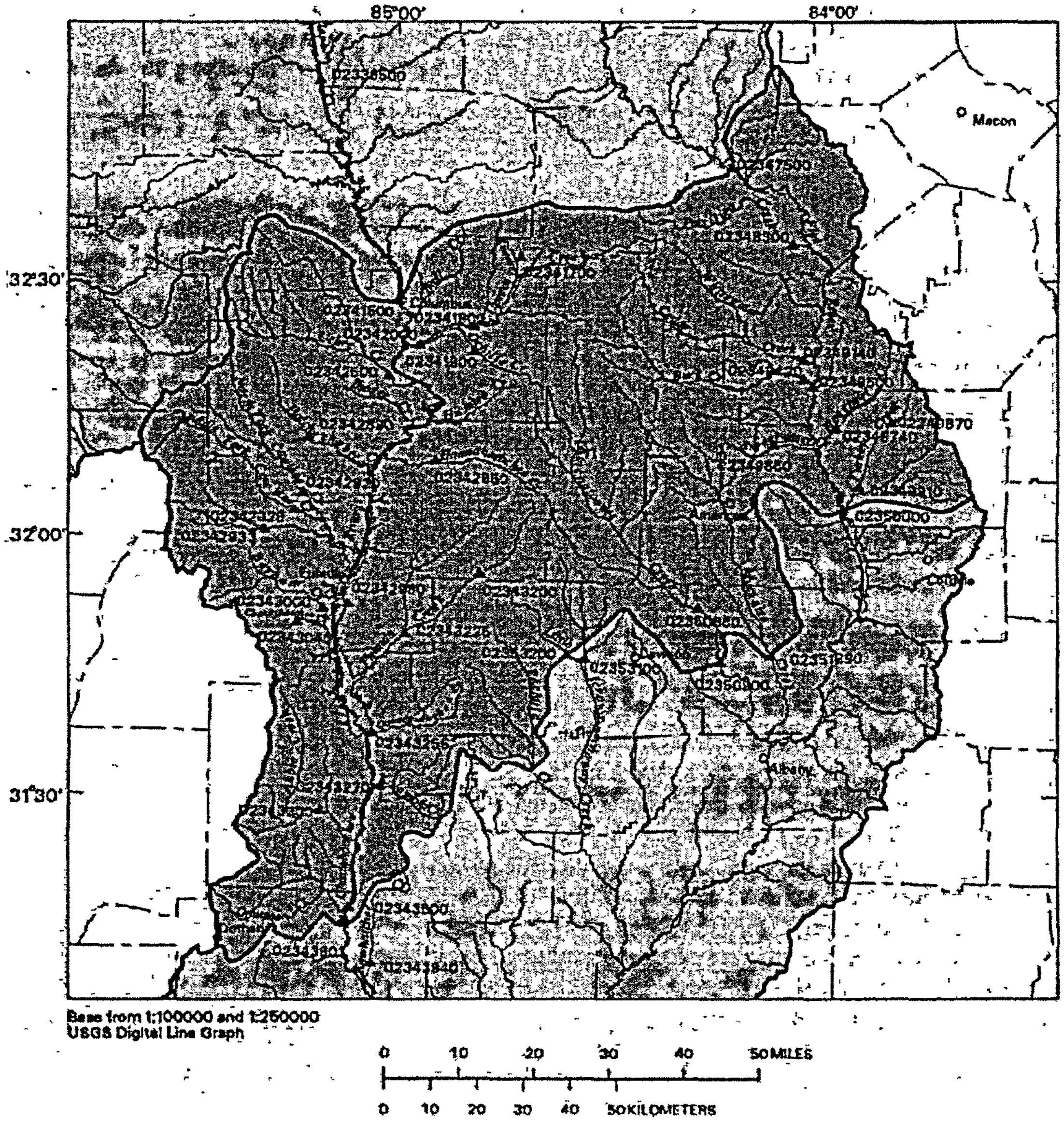
Cropping out north of and underlying the Claiborne aquifer is the Clayton aquifer, referred to as the Nanfalia–Clayton aquifer in Alabama. Confining the Clayton aquifer below the Claiborne aquifer is the Wilcox confining unit, which consists of parts of the Hatchetigbee, Tuscahoma, Nanafalia and Clayton Formations in Georgia (Long, 1989), and the clay units in the upper part of the Tuscahoma Sand in Alabama (Scott and Cobb, 1988). The recharge area of the Clayton/Nanafalia–Clayton aquifer generally coincides with the outcrop area, which extends form northern Henry County, Ala., and northwest through Quitman, southern Stewart and Webster Counties, Ga. The recharge area extends southeast to the northwestern edge of sediments of the overlying Claiborne aquifer.

Cropping out north of and underlying the Clayton/Nanafalia–Clayton aquifer is the Providence aquifer (Clarke and others, 1983) and its western equivalent, the Providence-Ripley aquifer (Kidd, 1987). Confining the Providence/Providence–Ripley aquifers below the Clayton/Nanafalia–Clayton aquifer is the Clayton–Providence confining unit, where present (Long, 1989). The recharge area of the Providence/Providence–Ripley aquifers extends from central Barbour County, Ala., northeast through Quitman, central Stewart, southern Marion Counties, Ala., and across northern Macon County, Ga. The recharge area of the Providence/Providence–Ripley aquifers extends in an irregular fashion southwest to the northwest edge of sediments of the overlying Clayton/Nanafalia–Clayton aquifer.

Cropping out north of and underlying the Providence/Providence–Ripley aquifers in Alabama is the Eutaw aquifer, comprised of the Eutaw Formation (Kidd, 1987) which is subsequently underlain by the Tuscaloosa aquifer. In Georgia, these aquifers are present but are difficult to distinguish, and are mapped as one unit (Pollard and Vorhis, 1980). The recharge area of the Eutaw and Tuscaloosa aquifers extends from Russell County Ala., across northern Chattahoochee and Marion Counties, Ga., and northwest across northern Taylor and southern Crawford Counties, Ga.

Surface-Water System

The surface-water system in Subarea 3 includes the Chattahoochee River and its tributaries in Georgia and Alabama and the Flint River and its tributaries in Georgia (fig. 7). The drainage area of the Flint River is about 2,810 mi^2, and the drainage area of the Chattahoochee River is about 3,370 mi^2. The drainage area of the Chattahoochee River is almost equally divided between the two States, encompassing about 1,670 mi^2 in Alabama and 1,700 mi^2 in Georgia. The major tributaries to the Chattahoochee River in Georgia include Bull Creek, Upatoi Creek, Hichitee Creek, Hannahatchee Creek, Pataula Creek, Cemochechobee Creek, and Kolomoki Creek. Major tributaries in Alabama include Uchee Creek, Ihagee Creek, Hatchechubbee Creek, Cowikee Creek, Barbour Creek, and Abbie Creek. Major tributaries to the Flint River include Patsiliga Creek, Whitewater Creek, Buck Creek, Hogcrawl Creek, Turkey Creek, Muckalee Creek, Kinchafoonee Creek, Ichawaynochaway Creek and Pachitla Creek. Stream-gaging station data exists for several, but not all, tributary streams. Stream-gaging stations noted in this study are listed in table 3.



EXPLANATION

02343940 ▲ Stream-gaging station and number

Figure 7. Selected stream-gaging stations, Subarea 3.

Table 3. Selected active and discontinued continuous-record stream-gaging stations in the Chattahoochee and Flint River basins, Subarea 3
[—, not applicable]

Station number	Station name	Drainage area (square miles)	Type of stream	Major aquifer drained	Period of record of unregulated flow	Mean-annual stream discharge (cubic feet per second)
02339500	Chattahoochee River at West Point, Ga.	3,550	regional	Providence	1896-1955	5,625
02341500	Chattahoochee River at Columbus, Ga.	4,670	do.	do.	none	—
02341800	Upatoi Creek near Columbus, Ga.	342	tributary	do.	1969-present	1/451
02342500	Uchee Creek near Fort Mitchell, Ala.	322	do.	do.	1947-present	2/436
02342933	South Fork Cowikee Creek near Batesville, Ala.	112	do.	do.	1964-71, 1975-present	2/120
02343200	Pataula Creek near Lumpkin, Ga.	70.0	do.	do.	1959-71	3/87.8
02343300	Abbie Creek near Haleburg, Ala.	146	do.	do.	1959-71, 1975-92	2/198
02343500	Chattahoochee River at Columbia, Ala.	8,040	regional	do.	none	—
02343801	Chattahoochee River at Andrews Lock and Dam, at Columbia, Ala.	8,210	do.	do.	none	—
02347500	Flint River near Culloden, Ga.	1,850	do.	do.	1912-22, 1929-30, 1938-present	1/2,330
02349000	Whitewater Creek below Rambulette Creek, near Butler, Ga.	93.4	tributary	do.	1952-71	3/164
02349500	Flint River at Montezuma, Ga.	2,900	regional	do.	1905-08, 1912, 1931-present	1/3,542
02349900	Turkey Creek at Byromville, Ga.	45.0	tributary	do.	1959-present	1/45.5
02350600	Kinchafoonee Creek at Preston, Ga.	197	do.	do.	1952-77	4/215
02351890	Muckalee Creek at State Route 195, near Leesburg, Ga.	362	do.	do.	1981-present	1/358

1/Stokes and McFarlane (1994).
2/Pearman and others (1994).
3/U.S. Geological Survey (1972).
4/U.S. Geological Survey (1978).

The Chattahoochee River flows south into the subarea from the Piedmont Province to the north. Within Subarea 3, the Chattahoochee River defines the boundary between the States of Alabama and Georgia. The river flows south across the successively exposed recharge areas of the aquifers, which trend east to west. Streamflow of the Chattahoochee River in Subarea 3 has been influenced by regulation upstream at Lake Harding since 1926, at Lake Sidney Lanier since 1955, and at West Point Lake since 1975 (Stokes and others, 1992). The Flint River also flows south into Subarea 3 from the Piedmont Province to the north, crossing the exposed recharge areas of the aquifers. Walter F. George Reservoir near Ft. Gaines, Ga., is the only major impoundment in Subarea 3 (table 4). Reservoir filling began in May 1962 and the reservoir became operational for navigational and power-generation purposes in March 1963. Lake Sidney Lanier is an upstream impoundment in Subarea 1 and Lake Harding is an upstream impoundment in adjacent Subarea 2 near the boundary of Subareas 2–3.

Table 4. Major impoundment in the Chattahoochee River basin, Subarea 3

Impoundment structure	Station number	Location	Installation date	Major uses	Total storage capacity (acre-feet)
Walter F. George Dam	02343240	Clay County, Ga.	1963	navigation and power generation	1/934,400

1/Stokes and McFarlane (1994).

For this report, the mean-annual stream discharge of a surface-water drainage measured at a gaging station is defined as the arithmetric average of all reported annual discharges for the selected period of record. Note that, by definition, the stream discharge includes both surface runoff and baseflow.

GROUND-WATER DISCHARGE TO STREAMS

Streamflow is comprised of two major components—a typical hydrograph integrates these components as:

- overland or surface runoff, represented by peaks, indicating rapid response to precipitation; and
- baseflow, represented by the slope of streamflow recession, indicating ground-water discharge to the stream.

In relation to the conceptual model, baseflow in streams is comprised of contributions from the local, intermediate, or regional ground-water flow regimes. Estimates of recharge to the ground-water system are minimum estimates because the budgets were developed as ground-water discharge to streams, and do not include ground water discharged as evapotranspiration, to wells, or ground water that flows downgradient into other aquifers beyond the topographic boundary defining Subarea 3. Local flow regimes likely are the most affected by droughts. Discharge measured in unregulated streams and rivers near the end of a drought should be relatively steady and composed largely of baseflow.

Mean-Annual Baseflow

Mean-annual baseflow was determined by averaging results of streamflow hydrograph-separation analyses for discrete water years representative of low-, mean-, and high-flow conditions in the Chattahoochee and Flint Rivers and their major tributaries. Streamflow data used to determine mean-annual baseflow at continuous-record gaging stations were selected according to periods of record when flow was unregulated. The hydrograph-separation program SWGW (Mayer and Jones, 1996) was applied to estimate mean-annual baseflow at eight continuous-record gaging stations in the Chattahoochee River basin and at three continuous-record gaging stations in the Flint River basin (table 5). For each gaging station, two recession indices are listed in table 5; one represents the rate of streamflow recession during the major rise period, generally in winter, and the other major recession period, generally in summer. Some variables that are supplied by the user to SWGW for each hydrograph separation are not listed in table 5, but can be obtained from the U.S. Geological Survey, Georgia District Office, Atlanta, Ga. These variables include the time-base (in days) from the peak to the cessation of surface runoff, the time period (the beginning and ending months) for application of the summer recession index, and the adjustment factor for the displacement of the recession curve. See Rutledge (1993) for a discussion of time-base, and Mayer and Jones (1996) for a discussion of the other user-supplied variables.

The mean-annual baseflow, in cubic feet per second; and the related unit-area baseflow, in cubic feet per second per square mile ($ft^3/s/mi^2$), were computed for each station. The station Chattahoochee River at Columbus, Ga. (02341500), is located at the northern edge of Subarea 3 and has been regulated by Lake Harding since 1926; thus, preventing use of hydrograph-separation methodology. Mean-annual baseflow at the Chattahoochee River at Columbus, Ga., therefore, was estimated from the upstream station at Chattahoochee at West Point, Ga. (02339500) (table 5). Faye and Mayer (1990, fig. 7) demonstrate the comparability of streamflow at these two stations, and the use of West Point gage data as an estimator of streamflow at the Columbus gage. Likewise, streamflow records for Kinchafoonee Creek at the southern boundary of the area were unavailable, and mean-annual baseflow was estimated using daily streamflow data at the station at nearby Muckalee Creek at State Route 195 near Leesburg, Ga. (02351890) (table 2).

Baseflow in the Chattahoochee River

The reach of the Chattahoochee River that transects Subarea 3 is bounded on the north by station 02341500, at Columbus, Ga., and to the south by station 02343500, at Columbia, Ala. (fig. 7). Through this reach, the river defines the boundary between the States of Alabama and Georgia. The mean-annual baseflow at these stations was estimated to be about 4,640 cubic feet per second (ft^3/s) and 7,460 ft^3/s, respectively (table 5). The difference in these values, 2,820 ft^3/s represents the sum of the baseflow from the intervening area between the gages under average conditions. This approximation utilizes none of the available tributary streamflow data and is considered to be of low confidence. Tributary streamflow data provide a more detailed analysis of the ground- and surface-water relation.

Table 5. Mean-annual stream discharge, estimated annual and mean-annual baseflow, and unit-area mean-annual baseflow at selected gaged streams in the Chattahoochee and Flint River basins, Subarea 3
[P, porous media; —, not available or not applicable]

Station number	Station name	Type of stream	Drainage area (square miles)	Major aquifer type	Recession index: Winter (days)	Recession index: Summer (days)	Water year	Flow conditions	Mean-annual stream discharge[1] (cubic feet per second)	Annual baseflow[2], [3] (cubic feet per second)	Mean-annual baseflow[3], [4] (cubic feet per second)	Unit-area mean-annual baseflow[3], [5] (cubic feet per second per square mile)
	CHATTAHOOCHEE RIVER BASIN											
	Georgia Contributing Area											
02339500	Chattahoochee River at West Point, Ga.	regional	3,550	P	140	100	1941	Low	3,018	1,960		
							1929	High	9,839	4,970	3,530	0.994
							1929	High	9,839	4,970		
02341500	Chattahoochee River at Columbus, Ga	regional	4,670	P	—	—	—	—	—	—	[6]4,640	—
—	intermediate drainage area upstream of Bull Creek at mouth at Columbus, Ga.	—	2	P	—	—	—	—	—	—	[7]1	—
—	Bull Creek at mouth at Columbus, Ga.	tributary	74	P	—	—	—	—	—	—	[7]52	—
—	intermediate drainage area between mouths of Bull Creek and Upatoi Creek near Columbus, Ga.	—	14	P	—	—	—	—	—	—	[7]9.9	—
02341800	Upatoi Creek near Columbus, Ga.	tributary	342	P	100	50	1988	Low	253	179		
							1982	Average	473	257	251	.734
							1973	High	601	317		
02342000	Upatoi Creek at Fort Benning, Ga.	do.	447	P	109	38	1945	Low	588	246		
							1946	Average	626	310	316	.707
							1947	High	726	391		
—	Upatoi Creek at mouth at Fort Benning, Ga.	do.	455	P	—	—	—	—	—	—	[7]322	—
—	intermediate drainage area between mouths of Upatoi and Hichitie Creeks, Ga.	—	66	P	—	—	—	—	—	—	[7]47	—
—	Hichitee Creek at mouth near Ft. Benning, Ga.	do.	55	P	—	—	—	—	—	—	[8]20	—
—	intermediate drainage area between mouths of Hichitee Creek and Hannahatchee Creek at Union, Ga	—	14	P	—	—	—	—	—	—	8/ 5	—
02342850	Hannahatchee Creek at Union, Ga.	tributary	121	P	—	—	—	—	—	—	[9]44	.364

Table 5. Mean-annual stream discharge, estimated annual and mean-annual baseflow, and unit-area mean-annual baseflow at selected gaged streams in the Chattahoochee and Flint River basins, Subarea 3—Continued

[P, porous media; —, not available or not applicable]

Station number	Station name	Type of stream	Drainage area (square miles)	Major aquifer type	Recession index: Winter (days)	Recession index: Summer (days)	Water year	Flow conditions	Mean-annual stream discharge[1] (cubic feet per second)	Annual baseflow[2, 3] (cubic feet per second)	Mean-annual baseflow[3, 4] (cubic feet per second)	Unit-area mean-annual baseflow[3, 5] (cubic feet per second per square mile)
—	Hannahatchee Creek at mouth near Omaha, Ga.	do.	146	P	—	—	—	—	—	—	[8]53	—
—	intermediate drainage area between mouths of Hannahatchee Creek and Pataula Creek near Lumpkin, Ga.	—	164	P	—	—	—	—	—	—	[10]92	—
02343200	Pataula Creek near Lumpkin, Ga.	tributary	70	P	75	50	1968	Low	40	34		
							1961	Average	84	47	53	.757
							1964	High	153	77		
—	Pataula Creek at mouth near Fort Gaines, Ga.	do.	394	P	—	—	—	—	—	—	[11]298	—
—	intermediate drainage area between mouths of Pataula Creek and Cemochechobee Creek, Ga.	—	41	P	—	—	—	—	—	—	[12]16	—
02343255	Cemochechobee Creek at Fort Gaines, Ga.	do.	103	P	—	—	—	—	—	—	[9]39	.379
—	Cemochechobee Creek at mouth near Fort Gaines, Ga.	tributary	106	P	—	—	—	—	—	—	[12]40	—
—	intermediate drainage area between mouths of Cemochechobee and Kolomoki Creeks, Ga.	—	19	P	—	—	—	—	—	—	[12]7.2	—
—	Kolomoki Creek at mouth, Ga.	tributary	102	P	—	—	—	—	—	—	[12]39	—
—	intermediate drainage area below mouth of Kolomoki Creek, Ga.	—	67	P	—	—	—	—	—	—	[12]25	—
	Alabama Contributing Area											
—	intermediate drainage area upstream of Uchee Creek at mouth at Fort Mitchell, Ala.	—	30	P	—	—	—	—	—	—	[13]12	—
02342500	Uchee Creek near Fort Mitchell, Ala.	tributary	322	P	109	38	1985	Low	185	67		
							1959	Average	447	130	130	.404
							1964	High	910	192		
—	Uchee Creek at mouth at Fort Mitchell, Ala.	tributary	334	P	—	—	—	—	—	—	13/135	—

Table 5. Mean-annual stream discharge, estimated annual and mean-annual baseflow, and unit-area mean-annual baseflow at selected gaged streams in the Chattahoochee and Flint River basins, Subarea 3—Continued

[P, porous media; —, not available or not applicable]

Station number	Station name	Type of stream	Drainage area (square miles)	Major aquifer type	Recession index: Winter (days)	Recession index: Summer (days)	Water year	Flow conditions	Mean-annual stream discharge[1/] (cubic feet per second)	Annual baseflow[2/, 3/] (cubic feet per second)	Mean-annual baseflow[3/, 4/] (cubic feet per second)	Unit-area mean-annual baseflow[3/, 5/] (cubic feet per second per square mile)
—	intermediate drainage area between mouths of Uchee and Ihagee Creeks, Ala.	—	11	P	—	—	—	—	—	—	[13/]4.4	—
—	Ihagee Creek at mouth near Holy Trinity, Ala.	tributary	34	P	—	—	—	—	—	—	[13/]14	—
—	intermediate drainage area between mouths of Ihagee and Hatchechubbee Creeks, Ala.	—	25	P	—	—	—	—	—	—	[13/]10	—
02342890	Hatchechubbee Creek near Pittsview, Ala.	tributary	51	P	—	—	—	—	—	—	[9/]7.3	.143
—	Hatchechubbee Creek at mouth near Eufaula, Ala.	tributary	151	P	—	—	—	—	—	—	[14/]22	—
—	intermediate drainage area between mouths of Hatchechubbee Creek and South Fork Cowikee Creek near Batesville, Ala.	—	56	P	—	—	—	—	—	—	[15/]8.0	—
02342933	South Fork Cowikee Creek near Batesville, Ala.	tributary	112	P	79	40	1969	Low	77	16		
							1977	Average	106	26	23	.205
							1978	High	158	28		
02343940	Cowikee Creek at mouth near Eufaula, Ala.	tributary	464	P	—	—	—	—	—	—	[16/]65	.140
—	intermediate drainage area between mouths of Cowikee and Barbour Creeks, Ala.	—	49	P	—	—	—	—	—	—	[17/]9.1	—
02343000	Barbour Creek at mouth near Eufaula, Ala.	tributary	95	P	—	—	—	—	—	—	[18/]22	.232
—	intermediate drainage area between mouths of Barbour Creek and Cheneyhatchee Creek near Eufaula, Ala.	—	4	P	—	—	—	—	—	—	[19/]1.6	—
02343040	Cheneyhatchee Creek near Eufaula, Ala.	tributary	28	P	—	—	—	—	—	—	[16/]16	.571
—	Cheneyhatchee Creek at mouth, Ala.	tributary	54	P	—	—	—	—	—	—	[20/]31	—
—	intermediate drainage area between mouths of Cheneyhatchee Creek and Abbie Creek near Haleburg, Ala.	—	136	P	—	—	—	—	—	—	[21/]89	—

Table 5. Mean-annual stream discharge, estimated annual and mean-annual baseflow, and unit-area mean-annual baseflow at selected gaged streams in the Chattahoochee and Flint River basins, Subarea 3—Continued

[P, porous media; —, not available or not applicable]

Station number	Station name	Type of stream	Drainage area (square miles)	Major aquifer type	Recession index: Winter (days)	Recession index: Summer (days)	Water year	Flow conditions	Mean-annual stream discharge[1] (cubic feet per second)	Annual baseflow[2,3] (cubic feet per second)	Mean-annual baseflow[3,4] (cubic feet per second)	Unit-area mean-annual baseflow[3,5] (cubic feet per second per square mile)
02343300	Abbie Creek near Haleburg, Ala.	tributary	146	P	81	48	1988	Low	120	72		
							1980	Average	207	113	108	.740
							1983	High	272	140		
—	Abbie Creek at mouth.	do.	196	P	—	—	—	—	—	—	[22]145	—
—	intermediate drainage area downstream of Abbie Creek at mouth	—	31	P	—	—	—	—	—	—	[22]23	—
02343500	Chattahoochee River at Columbia, Ala.	regional	8,043	P	222	111	1941	Low	5,860	3,030		
							1952	Average	9,590	6,550	7,460	.928
							1949	High	14,800	12,800		
						FLINT RIVER BASIN						
02347500	Flint River near Culloden, Ga.	regional	1,850	P	85	55	1941	Low	1,220	654		
							1941	Low	1,220	654	1,160	.628
							1949	High	2,370	1,480		
02349500	Flint River near Montezuma, Ga.	do.	2,900	P	113	54	1941	Low	2,260	1,680		
							1957	Average	3,760	1,740	2,000	.690
							1949	High	4,200	2,590		
02350000	Flint River near Vienna, Ga.	do.	3,390	P	—	—	—	—	—	—	[23]2,340	—
02351890	Muckalee Creek at State Route 195 near Leesburg, Ga.	tributary	362	P	85	55	1988	Low	210	132		
							1985	Average	315	157	183	.506
							1984	High	453	260		
02350900	Kinchafoonee Creek near Dawson, Ga.	do.	527	P	—	—	—	—	—	—	[24]267	—
02353100	Ichawaynochaway Creek near Graves, Ga.	do.	118	P	—	—	—	—	—	—	[24]60	—
02353200	Little Ichawaynochaway Creek near Shellman, Ga.	do.	52	P	—	—	—	—	—	—	[24]26	—

Table 5. Mean-annual stream discharge, estimated annual and mean-annual baseflow, and unit-area mean-annual baseflow at selected gaged streams in the Chattahoochee and Flint River basins, Subarea 3—Continued

[P, porous media; —, not available or not applicable]

Station number	Station name	Type of stream	Drainage area (square miles)	Major aquifer type	Recession index: Winter (days)	Recession index: Summer (days)	Water year	Flow conditions	Mean-annual stream discharge[1] (cubic feet per second)	Annual baseflow[2,3] (cubic feet per second)	Mean-annual baseflow[3,4] (cubic feet per second)	Unit-area mean-annual baseflow[3,5] (cubic feet per second per square mile)
02353400	Pachitla Creek (at subarea boundary) near Edison, Ga.	do.	190	P	—	—	—	—	—	—	[24]96	—

[1]From annually published U.S. Geological Survey data reports; for example, Pearman and others (1994) or Stokes and McFarlane (1994).
[2]Estimated using the SWGW program (Mayer and Jones, 1996).
[3]Values are reported to three significant digits to maintain the numerical balance of the water budget; implication of accuracy to the degree shown is not intended.
[4]Estimated by averaging discharges for low, average, and high flow years for the period of unregulated flow.
[5]Discharge divided by drainage area.
[6]Estimate based on unit-area discharge at Chattahoochee River at West Point, Ga.
[7]Estimate based on unit-area discharge at Upatoi Creek at Fort Benning, Ga.
[8]Estimate based on unit-area discharge at Hannahatchee Creek at Union, Ga.
[9]Estimate based on MOVE.1 (Hirsch, 1982) statistical correlation with a continuous-record station.
[10]Estimate based on mean of unit-area discharges at Hannahatchee Creek at Union, Ga., and at Pataula Creek near Lumpkin, Ga. [(0.364 + 0.757 2 = 0.560 cubic feet per second per square mile)].
[11]Estimate based on unit-area discharge at Pataula Creek near Lumpkin, Ga.
[12]Estimate based on unit-area discharge at Cemochechobee Creek at Fort Gaines, Ga.
[13]Estimate based on unit-area discharge at Uchee Creek near Fort Mitchell, Ala.
[14]Estimate based on unit-area discharge at Hatchechubbee Creek near Pittsview, Ala.
[15]Estimate based on mean of unit-area discharge at Hatchechubbee Creek at Pittsview, Ala., and Cowikee Creek at mouth near Eufaula, Ala. [(0.143 + 0.140 2 = 0.142 cubic feet per second per square mile)].
[16]Estimate based on graphical correlation with a continuous-record station.
[17]Estimate based on mean of unit-area discharge at Cowikee Creek at mouth near Eufaula, Ala., and Barbour Creek at mouth near Eufaula, Ala. [(0.140 + 0.232 2 = 0.186)].
[18]Estimate developed by computation of 60-percent flow duration of five years of streamflow record, which could not be analyzed by hydrograph-separation methodology.
[19]Estimate based on mean of unit-area discharge at Barbour Creek at mouth near Eufaula, Ala., and Cheneyhatchee Creek near Eufaula, Ala. [(0.232 + 0.571 2 = 0.402 cubic feet per second per square mile)].
[20]Estimate based on unit-area discharge at Cheneyhatchee Creek near Eufaula, Ala.
[21]Estimate based on mean of unit-area discharges at Cheneyhatchee Creek near Eufaula, Ala., and Abbie Creek near Haleburg, Ala. [(0.571 + 0.740 2 = 0.656 cubic feet per second per square mile)].
[22]Estimate based on unit-area discharge at Abbie Creek near Haleburg, Ala.
[23]Estimate based on unit-area discharge at Flint River near Montezuma, Ga.
[24]Estimate based on unit-area discharge at Muckalee Creek at State Route 195 near Leesburg, Ga.

To estimate the contribution to mean-annual baseflow from Alabama and Georgia separately, a gain analysis was performed using the tributary streams and intermediate drainage areas of each State. This analysis was performed using the hydrograph-separation method to estimate mean-annual baseflow at five continuous-record stations and, subsequently, in conjunction with estimation methods, estimate mean-annual baseflow for the tributary streams that have limited or no streamflow data. The discrete estimates of each State then were summed.

Streamflow data are available from continuous-record stations on Upatoi Creek, Ga. (0234200); Uchee Creek, Ala. (02342500); South Fork Cowikee Creek, Ala. (02342933); Pataula Creek, Ga. (02343200); and Abbie Creek, Ala. (02343300). These streams drain about one-third of the Subarea and are unevenly distributed over the area (fig. 7). The mean-annual baseflow at these five stations was estimated using the SWGW hydrograph-separation methodology, and are listed in table 2, along with respective unit-area discharges.

The flow duration of the mean-annual baseflow at these five continuous-record stations (0234200, 02342500, 02342933, 02343200, and 02343300) range from 57 to 67 percent, and averaged 62 percent. Therefore, a flow duration of 60 percent was chosen as approximately representative of mean-annual baseflow conditions. This indicates that the mean-annual baseflow component of streamflow is equaled or exceeded 60 percent of the time. Consequently, baseflow at several partial record gaging stations in Alabama and Georgia was estimated using the discharge computed at 60-percent flow duration. These estimates of mean-annual baseflow were converted to unit-area discharges and used to estimate baseflow from intermediate drainage areas and adjacent or nearby tributary streams. Estimates of mean-annual baseflow of ungaged streams and intermediate areas also were based on the unit-area mean-annual baseflow computed at one of the five continuous-record stations. All estimates of mean-annual baseflow using a surrogate unit-area discharge are identified in boldface type in table 5.

Estimated mean-annual baseflow from areas in Alabama and Georgia to the Chattahoochee River were computed by summation of the discrete discharges estimated for the tributary streams and intermediate drainage areas between the tributaries (table 5). The total mean-annual baseflow computed by summing the baseflow estimated from tributary streams and intermediate drainage areas is 1,618 ft^3/s (table 5). Of this, about one-third (591 ft^3/s) is from Alabama, and the remainder (1,027 ft^3/s) is from Georgia.

An approximate check of this tributary stream gain, 1,618 ft^3/s, is the net gain computed between the Chattahoochee River gages at Columbus, Ga., and Columbia, Ala., which bracket the reach of the tributary streams. The tributary stream gain is about 60 percent of the 2,820 ft^3/s net gain computed between the Chattahoochee River gages. The difference between the two computations of mean-annual baseflow to the Chattahoochee River may be the result of possible erroneous fundamental assumptions implicit to the tributary gain analysis, and to inaccuracies inherent in the applied estimation methods. The tributary gain analysis is based on the assumption that ground-water flow divides are coincident with surface-water topographic divides. Faye and Mayer (1990) postulated that this is not the case for the lower part of the Chattahoochee River (in Subarea 3)—that ground-water flow divides extend beyond the topographic divides that define the watershed draining to the lower part of the Chattahoochee River. Scott (1984) and Williams and others (1986a,b) clearly depict this condition on maps of the 1982 potentiometric surfaces of several Alabama aquifers in the southwestern corner of Subarea 3. Regional ground-water flow divides positioned beyond the surface-water divides would result in ground-water discharge to the Chattahoochee River from a contributing area substantially larger than the intervening area between the gages at Columbus, Ga., and Columbia, Ala. (table 5). Consequently, the Chattahoochee River net-gain analysis probably is an overestimate of mean-annual baseflow from the specified drainage area of Subarea 3.

Unknown error possibly was introduced in the Chattahoochee River net-gain analysis through the extrapolation of hydrograph-separation results from the station at West Point, Ga. (02339500), to the downstream station at Columbus, Ga. (02341500). Faye and Mayer (1990; fig. 7) demonstrated reasonable streamflow comparability but did not discuss the possible error inherent in the method. Any error or variability introduced in the unit-area discharge extrapolation is magnified by the 25-percent increase in drainage area between the stations at West Point and Columbus, Ga. Also, streamflow at the downstream station used in the net-gain analysis—Chattahoochee River at Columbia, Ala.—has been affected by the upstream control of streamflow at Lake Harding through the entire period-of-record of the station. Although far downstream, the effect of upstream control upon streamflow and, consequently, upon hydrograph-separation results at Columbia, Ala., is unknown, but possibly significant.

Unknown error in the estimates of mean-annual baseflow at both the Columbus, Ga., and Columbia, Ala., stations may also significantly affect the results of the Chattahoochee River net-gain analysis. A hypothetical error in streamflow measurement of plus or minus 5 percent at both stations results in a possible range of error in the reported net gain of more than plus or minus 20 percent. A hypothetical error of plus or minus 10 percent at both stations results in a range of net gain larger than the 1,618 ft^3/s computed from the tributary stream gain.

The estimates used to compute the tributary stream gain were made using deliberately conservative judgment and interpretation. Unit-area mean-annual baseflows were computed at gaging stations or partial record stations and then used to estimate baseflow downstream at the mouth of the tributary. Unit-area baseflow increases downstream in a basin of consistent hydrogeologic properties (Faye and Mayer, 1990) because more of the ground-water flow system is intersected with proximity of the tributary drain to the large regional drains, such as the Chattahoochee River (figs. 4, 5). This downstream increase in unit-area ground-water discharge is unaccounted for in the tributary stream analyses because unit-area tributary discharge frequently accounted for only part of the tributary drainage. Subjective adjustment of the discharge rates would add additional uncertainty to the analysis and was not attempted.

Although the magnitude and distribution of "unaccounted for" baseflow in the tributary stream-gain analysis is unknown, the distribution is assumed to be constant in time and uniform in space. The total and intermediate tributary drainage areas of the two States are about equal; therefore, any error that may result from the unit-area estimation method probably is evenly distributed between the States. Because all estimation methods were applied consistently and with disregard to location, any error in baseflow estimates also is considered evenly distributed between the States. Although the accuracy of the results in table 5 is unknown, the relative values are considered representative of the true baseflow.

Baseflow in the Flint River

In the eastern and south-central parts of Subarea 3, the Flint River is the major surface-water feature, functioning as the hydraulic sink for both surface and ground-water flow systems. Tributary streams (Muckalee Creek, Kinchafoonee Creek, Ichawaynochaway Creek, and Pachitla Creek) flow south out of Subarea 3 and then into the Flint River. Mean-annual baseflow in this part of Subarea 3 was computed from the mean-annual baseflow analysis of continuous streamflow data for three stations. Mean-annual baseflow in the Flint River where it enters Subarea 3 was computed for the gaging station 02347500, near Culloden, Ga. (table 5, fig. 7) using streamflow hydrograph separation. Similarly, mean-annual baseflow was computed farther downstream on the Flint River at gage 02349500, at Montezuma, Ga., (table 5, fig. 7). Mean-annual baseflow at station 02350000, Flint River near Vienna, Ga., was estimated using the mean-annual unit-area baseflow computed for the upstream gage 02349500, Flint River at Montezuma (table 5). Subsequently, mean-annual baseflow directly into the Flint River within Subarea 3 was computed by net-gain analysis between the stations at Culloden and Vienna, Ga. This net gain was about 1,180 ft^3/s. Mean-annual baseflow to Muckalee Creek was computed for station 02351890 (fig. 7) by streamflow-hydrograph separation. The resulting mean-annual unit-area baseflow was used to estimate mean-annual baseflow for the streams that flow south out of Subarea 3 and then into the Flint River (table 5, fig. 7). Results of these analyses are shown in boldface type in table 5. Summation of these values indicate that about 1,812 ft^3/s discharges from the ground-water flow system into the Flint River in Subarea 3 under mean-annual flow conditions (table 5).

Drought Flow for 1954 and 1986

Regional drought periods of 1938-45, 1950-63, and 1984-88 were marked by severe droughts in the years of 1941, 1954, and 1986 in the ACF and ACT River basins. Typically, the lowest mean-annual streamflow for the period of record occurred during one of these years. Streamflow probably was sustained entirely by baseflow near the end of these droughts. Near-synchronous discharge measurements at partial-record gaging stations or daily mean streamflow at continuous-record gaging stations near the end of these droughts were considered a quantitative estimate of near-minimum baseflow.

A significant base of streamflow data exists that describes the areal distribution of streamflow in Subarea 3 during the droughts of 1954 and 1986. Similar data for the 1941 drought for Subarea 3 are not comprehensive and were not applied to a mass-balance analysis. As noted previously, much of the areal streamflow data for the 1954 and 1986 droughts were collected during short periods of time, often only a few days. Studies describing these droughts (Thomson and Carter, 1955; Hale and others, 1989) indicated that many small tributary streams were dry, and that streamflow of the larger streams was diminishing near the end of the droughts. These observations are the basis for the assumption that the streamflow occurring in these streams during the 1954 and 1986 droughts was ground-water discharge (baseflow), and that overland runoff was nonexistent. Measured and estimated streamflows during the 1954 and 1986 droughts are listed in tables 6 and 7, respectively.

Table 6. Stream discharge during the drought of 1954, Subarea 3
[—, not applicable]

Station number	Station name	Type of stream	Drainage area, (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge[1/] (cubic feet per second per square mile)
	CHATTAHOOCHEE RIVER BASIN					
	Georgia Contributing Area					
02341500	Chattahoochee River at Columbus, Ga.	regional	4,670	10-03-54	[2/]679	0.145
—	intermediate drainage area upstream of Bull Creek at mouth, Georgia	—	2	—	[3/].15	—
02341529	Bull Creek at Georgia Highway 22 near Upatoi, Ga.	tributary	12.2	10-14-54	[4/].90	.074
[5/]	Bull Creek at mouth at Columbus, Ga.	do.	74	—	[3/]5.5	—
—	intermediate drainage area between mouths of Bull and Upatoi Creeks, Georgia	—	14	—	[6/]3.8	—
02342000	Upatoi Creek at Ft. Benning, Ga.	tributary	447	10-12-54	[7/]121	.271
[5/]278	Upatoi Creek at mouth at Ft. Benning, Ga.	do.	455	—	[6/]123	—
—	intermediate drainage area between mouths of Upatoi and Hichitee Creeks, Georgia	—	66	—	[6/]18	—
02342680	Hichitee Creek near Louvale, Ga.	tributary	39	10-26-54	[4/]7.9	.203
[5/]284A	Hichitee Creek at mouth near Ft. Benning, Ga.	do.	55	—	[8/]11	—
—	intermediate drainage area between mouths of Hichitee and Hannahatchee Creeks, Georgia	—	14	—	[9/]1.9	—
[5/]287	Hannahatchee Creek near Julia, Ga.	tributary	132	10-26-54	[4/]18	.136
[5/]287A	Hannahatchee Creek at mouth near Omaha, Ga.	do.	146	—	[9/]20	—
—	intermediate drainage area between mouths of Hannahatchee and Pataula Creeks, Georgia	—	164	—	[10/]36	—
02343225	Pataula Creek near Georgetown, Ga.	tributary	295	09-27-54	[4/]91	.308
[5/]296A	Pataula Creek at mouth near Fort Gaines, Ga.	do.	394	—	[11/]121	—
—	intermediate drainage area between mouths of Pataula and Cemochechobee Creeks, Georgia	—	41	—	[12/]13	—
02343255	Cemochechobee Creek at Fort Gaines, Ga.	tributary	103	10-21-54	[4/]32	.311
[5/]299C	Cemochechobee Creek at mouth near Fort Gaines, Ga.	do.	106	—	[12/]33	—
—	intermediate drainage area between mouths of Cemochechobee and Kolomoki Creeks, Georgia	—	19	—	[13/]8.4	—
02343260	Chattahoochee River at Fort Gaines, Ga.	regional	7,570	10-05-54	[4/]955	.126
02343270	Kolomoki Creek near Fort Gaines, Ga.	tributary	97	10-21-54	[4/]56	.577
[5/]103	Kolomoki Creek at mouth, Georgia	do.	102	—	[14/]59	—
—	intermediate drainage area downstream of mouth of Kolomoki Creek, Georgia	—	67	—	[14/]39	—

Table 6. Stream discharge during the drought of 1954, Subarea 3—Continued
[—, not applicable]

Station number	Station name	Type of stream	Drainage area, (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge[1] (cubic feet per second per square mile)
	Alabama Contributing Area					
—	intermediate drainage area upstream of Uchee Creek at mouth, Alabama	—	30	—	[15].72	—
02342500	Uchee Creek near Ft. Mitchell, Ala.	tributary	325	10-05-54	[7]7.9	.024
[16]18	Uchee Creek at mouth at Ft. Mitchell, Ala.	do.	334	—	[15]8.0	—
—	intermediate drainage area between mouths of Uchee and Ihagee Creeks, Alabama	—	11	—	[15].26	—
[16]19	Ihagee Creek at mouth near Holy Trinity, Ala.	tributary	34	—	[15].82	—
—	intermediate drainage area between mouths of Ihagee and Hatchechubbee Creeks, Alabama	—	25	—	[15].60	—
[16]22	Hatchechubbee Creek at mouth near Eufaula, Ala.	tributary	151	—	[17]5.1	—
—	intermediate drainage area between mouths of Hatchechubbee and Cowikee Creeks, Alabama	—	56	—	[17]1.9	—
02342940	Cowikee Creek near Eufaula, Ala.	tributary	464	—	[17]16	—
—	intermediate drainage area between mouths of Cowikee and Barbour Creeks, Alabama	—	49	—	[17]1.7	—
02342960	Chattahoochee River at Eufaula, Ala.	regional	6,730	10-05-54	[4]877	[18]0.130
02343000	Barbour Creek near Eufaula, Ala.	tributary	93	10-05-54	[7]3.2	.034
[16]32	Barbour Creek at mouth near Eufaula, Ala.	do.	97	—	[17]3.3	—
—	intermediate drainage area between mouths of Barbour and Cheneyhatchee Creeks, Alabama	—	4	—	[17].14	—
—	Cheneyhatchee Creek at mouth, Alabama	tributary	54	—	[17]1.8	—
—	intermediate drainage area between mouths of Cheneyhatchee and Abbie Creeks, Alabama	—	136	—	[19]13	—
02343300	Abbie Creek near Haleburg, Ala.	tributary	144	10-01-54	[4]22	.153
[16]37	Abbie Creek at mouth	do.	196	—	[20]30	—
—	intermediate drainage area downstream of Abbie Creek at mouth, Alabama	—	31	—	[20]4.7	—
02343500	Chattahoochee River at Columbia, Ala.	regional	8,040	10-06-54	[7]1,210	.150
	FLINT RIVER BASIN					
02347500	Flint River near Culloden, Ga.	regional	1,850	10-19-54	[7]97	.052
02348300	Patsiliga Creek at Reynolds, Ga.	tributary	139	10-22-54	[4]32	.230
[5]108A	Patsiliga Creek at mouth near Reynolds, Ga.	do.	142	—	[21]33	—
—	Beaver Creek at mouth near Reynolds, Ga.	do.	27	—	[21]6.2	—
02348400	Horse Creek at Ga. Highway 128, near Marshallville, Ga.	do.	30	10-21-54	[4]31	1.03
—	Horse Creek at mouth near Marshallville, Ga.	do.	37	—	[22]38	—
02349000	Whitewater Creek below Rambulette Creek near Butler, Ga.	do.	93.4	10-21-54	[7]132	1.41
[5]117A	Whitewater Creek at mouth near Oglethorpe, Ga.	do.	242	—	[23]341	—
02349350	Buck Creek near Ellaville, Ga.	do.	146	10-19-54	[4]90	.616
[5]121A	Buck Creek at mouth near Oglethorpe, Ga.	do.	232	—	[24]143	—
02349500	Flint River at Montezuma, Ga.	regional	2,900	10-19-54	[7]618	.213
—	Camp Creek at mouth near Andersonville, Ga.	tributary	61	—	[25]14	—
02349660	Sweetwater Creek at Andersonville, Ga.	do.	30	07-01-54	[7]12	.400

Table 6. Stream discharge during the drought of 1954, Subarea 3—Continued
[—, not applicable]

Station number	Station name	Type of stream	Drainage area, (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge[1/] (cubic feet per second per square mile)
—	Sweetwater Creek at mouth near Andersonville, Ga.	do.	42	—	[26/]17	—
02349730	Hogcrawl Creek near Montezuma, Ga.	do.	73.4	09-22-54	[4/]17	.232
—	Hogcrawl Creek at mouth near Andersonville, Ga.	do.	97	—	[25/]22	—
02349900	Turkey Creek near Byromville, Ga.	do.	45	09-20-54	[4/]4.6	.102
—	Turkey Creek at mouth near Cobb, Ga.	tributary	186	—	[27/]19	—
02350900	Kinchafoonee Creek near Dawson, Ga.	do.	527	10-21-54	[4/]117	.222
02351700	Muckalee Creek near Smithville, Ga.	do.	265	09-22-54	[4/]62	.234
02351800	Muckaloochee Creek at Smithville, Ga.	do.	47	09-22-54	[4/]25	.532
02351890	Muckalee Creek at State Highway 195 near Leesburg, Ga.	do.	362	—	[28/]101	—
02353100	Ichawaynochaway Creek near Graves, Ga.	do.	118	09-27-54	[4/]25	.212
02353200	Little Ichawaynochaway Creek near Shellman, Ga.	do.	52	09-27-54	[4/]25	.481
02353400	Pachitla Creek (at subarea boundary) near Edison, Ga.	do.	188	10-26-54	[4/]62	.330

[1/]Unit-area discharge computed using streamflow and drainage area.
[2/]Estimated unregulated discharge (Chapman and Peck, 1996b).
[3/]Estimate based on unit-area discharge at Bull Creek at Georgia Highway 22.
[4/]Miscellaneous discharge measurement.
[5/]Carter (1959).
[6/]Estimate based on unit-area discharge at Upatoi Creek at Ft. Benning, Ga.
[7/]Daily mean discharge.
[8/]Estimate based on unit-area discharge at Hichitee Creek near Louvale, Ga.
[9/]Estimate based on unit-area discharge at Hannahatchee Creek near Julia, Ga.
[10/]Estimate based on mean of unit-area discharge at Hannahatchee Creek near Julia, Ga., and Pataula Creek near Georgetown, Ga.
[11/]Estimate based on unit-area discharge at Pataula Creek near Georgetown, Ga.
[12/]Estimate based on unit-area discharge at Cemochechobee Creek at Fort Gaines, Ga.
[13/]Estimate based on mean of unit-area discharge at Cemochechobee Creek at Fort Gaines, Ga., and Kolomoki Creek near Fort Gaines, Ga.
[14/]Estimate based on unit-area discharge at Kolomoki Creek near Fort Gaines, Ga.
[15/]Estimate based on unit-area discharge at Uchee Creek near Ft. Mitchell, Ala.
[16/]Stallings and Pierce (1957).
[17/]Estimate based on unit-area discharge at Barbour Creek near Eufaula, Ala.
[18/]Unit-area discharge computed for intermediate drainage area using discharge measurements and drainage areas at Chattahoochee River stations at Columbus, Ga., and Eufaula, Ala.
[19/]Estimate based on mean of unit-area discharge at Barbour Creek near Eufaula, Ala., and Abbie Creek near Haleburg, Ala.
[20/]Estimate based on unit-area discharge at Abbie Creek near Haleburg, Ala.
[21/]Estimate based on unit-area discharge at Patsiliga Creek at Reynolds, Ga.
[22/]Estimate based on unit-area discharge at Horse Creek at Georgia Highway 128 near Marshallville, Ga.
[23/]Estimate based on unit-area discharge at Whitewater Creek below Rambulette Creek near Butler, Ga.
[24/]Estimate based on unit-area discharge at Buck Creek near Ellaville, Ga.
[25/]Estimate based on unit-area discharge at Hogcrawl Creek near Montezuma, Ga.
[26/]Estimate based on unit-area discharge at Sweetwater Creek at Andersonville, Ga.
[27/]Estimate based on unit-area discharge at Turkey Creek near Byromville, Ga.
[28/]Estimate based on area weighted average of unit-area discharges at Muckalee Creek near Smithville, Ga., and Muckaloochee Creek at Smithville, Ga.

Table 7. Stream discharge during the drought of 1986, Subarea 3
[—, not applicable]

Station number	Station name	Type of stream	Drainage area, (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge[1] (cubic feet per second per square mile)
	CHATTAHOOCHEE RIVER BASIN					
	Georgia Contributing Area					
02341500	Chattahoochee River at Columbus, Ga.	regional	4,670	—	[2]888	0.190
—	intermediate drainage area upstream of Bull Creek at mouth, Georgia	—	2	—	[3]39	—
[4]241A	Bull Creek at mouth at Columbus, Ga.	tributary	74	—	[3]15	—
—	intermediate drainage area between mouths of Bull and Upatoi Creeks, Georgia	—	14	—	[3]2.8	—
02342000	Upatoi Creek at Ft. Benning, Ga.	tributary	447	07-09-86	[5]88	.197
[4]278	Upatoi Creek at mouth at Ft. Benning, Ga.	do.	455	—	[3]90	—
—	intermediate drainage area between Upatoi and Hichitee Creeks, Georgia	—	66	—	[3]13	—
[4]284A	Hichitee Creek at mouth near Ft. Benning, Ga.	tributary	55	—	[6]4.6	—
—	intermediate drainage area between mouths of Hichitee and Hannahatchee Creeks, Georgia	—	14	—	[6]1.2	—
02342850	Hannahatchee Creek at Union, Ga.	tributary	121	07-09-86	[5]10	.083
[4]287A	Hannahatchee Creek at mouth near Omaha, Ga.	do.	146	—	[6]12	—
—	intermediate drainage area between mouths of Hannahatchee and Pataula Creeks, Georgia	—	164	—	[7]26	—
02343225	Pataula Creek near Georgetown, Ga.	tributary	295	07-08-86	[5]70	.237
[4]296A	Pataula Creek at mouth near Fort Gaines, Ga.	do.	394	—	[8]93	—
—	intermediate drainage area between mouths of Pataula and Cemochechobee Creeks, Georgia	—	41	—	[9]10	—
02343255	Cemochechobee Creek at Fort Gaines, Ga.	tributary	103	07-08-86	[5]26	.252
[4]299C	Cemochechobee Creek at mouth near Fort Gaines, Ga.	do.	106	—	[9]27	—
—	intermediate drainage area between mouths of Cemochechobee and Kolomoki Creeks, Georgia	—	19	—	[10]6.5	—
02343270	Kolomoki Creek near Fort Gaines, Ga.	tributary	98	07-08-86	[5]42	.429
[4]103	Kolomoki Creek at mouth, Ga.	do.	102	—	[11]44	—
—	intermediate drainage area downstream of Kolomoki Creek, Georgia	—	67	—	[11]29	—
	Alabama Contributing Area					
—	intermediate drainage area upstream of Uchee Creek, Alabama	—	30	—	[12].51	—
02342500	Uchee Creek near Ft. Mitchell, Ala.	tributary	325	07-12-86	[13]5.6	.017
[14]18	Uchee Creek at mouth at Ft. Mitchell, Ala.	do.	334	—	[12]5.7	—
—	intermediate drainage area between mouths of Uchee and Ihagee Creeks, Alabama	—	11	—	[12]1.9	—
[14]19	Ihagee Creek at mouth near Holy Trinity, Ala.	do.	34	—	[12].58	—
—	intermediate drainage area between mouths of Ihagee and Hatchechubbee Creeks, Alabama	—	25	—	[12].42	

Table 7. Stream discharge during the drought of 1986, Subarea 3—Continued
—, not applicable]

Station number	Station name	Type of stream	Drainage area, (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge[1] (cubic feet per second per square mile)
02342890	Hatchechubbee Creek near Pittsview, Ala.	tributary	51	07-09-86	[5].62	.012
[14]22	Hatchechubbee Creek at mouth near Eufaula, Ala.	do.	151	—	[15]1.8	—
—	intermediate drainage area between mouths of Hatchechubbee and Cowikee Creeks, Alabama	—	56	—	[15]0.67	—
02342920	North Fork Cowikee Creek near Glenville, Ala.	tributary	114	07-10-86	[5].09	.001
02342928	Middle Fork Cowikee Creek near Hawkinsville, Ala.	do.	168	07-10-86	[5]1.0	.006
02342933	South Fork Cowikee Creek near Batesville, Ala.	do.	112	07-15-86	[13].34	.003
[14]29	Cowikee Creek at mouth near Eufaula, Ala.	do.	464	—	[16]1.7	—
—	intermediate drainage area between mouths of Cowikee and Barbour Creeks, Alabama	—	49	—	[17]5.6	—
02342980	Barbour Creek at White Oak, Ala.	tributary	20	07-10-86	[5]2.3	.115
[14]32	Barbour Creek at mouth near Eufaula, Ala.	do.	97	—	[17]11	—
—	intermediate drainage area between mouths of Barbour and Cheneyhatchee Creeks, Alabama	—	4	—	[17].46	—
02343040	Cheneyhatchee Creek near Eufaula, Ala.	tributary	28	07-10-86	[5]1.6	.057
—	Cheneyhatchee Creek at mouth, Ala.	do.	54	—	[18]3.1	—
—	intermediate drainage area between mouths of Cheneyhatchee and Abbie Creeks, Alabama	—	136	—	[19]16	—
02343300	Abbie Creek near Haleburg, Ala.	tributary	146	07-15-86	[13]17	.116
[14]37	Abbie Creek at mouth, Ala.	do.	196	—	[20]23	—
—	intermediate drainage area downstream of Abbie Creek at mouth, Alabama	—	31	—	[20]3.6	—
02343801	Chattahoochee River near Columbia, Ala.	regional	8,210	07-13-86	[13]761	.093
	FLINT RIVER BASIN					
02347500	Flint River near Culloden, Ga.	regional	1,850	07-15-86	[13]107	.058
02348300	Patsiliga Creek at Reynolds, Ga.	tributary	139	07-08-86	[5]21	.151
[4]108A	Patsiliga Creek at mouth near Reynolds, Ga.	do.	142	—	[21]21	—
—	Beaver Creek at mouth near Reynolds, Ga.	do.	27	—	[21]4.1	—
—	Horse Creek at mouth near Marshallville, Ga.	do.	37	—	[21]5.6	—
02349140	Whitewater Creek near Oglethorpe, Ga.	do.	240	07-07-86	[5]172	.717
[4]117A	Whitewater Creek at mouth near Oglethorpe, Ga.	do.	242	—	[22]174	—
02349420	Buck Creek at Oglethorpe, Ga.	do.	224	07-07-86	[5]49	.219
[4]121A	Buck Creek at mouth near Oglethorpe, Ga.	do.	232	—	[23]51	—
02349500	Flint River at Montezuma, Ga.	regional	2,900	07-15-86	[13]523	.180
—	Camp Creek at mouth near Andersonville, Ga.	tributary	61	—	[24]12	—
—	Sweetwater Creek at mouth near Andersonville, Ga.	do.	42	—	[24]8.1	—
02349740	Hogcrawl Creek near Montezuma, Ga.	do.	83	07-07-86	[5]16	.193
—	Hogcrawl Creek at mouth near Andersonville, Ga.	do.	97.0	—	[24]19	—

Table 7. Stream discharge during the drought of 1986, Subarea 3—Continued
—, not applicable]

Station number	Station name	Type of stream	Drainage area, (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge[1] (cubic feet per second per square mile)
02349910	Turkey Creek near Drayton, Ga.	do.	76	07-07-86	[5]15	.197
—	Turkey Creek at mouth near Cobb, Ga.	do.	186	—	[25]37	—
02351890	Muckalee Creek at State Route 195 near Leesburg, Ga.	do.	362	07-14-86	[13]18	0.050
02350900	Kinchafoonee Creek near Dawson, Ga.	do.	527	07-15-86	[13]39	.074
02353100	Ichawaynochaway Creek near Dawson, Ga.	do.	118	—	[26]45	—
02353200	Little Ichawaynochaway Creek near Shellman, Ga.	do.	52	07-07-86	[5]20	.385
02353400	Pachitla Creek (at subarea boundary) near Edison, Ga.	do.	188	—	[5]44	—

[1]Unit-area discharge computed using streamflow and drainage area.
[2]Estimated unregulated discharge (Chapman and Peck, 1996b).
[3]Estimate based on unit-area discharge at Upatoi Creek at Ft. Benning, Ga.
[4]Carter (1959).
[5]Miscellaneous discharge measurement.
[6]Estimate based on unit-area discharge at Hannahatchee Creek at Union, Ga.
[7]Estimate based on mean of unit-area discharge at Hannahatchee Creek at Union, Ga., and Pataula Creek near Georgetown, Ga.
[8]Estimate based on unit-area discharge at Pataula Creek near Georgetown, Ga.
[9]Estimate based on unit-area discharge at Cemochechobee Creek at Fort Gaines, Ga.
[10]Estimate based on mean of unit-area discharge at Cemochechobee Creek at Fort Gaines, Ga., and Kolomoki Creek near Fort Gaines, Ga.
[11]Estimate based on unit-area discharge at Kolomoki Creek near Fort Gaines, Ga.
[12]Estimate based on unit-area discharge at Uchee Creek near Ft. Mitchell, Ala.
[13]Daily mean discharge.
[14]Stallings and Pierce (1957).
[15]Estimate based on unit-are discharge at Hatchechubbee Creek near Pittsview, Ala.
[16]Estimate based on area weighted average of unit-area discharges at North Fork Cowikkee Creek near Glenville, Ala., Middle Fork Cowikee Creek near Hawkinsville, Ala. and South Fork Cowikee Creek near Batesville, Ala.
[17]Estimate based on unit-area discharge at Barbour Creek at White Oak, Ala.
[18]Estimate based on unit-area discharge at Cheneyhatchee Creek near Eufaula, Ala.
[19]Estimate based on mean of unit-area discharge at Barbour Creek at White Oak, Ala., and Abbie Creek near Haleburg, Ala.
[20]Estimate based on unit-area discharge at Abbie Creek near Haleburg, Ala.
[21]Estimate based on unit-area discharge at Patsiliga Creek near Reynolds, Ga.
[22]Estimate based on unit-area discharge at Whitewater Creek near Oglethorpe, Ga.
[23]Estimate based on unit-area discharge at Buck Creek at Oglethorpe, Ga.
[24]Estimate based on unit-area discharge at Hogcrawl Creek near Montezuma, Ga.
[25]Estimate based on unit-area discharge at Turkey Creek near Drayton, Ga.
[26]Estimate based on unit-area discharge at Little Ichawaynochaway Creek near Shellman, Ga.

During October 1954, estimates of drought flow at the confluence of tributary streams and the Chattahoochee River, and intermediate drainage areas were based largely on a unit-area discharge conversion. These estimates are presented in bold typeface in table 6. The 1954 drought baseflow in the Chattahoochee River was computed by summing estimates of the tributary contributions (table 8). The estimated contributions from the States of Alabama and Georgia to the Chattahoochee River are shown in table 8.

Table 8. Relation between estimated mean-annual baseflow and drought flow in the Chattahoochee and Flint River basins, Subarea 3

River name, by state	Contributing drainage area (square miles)	Stream discharge, in cubic feet per second		
		Estimated mean-annual baseflow[1/]	Drought of 1954[2/]	Drought of 1986[3/]
Chattahoochee				
Georgia	1,720	1,027	492	375
Alabama	1,670	591	87	74
Chattahoochee–Georgia and Alabama	**3,390**	**1,618**	**579**	**449**
Flint				
Georgia	**2,810**	**1,812**	**963**	**498**
CHATTAHOOCHEE AND FLINT–GEORGIA AND ALABAMA	**6,200**	**3,430**	**1,542**	**947**

[1/] From tables 5 and 6.
[2/] From table 6.
[3/] From table 7.

Baseflow near the end of the 1954 drought in Subarea 3 had decreased to 1,540 ft^3/s, or about 45 percent of the mean-annual baseflow (table 5). Baseflow in the Chattahoochee River during the drought of 1954 was approximately 579 ft^3/s or 36 percent of mean-annual baseflow; baseflow in the Flint River was 963 ft^3/s or about 53 percent of mean-annual baseflow (table 5). These results indicate that the 1954 drought influenced baseflow and the ground-water flow system related to the Chattahoochee River to a greater degree than those of the Flint River. Of the 579 ft^3/s (table 8) discharged to the Chattahoochee River, about 492 ft^3/s, or 85 percent was from Georgia and 87 ft^3/s, or 15 percent was from Alabama.

The streamflow measurements and estimates based on unit-area discharges of the 1986 drought are listed in table 7. These estimates were computed in the same manner as that of the 1954 drought. The drought of 1986 was more severe than the 1954 drought, especially for the Flint River.

Baseflow in the Chattahoochee River during the drought of 1986 was about 449 ft^3/s, or approximately 28 percent of mean-annual baseflow; baseflow in the Flint River was about 498 ft^3/s, or 27 percent of mean-annual baseflow (table 8). Of the 449 ft^3/s discharged to the Chattahoochee River, about 16 percent, or 74 ft^3/s, was from Alabama and 84 percent, or 375 ft^3/s, was from Georgia (table 8).

Although the 1986 drought was more severe than the 1954 drought, with respect to baseflow, the relative distribution of baseflow in the Chattahoochee River is quite similar (table 8). According to table 8, Alabama contributed about 15 percent of the total baseflow in the Chattahoochee River for both droughts; and Georgia contributed about 85 percent. Apparently, as ground-water flow conditions decline from mean conditions to extreme low-flow conditions, the relative contribution from Alabama decreases, while the relative contribution from Georgia increases (table 8).

Baseflow in the Chattahoochee River under mean-annual and drought-flow conditions increases with increasing contributing drainage area (fig. 8). Although different in magnitude, the droughts affected the baseflow from contributing areas similarly. Tributaries contributed relatively more to mean-annual baseflow in the Chattahoochee River than to drought flow.

Baseflow in the Flint River under mean-annual and drought-flow conditions also increases with increasing contributing drainage area (fig. 9). Apparently, both the 1954 and 1986 droughts substantially affected baseflow in the upper part of the basin, as shown by the marginal increase in downstream discharge.

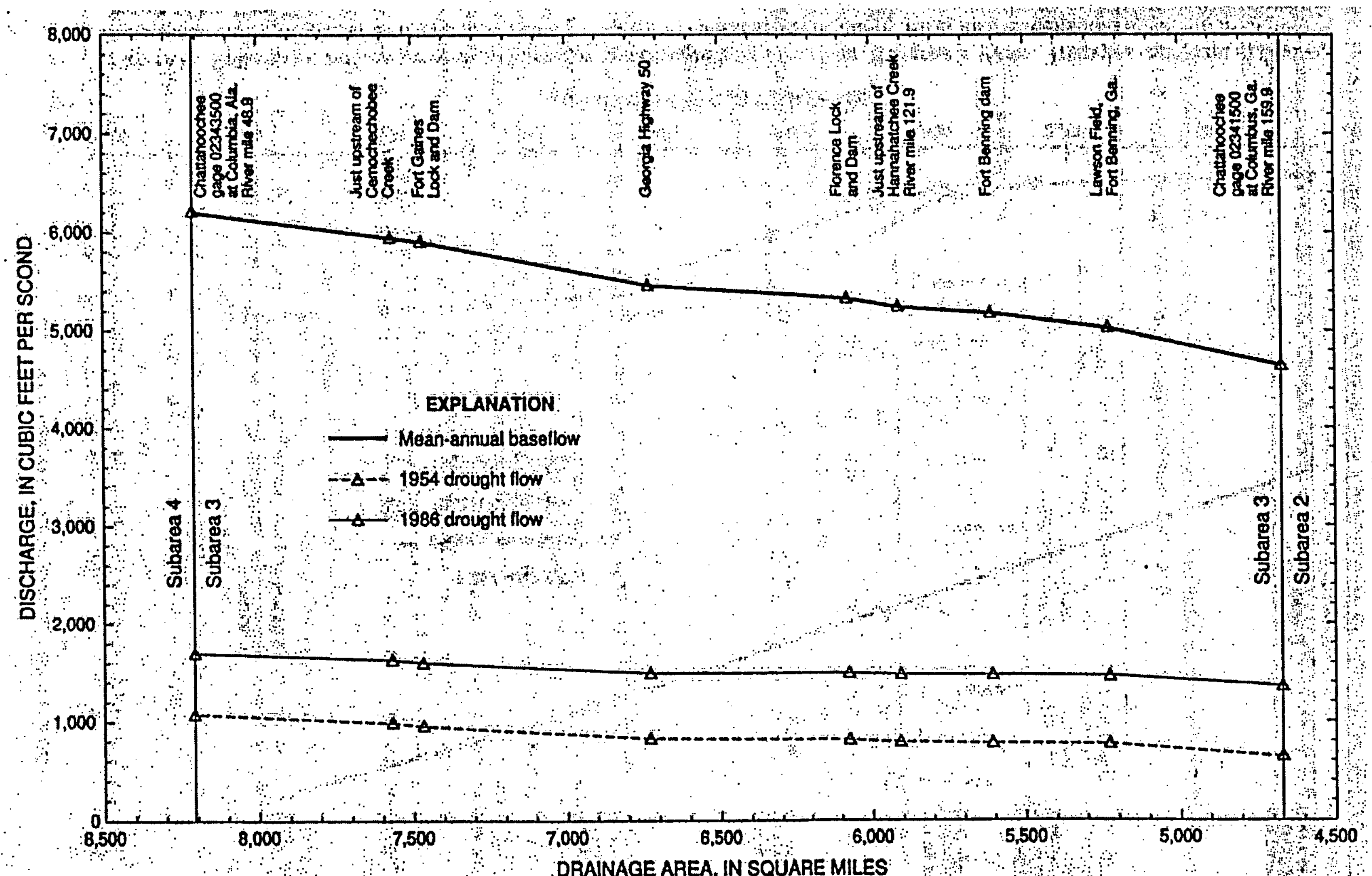


Figure 8. Relation between mean-annual baseflow and drought flow, Chattahoochee River, Subarea 3. [Note: Triangles represent estimated or measured discharges; lines connecting triangles represent interpolated discharge. River mile is measured upstream from the mouth of the Chattahoochee River.]

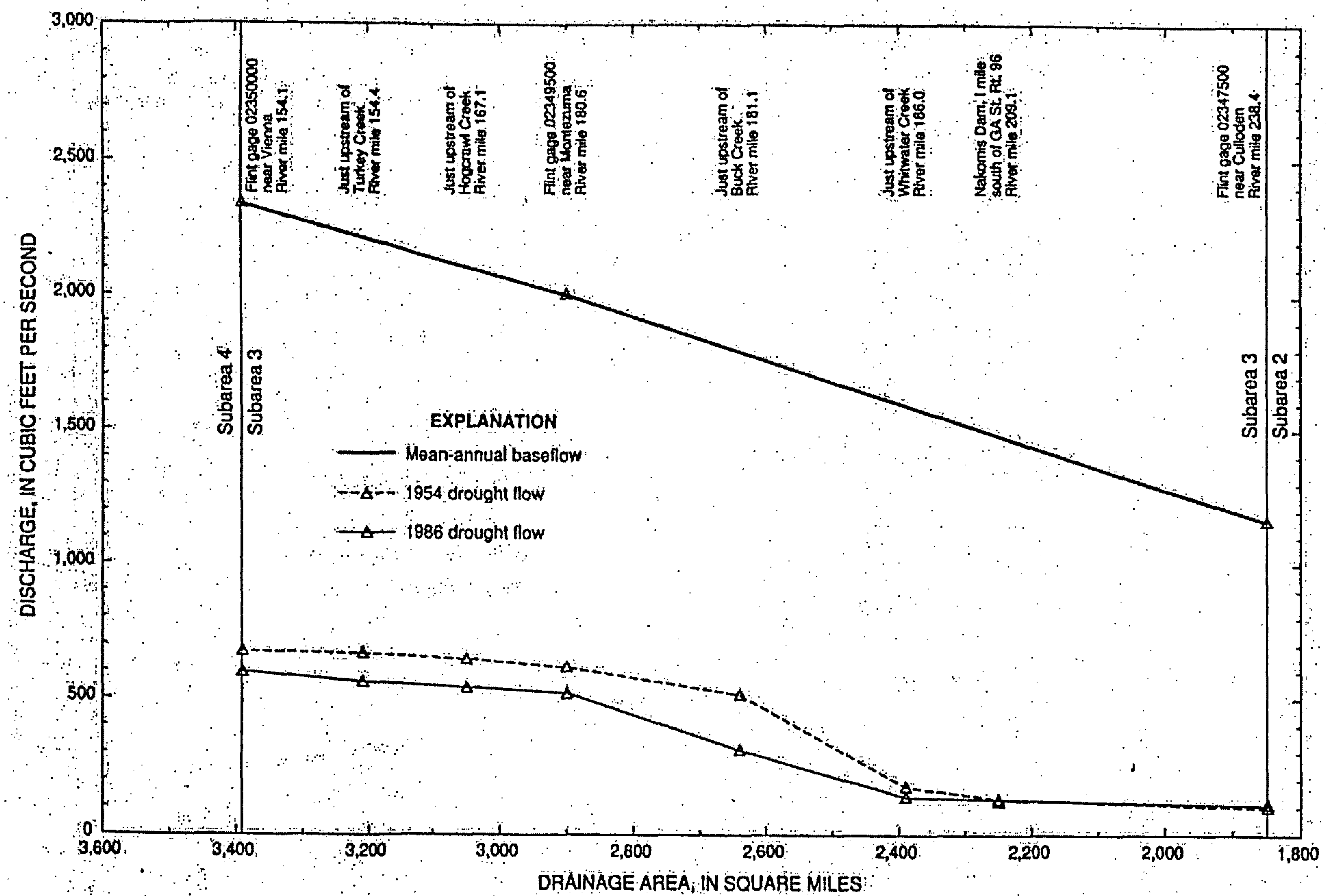


Figure 9. Relation between mean-annual baseflow and drought flow, Flint River, Subarea 3. [Note: Triangles represent estimated or measured discharges; lines connecting triangles represent interpolated discharge. River mile is measured upstream from the mouth of the Flint River.]

Baseflow in streams entering and exiting Subarea 3 was computed by summing the total baseflow for the subarea (table 8) and the streamflow at the most upstream subarea boundary. Mean-annual baseflow and drought flow at the northern subarea boundary for the Chattahoochee and Flint Rivers is listed in tables 5, 6, and 7. Ground-water discharges for the subarea were added to these values. The resulting baseflow to streams entering and exiting Subarea 3 is listed in table 9.

Table 9. Estimated drought flows and mean-annual baseflow in the Chattahoochee and Flint Rivers and tributaries; and ratio of average drought flow to mean-annual baseflow, Subarea 3

Contributing drainage area	Drought flows, in cubic feet per second						Mean-annual baseflow,[1] (cubic feet per second)		Ratio of average drought flow to mean-annual baseflow, (percent)	
	[2]1954		[3]1986		Average of 1954 and 1986 droughts					
	Chattahoochee River	Flint River	Chattahoochee River	Flint River	Chattahoochee River	Flint River	Chattahoochee River	Flint River	Chattahoochee River	Flint River
Flow entering subarea, by river	679	97	888	107	784	102	4,640	1,160	17	9
Flow gain in subarea, by river	579	963	449	498	514	730	1,618	1,812	32	40
Flow exiting drainage basin, by river	1,258	1,060	1,337	605	1,298	832	6,258	2,972	21	28
Flow exiting Subarea 3	*2,318*		*1,942*		*2,130*		*9,230*			

[1]From tables 6 and 7.
[2]From table 6.
[3]From table 7.

GROUND-WATER UTILIZATION AND GENERAL DEVELOPMENT POTENTIAL

Ground-water utilization is defined as the ratio of ground-water use in 1990 to mean-annual ground-water recharge. The degree of ground-water utilization is scale dependent. For example, local ground-water pumping may result in substantial storage change and water-level declines near a center of pumping; whereas, such pumping relative to the entire Subarea would be small compared to mean-annual recharge. Because ground-water use in Subarea 3 represents a relatively minor percentage of ground-water recharge, even a large increase in ground-water use in Subarea 3 in one State is likely to have little effect on ground-water and surface-water occurrence in the other.

The 1990 water-use data in table 1 represent estimated water use in Subarea 3, without regard to the effects of ground-water withdrawal at the boundary of the subarea. For the purposes of comparison, these data have been modified to represent only the ground-water withdrawal that affect ground-water flow in Subarea 3. The value of 12.6 Mgal/d shown in table 1 represents total public ground-water use in the Alabama part of Subarea 3, including the total ground-water public supply of 7.92 Mgal/d for the city of Dothan in Houston County in the extreme southwestern corner of Subarea 3 (W.S. Mooty, U.S. Geological Survey, written commun., 1995). The location of Dothan relative to the boundaries of Subarea 3 indicates that not all the ground water pumped is contributed from within Subarea 3. Scott and others (1984, figs. 13 and 14) show a cone of depression around Dothan in 1982, and estimate the contributing recharge area. Of that estimated area, about 20 percent represents the area contributing ground water to the Chattahoochee River in Subarea 3 under natural conditions. Ground water contributed from the remaining area flows to the west and south of Subarea 3. The area of the 1982 cone of depression is considered equal to that produced by 1990 pumpage. Consequently, only 20 percent of the total public-supply pumpage at Dothan (1.58 Mgal/d) is attributed to Subarea 3; thus, the total ground-water public supply for Alabama used in this report is 6.27 Mgal/d, and total ground-water use for Alabama is 10.62 Mgal/d or 16 ft^3/s.

Ground-water use of about 76 ft³/s in 1990 in Subarea 3 represented about 2.2 percent of the mean-annual baseflow and 4.9 to 8.0 percent of drought flow near the end of the droughts of 1954 and 1986, respectively (table 10). Ground-water withdrawal of 55 ft³/s in the Flint River basin is about 3 percent of the mean-annual baseflow, and about 5.7 percent of the 1954 drought flow, and about 11.0 percent of the 1986 drought flow (table 10).

Table 10. Relation between 1990 ground-water use and ground-water discharge during mean-annual baseflow and 1954 and 1986 drought flows, Subarea 3

Contributing area	Principal river	Ground-water use, 1990, (cubic feet per second)	Baseflow to the Chattahoochee and lint Rivers and their tributaries (cubic feet per second)			Ratio of ground-water use to baseflow (percent)		
			Mean-annual baseflow	1954 drought baseflow	1986 drought baseflow	Mean-annual baseflow	1954 drought baseflow	1986 drought baseflow
Alabama	Chattahoochee River	16	591	87	74	2.7	18.4	21.6
Georgia	Chattahoochee River	5	1,027	492	375	0.5	1.0	1.3
Alabama and Georgia	Chattahoochee River	21	1,618	579	449	1.3	3.6	4.7
Georgia	Flint River	55	1,812	963	498	3.0	5.7	11.0
Total, Subarea 3		76	3,430	1,542	947	2.2	4.9	8.0

Comparison of 1990 water-use to baseflow for the Chattahoochee River basin indicates an areally variable relation. The 1990 ground-water use of the Chattahoochee River basin, adjusted for the estimate of pumpage at Dothan, is about 21 ft³/s, or about 1.3 percent of the estimated 1,618 ft³/s mean annual baseflow (table 9). The 1990 ground-water use equals about 3.6 percent of the 1954 drought baseflow, and about 4.7 percent of the 1986 drought baseflow (table 9).

Alabama ground-water withdrawal (16 ft³/s) is about 76 percent of the Chattahoochee River basin area total (21 ft³/s), and accounts for about 2.7 percent of the mean-annual baseflow contributed from Alabama, 18 percent of the 1954 baseflow from Alabama, and 22 percent of the 1986 baseflow from Alabama (table 10).

Georgia ground-water withdrawal is about 24 percent of the Chattahoochee River basin area total. This ground-water use represents about 0.5 percent of the mean-annual baseflow contributed from Georgia, 1.0 percent of the 1954 baseflow from Georgia, and 1.3 percent of the 1986 baseflow from Georgia (table 10).

Several depressions occur in the potentiometric surfaces of various aquifers that underlie Subarea 3, indicating a relatively substantial withdrawal of ground water and interruption of natural flow paths. In the southern part of the subarea, a small cone of depression in the Nanafalia-Clayton aquifer has formed around the city of Dothan in Houston County, Ala. (Williams and others, 1986c). In the south-central part of the subarea, a larger cone of depression occurs in the Providence aquifer in northern Terrell County, Ga., caused by pumping at Albany in Dougherty County, Ga., just south of Subarea 3 (Clarke and others, 1983). This cone extends marginally into Subarea 3. A small cone of depression in the Providence aquifer is centered around Americus in Sumter County, Ga. (Clarke and others, 1983). A small cone of depression also has been identified in the Tuscaloosa aquifer near Eufaula, Barbour County, Ala. (Kidd, 1987). An areally extensive cone of depression that extends from northwest Early County to Sumter County, Ga., has formed in the Clayton aquifer and is attributed to irrigation pumping (Long, 1989).

Comparisons of the ground-water budgets, water-use data, and potentiometric surfaces indicate that the ground-water resources of Subarea 3 are not significantly impaired by ground-water use. Comparison of the ground-water withdrawal to mean-annual baseflow, indicates that 1990 ground-water withdrawal is less than 3 percent of average baseflow. Ground-water withdrawal during 1990 in Subarea 3 is about 9 percent of mean-annual baseflow, although for the Chattahoochee River basin, the baseflow and pumpage are not evenly distributed between the contributing areas in Georgia and Alabama. Most measurable cones of depression are small and are comparatively far removed from the recharge areas of contributing aquifers. These pumping centers probably affect intermediate and regional flow regimes most substantially and capture ground water that normally would discharge farther downgradient or to major tributaries or regional drains.

A general assessment of ground-water development potential in Subarea 3 would reflect, in part, the cumulative effects of current and anticipated future hydrologic stresses imposed on the ground-water resources, and to a lesser extent, the current availability of surface-water supplies. The nature of such an assessment is necessarily limited by a lack of knowledge of current hydrologic conditions and the lack of agreed upon standards by which Federal, State, or local water-resources managers evaluate the effects of additional stress and future development. Current pumpage and streamflow conditions might be unknown in some areas, making the results of an evaluation of development potential highly uncertain. Future stresses also might be linked to water-management practices that have yet to be formulated, or to water-management decisions that have yet to be made. Therefore, an assessment of ground-water development potential provides insight into only one aspect of the broader question of how water-management decisions affect ground-water availability; specifically, whether or not existing hydrologic data document flow-system behavior adequately to allow the potential effects of future development on the flow system to be adequately evaluated and understood. Further, an assessment of ground-water development potential does not account for the suitability of existing ground-water resource management approaches or the effects of future approaches on further resource development. Such answers partly are dependent on the synthesis of results from the various Comprehensive Study components and subsequent consideration by the Federal, State, or local water managers responsible for decision-making within the basin. The identification of areas that could be developed for ground-water supply to replace or supplement surface-water sources could not be determined from data available for Subarea 3.

SUMMARY

Drought conditions in the 1980's have focused attention on the multiple uses of the surface- and ground-water resources in the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) River basins in Alabama, Florida, and Georgia. Federal, State, and local agencies also have proposed projects that are likely to result in additional water use and revisions of reservoir operating practices within the river basins. The existing and proposed water projects have created conflicting demands for water and emphasized the problem of allocation of the resource. This study was initiated to describe ground-water availability in the lower-middle Chattahoochee River basin in Georgia and Alabama; and middle Flint River basin in Georgia, Subarea 3 of the ACF-ACT River basins, and to estimate the possible effects of increased ground-water use in the basin.

Subarea 3 encompasses about 4,510 square miles (mi^2) in southwestern Georgia and about 1,670 mi^2 in southeastern Alabama. Almost all the Subarea lies within the Coastal Plain physiographic province. The Chattahoochee and Flint Rivers are the major rivers of the Subarea, both entering the Subarea from the north and flowing generally southward into Subarea 4. The Chattahoochee River drains the western 3,370 mi^2 of the Subarea, while the Flint River drains the eastern 2,810 mi^2. Streamflow in the Chattahoochee River has been influenced by regulation upstream of Subarea 3 by Lake Harding since 1926, West Point Lake since 1975, and Lake Sidney Lanier since 1955; and within the Subarea by Walter F. George Reservoir since 1963. Most regulation occurs at Buford and West Point Dams. Tributary stream discharge to the Chattahoochee River is unregulated. There are no streamflow control structures on the Flint River upstream of or within the Subarea.

The hydrologic system is comprised of the aquifers and the rivers and streams. The aquifers are composed of sedimentary rock sequences that dip and thicken to the south. The outcrop area of the sediments functions as the recharge area of the aquifers, receiving precipitation that infiltrates down to the saturated zone. Recharge areas of the aquifers generally occur in east-west trending bands, and areas of outcrop of the older and deeper units that occur farther north are sequentially overlapped to the south by the overlying units. The Chattahoochee and Flint Rivers flow south, crossing the aquifers in an approximate orthogonal fashion.

The conceptual model of the hydrologic flow system is based upon work by several previous investigators. Ground water originates in the recharge areas of the aquifers, and subsequently flows downgradient to discharge to evapotranspiration, a pumping well, a river or stream, or flows farther downgradient into the confined part of the aquifer. Most of the water that enters the aquifers as recharge is discharged to nearby streams or rivers.

The conceptual model of ground-water flow and stream-aquifer relations subdivide the ground-water flow system into local (shallow), intermediate, and regional (deep) flow regimes. The regional flow regime probably approximates steady-state conditions and water from this regime discharges chiefly to the Chattahoochee River and Flint River. Ground-water discharge to tributaries primarily is from the local and intermediate flow regimes. Ground water that discharges to regional drains includes contributions from local, intermediate, and regional flow regimes. Mean-annual ground-water discharge to streams (baseflow) is considered to approximate the long-term, average recharge to ground water.

Estimates of ground-water discharge to the Chattahoochee and Flint Rivers were computed for mean-annual and extreme drought conditions. Under mean-annual conditions, about 1,618 ft^3/s is discharged from the ground-water flow system to the Chattahoochee River. Of this discharge, about 63 percent originates in Georgia and 37 percent in Alabama. Under mean-annual conditions, ground-water discharge to the Flint River is 1,812 ft^3/s. Near the end of drought of 1954, baseflow in the Chattahoochee River was about 579 ft^3/s; with 85 percent contributed from Georgia and 15 percent contributed from Alabama. Nearly contemporaneous discharge to the Flint River was 963 ft^3/s. Near the end of the drought of 1986, baseflow in the Chattahoochee River was about 449 ft^3/s; with 84 percent contributed from Georgia and 16 percent contributed from Alabama. Near contemporaneous baseflow in the Flint River was about 498 ft^3/s.

Ground-water resources were evaluated by comparing the ground-water budgets to 1990 ground-water withdrawal in the Subarea. Total 1990 ground-water withdrawal in the Chattahoochee River basin was about 1.5 percent of the mean-annual baseflow. Of this total 1990 ground-water use, about 25 percent occurred in Georgia and 75 percent in Alabama. Total 1990 ground-water withdrawal in the Chattahoochee River basin was about 4 percent of the 1954 drought baseflow, and about 5 percent of the 1986 drought baseflow. Total 1990 ground-water withdrawal in the Flint River basin was about 3 percent of the mean-annual baseflow, 6 percent of 1954 drought baseflow and 11 percent of the 1986 drought baseflow. Several cones of depression occur in the potentiometric surfaces of aquifers in Subarea 3. Although several of these cones represent substantial reductions in predevelopment water levels, none are extensive enough, or near enough to recharge areas, to greatly affect surface-water resources in Subarea 3.

Because ground-water use in Subarea 3 represents a relatively minor percentage of ground-water recharge, even a large increase in ground-water use in Subarea 3 in one State is likely to have little effect on ground-water and surface-water occurrence in the other.

The limited scope, lack of field-data collection, and the short duration of the ACF-ACT River basin study has resulted in incomplete descriptions of ground- and surface-water-flow systems. For example, the extent and continuity of local and regional flow systems largely are unknown. Similarly, quantitative descriptions of stream-aquifer relations, ground-water flow across State lines, water quality, drought flows, and ground-water withdrawal and subsequent effects on the flow systems (the availability and utilization issue) are highly interpretive; therefore, the descriptions and evaluations should be used accordingly.

A significant data base exists describing well-construction and yield data and hydraulic characteristics of aquifers in Subarea 3. Water-quality information and historic and recent ground-water withdrawal data, both areally and by aquifer, also are available. However, precise information describing the relation between ground water and surface water is lacking. Seepage runs (detailed streamflow measurements of drainage systems made concurrently during baseflow conditions) can be used to identify individual ground-water flow systems and to study stream-aquifer relations. Once identified, a flow system can be studied in detail to define its extent, recharge and discharge areas, movement of water, chemical quality, and the amount of water that can be withdrawn with inconsequential or minimal effects. These detailed studies might employ test drilling, borehole geophysical logging, surface geophysics, aquifer tests, a thorough water-withdrawal inventory, and chemical analyses of ground water to delineate the extent of the ground-water-flow system and evaluate its potential as a water supply. Evaluation of several such flow systems would greatly improve the understanding of ground-water resources throughout the Subarea.

Estimates of water use and ground-water discharge to streams are dependent on methodologies employed during data collection, computation, and analyses. Results reported herein are limited by a lack of recent data and the non-contemporaneity of all data. Analyses using limited data may not adequately describe stream-aquifer relations. Most importantly, analyses in this report describe only two hydrologic conditions—(1) mean-annual baseflow and (2) drought-flow conditions during 1954 and 1986. Results derived from extrapolation of information provided herein to other hydrologic conditions, such as much longer drought periods or increased ground-water withdrawal, should be used with caution. Special concern should be directed to changes in streamflow that may be caused by increased post-1990 withdrawal on ground-water discharge to streams in Subarea 3.

SUGGESTIONS FOR FURTHER STUDY

This report presents a discussion of ground-water resources and interaction of ground- and surface-water systems in the lower-middle Chattahoochee and middle Flint River basins, Subarea 3, of the ACF-ACT River basins. In Subarea 3, ground-water availability is addressed only from a regional perspective using historical data. Data collection was not a part of this study; therefore, lack of streamflow and ground-water data necessitated that estimation methods be used extensively to describe stream-aquifer relations. Additional data, particularly data describing surface- and ground-water conditions on a local scale, are needed to further refine and quantify the descriptions of ground- and surface-water relations in the Subarea. Analyses of these data possibly could better describe ground-water availability and development potential.

Although the overall objectives of this study were to evaluate the ground-water resources and supply, the data used to accomplish these objectives were stream-discharge data. Stream-discharge data were sufficient to meet study objectives; however, such data either were not totally adequate or were not available at critical sites. Future stream-discharge data collection to support resource management should emphasize (1) continuous-record data at critical hydrologic and political boundaries for a period of years; and (2) concurrent stream-discharge measurements at critical sites during drought periods.

Continuous stream-discharge data collected over a period of years at critical locations provide the basic information essential to basinwide water-resource planning and management. Current data coverage is incomplete. For example, stream-gaging stations located on major tributary streams would have eliminated or reduced the need to extrapolate and interpolate data from stations distant from these boundaries, and consequently, would have improved the accuracy of estimates of ground-water contributions.

The collection of drought-flow data obviously is contingent on the occurrence of a drought; thus, collection of drought data is not routine and is not easily planned. A contingency plan to collect drought data should be in place. The plan could consider, but not be limited to, logistics, manpower needs, and the preselection of stream data-collection locations. For more rigorous planning, field reconnaissance of preselected stream sites could be conducted.

Development of a ground-water flow model capable of simulating various ground-water management strategies would provide a powerful tool to water-resources managers. Aquifer-optimization management models, such as AQMAN3D (Puig and Rolon-Collazo, 1996), could be used to optimize development of the ground-water resource. Optimization models incorporate an existing ground-water flow model. The quality and reliability of the incorporated ground-water flow model can be enhanced greatly through the use of a parameter estimation code, such as MODFLOWP (Hill, 1992). The purpose of the parameter-estimation approach is to provide a measurement of reliability and hypotheses testing not found in ground-water flow models calibrated by trial-and-error. Such testing is important to effectively model ground-water flow in complex and dynamic systems, such as those of the southeastern Coastal Plain. The aquifer-optimization management model evaluates management strategies, to plan for optimal distributions of ground-water supply to wells and also for ground water to the streams and rivers within a set of specified constraints.

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Sect. 9.3

FISHES OF ALABAMA
AND THE MOBILE BASIN

James L. Oliver

Maurice F. Mettee, Patrick E. O'Neil, and J. Malcolm Pierson

Illustrations by
Karl J. Scheidegger

A cooperative effort of the Geological Survey of Alabama, Game and Fish Division of the Alabama Department of Conservation and Natural Resources, and the Region 4 Office of the U.S. Fish and Wildlife Service

Oxmoor House®

Published by Oxmoor House, Inc., book division of Southern Progress Corporation
P.O. Box 2463 Birmingham, Alabama 35201
Printed in the United States of America
First printing 1996

Library of Congress Cataloging-in-Publication Data
Mettee, Maurice F., 1943—
Fishes of Alabama and the Mobile basin

Bibliography: p.
Includes Index.
1. Freshwater Fishes—Alabama. 2. Freshwater Fishes—Alabama—Mobile Watershed. 3. Freshwater Fishes—Alabama—Identification. 4. Freshwater Fishes—Alabama—Mobile River Watershed—Identification.
I. O'Neil, Patrick E. 1955—, II. Pierson, J. Malcolm, 1949— III. Title
QL628.A2M47 1996 597.092'9671—dc20 96-33100 ISBN: 0-8487-1485-7

Unless otherwise indicated, photographs are by Patrick E. O'Neil, J. Malcolm Pierson, and Maurice F. Mettee. Unless otherwise indicated, illustrations were prepared by Karl J. Scheidegger. Financial support for preparation of the illustrations provided by the Tennessee Valley Authority.

Field sampling and manuscript preparation were supported with Sport Fish Restoration Funds provided by the U.S. Fish and Wildlife Service to the Game and Fish Division of the Alabama Department of Conservation and Natural Resources and the Geological Survey of Alabama.

Production supported with Sport Fish Restoration Funds provided by the U.S. Fish and Wildlife Service to the Game and Fish Division of the Alabama Department of Conservation and Natural Resources and Oxmoor House, Inc.

This book is listed as Monograph 15 of the Geological Survey of Alabama, Tuscaloosa, Alabama.

Oxmoor House, Inc.
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Final Recovery Plan for the

Shortnose Sturgeon

Acipenser brevirostrum

December 1998

U.S. Department of Commerce

National Oceanic and
Atmospheric Administration

National Marine Fisheries Service

Table 3. Shortnose Sturgeon Population Estimates*

Locality	Time	Type	Marked (m)	Captured (c)	Re-captured	Estimate Type	Population estimate	Precision 95% CI		Source
Saint John	1973-77	Adult	3,705	4,082	343	S-J	18,000	±30%		Dadswell 1979
Kennebec	1977-81	Adult	703	272	56	SCH	7,222	5,046	10,765	Squiers et al. 1982
Merrimack	1989	Spawning males				CAP	5	5	20	Kynard unpublished data
	1988-90	Spawning males				CAP	12	10	28	Kynard unpublished data
	1989-90	Total				CAP	33	18	89	Kynard unpublished data
Upper Connecticut	1992	Spawning				CAP	47	33	80	Kynard unpublished data
	1993	Spawning				CAP	98	58	231	Kynard unpublished data
	1976-77	Total	51	162	16	PET	516	317	898	Taubert 1980
	1976-78	Total	51	56	4	PET	714	280	2,856	Taubert 1980
	1977-78	Total	119	56	18	PET	370	235	623	Taubert 1980
	1976-78	Total	170	56	24	PET	297	267	618	Taubert 1980
Lower Connecticut	1988-93	Adult				SHU	895	799	1,018	Savoy and Shake 1993
	1988-93	Adult				SCH	875			
	1988-93	Adult				CHA	856			
Hudson	1979	Spawning	548	899	38	PET	12,669			Dovel 1979
	1980	Spawning	811	698	40	PET	13,844			Dovel 1979
	1980	Total					30,311			Dovel 1979 (extrapolation)
	1995	Adult	1909	2201	29	CAP	38,024	26,427	55,072	Bain et al. 1995
Delaware	1981-84	Partial				PET	14,080	10,079	20,378	Hastings et al. 1987
	1981-84	Partial				SCH	12,796	10,288	16,267	Hastings et al. 1987
	1983	Partial				S-J	6,408			Hastings et al. 1987
Ogeechee	1993	Total	31	36	5	SCH	361	326	400	Rogers and Weber 1994
Altamaha	1988	Total	64	87	1	SCH	2,862	1,069	4,226	
	1990	Total	112	175	24	SCH	798	645	1,045	
	1993	Total	44	83	7	SCH	468	316	903	Rogers unpublished data

Estimate Types: S-J=Seber Jolly, PET=Modified Petersen, SCH=Modified Schnabel, CAP=CAPTURE Method, SHU=Schumacher, CHA=Chapman, SPET=Simple Petersen

* Population estimates should be viewed with caution. In some cases, sampling biases may have violated the assumptions of the procedures used or resulted in inadequate representation of a population segment. Population estimates are not available for the following river systems: Penobscot, Chesapeake Bay, Cape Fear, Winyah Bay, Santee, Cooper, ACE Basin, Savannah, Satilla, St. Marys and St. Johns.

frequency, abundance, and catch rate data indicate that shortnose sturgeon may be experiencing higher juvenile mortality rates in the Ogeechee River system than in the Altamaha (below).

Altamaha River

The Altamaha River system drains the largest watershed east of the Mississippi River and comprises the confluence of the Ocmulgee and Oconee Rivers plus additional, smaller piedmont and coastal plain drainages. The system is moderately industrialized including two kraft process paper mills and a nuclear generating plant. The watershed landscape has been heavily altered by urbanization, suburban development, agriculture, and silviculture. The system is also dammed, but not below the fall line. Shortnose sturgeon were first documented in the Altamaha in the early 1970's (Dadswell et al. 1984), and, later, in a cursory study of spawning movements conducted in the late 1970's (Heidt and Gilbert 1979).

A two-year study of population structure and dynamics was conducted during the early 1990's (Flournoy et al. 1992), building on three additional years of survey data from the late 1980's (B. T-A. Woodward, Georgia Department of Natural Resources, unpublished data). Over 650 individuals were collected during the five years of study, with samples heavily dominated by juveniles (90%). Subsequent analysis of tag/recapture data indicated that, during the two-year study period in the 1990's, abundance did not exceed 6,055 individuals for all size and age classes. However, under the more rigorous constraints imposed by the assumptions of the recapture model and (probably) met under the conditions experienced during the summer of 1990, the point estimate is 798 individuals with a 95% confidence interval (CI) of 645-1,045 fish. The next time that those conditions were met (during the late summer of 1993), a similar 95% CI of 316-903 individuals was generated with a point estimate of 468 fish. An estimate generated from 1988 data, which met the same criteria, yielded 2,862 fish (95% CI 1,069-4,226). Based on these data, the Altamaha population segment is likely the largest and most viable one south of Cape Hatteras, North Carolina.

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2	AL	Houston	**Atlantic Coastline Railroad Passenger Depot**	Jct. of Powell St. and Headland Ave.	Dothan	1994-01-21	
3	AL	Houston	**Dothan Municipal Light and Water Plant**	126 N. College St.	Dothan	1991-10-03	
4	AL	Houston	**Dothan Opera House**	103 N. St. Andrews St.	Dothan	1977-12-16	
5	AL	Houston	**Federal Building and U.S. Courthouse**	100 W. Troy St.	Dothan	1974-12-31	
6	AL	Houston	**Main Street Commercial District**	E. Main, Foster, St. Andrews, Crawford, and Troy Sts.	Dothan	1983-04-21	
7	AL	Houston	**Purcell-Killingsworth House**	Main St.	Columbia	1982-12-16	

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1	AL	Henry	**Kennedy House**	300 Kirkland St.	Abbeville	1978-01-05	
2	AL	Henry	**Seaboard Coast Line Railroad Depot**	Broad St.	Headland	1980-09-04	

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1	GA	Early	**Bank of Jakin**	135 S. Pearl St.	Jakin	2003-07-25	
2	GA	Early	**Blakely Court Square Historic District**	Bounded by Powell St., Smith Ave., and Church and Bay Sts.	Blakely	2002-05-09	
3	GA	Early	**Butler, James And Clara, House**	418 College St.	Blakely	2002-01-11	
4	GA	Early	**Coheelee Creek Covered Bridge**	2 mi. N of Hilton on Old River Rd.	Hilton	1976-05-13	
5	GA	Early	**Early County Courthouse**	Courthouse Sq.	Blakely	1980-09-18	Georgia County Courthouses TR
6	GA	Early	**Harrell, Jane Donalson, House**	SR 1975 off U.S. 84	Jakin	1982-06-17	
7	GA	Early	**Kolomoki Mounds**	8 mi. N of Blakely on U.S. 27, Kolomoki Mounds State Park	Blakely	1966-10-15	

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Row	State	County	Resource Name	Address	City	Listed	Multiple
1	GA	Toombs	Brazell, Crawford W., House	607 Jackson St.	Vidalia	1982-06-17	
2	GA	Toombs	Citizens Bank of Vidalia	117 SE. Main St.	Vidalia	1992-01-22	
3	GA	Toombs	Garbutt, Robert and Missouri, House	700 W. Liberty St.	Lyons	2000-12-28	
4	GA	Toombs	Leader--Rosansky House	403 Jackson St.	Vidalia	1995-06-20	
5	GA	Toombs	Lyons Woman's Club House	East Liberty St.	Lyons	1985-05-02	
6	GA	Toombs	McLemore-Sharpe Farmstead	SW of Vidalia on GA 130	Vidalia	1982-08-19	
7	GA	Toombs	Peterson--Wilbanks House	404 Jackson St.	Vidalia	1990-03-22	
8	GA	Toombs	Smith, Jim, House	Rt. 3/Toombs County Rd. 18	Lyons	1989-08-31	
9	GA	Toombs	Vidalia Commercial Historic District	Roughly bounded by Meadow, Jackson, Pine, and Thompson Sts.	Vidalia	1996-09-27	

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Row	State	County	Resource Name	Address	City	Listed	Multiple
1	GA	Appling	**Appling County Courthouse**	Courthouse Sq.	Baxley	1980-09-18	Georgia County Courthouses TR
2	GA	Appling	**Bank of Surrency**	80 Hart St.	Surrency	2003-01-31	
3	GA	Appling	**Citizens Banking Company**	112-116 N. Main St.	Baxley	1985-05-02	
4	GA	Appling	**Deen, C. W., House**	413 N. Main St.	Baxley	1982-09-30	
5	GA	Appling	**United States Post Office--Baxley, Georgia**	124 Tippins St.	Baxley	2000-07-05	

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Row	State	County	Resource Name	Address	City	Listed	Multiple
1	AL	Autauga	**Bell House**	550 Upper Kingston Rd.	Prattville	1999-02-12	
2	AL	Autauga	**Daniel Pratt Historic District**	Roughly bounded by Northington Rd., 1st, 6th, Bridge, and Court Sts.	Prattville	1984-08-30	
3	AL	Autauga	**Lassiter House**	Antauga County 15. 0.5 mi. N of jct. of AL 14 and Co. Rd 15	Autaugaville	1997-07-17	
4	AL	Autauga	**Montgomery--Janes--Whittaker House**	S of Prattville off AL 14	Prattville	1974-10-25	
5	AL	Autauga	**Mount Sinai School**	1820 Cty. Rd. 57	Prattville	2001-11-29	The Rosenwald School Building Fund and Associated Buildings MPS

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Row	State	County	Resource Name	Address	City	Listed	Multiple
1	AL	Chilton	**Gragg Field Historic District**	700 Airport Rd.	Clanton	2004-06-02	
2	AL	Chilton	**Verbena**	US 31	Verbena	1976-01-19	
3	AL	Chilton	**Walker--Klinner Farm**	3.5 mi. E of Maplesville on AL 22	Maplesville	1987-10-15	

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Row	State	County	Resource Name	Address	City	Listed	Multiple
1	AL	Coosa	**Coosa County Jail**	Off AL 22	Rockford	1974-06-20	

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Row	State	County	Resource Name	Address	City	Listed	Multiple
1	AL	Elmore	**Alabama State Penitentiary**	NE of Wetumpka on US 231	Wetumpka	1973-05-08	
2	AL	Elmore	**East Wetumpka Commercial Historic District**	Roughly, Company St. from Spring St. to E. Bridge St. and E. Bridge and Commerce Sts. from Main to Hill Sts.	Wetumpka	1992-02-20	
3	AL	Elmore	**East Wetumpka Commercial Historic District (Boundary Increase)**	206 S. East Main St.	Wetumpka	1999-07-28	
4	AL	Elmore	**First Presbyterian Church Of Wetumpka**	W. Bridge St.	Wetumpka	1976-10-08	
5	AL	Elmore	**First United Methodist Church**	308 Tuskeena St.	Wetumpka	1973-02-15	
6	AL	Elmore	**Fort Toulouse**	4 mi (6.4 km) SW of Wetumpka at confluence of the Coosa and Tallapoosa rivers	Wetumpka	1966-10-15	
7	AL	Elmore	**Hickory Ground**	Address Restricted	Wetumpka	1980-03-10	
8	AL	Elmore	**Robinson Springs United Methodist Church**	AL 14 and AL 143	Robinson Springs	1982-03-01	
9	AL	Elmore	**Tallassee Commercial Historic District**	Roughly, 3 blocks on S side Barnett Blvd. between old River Rd. and DuBois St.	Tallassee	1992-03-06	
10	AL	Elmore	**Wetumpka L & N Depot**	Coosa St.	Wetumpka	1975-07-01	

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Verbena. **VERBENA,** U.S. 31, Late 19th-early 20th C. Multi-use district of 57 predominantly frame l-story structures; notable include the Verbena Baptist Church, the multi-gabled Gibson house, the hip-on-hip Brooks-Wingate house, and the Greek Revival Brooks-De Ramus store. Town first developed as summer resort, reached peak in late 1880's; later evolved as permanent settlement following second resort hotel fire, 1922, and construction of Mitchell Dam. *Multiple public/private.*

NRC 2000

H. L. Sumner, Jr.
Vice President
Hatch Project

Southern Nuclear
Operating Company, Inc.
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Tel 205.992.7279

SOUTHERN COMPANY
Energy to Serve Your World℠

January 15, 2004

NL-04-0047

Docket Nos.: 50-321
50-366

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Edwin I. Hatch Nuclear Plant
Update to the Hatch Biological Assessment Under the Endangered Species Act for Shortnose Sturgeon

Ladies and Gentlemen:

In response to NRC letter dated November 26, 2003, Southern Nuclear Operating Company (SNC) has revised the August 31, 2000, "Biological Assessment of the Potential Impact On Shortnose Sturgeon Resulting From An Additional 20 Years of Operation of the Edwin I. Hatch Nuclear Power Plant, Units 1 and 2," originally developed in support of license renewal for Edwin I. Hatch Nuclear Plant. SNC has revised the document to address questions resulting from a meeting between the NRC, National Marine and Fisheries Service, and the U.S. Army Corps of Engineers. The revision addresses the questions in the NRC correspondence referenced above, by including where practicable, additional detail and new information.

Please contact Mr. Tom Moorer, SNC Environmental Services Supervisor at 205-992-5807, if you have any additional questions.

Sincerely,

H. L. Sumner, Jr.

HLS/JTD/TCM

Enclosure: Biological Assessment Under the Endangered Species Act

IE25
A083

cc: <u>Southern Nuclear Operating Company</u>
Mr. J. B. Beasley, Jr., Executive Vice President
Mr. G. R. Frederick, General Manager – Plant Hatch
Document Services RTYPE: CHA02.004

<u>U. S. Nuclear Regulatory Commission</u>
Mr. L. A. Reyes, Regional Administrator
Mr. S. D. Bloom, NRR Project Manager – Hatch
Mr. M. T. Masnik, Senior Project Manager
Mr. D. S. Simpkins, Senior Resident Inspector – Hatch

ENCLOSURE
EDWIN I. HATCH NUCLEAR PLANT
BIOLOGICAL ASSESSMENT UNDER THE ENDANGERED SPECIES ACT

BIOLOGICAL ASSESSMENT OF THE POTENTIAL IMPACT ON SHORTNOSE STURGEON RESULTING FROM A MODIFICATION OF THE DREDGING FOOTPRINT EDWIN I. HATCH NUCLEAR POWER PLANT, UNITS 1 AND 2

Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

August 2000 - Revised

I. INTRODUCTION

In November 1999, Southern Nuclear Operating Company prepared and submitted to the NRC a Biological Information Update to address the impacts of continued operation of E. I. Hatch Nuclear plant on the Altamaha river population of the federally endangered shortnose sturgeon *Acipenser Brevirostrum*. This biological update was utilized by the U. S. Nuclear Regulatory Commission (NRC) to develop the "Hatch Biological Assessment under the Endangered Species Act for the Shortnose Sturgeon" submitted to the National Marine Fisheries Service on August 31, 2000 in support of informal consultation conducted under Section 7 of the Endangered Species Act. In February 2002, the NRC renewed the operating licenses for the E. I. Hatch Nuclear plant, Units 1 and 2 for an additional 20 years. The Operating License for Unit 1 extends through August 6, 2034 and the Operating License for Unit 2 extends through June 13, 2038. The documentation supporting the "Generic Environmental Impact Statement for License Renewal of Nuclear Plants Supplement 4, Regarding Edwin I. Hatch Nuclear Plant, Units 1 and 2" contains language concluding that the relicensing of Plant Hatch "may affect but is not likely to adversely affect" the shortnose sturgeon in the Altamaha River.

Based on recent discussions between the NRC, National Marine Fisheries Services and the U. S. Army Corps of Engineers, summarized in an NRC letter dated November 26, 2003, this Biological Assessment (BA) originally developed for the Hatch relicensing process has been revised. The revision was developed to include any additional available information on the shortnose sturgeon in the Altamaha River, and to provide an assessment of activities conducted under the Corps of Engineers Maintenance Dredging permit issued under Section 404 of the Clean water Act relative to potential for impact on the shortnose sturgeon. This revision updates existing information on the sturgeon, adds a detailed discussion of the potential for maintenance dredging at Plant Hatch to impact the sturgeon, and provides answers to specific questions raised in the referenced November 26, 2003 correspondence.

II. PROPOSED ACTION

The proposed action is the continued operation of the E. I. Hatch Nuclear Plant under the recently renewed NRC Operating Licenses. At the request of the NRC, National Marine Fisheries Service and the U. S. Army Corps of Engineers, Southern Nuclear has revised this BA to respond to specific questions identified in the November 26, 2003 NRC letter. The information contained in the original BA submitted by the NRC in support of license renewal has been revised herein, as appropriate, to respond to the specific questions identified in the November 26, 2003 NRC letter.

III. DESCRIPTION OF PROJECT AREA

A. General Plant Information

The HNP is a steam-electric generating facility operated by Southern Nuclear Operating Company (SNC). HNP is located in Appling County, Georgia, at river kilometer (rkm) 180, slightly southeast of the U.S. Highway 1 crossing of the Altamaha River. It is approximately 11 miles north of Baxley, Georgia; 98 miles southeast of Macon, Georgia; 73 miles northwest of Brunswick, Georgia; and 67 miles southwest of Savannah, Georgia.

HNP is a two-unit plant. Each unit is equipped with a General Electric Nuclear Steam Supply System that utilizes a boiling-water reactor with a Mark I containment design. Both units were originally rated at 2,436 megawatt-thermal and designed for a power level corresponding to approximately 2,537 megawatt-thermal. Both units are now licensed for 2,763 megawatt-thermal. HNP uses a closed-loop system for main condenser cooling that withdraws from and discharges to the Altamaha River via shoreline intake and offshore discharge structures. Descriptions of HNP can be found in documentation submitted to the NRC for the original operating license and subsequent license amendments. Georgia Power Company (GPC) submitted environmental reports for the construction stage and operating license stage for HNP in 1971 and 1975, respectively (References 1 and 2). In 1972, the Atomic Energy Commission (AEC)[1] issued a Final Environmental Statement (FES) for Units 1 and 2 (Reference 3), and in 1978, NRC issued a FES for Unit 2 (Reference 4). The FESs evaluate the environmental impacts from plant construction and operation in accordance with the National Environmental Policy Act (NEPA).

The property at the HNP site totals approximately 2,240 acres and is characterized by low, rolling sandy hills that are predominantly forested. The property includes approximately 900 acres north of the Altamaha River in Toombs County and approximately 1,340 acres south of the River in Appling County. All industrial facilities associated with the site are located in Appling County. The restricted area, which comprises the reactors, containment buildings, switchyard, cooling tower area and associated facilities, is approximately 300 acres. Approximately 1,600 acres are managed for timber production and wildlife habitat.

B. Heat Dissipation System

The excess heat produced by HNP's two nuclear units is absorbed by cooling water flowing through the condensers and the service water system. Main condenser cooling is provided by mechanical draft cooling towers. Each HNP circulating water system is a closed-loop cooling system that utilizes three cross-flow and one counter-flow mechanical-draft cooling towers for dissipating waste heat to the atmosphere.

For both Units 1 and 2, cooling tower makeup water is withdrawn from the Altamaha River through a single intake structure. The intake structure is located along the southern shoreline of the Altamaha River and is positioned so that water is available to the plant at both minimum flow and probable flood conditions (Attachment 1). The main river channel (thalweg) is located closer to the northern shoreline. The intake is approximately 150 feet long, 60 feet wide, and the

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[1]. Predecessor agency to NRC.

roof is approximately 60 feet above the water surface at normal river level. The water passage entrance is about 27 feet wide and extends from 16 feet below to 33 feet above normal water levels. Large debris is removed by trash racks, while small debris is removed by vertical traveling screens with a 3/8 inch mesh. Water velocity through the intake screens is 1.9 feet per second (fps) at normal river elevations and decreases at higher river flows. The U. S. Army Corps of Engineers issued permit Number 940003893 under Section 404 of the Clean Water Act to support maintenance dredging in front of the Hatch intake structure to remove accumulated sand, silt, and debris and ensure adequate water supply for plant operation. The specifics of this permit and the maintenance dredging process are discussed in detail in a subsequent section.

Water is returned to the Altamaha River via a submerged discharge structure that consists of two 42-inch lines extending approximately 120 feet out from the shore at an elevation of 54 feet mean sea level. The point of discharge is approximately 1,260 feet down-river from the intake structure and approximately 4 feet below the surface when the river is at its lowest level. The National Pollutant Discharge Elimination System (NPDES) Permit for HNP, issued by the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources (GA DNR) in 1997 requires weekly monitoring of discharge temperatures, but does not stipulate a maximum discharge temperature or maximum temperature rise across the condenser. Maximum discharge temperatures measured at the mixing box, which are reported to EPD on a quarterly basis, range from 62 °F in winter to 94 °F in summer.

C. Surface Water Use

The Altamaha River is the major source of water for the plant. Water is withdrawn from the River to provide cooling for certain once-through loads and makeup water to the cooling towers. SNC is permitted to withdraw a monthly average of up to 85 million gallons per day with a maximum 24-hour rate of up to 103.6 million gallons. As a condition of this permit, SNC is required to monitor and report withdrawals. HNP withdraws an annual average of 57.18 million gallons per day (88 cubic feet per second [cfs]).

The evaluation of surface water use in the FES concluded that the consumptive losses would be approximately 46 percent of the total water withdrawn from the River. In its environmental assessment for an extended power uprate, the NRC staff concluded that the necessary increase in makeup water to support the higher heat load would be insignificant and that cooling tower blowdown would decrease by approximately 626 gallons per minute (1.4 cfs). Consumptive water use for the plant operating at the extended power level is expected to be 57 percent of the total withdrawal.

The thermal discharge plume has been modeled using the Motz-Benedict model for horizontal jet discharges. The predictive thermal plume model was field verified during 1980 following commencement of Unit 2 operation (Reference 5). Twelve thermal plume monitoring surveys were conducted during 1980 and compared to model predictions. During each of the twelve surveys, temperatures were taken at depths of one foot, three feet, and five feet. All temperatures measurements were made from a boat moving along a pre-selected transects in the river using a temperature probe and continuous recorder. Monitoring equipment was calibrated in the laboratory before each survey and rechecked in the field before and after each survey. The average projected fully mixed excess temperature under average summer conditions (average river flow of 3000 cfs, ΔT of 4.7 °F) is 0.09 °F. During the 1980 field surveys, the period of lowest river flow and greatest cooling tower heat rejection (3220 cfs, and ΔT of 4.5 °F, respectively) resulted in a fully mixed excess temperature of 0.05 °F. The NRC modeled average expected thermal conditions and extreme thermal conditions under conservative assumptions in the Unit 2 Final Environmental Impact Statement (FES) (Reference 4). In that environmental statement, the NRC noted the small size of the thermal plume even under the conservative assumptions, and concluded thermal blockage in the Altamaha River from the plant discharge was not possible.

To control biofouling of cooling system components such as condenser tubes and cooling towers, an oxidizing biocide (typically sodium hypochlorite or sodium bromide) is injected into the system as needed to maintain a concentration of free oxidant sufficient to kill most microbial organisms and algae. When the system is being treated, blowdown is secured to prevent the discharge of residual oxidant into the river. After biocide addition, water is recirculated within the system until residual oxidant levels are below discharge limits specified in the NPDES permit.

D Maintenance Dredging of Intake

In order to ensure adequate depth of water at the Hatch intake structure to provide a dependable water supply for continued plant operation, the river bottom in the area of the intake structure must be maintained to remove accumulated sand, silt, and debris. Maintenance is performed by dredging with a hydraulic dredge, clamshell, or dragline. Permit Number 94003873 (Reference 26) has been issued by the Savannah District – U. S. Army Corps of Engineers under Section 404 of the Clean Water Act. The permit authorizes periodic maintenance dredging by hydraulic dredge, clamshell, or dragline for a ten (10) year period. Removed material is spoiled in an upland disposal area with no return of material to the river. The permit contains numerous special conditions to ensure protection of aquatic habitat. Special Conditions 1, 2, and 3 limit dredging to a specific time of the year (August 15 – November 31) and specifically prohibit dredging from December 1 through June 30 to ensure protection of anadromous fish. The permit also requires monitoring of dissolved oxygen during dredging and requires suspension of dredging operations if dissolved oxygen levels fall below 3.0 mg/L. The permit also specifies recordkeeping for each dredge event and reporting to the Corps of Engineers.

Recently, Plant Hatch applied for a permit modification to support a change in the size and shape of the dredge footprint. This modification was based on hydraulic engineering studies that indicated removal of the upstream sandbar area would enhance natural scouring properties of the river and ultimately reduce the amount of dredging required to maintain the intake structure. This permit modification is currently under consideration by the Savannah District Corps of Engineers. The requested modification proposes an increase in the current L-shaped profile to a larger L-shaped profile. The increase in profile size produces a maximum 8,571 yd^3 increase in the amount of material removed during each dredging event to maintain the footprint (Attachment 1). The increase in profile size is recommended as a mechanism to reduce the frequency of dredging by making the profile more amenable to natural flushing during high flow events. SNC recommends removal of material on the upstream side of the current footprint to expose the area near the intake structure to the effects of high flows and naturally flush accumulated material. Less frequent dredging provides an economic benefit to the plant and also benefits the environment by disturbing the river habitat less often. The increase in profile size does not have any relationship to the amount of water withdrawn by

Plant Hatch. No changes in withdrawal are associated with the modification request. The primary purpose of maintenance dredging at Plant Hatch is to ensure adequate water depth for the river water intake pumps and to minimize the amount of silt entrained by pump operation. The proposed modification will support the required dredging on a less frequent basis.

The area in front of the Hatch intake consists primarily of accumulated sand deposits that shift constantly with changes in river flow. This type of bottom has little value relative to the shortnose sturgeon. During the time dredging is conducted, shortnose sturgeon inhabit the area of the Altamaha near the fresh/saltwater interface or the deep hole refuges in the lower Altamaha (Reference 9).

Plant Hatch routinely conducts surveys of the river bottom in front of the intake structure to evaluate the need for dredging. A copy of the May 2003 River Bottom Topographical Survey is provided as Attachment 1.

Based on the above information, no significant impact to the Altamaha River population of the shortnose sturgeon should result from maintenance dredging activities at Plant Hatch. This conclusion is consistent with the "may affect but is not likely to adversely affect" finding in previous correspondence.

IV. STATUS REVIEW OF SHORTNOSE STURGEON

A. Life History

The shortnose sturgeon, *Acipenser brevirostrum,* is a member of the family Acipenseridae, a long-lived group of ancient anadromous and freshwater fishes. The species is currently known by at least 19 distinct population segments inhabiting Atlantic coast rivers from New Brunswick, Canada to northern Florida (Reference 6). Most shortnose sturgeon populations have their greatest abundance in the estuary of their respective river (Reference 7). The species is protected throughout its range.

The distribution of shortnose sturgeon strongly overlaps that of the Atlantic sturgeon, but life histories differ greatly between the two species. The Atlantic sturgeon is truly anadromous with adults and older juveniles spending large portions of their lives at sea. Shortnose sturgeon, however, are restricted to their natal streams. Shortnose sturgeon are not known to move among or between different river drainages (References 8 and 6).

Seasonal migration patterns and some aspects of spawning may be partially dependent on latitude. In northern rivers, shortnose sturgeon move to estuaries in summer months. In southern rivers, movement to estuaries usually occurs in winter (Reference 6). Shortnose sturgeon spawn in freshwater like the Atlantic sturgeon, but then return to the estuaries and spend much of their lives near the fresh/salt water interface. Fresh tidewaters and oligohaline areas serve as nurseries for shortnose sturgeon (Reference 9). Availability of spawning and rearing habitats may be limited throughout the range of shortnose sturgeon (Reference 7).

Shortnose sturgeon exhibit faster growth in southern rivers, but will reach larger adult size in northern rivers (Reference 6). Thus, shortnose sturgeon will reach sexual maturity (45-55 cm FL, [Reference 7]) at a younger age in southern rivers. Spawning by individual fish may only occur at intervals with frequencies of a few to several years. Dadswell, et al. (Reference 10) composed a detailed summary of the known biology of shortnose sturgeon.

Rivers of the deep south are on the edge of the natural range of the shortnose sturgeon and present somewhat unique problems for the species. The majority of southern rivers and estuaries regularly reach temperatures unfavorable to shortnose sturgeon. Intolerant of saline environments and limited to riverine habitats, shortnose sturgeon must seek thermal refuges during most summers in the south. The refuges are found in lower river reaches and consist usually of a few deep holes, possibly cooled by springs or seeps. The fish concentrated in a few of these thermal refuges quickly exhaust local food supplies and appear to just be surviving the summer (Reference 9). A life history that restricts the species to individual drainages, combined with seasonally restricted use of habitats, may be directly related to the species' current endangered status. Sturgeons have long been commercially important species, which may be a leading cause in their rapid decline worldwide. For more than a century, atlantic and shortnose sturgeon populations were subjected to extensive fishing, likely contributing to the massive population declines along the east coast (Reference 6). Prior to 1900, sturgeon catches were averaging over 3.0 million kg per annum, but this harvest was sustained for less than a decade. Prior to the closure of most east coast fisheries during the 1980s, catches had decreased to less than 1% of historical levels (Reference 11).

Although the shortnose sturgeon was severely overharvested in the past, the greatest threats to survival presently include barriers to its spawning grounds created by dams, loss of habitat for other life history stages, poor water quality, and incidental capture in gill net and trawl fisheries targeting other species (References 8 and 10). Shortnose sturgeon was listed as endangered in 1967 by the U.S. Fish and Wildlife Service. In 1974, the National Marine Fisheries Service reconfirmed this decision under the Endangered Species Act of 1973 (References 8 and 6).

B. Status in Altamaha River

The Altamaha River is large, with the largest watershed east of the Mississippi River. The Altamaha River is located entirely within the state of Georgia. It flows over 800 km from its headwaters to the Atlantic Ocean. The main body of the Altamaha is formed by the confluence of the Oconee and Ocmulgee rivers in the central coastal plain at Altamaha rkm 212 (Reference 8).

The incidences of catch and overharvest of sturgeons from Georgia rivers paralleled the trends of other states. From 1888 through 1892, sturgeon catches in Georgia averaged 71,000 kg per annum (Reference 12). "As recently as 49 years ago, a dealer in Savannah (GA) was shipping 4,500 kg of carcasses per week (6,500 kg in the round) during the peak three to five weeks of the spring run"(Reference 12). Similar harvests were recorded from the Altamaha River (Reference 9).

Catch rate data for sturgeons in Georgia are just as startling. In 1880, and average seasonal catch was 100 fish per net. During a 20-year period from the late 1950s through the late 1970s, net fishermen in the lower Altamaha River caught just 1.1 to 3.2 fish per net per season (Reference 13, as presented in Reference 9). These data indicate a 97-99% decline in the sturgeon fishery (Reference 9).

There is a continuing high demand for sturgeon roe and flesh. From 1962 to 1994 the source of the majority of sturgeon catches has shifted among the Savannah, Ogeechee, and Altamaha rivers. The Altamaha River has been the focus of a "much-throttled" fishery from 1982 to present. Certain recent events have kept prices for sturgeon products high or rising, fueling commercial fisheries and some poaching (Reference 11). Some of these events were an increasing US domestic demand for all seafood products, decreased supplies of sturgeon products as fisheries closed in the US, and sturgeon stocks worldwide were becoming more depleted by overharvest and habitat degradation, particularly in the republics of the old Soviet Union (Reference 11).

The Altamaha River population of shortnose sturgeon has been the focus of much recent research to assess abundance and distribution, determine migration patterns, and describe habitat utilization. Some authors suggested the Altamaha River population of shortnose sturgeon was in better shape than the population in the Savannah River, Georgia-South Carolina (Reference 11). Another study indicated shortnose sturgeon in the Altamaha River may be experiencing lower juvenile mortality rates than in the Ogeechee River, Georgia (Reference 7). The Shortnose Sturgeon Recovery Team indicated that the Altamaha River population was the largest and most viable population south of Cape Hatteras, North Carolina (Reference 6). Relative abundance data from one sampling station during 1986-1991 appear to demonstrate a relatively stable population with little trend in the abundance of juveniles (Reference 9).

Telemetry studies have revealed much information about the seasonal migrations of shortnose sturgeon in the Altamaha River and the importance of certain habitats. During summer in the Altamaha River, most fish ages 1+ and older are concentrated at or just upstream of the fresh/salt water interface in physiological refugia. Cooling water temperatures in the fall spur a movement of all sizes of fish to generally more saline waters. Some adult and most large juvenile fish move back to fresh tidewater near the end of autumn to overwinter with little movement or activity. In preparation for spawning in late winter-early spring, some adults will move upstream to locations near spawning sites. It is believed that spawning occurs during the February to March time frame (Reference 11). The majority of adults and a few large juveniles remain in oligohaline waters near the fresh/salt water interface and may be very active (Reference 8).

Several suspected spawning sites for shortnose sturgeon have been located within the Altamaha River system. Much of the spawning activity occurs in a 70-kilometer section of the Altamaha River centered about Doctortown, Georgia. Spawning has also been suspected in the lower Ocmulgee River, which is several kilometers upstream of the shoals marking the transition to the upper coastal plain (Reference 8). This reach is about 40 rkm upstream of HNP. However, recent discussions with Dr. Doug Peterson, a Professor at the University of Georgia currently conducting studies of the sturgeon spawning behavior for the National Marine Fisheries Service indicate that there is no scientific evidence to confirm the presence of spawning sites in the Ocmulgee (Reference 24). In addition, discussions with Mr. Jimmy Evans, Fisheries Biologist with the Georgia Department of Natural Resources confirm that no data exists to support the viability of this site. The potential site in the Ocmulgee River discussed in previous correspondence has been previously speculated to be a spawing site, no data currently exists to confirm this site. A map indicating the suspected spawning areas in relation to Plant Hatch is provided as Attachment 2.

Suspected spawning areas in the Altamaha River system were often adjacent to river bluffs with gravel, cobble, or hard rock substrate (Reference 11). Shortnose sturgeon eggs are demersal and adhesive after fertilization, sinking quickly and adhering to sticks, stones, gravel, and rubble on the stream bottom.

Shortnose sturgeon, especially juveniles, appear severely restricted to certain habitats near the fresh/salt water interface of the lower Altamaha River. During summers when the water temperature exceeds 28 °C, the fish are further restricted to a few deep holes near the interface. Recaptures of tagged fish indicate that the fish move little and lose weight during this time, which indicates the oversummering habitat is very important, and that food resources may be quickly exhausted (Reference 9). Flournoy, et al. (Reference 9) proposed that shortnose sturgeon were using a few deep holes in the lower Altamaha as physiological refuges, and that these holes may constitute critical habitat. They further hypothesized that the Altamaha River population of shortnose sturgeon existed only because the physiological refugia were available.

The Shortnose Sturgeon Recovery Team has identified numerous factors that may affect the continued survival and potential recovery of the species. Some of these factors may be habitat degradation or loss from dams, bridge construction, channel dredging, and pollutant discharges, as well as mortality from cooling water intake systems, dredging, and incidental capture in other fisheries (Reference 6). Recent evidence of illegal directed take of shortnose sturgeon in South Carolina indicate that poaching may also be a significant source of mortality (Reference 7).

All of the above factors may contribute to mortality in shortnose sturgeon populations, and the significance of each may vary with latitude and individual circumstances. However, the prevailing evidence seems to indicate, at least for the Altamaha River, that the primary threats to the population are commercial harvest and limited oversummering habitat. Dahlberg and Scott (Reference 14) recognized that shortnose sturgeon were often caught in gill nets by shad fishermen in the Altamaha River. The threat of bycatch remains real as many of the individual shortnose sturgeon used in recent studies were captured or recaptured with shad fishing gear. Rogers, et al. (Reference 11) stated that at least one of their tagged fish released in the estuary was captured in commercial shad gear, and six of the 36 individuals telemetered were initially collected with shad gear. Even if the fish are recognized as protected shortnose sturgeon and returned to the river, the capture may result in abandonment of spawning activity (Reference 7).

Several authors suggested the Altamaha River population of shortnose sturgeon may be healthier than the Savannah River population (Reference 8). Both rivers have discharges of similar magnitude and neither is dammed below the fall line. Both the Savannah and Altamaha are moderately industrialized, including paper mills and nuclear generating stations along their reaches from the fall line to the coast. Only the Savannah, however, is heavily altered and industrialized in its estuarine zone (Reference 11).

Previous research has shown shortnose sturgeon ages one year and older aggregate in the Altamaha River at or just upstream of the fresh/saltwater interface during the summer. These fish appear to move downstream into more saline water at the end of summer. During late fall and early winter, movement to less saline water occurs and some adults may move upstream toward spawning areas. Spawning is thought to occur during February through March. Some spawning fish move downstream immediately, while other remain upstream (Reference 8).

C. Low Potential for HNP to affect Shortnose Sturgeon

Biological, hydraulic, and physical factors affect the rates of impingement and entrainment. The shortnose sturgeon's known behavior and use of the Altamaha River indicates a low potential for impingement or entrainment with the cooling water for HNP. The low potential for impingement or entrainment is further reduced by siting, design, and operational characteristics of HNP. This is discussed in greater detail, below.

Available literature suggests there is little opportunity for shortnose sturgeon eggs or larvae to encounter the cooling water intakes at HNP. Much of the available spawning habitat for shortnose sturgeon in the Altamaha River is well downstream of HNP. Eggs and larvae from these spawning locations are not available for entrainment by HNP.

There is a suspected spawning area in the lower Ocmulgee River about 40 rkm upstream from HNP, but entrainment of eggs or larvae of from this site is also unlikely. Fertilized shortnose sturgeon eggs sink quickly and adhere tightly to rough substrates, even under high flow conditions. Shortnose sturgeon larvae seek bottom cover quickly upon hatching and seldom stray from cover (Reference 15). The larvae grow quickly and are able to maintain bottom contact without being swept downstream (Reference 15), and may linger near the spawning area for the first year of life (Reference 6). Some authors, after attempting to capture shortnose sturgeon larvae, speculated the larvae of shortnose sturgeon, contrary to larvae of Atlantic sturgeon, do not spend much time in the drift (References 16 and 17). These early life history behaviors suggest a very low potential for entrainment effects at HNP.

The location of the cooling water intake at HNP should further reduce the potential for entrainment and impingement. The intake structure was constructed flush with the shallow, southern shoreline of the Altamaha River. The deep river channel (thalweg) hugs the northern bank opposite of the intake structure. Literature indicates that shortnose sturgeon migrate along the bottom of river channels, often seeking the deepest water available. This behavior and the cooling water intake location on the shoreline opposite the river channel should minimize the probability of shortnose sturgeon encountering the intake structure.

Entrainment and impingement effects are also a function of withdrawal rates, which are reduced for facilities with closed cycle cooling systems in comparison to once through cooling systems. HNP is operated using 3 mechanical draft cooling towers per unit as described in Section III B of this assessment. Cooling towers have been suggested as mitigative measures to reduce known or predicted entrainment and impingement losses (see, for example, Reference 18). EPA has endorsed closed cycle cooling towers as the "best available technology" for minimizing entrainment and impingement mortality (Reference 19). The relatively small volumes of makeup and blowdown water needed for closed-cycle cooling systems result in concomitantly low entrainment, impingement, and discharge effects. In the GEIS for license renewal (Refernce 20), the staff noted that studies of intake and discharge effects of closed-cycle cooling systems have generally judged the impacts to be insignificant.

D. Existing Monitoring Data for HNP

This section briefly describes the methods and results of previous studies conducted at HNP. Initial preoperational surveys were conducted at HNP as required by the Unit 1 and 2 Final Environmental Statement (Reference 3) to "perform preoperational measurements of aquatic species to establish base-line data". During these surveys, one adult shortnose sturgeon was collected by gill net on March 13, 1974, in the vicinity of HNP. Three additional specimens of *Acipenser* sp. (two juveniles and one larva) were collected but could not be identified to species (Reference 4). No adult, juvenile, or larval shortnose sturgeon were collected during subsequent impingement and entrainment sampling conducted following startup of either Unit 1 or Unit 2.

Preoperational drift surveys where conducted weekly from February through May in 1973, and every 6 weeks June through December 1973. Samples were collected at four quadrates for transect above and below the plant intake and two locations close to the plant intake. Typical sample sets consisted of 14 individual samples from 15-minute collections. Drifting organisms were collected with a one-meter diameter 000-mesh nylon plankton net, set 6-12 inches above the river bottom. Samples were washed into a quart container and preserved with formalin.

Cataostomids, cyprindis, and centrarchids were the dominant ichthyoplanton families collected. Commercially important fish in these collections included *Alosa sapidissima* eggs, with mean densities approaching 0.3 per 1000 m^3 in March. *Alosa sapidissima* larvae were present in drift samples from May through June, with the density never exceeding 0.03 individuals per 1000 m^3. A sturgeon larva was collected during this sampling and sent to Dr. Donald Scott for identification of species, but could not be identified beyond the genus *Acipenser*. This is the only record of larval sturgeon found in the vicinity of HNP.

Entrainment samples at HNP were collected for the years 1975, 1976, and 1980 following unit startup. Samples were collected weekly during 1975 and 1976, and monthly in 1980 (Reference 21). Additional ichthyological drift data are available for 1974 (weekly collection) and 1979 (monthly collection), but were not used in summarizing entrainment rates. Monthly entrainment data for each taxa for 1975, 1976 represent entrainment estimates for Unit 1 operation. The 1980 data include entrainment estimates for Unit 1 and Unit 2 operation. There was no increase in fish eggs and larvae entrainment at HNP with both units operating. The differences in numbers of fish eggs and larvae reported in the studies are due to differences in species abundance from year to year, spawning activity upstream from the plant, river discharge, and time of year. No sturgeon larvae were found in any entrainment samples collected during operational monitoring.

The entrainment estimates assume a uniform distribution of fish eggs and larvae, while the cross section measurements suggest that the greater densities would occur in the channel furthest from the intake. Under normal flow and pumping conditions, the intake velocity is 1.9 fps. The measured range of intake velocities was from 0.3 fps to 2.7 fps. Estimated percent of river flow entrained in Plant Edwin I. Hatch cooling water has remained less than one percent with the exception of the months of July, August, and September, 1980. The increase in estimated percent flow entrained during this period was due to extremely low river elevations resulting from the lack of rainfall. The spawning period for the shortnose sturgeon in the Altamaha River occurs during the months of February and March. Review of historical river flow indicates that the flow during February and March, and following months when eggs or larval sturgeon could be present is traditionally high (Reference 11, 25 & Attachment 3) such that entrainment impacts would be further minimized.

Impingement data are available for five years, including 1975, 1976, 1977, 1979, and 1980. Impingement samples include weekly samples in 1975, 1976, and 1977 and monthly samples for 1979 and 1980. Each sample represents impingement for at least a 24-hour period. A total of 165 fish representing 22 species were collected. The highest number impinged per year, 61 fish, was in 1975, while the lowest, 14 fish, was in 1980. The data indicate low impingement estimates per day and per year. The 1975 estimates are 1.2 fish per day and 438 per year; 1976 estimates are 0.4 fish per day and 146 per year; 1977 estimates are 1.1 fish per day and 401.5 per year; 1979 estimates are 1.3 fish per day and 474.5 per year; and 1980 estimates are 1.2 fish per day and 438 per year. The hogchoker, *Trinectes maculatus*, was the most abundant and the only species collected consistently each year. Most species were collected only once during the five years. No sturgeon were collected in impingement samples during five years of sampling. In addition, no adult sturgeon has been reported impinged by the intake structure during the operation of the plant. Recent information (Reference 24) indicates that the likelihood of sturgeon spawning areas upstream of Plant Hatch is remote. This further supports the conclusion that potential for impingement of sturgeon by the Plant Hatch intake is low.

E. Comparison with other power generation facilities

The staff has performed an assessment (Reference 22) of the potential impact of the of operation of the Delaware River nuclear power plants, Salem 1 and 2 (once-though) and Hope Creek 1 (closed cycle), and concluded that plant operation was unlikely to adversely affect shortnose sturgeon. This conclusion was based on a combination of life history information, plant siting considerations, and engineering design to mitigate potential adverse impacts (Reference 22). The Hudson River, New York, supports a large sturgeon population including both shortnose and Atlantic species. There are six fossil-fueled and one nuclear electricity generating plants located along the Hudson River, and much research has been conducted to address impingement and entrainment concerns. Results for entrainment and impingement at the power generation facilities Bowline, Indian Point, and Roseton have been recently summarized for the period from 1972 through 1998 (Reference 17). These three facilities withdraw 62% of the maximum permitted water withdrawal from this reach of the Hudson River. Bowline Units 1 and 2 are two fossil fuel steam electric plants with combined capacity of 1200 MWe and utilize an intake structure located on an embayment off of the Hudson River. The maximum pumping rate is 384,000 gpm. Indian Point Units 2 and 3 are separate pressurized water reactors with combined capacity of 2042 MWe utilizing two separate shoreline intake structures. Predicted condenser cooling water flow rates are 840,000 gpm and 870,000 gpm for Indian Point Units 2 and 3, respectively. Roseton is a two-unit fossil-fueled steam electric plant with combined capacity of 1248 MWe and utilizes a shoreline intake structure. Maximum pumping rate is 641,000 gpm. Unlike HNP, all three of these facilities use once-through cooling. For comparison, the maximum pumping rate for HNP is 72,000 gpm. The GEIS for license renewal (Reference 20) notes that "Water withdrawal from adjacent bodies of water for plants with closed-cycle cooling systems is 5 to 10 percent of that for plants with once-through cooling systems, with much of this water being used for makeup of water by evaporation." The operation of the HNP cooling system is consistent with this description.

One of the environmental impacts identified for the three facilities on the Hudson River is entrainment and impingement of aquatic organisms, including striped bass, white perch, Atlantic tomcod, American shad, bay anchovy, alewife, blueback herring, and spottail shiner. Other species were considered, including Atlantic sturgeon (*Acipenser oxyrhynchus*) and shortnose sturgeon. No shortnose sturgeon eggs or larvae were collected in entrainment samples for these facilities over periods ranging from 5 to 14 years. As a result, entrainment effects on shortnose sturgeon are believed to be negligible.

Adult shortnose sturgeon, however, were collected in impingement samples at these facilities. Indian Point Unit 2 reported shortnose sturgeon in impingement samples for 10 of 19 years reported (ranging from 1 to 6 individuals per year). Indian Point Unit 3 reported shortnose sturgeon in impingement samples for 7 of 15 years reported (ranging from 1 to 3 individuals per year). The size of impinged shortnose sturgeon ranged from 12 to 18 inches. The low rate of impingement and the return of impinged fish to the Hudson River alive lead to the conclusion that impingement effects were negligible (Reference 17). Even though sampling has documented large numbers of affected fish at intakes along the Hudson River, and a large resident population of sturgeon exists, shortnose sturgeon are a very small component of the impingement and entrainment numbers (Reference 17). In fact, some recent research suggests that the shortnose sturgeon population in the Hudson River has increased during the last ten years and is now more numerous than the commercially exploited Atlantic sturgeon (Reference 23).

The use of closed cycle cooling minimizes water withdrawals from the Altamaha River. As a result, the probability is much lower of impinging shortnose sturgeon, particularly when compared to similarly situated facilities using once-through cooling systems. In addition, the existing monitoring data support the finding that no impacts are known to occur to shortnose sturgeon from entrainment and impingement at HNP.

V. CONCLUSION

The Plant Hatch intake structure is not located near designated critical habitat of the shortnose sturgeon. Based on the life history characteristics of shortnose sturgeon, siting and operational characteristics of the plant, and the seasonal dredging restrictions the continued operation of Plant Hatch may affect, but is not likely to adversely affect, the shortnose sturgeon, *Acipenser brevirostrum.*

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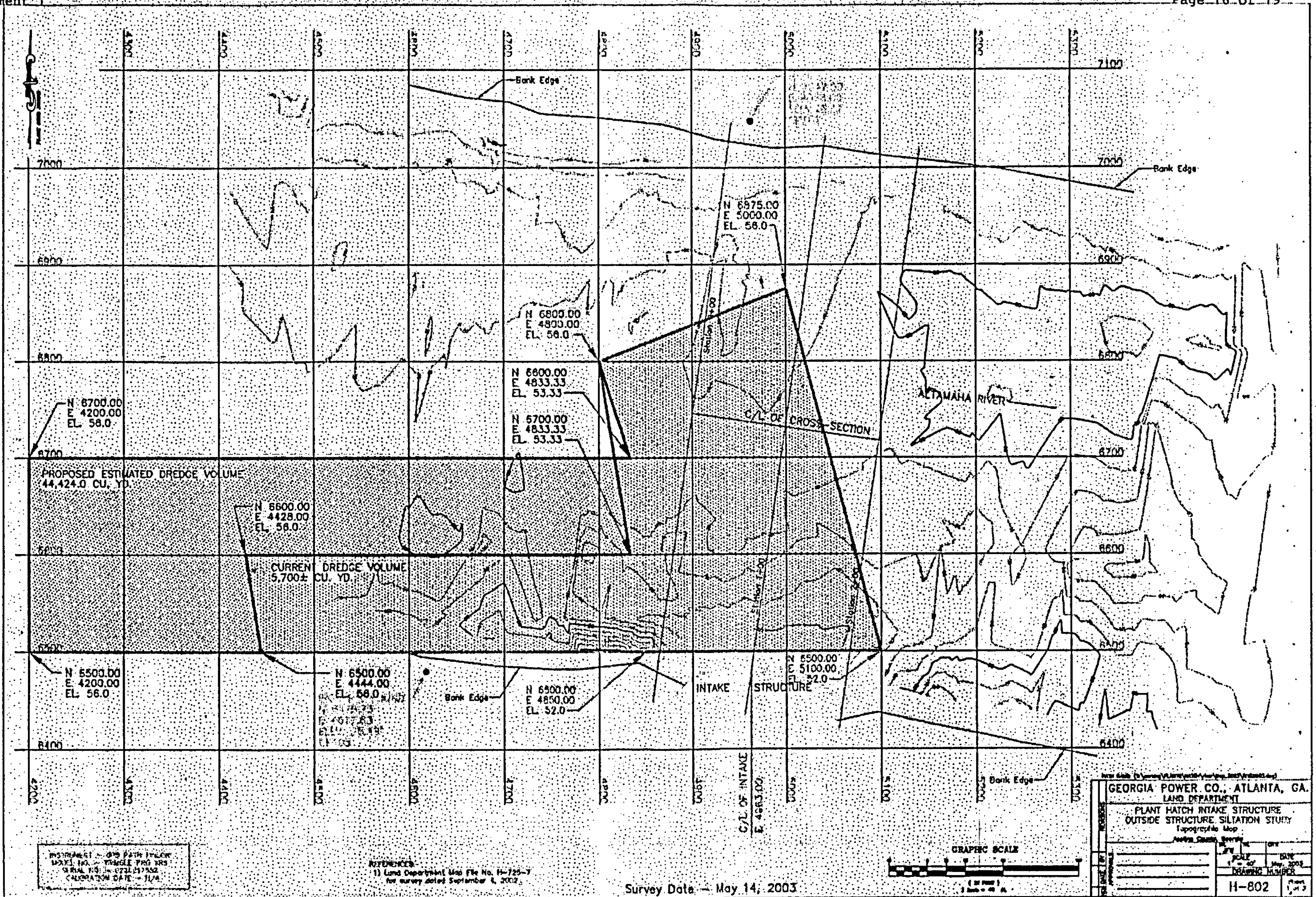

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PROPOSED ESTIMATED DREDGE VOLUME
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CURRENT DREDGE VOLUME
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ALTAMAHA RIVER
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EL. 56.0
N 6500.00
E 4444.00
EL. 56.0
N 6500.00
E 4850.00
EL. 52.0
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REFERENCES:
1) Land Department Map File No. H-725-7
for survey dated September 4, 2002
GRAPHIC SCALE
Survey Date — May 14, 2003
GEORGIA POWER CO., ATLANTA, GA.
LAND DEPARTMENT
PLANT HATCH INTAKE STRUCTURE
OUTSIDE STRUCTURE SILTATION STUDY
Topographic Map
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DRAWING NUMBER
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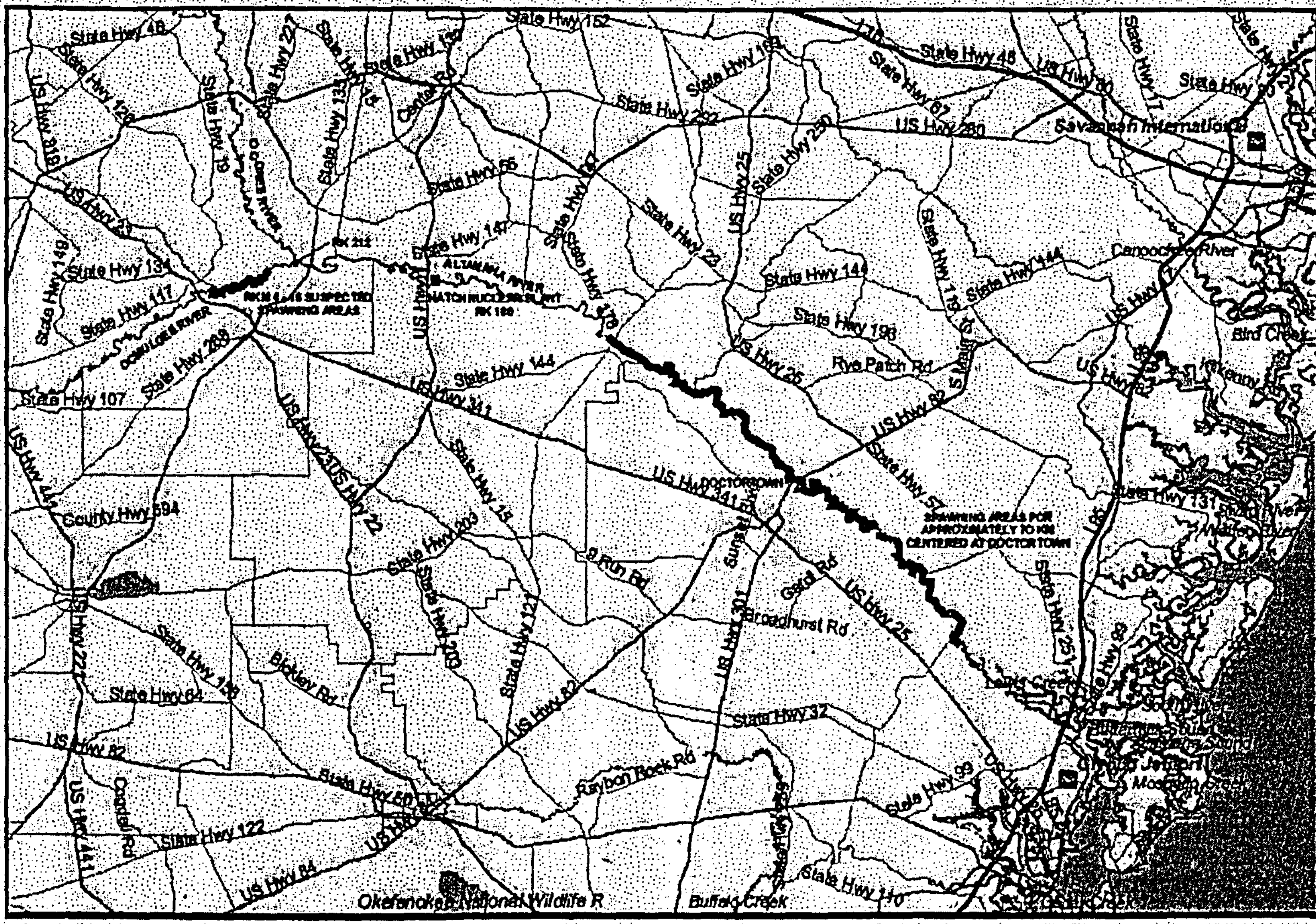

ALTAMAHA RIVER FROM THE CONFLUENCE WITH THE OCMULGEE RIVER TO THE COAST

Potential Spawning Reaches for the Shortnose Sturgeon Acipenser brevirostrum

GEORGIA POWER

Map produced by Environmental Field Services, December 12, 2003.

Scale = 1:800,000

C02

Water Resources

Data Category: Surface Water | Geographic Area: Georgia | GO

Monthly Streamflow Statistics for Georgia

Times for Georgia stations are shown as Eastern Standard Time. If your clock is set to Eastern Daylight Savings Time, add one hour to the time shown on the Web page to compare to your clock time.

Additional information may be found on the USGS Water Resources of Georgia page, including low-flow statistics and flood-frequency information for selected stations.

USGS 02225000 ALTAMAHA RIVER NEAR BAXLEY, GA

Available data for this site Surface-water: Monthly streamflow statistics | GO

Appling County, Georgia Hydrologic Unit Code 03070106 Latitude 31°56'20", Longitude 82°21'13" NAD27 Drainage area 11,600 square miles Contributing drainage area 11,600 square miles Gage datum 61.51 feet above sea level NGVD29	**Output formats** HTML table of all data Tab-separated data Reselect output format

YEAR	Monthly mean streamflow, in ft^3/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1949									13,860	6,434	5,945	6,499
1950	6,487	7,121	14,750	9,769	5,739	6,116	4,993	4,204	5,028	5,179	4,560	6,533
1951	10,130	9,138	10,530	14,760	6,545	3,719						
1970										2,625	5,421	5,933
1971	16,320	20,430	42,630	23,880	16,640	6,393	6,879	12,870	7,735	5,050	5,252	16,280
1972	30,520	34,170	16,250	11,670	7,252	6,749	6,418	4,436	3,268	2,597	3,663	10,210
1973	23,210	41,600	24,310	41,490	16,960	19,380	8,219	7,668	4,179	4,209	3,496	5,694
1974	13,819	31,950	16,490	21,160	6,596	6,070	4,314	7,554	6,599	2,912	3,474	6,871
1975	18,250	26,540	47,260	41,730	20,630	14,660	11,440	12,160	7,419	11,210	8,366	8,516
1976	14,590	16,180	20,970	13,070	16,720	14,490	8,429	4,157	3,968	7,206	6,808	22,430
1977	24,320	11,640	28,980	22,270	5,586	4,273	3,284	5,205	4,297	4,623	11,020	8,182
1978	18,180	34,260	17,820	10,250	16,660	5,820	3,774	5,779	2,877	2,224	2,336	4,486
1979	8,723	18,790	34,890	22,330	14,640	5,177	5,102	3,666	4,582	6,106	6,810	7,056
1980	10,800	15,900	38,300	39,450	11,150	10,240	6,049	3,053	2,468	3,018	3,094	4,089
1981	3,395	14,670	10,310	14,490	3,665	3,666	2,211	2,874	2,484	1,864	2,115	3,202
1982	22,220	27,080	15,270	13,610	12,280	8,321	6,153	6,112	3,464	3,992	3,932	11,690
1983	18,790	29,049	34,410	38,390	10,280	5,602	4,395	2,933	3,309	2,731	4,571	25,140
1984	22,790	22,970	29,809	24,710	18,970	8,064	6,274	16,580	3,597	2,665	4,048	4,821

1985	5,721	20,230	9,112	5,711	5,225	2,932	3,301	5,440	3,928	4,186	8,722	14,700
1986	8,503	14,800	10,770	5,635	2,576	2,406	1,810	2,093	3,129	2,133	4,530	15,650
1987	30,540	28,210	31,830	18,770	6,421	5,634	5,677	2,692	2,597	1,903	2,193	2,763
1988	7,281	11,870	11,290	9,252	6,040	2,302	1,796	1,902	4,272	3,286	3,191	3,495
1989	5,068	4,803	11,080	15,970	7,685	7,304	12,900	6,613	4,193	16,030	6,086	12,600
1990	24,000	24,890	31,550	14,900	6,298	3,830	2,666	2,765	2,975	4,952	5,538	4,915
1991	14,580	28,930	32,690	20,410	17,980	8,625	12,030	13,150	6,415	2,750	3,021	4,123
1992	12,889	20,900	23,680	13,500	4,406	7,088	5,355	8,880	11,050	11,350	12,120	29,870
1993	36,550	23,380	38,020	34,840	8,955	5,634	3,484	2,821	2,759	2,373	5,158	7,806
1994	10,380	18,370	21,950	16,530	5,651	5,401	32,470	19,600	10,570	24,560	12,440	21,550
1995	20,470	37,360	31,550	9,998	5,479	11,550	4,364	4,211	5,748	9,150	14,480	9,693
1996	11,940	29,970	30,190	18,540	9,603	6,536	3,430	4,028	3,297	4,415	3,767	7,034
1997	14,290	24,790	25,970	6,286	10,560	6,672	4,942	4,377	2,228	6,541	19,540	31,920
1998	46,750	60,419	65,210	35,290	20,520	6,713	3,547	4,968	7,308	6,099	4,481	3,784
1999	7,933	17,160	8,597	5,817	3,950	2,753	4,741	2,106	1,643	3,140	2,522	4,312
2000	6,949	11,120	10,470	9,326	2,813	1,877	1,666	1,683	3,133	2,542	2,471	4,488
2001	6,860	5,805	32,020	19,850	3,956	10,600	5,981	4,074	2,685	2,064	1,870	2,424
2002	3,504	7,193	7,977	8,436	4,035	2,285	1,880	1,627	2,170			
Mean of monthly streamflows	15,790	22,110	24,620	18,590	9,484	6,732	6,060	5,827	4,683	5,356	5,795	9,964

V-486

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Sect. 9.3

NUREG-1437
Supplement 18

Generic Environmental Impact Statement for License Renewal of Nuclear Plants

Supplement 18

V-427

Regarding
Joseph M. Farley Nuclear Plant, Units 1 and 2

Final Report Hatch ML011590278

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555-0001

NUREG-1437
Supplement 18

Generic Environmental Impact Statement for License Renewal of Nuclear Plants

Supplement 18

Regarding
Joseph M. Farley Nuclear Plant, Units 1 and 2

Final Report

Manuscript Completed: February 2005
Date Published: March 2005

Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Pointervint 2003
Sect. 9.3

Statement on the Apalachicola-Chattahoochee-Flint (ACF) Basin Compact
Alec L. Poitevint II
September 4, 2003

Despite intensive hard work and commitment, an allocation formula for the Apalachicola-Chattahoochee-Flint (ACF) basin will not be developed under the auspices of the ACF Compact. Like all those involved, we regret that.

At the same time, we recognize that fashioning an allocation formula was extremely complex. The goal -- a basinwide water allocation developed by those most affected -- was worth the effort and I compliment all who were part of the process. I compliment the Governors and their teams. Through the Governors' personal involvement and their staffs' efforts we were all able to understand the extent to which the States might agree. Though we fall short of an agreement among the States, we should not lose sight of that fact. In that respect, I urge the States to work with the interagency federal team to explore the extent to which basinwide management can benefit from this effort. At the same time, I compliment each of the agencies on the interagency federal team and their leadership for their firm and unwavering commitment to the Compact. They have shown an intense understanding of the factors which affect our basinwide water resources.

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The Compact process leaves us all with a better understanding of our regional interconnectedness and demonstrates the importance of cooperation and dialogue. As a part of the Compact discussions, there have been numerous public sessions which have increased the understanding of all participants on topics such as current and projected water demands, reservoir operations, hydropower, and environmental considerations.

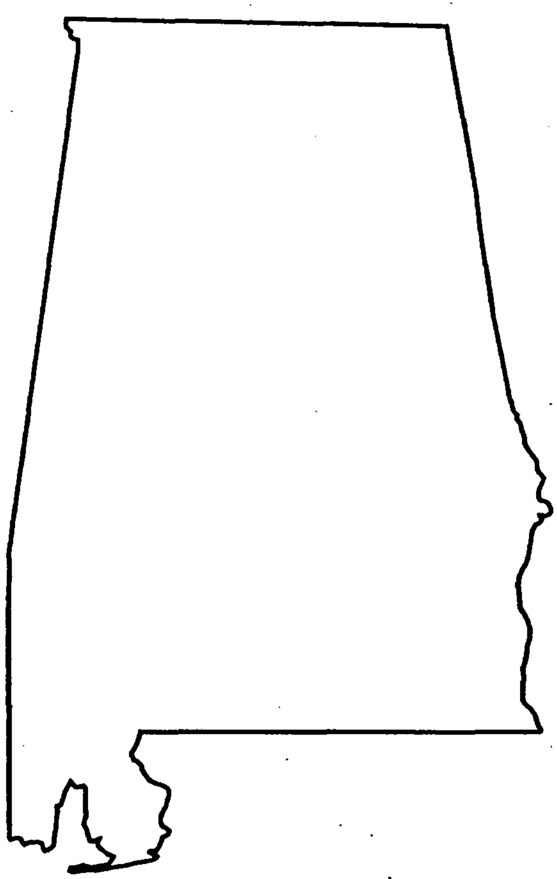
The value of a continuing information exchange does not end with dissolution of the Compact. Our whole region will continue to face the uncertainty of a myriad of issues reaching across state boundaries: dynamic precipitation patterns; unexpected growth patterns; developments in water use and re-use technology; and how human actions impact the water quality, biodiversity, and ecology of the basin. Thus, I strongly urge the Governors to consider preserving the Compact's goals of information collection through a monitoring process. I also urge the Governors to establish an alternative forum for a continuing dialogue informing our region on the common goal of the wise stewardship of this precious natural resource.

~~USGS 2005~~
Psinakis et.al.2005
Sect. 9.3

Water Resources Data Alabama Water Year 2004

By W.L. Psinakis, D.S. Lambeth, V.E. Stricklin, and M.W. Treece

Water-Data Report AL-04-1



Prepared in cooperation with the Alabama Department of Environmental Management, the Alabama Department of Transportation, and with other State, municipal, and Federal

U.S. Department of the Interior
U.S. Geological Survey

02343801 CHATTAHOOCHEE RIVER NEAR COLUMBIA, AL

LOCATION.--Lat 31°15'33", long 85°06'37", Early County, Ga.-Houston County, Ala., Hydrologic Unit 03130004, at left end of George W. Andrews Lock and Dam, 1.3 mi downstream from Omusee Creek, 2.3 mi south of Columbia, and at mile 46.5.

DRAINAGE AREA.--8,210 mi^2, approximately.

PERIOD OF RECORD.--October 1975 to current year.

GAGE.--Satellite transmitter with gate-opening and water-stage recorders. Datum of headwater gage and tail-water gage is 0.00 ft. NGVD of 1929.

REMARKS.--Estimated daily discharge: Oct. 29; Nov. 5; Dec. 18; Jan. 3, 8, 31; Feb. 17; Apr. 24; May 10, 23-24; June 15, 17; July 1, 23; and Aug. 28. Records fair, except periods of estimated record, which are poor. Flow regulated by Lake Sidney Lanier, West Point Lake, Lake Harding, Walter F. George Lake, and George W. Andrews Reservoir. No adjustments made for George W. Andrews Reservoir's annual change in contents, which is insignificant.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 1929, thought to be the highest since 1827, based on station on Chattahoochee River at Columbia, 2.4 mi upstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8030	4950	14000	9910	14700	13600	12500	6880	5980	e9990	6040	7800
2	7100	6790	14300	9470	14900	15000	8280	6360	6620	9900	7580	7470
3	7080	8380	14300	e5570	13600	14000	7670	7680	6190	11500	8620	7340
4	6630	8640	16800	6620	18800	13400	7170	7870	5590	10900	7700	6110
5	5620	e8200	20900	10500	16700	12700	9190	6680	4300	10500	6590	5960
6	4100	8360	21400	11100	22400	11700	7800	5750	3990	12400	6260	8200
7	6040	9170	21300	11200	25800	11400	8250	6350	3860	10200	5890	24500
8	8270	6840	19900	e10100	24000	11300	7610	5030	4090	9930	5410	25800
9	7960	7970	15000	10300	17600	12500	8610	3950	4250	9060	7930	11400
10	6110	5370	13100	13100	18800	11700	8980	e7570	4150	7110	12400	8330
11	6850	7450	13600	14300	18100	9620	7430	8650	6170	7260	14000	6320
12	6600	7870	10400	15100	18900	8890	7810	9260	7000	7460	9140	6080
13	7780	7830	12600	15900	28000	5960	6750	6880	5340	9830	10500	7000
14	8850	7720	13800	14400	33200	5640	8920	5470	7050	8510	7380	8250
15	8680	7820	19300	14400	32900	6870	9310	4520	e6520	7050	6720	14100
16	8650	7950	11000	16500	24900	6430	9980	3900	6600	8570	7660	29300
17	12900	7080	7560	12400	e19400	7940	8420	5560	e5170	7500	7570	52600
18	14000	7850	e9640	11000	23400	5570	7410	6540	5850	7280	8490	51600
19	13500	8690	9930	11400	23200	6010	9500	7320	6850	8480	6900	26600
20	14000	8250	9900	11100	15300	5430	8240	5890	5190	7520	5730	24800
21	11600	10300	9460	11000	15100	6470	7280	5560	6850	7770	4450	24400
22	10100	16600	9890	14400	11400	9420	6890	6400	9470	7560	3980	19900
23	11400	16600	10200	11300	11300	10900	6410	e5010	4620	e7860	6380	15900
24	9370	16400	8000	9770	14300	8570	e6720	e5980	4960	8130	7540	16200
25	5900	16600	8050	6430	11400	6210	7420	5150	4870	5570	7970	15700
26	5330	16600	8670	19500	17900	5510	7140	4650	6030	6260	7300	11900
27	7560	16500	5670	37400	20300	5830	7160	4910	7840	7230	6910	12400
28	8990	16900	7230	24300	19600	5760	8940	5380	7860	7120	e7190	16200
29	e7480	17000	10400	16500	15300	8100	8980	5240	10500	7020	4100	18900
30	6890	16500	8410	13100	---	7750	7970	5070	7980	7320	6790	19700
31	7570	---	10200	e14800	---	7600	---	5390	---	5820	7060	---
TOTAL	260940	313180	384910	412870	561200	277780	244740	186850	181740	258610	228180	510760
MEAN	8417	10440	12420	13320	19350	8961	8158	6027	6058	8342	7361	17030
MAX	14000	17000	21400	37400	33200	15000	12500	9260	10500	12400	14000	52600
MIN	4100	4950	5670	5570	11300	5430	6410	3900	3860	5570	3980	5960
CFSM	1.03	1.27	1.51	1.62	2.36	1.09	0.99	0.73	0.74	1.02	0.90	2.07
IN.	1.18	1.42	1.74	1.87	2.54	1.26	1.11	0.85	0.82	1.17	1.03	2.31

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1976 - 2004, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6394	8010	10980	13090	16800	19340	13530	9929	7895	8340	7282	6625
MAX	16730	23290	24660	31670	33800	45900	33400	25820	22920	38070	14550	17030
(WY)	1976	1993	1993	1978	1998	1990	1979	2003	2003	1994	1984	2004
MIN	2385	2998	3655	4726	4856	6912	4957	4536	3946	2425	2045	2265
(WY)	1987	1982	2000	1981	1989	2000	1999	1999	2000	1988	1988	1986

SUMMARY STATISTICS	FOR 2003 CALENDAR YEAR		FOR 2004 WATER YEAR		WATER YEARS 1976 - 2004	
ANNUAL TOTAL	5,682,510		3,821,760			
ANNUAL MEAN	15,570		10,440		10,660	
HIGHEST ANNUAL MEAN					16,050	1998
LOWEST ANNUAL MEAN					4,950	2000
HIGHEST DAILY MEAN	66,300	May 11	52,600	Sept. 17	195,000	Jul 7, 1994
LOWEST DAILY MEAN	4,100	Oct. 6	3,860	June 7	0.00	Nov 22, 1987
ANNUAL SEVEN-DAY MINIMUM	6,370	Oct. 1	4,320	June 4	1,640	May 14, 1985
MAXIMUM PEAK FLOW			60,700	Sept. 17	202,000	Jul 7, 1994
MAXIMUM PEAK STAGE			101.78	Sept. 17	123.98	Jul 7, 1994
ANNUAL RUNOFF (CFSM)	1.90		1.27		1.30	
ANNUAL RUNOFF (INCHES)	25.75		17.32		17.64	
10 PERCENT EXCEEDS	30,400		17,700		21,300	
50 PERCENT EXCEEDS	11,600		8,250		8,330	
90 PERCENT EXCEEDS	7,350		5,560		1,980	

e Estimated

02411000 COOSA RIVER AT JORDAN DAM NEAR WETUMPKA, AL

LOCATION.--Lat 32°36'50", long 86°15'18", in SE 1/4 NW 1/4 sec. 22, T. 19 N., R. 18 E., Elmore County, Hydrologic Unit 03150107, on right bank 0.5 mi downstream from Jordan Dam, 4 mi upstream from Corn Creek, 5.5 mi northwest of Wetumpka, and at mile 18.6.

DRAINAGE AREA.--10,102 mi^2.

PERIOD OF RECORD.--July 1912 to September 1914, December 1925 to current year. Prior to October 1936 published as "at Lock 18, near Wetumpka."

REVISED RECORD.--WDR AL-84-1: Drainage area. WDR AL-92-1: 1991. WRD AL-01-1: 2000.

GAGE.--Nonrecording gage since April 1975. Elevation of gage is 141.6 ft above NGVD of 1929 (levels by Alabama Power Co.). February 1926 to March 1975, water-stage recorder. July 1912 to September 1914, nonrecording gage at site 0.2 mi upstream at different elevation.

REMARKS.--No estimated daily discharges. Records good. Prior to June 30, 1967, and Feb. 10, 1975, to Aug. 14, 1980, daily discharge above 100 ft^3/s, computed on basis of powerplant records and flow over spillway at Jordan Dam; July 1, 1967 to Feb. 9, 1975 and Aug. 15, 1980 to current year on the combined flow through turbines at Jordan and Bouldin Dams (on diversion channel from Jordan Lake about 1 mi upstream from Jordan Dam) and flow over spillway at Jordan Dam. Flow regulated by several upstream reservoirs and hydroelectric plants.

COOPERATION.--Records collected by Alabama Power Co., under general supervision of U.S. Geological Survey, in connection with a Federal Energy Regulatory Commission project.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5,620	2,320	18,000	2,520	15,300	19,000	11,400	17,900	6,970	14,800	4,480	3,110
2	7,220	2,320	11,800	18,300	19,200	10,000	12,000	18,500	7,470	12,600	5,700	4,170
3	6,020	7,030	13,000	5,970	14,600	18,600	5,620	21,200	5,000	16,100	8,840	7,430
4	2,980	7,350	14,700	2,250	20,800	17,000	5,850	22,300	8,170	11,200	6,220	9,410
5	3,500	7,280	12,000	13,700	16,600	11,900	5,680	13,100	6,100	10,100	6,720	5,970
6	7,130	9,130	8,360	20,800	40,500	21,900	5,600	5,420	5,860	8,510	5,040	5,140
7	5,650	8,770	2,650	22,100	41,300	28,200	5,580	7,200	6,000	13,600	3,400	7,070
8	8,730	2,440	10,900	15,900	41,800	25,500	7,320	5,680	5,320	10,300	3,920	3,680
9	8,680	2,960	1,600	20,000	46,200	20,900	5,640	5,490	4,510	9,420	3,600	3,560
10	12,600	9,210	12,800	20,000	41,300	18,500	5,570	5,640	4,460	8,640	4,820	4,580
11	3,550	5,640	10,900	10,400	40,600	20,300	10,500	10,200	5,310	7,970	6,820	6,280
12	4,010	5,900	16,600	13,400	53,000	17,200	6,670	8,080	4,340	9,760	8,530	3,340
13	3,670	6,470	18,200	7,280	47,700	8,880	13,400	8,900	8,530	7,940	7,460	13,600
14	13,400	7,110	4,810	7,540	44,200	3,360	9,400	8,460	15,500	7,360	3,890	20,200
15	7,750	2,400	14,700	8,910	34,600	10,200	14,500	5,700	12,200	6,990	2,860	30,100
16	8,680	2,310	12,400	9,940	27,000	11,000	10,100	5,510	6,050	6,140	2,300	53,400
17	4,940	8,660	15,200	8,050	33,400	10,300	6,370	5,490	5,650	3,390	2,750	65,200
18	10,200	12,400	18,400	3,750	27,800	5,490	6,360	7,690	3,200	4,020	3,330	48,200
19	7,370	17,300	19,500	10,900	25,400	12,600	7,480	12,100	3,540	8,460	6,230	39,800
20	6,490	17,400	10,800	8,550	19,700	8,840	5,520	10,800	3,900	6,470	6,000	38,700
21	3,230	1,290	5,300	12,100	14,400	4,860	5,570	8,020	5,630	4,760	3,790	33,200
22	3,630	12,400	12,800	8,520	9,030	7,730	8,310	5,540	6,940	6,310	3,790	26,200
23	4,650	13,900	13,300	9,530	16,100	6,290	11,800	5,900	6,700	4,760	4,750	20,900
24	3,810	15,500	18,700	8,360	13,600	4,730	5,520	5,500	11,600	5,640	5,620	19,300
25	3,730	17,100	6,260	20,200	24,900	4,770	5,500	5,900	15,200	2,830	6,620	10,100
26	3,600	13,000	16,200	37,500	23,800	5,120	7,120	6,310	10,300	2,840	9,820	10,500
27	7,700	24,200	5,890	31,600	16,500	2,290	6,020	6,060	19,700	8,290	8,710	15,000
28	6,960	20,400	2,620	29,500	8,000	2,290	7,640	6,440	22,600	8,560	4,550	14,100
29	10,100	21,500	19,000	26,100	11,900	4,970	6,120	5,540	12,300	7,630	4,310	13,200
30	8,450	12,400	17,300	27,400	---	7,410	13,400	5,240	21,600	6,730	4,100	11,100
31	6,940	---	18,400	21,100	---	4,850	---	6,730	---	2,910	3,240	---
TOTAL	200,990	296,090	383,090	462,170	789,230	354,980	237,560	272,540	260,650	245,030	162,210	546,540
MEAN	6,484	9,870	12,360	14,910	27,210	11,450	7,919	8,792	8,688	7,904	5,233	18,220
MAX	13,400	24,200	19,500	37,500	53,000	28,200	14,500	22,300	22,600	16,100	9,820	65,200
MIN	2,980	1,290	1,600	2,250	8,000	2,290	5,500	5,240	3,200	2,830	2,300	3,110
CFSM	0.64	0.98	1.22	1.48	2.69	1.13	0.78	0.87	0.86	0.78	0.52	1.80
IN.	0.74	1.09	1.41	1.70	2.91	1.31	0.87	1.00	0.96	0.90	0.60	2.01

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 2004, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6,868	10,230	16,940	24,950	29,150	32,530	26,650	15,530	9,771	8,945	7,109	6,312
MAX	29,100	57,080	72,980	66,360	75,180	82,160	82,520	57,920	30,790	29,400	20,680	21,370
(WY)	(1996)	(1930)	(1933)	(1937)	(1990)	(1929)	(1979)	(2003)	(1989)	(2003)	(1984)	(1975)
MIN	2,128	2,547	4,054	4,237	7,437	7,516	4,452	2,384	2,688	2,071	2,577	2,307
(WY)	(1936)	(1940)	(1934)	(1956)	(2000)	(1988)	(1986)	(1986)	(1988)	(1988)	(1986)	(1931)

Robinson et al 1996

GROUND-WATER RESOURCES OF THE COOSA RIVER BASIN IN GEORGIA AND ALABAMA—*SUBAREA 6* OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT AND ALABAMA-COOSA-TALLAPOOSA RIVER BASINS

U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the

ALABAMA DEPARTMENT OF ECONOMIC AND COMMUNITY AFFAIRS
OFFICE OF WATER RESOURCES

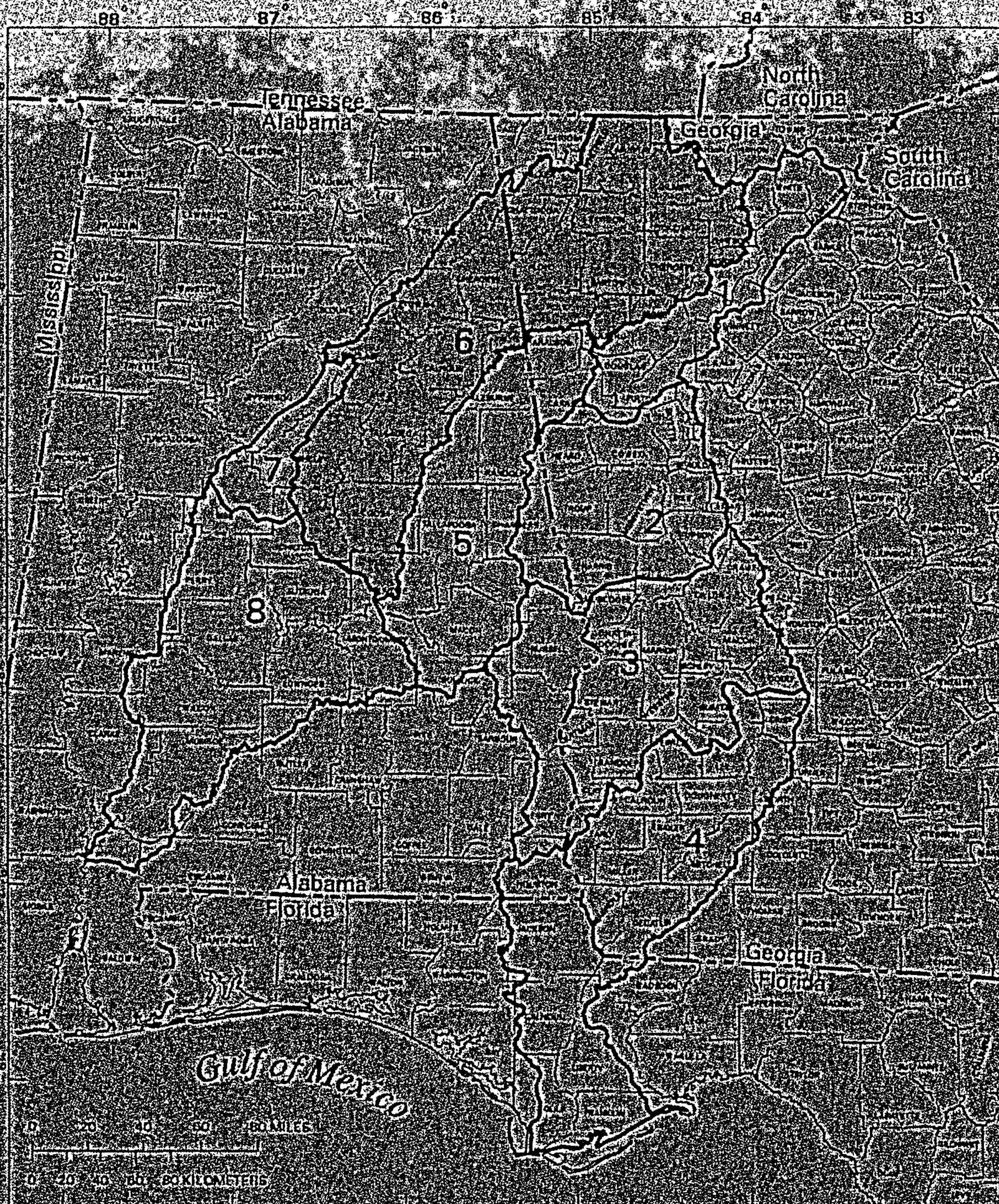
GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

U.S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT

U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

Open-File Report 96-177



Base from 1:100000 and 1:250000 USGS Digital Line Graph

Location of subareas in the Apalachicola–Chattahoochee–Flint and Alabama–Coosa–Tallapoosa River basins. Subarea described in this report is shaded.

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ILLUSTRATIONS

TABLES

CONVERSION FACTORS, ABBREVIATIONS AND ACRONYMS, AND VERTICAL DATUM

CONVERSION FACTORS

Multiply	by	to obtain
	Length	
inch (in.)	25.4	millimeter
inch per year (in/yr)	25.4	millimeter per year
foot (ft)	0.3048	meter
square foot (ft^2)	0.0929	square meter
mile (mi)	1.609	kilometer
feet per mile (ft/mi)	0.1894	meter per kilometer
	Area	
acre	4,047	square meter
square mile (mi^2)	2.59	square kilometer
	Volumetric rate and volume	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
	448.831	gallon per minute
	0.6463	million gallons per day
cubic foot per second per square mile ($ft^3/s/mi^2$)	0.01093	cubic meter per second per square kilometer
gallon per minute (gal/min)	6.309×10^{-5}	cubic meter per second
	2.228×10^{-3}	cubic foot per second
	0.06308	liter per second
	1,440	gallon per day
gallon per day (gal/d)	3.785×10^{-3}	cubic meters per day
million gallons per day (Mgal/d)	1.547	cubic foot per second
	63.09	cubic meter per second
	694.44	gallons per minute
gallon per minute per foot of drawdown (gal/min/ft)	1.24×10^{-2}	cubic meters per minute per minute per meter of drawdown
acre-foot	325,900	gallon
	Transmissivity	
foot squared per day (ft^2/d)	0.0929	meter squared per day

Temperature

Temperature in degrees Fahrenheit (° F) can be converted to degrees Celsius as follows:

$$\times C = 5/9 \times (° F - 32)$$

ABBREVIATIONS AND ACRONYMS

7Q2	7-day, 2-year low flow
ACF	Apalachicola-Chattahoochee-Flint River basin
ACT	Alabama-Coosa-Tallapoosa River basin
ADAPS	Automated Data Processing System
Corps	U.S. Army Corps of Engineers
MOA	Memorandum of Agreement
GWSI	Ground Water Site Inventory database
MOVE.1	Maintenance of Variance Extension, Type 1; computer program (Hirsch, 1982)
RORA	Computer program (Rutledge, 1993)
SWGW	Surface Water-Ground Water; computer program (Mayer and Jones, 1996)
USGS	U.S. Geological Survey

VERTICAL DATUM

Sea Level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NVGD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

GLOSSARY

7Q2—Minimum average stream discharge for 7 consecutive days for a 2-year recurrence interval.

Alluvium—Sediment transported and deposited by flowing water.

Altitude—As used in this report, refers to the distance above sea level.

Anisotropic—Condition having varying hydraulic properties of an aquifer according to flow direction.

Annual—As used in this report, refers to a water year.

Aquifer—A formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian—Synonymous with confined.

Baseflow—That part of the stream discharge that is not attributable to direct runoff from precipitation or melting snow; it is usually sustained by ground-water discharge.

Bedrock—A general term for the consolidated rock that underlies soils or other unconsolidated surficial material.

Clastics—Rocks composed of fragments of older rocks, for example, sandstone.

Colluvium—Heterogeneous aggregates of rock detritus resulting from the transporting action of gravity.

Cone of depression—A depression of the potentiometric surface, often in the shape of an inverted cone, that develops around a well which is being pumped.

Confined aquifer—An aquifer bounded above and below by impermeable beds or by beds of distinctly lower permeability than that of the aquifer itself; ground water in the aquifer is under pressure significantly greater than that of the atmosphere.

Continuous-record gaging station—Complete records of discharge obtained using a continuous stage-recording device through which either instantaneous or mean-daily discharge may be computed for any time, or any period of time, during the period of record.

Crystalline rock—A general term for igneous and metamorphic rocks.

Darcian flow—Flow that is laminar and in which inertia can be neglected.

Dendritic drainage—A branching stream pattern that resembles the branching of trees.

Drought—There is no accepted definition of drought. As used in this report, a period of deficient rainfall extending long enough to cause streamflow to fall to unusually low levels for the period of record.

Evapotranspiration—The combined evaporation of water from the soil surface and transpiration from plants.

Faults—Fractures in the Earth along which there has been displacement parallel to the fault plane.

Foliation—A planar or layered structure in metamorphic rocks that is caused by parallel orientation of minerals or bands of minerals.

Fluvial—Pertaining to the actions of rivers.

Fracture—Breaks in rocks due to intense folding or faulting.

Geologic contact—The boundary surface between one body of rock or sediment and another.

Ground-water recharge—The process of water addition to the saturated zone or the volume of water added by this process.

Head, static—The height above a standard datum of the surface of a column of water (or other liquid) that can be supported by the static pressure at a given point. The static head is the sum of the elevation head and the pressure head.

GLOSSARY—Continued

Head, total—The total head of a liquid at a given point is the sum of three components: (a) the elevation head, which is equal to the elevation of the point above a datum, (b) the pressure head, which is the height of a column of static water that can be supported by the static pressure at the point, and (c) the velocity head, which is the height to which the kinetic energy of the liquid is capable of lifting the liquid.

Heterogeneous—Pertaining to a substance having different characteristics in differing locations.

Hydraulic conductivity—The capacity of a rock to transmit water. It is expressed as the volume of water that will move through a medium in a unit of time under a unit hydraulic gradient through a unit area measured perpendicular to the direction of flow.

Hydraulic gradient—A change in the static pressure of ground water, expressed in terms of the height of water above a datum, per unit of distance in a given direction.

Hydrograph separation—Division of the stream hydrograph into components of aquifer discharge and surface runoff.

Igneous rock—Rocks which have solidified or crystallized from a hot fluid mass called magma.

Intergranular porosity—Porosity resulting from space between grains.

Intrusive igneous rocks—Masses of igneous rock formed by magma cooling beneath the surface.

Isotropic—Condition in which hydraulic properties of an aquifer are equal in all directions.

Joints—Fractures in rocks, often across bedding planes, along which little or no movement has taken place.

Mafic—Applied to the ferromagnesian minerals or to igneous rocks relatively rich in such minerals.

Mean annual—As used in this report, refers to the average of the annual values for a specified period of record.

Metamorphic rock—Rocks derived from pre-existing rocks by mineralogical, chemical, and structural alterations due to endogenetic processes.

Partial-record gaging station—Is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years.

Permeability—The property of a porous medium to transmit fluids under an hydraulic gradient.

Porosity—The amount of pore space and fracture openings, expressed as the ratio of the volume of pores and openings to the volume of rock.

Potentiometric surface—An imaginary surface representing the static head of ground water and defined by the level to which water will rise in a tightly cased well.

Primary porosity—Porosity due to the soil or rock matrix; the original interstices created when a rock was formed.

Recession index—The number of days required for discharge to decline one complete log cycle.

Regolith—Loose, unconsolidated and weathered rock and soil covering bedrock.

Residuum—The material resulting from the decomposition of rocks in place and consisting of the nearly insoluble material left after all the more readily soluble constituents of the rocks have been removed.

Rock—Any naturally formed consolidated material consisting of two or more minerals.

Run-off—Precipitation that flows from the surface of the land and into streams and rivers.

Saprolite—Surficial deposits produced by the decay of rocks and remaining as residuals.

Secondary openings—Voids produced in rocks subsequent to their formation through processes such as solution, weathering, or movement.

GLOSSARY—Continued

Secondary porosity—Porosity due to such phenomena as dissolution or structurally controlled fracturing.

Soil—The layer of unconsolidated material at the land surface that supports plant growth.

Specific capacity—The rate of discharge of water from the well divided by the related drawdown of the water level within the well.

Specific yield—The ratio of the volume of water which the porous medium after being saturated, will yield by gravity to the volume of the porous medium.

Storage coefficient—The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head (virtually equal to the specific yield in an unconfined aquifer).

Stream discharge—The volume of water flowing past a given point in a stream channel in a given period of time.

Transmissivity—The rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient. It equals the hydraulic conductivity multiplied by the aquifer thickness.

Trellis drainage—A river system resembling a trellis or rectangular pattern and characteristic of areas of folded sedimentary rocks where tributaries cut channels through less resistant beds.

Unconfined aquifer—An aquifer in which the water table is a free surface at atmospheric pressure.

Unit-area discharge—Stream or ground-water discharge divided by the drainage area.

Water table—Upper surface of a zone of saturation under atmospheric pressure.

Water year—The standard water-year used by the U.S. Geological Survey is from October 1 to September 30 of the second calendar year.

GROUND-WATER RESOURCES OF THE COOSA RIVER BASIN IN GEORGIA AND ALABAMA—*SUBAREA 6* OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT AND ALABAMA-COOSA-TALLAPOOSA RIVER BASINS

By James L. Robinson, Celeste A. Journey, and J.B. Atkins

ABSTRACT

Drought conditions in the 1980's focused attention on the multiple uses of the surface- and ground-water resources in the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) River basins in Georgia, Alabama, and Florida. State and Federal agencies also have proposed projects that would require additional water resources and revise operating practices within the river basins. The existing and proposed water projects create conflicting demands for water by the States and emphasize the problem of water-resource allocation. This study was initiated to describe ground-water availability in the Coosa River basin of Georgia and Alabama, Subarea 6 of the ACF and ACT River basins, and to estimate the possible effects of increased ground-water use within the basin.

Subarea 6 encompasses about 10,060 square miles in Georgia and Alabama, totaling all but about 100 mi^2 of the total area of the Coosa River basin; the remainder of the basin is in Tennessee. Subarea 6 encompasses parts of the Piedmont, Blue Ridge, Cumberland Plateau, Valley and Ridge, and Coastal Plain physiographic provinces. The major rivers of the subarea are the Oostanaula, Etowah, and Coosa. The Etowah and Oostanaula join in Floyd County, Ga., to form the Coosa River. The Coosa River flows southwestward and joins with the Tallapoosa River near Wetumpka, Ala., to form the Alabama River.

The Piedmont and Blue Ridge Provinces are underlain by a two-component aquifer system that is composed of a fractured, crystalline-rock aquifer characterized by little or no primary porosity or permeability; and the overlying regolith, which generally behaves as a porous-media aquifer. The Valley and Ridge and Cumberland Plateau Provinces are underlain by fracture- and solution-conduit aquifer systems, similar in some ways to those in the Piedmont and Blue Ridge Provinces. Fracture-conduit aquifers predominate in the well-consolidated sandstones and shales of Paleozoic age; solution-conduit aquifers predominate in the carbonate rocks of Paleozoic age. The Coastal Plain is underlain by southward-dipping, poorly consolidated deposits of sand, gravel, and clay of fluvial and marine origin.

The conceptual model described for this study qualitatively subdivides the ground-water flow system into local (shallow), intermediate, and regional (deep) flow regimes. Ground-water discharge to tributaries mainly is from local and intermediate flow regimes and varies seasonally. The regional flow regime probably approximates steady-state conditions and discharges chiefly to major drains such as the Coosa River, and in upstream areas, to the Etowah and Oostanaula Rivers. Ground-water discharge to major drains originates from all flow regimes. Mean-annual ground-water discharge to streams (baseflow) is considered to approximate the long-term, average recharge to ground water. The mean-annual baseflow was estimated using an automated hydrograph-separation method, and represents discharge from the local, intermediate, and regional flow regimes of the ground-water flow system. Mean-annual baseflow in Georgia was estimated to be about 4,600 cubic feet per second (ft^3/s) (from the headwaters to the Georgia-Alabama State line), 5,360 ft^3/s in Alabama, and 9,960 ft^3/s for all of Subarea 6 (at the Subarea 6-Subarea 8 boundary). Mean-annual baseflow represented about 60 percent of total mean-annual stream discharge for the period of record.

Stream discharge for selected sites on the Coosa River and its tributaries were compiled for the years 1941, 1954, and 1986, during which sustained droughts occurred throughout most of the ACF-ACT area. Stream discharges were assumed to be sustained entirely by baseflow during the latter periods of these droughts. Estimated baseflow near the end of the individual drought years ranged from about 11 to 27 percent of the estimated mean-annual baseflow in Subarea 6.

The potential exists for the development of ground-water resources on a regional scale throughout Subarea 6. Estimated ground-water use in 1990 was 1.1 to 1.6 percent of the estimated mean-annual baseflow, and ranged from about 4.3 to 9.9 percent of the average baseflow near the end of the droughts of 1941, 1954, and 1986. Because ground-water use in Subarea 6 represents a relatively minor percentage of ground-water recharge, even a large increase in ground-water use in Subarea 6 in one State is likely to have little effect on ground-water and surface-water occurrence in the other. Indications of long-term ground-water level declines were not observed; however, the number and distribution of observation wells for which long-term water-level measurements are available in Subarea 6 are insufficient to draw conclusions.

INTRODUCTION

Increased and competing demands for water and the droughts of 1980-81, 1986, and 1988 in the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) River basins have focused the attention of water managers and users in Alabama, Florida, and Georgia, on the water resources in the two basins. The ACF-ACT River basins encompass about 42,400 square miles (mi^2) and extend from near the Georgia-Tennessee State line, through most of central and southern Alabama and Georgia and part of the Florida panhandle to the Gulf of Mexico (fig. 1). Ground- and surface-water systems of the ACF-ACT River basins behave as an integrated, dynamic flow system comprised of an interconnected network of aquifers, streams, reservoirs, control structures, floodplains, and estuaries. The degree of hydrologic interaction between ground water and surface water suggests that the water resources be investigated and managed as a single hydrologic entity, to account for the climatic and anthropogenic factors that influence the flow systems.

Recent water projects and resource allocations, and other actions proposed by Federal, State, and local agencies, have resulted in conflicts among the States of Alabama, Florida, and Georgia, and the U.S. Army Corps of Engineers (Corps). The Corps has been given the authority to regulate the Nation's surface waters through the Rivers and Harbors Act of 1927, in accordance with the U.S. House of Representatives Document Number 308, 69th U.S. Congress. Proposed projects designed to increase development and to re-allocate surface-water supplies in Georgia, based on revised operating practices of control structures for flood control, navigation, and hydropower generation, and a proposal to construct a dam and reservoir have met with opposition from Alabama and Florida. As a result, in 1991, the U.S. Congress authorized the Corps to initiate a Comprehensive Study of the ACF-ACT River basins that would "develop the needed basin and water-resources data and recommend an interstate mechanism for resolving issues" (Draft Plan of Study, Comprehensive Study, Alabama-Coosa-Tallapoosa and Apalachicola-Chattahoochee-Flint River basins, prepared by: The Comprehensive Study Technical Coordination Group, July 1991, U.S. Army Corps of Engineers, Mobile District).

In 1992, the Governors of Alabama, Florida, and Georgia; and the U.S. Army, Assistant Secretary for Civil Works, signed a Memorandum of Agreement (MOA) establishing a partnership to address interstate water-resource issues and promote coordinated systemwide management of water resources. An important part of this process is the Comprehensive Study of the ACF and ACT River basins. Since this signing, the Study Partners defined scopes of work to develop relevant technical information, strategies, and plans, and to recommend a formal coordination mechanism for the long-term, basinwide management and use of water resources needed to meet environmental, public health, and economic needs (U.S. Army Corps of Engineers, written commun., 1993). The U.S. Geological Survey (USGS) was requested to assist in the development of a scope of work for the ground-water-supply element of the Comprehensive Study, and in June 1993, was asked to conduct that study element.

Eight subareas of the ACF-ACT River basins were identified by the Study Partners and the USGS on the basis of hydrologic and physiographic boundaries. Addressing the study at the smaller, subarea scale within the ACF-ACT River basins facilitated evaluation of the ground-water resources on a more detailed scale. This report is one of a series of eight reports that present results of ground-water studies of the ACF-ACT subareas.

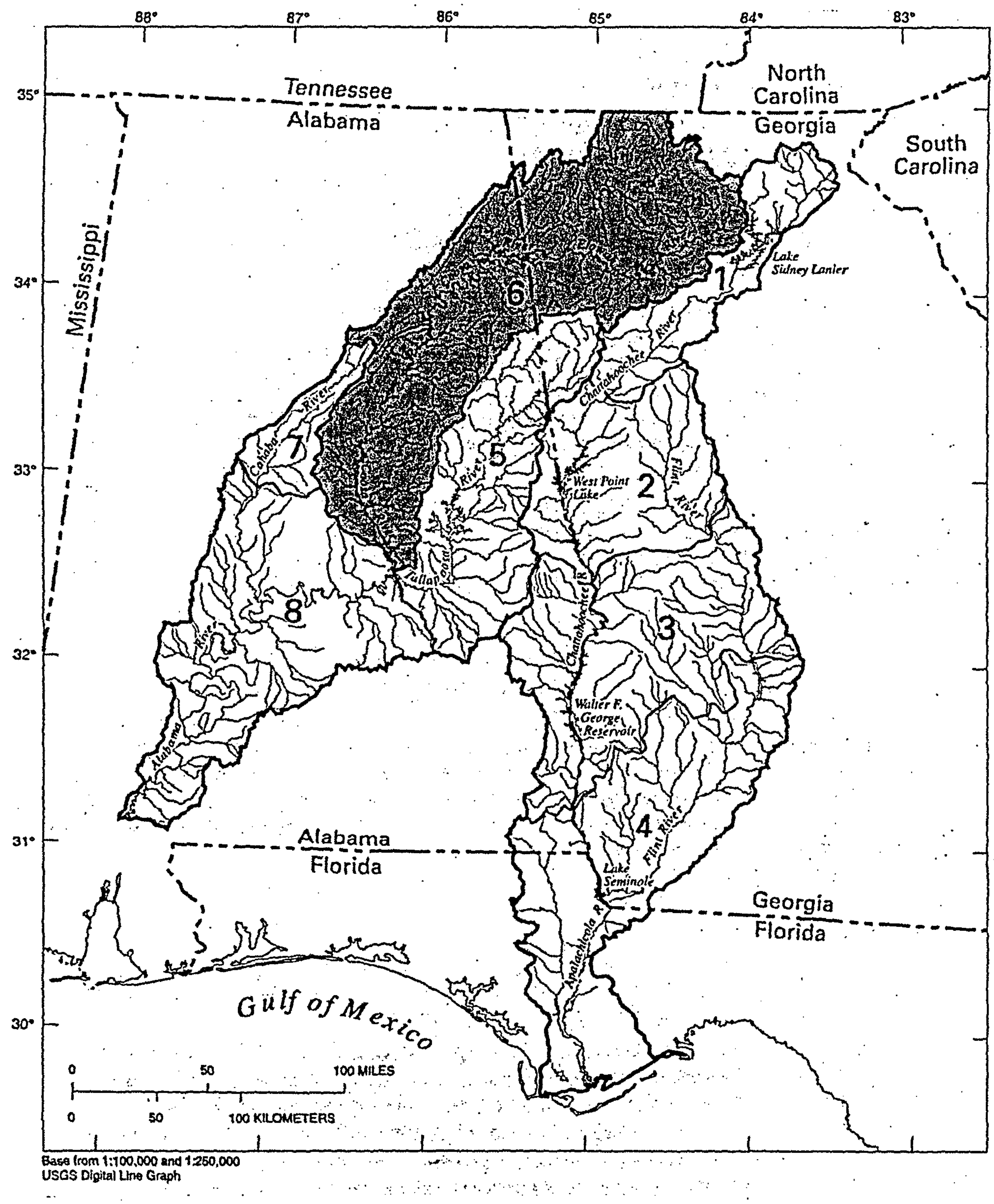


Figure 1. Subareas and major streams in the Apalachicola–Chattahoochee–Flint and Alabama–Coosa–Tallapoosa River basins.

Purpose and Scope

This report describes the ground-water resources of the Coosa River basin of Georgia and Alabama—Subarea 6 of the ACF-ACT River basins. The report provides an analysis of ground-water resources that can be used to address resource-allocation alternatives created by existing and proposed uses of the water resources in the river basins. Specific objectives of this study were to:

- describe a conceptual model of ground-water flow and stream-aquifer relations;
- describe the hydrologic setting of Subarea 6;
- quantify mean-annual and drought period ground-water contributions to the Coosa River from the headwaters to Wetumpka, Ala., including separate computations of the contributions from Georgia and from Alabama; from Georgia into Alabama across the State line; and the ground water exiting Subarea 6; and
- describe and evaluate ground-water utilization and general development potential.

Findings contained herein are but one component of a multidiscipline assessment of issues related to the basinwide utilization and management of water. This report is not intended to provide definitive answers regarding the acceptability of ground-water-resource utilization or the potential for additional resource development. Such answers are dependent on the synthesis of results from all components of the Comprehensive Study and on subsequent consideration by the Federal, State, and local water-resource managers responsible for decision making within the basin.

The report scope includes literature and data searches and an assessment of existing geologic data. A conceptual model that describes the hydrologic processes governing the ground- and surface-water flow was developed, and an evaluation of ground-water utilization was made by compiling and evaluating existing hydrologic, geologic, climatologic, and water-use data. Field data were not collected during this study.

Physical Setting of Study Area

The Subarea 6 study area encompasses about 4,700 mi^2 in northwestern Georgia and about 5,360 mi^2 in northeastern Alabama (fig. 1). The Coosa River basin also includes about 100 mi^2 in southeastern Tennessee; however, that part of the basin is not in the Subarea 6 study area. The study area is bounded to the north by the Georgia-Tennessee State line, to the east by the upper Chattahoochee River basin (Subarea 1) and to the south-southeast by the Tallapoosa River basin (Subarea 5). To the west, the study area is bounded by the Cahaba River basin (Subarea 7), and to the south-southwest by the Alabama River basin (Subarea 8). Major rivers of Subarea 6 flow southwestward into the Alabama River (Subarea 8) (fig. 1).

Physiography

Fifty-two percent of Subarea 6 lies within the Valley and Ridge Province and 34 percent lies within the Piedmont Province. The Cumberland Plateau, Blue Ridge, and Coastal Plain Provinces comprise 8, 4, and 2 percent, respectively, of Subarea 6 (Sapp and Emplaincourt, 1975; Clark and Zisa, 1976) (fig. 2).

The Blue Ridge Province is dominated by mountains as high as about 4,100 feet (ft) above sea level. Land-surface altitude of intermountain plateaus within the province ranges from about 1,600 to 1,700 ft (Brackett and others, 1991). Most streams are characterized by rectangular or trellis drainage patterns. The Blue Ridge is distinguished from the Piedmont Province chiefly by its greater topographic relief (Clark and Zisa, 1976).

The Piedmont Province is a well-dissected upland characterized by rounded interstream areas to the north and rolling topography, indicating a dissected peneplain of advanced erosional maturity to the south (Chandler and Lines, 1974). Prominent topographic features generally reflect the erosional and weathering resistance of quartzites, amphibolites, and mafic/ultramafic plutonic rocks. Stream patterns predominantly are dendritic; however, a modified trellis pattern is associated with divides separating linear ridges underlain by quartzite in the southern part of the Piedmont. Altitude ranges from about 500 to 1,500 ft.

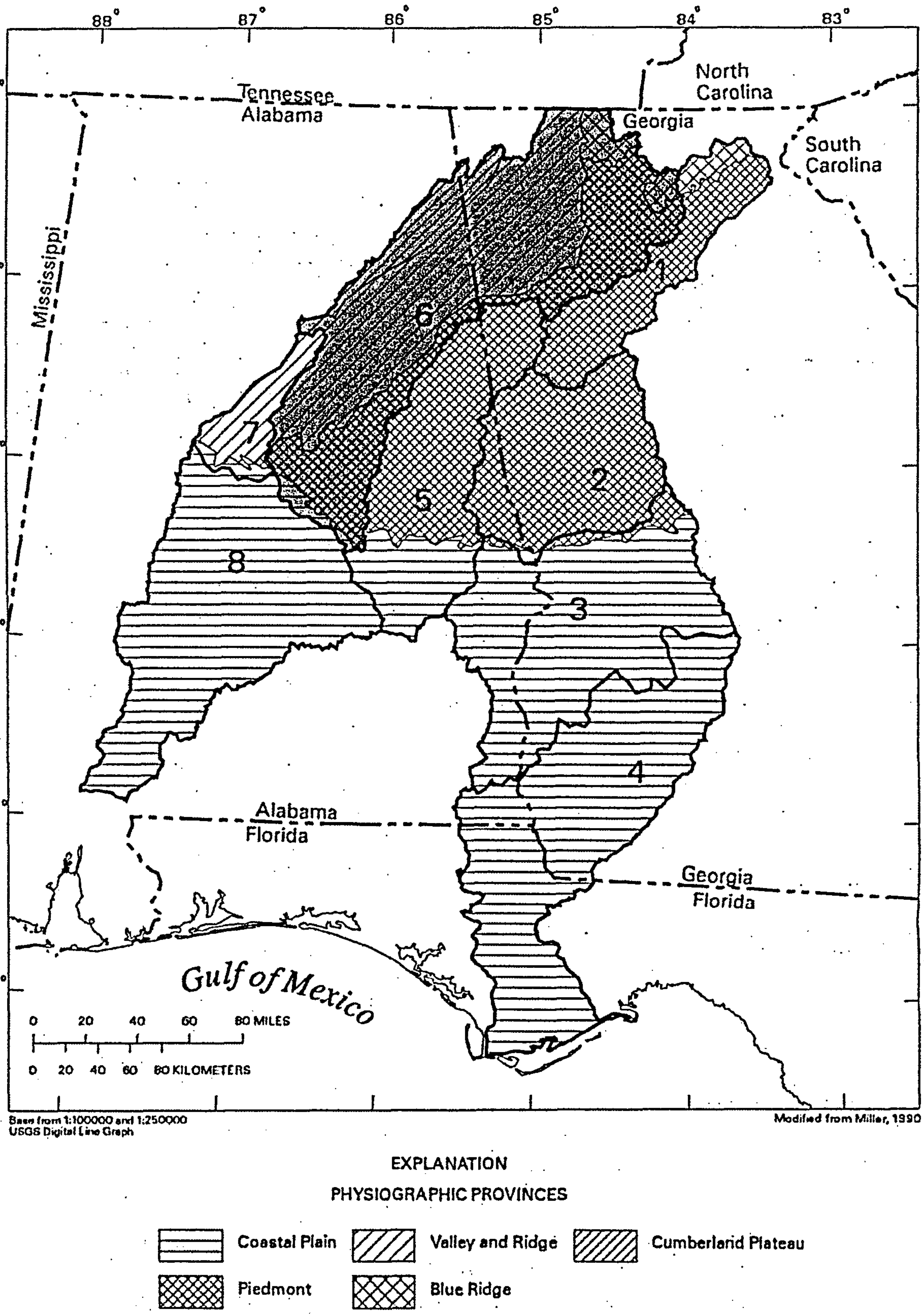


Figure 2. Physiographic provinces and subareas in the Apalachicola–Chattahoochee–Flint and Alabama–Coosa–Tallapoosa River basins.

The Valley and Ridge Province consists of relatively narrow, northeast-trending linear ridges at altitudes ranging from about 600 to 1,600 ft. Intervening streams drain relatively wide valleys that range in altitude from 400 to 900 ft (Scott, Cobb, and Castleberry, 1987; and Cressler and others, 1976). In contrast, the Cumberland Plateau is dominated by relatively flat plateaus ranging in altitude from 1,500 to 1,800 ft that bound narrow, northeast-southwest-trending linear valleys. Stream patterns both in the Valley and Ridge and Cumberland Plateau Provinces predominantly are trellis or rectangular.

The Coastal Plain Province is characterized by relatively flat to gently rolling uplands and broad, gently sloping valleys that range in altitude from about 130 to 850 ft above sea level (Scott, Cobb, and Castleberry, 1987). Stream patterns generally are dendritic. For a more complete discussion of the Coastal Plain Province, the reader is referred to Miller (1990).

Climate

The climate in Subarea 6 is moist and temperate. Mean-annual precipitation ranges from 52 to 64 inches (in.) (Harkins and others, 1982; Cressler and others, 1976; Carter and Stiles, 1983; Miller, 1990). Precipitation chiefly occurs as rainfall, and to a lesser extent, as snowfall. Rainfall is fairly evenly distributed throughout the year, but a distinct dry season usually occurs from mid-summer to late fall. Winter is the wettest season and March the wettest month (Harkins and others, 1982). The mean-annual temperature is about 60 degrees Fahrenheit.

Ground-Water Use

The estimated ground-water use in Subarea 6 during 1990 was about 87 million gallons per day (Mgal/d) or about 134 cubic feet per second (ft^3/s) (Baker and Mooty, 1993; Fanning and others, 1992). Of this total, about 59 percent was for public water supply, about 16 percent for domestic water supply, 16 percent for self-supplied industrial and commercial activities, and 9 percent for agricultural use. The largest ground-water use in Georgia is for self-supplied industrial and commercial supply, and in Alabama is for public water supply (table 1).

Table 1. Estimated ground-water use, by category, Subarea 6, 1990
[Mgal/d, million gallons per day; ft^3/s, cubic feet per second]

State	Public water supply		Self-supplied industrial and commercial		Agricultural		Domestic		Total	
	(Mgal/d)	(ft^3/s)	(Mgal/d)	(ft^3/s)	(Mgal/d)	(ft^3/s)	(Mgal/d)	(ft^3/s)	(Mgal/d)	(ft^3/s)
Georgia[1/]	8.3	12.8	12.4	19.2	2.2	3.4	9.2	14.2	32.1	49.6
Alabama[2/]	43.3	67.0	1.4	2.2	5.4	8.4	4.5	7.0	54.6	84.5
Subarea total	**51.6**	**79.8**	**13.8**	**21.4**	**7.6**	**11.8**	**13.7**	**21.2**	**86.7**	**134.1**

[1/]Fanning and others (1992).
[2/]Baker and Mooty (1993).

Ground-water use reported by Baker and Mooty (1993) and Fanning and others (1992) is by county; ground-water use in those counties that are partially in Subarea 6 are reported herein for Subarea 6 only. Ground-water use for public water supply, and self-supplied industrial and commercial uses were determined by using site-specific data. Ground-water pumpage for domestic purposes was determined by subtracting the population served by public supply facilities from the total population of the county or hydrologic unit, then multiplying that number by a water-use coefficient of 75 gallons per day (gal/d) per person. Agricultural ground-water use was estimated by multiplying the reported county use by the percentage of the land area of the county in Subarea 2.

Previous Investigations

Investigations of the geology of the general area of Subarea 6 began in the 19th century. Reports published before 1900 by the Geological Survey of Alabama and the Georgia Geologic Survey described the mineral deposits of the region, and concentrated on the precious metal deposits in the Piedmont Province. Smith (1907) conducted a study of the ground-water resources of Alabama, and McCallie (1908) described ground-water resources in the Piedmont and Blue Ridge Provinces of Georgia. Brackett and others (1991) described the ground-water resources of the Piedmont and Blue Ridge Provinces in Alabama and Georgia. Subsequent studies of the geology of the Piedmont and Blue Ridge Provinces were completed by Crickmay (1952), and Baker (1957), Sever (1964), Joiner and others (1967), Scarbrough and others (1969), and Guthrie and DeJarnette (1989).

Early studies of the Valley and Ridge Province included those by Hayes (1892), who described the geology of northeastern Alabama and adjacent parts of Georgia and Tennessee, and by McCalley (1897) who studied the Paleozoic strata of the Coosa Valley of Alabama. As early as 1933, ground water in the Paleozoic rocks of northern Alabama was a subject of study by Johnston (1933). More recent geologic studies include Butts and Gildersleeve (1948), on the Paleozoic strata of northwestern Georgia; Allen and Lester (1957), on zonation of the Middle and Upper Ordovician strata in northwestern Georgia; McLemore and Hurst (1970), on the carbonate rocks in the Coosa Valley of Georgia; Thomas (1972), who correlated Mississippian strata in Alabama; and Chowns (1972, 1977, 1983, 1989), on the geology and stratigraphy of the Paleozoic strata of northwestern Georgia. Additional studies of the geology and water resources of counties that lie wholly or partially within the Coosa River basin, published by the Georgia Geologic Survey and the Geological Survey of Alabama, are listed in the "Selected References" section of this report.

Well inventories and discussions of the water resources were presented in water-resources and water-availability reports that were prepared for county and larger areas in Alabama and Georgia: (Cressler and others, 1976; Scott, Cobb, and Castleberry, 1987; Scott, Harris, and Cobb, 1987; Bossong, 1989; Kidd, 1989; Planert and Pritchett, 1989; and Peck and Cressler, 1993).

One of the earliest reports discussing the surface-water resources of the ACF-ACT River basin area was "Water Powers of Alabama" (Hall and Hall, 1916). This report contains information on the dry-weather flow of streams in Alabama, and includes flow data for the Coosa River at Rome, Ga. Carter and others (1949) described the water resources and hydrology of southeastern Alabama. Peirce (1955) described the hydrology and surface-water resources of the ACT River basin area in Alabama to the mouth of the Cahaba River, and also included data for tributaries in the Piedmont Province of Alabama. Thompson and Carter (1955) described the effects of the drought of 1954 on streamflow in Georgia. Hale and others (1989) described the effects of the drought of 1986 on streamflow in Alabama, Georgia, North Carolina, South Carolina, Tennessee, and Virginia. Faye and Mayer (1990) described ground-water flow and stream-aquifer relations in the northern Coastal Plain part of the ACF River basin area.

Reports describing methods of estimating streamflow and ground-water discharge to streamflow include Bingham (1982), Hirsch (1982), Hoos (1990), Rorabaugh (1960, 1964), Rutledge (1991, 1992, 1993), and Mayer and Jones (1996). Data collected as part of the ongoing surface-water monitoring program of the USGS are published annually in the reports "Water-Resources Data, Alabama" (or Georgia, respectively). Other reports containing information about the surface- and ground-water resources of the ACF-ACT River basin area are listed in the "Selected References" section of this report.

Well and Surface-Water Station Numbering Systems

Wells in Georgia are numbered by a system based on the U.S. Geological Survey topographic maps. Each 7 1/2-minute topographic quadrangle map in Georgia has been assigned a number and letter designation beginning at the southwest corner of the State. Numbers increase sequentially eastward through 39; letters advance northward through "Z," then double-letter designations "AA" through "PP" are used. The letters "I," "O," "II," and "OO" are not used. Wells inventoried in each quadrangle are numbered sequentially beginning with "1." Thus, the second well inventoried in the Zebulon quadrangle (designated 11Y) is designated 11Y002.

The well-numbering system in Alabama is based on the Federal system of subdivision of public lands into townships and ranges. Each township is divided into 36 sections numbered from one in the northeast corner to 36 in the southeast corner. Each township is assigned a letter in the same order that sections are numbered from "A" through "X," with "A" being assigned to the northeasternmost equal subdivision of the section and "X" to the southeasternmost subdivision. Letter designations are doubled or tripled as needed. Wells in each subdivision are numbered consecutively such as A-1, A-2.

Wells in the USGS Ground-Water Site Inventory (GWSI) data base are assigned a 15-digit identification number based on the latitude and longitude grid system. The first six digits denote the degrees, minutes, and seconds of latitude. The next seven digits the degrees, minutes, and seconds of longitude. The last two digits (assigned sequentially) identify wells within a one-second grid.

The USGS established a standard identification numbering system for all surface-water stations in 1950. Stations are numbered according to downstream order. Stations on a tributary entering upstream of a main-stream station are numbered before and listed before the main-stream station. No distinction is made between continuous-record and partial-record stations. Each station has a unique eight-digit number that includes a two-digit part number (02 refers to natural drainage into the Eastern Gulf of Mexico) and a six digit downstream order number. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete number for each station includes a two-digit part number "02" plus the downstream-order number, which can be from 6 to 12 digits. All records for a drainage basin, encompassing more than one State, can easily be correlated by part number and arranged in downstream order.

Approach and Methods of Study

This study included several work elements used to appraise the ground-water resources of Subarea 6, including the description of a conceptual model of ground-water flow and stream-aquifer relations, and an assessment of ground-water availability. The approach and methods used to accomplish these tasks included:

- compilation of information and data from pertinent literature, including geologic, ground-water, streamflow, and ground-water use data;
- separation of streamflow hydrographs to estimate mean-annual ground-water contribution to the Coosa River and its tributaries;
- evaluation of streamflow records and periodic discharge measurements during drought periods to estimate "worst-case" streamflow conditions; and
- comparison of 1990 ground-water use with mean-annual and drought-flow conditions to evaluate ground-water availability.

Literature and data reviews provided information necessary to describe a conceptual model of ground-water/surface-water relations. Much of the conceptual model is based on results of previous investigations by Toth (1962, 1963), Freeze (1966), Freeze and Witherspoon (1966, 1967, 1968), Winter (1976), Faye and Mayer (1990), Heath (1984, 1989), and Miller (1990). These studies suggest that large rivers, such as the Coosa, and their tributaries function as hydraulic drains for ground-water flow, and that during significant droughts, most of the discharge in these streams is contributed by ground water.

Streamflow data were compiled from the USGS Automated Data Processing System (ADAPS) database. Streamflow records from continuous-record and miscellaneous discharge-measurement stations were used for hydrograph-separation analyses and drought streamflow evaluation.

Stream-aquifer relations were quantified using two approaches: (1) the hydrograph-separation method of Rorabaugh (1960, 1964) and Daniel (1976), called the recession-curve-displacement method; and (2) a drought-flow mass-balance analysis of streamflow. The hydrograph-separation method was used to estimate the mean-annual discharge of ground water (baseflow) to the basin. The mean-annual baseflow was used as a base or reference with which to compare and evaluate droughts under "worst-case" conditions. An estimate also was made of the mean-annual volume of ground water discharged to Alabama from Georgia as baseflow at the State line and from Subarea 6 to Subarea 8 as baseflow in the Coosa River at it's mouth. The mass-balance analysis was used to estimate the minimum baseflow contributions to the surface-water system during historically significant droughts and the ground water delivered as baseflow to Alabama from Georgia, and from Subarea 6 to Subarea 8 in Alabama at the end of these droughts.

Mean-Annual Baseflow Analysis

Discharge data from continuous-record gaging stations along the Coosa River and its tributaries were selected for baseflow analysis based on the period of record of unregulated flow. Streamflow representative of low, average, and high years of stream discharge were evaluated by hydrograph-separation methods to estimate annual baseflow. The mean-annual baseflow was then computed as the average baseflow of the three representative flow years.

The selection process for the most representative year of low, average, and high stream discharge involved objective statistical examination of the discharge data, followed by some subjectivity in the final choice of the water year selected. Hydrographs acceptable for separation were characterized by relatively normal distributions of daily stream discharge, small ranges of discharge, and the absence of extremely high, isolated peak stream discharge. For each station, the mean annual stream discharge was computed for the period of record of unregulated flow and used as a reference mean for low-, average-, and high-flow conditions for that station. The mean- and median-annual stream discharge for those water years identified as acceptable were compared to the reference mean. Because extremely high discharge during a water year could greatly influence the mean but not the median (which is similar to the geometric mean for positively skewed data sets, such as discharge), the process of selecting representative water years for low-, average-, and high-flow conditions considered the position of the mean discharge for the selected year relative to the median and the reference mean. The hydrographs for these representative water years were examined and separated. True subjectivity in the selection process entered only at this point, such that, if acceptable hydrographs were available for several years, one year arbitrarily was chosen over the others.

The separation analyses were conducted using the computer program SWGW (Mayer and Jones, 1996) which is an automated version of the recession-curve-displacement method, often referred to as the Rorabaugh or Rorabaugh-Daniel method. The SWGW program was applied to a water-year period of streamflow data. SWGW utilizes daily mean discharge data collected at unregulated stream-gaging sites and requires at least 10 years of record to accurately estimate a recession index necessary for hydrograph-separation analysis.

The hydrograph-separation method estimates the ground-water component of total streamflow. In general, the streamflow hydrograph can be separated into two components—surface runoff and baseflow (ground-water discharge to streams). Figure 3 shows the graphical output from the SWGW program. Surface runoff is the quick response (peaks) of stream stage to precipitation and nearby overland flow.

Application of the recession-curve-displacement method requires the use of the streamflow recession index. The streamflow recession index is defined as the number of days required for baseflow to decline one order of magnitude (one log cycle), assuming no other additional recharge to the ground-water system. The streamflow recession index is a complex number that reflects the loss of ground water to evapotranspiration (Daniel, 1976) or leakage, and the influence of geologic heterogeneities in the basin (Horton, 1933; Riggs, 1963). The slope of the streamflow recession is affected by evapotranspiration, such that the streamflow recession index varies from a maximum during the major rise period to a minimum during the major recession period (fig. 3). The major rise period of streamflow generally occurs from November through March or April, when precipitation is greatest and evapotranspiration is least. The major recession period occurs during late spring through fall and coincides with a period of lesser precipitation, higher temperature, and greater evapotranspiration (fig. 3). Two recession indices were estimated for streamflow observed at each continuous-record gaging station used in the mean-annual baseflow analysis; one index for the major rise period and one for the major recession period.

Available ground-water-level data indicate that long-term changes in ground-water storage are minimal in Subarea 6. Because long-term storage changes are minimal, mean-annual ground-water discharge, estimated using the hydrograph-separation method, is considered an estimate of minimum mean-annual recharge. Also, aquifers at a regional scale in Subarea 6 are considered, for purposes of analysis, to respond as homogeneous and isotropic media.

Results of the mean-annual baseflow analysis are based on measured and estimated data, and the analytical methods to which they are applied. Drainage areas were measured using the most accurate maps available at the time of delineation (Novak, 1985), and are reported in units of square miles. Drainage areas are reported to the nearest square mile for areas greater than 100 mi^2; to the nearest tenth of a square mile for areas between 10 and 100 mi^2; and to the nearest hundredth of a square mile for areas less than 10 mi^2, if the maps and methods used justify this degree of accuracy (Novak, 1985). Annual stream discharge, the sum of the daily mean stream discharges for a given water year, is reported in units of cubic feet per second, to the nearest cubic foot per second. Daily mean discharge is reported to the nearest tenth of a cubic foot per second for discharge between 1.0 and 9.9 ft^3/s; to the nearest unit for discharge between 10 and 100 ft^3/s; and is reported using three significant figures for discharge equal to or greater than 100 ft^3/s (Novak, 1985).

The accuracy of stream-discharge records depends primarily on: (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements; and (2) the accuracy of measurements of stage and discharge, and the interpretation of records. Accuracy of records of streamflow data used in this report can be found in annually published USGS data reports, for example, Pearman and others (1994). The accuracy attributed to the records is indicated under "REMARKS" in the annual data reports for each station. "Excellent" means that about 95 percent of the daily discharges are within 5 percent of the true discharge; "good," within 10 percent; and "fair," within 15 percent. Records that do not meet these criteria are rated "poor." The accuracy of streamflow records at a station may vary from year to year. In addition, different accuracies may be attributed to different parts of a given record during a single year (Novak, 1985).

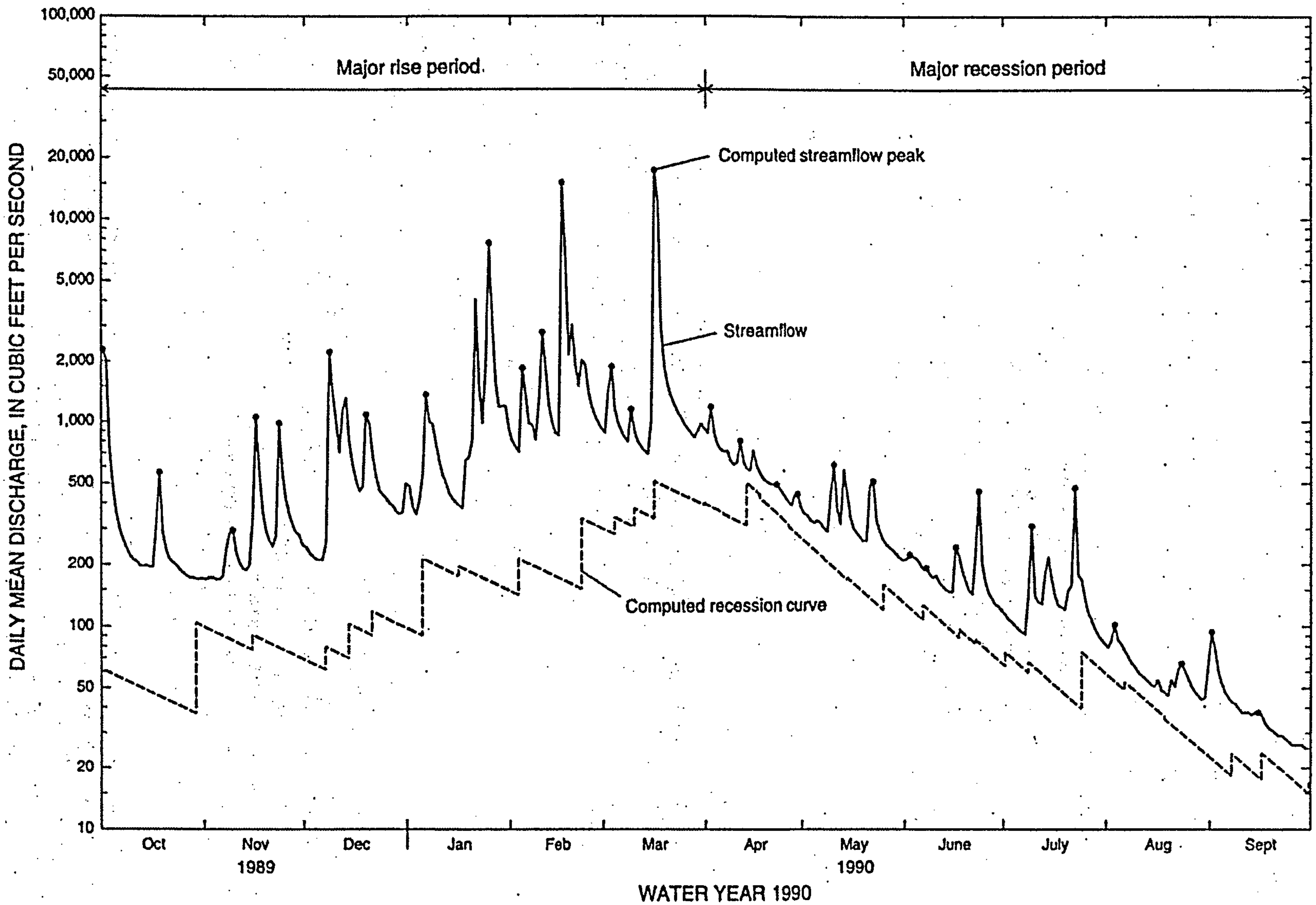


Figure 3. Streamflow hydrograph, separated by program SWGW.

Results of the mean-annual baseflow analyses are inherently uncertain. The hydrograph-separation method of analysis is partly subjective, relying on the input of several user-selected variables. As such, the results of the analyses derived and reported herein, are difficult to independently confirm and are presented as estimates of unknown quality and confidence. However, because the values in this report are used in several water budgets, not only within Subarea 6 but also from subarea to subarea, hydrograph-separation results may be reported to a greater significance than the data and analyses warrant to maintain the numerical balance of the water budget; implication of accuracy to the extent shown is not intended.

Drought-Flow Analysis

Daily mean streamflow data collected at gaging stations during periods of low flow and corresponding periodic measurements of stream discharge collected at partial-record stations were compiled for the drought years 1941, 1954, and 1986. These data included nearly concurrent daily measurements of streamflow in the Coosa River and periodic measurements of tributary discharge.

Standard periods of analyses for drought studies were selected for all ACF-ACT subareas. The period of analysis selected for compiling 1954 drought data was September 15 through November 1, 1954. The selected period for the 1986 drought was July 1 through August 14, 1986. Streamflow during these periods was considered to represent the "worst case" of ground-water storage and availability throughout the ACF-ACT study area. Discharge data were sparse during the 1941 drought; therefore, a standard period of analysis was not selected for the entire ACF-ACT study area.

The period of "worst-case" conditions may not include the minimum streamflow that occurred during a drought at a streamflow measurement site. Minimum drought flows typically occur at different times at different stations within large watersheds, such as the Coosa River basin. Rather, the "worst-case" evaluation was designed to describe streamflow during the advanced stages of each drought; thus, providing a near-contemporaneous summary of streamflow conditions during periods of low flow throughout the ACF-ACT study area.

The estimated "worst-case" distribution of Coosa River streamflow during the 1941, 1954, and 1986 drought periods was determined by balancing mass in the stream network in a general downstream direction during a relatively short interval of time. The tributary discharge to the Coosa River during drought periods was calculated using a unit-area discharge extrapolated to the entire drainage area of the tributary. Unit-area discharges are based on streamflow measurements that generally are inclusive of only part of the tributary drainage, and may not be representative of an average unit-area discharge for the entire tributary drainage. Therefore, most unit-area discharges used to estimate discharge at ungaged and unmeasured tributaries were based on streamflow data measured near the mouths of tributaries to better represent the entire tributary contributing area.

Because daily discharge or periodic discharge measurements did not exist for some sites during all or some of the three drought periods, estimates of the daily discharge at those sites during the drought periods were based on correlation methods that use relations of available discharge data from other periods. The logarithms of these discharge data were correlated with the logarithms of concurrent daily discharges at selected continuous-record gaging stations (index stations). The relation was defined by a line of correlation determined by a technique known as MOVE.1—Maintenance of Variance Extension, Type 1 (Hirsch, 1982)—or by a graphically determined best-fit line (Riggs, 1972). The MOVE.1 technique was used instead of ordinary least-squares regression to develop these relations because it produces an estimate that is less biased than the ordinary least-squares regression.

Drought streamflow daily discharges were estimated for 1941, 1954, and 1986 for partial-record and continuous-record stations where at least 10 discharge measurements were available, using the MOVE.1 line and the concurrent daily discharge for the index station. This estimating technique transfers a selected daily discharge from the index station using the MOVE.1 line of correlation to determine the corresponding daily discharge for the partial-record station or continuous-record station (dependent station). This technique assumes that daily discharges will occur concurrently at the dependent station and the index station and that the two stations drain hydrologically and geologically similar basins in close geographical proximity. Partial-record stations having fewer than 10 discharge measurements, or where relations between dependent stations and index stations were not linear, were correlated with index stations by a graphical technique. A graphically determined best-fit line through an x-y plot of concurrent daily discharge for the index station and discharge data for the dependent station was used for estimating daily discharges (Riggs, 1972).

CONCEPTUAL MODEL OF GROUND-WATER FLOW AND STREAM-AQUIFER RELATIONS

The conceptual model of the ground-water flow and stream-aquifer relations in Subarea 6 is based on previous work done in other areas by Toth (1962, 1963), Freeze (1966), Freeze and Witherspoon (1966, 1967, 1968), Winter (1976), and Faye and Mayer (1990). These studies suggest that recharge originates from precipitation that infiltrates the land surface, chiefly in upland areas, and percolates directly, or leaks downward to the water table. Ground water subsequently flows through the aquifer down the hydraulic gradient and either discharges to a surface-water body or continues downgradient into confined parts of an aquifer. Major elements of this conceptual model include descriptions of flow regimes, stream-aquifer relations, recharge to ground water, and ground-water discharge to streams.

Toth (1963) observed that most ground-water flow systems could be qualitatively subdivided into paths of local (shallow), intermediate, and regional (deep) flow. Local flow regimes are characterized by relatively shallow and short flow paths that extend from a topographic high to an adjacent topographic low. Intermediate flow paths are longer and somewhat deeper than local flow paths and contain at least one local flow path. Regional flow paths (fig. 4) begin at or near the major topographic (drainage) divide and terminate at regional drains, which is the Coosa River in Subarea 6. Depending on local hydrogeologic conditions, all three flow regimes may not be present everywhere within the subarea.

The water table in Subarea 6 probably is a subdued replica of the land-surface topography but generally has less relief. The presence of ground-water flow regimes depends largely on the configuration of the water table, such that recharge occurs in highland areas and discharge occurs in lowland areas. Quantities of recharge to the water table and ground-water discharge to streams are variably distributed throughout the local, intermediate, and regional flow regimes. Local regimes receive the greatest ground-water recharge from the water table and provide the most ground-water discharge to streams. Ground-water discharge to tributary drainages primarily is from local and intermediate flow regimes; ground-water discharge to regional drains, such as the Coosa River includes contributions from the regional as well as local and intermediate regimes.

Seasonal variation in rainfall affects the local ground-water flow regime most significantly, and affects the regional flow regime least significantly. Generally, regional flow probably approximates steady-state conditions, and long-term recharge to and discharge from this regime will not vary significantly.

Continuum methods of analysis of ground-water flow, such as hydrograph separation, are based on assumptions of laminar flow through a medium characterized by systematic changes in primary porosity and permeability. Such media generally are classified as porous media. Ground-water flow through porous media is commonly termed Darcian flow. Fractured rock media in the Valley and Ridge, Cumberland Plateau, Piedmont, and Blue Ridge Provinces contain virtually no primary porosity or permeability and virtually all ground-water flow occurs through secondary openings. For purposes of analysis, continuum methods based on assumptions of Darcian flow are applied to ground-water flow through fractured rock media. Such approaches commonly are justified on a regional scale because fracture systems typically are ubiquitous and intersecting. Further support for the assumption of Darcian flow is provided by regional scale maps of potentiometric surfaces, which demonstrate the continuity of ground-water flow through fractured rocks at a county or multi-county scale. Examples of regional scale maps of potentiometric surfaces in fractured rock aquifers are shown by Bossong (1989) and Planert and Pritchett (1989).

Results of smaller-scale studies also demonstrate the continuity of ground-water flow through fractured media. For example, long-term ground-water pumping operations near Ridgeway, S.C., began in the fall of 1988 to dewater fractured Piedmont rocks to accommodate open-pit mining of gold-bearing ore (Glenn and others, 1989). Detailed ground-water monitoring around and within the mined areas indicated that after less than one year of pumping, drawdown extended in an oblong distribution for more than 1 mi beyond the center of pumping. Drawdown decreased uniformly with distance from pumped wells. Nelson (1989) used water-level data from numerous monitoring wells at a 120-acre study site constructed in fractured Piedmont rocks to describe stream-aquifer relations (non-pumping conditions) near the Rocky River in North Carolina. Nelson (1989) concluded that the Rocky River was a drain for ground water discharged from Piedmont rocks, and that observed hydraulic relations between the fractured-rock aquifer and the river and within the aquifer at various depths, were consistent with porous-media concepts of ground-water flow, as described by Toth (1962, 1963).

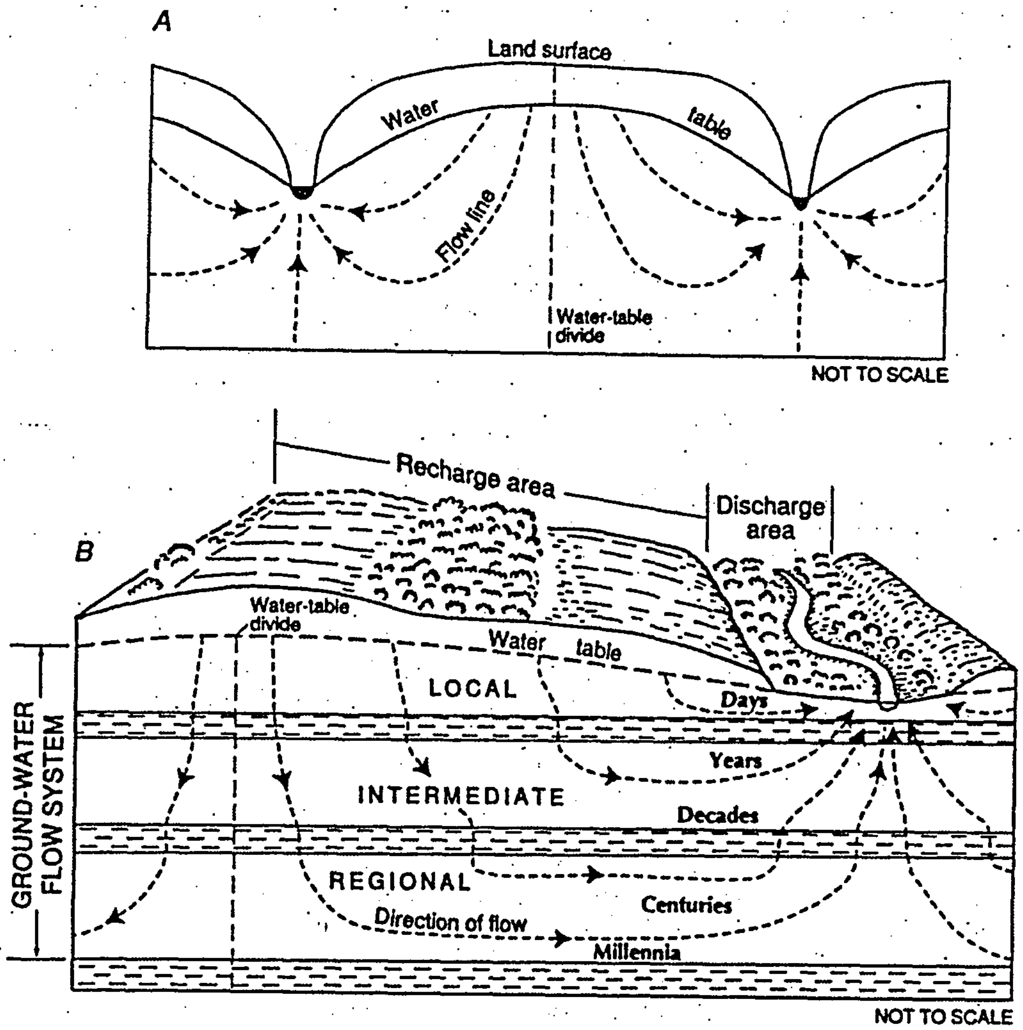


Figure 4. (*A*) Distribution of ground-water flow in an areally extensive, isotropic, homogeneous aquifer system (modified from Hubbert, 1940, and Heath, 1984) and (*B*) example of local, intermediate, and regional ground-water flow (modified from Heath, 1984).

HYDROLOGIC SETTING

The hydrologic framework of Subarea 6 contains dynamic hydrologic systems consisting of aquifers, streams, reservoirs, and floodplains. These systems are interconnected and form a single hydrologic entity that is stressed by natural hydrologic and climatic factors and by anthropogenic factors. For this discussion, the hydrologic framework is separated into two systems: the ground-water system and surface-water system.

Ground-Water System

The ground-water system forms as geology and climate interact. Geology primarily determines the aquifer types present, as well as the natural quality and quantity of ground water. Climate primarily influences the quantity of ground water.

Geology

A detailed description of the diverse and complex geology of Subarea 6 is beyond the scope of this study; however, a brief description of the geology of the subarea is presented, based on selected published descriptions of various geologic investigations (see the section "Selected References"). The geology in each physiographic province of Subarea 6 (fig. 2) generally is unique to each province; therefore, geology is discussed by province.

The Blue Ridge and Piedmont Provinces are characterized by complex sequences of igneous rocks of Precambrian to Paleozoic age, and metamorphic rocks of late Precambrian to Permian age (Miller, 1990); in the Piedmont, isolated igneous rocks of Mesozoic age also are present (D.C. Prowell, U.S. Geological Survey, oral commun., 1996). Collectively, these rocks are called crystalline rocks. The metamorphic rocks originally were sedimentary, volcanic, and volcaniclastic rocks that have been altered by several stages of regional metamorphism to slate, phyllite, schist, gneiss, quartzite, and marble; a variety of cataclastic rocks also are present. The metamorphic rocks are extensively folded and faulted. The intrusive igneous rocks, dominantly granites and lesser amounts of diorite and gabbro, occur as widespread plutons. The rocks are characterized by a complex outcrop and subsurface distribution pattern, as shown on geologic maps of various scales (Szabo and others, 1988). Because rock characteristics can vary significantly on the scale of a few tens of feet within the same lithologic unit, detailed geologic-unit differentiation can be accomplished only on the scale of a topographic quadrangle, or larger. The Piedmont contains major fault zones that generally trend northeast-southwest and form the boundaries between major rock groups (Georgia Geologic Survey, 1976).

The crystalline igneous and metamorphic rocks largely are covered by a layer of weathered rock and soil known as regolith. The regolith ranges in thickness from a few to more than 150 ft, depending upon the type of parent rock, topography, and hydrogeologic history. From the land surface, the regolith consists of a porous and permeable soil zone that grades downward into a clay-rich, relatively impermeable zone that overlies and grades into porous and permeable saprolite, generally referred to as a transition zone (Heath, 1989). The transition zone grades downward into unweathered bedrock. Regolith thickness generally is less in the Blue Ridge Province than in the Piedmont because of the steeper slopes (Schmitt and others, 1989; Brackett and others, 1991). In general, the massive granite and gabbro rocks are poorly fractured and are characterized by a thin soil cover; in contrast, the schists and gneisses are moderately to highly fractured. The weathering of the rocks is erratic and usually deep; remnants of the original texture and foliation are retained in the saprolite in many places (Clarke, 1963).

Rocks of Paleozoic age characterize the Valley and Ridge and Cumberland Plateau Provinces. These rocks are folded, faulted, and thrusted clastic and carbonate rocks of fluvial and marine origin that have been only locally metamorphosed. The deformation of rocks in the Cumberland Plateau is less intense than those in the Valley and Ridge. Fold axes trend northeast to southwest. Typical rock types include shale, siltstone, sandstone, limestone, and dolostone. Lenticular, discontinuous quartz sand and gravel beds of Cenozoic age have been deposited in the valley floor of the Coosa River. Significant deposits have been noted in Calhoun (Warman and Causey, 1962), Cherokee (Causey, 1965a), Elmore (Lines, 1975), Etowah (Causey 1961a), and St. Clair (Johnston, 1933) Counties, Ala.

Sediments of Cretaceous age in the Coastal Plain Province mostly are undeformed, poorly consolidated, clastic deposits of estuarine, deltaic, and shallow marine origin and form a southward-thickening wedge that overlies rocks of the Piedmont and Valley and Ridge Provinces. These sediments dip gently to the south and southeast. Typical sediment types are clay, sand, and gravel. The outcrops of Cretaceous sediments, which contain sand and gravel aquifers in limited use in Subarea 6, form narrow bands across Chilton, Autauga, and Elmore Counties, Ala.

Aquifers

Aquifers in Subarea 6 (fig. 5) vary widely in their lithologic and water-bearing characteristics (table 2). Three types of aquifers are present in the Subarea, identified on the basis of their ability to store and yield water: (1) porous-media; (2) solution-conduit; and (3) fracture-conduit aquifers (table 2). These aquifer types differ fundamentally in origin and water-supply potential. Aquifers are not hydraulically isolated within physiographic provinces, which also could be considered "hydrogeologic provinces." Ground water flows from one hydrogeologic unit to another; for example, where the units are juxtaposed, ground water can flow from the fracture-conduit aquifers of the Piedmont to the porous-media aquifers of the Coastal Plain.

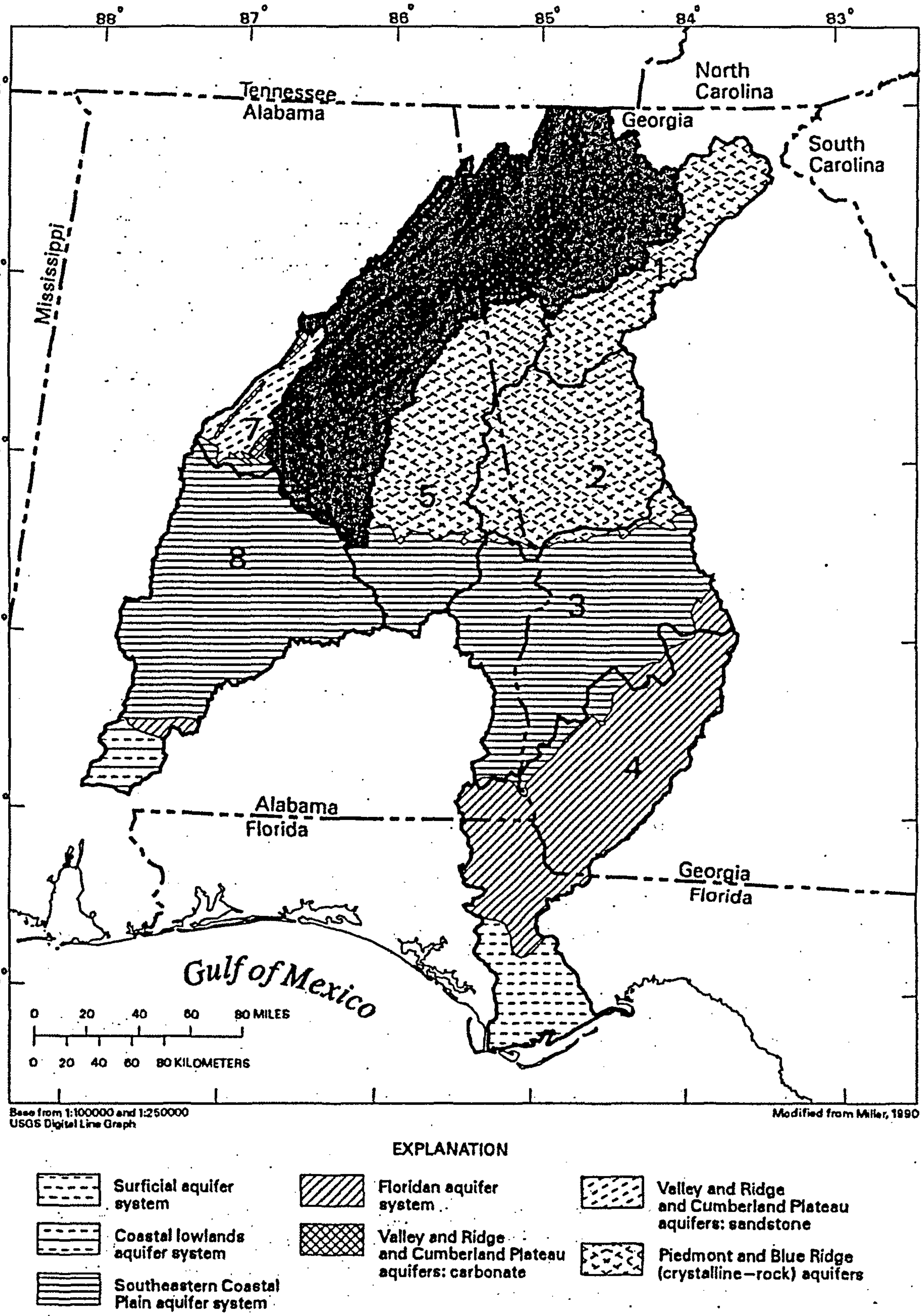


Figure 5. Major aquifers and subareas in the Apalachicola–Chattahoochee–Flint and Alabama–Coosa–Tallapoosa River basins.

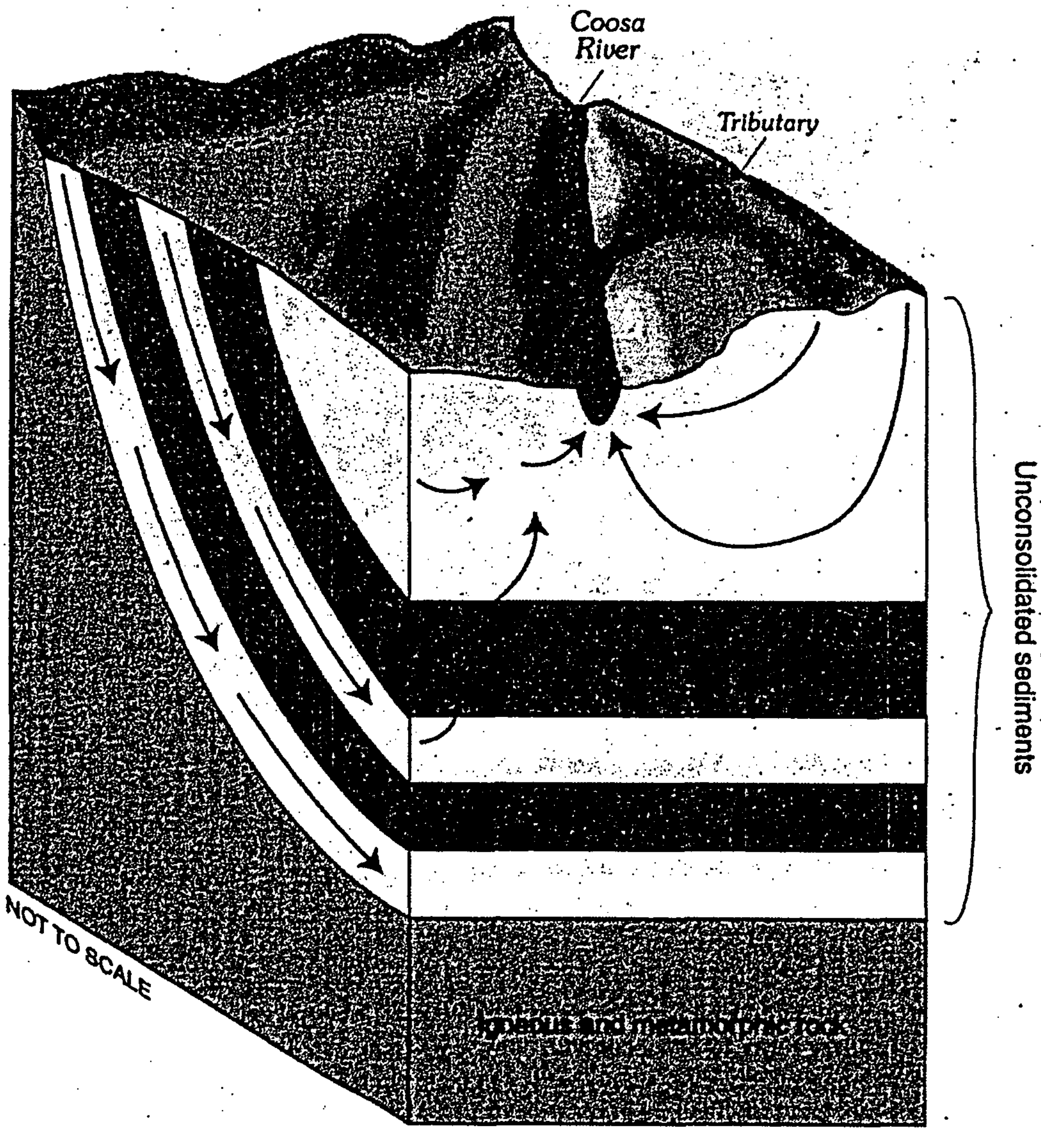
Table 2. Generalized geologic units in Subarea 6, and water-bearing properties, chemical characteristics, and well yields
[—, no available data]

Physiographic province	Geologic age and lithology	Aquifer type	Water-bearing properties and chemical characteristics	Well yield
Valley and Ridge	Cenozoic—sand and gravel	porous-media	generally adequate only for domestic use, may have high iron concentrations	10 gallons per minute typical
Coastal Plain	Cretaceous—sand and gravel beds of the Coker and Gordo Formations	porous-media	used for limited public water supply in Chilton and Elmore Counties, Alabama	100 to 200 gallons per minute (Scott, Cobb, and Castleberry, 1987)
Valley and Ridge and Cumberland Plateau	Paleozoic—sandstone, shale, and siltstone	fracture-conduit	yield highly variable, may have high iron content, in limited use for public-water supply	10 to 200 gallons per minute (Bossong, 1989)
	Paleozoic—limestone, dolostone, chert	solution-conduit	widely used for public water supply, water may have high concentrations of calcium and bicarbonate	10 to 2,000 gallons per minute (Bossong, 1989)
Piedmont and Blue Ridge	regolith, soil, alluvium, colluvium, and saprolite derived from various-aged rocks	porous-media; preferential flow	generally suitable for domestic use only	—
	Precambrian to Paleozoic—quartzite, slate, gneiss, schist, marble, phyllite, granite	fracture-conduit	local, discontinuous properties, well yields variable, water quality generally good	1 to 25 gallons per minute typical; may exceed 500 gallons per minute (Kidd, 1989; Guthrie and others, 1994)

Porous-media aquifers typically consist of unconsolidated or poorly consolidated sediments. In these aquifers, ground water moves through interconnected pore spaces between sediment grains. The space between sediment grains is termed voids or interstices, and the interconnection of these spaces allows water to flow through the sediments. Such flow is said to be the result of primary permeability. The porous-media aquifers occur in sand and gravel deposits in the valley floor of the Coosa River and in clastic deposits in the southeastern Coastal Plain (figs. 1 and 2). For a more complete discussion of aquifers of the Coastal Plain Province, the reader is referred to Miller (1990).

Lenticular, discontinuous sand and gravel deposits in the valley floor of the Coosa River are limited in thickness and extent and form local aquifers. Ground-water flow generally is toward the river, but may be reversed temporarily near the river during periods of high streamflow. Wells completed in these sediments generally yield small quantities of water. These aquifers are hydraulically connected to the Coosa River and area not major sources of ground water in Subarea 6.

The Coosa River flows across the outcrop area of the Cretaceous sediments in northwestern Elmore County, Ala. Aquifers in these sediments are of the porous-media type (fig. 6), and the Coosa River receives water discharged from these aquifers. Water not intercepted by the river or by ground-water withdrawal flows downgradient through the aquifers beyond Subarea 6. These aquifers have limited thickness and extent and are not major sources of ground water in Subarea 6. Ground water flows southward and eastward away from the area of outcrop towards major pumping centers in Montgomery and Autauga Counties, Ala. (Scott, Cobb, and Castleberry, 1987).



EXPLANATION

→ General direction of ground-water movement

Figure 6. Conceptual ground-water and surface-water systems in Subarea 6: porous-media aquifer in unconsolidated sediments of the Coastal Plain Province.

Solution-conduit aquifers of Subarea 6 (fig. 7) occur in well-cemented carbonate rocks of the Valley and Ridge and Cumberland Plateau Provinces. The study of the occurrence and development of ground water in solution-conduit aquifers is an area of specialization and is only briefly explained here. The carbonate rocks of Subarea 6 are characterized by little primary porosity or permeability. Secondary porosity features, such as solution-enlarged fractures and bedding planes, form a system of interconnected conduits through which water moves (Bossong, 1989). The weathered zone above many of the carbonate-rock aquifers contains a layer of chert rubble that stores and transmits water slowly to the underlying fractured-rock aquifer. The carbonate-rock aquifers are anisotropic and heterogeneous because of the local and directional nature of water-bearing units in the bedrock.

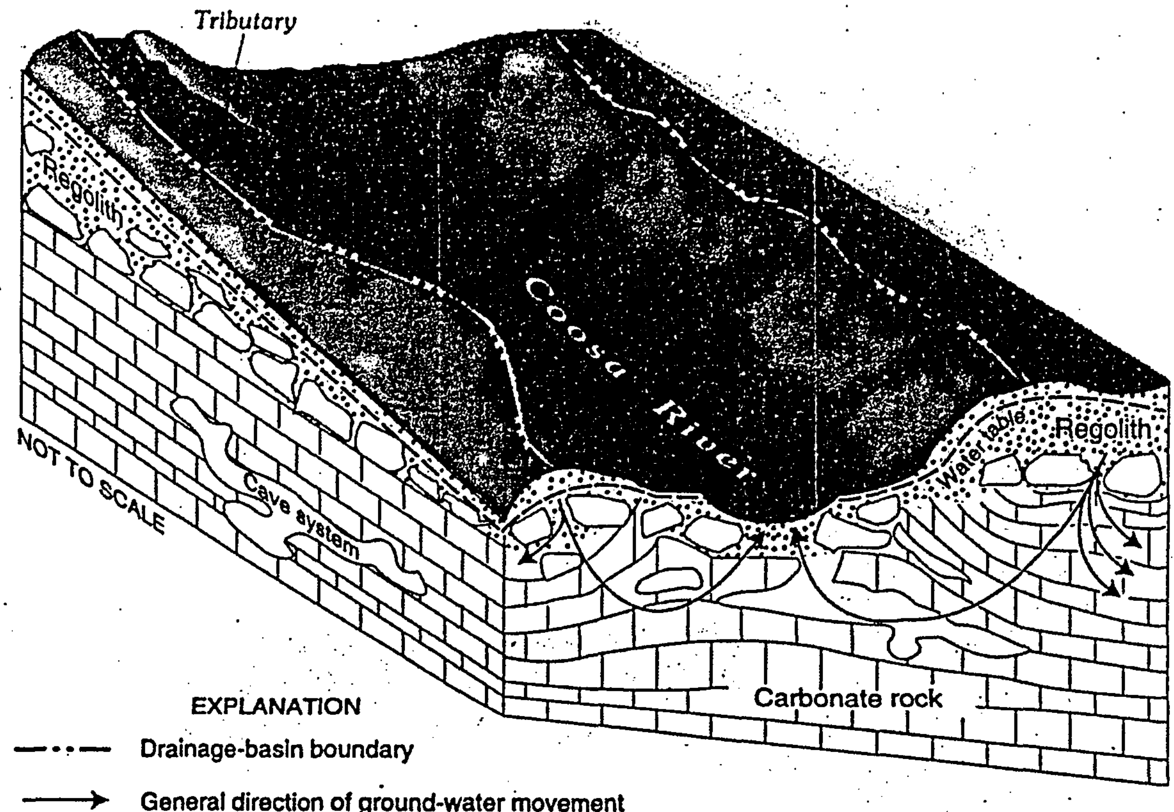
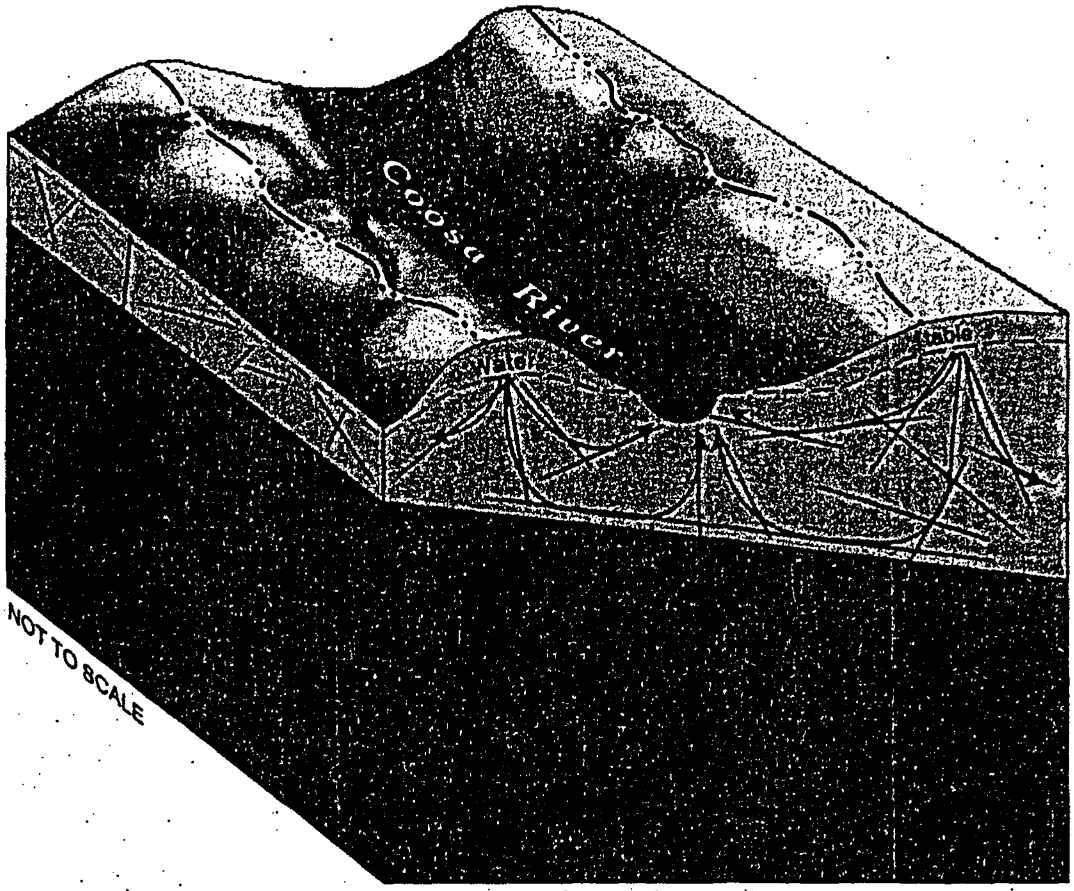


Figure 7. Conceptual ground-water and surface-water systems of Subarea 6: solution-conduit aquifer in the carbonate rocks of the Valley and Ridge and Cumberland Plateau Provinces.

Wells completed in solution-conduit aquifers may supply several thousand gallons of water per minute. Wells that do not intercept secondary permeability zones will, however, seldom supply more than 10 gallons per minute or may be dry. In Subarea 6, most public water-supply wells completed in solution-conduit aquifers yield 350 to 700 gal/min (Bossong, 1989). Folding and faulting of rocks have disrupted regional stratigraphic continuity so that the same aquifer unit may occur in adjacent valleys but not be hydraulically connected (Planert and Pritchett, 1989). As in any solution-conduit aquifer system, ground-water withdrawal and consequent water-level declines could induce sinkhole development. The likelihood of sinkhole development would depend on several factors—including, but not limited to—quantity of water withdrawn, amount of water-level decline, proximity of solution conduits to the land surface, and land-surface loading.

In Subarea 6, fracture-conduit aquifers occur in shale, siltstone, and sandstone (fig. 8) of the Valley and Ridge and Cumberland Plateau Provinces, and in igneous and metamorphic rocks (fig. 9) of the Blue Ridge and Piedmont Provinces. Two general water-bearing zones comprise the ground-water flow system in fracture-conduit aquifers: (1) the shallow regolith, composed of saprolite, soil, colluvium, and alluvium; and (2) the deeper, fractured bedrock. The soil and alluvium of the regolith is characteristic of a porous-media aquifer and bedrock is characteristic of a fracture-conduit aquifer. In general, the regolith consists of porous, permeable soil at land surface, grading downward into a highly weathered, clay-rich, relatively impermeable zone that overlies a less-weathered and more permeable transition zone (Heath, 1989). In some instances, ground water in the regolith is similar to that in porous media, where intergranular porosity is present in the soil or alluvium, or where rocks have been deeply weathered, and retain few structural characteristics. Porosity of the regolith can range from 20 to 30 percent (Heath, 1984). The transition zone between saprolite and bedrock contains weathered material and boulders, and along structural features, such as foliation and jointing, generally is more permeable than the saprolite. Ground-water flow can be preferential in saprolite, where weathered rock retains relict structural features (Stewart, 1964; Stewart and others, 1964).



EXPLANATION

Fractured sandstone

Drainage-basin boundary

General direction of ground-water movement

Figure 8. Conceptual ground-water and surface-water systems in Subarea 6: fracture-conduit aquifer in the clastic sedimentary rocks of the Valley and Ridge and Cumberland Plateau Provinces.

In fracture-conduit aquifers, nearly all ground-water movement is through fractured or broken rock and through openings between cleavage planes. Secondary porosity is created by faulting and fracturing and is enhanced by weathering along these openings. The bedrock below the weathered zone and beyond fractures typically has little or no porosity or primary permeability. Ground-water storage primarily is in the overlying weathered rock (regolith or saprolite, which behaves like a porous-media aquifer). The volume of water in storage is controlled by the porosity and thickness of the regolith, which is thicker in marble, schist, and gneiss, and in valleys (Kidd, 1989); to a lesser degree, the volume of water in storage is controlled by the amount of fracturing of the rock. Because of the limited storage in fractures, water levels in fracture-conduit aquifers respond rapidly to pumping and to seasonal changes in rainfall.

The fracture-conduit aquifers are anisotropic and heterogenous because of the highly complex and locally variable geologic characteristics controlling the presence of the water-bearing units in the bedrock and regolith. Rock type, structural features, and regolith thickness vary locally and affect the storage capacity and hydraulic conductivity of an aquifer (LeGrand, 1967, 1989; Daniel, 1987; Guthrie and DeJarnette, 1989; Schmitt and others, 1989; Chapman and others, 1993; Guthrie and others, 1994).

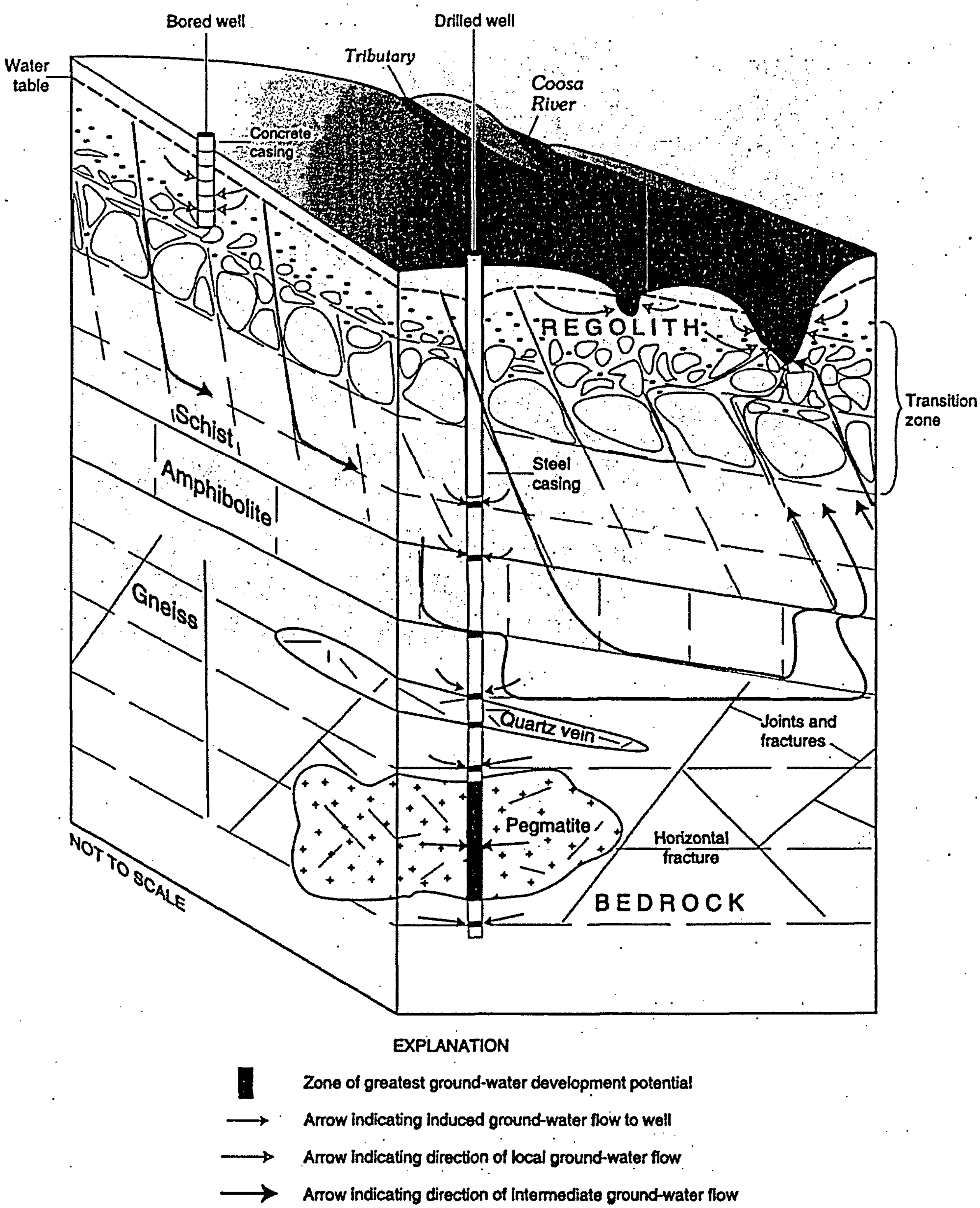


Figure 9. Conceptual ground-water and surface-water systems in Subarea 6: fracture-conduit aquifer in the igneous and metamorphic rocks of the Blue Ridge and Piedmont Provinces.

Fracture-conduit aquifers formed in shale, siltstone, and sandstone of the Valley and Ridge and Cumberland Plateau Provinces may yield quantities of water suitable for public or industrial supply. In Subarea 6, most public water-supply wells completed in shale, siltstone, or sandstone yield less than 100 gal/min (Bossong, 1989). Yields from wells completed in the fractured crystalline-rock aquifers (schist, gneiss, quartzite, and granite) generally range from 1 to 25 gal/min, but may exceed 500 gal/min (Kidd, 1989). Guthrie and others (1994) reported that yields of wells in the Piedmont of Alabama range from 0 to 700 gal/min. In the Piedmont of Alabama, yields from wells drilled in mica schist generally are the highest (Baker, 1957); and yield from wells drilled in granite and other igneous rocks are the lowest. Yield from wells in valleys, where the regolith is thickest, average four times as much as that from wells located on hilltops where the regolith is thin (Baker, 1957). Well depth generally ranges from 100 to 500 ft. Wells may yield water from several fractures throughout a borehole or from a single productive fracture. Conversely, a borehole may not intersect a fracture, or the fracture may not be water bearing, and thus, may yield little or no water. Because of the complex nature of the secondary permeability in fracture-conduit aquifers, production zones generally are of limited extent. Quantitative estimates of aquifer properties such as transmissivity, hydraulic conductivity, and storage coefficient are difficult to assess because of the highly localized geologic controls on secondary permeability.

Recent studies have shown that a thorough evaluation of hydrogeologic settings in areas characterized by solution-conduit and fracture-conduit aquifers can lead to an increased likelihood of successful development of ground-water resources. Most municipal, industrial, and commercial ground-water exploration plans now include consultation with hydrogeologists, who evaluate surficial geology, including structural features, topographic relations to geologic features, existing well information, and land use. Surface and borehole geophysical surveys also may be conducted to delineate subsurface features that indicate the sources of water to wells and the water-bearing properties of the rocks.

Ground-Water Levels

Ground-water levels fluctuate in response to natural and anthropogenic processes, such as seasonal changes in rainfall, interaction with the surface-water system, and ground-water withdrawal. These fluctuations indicate changes in the amount of water in storage in an aquifer. In Subarea 6, long-term water-level data were available for 8 wells in fracture-conduit aquifers for the period 1968-94; 18 wells in solution-conduit aquifers for the period 1959-94; and 4 wells in the porous-media aquifers of the Coastal Plain for the period 1972-94.

The hydrograph of well O3PP01 (just north of Subarea 6) (fig. 10) completed in a solution-conduit aquifer in Walker County, Ga., shows a seasonal water-level fluctuation that probably is typical of such wells in Subarea 6. Annual low water levels occur in the fall after the dry summer; and annual high water levels occur in the early spring because of recharge following rainfall during the winter. Although the water level fluctuates seasonally, significant year-to-year or long-term change in the average water level in the aquifer has not occurred. This suggests that mean-annual recharge and discharge are approximately equal, and during the period November 1977 to 1995, permanent changes in storage in the aquifer have not occurred.

Ground-water levels in observation wells in Subarea 6 ranged from about 2 ft above land surface (a flowing well) to 60 ft below land surface in the fracture-conduit aquifers, from 2 to 150 ft below land surface in the solution-conduit aquifers, and from 13 to 226 ft below land surface in the porous-media aquifers. Water levels fluctuated 5 to 45 ft seasonally over the period of record. Water-level trends and long-term changes were not observed. However, the number and distribution of wells having long-term water-level records in Subarea 6 is insufficient to make any conclusions. In general, shallow, bored wells that are completed in regolith are more susceptible to water-level decline during droughts. Wells that are completed in bedrock often are more capable of sustaining yields during droughts.

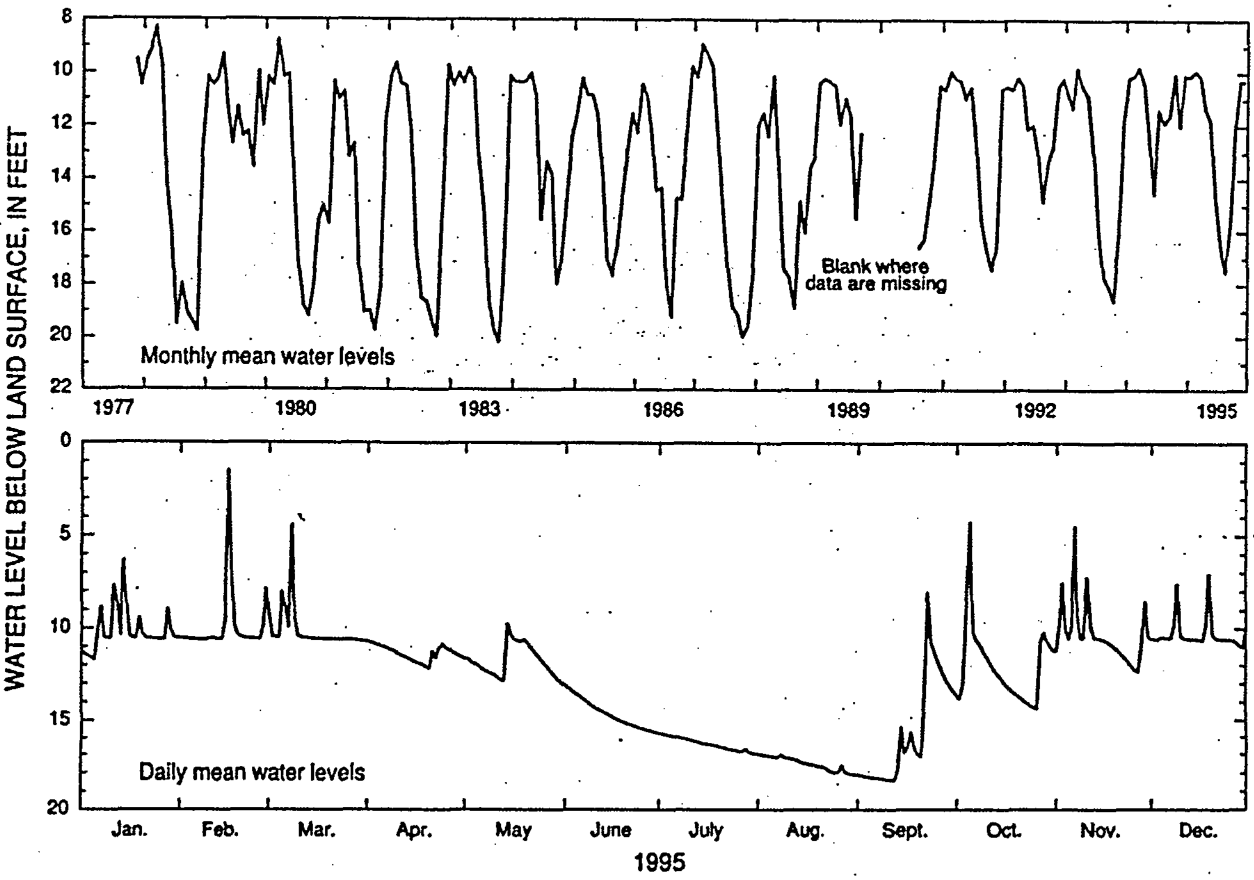


Figure 10. Water-level fluctuations in observation well 03PP01, Walker County, Georgia, 1977–95.

Surface-Water System

The surface-water system in Subarea 6 includes the Coosa River and its tributaries. The drainage area of the Coosa River basin encompasses about 5,360 mi^2 in Alabama (U.S. Army Corps of Engineers, 1985a,b); about 4,700 mi^2 in Georgia; and about 100 mi^2 in Tennessee (not included in Subarea 6). The confluence of the Etowah and Oostanaula Rivers near Rome, Ga., forms the Coosa River. The drainage area of the Coosa River near Rome, Ga. (02397000), is about 4,040 mi^2. From Rome, Ga., the Coosa River flows southwest into Weiss Reservoir in Cherokee County, Ala. From Weiss Reservoir, the Coosa River flows southwest across the Valley and Ridge and Piedmont Provinces. The major tributaries of the Coosa River include the Etowah, Oostanaula, and Chattooga Rivers in Georgia; and the Little River, Terrapin, Big Wills, Big Canoe, Tallaseehatchee, Cane, Choccolocco, Talladega, Kelly, Yellowleaf, and Hatchet Creeks in Alabama. The Coosa River joins the Alabama River near Wetumpka, Ala.

For this report, the mean-annual stream discharge of a surface-water drainage measured at a gaging station is defined as the arithmetic average of all reported annual discharges for the period of record. Note that, by definition, the stream discharge includes both surface runoff and baseflow.

The estimated mean-annual contribution of stream discharge of the Coosa River from Georgia into Alabama is between about 6,700 and 8,200 ft^3/s, using values based on mean-annual stream discharge data collected at Coosa River near Rome, Ga. (02397000), and Coosa River at Leesburg, Ala. (02399500), respectively (table 3; fig. 11). The estimated mean-annual stream discharge of the Coosa River to the Alabama River (into Subarea 8) is about 16,000 ft^3/s (table 3); this value is based on data for the continuous-record stream-gaging station—Coosa River at Jordan Dam near Wetumpka, Ala. (02411000)—which is representative of essentially the entire Coosa River basin.

Table 3. Selected active and discontinued continuous-record stream-gaging stations in the Coosa River basin, Subarea 6

[I, fracture-conduit aquifer in igneous or metamorphic rocks; F, fracture-conduit aquifer in clastic rocks; S, solution-conduit aquifer]

Station number	Station name	Drainage area (square miles)	Type of stream	Major aquifer drained	Period of record of unregulated flow	Mean-annual stream discharge (cubic feet per second)
02379500	Cartecay River near Ellijay, Ga.	134	tributary	I	1937-1977	[1]289
02380500	Coosawattee River near Ellijay, Ga.	236	do.	I	1938-1949 1963-1994	[2]515
02382500	Coosawattee River at Carters, Ga.	521	do.	I	1896-1908 1918-1923 1961-1972	[2]1,184
02383500	Coosawattee River near Pine Chapel, Ga.	831	do.	I	1938-1974	[2]1,502
02384500	Conasauga River near Eton, Ga.	252	do.	I,S	1981-1994	[2]482
02388500	Oostanaula River near Rome, Ga.	2,120	regional	I,S,F	1939-1974	[2]3,627
02389000	Etowah River near Dawsonville, Ga.	107	do.	I	1940-1976	[3]270
02392000	Etowah River at Canton, Ga.	613	do.	I	1896-1905 1936-1949	[2]1,239
02394000	Etowah River at Allatoona Dam, above Cartersville, Ga.	1,120	do.	I	1938-1949	[2]1,910
02396000	Etowah River at Rome, Ga.	1,820	do.	I,S	1904-1921 1938-1949	[2]2,955
02397000	Coosa River near Rome, Ga.	4,040	do.	I,S,F	1896-1903 1928-1931 1937-1949	[2]6,711
02397500	Cedar Creek near Cedartown, Ga.	115	tributary	S	1942-1973	[4]160
02398000	Chattooga River at Summerville, Ga.	192	do.	S	1937-1994	[2]359
02398300	Chattooga River above Gaylesville, Ala.	366	do.	S	1959-1967 1984-1994	[5]640
02398500	Chattooga River at Gaylesville, Ala.	379	do.	S	1937-1960	[6]649
02399000	Little River near Jamestown, Ala.	125	do.	F	1922-1932 1935-1949	[6]260
02399200	Little River near Blue Pond, Ala.	199	do.	F	1958-1967 1970-1994	[5]491
02399500	Coosa River at Leesburg, Ala.	5,270	regional	I,S,F	1937-1949	[5]8,161
02400100	Terrapin Creek at Ellisville, Ala.	252	tributary	S,F	1962-1967 1980-1994	[5]390
02400500	Coosa River at Gadsden, Ala.	5,805	regional	I,S,F	1926-1949	[5]9,468
02401000	Big Wills Creek near Reece City, Ala.	182	tributary	S	1943-1970 1986-1994	[5]302
02401500	Big Canoe Creek near Gadsden, Ala.	253	do.	S	1938-1965	[6]431
02402500	Coosa River at Riverside, Ala.	7,070	regional	I,S,F	1896-1916	[6]11,740
02404400	Choccolocco Creek at Jackson Shoal near Lincoln, Ala.	481	tributary	I,S	1960-1967 1984-1994	[5]713
02404500	Choccolocco Creek near Lincoln, Ala.	496	do.	I,S	1938-1953	[6]709
02405000	Coosa River near Cropwell, Ala.	7,663	regional	I,S,F	[1]1941-1949	[6]12,570
02405500	Kelly Creek near Vincent, Ala.	193	tributary	F	1951-1970 1986-1994	[5]323
02406500	Talladega Creek at Alpine, Ala.	150	do.	I,S	1900-1904 1938-1951 1987-1994	[5]240
02407000	Coosa River at Childersburg, Ala.	8,390	regional	I,S,F	1913-1949	[6]13,860
02407500	Yellowleaf Creek near Wilsonville, Ala.	96.5	tributary	F	1951-1967	[6]148
02408500	Hatchet Creek near Rockford, Ala.	233	do.	I	1944-1979	[6]386
02408540	Hatchet Creek below Rockford, Ala.	263	do.	I	1980-1994	[5]404
02411000	Coosa River at Jordan Dam near Wetumpka, Ala.	10,102	regional	I,S,F	[1]1912-1914	[5]16,360

[1]U.S. Geological Survey (1978).
[2]Stokes and McFarlane (1994).
[3]U.S. Geological Survey (1977).
[4]U.S. Geological Survey (1974).
[5]Pearman and others (1994).
[6]Atkins and Pearman (1994).

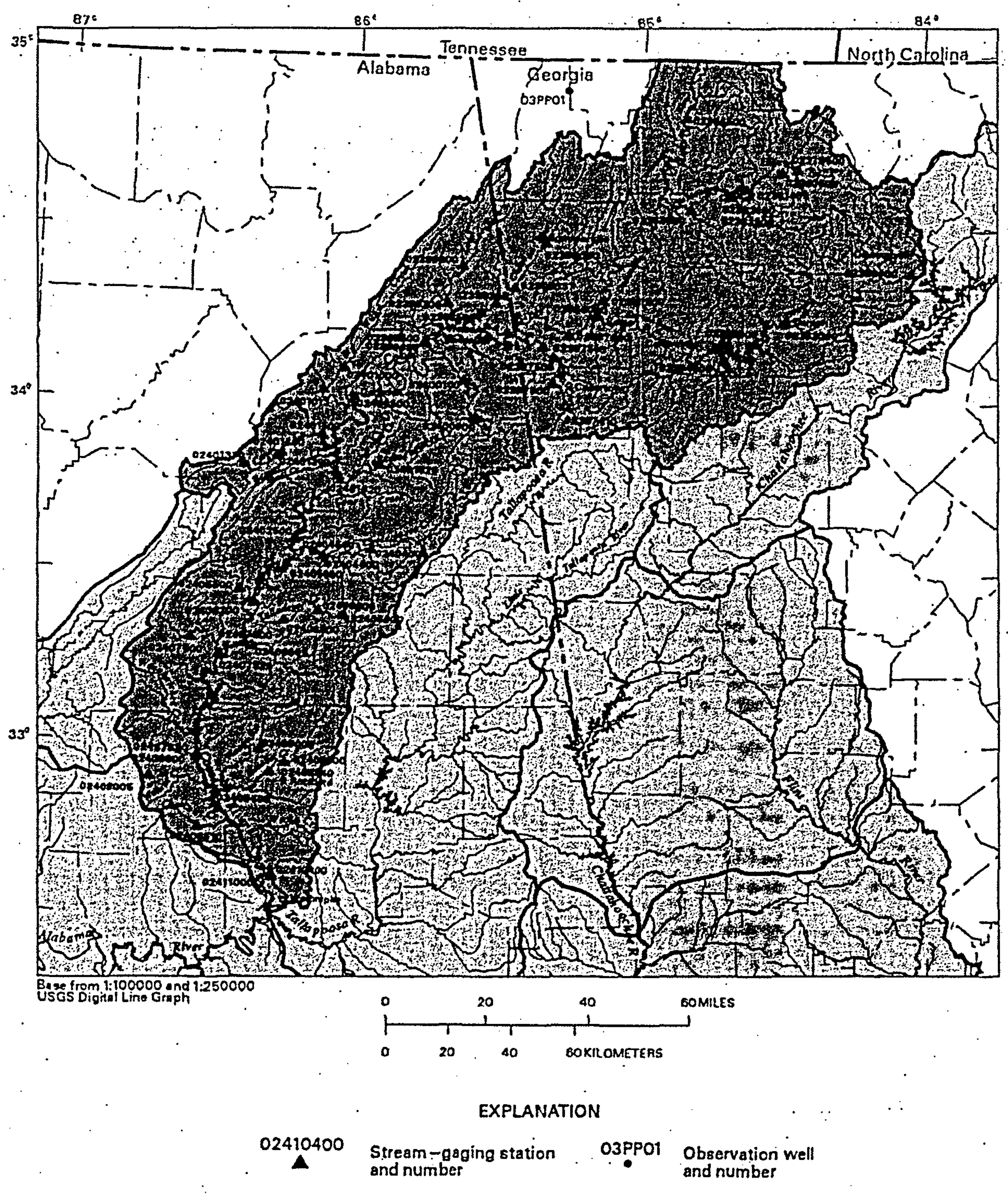


Figure 11. Selected stream-gaging stations, Subarea 6, and observation well 03PP01, Walker County, Georgia.

Streamflow characteristics of the tributaries of the Coosa River in Subarea 6 vary with geology. Seven-day two-year low flows (7Q2) in tributaries draining terranes underlain by igneous and metamorphic rocks in Georgia range from about 0.4 to 0.8 cubic foot per second per square mile ($ft^3/s/mi^2$). These corresponding low flows in tributaries draining igneous and metamorphic rocks in Alabama range from about 0.1 to 0.3 $ft^3/s/mi^2$. The range of estimated 7Q2 for tributaries draining carbonate rocks in both Georgia and Alabama is about 0.2 to 0.4 $ft^3/s/mi^2$. In general, the lowest 7Q2, about 0.005 to 0.02 $ft^3/s/mi^2$, occurs in tributaries that drain sandstone and shale of the Valley and Ridge and Cumberland Plateau Provinces of Alabama.

The largest drainage system in Subarea 6 is the Coosa River, which integrates and is influenced by the streamflow characteristics of its tributaries. Estimated 7Q2 for the Coosa River ranges from about 0.3 to 0.4 $ft^3/s/mi^2$. The greatest value (0.4 $ft^3/s/mi^2$) is near Rome, Ga. (02397000), because of the influence of the relatively higher low flows maintained by the igneous and metamorphic rocks of Georgia. As more and more of the drainage basin is integrated, downstream 7Q2 in the Coosa River varies less than 15 percent, from about 0.3 to 0.35 $ft^3/s/mi^2$.

The Coosa River basin has three major impoundments in the Piedmont Province in Georgia, one in the Piedmont Province in Alabama, and five in the Valley and Ridge Province in Alabama (figs. 2 and 11; table 4). The impoundments mainly are used for power generation, flood control, and recreation. The first was completed in 1914 near Clanton, Ala., and the last in 1975 in Murray County, Ga. Total reservoir storage is 1,160,400 acre-feet in Georgia, and 1,425,524 acre-feet in Alabama.

Table 4. Major impoundments in the Coosa River basin, Subarea 6

Impoundment structure	Station number	Location	Installation date	Major uses	Total storage capacity (acre-feet)
Carters Dam	02381400	Murray County, Ga.	1974	power generation, flood control, recreation	[1]472,800
Carters re-regulation Dam	02382400	Murray County, Ga.	1975	do.	[1]17,600
Allatoona Dam	02393500	Bartow County, Ga.	1949	do.	[1]670,000
Weiss Dam	02399499	Cherokee County, Ala.	1961	do.	[2]360,400
H. Neely Henry Dam	02401620	Calhoun County, Ala.	1966	do.	[2]120,850
Logan Martin Dam	02405200	St. Clair County, Ala.	1964	do.	[2]273,300
Lay Dam	02407950	Chilton County, Ala.	1914	power generation, recreation	[2]144,994
			1968		[3]262,774
Mitchell Dam	02409400	Chilton County, Ala.	1923	do.	[2]172,000
Jordan Dam	02410400	Elmore County, Ala.	1929	do.	[2]236,200

[1]Stokes and McFarlane (1994).
[2]Pearman and others (1994).
[3]Storage capacity of Lay Lake was increased from 144,994 to 262,774 acre-feet in 1968 (Pearman and others, 1994).

GROUND-WATER DISCHARGE TO STREAMS

Streamflow is comprised of two major components—a typical hydrograph integrates these components as:

- overland or surface runoff, represented by peaks, indicating rapid response to precipitation; and
- baseflow, represented by the slope of the streamflow recession, indicating ground-water discharge to the stream.

In relation to the conceptual model, baseflow in streams is comprised of contributions from the local, intermediate, or regional ground-water flow regimes. Estimates of recharge to the ground-water system are minimum estimates because the budgets were developed as ground-water discharge to streams, and do not include ground water discharged as evapotranspiration, to wells, or ground water that flows downgradient into other aquifers beyond the topographic boundary defining Subarea 6. Local flow regimes likely are the most affected by droughts. Discharge measured in unregulated streams and rivers near the end of a drought should be relatively steady and composed largely of baseflow.

Mean-Annual Baseflow

Mean-annual baseflow was determined by estimating mean-annual ground-water discharge to the Coosa River and its major tributaries. Streamflow data used to determine mean-annual ground-water discharge at continuous-record gaging stations were selected according to periods of record when flow was unregulated. The modified hydrograph-separation program SWGW (Mayer and Jones, 1996) was applied to estimate mean-annual baseflow at 25 continuous-record gaging stations in the Coosa River basin (table 5), including one station in Georgia and five stations in Alabama on the Coosa River. For each gaging station, two recession indices are listed in table 5; one represents the rate of streamflow recession during the major rise period, generally in winter, and the other during the major recession period, generally in summer. Some variables that are supplied by the user to SWGW for each hydrograph separation are not listed in table 5, but can be obtained from the U.S. Geological Survey, Alabama District Office, Montgomery, Ala. These variables include the time-base (in days) from the peak to the cessation of surface runoff, the time period (the beginning and ending months) for application of the summer recession index, and the adjustment factor for the displacement of the recession curve. See Rutledge (1993) for a discussion of time-base, and Mayer and Jones (1996) for a discussion of the other user-supplied variables.

The mean-annual baseflow, in cubic feet per second; and the related unit-area baseflow, in cubic feet per second per square mile, were computed for each station. Mean unit-area baseflow estimated for four stations representing discharge from igneous and metamorphic rocks was 1.19 $ft^3/s/mi^2$; for six stations representing discharge from carbonate rocks, was 0.886 $ft^3/s/mi^2$; and for three stations representing discharge from fractured clastic rocks, 0.640 $ft^3/s/mi^2$. Mean unit-area baseflow was not estimated at continuous-record gaging stations in unconsolidated clastic sediments of the Coastal Plain Province of Subarea 6.

Mean-annual baseflow in the Coosa River and tributaries at the Georgia-Alabama State line and at the mouth of the Coosa River was estimated using representative unit-area mean-annual baseflow derived from the hydrograph-separation analyses to estimate discharge from ungaged drainages. Baseflow estimates based on mean-annual unit-area stream discharges were checked using a mass-balance approach. For example, the estimated mean-annual baseflow at the Georgia-Alabama State line should approximate, but be less than, the estimated mean-annual baseflow in the Coosa River at Leesburg, Ala. Because of the lack of unregulated flow data for the Coosa River near its mouth, the unit-area mean-annual baseflow for Subarea 6 probably is best represented by the results of hydrograph separation using streamflow data for the Coosa River at Childersburg, Ala. (table 5). The unit-area mean-annual baseflow determined for the Coosa River at Childersburg, Ala., was used, together with the unit-area mean-annual baseflow of major tributaries, to estimate the mean-annual baseflow at the mouth of the Coosa River (table 6).

The mean-annual baseflow in the Coosa River and tributaries in Georgia at the Georgia-Alabama State line is estimated to be about 4,600 ft^3/s (table 6). The estimated cumulative contribution of mean-annual baseflow at the mouth of the Coosa River entering the Alabama River (at the boundary with Subarea 8) is 9,960 ft^3/s (table 6). The difference of 5,360 ft^3/s is the estimated mean-annual baseflow in the Coosa River tributaries in Alabama. Mean-annual baseflow of the Coosa River and drainage area is shown in figure 12 and summarized in table 6. Estimated mean-annual baseflow in the Coosa River ranges from about 58 to 64 percent of mean-annual stream discharge and is estimated to be about 60 percent of the mean-annual stream discharge at the mouth of the Coosa River.

Table 5. Mean-annual stream discharge, estimated annual and mean-annual baseflow, and unit-area mean-annual baseflow at selected gaged streams in the Coosa River basin, Subarea 6

[I, fracture-conduit aquifer in igneous and metamorphic rocks; F, fracture-conduit aquifer in clastic rocks; S, solution-conduit aquifer in carbonate rocks]

Station number	Station name	Type of stream	Drainage area (square miles)	Major aquifer type	Recession index		Water year	Flow conditions	Mean-annual stream discharge[1] (cubic feet per second)	Annual baseflow[2,3] (cubic feet per second)	Mean-annual baseflow[3,4] (cubic feet per second)	Unit-area mean-annual baseflow[3,5] (cubic feet per second per square mile)
					Winter (days)	Summer (days)						
02383500	Coosawattee River near Pine Chapel, Ga.	tributary	831	I	130	80	1941	Low	717	569		
							1966	Average	1,423	984	958	1.15
							1964	High	2,065	1,320		
02388500	Oostanaula River near Rome, Ga.	regional	2,120	I,S	136	80	1941	Low	1,626	1,030		
							1972	Average	3,457	1,950	1,780	.840
							1964	High	5,096	2,360		
02392000	Etowah River at Canton, Ga.	do.	613	I	145	85	1986	Low	510	413		
							1977	Average	1,188	898	897	1.46
							1946	High	1,868	1,380		
02396000	Etowah River at Rome, Ga.	do.	1,820	I,S	110	65	1941	Low	1,550	1,190		
							1948	Average	2,818	1,980	1,990	1.09
							1946	High	4,355	2,810		
02397000	Coosa River near Rome, Ga.	do.	4,040	I,S	124	75	1941	Low	3,236	2,360		
							1948	Average	6,031	3,880	3,930	.973
							1946	High	9,943	5,560		
02397500	Cedar Creek near Cedartown, Ga.	tributary	115	S	114	70	1956	Low	105	69.6		
							1963	Average	163	87.6	89.1	.775
							1964	High	220	110		
02398000	Chattooga River at Summerville, Ga.	do.	192	S	120	65	1986	Low	133	107		
							1991	Average	340	208	185	.964
							1984	High	506	241		
02398300	Chattooga River above Gaylesville, Ala.	do.	366	S	117	70	1986	Low	249	220		
							1965	Average	633	396	362	.989
							1990	High	1,147	471		
02398500	Chattooga River at Gaylesville, Ala.	do.	379	S	117	65	1959	Low	436	281		
							1953	Average	724	391	373	.984
							1949	High	1,122	446		

Table 5. Mean-annual stream discharge, estimated annual and mean-annual baseflow, and unit-area mean-annual baseflow at selected gaged streams in the Coosa River basin, Subarea 6—Continued

[I, fracture-conduit aquifer in igneous and metamorphic rocks; F, fracture-conduit aquifer in clastic rocks; S, solution-conduit aquifer in carbonate rocks]

Station number	Station name	Type of stream	Drainage area (square miles)	Major aquifer type	Recession index		Water year	Flow conditions	Mean-annual stream discharge[1/] (cubic feet per second)	Annual baseflow[2/,3/] (cubic feet per second)	Mean-annual baseflow[3/,4/] (cubic feet per second)	Unit-area mean-annual baseflow[3/,5/] (cubic feet per second per square mile)
					Winter (days)	Summer (days)						
02399000	Little River near Jamestown, Ala.	tributary	125	F	35	19	1941	Low	136	51.9		
							1947	Average	275	80.7	76.3	.610
							1946	High	396	96.2		
02399200	Little River near Blue Pond, Ala.	tributary	199	F	52	20	1986	Low	192	58.6		
							1987	Average	492	145	132	.663
							1973	High	696	193		
02399500	Coosa River at Leesburg, Ala.	regional	5,270	I,S,F	124	70	1941	Low	4,460	3,320		
							1948	Average	7,863	4,930	5,260	.998
							1946	High	12,630	7,540		
02400100	Terrapin Creek at Ellisville, Ala.	tributary	252	S,F	120	70	1986	Low	147	129		
							1991	Average	365	243	212	.841
							1964	High	488	265		
02400500	Coosa River at Gadsden, Ala.	regional	5,805	I,S,F	124	70	1941	Low	4,673	3,350		
							1947	Average	9,081	5,430	5,750	.990
							1946	High	14,310	8,460		
02401000	Big Wills Creek near Reece City, Ala.	tributary	182	S	125	170	1988	Low	112	81.7		
							1961	Average	299	192	165	.906
							1990	High	450	222		
02401500	Big Canoe Creek near Gadsden, Ala.	regional	253	S	67	30	1956	Low	302	136		
							1951	Average	438	172	176	.696
							1961	High	605	221		
02402500	Coosa River at Riverside, Ala.	regional	7,070	I,S,F	120	70	1904	Low	5,024	3,990		
							1908	Average	11,490	6,840	6,560	.928
							1901	High	15,870	8,850		
02404400	Choccolocco Creek at Jackson Shoal near Lincoln, Ala.	tributary	481	I,S	120	70	1986	Low	221	189		
							1989	Average	781	464	417	.867
							1990	High	1,109	598		
02404500	Choccolocco Creek near Lincoln, Ala.	tributary	496	I,S	120	70	1941	Low	437	331		
							1952	Average	722	448	468	.944
							1949	High	1,172	626		

Table 5. Mean-annual stream discharge, estimated annual and mean-annual baseflow, and unit-area mean-annual baseflow at selected gaged streams in the Coosa River basin, Subarea 6—Continued

[I, fracture-conduit aquifer in igneous and metamorphic rocks; F, fracture-conduit aquifer in clastic rocks; S, solution-conduit aquifer in carbonate rocks]

Station number	Station name	Type of stream	Drainage area (square miles)	Major aquifer type	Recession index. Winter (days)	Recession index. Summer (days)	Water year	Flow conditions	Mean-annual stream discharge[1] (cubic feet per second)	Annual baseflow[2,3] (cubic feet per second)	Mean-annual baseflow[3,4] (cubic feet per second)	Unit-area mean-annual baseflow[3,5] (cubic feet per second per square mile)
02405000	Coosa River near Cropwell, Ala.	regional	7,663	I,S,F	120	70	1945	Low	9,400	5,380		
							1943	Average	14,090	7,360	7,500	.979
							1946	High	19,350	9,760		
02405500	Kelly Creek near Vincent, Ala.	tributary	193	F	40	20	1988	Low	112	61.4		
							1966	Average	305	126	125	.648
							1968	High	493	187		
02406500	Talladega Creek at Alpine, Ala.	tributary	150	I,S	130	70	1941	Low	156	111		
							1947	Average	260	174	170	1.13
							1949	High	373	224		
02407000	Coosa River at Childersburg, Ala.	regional	8,390	I,S,F	122	70	1931	Low	8,262	5,160		
							1943	Average	14,510	8,400	8,220	.980
							1946	High	20,300	11,100		
02408500	Hatchet Creek near Rockford, Ala.	tributary	233	I	130	70	1959	Low	268	183		
							1968	Average	398	250	255	1.09
							1976	High	612	332		
02408540	Hatchet Creek below Rockford, Ala.	tributary	263	I	130	70	1985	Low	245	176		
							1987	Average	403	255	278	1.06
							1990	High	657	402		

[1]From annually published U.S. Geological Survey data reports, for example: Pearman and others (1994) or Stokes and McFarlane (1994).
[2]Estimated using the SWGW program (Mayer and Jones, 1996).
[3]Values are reported to three significant digits to maintain the numerical balance of the water budget; implication of accuracy to the degree shown is not intended.
[4]Estimated by averaging discharges for low, average, and high flow years for the period of unregulated flow.
[5]Discharge divided by drainage area.

Table 6. Estimated mean-annual baseflow at selected gaged streams, estimation sites, the Georgia-Alabama State line, and exiting Subarea 6
[—, not applicable]

Station number or estimation site	Station name	Drainage area (square miles)	Mean-annual stream discharge (cubic feet per second)	Mean-annual baseflow[1] (cubic feet per second)	Unit-area mean-annual baseflow[1] (cubic feet per second per square mile)
02397000	Coosa River near Rome, Ga.	4,040	[2]6,711	[3]3,930	[4]0.973
02397500	Cedar Creek near Cedartown, Ga.	115	[2]160	[3]89.1	[4].775
02398000	Chattooga River at Summerville, Ga.	192	[2]359	[3]185	[4].964
Estimation site	Chattooga River at Georgia-Alabama State line	[5]286	—	[6]276	—
Estimation site	Little River at Georgia-Alabama State line	[5]43.8	—	[6]26.7	—
Estimation site	Coosa River at Georgia-Alabama State line	[5]4,362	—	[6]4,300	—
Cumulative drainage area and baseflow in the Coosa River and tributaries at Georgia–Alabama State line		**[5]4,692**	—	**[7]4,600**	—
02399500	Coosa River at Leesburg, Ala.	5,270	[2]8,161	[3]5,260	[4].998
02407000	Coosa River at Childersburg, Ala.	8,390	[2]13,860	[3]8,220	[4].980
02408500	Hatchet Creek near Rockford, Ala.	233	[2]386	[3]255	[4]1.09
02408540	Hatchet Creek below Rockford, Ala.	263	[2]404	[3]278	[4]1.06
02411000	Coosa River at Jordan Dam near Wetumpka, Ala.	10,102	[2]16,360	—	—
Drainage area and estimated baseflow in the Coosa River in Subarea 6		**[5]10,161**	—	**[6]9,960**	—

[1]Values are reported to three significant digits to maintain the numerical balance of the water budget; implication of accuracy to the degree shown is not intended.
[2]From table 3.
[3]From table 5.
[4]Discharge divided by the drainage area—termed the unit-area discharge.
[5]Drainage areas in the Coosa River basin, Ala. (James L. Pearman, U.S. Geological Survey, written commun., 1980).
[6]Estimate based on unit-area discharge of station(s) for the same reaches listed in table 5.
[7]Sum of measured and estimated mean-annual baseflow.

Drought Flow for 1941, 1954, and 1986

Regional drought periods of 1938-45, 1950-63, and 1984-88 were marked by severe droughts in the years of 1941, 1954, and 1986 in the ACF and ACT River basins. Typically, the lowest mean-annual streamflow for the period of record occurred during one of these years. Streamflow was assumed to be sustained entirely by baseflow near the end of these droughts. Near-synchronous discharge measurements at partial-record gaging stations or daily mean streamflow at continuous-record gaging stations during these periods were assumed to provide a quantitative estimate of minimum baseflow across the Georgia-Alabama State line and from Subarea 6 into Subarea 8. Where available, streamflow data for an interval of a few days were compiled; and where not available, streamflow was estimated using various techniques.

Estimated and measured streamflow near the end of the 1941, 1954, and 1986 drought years at selected sites on the Coosa River and its tributaries are shown in tables 7, 8, and 9, respectively, and summarized in table 10. Streamflow near the end of the drought of 1941 represented the minimum baseflow in the Coosa River in Georgia; however, streamflow in Subarea 6 in Alabama was lowest during the drought of 1986. Estimated streamflow at the Georgia-Alabama State line near the end of the 1941, 1954, and 1986 drought years was 1,060, 1,170, and 1,230 ft^3/s, respectively (tables 7, 8, and 9); streamflow range was 170 ft^3/s, and the average streamflow (table 11) was 1,150 ft^3/s. Estimated streamflows at the mouth of the Coosa River near the end of the 1941, 1954, and 1986 droughts were 2,070, 1,780, and 2,170 ft^3/s, respectively (tables 7, 8, and 9); streamflow range was 390 ft^3/s, and the average streamflow (table 11) was 2,010 ft^3/s.

Table 7. Stream discharge during the months of October and November of the drought of 1941, Subarea 6
[—, not applicable]

Station number or estimation site	Station name	Type of stream	Drainage area (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge (cubic feet per second per square mile)
02388500	Oostanaula River near Rome, Ga.	tributary	2,120	10/25/41	1/441	2/0.208
02396000	Etowah River at Rome, Ga.	tributary	1,820	10/25/41	1/520	2/286
02397000	Coosa River near Rome, Ga.	regional	4,040	10/24/41	1/972	2/.241
02398000	Chattooga River at Summerville, Ga.	do.	192	10/23/41	1/50	2/.260
Estimation site	Chattooga River at Georgia-Alabama State line	do.	3/286	—	4/74	—
02398500	Chattooga River at Gaylesville, Ala.	do.	379	10/24/41	1/98	2/.259
Estimation site	Chattooga River at mouth below Gaylesville, Ala.	do.	3/380	—	5/98	—
Estimation site	Little River at Georgia-Alabama State line	do.	3/43.8	—	5/0.2	—
02399000	Little River near Jamestown, Ala.	do.	125	10/24/41	1/5	2/.004
Estimation site	Little River at edge of backwater of Weiss Lake near Little River, Ala.	do.	3/208	—	5/1	—
Estimation site	Coosa River at Georgia-Alabama State line	regional	3/4,362	—	5/990	—
Cumulative drainage area and stream discharge, Coosa River basin at Georgia-Alabama State line			3/4,692	—	**6/1,060**	—
02399500	Coosa River at Leesburg, Ala.	regional	5,270	10/24/41	1/1,130	2/.214
Estimation site	Terrapin Creek at mouth near Centre, Ala.	tributary	3/284	—	7/68	—
02400500	Coosa River at Gadsden, Ala.	regional	5,805	10/24/41	1/1,220	2/.210
02401013	Big Wills Creek near Attalla, Ala.	tributary	218	11/13/41	8/56	2/.257
Estimation site	Big Wills Creek at U.S.Highway 411, 1/4-mile above mouth near Gadsden, Ala.	do.	3/366	—	5/94	—
02401400	Big Canoe Creek near Ashville, Ala.	do.	145	11/13/41	8/18	2/.124
02401500	Big Canoe Creek near Gadsden, Ala.	do.	253	10/25/41	1/19	2/.075
Estimation site	Big Canoe Creek at mouth above Greensport, Ala.	do.	3/277	—	5/21	—
Estimation site	Beaver Creek at edge of backwater of H. Neely Henry Lake	do.	3/35.7	—	9/3	—
Estimation site	Shoal Creek at edge of backwater of H. Neely Henry Lake	do.	3/28.9	—	9/2	—
Estimation site	Tallasseehatchee Creek at confluence with Ohatchee Creek near Ohatchee, Ala.	do.	3/136	—	7/49	—
Estimation site	Ohatchee Creek at mouth but excluding Tallasseehatchee Creek	do.	3/87.0	—	7/3	—
Estimation site	Cane Creek at edge of backwater of Logan Martin Lake near Ragland, Ala.	do.	3/96.5	—	7/25	—
Estimation site	Trout Creek at edge of backwater of Logan Martin Lake near Ragland, Ala.	do.	3/28.2	—	10/1	—
02404000	Choccolocco Creek near Jenifer, Ala.	do.	277	10/25/41	1/69	2/.249
02404500	Choccolocco Creek near Lincoln, Ala.	do.	496	10/25/41	1/159	2/.321
Estimation site	Choccolocco Creek at mouth above Cropwell, Ala.	do.	3/502	—	5/161	—
Estimation site	Kelly Creek at mouth above Vincent, Ala.	do.	3/208	—	11/8	—
02406500	Talladega Creek at Alpine, Ala.	do.	150	10/25/41	1/55	2/.367
Estimation site	Talladega Creek at Alabama Highway 235, 1/4-mile above mouth near Childersburg, Ala.	do.	3/175	—	5/64	—
02406995	Tallasseehatchee Creek at Childersburg, Ala.	do.	184	11/12/41	8/30	2/.163

Table 7. Stream discharge during the months of October and November of the drought of 1941, Subarea 6—Continued
[—, not applicable]

Station number or estimation site	Station name	Type of stream	Drainage area (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge (cubic feet per second per square mile)
Estimation site	Tallasseehatchee Creek at Alabama Highway 235, 1/4-mile above mouth near Childersburg, Ala.	do.	3/199	—	5/33	—
02407000	Coosa River at Childersburg, Ala.	regional	8,390	10/25/41	1/1,840	2/.219
02407520	Yellowleaf Creek at Wilsonville, Ala.	tributary	164	11/17/41	8/6.6	2/.040
Estimation site	Yellowleaf Creek at mouth above Wilsonville, Ala.	do.	3/184	—	5/7	—
Estimation site	Waxahatchee Creek at Alabama Highway 145 at edge of backwater of Lay Lake	do.	3/180	—	12/30	—
Estimation site	Yellowleaf Creek at County Road, 1/2-mile above mouth	do.	3/77.9	—	13/18	—
Estimation site	Walnut Creek at mouth above Mitchell Dam, Ala.	do.	3/53.2	—	13/6	—
Estimation site	Hatchet Creek at mouth above Mitchell Dam, Ala.	do.	3/357	—	14/51	—
Estimation site	Weogufka Creek at mouth above Mitchell Dam, Ala.	do.	3/128	—	12/21	—
02409510	Chestnut Creek at Verbena, Ala.	do.	38.7	10/23/41	8/2.4	2/.062
Estimation site	Chestnut Creek at mouth near Mountain Creek, Ala.	do.	3/74.9	—	5/5	—
Estimation site	Weoka Creek at mouth near Titus, Ala.	do.	3/78.7	—	15/5	—
02411000	Coosa River at Jordan Dam near Wetumpka, Ala.	regional	10,102	—	16/2,060	2/.204
Drainage area and stream discharge at the mouth of the Coosa River			**3/10,161**	—	**17/2,070**	—

1/Daily mean discharge.
2/Discharge divided by the drainage area.
3/Drainage areas in the Coosa River basin, Ala. (James L. Pearman, U.S. Geological Survey, written commun., 1980).
4/Estimate based on unit-area discharge of the Chattooga River at Summerville, Ga.
5/Estimate based on unit-area discharge(s) of station(s) on the same reach.
6/Sum of measured and estimated ground-water discharge to the Coosa River and tributaries in Georgia.
7/Estimate based on the correlation to the discharge of Choccolocco Creek near Jenifer, Ala., using the Maintenance-of-Variance Extension Technique.
8/Discharge measurement.
9/Estimate based on unit-area discharge of Big Canoe Creek near Gadsden, Ala.
10/Estimate based on unit-area discharge of Big Canoe Creek near Gadsden, Ala., using the Maintenance-of-Variance Extension Technique.
11/Estimate based on unit-area discharge of Yellowleaf Creek at Wilsonville, Ala.
12/Estimate based on correlation to the discharge of Mulberry Creek near Jones, Ala., using the Maintenance-of-Variance Extension Technique.
13/Estimate based on correlation to the discharge of Mulberry Creek near Jones, Ala., using the Maintenance-of-Variance Extension Technique.
14/Estimate based on correlation to the discharge of Talladega Creek at Alpine, Ala., using the Maintenance-of-Variance Extension Technique.
15/Estimate based on unit-area discharge of Chestnut Creek at Verbena, Ala.
16/Estimate based on unit-area discharge computed using the sum of tributary discharges and respective drainage areas intermediate to this station and the nearest upstream Coosa River station.
17/Estimate based on unit-area discharge computed using the sum of tributary discharges and respective drainage areas intermediate to the Coosa River at Jordan Dam near Wetumpka, Ala., and the Coosa River at Childersburg, Ala., station.

Table 8. Stream discharge during the months of September and October of the drought of 1954, Subarea 6
[—, not applicable]

Station number or estimation site	State name	Type of stream	Drainage area (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge (cubic feet per second per square mile)
02388500	Oostanaula River near Rome, Ga.	tributary	2,120	09/27/54	[1]432	[2]0.204
02396000	Etowah River at Rome, Ga.	do.	1,820	09/—/54	[3]453	[2].249
02397000	Coosa River near Rome, Ga.	regional	4,040	09/—/54	[3]961	[2].238
02397500	Cedar Creek near Cedartown, Ga.	tributary	115	09/30/54	[1]35	[2].304
02397505	Cedar Creek near Cave Springs, Ga.	do.	169	10/07/54	[4]62	[2].367
Estimation site	Big Cedar Creek at mouth below Fosters Mills, Ga., near Georgia-Alabama State line	do.	[5]211	—	[6]77	—
02398000	Chattooga River at Summerville, Ga.	do.	192	09/30/54	[1]62	[2].323
Estimation site	Chattooga River at Georgia-Alabama State line	do.	[5]286	—	[6]92	—
02398500	Chattooga River at Gaylesville, Ala.	do.	379	09/30/54	[1]102	[2].269
Estimation site	Chattooga River at mouth below Gaylesville, Ala.	do.	[5]380	—	[6]102	—
Estimation site	Little River at Georgia-Alabama State line	do.	[5]43.8	—	[7]0.2	—
Estimation site	Little River at edge of backwater of Weiss Lake near Little River, Ala.	do.	[5]208	—	[7]1	—
Estimation site	Coosa River at Georgia-Alabama State line	regional	[5]4,362	—	[8]1,080	—
Cumulative drainage area and stream discharge, Coosa River basin at Georgia-Alabama State line			**4,692**	—	**[9]1,170**	—
02399500	Coosa River at Leesburg, Ala.	regional	5,270	09/—/54	[3]1,239	[2].235
02400000	Terrapin Creek near Piedmont, Ala.	tributary	116	09/30/54	[1]2.8	[2].024
Estimation site	Terrapin Creek at mouth near Centre, Ala.	do.	[5]284	—	[6]7	—
02400500	Coosa River at Gadsden, Ala.	regional	5,805	09/—/54	[3]1,270	[2].219
02401000	Big Wills Creek near Reece City, Ala.	tributary	182	09/30/54	[1]37	[2].203
Estimation site	Big Wills Creek at U.S. Highway 411, 1/4-mile above mouth near Gadsden, Ala.	do.	[5]366	—	[6]74	—
02401500	Big Canoe Creek near Gadsden, Ala.	do.	253	09/30/54	[1]12	[2].047
Estimation site	Big Canoe Creek at mouth above Greensport, Ala.	tributary	[5]277	—	[6]13	—
Estimation site	Beaver Creek at edge of backwater of H. Neely Henry Lake	do.	[5]35.7	—	[10]2	—
Estimation site	Shoal Creek at edge of backwater of H. Neely Henry Lake	do.	[5]28.9	—	[10]1	—
02401820	Tallasseehatchee Creek below Wellington, Ala.	do.	100	09/29/54	[4]32	[2].32
Estimation site	Tallasseehatchee Creek at confluence with Ohatchee Creek near Ohatchee, Ala.	do.	[5]136	—	[6]44	—
Estimation site	Ohatchee Creek at mouth—excluding Tallasseehatchee Creek	do.	[5]87.0	—	[11]0.3	—
Estimation site	Cane Creek at edge of backwater of Logan Martin Lake near Ragland, Ala.	do.	[5]96.5	—	[11]22	—
Estimation site	Trout Creek at edge of backwater of Logan Martin Lake near Ragland, Ala.	do.	[5]28.2	—	[12]0.4	—
02404000	Choccolocco Creek near Jenifer, Ala.	do.	277	09/29/54	[1]57	[2].206
Estimation site	Choccolocco Creek at mouth above Cropwell, Ala.	do.	[5]502	—	[6]103	—
02405000	Coosa River near Cropwell, Ala.	regional	7,663	09/—/54	[3]1,650	[2].215
02405500	Kelly Creek near Vincent, Ala.	tributary	193	09/29/54	[1]1.7	[2].009
Estimation site	Kelly Creek at mouth above Vincent, Ala.	tributary	[5]208	—	[6]2	—

Table 8. Stream discharge during the months of September and October of the drought of 1954, Subarea 6—Continued
[—, not applicable]

Station number or estimation site	State name	Type of stream	Drainage area (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge (cubic feet per second per square mile)
02406000	Talladega Creek near Talladega, Ala.	do.	101	09/30/54	[1]1.9	[2].019
02406500	Talladega Creek at Alpine, Ala.	do.	150	09/28/54	[4]42	[2].28
Estimation site	Talladega Creek at Alabama Highway 235, 1/4-mile above mouth near Childersburg, Ala.	do.	[5]175	—	[6]49	—
Estimation site	Tallasseehatchee Creek at Alabama Highway 235, 1/4-mile above mouth near Childersburg, Ala.	do.	[5]199	—	[13]1	—
02407000	Coosa River at Childersburg, Ala.	regional	8,390	—	[8]1,720	[2].205
02407500	Yellowleaf Creek near Wilsonville, Ala.	tributary	96.5	09/30/54	[1]0.5	[2].005
Estimation site	Yellowleaf Creek at mouth above Wilsonville, Ala.	do.	[5]184	—	[6]1	—
Estimation site	Waxahatchee Creek at Alabama Highway 145 at edge of backwater of Lay Lake	do.	[5]180	—	[13]6	—
02408005	Yellowleaf Creek near Thorsby, Ala.	do.	17.0	09/30/54	[4]1.9	[2].112
Estimation site	Yellowleaf Creek at County Road, 1/2-mile above mouth	do.	[5]77.9	—	[6]9	—
Estimation site	Walnut Creek at mouth above Mitchell Dam, Ala.	do.	[5]53.2	—	[14]1	—
02408500	Hatchet Creek near Rockford, Ala.	do.	233	10/03/54	[1]8	[2].034
Estimation site	Hatchet Creek at mouth above Mitchell Dam, Ala.	do.	[5]357	—	[6]12	—
02409000	Weogufka Creek near Weogufka, Ala.	do.	73.4	09/28/54	[1]0.1	[2].001
Estimation site	Weogufka Creek at mouth above Mitchell Dam, Ala.	do.	[5]128	—	[6].1	—
Estimation site	Chestnut Creek at mouth near Mountain Creek, Ala.	do.	[5]74.9	—	[13]1	—
Estimation site	Weoka Creek at mouth near Titus, Ala.	do.	[5]78.7	—	[13]1	—
02411000	Coosa River at Jordan Dam near Wetumpka, Ala.	regional	10,102	—	[8]1,770	[2].175
Drainage area and stream discharge at the mouth of the Coosa River			[5]10,161	—	[15]1,780	—

[1]Daily mean discharge.
[2]Discharge divided by the drainage area.
[3]Mean discharge for September 1954, adjusted for change in upstream reservoir storage.
[4]Discharge measurement.
[5]Drainage areas in the Coosa River basin, Ala. (James L. Pearman, U.S. Geological Survey, written commun., 1980).
[6]Estimate based on unit-area discharge of station(s) on the same reach.
[7]Estimate based on unit-area discharge of the Little River near Jamestown, Ala., which was 0.004 on October 26, 1941.
[8]Estimate based on unit-area discharge computed using the sum of tributary discharges and respective drainage areas intermediate to this station and the nearest upstream Coosa River station.
[9]Sum of all measured and estimated ground-water discharge to the Coosa River and tributaries in Georgia.
[10]Estimate based on unit-area discharge of Big Canoe Creek near Gadsden, Ala.
[11]Estimate based on correlation to discharge of Choccolocco Creek near Jenifer, Ala., using the Maintenance-of-Variance Extension Technique.
[12]Estimate based on correlation to discharge of Big Canoe Creek near Gadsden, Ala., using the Maintenance-of-Variance Extension Technique.
[13]Estimate based on unit-area discharge of Hatchet Creek near Rockford, Ala.
[14]Estimate based on correlation to discharge of Mulberry Creek near Jones, Ala., using the Maintenance-of-Variance Extension Technique.
[15]Estimate based on unit-area discharge computed using the sum of tributary discharges and respective drainage areas intermediate to th Coosa River at Jordan Dam near Wetumpka, Ala., and the Coosa River at Childersburg, Ala., stations.

Table 9. Stream discharge during the month of July of the drought of 1986, Subarea 6
[—, not applicable]

Station number or estimation site	Station name	Type of stream	Drainage area (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge (cubic feet per second per square mile)
02388500	Oostanaula River near Rome, Ga.	tributary	2,120	07/—/86	[1]512	[2]0.242
02396000	Etowah River at Rome, Ga.	do.	1,820	07/—/86	[1]455	[2].250
02397000	Coosa River near Rome, Ga.	regional	4,040	07/—/86	[1]1,010	[2].250
02397410	Cedar Creek at Cedartown, Ga.	tributary	66.9	07/08/86	[3]13	[2].194
02397500	Cedar Creek near Cedartown, Ga.	do.	115	07/10/86	[4]31	[2].270
02397516	Big Cedar Creek at Fosters Mills, Ga.	do.	200	07/08/86	[4]84	[2].420
Estimation site	Big Cedar Creek at mouth below Fosters Mills, Ga., near Georgia-Alabama State line	do.	[5]211	—	[6]89	—
02398000	Chattooga River at Summerville, Ga.	do.	192	07/15/86	[3]63	[2].328
02398037	Chattooga River at Chattoogaville, Ga.	do.	281	07/15/86	[4]91	[2].324
Estimation site	Chattooga River at Georgia-Alabama State line	do.	[5]286	—	[6]93	—
02398300	Chattooga River above Gaylesville, Ala.	do.	366	07/15/86	[3]109	[2].298
Estimation site	Chattooga River at mouth below Gaylesville, Ga.	do.	[5]380	—	[6]113	—
Estimation site	Little River at Georgia-Alabama State line	do.	[5]43.8	—	[6]0.6	—
02399000	Little River near Jamestown, Ala.	do.	125	07/10/86	[4]1.8	[2].014
02399200	Little River near Blue Pond, Ala.	do.	199	07/10/86	[3]6.6	[2].033
Estimation site	Little River at edge of backwater of Weiss Lake near Little River, Ala.	do.	[5]208	—	[6]7	—
Estimation site	Coosa River at Georgia-Alabama State line	regional	[5]4,362	—	[7]1,140	—
Cumulative drainage area and stream discharge, Coosa River basin at Georgia-Alabama State line			[5]4,692	—	[8]1,230	—
02400000	Terrapin Creek near Piedmont, Ala.	tributary	116	07/08/86	[4]5.3	[2].046
02400100	Terrapin Creek at Ellisville, Ala.	do.	252	07/08/86	[3]75	[2].298
Estimation site	Terrapin Creek at mouth near Centre, Ala.	do.	[5]284	—	[6]85	—
02401000	Big Wills Creek near Reece City, Ala.	do.	182	07/10/86	[4]43	[2].236
Estimation site	Big Wills Creek at U.S. Highway 411, 1/4-mile above mouth near Gadsden, Ala.	do.	[5]366	—	[6]86	—
02401370	Big Canoe Creek near Springville, Ala.	do.	45.0	07/08/86	[3]11	[2].244
02401390	Big Canoe Creek at Ashville, Ala.	do.	141	07/08/86	[3]22	[2].156
Estimation site	Big Canoe Creek at mouth above Greensport, Ala.	do.	[5]277	—	[6]43	—
Estimation site	Beaver Creek at edge of backwater of H. Neely Henry Lake	do.	[5]35.7	—	[9]6	—
Estimation site	Shoal Creek at edge of backwater of H. Neely Henry Lake	do.	[5]28.9	—	[10]2	—
Estimation site	Tallasseehatchee Creek at confluence with Ohatchee Creek near Ohatchee, Ala.	do.	[5]136	—	[11]41	—
Estimation site	Ohatchee Creek at mouth but excluding Tallasseehatchee Creek	do.	[5]87.0	—	[11]2	—
02401905	Cane Creek near Alexandria, Ala.	do.	[5]28.2	07/08/86	[4]2.6	[2].093
Estimation site	Cane Creek at edge of backwater of Logan Martin Lake near Ragland, Ala.	do.	[5]96.5	—	[11]22	—
Estimation site	Trout Creek at edge of backwater of Logan Martin Lake near Ragland, Ala.	do.	[5]28.2	—	[8]4	—
02404000	Choccolocco Creek near Jenifer, Ala.	do.	277	07/09/86	[4]57	[2].206
02404400	Choccolocco Creek at Jackson Shoal near Lincoln, Ala.	do.	481	07/09/86	[3]125	[2].260
Estimation site	Choccolocco Creek at mouth above Cropwell, Ala.	do.	[5]502	—	[6]130	—
Estimation site	Kelly Creek at mouth above Vincent, Ala.	tributary	[5]208	—	[12]1	—

Table 9. Stream discharge during the month of July of the drought of 1986, Subarea 6—Continued
[—, not applicable]

Station number or estimation site	Station name	Type of stream	Drainage area (square miles)	Date	Stream discharge (cubic feet per second)	Unit-area discharge (cubic feet per second per square mile)
02405800	Talladega Creek above Talladega, Ala.	do.	69.6	07/09/86	[4]6.3	[2].091
02406000	Talladega Creek near Talladega, Ala.	do.	101	07/09/86	[4]12	[2].119
02406500	Talladega Creek at Alpine, Ala.	do.	150	07/08/86	[4]36	[2].240
Estimation site	Talladega Creek at Alabama Highway 235, 1/4-mile above mouth near Childersburg, Ala.	do.	[5]175	—	[6]42	—
Estimation site	Tallasseehatchee Creek at Alabama Highway 235, 1/4-mile above mouth near Childersburg, Ala.	do.	[5]199	—	[13]48	—
02407500	Yellowleaf Creek near Wilsonville, Ala.	do.	96.5	07/11/86	[4].37	[2].004
Estimation site	Yellowleaf Creek at mouth above Wilsonville, Ala.	do.	[5]184	—	[6]1	—
Estimation site	Waxahatchee Creek at Alabama Highway 145 at edge of backwater of Lay Lake	do.	[5]180	—	[14]21	—
Estimation site	Yellowleaf Creek at County Road, 1/2-mile above mouth	do.	[5]77.9	—	[15]10	—
Estimation site	Walnut Creek at mouth above Mitchell Dam, Ala.	do.	[5]53.2	—	[15]5	—
02408500	Hatchet Creek near Rockford, Ala.	do.	233	07/08/86	[4]28	[2].120
02408540	Hatchet Creek below Rockford, Ala.	do.	263	07/08/86	[3]38	[2].144
Estimation site	Hatchet Creek at mouth above Mitchell Dam, Ala.	do.	[5]357	—	[6]51	—
Estimation site	Weogufka Creek at mouth above Mitchell Dam, Ala.	do.	[5]128	—	[16]3	—
Estimation site	Chestnut Creek at mouth near Mountain Creek, Ala.	do.	[5]74.9	—	[15]2	—
Estimation site	Weoka Creek at mouth near Titus, Ala.	do.	[5]78.7	—	[14]9	—
02411000	Coosa River at Jordan Dam near Wetumpka, Ala.	regional	10,102	—	[7]2,160	[2].214
Drainage area and stream discharge at the mouth of the Coosa River		—	[5]10,610	—	[7]2,170	—

[1]Mean discharge for July 1986, adjusted for change in upstream reservoir storage.
[2]Discharge divided by drainage area.
[3]Daily mean discharge.
[4]Discharge measurement.
[5]Drainage areas in the Coosa River basin (James L. Pearman, U.S. Geological Survey, written commun., 1980).
[6]Estimate based on unit-area discharge of stations on the same reach.
[7]Estimate based on unit-area discharge computed using the sum of tributary discharges and respective drainage areas intermediate to the Coosa River at Jordan Dam near Wetumpka, Ala., station and the Coosa River at the Georgia-Alabama State line.
[8]Sum of all measured and estimated ground-water discharge to the Coosa River and tributaries in Georgia.
[9]Estimate based on unit-area discharge of Big Canoe Creek at Ashville, Ala.
[10]Estimate based on unit-area discharge of Big Canoe Creek at Ashville, Ala., using the Maintenance-of-Variance Extension Technique.
[11]Estimate based on correlation to discharge of Choccolocco Creek near Jenifer, Ala., using the Maintenance-of-Variance Extension Technique.
[12]Estimate based on correlation to discharge of Talladega Creek at Alpine, Ala., using the Maintenance-of-Variance Extension Technique.
[13]Estimate based on unit-area discharge of Talladega Creek at Alpine, Ala.
[14]Estimate based on unit-area discharge of Hatchet Creek near Rockford, Ala.
[15]Estimate based on correlation to Mulberry Creek discharge near Jones, Ala., using Maintenance-of-Variance Extension Technique.
[16]Estimate based on correlation to discharge of Hatchet Creek near Rockford, Ala., using Maintenance-of-Variance Extension Technique.

Table 10. Relations among mean-annual stream discharge, estimated mean-annual baseflow, and drought flow in the Coosa River, Subarea 6

[Mean-annual stream discharge is mean for the period of record; —, not applicable or no available data]

Station number or estimation site	Station name	Drainage area (square miles)	Stream discharge, in cubic feet per second				
			Mean-annual stream discharge[1]	Estimated mean-annual baseflow[2]	Drought of 1941[3]	Drought of 1954[4]	Drought of 1986[5]
02397000	Coosa River near Rome, Ga.	4,040	6,711	3,930	972	961	1,010
Estimation site	Coosa River at Georgia-Alabama State line	4,362	—	4,300	990	1,080	1,140
02399500	Coosa River at Leesburg, Ala.	5,270	8,161	5,260	1,130	1,239	—
02400500	Coosa River at Gadsden, Ala.	5,805	9,468	5,750	1,220	1,270	—
02402500	Coosa River at Riverside, Ala.	7,070	11,740	6,560	—	—	—
02405000	Coosa River near Cropwell, Ala.	7,663	12,570	7,500	—	1,650	—
02407000	Coosa River at Childersburg, Ala.	8,390	13,860	8,220	1,840	1,720	—
02411000	Coosa River at Jordan Dam near Wetumpka, Ala.	10,102	16,360	—	2,060	1,770	2,160
Estimation site	**Coosa River at mouth**	**10,161**	**—**	**9,960**	**2,070**	**1,780**	**2,170**

[1]From table 3
[2]From tables 5 and 6.
[3]From table 7.
[4]From table 8.
[5]From table 9.

Table 11. Estimated drought flows and mean-annual baseflow in the Coosa River and tributaries; and ratio of average drought flow to mean-annual baseflow, Subarea 6

	Drought flows, in cubic feet per second				Mean-ann[1] (in cubic feet per second)	Ratio of average drought flow to mean-annual baseflow (percent)
	1941[2]	1954[3]	1986[4]	Average drought flow		
Georgia	1,060	1,170	1,230	1,150	4,600	25
Alabama	1,010	610	940	853	5,360	16
Exiting Subarea 6	**2,070**	**1,780**	**2,170**	**[5]2,010**	**9,960**	**20**

[1]From tables 6 and 10.
[2]From tables 7.
[3]From tables 8.
[4]From tables 9.
[5]Average drought flow exiting Subarea 6, 1941, 1954, and 1986.

Baseflow near the end of these droughts averaged about 25 percent of the estimated mean-annual baseflow to the surface-water system in Georgia (ranged from about 23 to 27 percent for individual drought years); about 16 percent of the estimated mean-annual baseflow in Alabama (ranged from about 11 to 19 percent for individual drought years); and about 20 percent (ranged from about 18 to 22 percent for individual drought years) of the estimated mean-annual baseflow at the mouth of the Coosa River (Subarea 6-Subarea 8 boundary). Streamflow profiles for the Coosa River were plotted from estimated and measured streamflow at selected stations for the 1941, 1954, and 1986 drought years (fig. 12). In relation to the conceptual model of ground-water flow and stream-aquifer relations, the mean-annual baseflow estimated for the Coosa River represents ground-water discharge from the local, intermediate, and regional flow regimes. Baseflow during droughts indicates greatly reduced contributions from the local and intermediate flow regimes. Drainage areas, drought flows, and baseflows in the Coosa River basin near the end of the 1941, 1954, and 1986 droughts are plotted in figure 12 and summarized in tables 10 and 11.

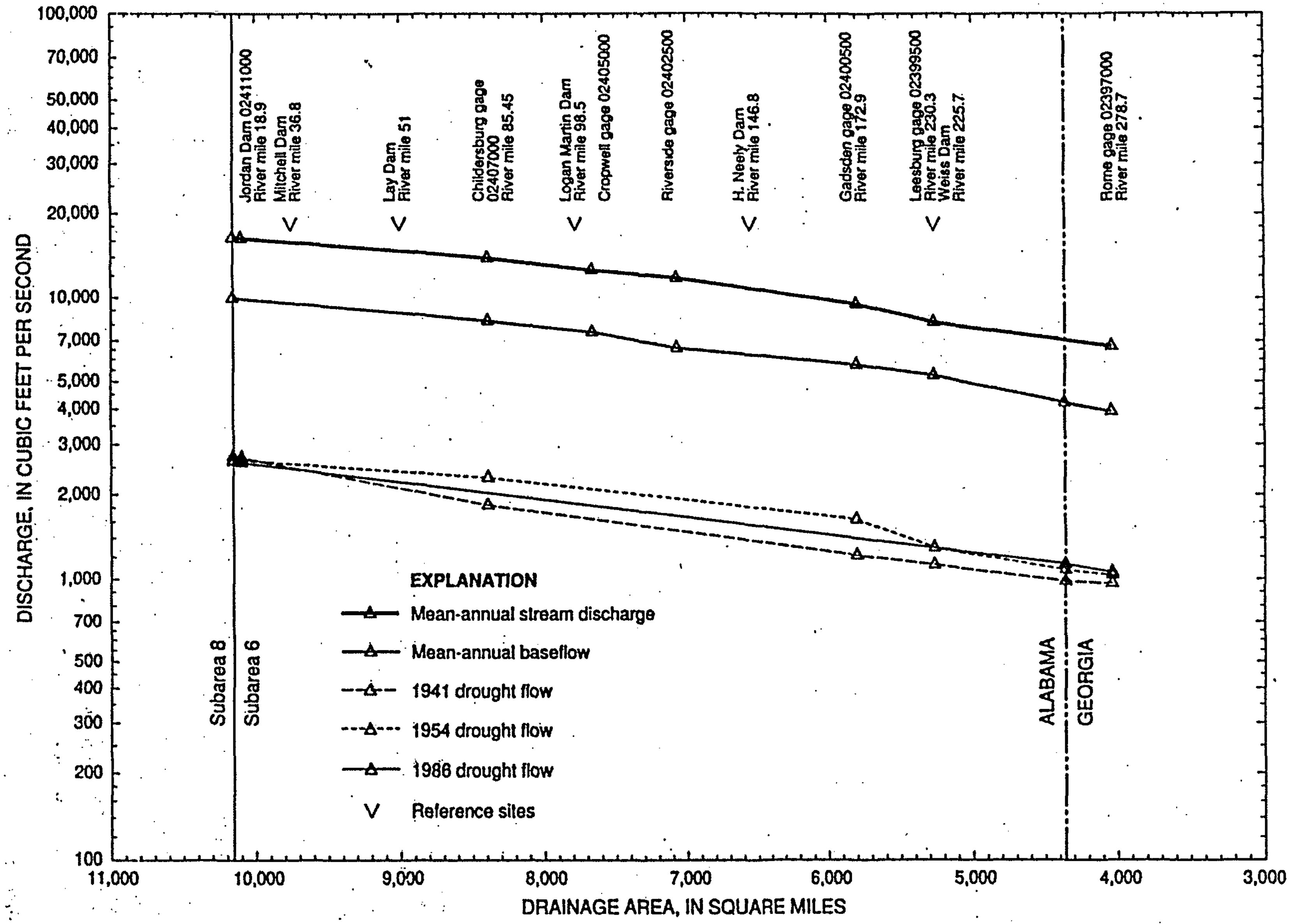


Figure 12. Relations among mean-annual stream discharge, mean-annual baseflow, and drought flow, Coosa River, Subarea 6. [Note: Triangles represent estimated or measured discharges; lines connecting triangles represent interpolated discharge. River mile is measured upstream from the mouth of the Coosa River.]

GROUND-WATER UTILIZATION AND GENERAL DEVELOPMENT POTENTIAL

Ground-water utilization is defined as the ratio of ground-water use in 1990 to mean-annual ground-water recharge. The degree of ground-water utilization is scale dependent. For example, local ground-water pumping may result in substantial storage change and water-level declines near a center of pumping; whereas, such pumping relative to the entire Subarea would be small compared to mean-annual recharge. Because ground-water use in Subarea 6 represents a relatively minor percentage of ground-water recharge, even a large increase in ground-water use in Subarea 6 in one State is likely to have little effect on ground-water and surface-water occurrence in the other.

Ground-water use of about 134 ft^3/s in 1990 in Subarea 6 represented 1.1 to 1.6 percent of the mean-annual baseflow in the surface-water system and 4.3 to 9.9 percent of the average drought flow near the end of the droughts of 1941, 1954, and 1986 (table 12). For the worst-case scenario, in which flow decreased to the minimum during the period of analysis, 1990 ground-water use represented 4.7 to 13.9 percent of the minimum drought flows. Local problems of ground-water overuse were not identified. However, long-term water-level data at wells in Subarea 6 are few in number and poorly distributed areally; and conclusions regarding regional water-level declines or storage change cannot be reasonably drawn.

Table 12. Relation between 1990 ground-water use and ground-water discharge during mean-annual baseflow, average drought flow, and minimum drought flow, Subarea 6

	Ground-water use, 1990 (cubic feet per second)	Baseflow to the Coosa River and tributaries (cubic feet per second)			Ratio of ground-water use to baseflow (percent)		
		Mean-annual baseflow	Average drought baseflow	Minimum drought baseflow	Mean-annual baseflow	Average drought baseflow	Minimum drought baseflow
Georgia	1/49.6	4,600	1,150	2/1,060	1.1	4.3	4.7
Alabama	3/84.5	5,360	853	4/610	1.6	9.9	13.9
Exiting Subarea 6	**134.1**	**9,960**	**5/2,010**	**4/1,780**	**1.4**	**6.7**	**7.5**

1/From Fanning and others (1992).
2/Minimum stream discharge during 1941 drought.
3/From Baker and Mooty (1993).
4/Minimum stream discharge during 1954 drought.
5/Average drought flow exiting Subarea 6, 1941, 1954, and 1986.

In general, ground-water resources are underutilized throughout the study area. The rural population relies on ground water as their principal source of water supply; whereas, more densely populated areas rely on surface-water resources. However, wells supplied water to many communities prior to the development of large surface-water reservoirs. In recent years, suburban communities have developed ground-water supplies in response to curtailed surface-water supplies.

A general assessment of ground-water development potential in Subarea 6 would reflect, in part, the cumulative effects of current and anticipated future hydrologic stresses imposed on the ground-water resources, and to a lesser extent, the current availability of surface-water supplies. The nature of such an assessment is necessarily limited by a lack of knowledge of current hydrologic conditions and the lack of agreed upon standards by which Federal, State, or local water-resource managers evaluate the effects of additional stress and future development. Current pumpage and streamflow conditions might be unknown in some areas, making the results of an evaluation of development potential highly uncertain. Future stresses also might be linked to water-management practices that have yet to be formulated, or to water-management decisions that have yet to be made. Therefore, an assessment of ground-water development potential provides insight only into one aspect of the broader question of how water-management decisions affect ground-water availability; specifically, whether existing hydrologic data document flow-system behavior adequately to allow the potential effects of future development on the flow system to be adequately evaluated and understood. Further, an assessment of ground-water development potential does not account for the suitability of existing ground-water resource management approaches or the effects of future approaches on further resource development. Such answers partly are dependent on the synthesis of results from the various Comprehensive Study components and subsequent consideration by the Federal, State, or local water managers responsible for decision-making within the basin.

The identification of areas that could be developed for ground-water supply to replace or supplement surface-water sources could not be determined from available data for Subarea 6. Because geologic controls affecting ground-water availability are highly variable, even on a local scale, regional evaluations are inherently characterized by a high degree of uncertainty. Ground-water availability may be a constraint in areas underlain by Piedmont crystalline-rock and Paleozoic-rock terranes more because of the difficulty in locating water-bearing voids in the rocks, rather than because of a lack of water. Ground-water resources probably could provide supplemental supplies during peak demand periods throughout most suburban areas of Subarea 6. In more rural areas, ground-water supplies could serve as a primary resource depending upon demands. Generally, wells need only supply about 5 gal/min for domestic users, and may not be drilled to a depth that taps the available ground-water supply at a site. Most municipal or industrial users generally require well yields of at least 50 to 100 gal/min or more, and wells for such supplies likely are drilled to a depth sufficient to intersect as many water-bearing zones as feasible. Municipal and industrial users also tend to drill multiple wells to obtain the required ground-water supply.

SUMMARY

Drought conditions in the 1980's have focused attention on the multiple uses of the surface- and ground-water resources in the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) River basins in Alabama, Florida, and Georgia. Federal, State, and local agencies also have proposed projects that are likely to result in additional water use and revisions of reservoir operating practices within the river basins. The existing and proposed water projects have created conflicting demands for water and emphasized the problem of allocation of the resource. This study was initiated to describe ground-water availability in the Coosa River basin in Georgia and Alabama, Subarea 6 of the ACF-ACT River basins, and to estimate the possible effects of increased ground-water use in the basin.

Subarea 6 encompasses about 4,700 square miles (mi^2) in northwestern Georgia and about 5,360 mi^2 in northeastern Alabama. The Coosa River basin also includes about 100 mi^2 in southeastern Tennessee; however, that part of the basin is not in the study area. Subarea 6 is bounded to the north by the Georgia-Tennessee State line, to the east by the upper Chattahoochee River basin (Subarea 1) and to the south-southeast by the Tallapoosa River basin (Subarea 5). To the west, the study area is bounded by the Cahaba River basin (Subarea 7), and to the south-southwest by the Alabama River basin (Subarea 8). Major rivers of Subarea 6 flow southwestward into the Alabama River (Subarea 8).

The Piedmont and Blue Ridge Provinces are characterized by a two-component aquifer system composed of a fractured crystalline-rock aquifer characterized by little or no primary porosity or permeability; the overlying weathered regolith, composed of soil alluvium, colluvium, and saprolite, that responds hydraulically as a porous-media aquifer. The Valley and Ridge and Cumberland Plateau Provinces are characterized by fracture- and solution-conduit aquifers, similar in some ways to aquifers in the Piedmont and Blue Ridge Provinces. Fracture-conduit aquifers are predominant in the well-consolidated sandstone and shale of Paleozoic age; and solution-conduit aquifers are predominant in the carbonate rocks of Paleozoic age. The Coastal Plain is characterized by southward-dipping, poorly consolidated Cretaceous-age sand, gravel, and clay deposits of fluvial and marine origin.

The conceptual model of ground-water flow and stream-aquifer relations subdivides the ground-water flow system into local (shallow), intermediate, and regional (deep) flow regimes. The regional flow regime probably approximates steady-state conditions and water discharges chiefly to the Coosa River, and downstream reaches of the Etowah and Oostanaula Rivers. Ground-water discharge to tributaries primarily is from the local and intermediate flow regimes. Ground water that discharges to regional drains is composed of local, intermediate, and regional flow regimes. Mean-annual ground-water discharge to streams (baseflow) is considered to approximate the long-term, average recharge to ground water.

Mean-annual baseflow in Subarea 6 was estimated using an automated hydrograph-separation method. Mean-annual baseflow to the Coosa River and tributaries was estimated to be about 4,600 cubic feet per second (ft^3/s) in Georgia (from the headwaters to the Georgia-Alabama State line); about 5,360 ft^3/s in Alabama; and about 9,960 ft^3/s at the mouth of the Coosa River (at the Subarea 6-Subarea 8 boundary). Mean-annual baseflow represents about 60 percent of the mean-annual stream discharge at the mouth of the Coosa River.

Stream discharges for selected sites on the Coosa River and tributaries were compiled for the years 1941, 1954, and 1986, during which historically significant droughts occurred throughout most of the ACF-ACT River basins. Stream discharge was assumed to be sustained entirely by baseflow during the latter periods of these droughts.

Estimated baseflow near the end of the individual drought years ranged from about 11 to 27 percent of the estimated mean-annual baseflow in Subarea 6.

The limited scope, lack of field-data collection, and the short duration of the ACF-ACT River basin study has resulted in incomplete descriptions of ground- and surface-water-flow systems, which may affect the future management of water resources in the basins. For example, the extent and continuity of local and regional flow systems and their relation to geology is largely unknown. Similarly, quantitative descriptions of stream-aquifer relations, ground-water flow across State lines, water quality, drought flows, and ground-water withdrawal and subsequent effects on the flow systems (the availability and utilization issue) are highly interpretive; therefore, the descriptions should be used accordingly.

Estimates of water-use and ground-water discharge to streams are dependent on methodologies employed during data collection, computation, and analyses. Results reported herein are limited by a lack of recent data, particularly water-use data, and the non-contemporaneity of all data. Analyses using limited data may not adequately describe stream-aquifer relations. Most importantly, analyses in this report describe only two hydrologic conditions—(1) mean-annual baseflow and (2) drought-flow conditions during 1941, 1954, and 1986. Analyses derived from extrapolation to other hydrologic conditions, such as much longer drought periods or increased ground-water withdrawal, should be used with caution. Special concern also should be directed to the effects of increased post-1990 withdrawal on ground-water discharge to streams in Subarea 6.

The potential exists for the development of ground-water resources on a regional scale throughout Subarea 6. Ground-water use in 1990 represented about 1.1 to 1.6 percent of the estimated mean-annual baseflow, and about 4.3 to 9.9 percent of the average drought flow during the droughts of 1941, 1954, and 1986. Because ground-water use in Subarea 6 represents a relatively minor percentage of ground-water recharge, even a large increase in ground-water use in Subarea 6 in one State probably would have little effect on the quantity of ground-water and surface-water occurrence in the other. Long-term ground-water level declines were not observed; however, long-term water-level data at wells in Subarea 6 are few in number and poorly distributed areally, and conclusions regarding regional water-level declines or storage changes cannot be reasonably drawn.

SUGGESTIONS FOR FURTHER STUDY

This report presents a discussion of ground-water resources and interaction of ground- and surface-water systems in the Coosa River basin, Subarea 6, of the ACF-ACT River basins. In Subarea 6, ground-water availability is addressed only from a regional perspective using historical data. Data collection was not a part of this study; therefore, lack of streamflow and ground-water data necessitated that estimation methods be used extensively to describe stream-aquifer relations. Additional data, particularly data describing surface- and ground-water conditions on a local scale, are needed to further refine and quantify the interaction of ground- and surface-water systems in the Subarea. Analyses of these data could better describe stream-aquifer relations, as well as ground-water availability and development potential in Subarea 6.

Although the overall objectives of this study were to evaluate the ground-water resources and supply, the data used to accomplish these objectives were stream-discharge data. Stream-discharge data were sufficient to meet study objectives; however, such data either were not totally adequate or were not available at critical sites. Future stream-discharge data collection to support resource management should emphasize (1) continuous-record data at critical hydrologic and political boundaries for a period of years; and (2) concurrent stream-discharge measurements at critical sites during drought periods.

Continuous stream-discharge data collected over a period of years at critical locations provide the basic information essential to basinwide water-resource planning and management. Current data coverage is incomplete. For example, stream-gaging stations located at State lines and subarea boundaries would have eliminated or reduced the need to extrapolate and interpolate data from stations distant from these boundaries, and consequently, would have improved the accuracy of estimates of ground-water contributions from subarea to subarea and from State to State.

The collection of drought-flow data obviously is contingent on the occurrence of a drought; thus, collection of drought data is not routine and is not easily planned. A contingency plan to collect drought data should be in place. The plan could consider, but not be limited to, logistics, manpower needs, and the preselection of stream data-collection locations. For more rigorous planning, field reconnaissance of preselected stream sites could be conducted.

Data-base development also is critical to resource management. Data elements, such as well construction and yield; hydraulic characteristics of aquifers; water quality; and ground-water withdrawals—both areally and by aquifer—are particularly important. Seepage runs (detailed streamflow measurements of drainage systems made concurrently during baseflow conditions) can be used to identify individual ground-water flow systems and improve the understanding of stream-aquifer relations, especially in crystalline and mixed-rock terranes. Once identified, a flow system can be studied in detail to define its extent, recharge and discharge areas, movement of water, chemical quality, and the amount of water that can be withdrawn with inconsequential or minimal effects. These detailed studies might include test drilling, borehole geophysical logging, applications of surface geophysics, aquifer testing, a thorough water-withdrawal inventory, and chemical analyses of ground water to delineate the extent of the ground-water-flow system and evaluate its potential as a water supply. Evaluation of several such flow systems would greatly improve the understanding of ground-water resources throughout the subarea. Because aquifer properties vary substantially on a local scale and data are sparse, field studies are needed to obtain quantitative definitions of the hydraulic interactions of aquifers and streams in Subarea 6.

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COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY AUGUST 2003

SOUTHEAST ALABAMA REGIONAL ECONOMIC DEVELOPMENT DISTRICT

Barbour
Coffee
Covington
Dale
Geneva
Henry
And
Houston Counties

Prepared by the
Southeast Alabama Regional Planning and Development Commission
P.O. Box 1406, Dothan, AL 36302 (334) 794-4093

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CHAPTER I

THE CEDS COMMITTEE

CHAPTER I

THE ECONOMIC DEVELOPMENT DISTRICT CEDS COMMITTEE

The Southeast Alabama Regional Planning and Development Commission (SEARP&DC) was created in June 1969 and is located in the extreme Southeast corner of Alabama. Elected officials and civic leaders initiated action to join several counties together in a common cause to promote and improve the economic status of all citizens residing in the six-county area. The counties consisted of Barbour, Coffee, Dale, Geneva, Henry and Houston counties, and the initial byline of the organization was "Planning Today to Preclude Problems of Tomorrow".

The organization was originally known as the Southeast Alabama Economic Development District. The name was changed to the Southeast Alabama Regional Planning and Development Commission with the addition of Covington County in 1971. The commission now consists of a seven county area and is dedicated to the theme of "Progress through Planning". Figure 1 shows a location map of the seven counties that comprise the district.

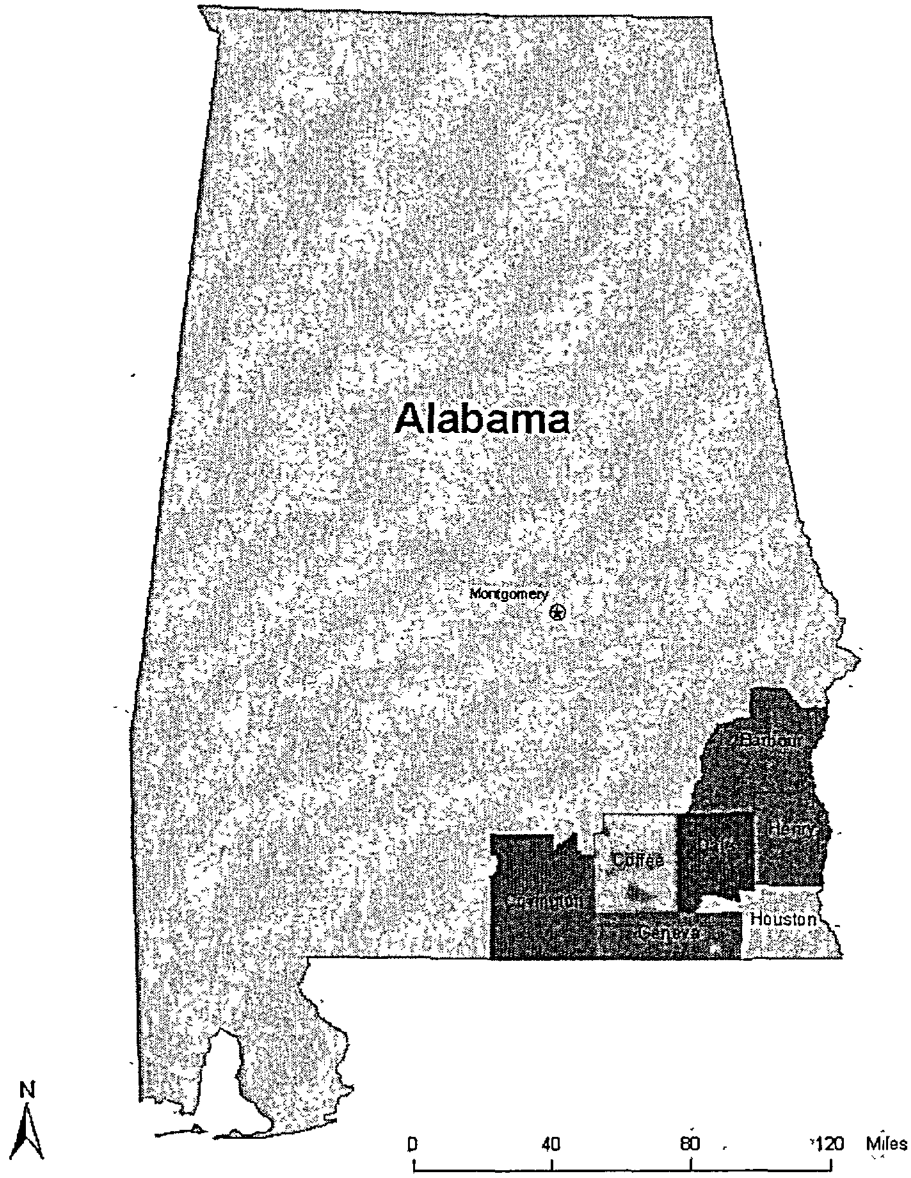
The Southeast Alabama Regional Planning and Development Commission was incorporated as a non-profit corporation under the legal status of the Code of Alabama, Legislative Act 1126, enacted during the regular session of the Alabama Legislature during 1969. The current bylaws of the commission were developed and adopted by the organization in 1974 and the commission has its main office located in the southeastern sector of the district in Dothan, Houston County, Alabama.

The commission is directed by a Board of Directors, which establishes policies and guidelines, and also complements the professional staff employed on a full time basis. The Board of Directors consists of thirty-five representatives from the seven county member counties, with each county represented by five Directors, of which a minimum of three are elected officials representing county and municipal governments. The Board of Directors also serves as the CEDS Committee. A list of current directors follows.

Directors serve without compensation and meet on an established quarterly basis unless special meetings are required and called by the Chairperson or the other elected officers of the Board of Directors. Members of the Board of Directors, because of their diverse backgrounds and professions, and their positions of leadership within their respective counties, are well aware of the major economic and social problems which exist and therefore, are in a position to present the needs of their respective counties in a constructive and positive manner.

All of the counties in the district are currently classified as EDA-Long Term Economically Distressed areas and are eligible for EDA funds. The city of Dothan; however, is the only area within the seven counties that does not qualify as economically distressed. The Southeast Alabama Regional Planning and Development Commission's primary goal is to enhance the economic and social well-being of the residents residing in the district. Working with local government entities, businesses, and citizens to develop their potential through various forms of technical assistance and planning is the major means of accomplishing this goal.

Figure 1
Southeast Alabama Economic Development District



Southeast Alabama Regional Planning And Development Commission Board of Directors

NAME	COUNTY	ADDRESS	OCCUPATION		APPT DATE	RACE SEX
Jay Jaxon	BARBOUR	P. O. Box 219, Eufaula, AL 36027 (687-1206)8031 (B)	Mayor		Elected 5/93	W-M
Rebecca Beasley		P.O. Box 69, Clayton, AL 36016 (775-3254)	Mayor		Elected 10/96	W-F
G. Berry Forte*		P. O. Box 398, Clayton, AL 36016 (775-3203)/687-9985(H)	Chairman, Co Comm.		Elected 1/83	B-M
Frank Straughn, Jr.		107 Ridgewood Lane, Eufaula, AL 36027(616-4408)	Co Commissioner, Chair		Elected 1/01	W-M
Roy Crow		P.O. Box 1209, Eufaula, AL 36072 (616-4301)	Businessman	A-L	Dec-95	W-M
Tim Alford	COFFEE	P.O. Box 311000, Enterprise, AL 36331 (347-1211)	Mayor		Elected 11/00	W-M
B. F. Garth*		P.O. Box 868, Enterprise, AL 36331 (347-8690)	Ret.Edu/OCAP Chrm	A-L	Sep-69	B-M
James Grimes		200 Buford Street, Elba, AL 36323 (897-2333)	Mayor		Elected 11/96	W-M
Robert Stephens		588 E. Davis St, Elba, AL 36323 (897-5130)/894-5556	Commissioner		Elected 7/91	W-M
Jim Thompson		2692 CR 156 Enterprise, AL 36330 (393-1526)	Commissioner		Elected 1/01	W-M
Greg White	COVINGTON	P.O. Box 188, Andalusia, AL 36420 (222-3613)2907	Chairman, Co Comm		Elected 5/95	W-M
Glen Zorn		P.O. Box 351, Florala, AL 36442 (858-6043)/6442	Mayor		Elected 11/97	W-M
Danny Lindsey*		406 S. College St., Opp, AL 36467 (493-9622)	City Councilman		Elected 12/00	B-M
Jerry Boothe		P.O. Box 427, Opp, AL 36467 493-3555/7465 (H)	Businessman	A-L	Nov-96	W-M
C.L. Kirkpatrick*		P. O. Box 852, Andalusia, AL 36420 (222-6156/5343)	Businessman	A-L	Sep-93	B-M
Eunice Hagler	DALE	1702 Hwy 123 S, Ozark, AL 36360 (774-6025)/2754 (J)	Judge of Probate		Elected 2/99	W-F
Bob Bunting		P.O. Box 1987, Ozark, AL 36361 (774-3300)	Mayor		Elected 12/96	W-M
Wess Etheredge		P.O. Box 188, Daleville, AL 36322 (598-2345)	Mayor		Elected 11/96	W-M
Julie Jones*		1702 Hwy 123 S, Ozark, AL 36360 (774-6025)	Businesswoman	A-L	Mar-92	B-F
Glen O. Granthan		8795 County Road 1, Enterprise, AL 36330	Commissioner		Elected 11/02	W-M
Ernest Smith*	GENEVA	Rt 1, Box 216-B, Geneva, AL 36340 (684-9775)	Ret. Educator	A-L	Sep-69	B-M
Gene Brannon		203 W. Main St, Hartford, AL 36344 (588-2245)	Mayor		Elected 9/74	W-M
Harry Adkison		P.O. Box 430, Geneva, AL 36340 (684-2276)/75	Judge of Probate		Elected 1/95	W-M
John Williams*		522 South Line St, Samson, AL 36477 (898-7578)	Educator	A-L	Apr-83	B-M
Milton Harris		P. O. Box 194, Malvern AL 36349 (793-6535	Mayor		Elected 11/02	W-M
Joe Paul		P.O. Box 429, Geneva, AL 36340 (684-2636)	Attorney (ex-officio)		Sep-82	W-M
Charles Money	HENRY	109 Carter Ridge RD, Abbeville, AL 36310 (585-5194)	Commissioner		Elected 11/02	W-M
Lamar Turner		P.O. Box 457, Abbeville, AL 36310 (585-3257)	Judge of Probate/Busm.		Elected 3/95	W-M
Mary E Williams*		300 Bennett Street, Headland, AL 36345 (693-3690)	Retired Educator	A-L	Elected 3/97	B-F
Tommy Jones		P. O. Box 124, Newville, AL 36352 (889-4559)	Commissioner		Elected 12/98	W-M
Roger Money		1227 Davis St, Haleburg/Columbia, AL 36319 (585-5567)	Mayor, Haleburg		Elected 11/00	W-M
Chester Sowell	HOUSTON	P.O. Box 2128, Dothan, AL 36302 (793-0100)	Mayor/Businessman		Elected 11/97	W-M
William Eaton*		1280 Webb Rd, Dothan, AL 36303 (792-3202/3-1748)	Businessman	A-L	Feb-94	B-M
Wylie Yelverton*		1402 Carver Dr., Dothan, AL 36303 (792-6940) H	Commissioner/Bus.		Elected 11/94	B-M
Mark Culver		P.O. Box 6406, Dothan, AL 36302 (677-4741)	Chairman, Co Comm		May-97	W-M
Bobby Monk		5 Houston Street, Cottonwood, AL 36320 (691-2671)/2723BL	Mayor/Businessman		Elected 11/84	W-M

OFFICERS:
Julie Jones, Chairman
Roy Crow, First Vice Chairman
Robert Stephens, Second Vice Chairman
Gene Brannon, Secretary/Treasurer

EXECUTIVE COMMITTEE:
Robert Stephens
Julie Jones*
Harry Adkison
Berry Forte*
Mary Ethel Williams*

W. Fred Dykes, Executive Director (Ex-Officio)
C. L. Kirkpatrick*
Gene Brannon
Wylie Yelverton*
Joe Paul, Legal Counsel (Ex-Officio)
Roy Crow

B.F. Garth (Ex-Officio)

*MINORITIES
A-L - At Large Members

For more information on Board Members please contact SEARP&DC

CHAPTER II

DISTRICT OVERVIEW

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DISTRICT OVERVIEW

HUMAN RESOURCES

In order to portray an accurate picture of the human resource capabilities of the seven counties that comprise the Southeast Alabama Economic Development District: Barbour, Coffee, Covington, Dale, Geneva, Henry and Houston, an assessment of the area's demographic make-up, i.e., population trends, employment, income, and other primary factors contributing to the District's overall development, is presented. The data provided, for the most part, is derived from various census reports and state agencies including universities. Information is presented in a manner that allows for various comparisons: national, state, and regional where possible.

POPULATION TRENDS

The Southeast Alabama Regional Planning and Development Commission is comprised of the seven most southeastern counties in Alabama. The District is predominantly rural with the largest city being Dothan, in Houston County, with a population of 57,737 (2000). Overall, the district had a population increase of 3.80% from 1980 through 1990 and a 6.7% increase from 1990 through 2000. Currently, all of the counties in the District are classified as "long-term economic distressed" counties by the Economic Development Administration.

In order to set the framework for other sections of this narrative, information on population, those counties growing and those declining, is necessary. From previous research for EDA Progress Reports and based on recent Census 2000 figures, we found the Region's growth for the decade of the 90's to be at a much slower pace that the State's with a growth rate of only 6.7% compared to the State's rate of 10.1%. During the past ten years the Southeast Alabama region has experienced a growth in population from 272,120 in 1990 to 290,274 in 2000, which as previously mentioned was well below the State average.

Table 1 presents a historical picture of the district's population growth from 1960 through 2000 and the percentage change between the decades. From this chart, we developed a Regional Growth Profile dividing the seven counties into three categories: (1) high population growth -- those that exceed the State's 10.1% margin of change from 1990-2000, (2) slow growth counties -- those with positive change yet below the 10.1% margin, and (3) no growth counties -- those counties that experienced a decline in population change. This is an inter-regional classification, and thus, it serves for regional comparisons only. Looking at Table 1, it can be seen that the decade of the 80's was the slowest period of population growth of the four decades listed.

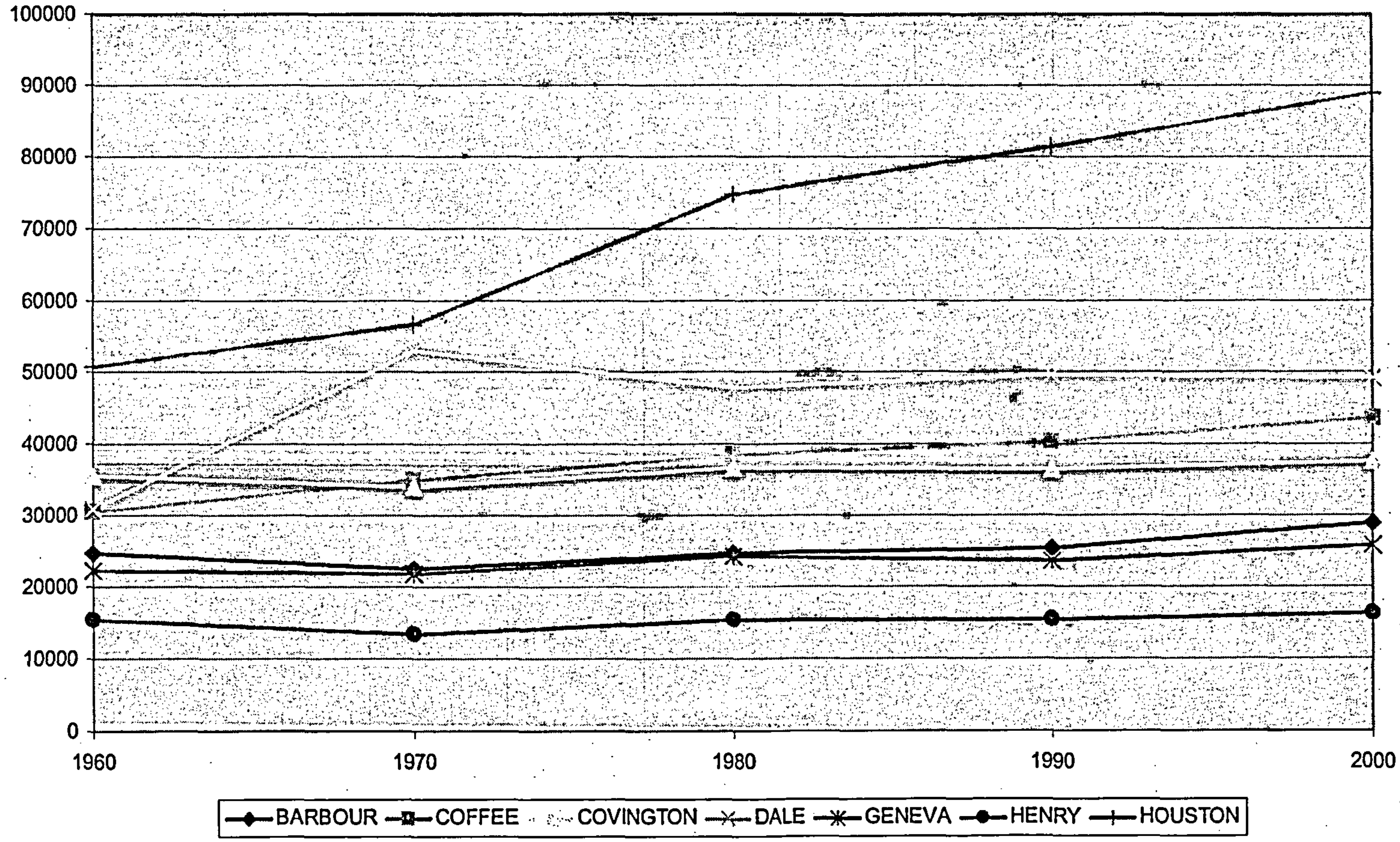
Table 1

POPULATION TABULATIONS FOR SOUTHEAST ALABAMA
AND PERCENT CHANGE FOR THE YEARS
1960-2000

	1960	1970	1980	1990	2000	PERCENT CHANGE 1960-70	1970-80	1980-90	1990-00
ALABAMA	3,266,740	3,444,354	3,893,888	4,040,587	4,447,100	5.4%	13.1%	3.8%	10.1%
SEARP&DC	210,024	236,241	262,147	272,120	290,274	12.5%	11.0%	3.8%	6.7%
BARBOUR	24,700	22,543	24,756	25,417	29,038	-8.7%	9.8%	2.7%	14.2%
COFFEE	30,583	34,872	38,533	40,240	43,615	14.0%	10.5%	4.4%	8.4%
COVINGTON	35,631	34,079	36,850	36,478	37,631	-4.4%	8.1%	-1.0%	3.2%
DALE	31,066	52,985	47,821	49,633	49,129	70.6%	-9.8%	3.8%	-1.0%
GENEVA	22,310	21,924	24,253	23,647	25,764	-1.7%	10.6%	-2.5%	9.0%
HENRY	15,286	13,254	15,302	15,374	16,310	-13.3%	15.5%	0.5%	6.1%
HOUSTON	50,718	56,574	74,632	81,331	88,787	11.5%	31.9%	9.0%	9.2%

SOURCE: U.S. CENSUS BUREAU

FIGURE 2
POPULATION TRENDS FOR SOUTHEAST ALABAMA



The only high growth county is Barbour with a 14.2% growth. This growth can certainly be attributed to the location of the Charcon Popkhand poultry processing plant in Barbour County in 1998. This plant created over 1,500 new jobs.

The slow growth counties are: Coffee with 8.4% growth, Covington with 3.2% growth, Geneva with 9.0% growth, Henry with 6.1% growth, and Houston with 9.2% growth. All of these counties have experienced major plant closures and layoffs within the last five years. Over 7,000 jobs have been lost in the southeast Alabama region. The CMI Industries located in Geneva County (416 employees) and Dorsey Trailers located in Coffee County (650 employees) are two of the most recent plant closures. Geneva County has lost over 1,900 jobs and Covington County has lost over 2,200 jobs in the past five years, while Houston County has lost 1,950 jobs and Coffee County has lost 1,100 jobs.

Looking at long-term trends, the region's total population in 1960 increased from 210,024 to 236,241 in 1970. The district's population increased to 262,147 in 1980. By 1990, the region's population continued to grow, albeit at a significantly slower pace. In 1990, the total population was 272,120 and increased to 290,274 by 2000. To illustrate this demographic development, compare the percentage of population change that is the amount of differences between each decade's population figures. In the 1960-70 period, the region's population increased by 12.5% and 11.0% for the next period. However, during the 1980-90 period; the percentage of growth was only 3.8%, which mirrored the State's population change rate of 3.8%. The region did appear to rebound during the 1990-2000 period with an increase in the growth rate from 3.8% to 6.7%. However, this is well below the State growth rate of 10.1% for the same time period (see Table 1).

The District's counties, as a whole, are becoming increasingly more rural. According to the 2000 Census, Henry County's population became entirely rural (see Table 2). The next most dramatic shift in population from urban to rural occurred in Barbour County with an increase of 18.8%. All counties in the district became more rural in 2000. Houston County, with the largest municipality in the District, Dothan, became slightly more rural, 3.4%. The region, as a whole, became more rural by 12.3% during the 90's. The state of Alabama also became more rural during the 90's by 5%.

TABLE 2
URBAN/RURAL POPULATION DISTRIBUTION
DISTRICT COUNTIES AND ALABAMA

Government	2000 Urban #	2000 Rural #	2000 Rural %	1990 Rural %	1980 Rural %
Alabama	2,465,539	1,981,561	44.6	39.6	40.0
Barbour	8,574	20,464	70.5	51.7	51.1
Coffee	19,440	24,175	55.4	40.8	42.6
Covington	10,550	27,081	72.0	53.7	52.2
Dale	22,191	26,938	54.8	41.2	38.2
Geneva	3,392	22,372	86.8	80.2	69.0
Henry	0	16,310	100.0	62.1	57.6
Houston	57,814	30,973	34.9	31.5	34.3
Region	121,961	168,313	58.0	45.7	44.9

Source: U.S. Census Bureau, 1980-2000

To analyze the demographic changes in the Southeast Alabama Region, one must review changes in population trends within and between the counties. As in prior decades, changes occurring on the national and international economic scene strongly influence the demographic profiles of local communities.

During the last decade, numerous textile and apparel plant closures throughout the region forced many unemployed workers to move to larger cities and counties with stronger manufacturing/industrial and service economies. Counties strongest hit by the plant closures were Geneva, Coffee and Covington. To best demonstrate the demographic transitions that occurred during the past decade, the seven counties can be divided into three distinguishable categories: high growth, slow-growth, and no-growth.

High Growth Counties

The High Population Growth category includes those counties in which the margin of population change between 1990 and 2000 exceeds the State's 10.1% margin of change. Barbour County is the only high growth county in the southeast Alabama region. Barbour County experienced a population growth of 14.2%; however, two of the municipalities located in Barbour County experienced significant population declines.

TABLE 3
BARBOUR COUNTY POPULATION
1980-2000

JURISDICTION	1980	1990	2000	% CHANGE 80-90	% CHANGE 90-00
BARBOUR COUNTY	24,756	25,417	29,038	2.7%	14.2%
BLUE SPRINGS	112	107	92	-4.5%	-14.0%
CLAYTON	1,589	1,792	1,490	12.8%	-16.8%
CLIO	1,224	1,412	2,253	15.4%	59.6%
EUFAULA	12,097	13,539	13,874	11.9%	2.5%
LOUISVILLE	791	728	633	-8.0%	-13.0%

Source: U.S. Census Bureau

Slow Growth Counties

The Slow Population Growth category includes those counties in which the margin of population change between 1990 and 2000 is positive and below the State's 10.1% margin of change. This group is comprised of Coffee, Covington, Geneva, Henry and Houston Counties. Two of the regions largest population centers fall into this category: Dothan, which is located in Houston County and Enterprise, in Coffee County.

TABLE 4
COFFEE COUNTY POPULATION
1980-2000

JURISDICTION	1980	1990	2000	% CHANGE 80-90	% CHANGE 90-00
COFFEE COUNTY	38,533	40,240	43,615	4.4%	8.4%
ELBA	4,355	4,132	4,178	-5.1%	1.1%
ENTERPRISE	18,033	20,187	21,085	11.9%	4.4%
KINSTON	604	598	607	-1.0%	1.5%
NEW BROCKTON	1,392	1,188	1,178	-14.7%	-1.0%

Source: U.S. Census Bureau

TABLE 5
COVINGTON COUNTY POPULATION
1980-2000

JURISDICTION	1980	1990	2000	% CHANGE 80-90	% CHANGE 90-00
COVINGTON COUNTY	36,850	36,478	37,631	-1.0%	3.2%
ANDALUSIA	10,415	9,388	8,749	-9.9%	-6.8%
BABBIE	553	532	645	-4.0%	21.2%
CAROLINA	203	201	240	-1.0%	19.4%
FLORALA	2,165	2,125	1,963	-1.8%	-7.6%
GANTT	314	265	260	-15.6%	-1.9%
HEATH	354	182	218	-48.6%	19.8%
HORN HILL		271	219		-19.2%
LIBERTYVILLE	141	133	92	-5.7%	-30.8%
LOCKHART	547	472	549	-13.7%	16.3%
ONYCHA	147	144	208	-2.0%	44.4%
OPP	7,204	7,043	6,588	-2.2%	-6.5%
RED LEVEL	504	588	583	16.7%	-1.0%
RIVER FALLS	669	704	594	5.2%	-15.6%
SANFORD	250	268	293	7.2%	9.3%

Source: U.S. Census Bureau

TABLE 6
GENEVA COUNTY POPULATION
1980-2000

JURISDICTION	1980	1990	2000	% CHANGE 80-90	% CHANGE 90-00
GENEVA COUNTY	24,253	23,647	25,764	-2.5%	9.0%
BLACK	156	174	224	11.5%	28.7%
COFFEE SPRINGS	339	317	280	-6.5%	-11.7%
EUNOLA	169	195	178	15.4%	-8.7%
GENEVA	4,866	4,776	4,426	-1.8%	-7.3%
HARTFORD	2,647	2,567	2,345	-3.0%	-8.6%
MALVERN	558	977	1,215	75.1%	24.4%
SAMSON	2,402	2,249	2,045	-6.4%	-9.1%
SLOCOMB	2,153	1,906	2,090	-11.5%	9.7%

Source: U.S. Census Bureau

TABLE 7
HENRY COUNTY POPULATION
1980-2000

JURISDICTION	1980	1990	2000	% CHANGE 80-90	% CHANGE 90-00
HENRY COUNTY	15,302	15,374	16,310	0.5%	6.1%
ABBEVILLE	3,155	3,168	3,000	0.4%	-5.3%
HALEBURG	106	80	120	-22.6%	50.0%
HEADLAND	3,327	3,312	3,662	-0.4%	10.6%
NEWVILLE	814	566	570	-30.5%	1.0%

Source: U.S. Census Bureau

TABLE 8
HOUSTON COUNTY POPULATION
1980-2000

JURISDICTION	1980	1990	2000	% CHANGE 80-90	% CHANGE 90-00
HOUSTON COUNTY	74,632	81,331	88,787	9.0%	9.2%
ASHFORD	2,165	1,918	1,910	-11.4%	-0.4%
AVON	433	434	429	.2%	-1.2%
COLUMBIA	881	870	816	-1.2%	-6.2%
COTTONWOOD	1,352	1,377	1,157	1.8%	-16.0%
COWARTS	418	1,546	1,557	269.9%	1.0%
DOTHAN	48,750	54,971	57,652	12.8%	4.9%
GORDON	362	491	416	35.6%	-15.3%
KINSEY	1,239	1,697	1,790	37.0%	5.5%
MADRID	172	218	311	26.7%	42.7%
REHOBETH		661	959		45.1%
TAYLOR	1,003	1,315	1,865	31.1%	41.8%
WEBB	448	964	1,318	115.2%	34.7%

Source: U.S. Census Bureau

No Growth Counties

The No Growth category includes those counties, which experienced a population decline between the years 1990-00. Dale County is the only county that can be classified into this group. Dale County experienced a slight population loss for this period.

TABLE 9
DALE COUNTY POPULATION
1980-2000

JURISDICTION	1980	1990	2000	% CHANGE 80-90	% CHANGE 90-00
DALE COUNTY	47,821	49,633	49,129	3.8%	-1.0%
ARITON	844	759	810	-10.1%	6.7%
CLAYHATCHEE	560	437	445	-22.0%	1.8%
DALEVILLE	4250	5,366	4,688	26.3%	-12.6%
GRIMES	298	412	465	38.3%	12.9%
LEVEL PLAINS	867	1,468	1,522	69.3%	3.7%
MIDLAND CITY	1,903	1,819	1,730	-4.4%	-4.9%
NAPIER FIELD	493	447	393	-3.1%	-12.1%
NEWTON	1,540	1,499	1,744	-2.7%	16.3%
OZARK	13,188	16,481	15,142	25.0%	-8.1%
PINCKARD	771	616	678	-20.1%	10.1%

Source: U.S. Census Bureau

Population Characteristics

Population Density

Table 10 presents the population density for the district counties for the years 1970, 1980, 1990 and 2000. The 2000 figures directly correlate to the three classifications previously mentioned. Dale County was the only county to suffer a decrease in population density by 1.0%. The State had an increase of 9.1% in 2000. Barbour County had an increase of 12.5%. Houston County increased by 8.5% and Geneva County increased by 8.3% in 2000. Coffee County had a 7.8% increase. Houston County is nearly twice as densely populated as the State as a whole.

TABLE 10

LAND AREA AND POPULATION DENSITY
1970, 1980, 1990, AND 2000

Government	Land Area Square Miles	Population Per Square Mile 1970	1980	1990	2000
Alabama	50,744	69.7	76.7	79.6	87.6
Barbour	885	25.3	28.0	28.7	32.8
Coffee	679	51.5	56.7	59.2	64.2
Covington	1,034	34.6	35.6	35.3	36.4
Dale	561	94.7	85.2	88.5	87.6
Geneva	576	38.0	42.1	41.0	44.7
Henry	562	23.9	27.2	27.4	29.0
Houston	580	98.4	128.6	140.1	153.1

Source: Alabama County Data Books, 1984 & 1997 and County and City Data Book, 2000

Migration

The South continues to be hot spot for in-migration. In 1960, the South comprised 30.7% of the Nation's population and this figure rose to 35.6% by 2000. Only the West out-paced the South in population growth with a 19.7% increase from 1990 to 2000. The South Division grew by 17.3%. Alabama, in the East South Central Division, grew by the smallest amount 12.2%, so the district is in a part of the slower growing South. Though it is a slow growing population the state as well as the district have experienced in-migration. The district actually experienced in-migration in all counties, except Dale County (see Table 11).

TABLE 11

POPULATION MIGRATON
ALABAMA AND DISTRICT COUNTIES, 1970-1998

	Number/Percents*					
Governments	1970-1980		1980-1990		1990-1998	
Alabama	179,503	5.2	-89,117	-2.3	126,168	3.1
Barbour	696	3.1	-727	-2.9	689	2.7
Coffee	338	1.0	-794	-2.1	223	0.6
Covington	1,510	4.4	-1,001	-2.7	789	2.2
Dale	-12,317	-23.3	-3,781	-7.9	-5,186	-10.4
Geneva	1,246	5.7	-1,056	-4.4	1,282	5.4
Henry	1,150	8.7	-310	-2.0	220	1.4
Houston	11,630	20.6	720	1.0	817	1.0

*Note: Percents are figured from the period starting dates.
Source: Alabama State Data Books, 1984 & 1997, ADECA; Economic Abstract of Alabama 2000

Age

Population age data compiled for the region dramatically demonstrates the influences of the availability of economic opportunities and the age distribution. If opportunities are scarce, young people tend to migrate out of the area, leaving behind an aging population. In the following table, data describing the age distribution for the southeast region is presented.

TABLE 12

POPULATION AGE BY COUNTY
1980, 1990 and 2000

COUNTY	MEDIAN AGE		PERCENT UNDER 18			PERCENT OVER 65		
	1990	2000	1980	1990	2000	1980	1990	2000
BARBOUR	32.8	35.8	32.6	29.4	25.4	13.5	14.7	13.3
COFFEE	34.1	37.2	29.8	25.7	24.8	11.4	13.2	14.1

COVINGTON	36.2	39.8	27.1	25.3	23.5	16.2	17.3	17.9
DALE	29.1	34.3	30.7	28.0	26.6	7.9	9.4	11.8
GENEVA	36.4	39.3	29.7	24.9	24.0	14.6	18.8	16.3
HENRY	35.4	39.3	30.7	26.7	24.1	14.3	16.3	16.4
HOUSTON	33.1	36.7	31.0	27.6	25.9	10.3	12.5	13.7

Source: U.S. Census, 1980-2000

The median statistic divides the age distribution into two equal parts: one-half falling below the median value and one-half above the value. Covington, Geneva and Henry Counties have the highest median age. Persons residing in Covington, Geneva, and Henry Counties tend to be older. Dale County has the lowest median age in the region, due primarily to location of the Fort Rucker Army Base in the County.

Race

Nationwide, in those geographical areas where the total population increased, the Black population increased at a similar rate. However, in areas that experienced population loss, the White population declined at a higher rate than the Black population. This trend suggests that the Black population was less mobile than the White population. In Southeast Alabama, the Black population increased slightly in Barbour, Coffee, Dale and Houston Counties, and declined in Covington, Geneva, and Henry Counties. See Table 13 for a district analysis of changes in racial composition from 1970 through 2000.

TABLE 13

BLACK POPULATION
1970, 1980, 1990, AND 2000

	1970		1980		1990		2000	
COUNTY	TOTAL	BLACK	TOTAL	BLACK	TOTAL	BLACK	TOTAL	BLACK
BARBOUR	22,543	10,389	24,756	11,003	25,417	11,197	29,038	13,451
		46.1%		44.4%		44.0%		46.3%
COFFEE	34,872	5,695	38,533	6,532	40,240	6,937	43,615	8,013
		17.1%		16.9%		17.2%		18.4%
COVINGTON	34,079	5,043	36,850	4,845	36,487	4,778	37,631	4,648
		14.8%		13.1%		13.1%		12.3%
DALE	52,938	6,448	47,821	7,828	49,633	8,895	49,129	10,002
		12.2%		16.4%		17.9%		20.4%
GENEVA	21,924	2,866	24,253	3,097	23,647	2,827	25,764	2,743
		13.1%		12.8%		11.9%		10.6%
HENRY	13,254	5,341	15,302	5,799	15,374	5,406	16,310	5,268
		40.3%		37.9%		35.2%		32.3%
HOUSTON	56,574	13,408	76,732	16,464	81,331	18,967	88,787	21,840
		23.7%		22.1%		23.3%		24.6%

Source: U.S. Census Bureau

Education

The district has seen improvement in the educational levels of its citizens from 1980 through 2000 as seen in Table 14. Generally, the district has enjoyed good progress in educational attainment. Citizens considerably behind in education are making progress and those above the State's average continue to improve. None of the counties in the district equal the Nation's rate of 80.4% of the population twenty-five years and older having at least a high school education. Dale County's rate was 77.8% and Houston County's rate was 76.5%. These are the only two counties in the region with rates slightly above the State's average of 75.3% in 2000.

TABLE 14

PECENTAGE OF HIGH SCHOOL AND COLLEGE GRADUATES
FOR PERSONS 25 YEARS OF AGE AND OLDER
ALABAMA AND THE DISTRICT COUNTIES - 1980, 1990, AND 2000

Government	Persons 25+	High School Graduates or Higher (In Percent)			College Graduates or Higher (In Percent)	
	2000	1980	1990	2000	1990	2000
Alabama	2,887,400	56.5	66.9	75.3	15.7	19.0
Barbour	18,896	45.0	55.6	64.7	11.8	10.9
Coffee	28,885	56.7	67.2	73.2	16.5	19.3
Covington	25,705	44.3	57.3	68.4	9.1	12.2
Dale	31,390	65.0	74.2	77.8	13.5	14.0
Geneva	17,588	46.0	55.4	65.6	6.8	8.7
Henry	10,967	44.0	58.5	66.7	8.2	14.1
Houston	58,671	58.3	68.3	76.5	15.0	18.4

Source: U.S. Census, 1980-2000

Looking at persons twenty-five and older, which are college graduates or higher, the district is generally behind the state. In 2000, the State rate of persons with a college education was 19.0%. Coffee County, the best in our district, had a rate of 19.3%. Barbour County actually had a decline of .9% from 1990 to 2000. Henry County had the greatest increase of 5.9% from 8.2% to 14.1%. Nationally, the average is 24.4%

It is apparent that some educational progress has been made in the district. However, more progress needs to be made in order for the district to have a well-trained workforce and be able to compete for jobs.

SUMMARY

All counties within the District had positive population changes from 1990 to 2000 except for Dale County. This change, -1.00% moved Dale County into the no-growth population ranking. While Barbour, Covington and Geneva counties came up in their prospective rankings between 1990 and 2000, Coffee and Houston counties declined in their rankings. Henry County remained the same.

Percent change in population from 1960 to 2000 shows an increase in District counties. The state of Alabama increased by 36% during this period. While some counties have seen substantial growth in population, Coffee County by 43%, Dale by 58%, and Houston by 75%, during this period, other counties albeit significantly less showed an increase, Barbour by 18%, Covington by 6%, Geneva by 15%, and Henry by 7%.

Median age ranged from 34.3 to 39.8, increasing from1990 to 2000. Dale County had the lowest median age, this due largely to the presence of the military. Dale County also had the highest percentage of people under eighteen (26.6%), while Covington County had the lowest percentage (23.5%), with only a 3.1% difference. Of the population, age 65 and over, Dale County had the lowest percentage of 11.8%, while Covington County had the highest percentage of 17.9%.

Progress in education continues to be made, but much more needs to be made in order for the Southeast Alabama District to be competitive in the global marketplace.

Labor Force

The Southeast Alabama region has experienced a reduction in the regional labor force due to numerous industrial plant closings over the past 5 years. These closings have primarily affected low skill textile workers. Many of these workers do not possess the skills required to obtain new jobs. These workers will require training in order to learn new skills in the workplace. These workers will be out of the workforce for a period of time while retraining and obtaining new skills. The district has been negatively impacted by the General Agreement on Tariffs and Trade (GATT) agreement and the North American Free Trade Agreement (NAFTA). GATT has impacted the district's agricultural economy through increased competition to the peanut industry with the importation of cheaper foreign peanuts into the U.S. NAFTA has virtually eliminated all textile industries in the district through low-wage labor available off shore. Layoffs, downsizing, and closures have occurred eliminating thousands of jobs.

Labor Force Employment/Unemployment

In order to determine the economic impact recent plant closings and layoffs have had on employment, Table 15 (ten pages) was prepared. This table displays a ten year period covering January 1993 through December 2002, presenting detailed monthly information on: civilian labor force; number of persons employed; unemployment and percentage of unemployment. Figure 2 and Figure 3 are derived from the data in Table 15 and are presented quarterly. Looking at Figure 3, it can be seen that during the last year, unemployment rates have decreased slightly. The unemployment rate between November 2001 and November 2002 decreased 1.3 percent. According to the data in Figure 2, peak employment for the ten-year period occurred in December of 1997 with 133,070 persons.

The District's overall unemployment rate decreased to 4.7% in November 2002 from a previous rate of 6.0% in November 2001. During this time period there were many fluctuations in unemployment rates, with all counties experiencing a decrease in unemployment rates. Barbour County decreased from 7.7% to 5.1%, Coffee County decreased from 5.2% to 3.4%, Covington County decreased slightly from 5.7% to 5.1%, Dale County decreased slightly from 5.1% to 4.1%, Geneva County decreased substantially from 7.4% to 4.0%, Henry County decreased from 6.8% to 5.4%, and Houston County decreased slightly from 4.4% to 3.8%. The trends for the past ten years for the district, in comparison to the state averages, are depicted in Figure 3.

The availability of a quality labor force is a key factor for future development. Since the educational level of the district population is low, some companies may eliminate our district in the data phase of their site selection. This problem prevents the district from being considered for many economic opportunities.

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 1993									
CIVILIAN LABOR FORCE	1,971,100	126,400	12,370	18,630	16,840	19,870	12,020	7,120	39,550
EMPLOYMENT	1,810,500	114,910	10,950	17,190	14,920	18,040	11,160	6,130	36,520
UNEMPLOYMENT	160,600	11,490	1,420	1,440	1,920	1,830	860	990	3,030
UNEMPLOYMENT %	8.1	9.1	11.5	7.7	11.4	9.2	7.1	13.9	7.7
FEBRUARY 1993									
CIVILIAN LABOR FORCE	1,970,600	125,900	12,260	18,780	16,770	19,950	11,740	6,830	39,570
EMPLOYMENT	1,821,600	115,220	11,000	17,380	14,990	18,050	11,100	6,150	36,550
UNEMPLOYMENT	149,000	10,680	1,260	1,400	1,780	1,900	640	680	3,020
UNEMPLOYMENT %	7.6	8.5	10.3	7.5	10.6	9.5	5.5	10.0	7.6
MARCH 1993									
CIVILIAN LABOR FORCE	1,980,900	127,490	12,360	19,020	16,800	20,270	12,000	6,900	40,140
EMPLOYMENT	1,825,300	116,340	11,100	17,570	15,040	18,230	11,260	6,220	36,920
UNEMPLOYMENT	155,600	11,150	1,260	1,450	1,760	2,040	740	680	3,220
UNEMPLOYMENT %	7.9	8.7	10.2	7.6	10.5	10.1	6.2	9.9	8.0
APRIL 1993									
CIVILIAN LABOR FORCE	1,943,300	124,830	12,140	18,710	16,450	19,750	11,650	6,660	39,470
EMPLOYMENT	1,797,400	115,090	11,010	17,460	14,920	18,040	11,060	6,080	36,520
UNEMPLOYMENT	145,900	9,740	1,130	1,250	1,530	1,710	590	580	2,950
UNEMPLOYMENT %	7.5	7.8	9.3	6.7	9.3	8.7	5.1	8.7	7.5
MAY 1993									
CIVILIAN LABOR FORCE	1,966,000	126,710	12,350	19,110	16,530	20,030	11,890	6,810	39,990
EMPLOYMENT	1,824,100	117,410	11,300	17,840	15,170	18,360	11,330	6,230	37,180
UNEMPLOYMENT	141,900	9,300	1,050	1,270	1,360	1,670	560	580	2,810
UNEMPLOYMENT %	7.2	7.3	8.5	6.6	8.2	8.3	4.7	8.5	7.0
JUNE 1993									
CIVILIAN LABOR FORCE	1,966,800	129,230	12,540	19,380	16,830	20,350	12,230	6,970	40,930
EMPLOYMENT	1,817,800	117,840	11,360	17,920	15,310	18,360	11,450	6,250	37,190
UNEMPLOYMENT	149,000	11,390	1,180	1,460	1,520	1,990	780	720	3,740
UNEMPLOYMENT %	7.6	8.8	9.4	7.5	9.1	9.8	6.4	10.4	9.1
JULY 1993									
CIVILIAN LABOR FORCE	1,959,100	129,140	12,610	19,280	16,910	21,280	12,240	6,870	39,950
EMPLOYMENT	1,808,600	115,280	11,070	17,810	15,120	18,170	10,110	6,210	36,790
UNEMPLOYMENT	150,500	13,860	1,540	1,470	1,790	3,110	2,130	660	3,160
UNEMPLOYMENT %	7.7	10.7	12.2	7.6	10.6	14.6	17.4	9.6	7.9
AUGUST 1993									
CIVILIAN LABOR FORCE	1,958,100	127,040	12,290	19,090	16,480	20,180	11,930	6,710	40,360
EMPLOYMENT	1,815,800	116,900	11,260	17,810	15,190	18,270	11,280	6,080	37,010
UNEMPLOYMENT	142,300	10,140	1,030	1,280	1,290	1,910	650	630	3,350
UNEMPLOYMENT %	7.3	8.0	8.4	6.7	7.8	9.4	5.4	9.4	8.3
SEPTEMBER 1993									
CIVILIAN LABOR FORCE	1,958,300	127,430	12,370	19,160	16,570	20,090	12,160	6,770	40,310
EMPLOYMENT	1,815,100	118,100	11,420	17,990	15,420	18,380	11,490	6,180	37,220
UNEMPLOYMENT	143,200	9,330	950	1,170	1,150	1,710	670	590	3,090
UNEMPLOYMENT %	7.3	7.3	7.7	6.1	6.9	8.5	5.5	8.7	7.7
OCTOBER 1993									
CIVILIAN LABOR FORCE	1,941,100	125,710	12,190	18,880	16,260	20,100	11,940	6,570	39,770
EMPLOYMENT	1,808,200	117,130	11,350	17,760	15,150	18,340	11,330	6,060	37,140
UNEMPLOYMENT	132,900	8,580	840	1,120	1,110	1,760	610	510	2,630
UNEMPLOYMENT %	6.8	6.8	6.9	5.9	6.8	8.7	5.1	7.8	6.6
NOVEMBER 1993									
CIVILIAN LABOR FORCE	1,963,300	126,240	12,260	18,760	16,260	20,290	11,900	6,630	40,140
EMPLOYMENT	1,811,900	116,850	11,340	17,560	14,970	18,430	11,230	6,000	37,320
UNEMPLOYMENT	151,400	9,390	920	1,200	1,290	1,860	670	630	2,820
UNEMPLOYMENT %	7.7	7.4	7.5	6.4	7.9	9.2	5.6	9.5	7.0
DECEMBER 1993									
CIVILIAN LABOR FORCE	1,968,800	126,910	12,300	18,690	16,480	20,410	11,990	6,670	40,370
EMPLOYMENT	1,826,300	117,780	11,410	17,460	15,280	18,570	11,350	6,110	37,600
UNEMPLOYMENT	142,500	9,130	890	1,230	1,200	1,840	640	560	2,770
UNEMPLOYMENT %	7.2	7.2	7.2	6.6	7.3	9.0	5.3	8.3	6.9

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 1994									
CIVILIAN LABOR FORCE	2,015,800	130,880	11,930	20,750	17,220	20,690	12,310	6,460	41,520
EMPLOYMENT	1,877,400	121,940	11,000	19,520	15,970	18,960	11,730	5,920	38,840
UNEMPLOYMENT	138,400	8,940	930	1,230	1,250	1,730	580	540	2,680
UNEMPLOYMENT %	6.9	6.8	7.8	5.9	7.3	8.4	4.7	8.3	6.4
FEBRUARY 1994									
CIVILIAN LABOR FORCE	2,015,600	130,860	11,870	20,860	17,160	20,700	12,300	6,380	41,590
EMPLOYMENT	1,884,100	121,710	11,020	19,670	15,900	18,900	11,660	5,830	38,730
UNEMPLOYMENT	131,500	9,150	850	1,190	1,260	1,800	640	550	2,860
UNEMPLOYMENT %	6.5	7.0	7.2	5.7	7.3	8.7	5.2	8.7	6.9
MARCH 1994									
CIVILIAN LABOR FORCE	2,017,100	130,680	11,900	20,800	17,090	20,630	12,480	6,340	41,440
EMPLOYMENT	1,891,100	122,870	11,140	19,770	16,010	19,090	11,860	5,880	39,120
UNEMPLOYMENT	126,000	7,810	760	1,030	1,080	1,540	620	460	2,320
UNEMPLOYMENT %	6.2	6.0	6.4	4.9	6.3	7.5	5.0	7.3	5.6
APRIL 1994									
CIVILIAN LABOR FORCE	2,018,400	131,220	12,030	20,930	17,090	20,720	12,400	6,320	41,730
EMPLOYMENT	1,897,700	123,600	11,300	19,950	16,100	19,200	11,830	5,870	39,350
UNEMPLOYMENT	120,700	7,620	730	980	990	1,520	570	450	2,380
UNEMPLOYMENT %	6.0	5.8	6.1	4.7	5.8	7.3	4.6	7.1	5.7
MAY 1994									
CIVILIAN LABOR FORCE	2,020,100	132,250	11,950	21,040	17,320	20,860	12,850	6,390	41,840
EMPLOYMENT	1,900,800	124,610	11,250	20,150	16,410	19,280	12,090	5,920	39,510
UNEMPLOYMENT	119,300	7,640	700	890	910	1,580	760	470	2,330
UNEMPLOYMENT %	5.9	5.8	5.9	4.2	5.3	7.6	5.9	7.4	5.6
JUNE 1994									
CIVILIAN LABOR FORCE	2,025,600	134,690	12,240	21,360	17,650	21,330	13,120	6,450	42,540
EMPLOYMENT	1,909,500	125,860	11,350	20,340	16,570	19,460	12,320	5,940	39,880
UNEMPLOYMENT	116,100	8,830	890	1,020	1,080	1,870	800	510	2,660
UNEMPLOYMENT %	5.7	6.6	7.3	4.8	6.1	8.8	6.1	7.9	6.3
JULY 1994									
CIVILIAN LABOR FORCE	2,028,200	133,950	12,240	21,430	17,500	21,090	12,870	6,470	42,350
EMPLOYMENT	1,911,200	126,050	11,500	20,340	16,500	19,480	12,310	6,010	39,910
UNEMPLOYMENT	117,000	7,900	740	1,090	1,000	1,610	560	460	2,440
UNEMPLOYMENT %	5.8	5.9	6.1	5.1	5.7	7.6	4.3	7.1	5.8
AUGUST 1994									
CIVILIAN LABOR FORCE	2,034,000	133,800	12,220	21,310	17,320	21,070	12,850	6,400	42,630
EMPLOYMENT	1,915,800	125,910	11,500	20,340	16,330	19,550	12,220	5,900	40,070
UNEMPLOYMENT	118,200	7,890	720	970	990	1,520	630	500	2,560
UNEMPLOYMENT %	5.8	5.9	5.9	4.5	5.7	7.2	4.9	7.7	6.0
SEPTEMBER 1994									
CIVILIAN LABOR FORCE	2,038,700	133,590	12,190	21,560	17,170	20,940	13,010	6,360	42,360
EMPLOYMENT	1,922,500	126,540	11,510	20,640	16,320	19,550	12,490	5,960	40,070
UNEMPLOYMENT	116,200	7,050	680	920	850	1,390	520	400	2,290
UNEMPLOYMENT %	5.7	5.3	5.6	4.3	5.0	6.6	4.0	6.2	5.4
OCTOBER 1994									
CIVILIAN LABOR FORCE	2,037,300	134,030	12,190	21,550	17,160	21,160	12,990	6,320	42,660
EMPLOYMENT	1,917,900	126,460	11,470	20,590	16,270	19,620	12,410	5,880	40,220
UNEMPLOYMENT	119,400	7,570	720	960	890	1,540	580	440	2,440
UNEMPLOYMENT %	5.9	5.6	5.9	4.5	5.2	7.3	4.4	7.0	5.7
NOVEMBER 1994									
CIVILIAN LABOR FORCE	2,048,400	135,440	12,400	21,890	17,400	21,220	13,230	6,490	42,810
EMPLOYMENT	1,929,900	127,870	11,700	20,990	16,510	19,730	12,450	6,060	40,430
UNEMPLOYMENT	118,500	7,570	700	900	890	1,490	780	430	2,380
UNEMPLOYMENT %	5.8	5.6	5.7	4.1	5.1	7.0	5.9	6.6	5.6
DECEMBER 1994									
CIVILIAN LABOR FORCE	2,042,200	133,880	12,180	21,530	17,140	21,100	13,030	6,380	42,520
EMPLOYMENT	1,923,100	126,890	11,570	20,590	16,250	19,720	12,370	5,980	40,410
UNEMPLOYMENT	119,100	6,990	610	940	890	1,380	660	400	2,110
UNEMPLOYMENT %	5.8	5.2	5.0	4.3	5.2	6.6	5.1	6.3	5.0

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 1995									
CIVILIAN LABOR FORCE	2,045,800	132,160	12,290	21,250	17,300	20,640	12,690	6,390	41,600
EMPLOYMENT	1,924,000	124,090	11,520	20,200	16,220	19,010	11,950	5,900	39,290
UNEMPLOYMENT	121,800	8,070	770	1,050	1,080	1,630	740	490	2,310
UNEMPLOYMENT %	6.0	6.1	6.3	4.9	6.3	7.9	5.8	7.6	5.5
FEBRUARY 1995									
CIVILIAN LABOR FORCE	2,049,000	132,810	12,160	21,370	17,460	20,850	12,800	6,300	41,870
EMPLOYMENT	1,922,600	124,400	11,370	20,280	16,190	19,140	12,000	5,870	39,550
UNEMPLOYMENT	126,400	8,410	790	1,090	1,270	1,710	800	430	2,320
UNEMPLOYMENT %	6.2	6.3	6.5	5.1	7.2	8.2	6.2	6.8	5.5
MARCH 1995									
CIVILIAN LABOR FORCE	2,047,700	132,430	12,430	21,180	17,410	20,660	12,800	6,350	41,600
EMPLOYMENT	1,922,600	124,440	10,940	20,220	16,380	19,200	12,030	5,990	39,680
UNEMPLOYMENT	125,100	7,990	1,490	960	1,030	1,460	770	360	1,920
UNEMPLOYMENT %	6.1	6.0	11.9	4.5	5.9	7.1	6.0	5.6	4.6
APRIL 1995									
CIVILIAN LABOR FORCE	2,050,600	133,340	12,240	21,390	17,540	20,860	12,690	6,380	42,240
EMPLOYMENT	1,922,200	125,500	11,190	20,470	16,560	19,370	11,880	6,000	40,030
UNEMPLOYMENT	128,400	7,840	1,050	920	980	1,490	810	380	2,210
UNEMPLOYMENT %	6.3	5.9	8.6	4.3	5.6	7.1	6.4	6.0	5.2
MAY 1995									
CIVILIAN LABOR FORCE	2,054,000	133,120	12,430	21,450	17,580	20,610	12,690	6,370	41,990
EMPLOYMENT	1,923,100	125,520	11,220	20,570	16,650	19,290	11,980	5,950	39,860
UNEMPLOYMENT	130,900	7,600	1,210	880	930	1,320	710	420	2,130
UNEMPLOYMENT %	6.4	5.7	9.7	4.1	5.3	6.4	5.6	6.6	5.1
JUNE 1995									
CIVILIAN LABOR FORCE	2,064,100	136,430	12,600	21,890	18,270	21,150	13,110	6,520	42,890
EMPLOYMENT	1,928,500	126,850	11,380	20,790	16,790	19,460	12,290	5,930	40,210
UNEMPLOYMENT	135,600	9,580	1,220	1,100	1,480	1,690	820	590	2,680
UNEMPLOYMENT %	6.6	7.0	9.7	5.0	8.1	8.0	6.2	9.0	6.2
JULY 1995									
CIVILIAN LABOR FORCE	2,066,000	134,380	12,330	21,790	17,930	20,930	12,670	6,570	42,160
EMPLOYMENT	1,926,000	124,740	11,330	20,750	16,580	19,350	10,740	6,010	39,980
UNEMPLOYMENT	140,000	9,640	1,000	1,040	1,350	1,580	1,930	560	2,180
UNEMPLOYMENT %	6.8	7.2	8.1	4.8	7.5	7.6	15.2	8.5	5.2
AUGUST 1995									
CIVILIAN LABOR FORCE	2,064,800	133,480	12,340	21,540	17,580	20,830	12,470	6,380	42,340
EMPLOYMENT	1,930,900	124,680	11,100	20,470	16,150	19,370	11,620	5,930	40,040
UNEMPLOYMENT	133,900	8,800	1,240	1,070	1,430	1,460	850	450	2,300
UNEMPLOYMENT %	6.5	6.6	10.1	5.0	8.2	7.0	6.8	7.1	5.4
SEPTEMBER 1995									
CIVILIAN LABOR FORCE	2,066,200	133,040	12,180	21,460	17,550	20,820	12,450	6,490	42,090
EMPLOYMENT	1,934,800	124,880	11,140	20,490	16,180	19,400	11,620	5,950	40,100
UNEMPLOYMENT	131,400	8,160	1,040	970	1,370	1,420	830	540	1,990
UNEMPLOYMENT %	6.4	6.1	8.5	4.5	7.8	6.8	6.7	8.4	4.7
OCTOBER 1995									
CIVILIAN LABOR FORCE	2,065,000	133,560	12,350	21,400	17,700	20,960	12,380	6,570	42,200
EMPLOYMENT	1,936,000	125,240	11,290	20,420	16,210	19,480	11,560	6,020	40,260
UNEMPLOYMENT	129,000	8,320	1,060	980	1,490	1,480	820	550	1,940
UNEMPLOYMENT %	6.2	6.2	8.6	4.6	8.4	7.0	6.6	8.3	4.6
NOVEMBER 1995									
CIVILIAN LABOR FORCE	2,069,200	133,730	12,250	21,260	17,770	20,910	12,350	6,560	42,630
EMPLOYMENT	1,943,500	125,780	11,310	20,320	16,360	19,630	11,540	6,050	40,570
UNEMPLOYMENT	125,700	7,950	940	940	1,410	1,280	810	510	2,060
UNEMPLOYMENT %	6.1	5.9	7.6	4.4	7.9	6.1	6.5	7.7	4.8
DECEMBER 1995									
CIVILIAN LABOR FORCE	2,074,200	133,230	12,310	21,480	17,470	20,940	11,800	6,570	42,660
EMPLOYMENT	1,951,500	125,580	11,190	20,410	16,090	19,810	11,020	6,130	40,930
UNEMPLOYMENT	122,700	7,650	1,120	1,070	1,380	1,130	780	440	1,730
UNEMPLOYMENT %	5.9	5.7	9.1	5.0	7.9	5.4	6.6	6.7	4.1

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 1996									
CIVILIAN LABOR FORCE	2,072,900	132,490	12,690	21,210	17,480	20,890	11,650	6,550	42,020
EMPLOYMENT	1,954,600	123,260	11,210	20,250	16,110	19,480	10,380	5,580	40,250
UNEMPLOYMENT	118,300	9,230	1,480	960	1,370	1,410	1,270	970	1,770
UNEMPLOYMENT %	5.7	7.0	11.7	4.5	7.8	6.7	10.9	14.8	4.2
FEBRUARY 1996									
CIVILIAN LABOR FORCE	2,074,000	133,480	12,600	21,340	17,720	21,040	11,810	6,560	42,410
EMPLOYMENT	1,959,800	124,640	11,320	20,410	16,210	19,570	10,620	6,070	40,440
UNEMPLOYMENT	114,200	8,840	1,280	930	1,510	1,470	1,190	490	1,970
UNEMPLOYMENT %	5.5	6.6	10.1	4.4	8.5	7.0	10.1	7.4	4.6
MARCH 1996									
CIVILIAN LABOR FORCE	2,083,300	133,310	12,730	20,880	17,820	20,990	11,920	6,610	42,360
EMPLOYMENT	1,967,100	123,870	11,370	18,830	16,140	19,740	10,840	6,160	40,790
UNEMPLOYMENT	116,200	9,440	1,360	2,050	1,680	1,250	1,080	450	1,570
UNEMPLOYMENT %	5.6	7.1	10.7	9.8	9.4	6.0	9.0	6.8	3.7
APRIL 1996									
CIVILIAN LABOR FORCE	2,087,000	133,500	12,460	21,160	17,570	21,220	12,000	6,440	42,650
EMPLOYMENT	1,970,800	124,730	11,360	19,600	15,940	19,860	10,880	6,050	41,040
UNEMPLOYMENT	116,200	8,770	1,100	1,560	1,630	1,360	1,120	390	1,610
UNEMPLOYMENT %	5.6	6.6	8.9	7.4	9.3	6.4	9.3	6.1	3.8
MAY 1996									
CIVILIAN LABOR FORCE	2,089,700	133,410	12,350	21,170	17,580	21,010	11,990	6,450	42,860
EMPLOYMENT	1,977,300	126,400	11,300	20,260	16,300	20,010	11,050	6,120	41,360
UNEMPLOYMENT	112,400	7,010	1,050	910	1,280	1,000	940	330	1,500
UNEMPLOYMENT %	5.4	5.3	8.5	4.3	7.3	4.7	7.8	5.1	3.5
JUNE 1996									
CIVILIAN LABOR FORCE	2,086,500	135,890	12,750	21,470	17,810	21,440	12,190	6,500	43,730
EMPLOYMENT	1,978,700	127,300	11,370	20,460	16,310	20,220	11,050	6,100	41,790
UNEMPLOYMENT	107,800	8,590	1,380	1,010	1,500	1,220	1,140	400	1,940
UNEMPLOYMENT %	5.2	6.3	10.8	4.7	8.4	5.7	9.3	6.2	4.4
JULY 1996									
CIVILIAN LABOR FORCE	2,089,300	134,120	12,520	21,230	17,460	21,140	11,830	6,430	43,510
EMPLOYMENT	1,985,000	126,360	11,300	20,340	16,060	20,120	10,900	6,050	41,590
UNEMPLOYMENT	104,300	7,760	1,220	890	1,400	1,020	930	380	1,920
UNEMPLOYMENT %	5.0	5.8	9.7	4.2	8.0	4.8	7.8	5.9	4.4
AUGUST 1996									
CIVILIAN LABOR FORCE	2,089,800	133,420	12,290	21,100	17,270	21,070	11,640	6,340	43,710
EMPLOYMENT	1,988,100	125,850	11,190	20,260	16,090	20,080	10,770	5,950	41,510
UNEMPLOYMENT	101,700	7,570	1,100	840	1,180	990	870	390	2,200
UNEMPLOYMENT %	4.9	5.7	9.0	4.0	6.8	1.7	7.5	6.2	5.0
SEPTEMBER 1996									
CIVILIAN LABOR FORCE	2,091,600	132,400	12,240	21,170	17,200	20,790	11,630	6,250	43,120
EMPLOYMENT	1,989,700	125,470	11,200	20,380	16,080	19,930	10,820	5,880	41,180
UNEMPLOYMENT	101,900	6,930	1,040	790	1,120	860	810	370	1,940
UNEMPLOYMENT %	4.9	5.2	8.5	3.7	6.5	4.1	7.0	5.9	4.5
OCTOBER 1996									
CIVILIAN LABOR FORCE	2,095,100	134,160	12,370	21,460	17,570	20,980	11,950	6,430	43,400
EMPLOYMENT	1,995,200	126,420	11,220	20,440	16,230	20,060	10,940	6,060	41,470
UNEMPLOYMENT	99,900	7,740	1,150	1,020	1,340	920	1,010	370	1,930
UNEMPLOYMENT %	4.8	5.8	9.3	4.8	7.6	4.4	8.5	5.8	4.4
NOVEMBER 1996									
CIVILIAN LABOR FORCE	2,097,300	133,860	12,160	21,500	17,410	21,150	11,790	6,380	43,470
EMPLOYMENT	2,000,000	127,030	11,180	20,660	16,170	20,230	10,920	6,060	41,810
UNEMPLOYMENT	97,300	6,830	980	840	1,240	920	870	320	1,660
UNEMPLOYMENT %	4.6	5.1	8.1	3.9	7.1	4.3	7.4	5.1	3.8
DECEMBER 1996									
CIVILIAN LABOR FORCE	2,096,700	134,360	12,160	21,480	17,510	21,190	11,840	6,460	43,720
EMPLOYMENT	2,002,600	127,930	11,230	20,570	16,180	20,430	11,120	6,170	42,230
UNEMPLOYMENT	94,100	6,430	930	910	1,330	760	720	290	1,490
UNEMPLOYMENT %	4.5	4.8	7.7	3.5	7.6	3.6	6.1	4.5	3.4

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 1997									
CIVILIAN LABOR FORCE	2,088,400	131,740	11,960	21,040	17,170	20,730	11,750	6,320	42,770
EMPLOYMENT	1,996,600	125,290	11,050	20,300	16,050	19,840	11,030	6,010	41,010
UNEMPLOYMENT	91,800	6,450	910	740	1,120	890	720	310	1,760
UNEMPLOYMENT %	4.4	4.9	7.6	3.5	6.5	4.3	6.1	4.9	4.1
FEBRUARY 1997									
CIVILIAN LABOR FORCE	2,096,100	132,410	12,250	21,150	17,380	20,800	11,690	6,390	42,750
EMPLOYMENT	2,003,400	125,340	11,110	20,370	16,210	19,790	10,930	6,040	40,890
UNEMPLOYMENT	92,700	7,070	1,140	780	1,170	1,010	760	350	1,860
UNEMPLOYMENT %	4.4	5.3	9.3	3.7	6.7	4.9	6.5	5.4	4.3
MARCH 1997									
CIVILIAN LABOR FORCE	2,105,800	132,280	12,160	21,080	17,280	20,820	11,720	6,420	42,800
EMPLOYMENT	2,010,200	126,350	11,350	20,350	16,300	19,940	11,080	6,120	41,210
UNEMPLOYMENT	95,600	5,930	810	730	980	880	640	300	1,590
UNEMPLOYMENT %	4.5	4.5	6.6	3.5	5.7	4.2	5.5	4.7	3.7
APRIL 1997									
CIVILIAN LABOR FORCE	2,098,900	132,210	12,180	20,910	17,260	20,920	11,580	6,400	42,960
EMPLOYMENT	2,006,100	125,950	11,400	20,180	16,300	19,980	10,710	6,100	41,280
UNEMPLOYMENT	92,800	6,250	780	730	960	940	860	300	1,680
UNEMPLOYMENT %	4.4	4.7	6.4	3.5	5.6	4.5	7.4	4.7	3.9
MAY 1997									
CIVILIAN LABOR FORCE	2,099,900	131,910	12,110	20,830	17,270	20,880	11,470	6,420	42,930
EMPLOYMENT	2,002,000	125,970	11,350	20,180	16,310	19,950	10,850	6,100	41,230
UNEMPLOYMENT	97,900	5,940	760	650	960	930	620	320	1,700
UNEMPLOYMENT %	4.7	4.5	6.2	3.1	5.5	4.4	5.4	4.9	4.0
JUNE 1997									
CIVILIAN LABOR FORCE	2,095,800	133,960	12,360	21,110	17,710	21,340	11,540	6,470	43,430
EMPLOYMENT	2,000,900	126,470	11,400	20,200	16,560	20,020	10,860	6,050	41,380
UNEMPLOYMENT	94,900	7,490	960	910	1,150	1,320	680	420	2,050
UNEMPLOYMENT %	4.5	5.6	7.8	4.3	6.5	6.2	5.9	6.4	4.7
JULY 1997									
CIVILIAN LABOR FORCE	2,108,600	133,250	12,250	21,040	17,480	21,250	11,350	6,440	43,440
EMPLOYMENT	2,009,200	126,570	11,420	20,200	16,470	20,100	10,770	6,060	41,550
UNEMPLOYMENT	99,400	6,680	830	840	1,010	1,150	580	380	1,890
UNEMPLOYMENT %	4.7	5.0	6.8	4	5.8	5.4	5.1	6	4.4
AUGUST 1997									
CIVILIAN LABOR FORCE	2,109,200	132,730	12,120	20,800	17,290	21,290	11,220	6,440	43,570
EMPLOYMENT	2,009,000	125,640	11,260	19,970	16,260	20,060	10,590	6,050	41,450
UNEMPLOYMENT	100,200	7,090	860	830	1,030	1,230	630	390	2,120
UNEMPLOYMENT %	4.8	5.3	7.1	4	6	5.8	5.6	6.1	4.9
SEPTEMBER 1997									
CIVILIAN LABOR FORCE	2,119,100	132,670	12,220	20,870	17,310	21,270	11,260	6,400	43,340
EMPLOYMENT	2,013,900	126,180	11,420	20,130	16,260	20,100	10,690	6,050	41,530
UNEMPLOYMENT	105,200	6,490	800	740	1,050	1,170	570	350	1,810
UNEMPLOYMENT %	5.0	4.9	6.6	3.6	6.1	5.5	5.1	5.5	4.2
OCTOBER 1997									
CIVILIAN LABOR FORCE	2,125,400	133,220	12,250	20,830	17,550	21,520	11,080	6,380	43,610
EMPLOYMENT	2,023,900	126,430	11,450	20,060	16,310	20,240	10,500	6,040	41,830
UNEMPLOYMENT	101,500	6,790	800	770	1,240	1,280	580	340	1,780
UNEMPLOYMENT %	4.8	5.1	6.6	3.7	7.1	5.9	5.3	5.3	4.1
NOVEMBER 1997									
CIVILIAN LABOR FORCE	2,127,900	133,840	12,160	20,950	17,700	21,550	11,060	6,420	44,000
EMPLOYMENT	2,028,900	127,440	11,490	19,910	16,500	20,500	10,550	6,120	42,370
UNEMPLOYMENT	99,000	6,490	670	1040	1,290	1,050	510	300	1,630
UNEMPLOYMENT %	4.7	4.8	5.5	5	7.3	4.9	4.6	4.7	3.7
DECEMBER 1997									
CIVILIAN LABOR FORCE	2,154,100	138,420	12,410	22,220	17,880	22,030	11,940	6,370	45,570
EMPLOYMENT	2,055,000	133,070	11,860	21,450	16,820	21,150	11,530	6,120	44,140
UNEMPLOYMENT	99,100	5,350	550	770	1,060	880	410	250	1,430
UNEMPLOYMENT %	4.6	3.9	4.4	3.5	5.9	4.0	3.4	3.9	3.1

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 1998									
CIVILIAN LABOR FORCE	2,146,400	136,590	12,280	22,180	17,790	21,600	11,720	6,320	44,700
EMPLOYMENT	2,057,300	130,860	11,700	21,390	16,650	20,710	11,170	6,020	43,220
UNEMPLOYMENT	89,100	5,730	580	790	1,140	890	550	300	1,480
UNEMPLOYMENT %	4.1	4.2	4.7	3.5	6.4	4.1	4.7	4.7	3.3
FEBRUARY 1998									
CIVILIAN LABOR FORCE	2,141,600	136,630	12,300	22,000	17,820	21,610	11,790	6,320	44,790
EMPLOYMENT	2,059,800	131,020	11,740	21,260	16,740	20,740	11,230	6,030	43,280
UNEMPLOYMENT	81,800	5,610	560	740	1,080	870	560	290	1,510
UNEMPLOYMENT %	3.8	4.1	4.6	3.4	6.1	4.0	4.7	4.6	3.4
MARCH 1998									
CIVILIAN LABOR FORCE	2,149,900	136,170	12,300	21,530	17,780	21,740	11,660	6,320	44,840
EMPLOYMENT	2,060,000	130,620	11,830	20,160	16,740	20,930	11,230	6,040	43,690
UNEMPLOYMENT	89,900	5,550	470	1,370	1,040	810	430	280	1,150
UNEMPLOYMENT %	4.2	4.1	3.9	6.3	5.8	3.7	3.7	4.5	2.6
APRIL 1998									
CIVILIAN LABOR FORCE	2,137,500	135,660	12,410	21,770	17,440	21,590	11,520	6,180	44,750
EMPLOYMENT	2,058,800	131,460	11,950	21,170	16,620	20,930	11,170	5,940	43,680
UNEMPLOYMENT	78,700	4,200	460	600	820	660	350	240	1,070
UNEMPLOYMENT %	3.7	3.1	3.7	2.8	4.7	3.1	3.1	3.9	2.4
MAY 1998									
CIVILIAN LABOR FORCE	2,144,600	136,390	12,490	21,830	17,550	21,620	11,610	6,300	44,990
EMPLOYMENT	2,057,900	131,750	11,980	21,200	16,730	20,920	11,230	6,030	43,660
UNEMPLOYMENT	86,700	4,640	510	630	820	700	380	270	1,330
UNEMPLOYMENT %	4.0	3.4	4.1	2.9	4.7	3.2	3.3	4.3	3.0
JUNE 1998									
CIVILIAN LABOR FORCE	2,142,500	138,530	12,820	22,010	17,930	21,970	11,770	6,440	45,590
EMPLOYMENT	2,060,700	132,450	12,140	21,200	16,890	21,060	11,100	6,100	43,960
UNEMPLOYMENT	81,800	6,080	680	810	1,040	910	670	340	1,630
UNEMPLOYMENT %	3.8	4.4	5.3	3.7	5.8	4.1	5.7	5.3	3.6
JULY 1998									
CIVILIAN LABOR FORCE	2,146,100	137,630	12,700	22,170	17,970	21,790	11,090	6,610	45,300
EMPLOYMENT	2,067,800	132,490	12,090	21,460	17,020	21,040	10,650	6,330	43,900
UNEMPLOYMENT	78,300	5,140	610	710	950	750	440	280	1,400
UNEMPLOYMENT %	3.7	3.7	4.8	3.2	5.3	3.5	4.0	4.2	3.1
AUGUST 1998									
CIVILIAN LABOR FORCE	2,145,600	136,640	12,590	21,920	17,650	21,770	11,030	6,570	45,110
EMPLOYMENT	2,065,500	131,100	11,940	21,190	16,640	20,960	10,370	6,250	43,750
UNEMPLOYMENT	80,100	5,540	650	730	1,010	810	660	320	1,360
UNEMPLOYMENT %	3.7	4.1	5.2	3.3	5.7	3.7	6.0	4.9	3.0
SEPTEMBER 1998									
CIVILIAN LABOR FORCE	2,152,100	136,660	12,650	22,010	17,690	21,680	11,060	6,530	45,040
EMPLOYMENT	2,061,600	130,830	12,000	21,230	16,570	20,890	10,320	6,230	43,590
UNEMPLOYMENT	90,500	5,830	650	780	1,120	790	740	300	1,450
UNEMPLOYMENT %	4.2	4.3	5.1	3.5	6.3	3.6	6.7	4.6	3.2
OCTOBER 1998									
CIVILIAN LABOR FORCE	2,158,600	137,190	12,710	22,140	17,780	21,850	11,110	6,410	45,190
EMPLOYMENT	2,064,400	130,710	12,060	21,330	16,450	20,940	10,130	6,100	43,700
UNEMPLOYMENT	94,200	6,480	650	810	1,330	910	980	310	1,490
UNEMPLOYMENT %	4.4	4.7	5.1	3.7	7.5	4.1	8.8	4.9	3.3
NOVEMBER 1998									
CIVILIAN LABOR FORCE	2,153,200	135,970	12,640	21,920	17,660	21,730	10,330	6,420	45,270
EMPLOYMENT	2,062,000	129,660	12,080	21,050	16,430	20,980	9,320	6,010	43,790
UNEMPLOYMENT	91,200	6,310	560	870	1,230	750	1,010	410	1,480
UNEMPLOYMENT %	4.2	4.6	4.4	4.0	6.9	3.5	9.7	6.4	3.3
DECEMBER 1998									
CIVILIAN LABOR FORCE	2,158,800	135,250	12,940	21,840	17,490	21,320	10,460	6,150	45,050
EMPLOYMENT	2,071,500	130,010	12,510	21,060	16,410	20,670	9,540	5,920	43,900
UNEMPLOYMENT	87,300	5,240	430	780	1,080	650	920	230	1,150
UNEMPLOYMENT %	4.0	3.9	3.3	3.5	6.1	3.1	8.8	3.7	2.5

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 1999									
CIVILIAN LABOR FORCE	2,162,300	134,240	12,910	21,630	17,470	21,140	10,340	6,130	44,620
EMPLOYMENT	2,077,000	128,110	12,420	20,770	16,140	20,320	9,460	5,850	43,150
UNEMPLOYMENT	85,300	6,130	490	860	1,330	820	880	280	1,470
UNEMPLOYMENT %	3.9	4.6	3.8	4.0	7.6	3.9	8.5	4.6	3.3
FEBRUARY 1999									
CIVILIAN LABOR FORCE	2,161,700	134,460	12,900	21,910	17,480	21,140	10,310	6,120	44,600
EMPLOYMENT	2,076,400	127,930	12,390	20,890	16,210	20,240	9,400	5,810	42,990
UNEMPLOYMENT	85,300	6,530	510	1,020	1,270	900	910	310	1,610
UNEMPLOYMENT %	3.9	4.9	3.9	4.6	7.3	4.2	8.9	5.1	3.6
MARCH 1999									
CIVILIAN LABOR FORCE	2,176,100	134,670	12,930	21,730	17,350	21,360	10,140	6,130	45,030
EMPLOYMENT	2,079,800	128,740	12,440	20,900	16,170	20,530	9,270	5,820	43,610
UNEMPLOYMENT	96,300	5,930	490	830	1,180	830	870	310	1,420
UNEMPLOYMENT %	4.4	4.4	3.8	3.8	6.8	3.9	8.6	5.1	3.1
APRIL 1999									
CIVILIAN LABOR FORCE	2,173,300	135,410	13,160	21,730	17,440	21,490	10,170	6,110	45,310
EMPLOYMENT	2,073,200	129,030	12,600	20,870	16,210	20,590	9,250	5,780	43,730
UNEMPLOYMENT	100,100	6,380	560	860	1,230	900	920	330	1,580
UNEMPLOYMENT %	4.6	4.7	4.2	3.9	7.1	4.2	9.0	5.4	3.5
MAY 1999									
CIVILIAN LABOR FORCE	2,174,000	135,280	13,210	21,580	17,350	21,500	10,150	6,090	45,400
EMPLOYMENT	2,071,900	128,840	12,560	20,790	16,150	20,580	9,270	5,770	43,720
UNEMPLOYMENT	102,100	6,440	650	790	1,200	920	880	320	1,680
UNEMPLOYMENT %	4.7	4.8	4.9	3.7	6.9	4.3	8.6	5.3	3.7
JUNE 1999									
CIVILIAN LABOR FORCE	2,164,400	136,850	13,370	21,810	17,560	21,880	10,250	6,170	45,810
EMPLOYMENT	2,067,800	129,120	12,580	20,820	15,930	20,680	9,360	5,820	43,930
UNEMPLOYMENT	96,600	7,730	790	990	1,630	1,200	890	350	1,880
UNEMPLOYMENT %	4.5	5.6	5.9	4.6	9.3	5.5	8.7	5.7	4.1
JULY 1999									
CIVILIAN LABOR FORCE	2,170,200	135,690	13,200	21,750	17,160	21,720	10,190	6,170	45,500
EMPLOYMENT	2,082,600	129,500	12,600	20,880	15,900	20,730	9,480	5,880	44,030
UNEMPLOYMENT	87,600	6,190	600	870	1,260	990	710	290	1,470
UNEMPLOYMENT %	4.0	4.6	4.5	4.0	7.4	4.6	6.9	4.7	3.2
AUGUST 1999									
CIVILIAN LABOR FORCE	2,171,600	135,290	13,200	21,580	17,200	21,620	10,060	6,210	45,420
EMPLOYMENT	2,074,900	128,400	12,530	20,640	15,740	20,570	9,390	5,840	43,690
UNEMPLOYMENT	96,700	6,890	670	940	1,460	1,050	670	370	1,730
UNEMPLOYMENT %	4.5	5.1	5.1	4.4	8.5	4.9	6.7	6.0	3.8
SEPTEMBER 1999									
CIVILIAN LABOR FORCE	2,172,700	134,860	13,160	21,710	17,130	21,540	9,920	6,180	45,220
EMPLOYMENT	2,071,600	128,040	12,500	20,750	15,680	20,480	9,280	5,850	43,500
UNEMPLOYMENT	101,100	6,820	660	960	1,450	1,060	640	330	1,720
UNEMPLOYMENT %	4.7	5.1	5.0	4.4	8.5	4.9	6.4	5.3	3.8
OCTOBER 1999									
CIVILIAN LABOR FORCE	2,164,600	135,080	13,160	21,740	17,080	21,700	9,790	6,140	45,470
EMPLOYMENT	2,070,100	128,490	12,460	20,760	15,720	20,640	9,230	5,830	43,850
UNEMPLOYMENT	94,500	6,590	700	980	1,360	1,060	560	310	1,620
UNEMPLOYMENT %	4.4	4.9	5.3	4.5	8.0	4.9	5.7	5.0	3.6
NOVEMBER 1999									
CIVILIAN LABOR FORCE	2,166,200	135,510	13,170	21,670	17,070	21,850	9,890	6,120	45,740
EMPLOYMENT	2,071,000	129,370	12,570	20,520	15,820	20,880	9,370	5,860	44,350
UNEMPLOYMENT	95,200	6,140	600	1,150	1,250	970	520	260	1,390
UNEMPLOYMENT %	4.4	4.5	4.6	5.3	7.3	4.4	5.2	4.3	3.0
DECEMBER 1999									
CIVILIAN LABOR FORCE	2,182,500	139,110	13,610	22,490	17,520	21,840	10,700	6,510	46,440
EMPLOYMENT	2,079,500	132,860	13,080	21,150	16,280	20,910	10,210	6,230	45,000
UNEMPLOYMENT	103,000	6,250	530	1,340	1,240	930	490	280	1,440
UNEMPLOYMENT %	4.7	4.5	3.9	5.9	7.1	4.3	4.6	4.3	3.1

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 2000									
CIVILIAN LABOR FORCE	2,197,800	139,870	13,520	22,380	17,920	21,860	10,730	6,610	46,850
EMPLOYMENT	2,089,700	131,910	12,920	20,880	16,240	20,800	10,130	6,170	44,770
UNEMPLOYMENT	108,100	7,960	600	1,500	1,680	1,060	600	440	2,080
UNEMPLOYMENT %	4.9	5.7	4.4	6.7	9.4	4.9	5.6	6.6	4.4
FEBRUARY 2000									
CIVILIAN LABOR FORCE	2,200,000	140,170	13,660	22,330	17,980	21,990	10,680	6,570	46,960
EMPLOYMENT	2,098,400	132,220	13,030	20,980	16,280	20,830	10,100	6,170	44,830
UNEMPLOYMENT	101,600	7,950	630	1,350	1,700	1,160	580	400	2,130
UNEMPLOYMENT %	4.5	5.7	4.6	6.1	9.5	5.3	5.5	6.1	4.5
MARCH 2000									
CIVILIAN LABOR FORCE	2,186,700	138,530	13,550	21,960	17,600	21,750	10,660	6,450	46,560
EMPLOYMENT	2,095,200	132,260	13,030	20,890	16,240	20,890	10,090	6,150	44,970
UNEMPLOYMENT	91,500	6,270	520	1,070	1,360	860	570	300	1,590
UNEMPLOYMENT %	4.2	4.5	3.9	4.9	7.7	4.0	5.3	4.6	3.4
APRIL 2000									
CIVILIAN LABOR FORCE	2,177,700	138,340	13,580	21,890	17,510	21,730	10,660	6,420	46,550
EMPLOYMENT	2,087,700	131,640	12,990	20,790	16,130	20,830	9,970	6,100	44,830
UNEMPLOYMENT	90,000	6,700	590	1,100	1,380	900	690	320	1,720
UNEMPLOYMENT %	4.1	4.8	4.3	5.0	7.9	4.1	6.5	4.9	3.7
MAY 2000									
CIVILIAN LABOR FORCE	2,187,200	139,350	13,690	22,140	17,720	21,840	10,710	6,460	46,790
EMPLOYMENT	2,093,800	132,260	13,110	20,930	16,290	20,870	10,030	6,120	44,910
UNEMPLOYMENT	93,400	7,090	580	1,210	1,430	970	680	340	1,880
UNEMPLOYMENT %	4.3	5.1	4.2	5.5	8.1	4.4	6.3	5.3	4.0
JUNE 2000									
CIVILIAN LABOR FORCE	2,179,000	141,360	13,790	22,070	17,920	22,270	10,840	6,560	47,910
EMPLOYMENT	2,096,100	132,720	13,060	20,750	16,350	21,050	10,050	6,160	45,300
UNEMPLOYMENT	82,900	8,640	730	1,320	1,570	1,220	790	400	2,610
UNEMPLOYMENT %	3.8	6.1	5.3	6.0	8.8	5.5	7.3	6.1	5.5
JULY 2000									
CIVILIAN LABOR FORCE	2,187,600	139,960	13,750	21,980	17,710	22,050	10,690	6,400	47,380
EMPLOYMENT	2,097,700	132,250	13,100	20,630	16,350	20,970	10,020	6,060	45,120
UNEMPLOYMENT	89,900	7,710	650	1,350	1,360	1,080	670	340	2,260
UNEMPLOYMENT %	4.1	5.7	4.7	6.1	7.7	4.9	6.3	5.3	4.8
AUGUST 2000									
CIVILIAN LABOR FORCE	2,193,800	140,000	13,750	21,890	17,730	22,080	10,740	6,490	47,320
EMPLOYMENT	2,094,300	131,550	13,020	20,610	16,200	20,820	9,990	6,100	44,810
UNEMPLOYMENT	99,500	8,450	730	1,280	1,530	1,260	750	390	2,510
UNEMPLOYMENT %	4.5	6.3	5.3	5.9	8.6	5.7	7.0	6.0	5.3
SEPTEMBER 2000									
CIVILIAN LABOR FORCE	2,186,200	139,260	13,630	21,990	17,690	21,940	10,610	6,490	46,910
EMPLOYMENT	2,089,900	131,400	12,930	20,820	16,130	20,760	9,970	6,110	44,680
UNEMPLOYMENT	96,300	7,860	700	1,170	1,560	1,180	640	380	2,230
UNEMPLOYMENT %	4.4	5.9	5.2	5.3	8.8	5.4	6.0	5.8	4.7
OCTOBER 2000									
CIVILIAN LABOR FORCE	2,187,200	140,350	13,970	22,200	17,790	22,090	10,730	6,570	47,000
EMPLOYMENT	2,090,100	132,090	13,020	20,920	16,200	20,850	10,050	6,170	44,880
UNEMPLOYMENT	97,100	8,260	950	1,280	1,590	1,240	680	400	2,120
UNEMPLOYMENT %	4.4	6.3	6.8	5.8	8.9	5.6	6.4	6.1	4.5
NOVEMBER 2000									
CIVILIAN LABOR FORCE	2,183,800	139,880	13,900	21,670	17,800	22,150	10,710	6,570	47,080
EMPLOYMENT	2,081,700	131,720	13,020	20,500	16,210	20,880	10,010	6,160	44,940
UNEMPLOYMENT	102,100	8,160	880	1,170	1,590	1,270	700	410	2,140
UNEMPLOYMENT %	4.7	6.2	6.3	5.4	8.9	5.7	6.5	6.3	4.5
DECEMBER 2000									
CIVILIAN LABOR FORCE	2,175,200	137,420	14,300	21,340	17,350	21,600	10,390	6,640	45,800
EMPLOYMENT	2,076,400	129,690	13,590	19,750	15,730	20,520	9,820	6,230	44,050
UNEMPLOYMENT	98,800	7,730	710	1,590	1,620	1,080	570	410	1,750
UNEMPLOYMENT %	4.5	6.0	5.0	7.5	9.3	5.0	5.5	6.2	3.8

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 2001									
CIVILIAN LABOR FORCE	2,188,500	136,910	14,380	21,260	17,450	21,340	10,580	6,690	45,210
EMPLOYMENT	2,080,900	127,890	13,480	19,500	15,730	20,150	9,530	6,240	43,260
UNEMPLOYMENT	107,600	9,020	900	1,760	1,720	1,190	1,050	450	1,950
UNEMPLOYMENT %	4.9	7.3	6.3	8.3	9.8	5.6	9.9	6.7	4.3
FEBRUARY 2001									
CIVILIAN LABOR FORCE	2,191,000	136,640	14,730	21,050	17,260	21,350	10,330	6,710	45,210
EMPLOYMENT	2,082,300	127,060	13,210	19,420	15,660	20,170	9,160	6,130	43,310
UNEMPLOYMENT	108,700	9,580	1,520	1,630	1,600	1,180	1,170	580	1,900
UNEMPLOYMENT %	5.0	8.1	10.3	7.7	9.3	5.5	11.3	8.7	4.2
MARCH 2001									
CIVILIAN LABOR FORCE	2,187,900	136,470	14,340	21,040	17,140	21,480	10,380	6,660	45,430
EMPLOYMENT	2,069,800	127,770	13,230	19,400	15,700	20,320	9,280	6,200	43,640
UNEMPLOYMENT	118,100	8,700	1,110	1,640	1,440	1,160	1,100	460	1,790
UNEMPLOYMENT %	5.4	7.2	7.7	7.8	8.4	5.4	10.6	6.9	3.9
APRIL 2001									
CIVILIAN LABOR FORCE	2,187,200	137,030	14,380	21,180	17,000	21,590	10,460	6,640	45,780
EMPLOYMENT	2,071,600	128,310	13,260	19,560	15,650	20,440	9,320	6,190	43,890
UNEMPLOYMENT	115,600	8,720	1,120	1,620	1,350	1,150	1,140	450	1,890
UNEMPLOYMENT %	5.3	7.2	7.8	7.7	7.9	5.3	10.9	6.8	4.1
MAY 2001									
CIVILIAN LABOR FORCE	2,169,500	136,470	14,210	21,080	16,940	21,510	10,340	6,640	45,750
EMPLOYMENT	2,067,000	129,040	13,190	19,800	15,720	20,520	9,470	6,280	44,060
UNEMPLOYMENT	102,500	7,430	1,020	1,280	1,220	990	870	360	1,690
UNEMPLOYMENT %	4.7	6.1	7.2	6.1	7.2	4.6	8.4	5.4	3.7
JUNE 2001									
CIVILIAN LABOR FORCE	2,156,200	136,420	14,240	20,890	16,790	21,650	10,170	6,560	46,120
EMPLOYMENT	2,064,700	128,710	13,200	19,640	15,640	20,580	9,280	6,180	44,190
UNEMPLOYMENT	91,500	7,710	1,040	1,250	1,150	1,070	890	380	1,930
UNEMPLOYMENT %	4.2	6.2	7.3	6.0	6.8	4.9	8.8	5.7	4.2
JULY 2001									
CIVILIAN LABOR FORCE	2,156,000	135,230	14,060	20,550	16,580	21,540	10,040	6,570	45,890
EMPLOYMENT	2,059,400	128,550	13,050	19,500	15,690	20,610	9,260	6,200	44,240
UNEMPLOYMENT	96,600	6,680	1,010	1,050	890	930	780	370	1,650
UNEMPLOYMENT %	4.5	5.6	7.2	5.1	5.4	4.3	7.7	5.7	3.6
AUGUST 2001									
CIVILIAN LABOR FORCE	2,163,500	135,080	14,110	20,540	16,550	21,450	10,110	6,630	45,690
EMPLOYMENT	2,061,700	127,890	13,030	19,490	15,570	20,430	9,290	6,220	43,860
UNEMPLOYMENT	101,800	7,190	1,080	1,050	980	1,020	820	410	1,830
UNEMPLOYMENT %	4.7	5.9	7.6	5.1	5.9	4.7	8.1	6.2	4.0
SEPTEMBER 2001									
CIVILIAN LABOR FORCE	2,167,800	134,180	14,010	20,450	16,590	21,350	10,030	6,540	45,210
EMPLOYMENT	2,059,400	127,380	13,060	19,450	15,630	20,270	9,260	6,190	43,520
UNEMPLOYMENT	108,400	6,800	950	1,000	960	1,080	770	350	1,690
UNEMPLOYMENT %	5.0	5.6	6.8	4.9	5.8	5.1	7.7	5.3	3.7
OCTOBER 2001									
CIVILIAN LABOR FORCE	2,170,200	135,580	14,080	20,700	16,770	21,590	10,210	6,610	45,620
EMPLOYMENT	2,056,100	128,500	13,110	19,610	15,810	20,410	9,450	6,280	43,830
UNEMPLOYMENT	114,100	7,080	970	1,090	960	1,180	760	330	1,790
UNEMPLOYMENT %	5.3	5.7	6.9	5.3	5.7	5.5	7.5	4.9	3.9
NOVEMBER 2001									
CIVILIAN LABOR FORCE	2,170,100	134,590	14,030	20,360	16,530	21,490	9,810	6,550	45,820
EMPLOYMENT	2,044,600	127,240	12,950	19,310	15,590	20,400	9,090	6,100	43,800
UNEMPLOYMENT	125,500	7,350	1,080	1,050	940	1,090	720	450	2,020
UNEMPLOYMENT %	5.8	6.0	7.7	5.2	5.7	5.1	7.4	6.8	4.4
DECEMBER 2001									
CIVILIAN LABOR FORCE	2,150,400	133,550	14,050	19,430	16,460	21,460	9,830	6,480	45,840
EMPLOYMENT	2,020,600	126,550	13,250	18,380	15,420	20,420	9,120	6,120	43,840
UNEMPLOYMENT	129,800	7,000	800	1,050	1,040	1,040	710	360	2,000
UNEMPLOYMENT %	6.0	5.6	5.7	5.4	6.3	4.8	7.2	5.6	4.4

TABLE 15
LABOR FORCE DATA FOR
ALABAMA AND THE DISTRICT COUNTIES

(continued)

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
JANUARY 2002									
CIVILIAN LABOR FORCE	2,163,500	133,010	14,070	19,180	16,550	21,350	9,790	6,540	45,530
EMPLOYMENT	2,049,700	125,930	13,140	18,260	15,480	20,280	9,090	6,130	43,550
UNEMPLOYMENT	113,800	7,080	930	920	1,070	1,070	700	410	1,980
UNEMPLOYMENT %	5.3	5.8	6.6	4.8	6.4	5.0	7.2	6.3	4.3
FEBRUARY 2002									
CIVILIAN LABOR FORCE	2,165,200	123,560	14,070	19,150	16,620	12,260	9,630	6,480	45,350
EMPLOYMENT	2,047,000	125,710	13,230	18,280	15,540	20,190	9,010	6,110	43,350
UNEMPLOYMENT	118,200	6,850	840	870	1,080	1,070	620	370	2,000
UNEMPLOYMENT %	5.5	5.5	6.0	4.5	6.5	5.0	6.4	5.8	4.4
MARCH 2002									
CIVILIAN LABOR FORCE	2,161,800	132,380	13,990	19,170	16,510	21,250	9,610	6,520	45,330
EMPLOYMENT	2,032,700	125,570	13,050	18,320	15,570	20,190	9,000	6,090	43,350
UNEMPLOYMENT	129,100	6,810	940	850	940	1,060	610	430	1,980
UNEMPLOYMENT %	6.0	5.6	6.7	4.4	5.7	5.0	6.4	6.5	4.4
APRIL 2002									
CIVILIAN LABOR FORCE	2,154,300	132,760	14,090	19,300	16,550	21,350	9,640	6,540	45,290
EMPLOYMENT	2,033,300	126,200	13,040	18,440	15,680	20,280	9,080	6,140	43,540
UNEMPLOYMENT	121,000	6,560	1,050	860	870	1,070	560	400	1,750
UNEMPLOYMENT %	5.6	5.4	7.5	4.4	5.3	5.0	5.8	6.2	3.9
MAY 2002									
CIVILIAN LABOR FORCE	2,152,600	133,210	14,130	19,300	16,810	21,340	9,630	6,570	45,430
EMPLOYMENT	2,029,700	126,810	13,140	18,560	15,760	20,350	9,130	6,180	43,690
UNEMPLOYMENT	122,900	6,400	990	740	1,050	990	500	390	1,740
UNEMPLOYMENT %	5.7	5.2	7.0	3.8	6.2	4.6	5.2	5.9	3.8
JUNE 2002									
CIVILIAN LABOR FORCE	2,140,300	135,410	14,340	19,380	16,940	21,810	10,050	6,750	46,140
EMPLOYMENT	2,024,400	128,370	13,140	18,600	16,010	20,590	9,530	6,300	44,200
UNEMPLOYMENT	115,900	7,040	1,200	780	930	1,220	520	450	1,940
UNEMPLOYMENT %	5.4	5.6	8.4	4.0	5.5	5.6	5.1	6.7	4.2
JULY 2002									
CIVILIAN LABOR FORCE	2,150,100	135,710	14,200	19,400	17,170	21,810	9,950	6,940	46,240
EMPLOYMENT	2,027,500	128,700	13,150	18,630	16,020	20,680	9,510	6,310	44,400
UNEMPLOYMENT	122,600	7,390	1,050	1,150	1,150	1,130	440	630	1,840
UNEMPLOYMENT %	5.7	5.8	7.4	4.0	6.7	5.2	4.4	9.0	4.0
AUGUST 2002									
CIVILIAN LABOR FORCE	2,146,800	134,280	14,090	19,190	16,580	21,730	9,810	6,630	46,250
EMPLOYMENT	2,024,600	127,700	13,080	18,440	15,750	20,630	9,330	6,170	44,300
UNEMPLOYMENT	122,200	6,580	1,010	750	830	1,100	480	460	1,950
UNEMPLOYMENT %	5.7	5.3	7.1	3.9	5.0	5.0	4.9	6.9	4.2
SEPTEMBER 2002									
CIVILIAN LABOR FORCE	2,151,500	133,800	13,890	19,350	16,500	21,620	9,660	6,550	46,230
EMPLOYMENT	2,029,900	127,770	13,080	18,600	15,710	20,650	9,210	6,180	44,340
UNEMPLOYMENT	121,600	6,030	810	750	790	970	450	370	1,890
UNEMPLOYMENT %	5.7	4.8	5.8	3.9	4.8	4.5	4.7	5.6	4.1
OCTOBER 2002									
CIVILIAN LABOR FORCE	2,157,700	134,720	13,980	19,550	16,630	21,810	9,710	6,550	46,490
EMPLOYMENT	2,036,400	128,450	13,150	18,790	15,770	20,740	9,270	6,200	44,530
UNEMPLOYMENT	121,300	6,270	830	760	860	1,070	440	350	1,960
UNEMPLOYMENT %	5.6	4.9	5.9	3.9	5.2	4.9	4.6	5.3	4.2
NOVEMBER 2002									
CIVILIAN LABOR FORCE	2,161,400	134,930	14,000	19,440	16,680	21,860	9,640	6,510	46,800
EMPLOYMENT	2,035,100	128,860	13,230	18,730	15,780	20,890	9,240	6,140	44,850
UNEMPLOYMENT	126,300	6,070	770	710	900	970	400	370	1,950
UNEMPLOYMENT %	5.8	4.7	5.5	3.7	5.4	4.4	4.2	5.6	4.2
DECEMBER 2002									
CIVILIAN LABOR FORCE	2,091,000	128,440	13,000	18,780	15,890	20,380	9,030	6,100	45,260
EMPLOYMENT	1,966,700	122,850	12,300	18,130	15,040	19,490	8,650	5,760	43,480
UNEMPLOYMENT	124,300	5,590	700	650	850	890	380	340	1,780
UNEMPLOYMENT %	5.9	4.6	5.4	3.5	5.3	4.4	4.2	5.6	3.9

SOURCE: STATE OF ALABAMA, DEPARTMENT OF INDUSTRIAL RELATIONS, 1993-2002

LABOR FORCE DATA FOR ALABAMA AND THE DISTRICT COUNTIES

	ALABAMA	REGION	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
1993									
CIVILIAN LABOR FORCE	1,990,000	130,470	11,760	20,670	16,620	20,940	12,050	6,500	41,930
EMPLOYMENT	1,840,000	119,930	10,600	19,270	15,080	19,000	11,240	5,860	38,880
UNEMPLOYMENT	149,000	10,540	1,160	1,400	1,540	1,940	810	640	3,050
UNEMPLOYMENT %	7.5	8.1	9.9	6.8	9.3	9.3	6.7	9.9	7.3
1994									
CIVILIAN LABOR FORCE	2,031,000	132,880	12,100	21,380	17,370	20,940	12,670	6,360	42,060
EMPLOYMENT	1,909,000	124,550	11,260	20,250	16,290	19,380	11,870	5,860	39,640
UNEMPLOYMENT	122,000	8,330	840	1,130	1,080	1,560	800	500	2,420
UNEMPLOYMENT %	6.0	6.3	6.9	5.3	6.2	7.5	6.3	7.8	5.8
1995									
CIVILIAN LABOR FORCE	2,062,300	133,670	12,360	21,520	17,640	21,120	12,640	6,370	42,020
EMPLOYMENT	1,932,800	125,320	11,280	20,510	16,370	19,650	11,750	5,890	39,870
UNEMPLOYMENT	129,500	8,350	1,080	1,010	1,270	1,470	890	480	2,150
UNEMPLOYMENT %	6.3	6.2	8.7	4.7	7.2	7.0	7.0	7.5	5.1
1996									
CIVILIAN LABOR FORCE	2,087,767	133,700	12,443	21,264	17,533	21,076	11,853	6,450	43,080
EMPLOYMENT	1,980,742	125,772	11,271	20,205	16,152	19,978	10,858	6,021	41,288
UNEMPLOYMENT	107,025	7,928	1,173	1,059	1,382	1,098	996	429	1,792
UNEMPLOYMENT %	5.1	5.9	9.4	5.0	7.9	5.2	8.4	6.7	4.2
1997									
CIVILIAN LABOR FORCE	2,102,422	132,573	12,179	20,981	17,350	21,033	11,509	6,411	43,110
EMPLOYMENT	2,005,700	125,973	11,307	20,209	16,302	19,976	10,834	6,064	41,281
UNEMPLOYMENT	96,722	6,599	872	772	1,048	1,058	673	347	1,829
UNEMPLOYMENT %	4.6	5.0	7.2	3.7	6.0	5.0	5.9	5.4	4.2
1998									
CIVILIAN LABOR FORCE	2,152,700	135,650	12,750	22,060	17,450	21,240	11,060	6,310	44,780
EMPLOYMENT	2,061,900	129,830	12,150	21,210	16,350	20,400	10,390	6,000	43,330
UNEMPLOYMENT	90,800	5,820	600	850	1,100	840	670	310	1,450
UNEMPLOYMENT %	4.2	4.3	4.7	3.8	6.3	4.0	6.1	4.9	3.2
1999									
CIVILIAN LABOR FORCE	2,140,900	135,860	13,370	21,890	17,080	21,280	10,670	6,430	45,140
EMPLOYMENT	2,038,900	128,890	12,720	20,850	15,670	20,240	9,870	6,090	43,450
UNEMPLOYMENT	102,000	6,970	650	1,040	1,410	1,040	800	340	1,690
UNEMPLOYMENT %	4.8	5.6	4.9	4.7	8.2	4.9	7.5	5.2	3.8
2000									
CIVILIAN LABOR FORCE	2,154,300	136,790	13,990	21,490	16,950	21,470	10,500	6,600	45,790
EMPLOYMENT	2,055,200	128,770	13,270	20,160	15,370	20,320	9,820	6,210	43,620
UNEMPLOYMENT	99,100	8,020	720	1,330	1,580	1,150	680	390	2,170
UNEMPLOYMENT %	4.6	6.2	5.1	6.2	9.3	5.4	6.5	5.9	4.7
2001									
CIVILIAN LABOR FORCE	2,147,600	134,220	14,260	19,880	16,450	21,440	10,090	6,570	45,530
EMPLOYMENT	2,033,200	126,170	13,170	18,550	15,230	20,310	9,160	6,140	43,610
UNEMPLOYMENT	114,400	8,050	1,090	1,330	1,220	1,130	930	430	1,920
UNEMPLOYMENT %	5.3	6.7	7.7	6.7	7.4	5.3	9.2	6.5	4.2
2002									
CIVILIAN LABOR FORCE	2,102,900	128,740	13,290	18,680	15,950	20,380	9,150	6,280	45,010
EMPLOYMENT	1,978,500	122,090	12,340	17,880	14,990	19,310	8,630	5,860	43,080
UNEMPLOYMENT	124,400	6,650	950	800	960	1,070	520	420	1,930
UNEMPLOYMENT %	5.9	5.6	7.1	4.3	6.0	5.3	5.7	6.7	4.3

SOURCE: STATE OF ALABAMA, DEPARTMENT OF INDUSTRIAL RELATIONS, 1993-2002

FIGURE 3
SEARP&DC REGIONAL LABOR FORCE
1993-2002

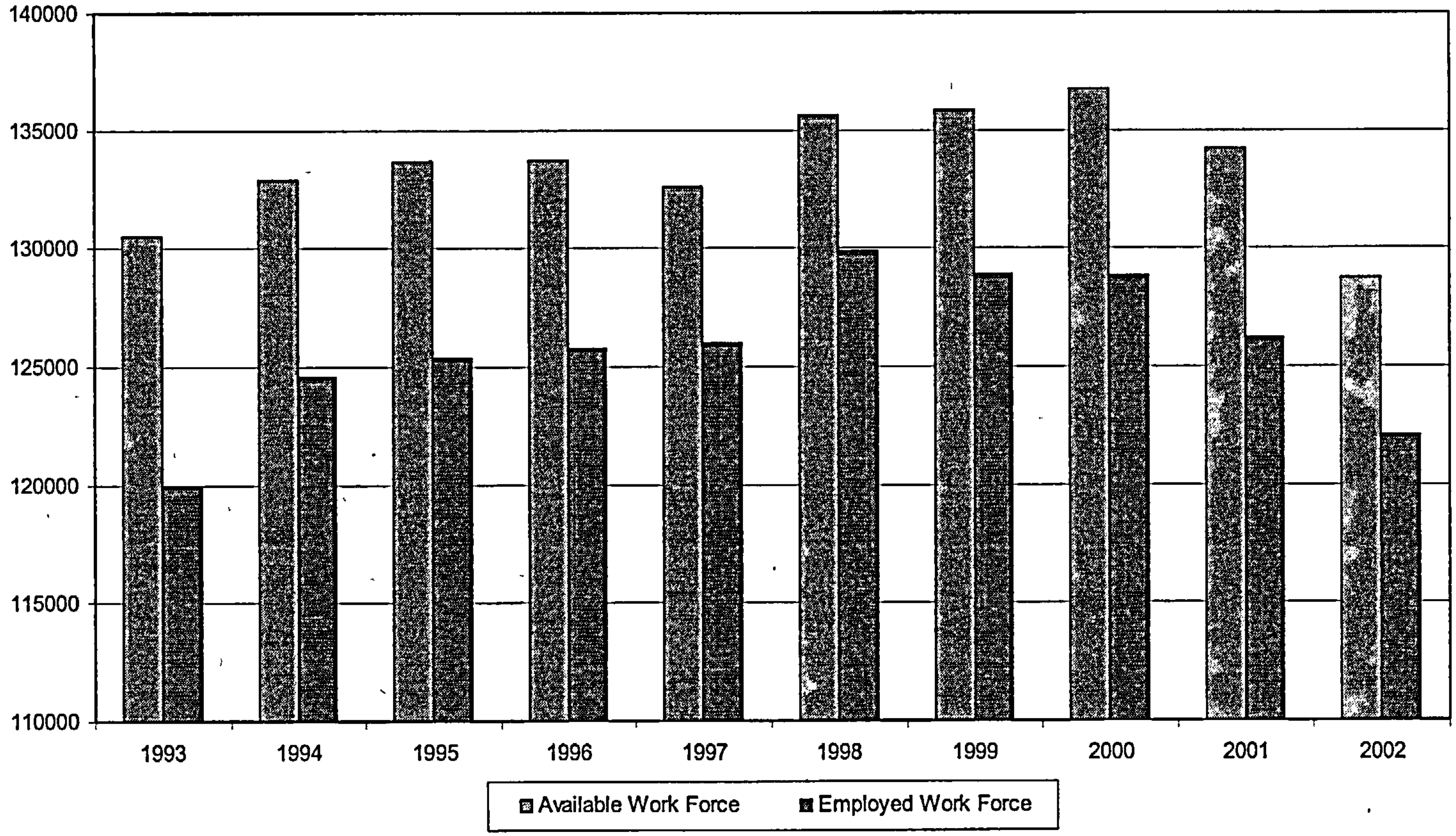
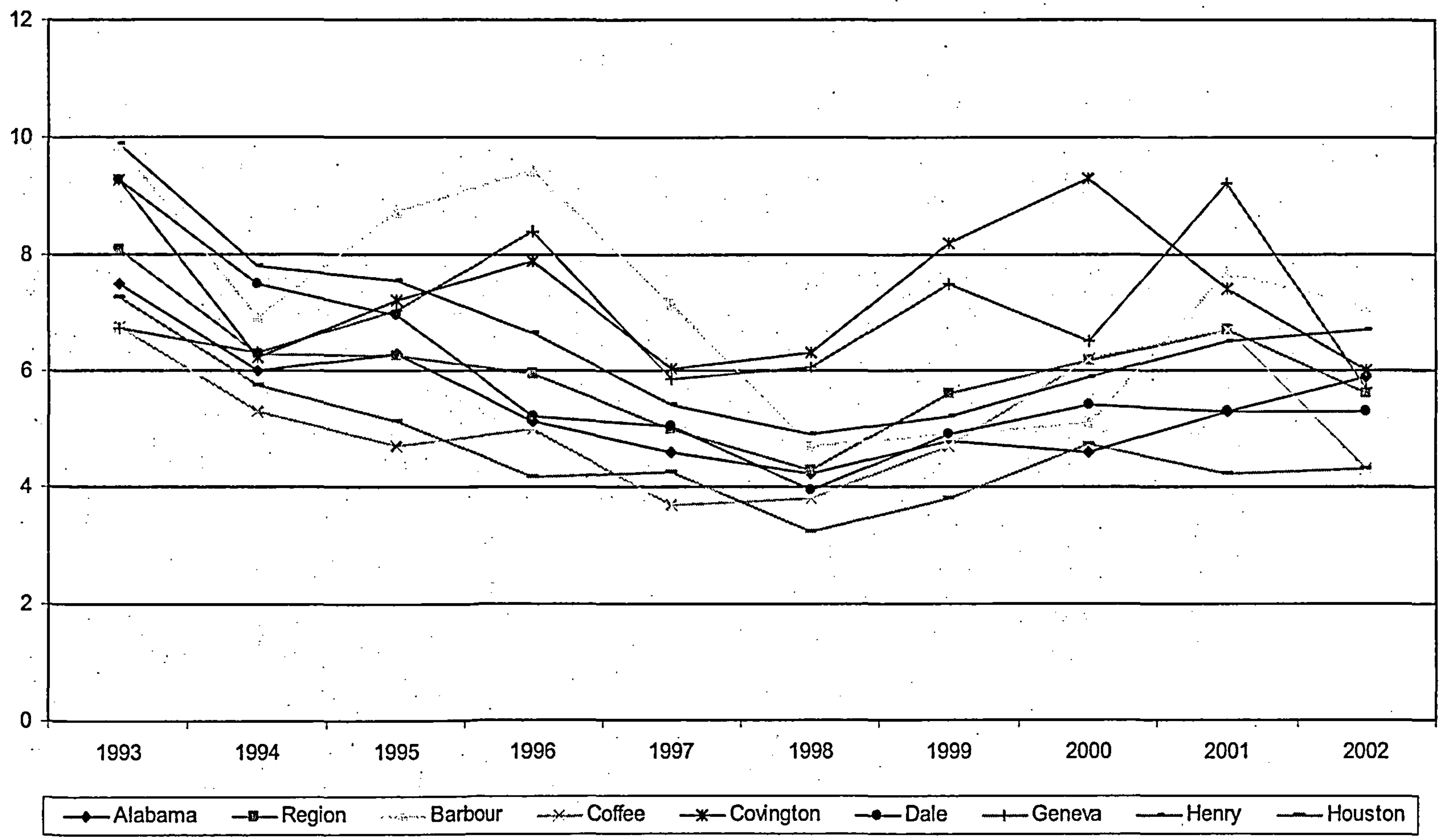


FIGURE 3A
UNEMPLOYMENT RATES FOR ALABAMA & SOUTHEAST ALABAMA REGION
1993-2002



Lay-Off Update

During the period from July 1, 1993 through the present, the following layoffs/plant closings occurred:

TABLE 16

PLANT CLOSINGS/LAYOFFS IN THE SOUTHEAST ALABAMA ECONOMIC DEVELOPMENT DISTRICT

Company	County	Type	# of Jobs Affected	Action
Hughes Missile Electronic	Barbour	Layoffs	350	Jobs Restored
Boutwell Lumber	Barbour	Closing	35	
Van Heusen	Barbour	Closing	230	
TNS Mills	Barbour	Closing	103	Jobs Restored
Louisiana-Pacific Corp	Barbour	Closing	235	
Dowling Textiles	Barbour	Closing	20	
American Buildings	Barbour	Layoffs	100+	
LMR International	Barbour	Layoffs	48	
Kleinert's Inc. of AL	Coffee	Layoffs	428	
Dorsey Trailers	Coffee	Closing	650	300 Jobs Restored
Arrow Shirt Factory	Coffee	Closing	280	
Covington Industries	Coffee	Layoffs	20	
Van Heusen	Covington	Closing	257	
Manhattan Shirt Company	Covington	Closing	80	
Bush Hog	Covington	Layoffs	100	
Salant Menswear Corp	Covington	Closing	200	
General Manufacturing Co., Inc.	Covington	Closing	290	
Covington Industries, Inc.	Covington	Layoffs	556	
Sweatt Prefade	Covington	Closing	150	
Franklin-Ferguson	Covington	Closing	125	
Southern Trim	Covington	Closing	100	
Judy Bond	Covington	Closing	125	
Louisiana-Pacific Corp	Covington	Closing	75+	
Coca-Cola Bottling	Covington	Relocation	36	
Opp-Micolas Mills	Covington	Layoffs	130	
Shorewood Packaging	Covington	Closing	120	
The Opp Mill	Covington	Closing	350	
Sikorsky Support Services	Dale	Closing	111	
UNC Helicopters	Dale	Layoffs	200+	
Van Heusen	Dale	Layoffs	100	
M.O. Carroll-Newton	Dale	Layoffs	97	
Champion Products	Geneva	Closing	292	

Van Heusen	Geneva	Closing	990	
Teledyne Brown	Geneva	Closing	150	
Dale's Sportswear	Geneva	Closing	150	
Russell Corporation	Geneva	Closing	407	
Covington Industries	Geneva	Closing	125	
CMI Industries, Inc.	Geneva	Layoffs	416	
Fleming Foods	Geneva	Closing	159	
Champion Paper Co.	Henry	Closing	150	
Warners	Houston	Closing	338	
Wex-Tex, Industries	Houston	Closing	155	
Ansell, Inc.	Houston	Layoffs	60	
Dothan Industries	Houston	Closing	90+	
General Cigar	Houston	Layoffs	175	
Gates Rubber	Houston	Closing	100	
Sony Corporation	Houston	Layoffs	292	
London International	Houston	Closing	400	
Russell Corporation	Houston	Closing	235	
Montgomery Ward	Houston	Closing	81	
Collin Signs	Houston	Layoffs	80	
Twitchell Corporation	Houston	Layoffs	56	

Source: Alabama Department of Economic and Community Affairs and SEARP&DC

INCOME

Two barometers for looking at the economic progress or lack thereof in Southeast Alabama are per capita income and median family income. To see if "real" progress has been made, dollars need to be adjusted for inflation (or turned in to what we call "constant" dollars). This section focuses on both of these measures and the constant dollar adjustment to measure the change that has occurred during the past three decades beginning in 1979 and ending in 1999.

PER CAPITA INCOME

There are two different sources of government figures on per capita income (PCI): the Bureau of the Census and the Bureau of Economic Analysis (BEA). The BEA figures are always higher than the Census figures. Both are useful for comparison if they are not mixed - i.e., comparing Census to Census and BEA to BEA.

From the Bureau of the Census PCI figures, Table 17 and Figure 4 were developed for illustrative purposes. Since Table 17 covers three decades from 1979 through 1999, historical progression or recession can be noted. Comparisons are also made with the U.S. and the State. In 1979, Barbour and Henry Counties had the lowest PCI's of the District with 62.3% and 66.9% of the U.S. PCI, respectively. By 1999, Henry County's PCI, as a percent of the U.S.'s PCI, had grown 5.7%; this is quite a remarkable improvement. The State's growth rate for the three decades was only 3.5%. Therefore, Henry County made significant progress in PCI improvement. Unfortunately, Barbour and Geneva Counties per capita income decreased as a percent of the U.S's PCI, 0.6% and 8.8%, respectively. Covington and Dale Counties had slight improvements during these three decades in comparison to the Nation's average with 0.1%, and 1.4%, respectively. Houston and Coffee County's PCI are the only ones in the District to exceed the State's PCI.

The District's PCI, which goes from a low of 73.0% of the nation's PCI to a high of 74.2%, still remains a matter of concern. Progress, albeit slow, has been made.

Using the Bureau of Economic Analysis data on PCI (Table 18), there is some variance in the data; the figures are consistently higher (BEA uses a different methodology). In terms of improvement in PCI, comparing the years 1999 and 2000, Covington, Dale and Houston counties and the state showed positive growth, as can be seen in Table 18. While Barbour, Coffee, Geneva and Henry counties all declined in PCI. Dale County had the largest increase--from $20,082 in 1999 to $20,680 in 2000.

FIGURE 4
PER CAPITA INCOME 1979-1999

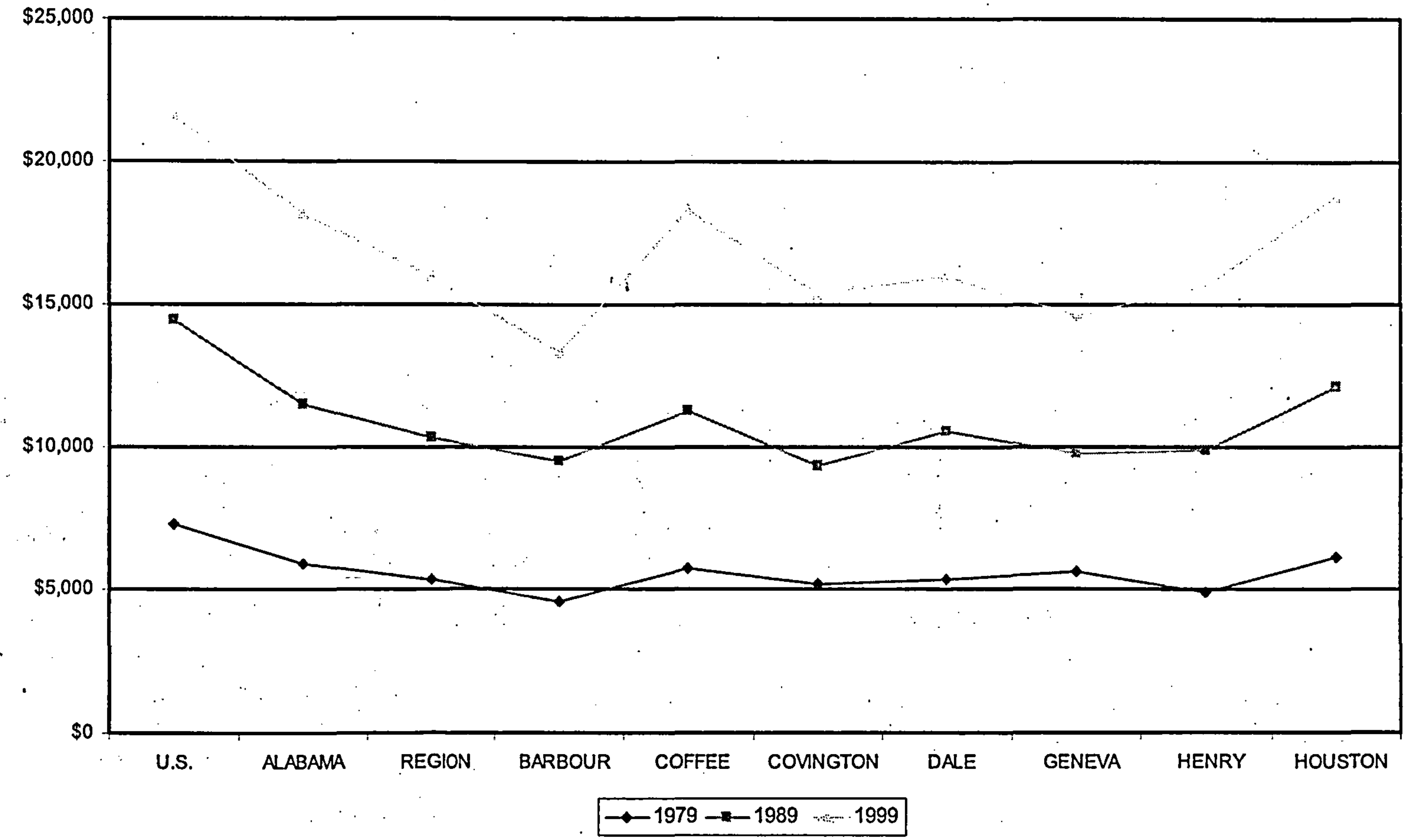


TABLE 17

PER CAPITA INCOME FOR U.S., ALABAMA, AND DISTRICT COUNTIES

LOCATION	1979 PER CAPITA INCOME	PERCENT OF U.S.	PERCENT OF ALABAMA	1989 PER CAPITA INCOME	PERCENT OF U.S.	PERCENT OF ALABAMA	1999 PER CAPITA INCOME	PERCENT OF U.S.	PERCENT OF ALABAMA
U.S.	7,298			14,420			21,587		
ALABAMA	5,894	80.8		11,486	79.7		18,189	84.3	
REGION	5,331	73.0	90.4	10,366	71.8	90.2	16,010	74.2	88.0
BARBOUR	4,544	62.3	77.1	9,515	66.0	82.8	13,316	61.7	73.2
COFFEE	5,714	78.3	96.9	11,286	78.3	98.3	18,321	84.9	100.7
COVINGTON	5,186	71.1	88.0	9,315	64.6	81.1	15,366	71.2	84.5
DALE	5,313	72.8	90.1	10,580	73.4	92.1	16,010	74.2	88.0
GENEVA	5,585	76.5	94.8	9,768	67.7	85.0	14,620	67.7	80.4
HENRY	4,880	66.9	82.8	9,909	68.7	86.3	15,681	72.6	86.2
HOUSTON	6,094	83.5	103.4	12,118	84.0	105.5	18,759	86.9	103.1

SOURCE: U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS

TABLE 18

PER CAPITA PERSONAL INCOME
1979-2000, CURRENT DOLLARS

	1979	Percent of U.S.	Percent of State	1989	Percent of U.S.	Percent of State	1999	Percent of U.S.	Percent of State	2000	Percent of U.S.	Percent of State
UNITED STATES	9,033			17,738			28,546			29,469		
ALABAMA	7,064	78%		14,266	80%		22,972	80%		23,521	80%	
BARBOUR COUNTY	6,127	68%	87%	12,417	70%	87%	21,744	76%	95%	20,264	69%	86%
COFFEE COUNTY	6,511	72%	92%	14,420	81%	101%	23,165	81%	101%	22,631	77%	96%
COVINGTON COUNTY	6,429	71%	91%	11,995	68%	84%	19,105	67%	83%	19,657	67%	84%
DALE COUNTY	6,112	68%	87%	12,612	71%	88%	20,082	70%	87%	20,680	70%	88%
GENEVA COUNTY	6,651	74%	94%	13,233	75%	93%	19,752	69%	86%	18,870	64%	80%
HENRY COUNTY	6,083	67%	86%	12,529	71%	88%	20,017	70%	87%	19,910	68%	85%
HOUSTON COUNTY	6,971	77%	99%	15,188	86%	106%	24,120	84%	105%	24,587	83%	105%

Source: U.S. Department of Commerce, Bureau of Economic Analysis, May 2002

Table 19
**PER CAPITA INCOME AS A %
OF THE U.S. PCI FOR ALABAMA
AND DISTRICT COUNTIES, 1979 AND 1999**

Government	1979	1999	Percentage Increase (Decrease)
Alabama	80.8%	84.3%	3.5
Barbour	62.3%	61.7%	(0.6)
Coffee	78.3%	84.9%	6.6
Covington	71.1%	71.2%	0.1
Dale	72.8%	74.2%	1.4
Geneva	76.5%	67.7%	(8.8)
Henry	66.9%	72.6%	5.7
Houston	83.5%	86.9%	3.4

Source: Census Data from Table 17.

The differences between the sources of data are problematic since they use different methodologies, but are useful in determining trends. BEA data is updated on a consistent basis; therefore, between censuses, it is used more often.

MEDIAN FAMILY INCOME & POVERTY

Median family income, persons below the poverty level, and families below the poverty level for 1990 and 2000 is presented in Tables 20 and 21. Comparing the "like" figures for 2000, all seven counties increased as follows: Barbour ($8,039), Coffee ($12,011), Covington ($9,944), Dale ($10,221), Geneva ($7,574), Henry ($9,001) and Houston ($12,619).

Barbour, Dale, Geneva and Henry Counties experienced an increase in persons below the poverty level. Henry County experienced the largest increase. In 1990, 2,636 of its citizens were living below the poverty level and by 2000 this had increased to 3,070. The County has developed an Economic Development Corporation, hired a County professional economic developer, and begun an industrial park project.

The District, with the exception of Coffee, Covington, and Houston Counties, experienced an increase in the percent of families living below the poverty level. Counties with increases in poverty are as follows: Barbour (1.6%), Dale (1.7%), Geneva (0.3%), and Henry (1.4%). In final analysis, there were positive economic results accomplished in the District from 1990-2000. Coffee, Covington and Henry Counties experienced the most significant gains.

TABLE 20
2000 MEDIAN FAMILY INCOME AND POVERTY STATUS FOR ALABAMA AND SELECTED ALABAMA COUNTIES

LOCATION	MEDIAN FAMILY INCOME (CURRENT $)	PERSONS WITH INCOME BELOW POVERTY LEVEL	PERCENT OF PERSONS	FAMILIES WITH INCOME BELOW POVERTY LEVEL	PERCENT OF FAMILIES
ALABAMA	$ 50,046	33,899,812	12.4	6,620,945	9.2
BARBOUR COUNTY	$ 31,877	7,032	26.8	1,605	21.6
COFFEE COUNTY	$ 39,664	6,285	14.7	1,419	11.3
COVINGTON COUNTY	$ 33,201	6,838	18.4	1,524	14.1
DALE COUNTY	$ 37,806	7,140	15.1	1,730	12.6
GENEVA COUNTY	$ 32,563	5,010	19.6	1,200	15.9
HENRY COUNTY	$ 36,555	3,070	19.1	692	14.5
HOUSTON COUNTY	$ 42,437	13,146	15.0	2,981	11.8

SOURCE: 2000 CENSUS OF POPULATION AND HOUSING, U.S. DEPARTMENT OF COMMERCE

TABLE 21
1990 MEDIAN FAMILY INCOME AND POVERTY STATUS FOR ALABAMA AND SELECTED ALABAMA COUNTIES

LOCATION	MEDIAN FAMILY INCOME (CURRENT $)	PERSONS WITH INCOME BELOW POVERTY LEVEL	PERCENT OF PERSONS	FAMILIES WITH INCOME BELOW POVERTY LEVEL	PERCENT OF FAMILIES
ALABAMA	$ 28,688	723,614	18.3	158,369	14.3
BARBOUR COUNTY	$ 23,838	6,244	25.2	1,348	20.0
COFFEE COUNTY	$ 27,653	6,180	15.5	1,374	11.7
COVINGTON COUNTY	$ 23,257	7,971	22.0	1,738	16.5
DALE COUNTY	$ 27,585	6,971	14.8	1,454	10.9
GENEVA COUNTY	$ 24,989	4,583	19.5	1,080	15.6
HENRY COUNTY	$ 27,554	2,636	17.4	566	13.1
HOUSTON COUNTY	$ 29,818	13,275	16.5	2,938	12.8

SOURCE: 1990 CENSUS OF POPULATION AND HOUSING, U.S. DEPARTMENT OF COMMERCE

Figure 5
2000 Median Family Income

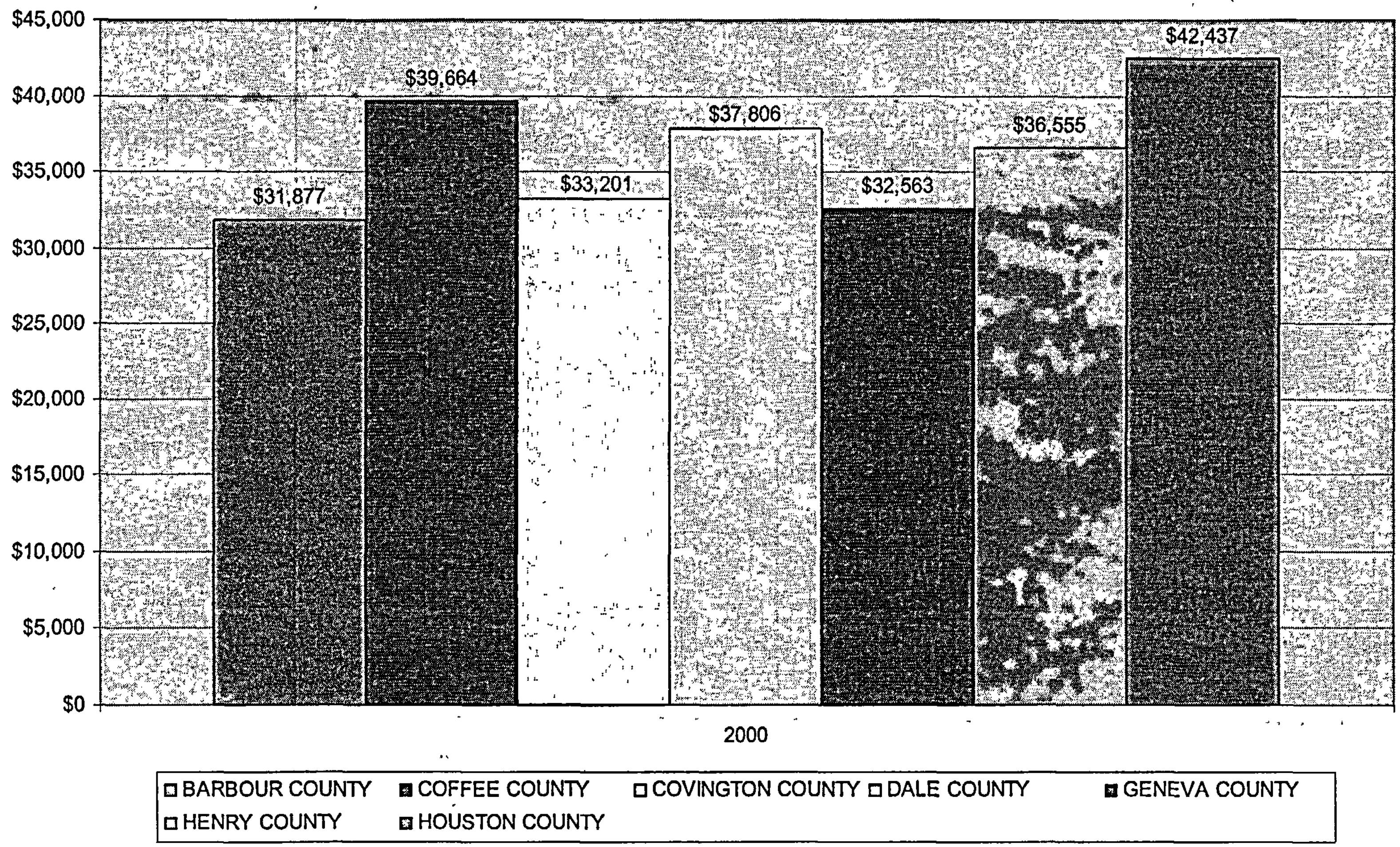
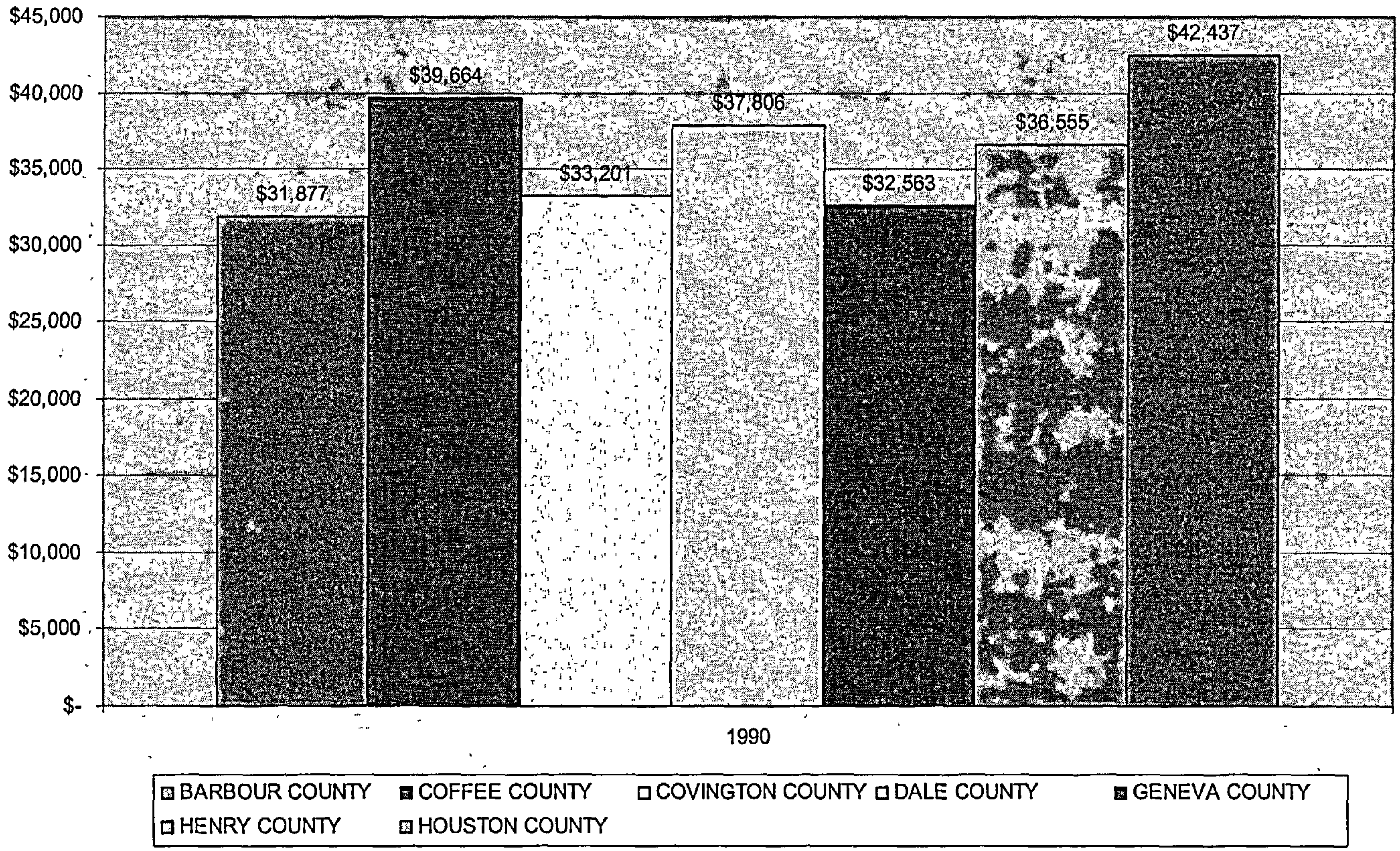


Figure 6
1990 Median Family Income



EARNINGS PER JOB

Figures 7 and 8 show average earnings per job and wage and salary earnings per job. All counties except Dale County remain below the state level with Geneva County earning the least per job in 2000 and Dale County earning the most per job. Wage and salary earnings also show Geneva County earning the least per job in 2000 and Dale County earning the most per job. The only county to exceed the 2000 state average of $37,129 is Dale County with $42,725 per manufacturing job (see Figure 9). Coffee County earns the least per job for the manufacturing sector with $26,288 per job.

EMPLOYMENT AND EARNINGS LONG-TERM TRENDS

While it is somewhat of an uncertain science to determine the economy's future, it is much easier to look at its history. To look at changes in the composition of the economies of the District's counties, Tables 22-28A depict shifts of employment "where the jobs are coming from"; Tables 29-35A show shifts in earnings by place of work; and Figure 9 shows manufacturing employment and the percentage of persons in manufacturing employment in the various counties.

Beginning with Barbour County, manufacturing employment steadily grew in prominence from 1969 to 2000 in terms of the composition of the workforce and percentage of the total County economy. The trends for 2000 show the manufacturing percent of the economy continuing to increase, as well as an increase in manufacturing jobs, albeit at a much slower pace. Currently, the manufacturing percent of the economy increased to 39.5% in 2000. The number of persons employed in the manufacturing sector increased to 5,334. This depicts a strong showing for manufacturing. Services showed an increase as a percent of the County's total employment in the last five years--from 2,202 in 1995 to 2,771 in 2000. In the last 20 years, it appears the Farm/Agriculture has suffered the most in Barbour County. Farm employment dropped sharply from 1,188 in 1979 to 584 in 2000 and only accounted for 7.2% of the earnings.

Coffee County's employment is heavily reliant on the manufacturing, retail trade and service sectors for both jobs and income. Manufacturing has steadily declined throughout the last 5 years. Employment has decreased from 5,372 in 1995 to 3,911 in 2000. Earnings in manufacturing also decreased from 1995 to 2000. Jobs in the service sector have increased during each monitoring period. As of 2000, the service sector made up 23.7% of the jobs in Coffee County and 21.8% of the earnings. With the exception of farming and manufacturing, the other sectors in Coffee County have gradually increased.

While manufacturing employment in Covington County typically has comprised the largest employment sector of the County, the service sector has become the largest employment sector over the past 5 years. From 1995 to 2000 employment in the manufacturing sector has decreased substantially from 4,878 to 3,236, while the service sector has continued to grow from 3,763 to 3,949. Manufacturing and services provide the largest part of the earnings in the County.

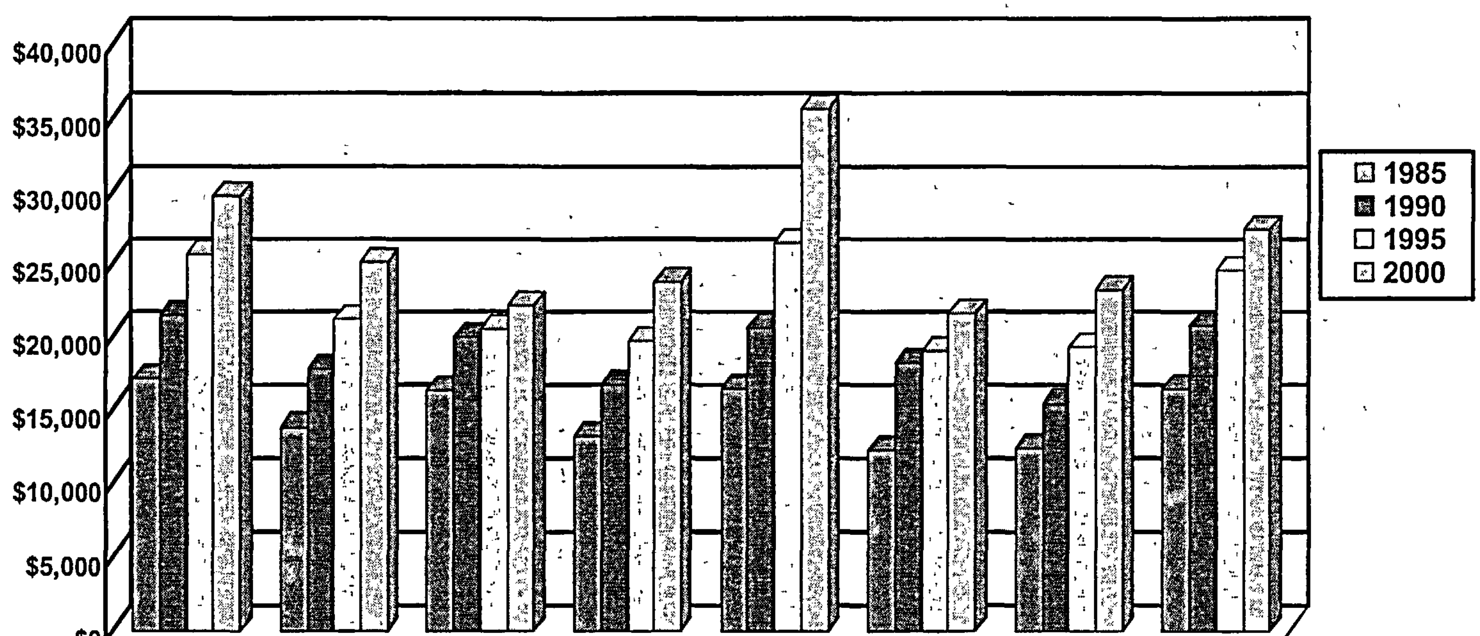
Dale County is highly dependent on the government for jobs and income. As of 2000, 37.8% of the County's employees were government jobs. Unlike a majority of the counties in the district, manufacturing employment has steadily grown since 1995 in Dale County, with a 1.5% increase from 1995 through 2000. Both Daleville and Ozark are making significant strides to improve the County's economy. The service sector continues to grow, while it remains to be seen what will happen with the government jobs.

Geneva County's farm economy is rebounding in terms of earnings from farming; however, employment in this sector has steadily dropped. However, in 2000 Geneva County's earnings from farming did drop drastically by 6.0%. Nevertheless, poultry production, where much of the increased earnings have come, is generating significant dollars to help the County's overall economy. Farm income is the second highest percentage income producer in the County, second only to government. Employment has continued to grow in the services and government sectors, while employment has declined in the manufacturing, farming and retail trade sectors.

Henry County has shown strong growth in employment and earnings attributed to manufacturing. While the percentage of the manufacturing employment as compared to the total employment numbers has decreased, the number employed in this sector has increased. Unfortunately, the County appears to be extremely reliant on the manufacturing sector, 29.2% of the County's employment and 36.8% of its earnings comes from the manufacturing sector. Income earnings from farming continues to decrease; 2.9% from 9.1% in 1999 to 6.2% in 2000.

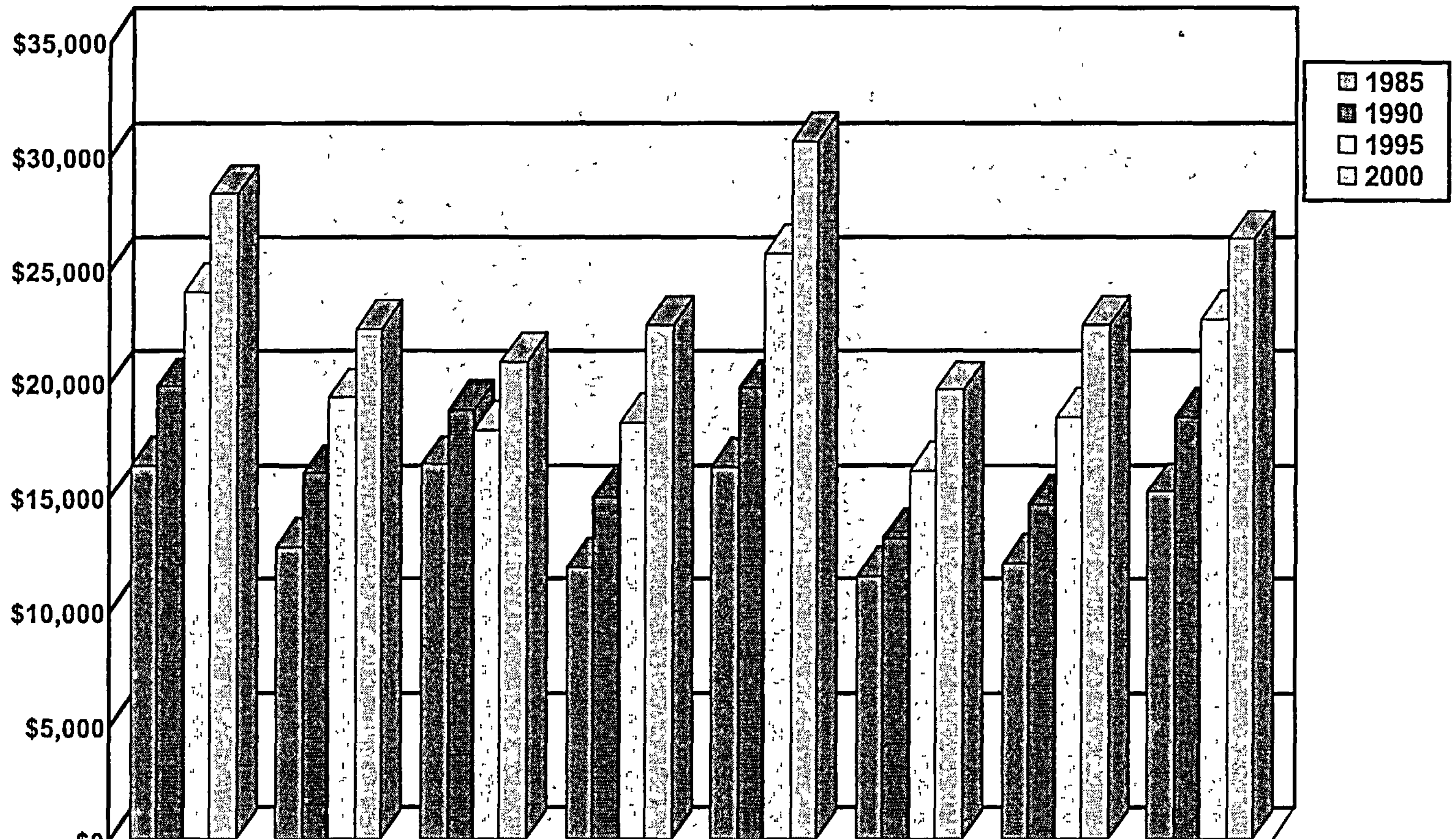
Houston County's economy has seen a major shift from manufacturing to services and retail trade. The service sector comprises a much larger percentage of the County's earnings than does manufacturing. Manufacturing employment has been steadily decreasing throughout the years. The County remains a regional retail and medical services center.

In summary, represented in Figure 28A, the services sector for the district has experienced the greatest upward trend in job numbers. By contrast, represented in Figure 35A, manufacturing as a percentage of the total district economy, continues to account for more earnings than any other sector. Overall, the district is highly dependent on (1) manufacturing, (2) government, and (3) services, as creators of jobs and wealth. Though of diminishing importance, farm income is critical to several of the District's counties.



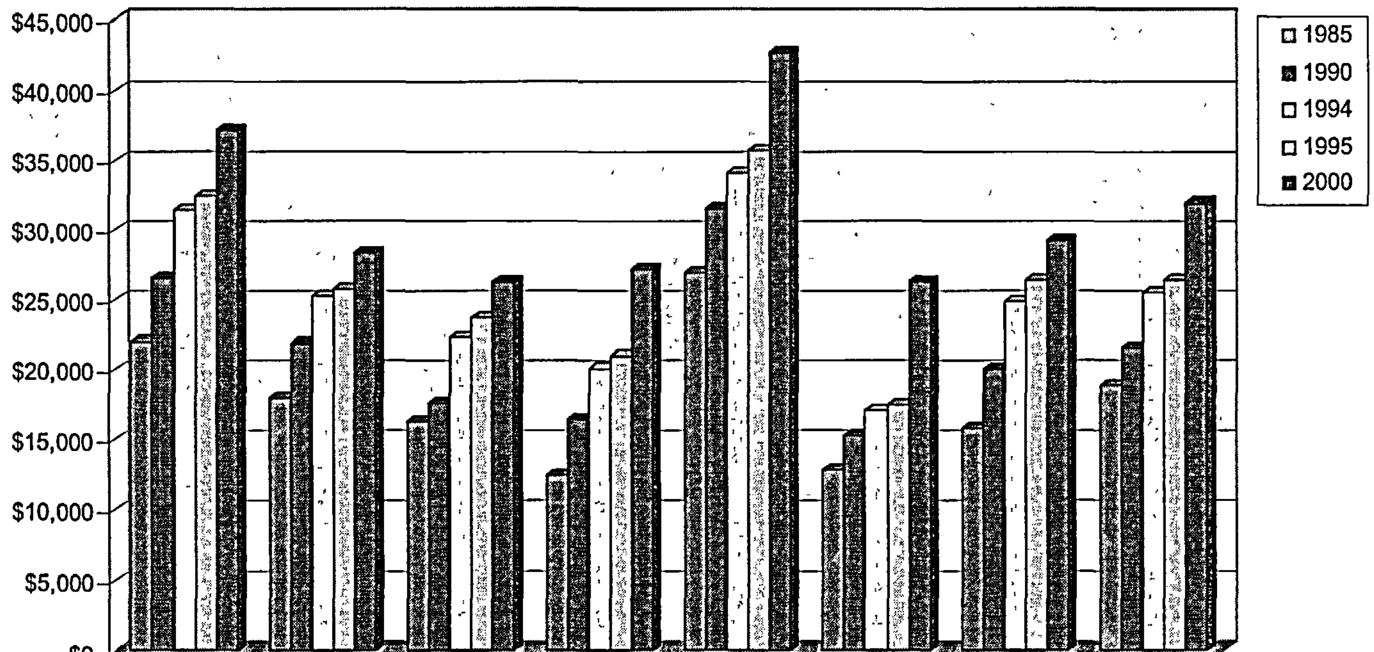
	ALABAMA	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
1985	17133	13787	16286	13130	16400	12276	12387	16400
1990	21410	17722	19955	16732	20626	18165	15411	20760
1995	25572	21133	20438	19677	26392	18943	19209	24551
2000	29670	25008	22152	23759	35561	21536	23209	27356

Figure 8
Wage and Salary Earnings Per Job



	ALABAMA	BARBOUR	COFFEE	COVINGTON	DALE	GENEVA	HENRY	HOUSTON
1985	16346	12835	16423	11951	16303	11524	12088	15186
1990	19805	16020	18772	14958	19734	13237	14676	18448
1995	23983	19313	17882	18240	25658	16103	18495	22757
2000	28280	22369	20868	22524	30610	19628	22528	26259

Figure 9
AVERAGE EARNINGS PER MANUFACTURING JOB
ALABAMA AND THE DISTRICT COUNTIES, 1985, 1990, 1994, 1995 & 2000



	Alabama	Barbour	Coffee	Covington	Dale	Geneva	Henry	Houston
1985	21981	17990	16297	12489	26946	12811	15755	18815
1990	26592	21857	17591	16452	31558	15286	20051	21502
1994	31366	25290	22345	20061	34105	17001	24840	25522
1995	32392	25777	23734	20963	35776	17395	26442	26411
2000	37129	28356	26288	27129	42725	26314	29200	31975

TABLE 22
BARBOUR COUNTY
FULL-TIME AND PART-TIME EMPLOYEES BY MAJOR INDUSTRY
1969, 1979, 1989, 1995, 1999 AND 2000

	1969		1979		1989		1995		1999		2000	
FARM	1,552	16.5%	1,188	12.0%	754	6.5%	653	5.1%	600	4.1%	584	3.8%
MANUFACTURING	1,870	19.8%	2,408	24.3%	3,663	31.3%	3,994	31.0%	4,975	34.0%	5,334	34.8%
RETAIL TRADE	1,039	11.0%	1,243	12.6%	1,523	13.0%	1,811	14.1%	2,036	13.9%	2,086	13.6%
SERVICES	2,262	24.0%	1,492	15.1%	1,868	16.0%	2,202	17.1%	2,603	17.8%	2,771	18.1%
GOVERNMENT	1,352	14.3%	1,747	17.7%	1,790	15.3%	2,359	18.3%	2,231	15.3%	2,243	14.6%
OTHER	1,347	14.3%	1,814	18.3%	2,091	17.9%	1,847	14.4%	2,174	14.9%	2,295	15.0%
TOTAL	9,422	100.0%	9,892	100.0%	11,687	100.0%	12,866	100.0%	14,619	100.0%	15,313	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 23
COFFEE COUNTY
FULL-TIME AND PART-TIME EMPLOYEES BY MAJOR INDUSTRY
1969, 1979, 1989, 1995, 1999 AND 2000

	1969		1979		1989		1995		1999		2000	
FARM	2,177	18.5%	1,781	11.5%	1,257	7.1%	1,178	5.8%	1,152	5.4%	1,121	5.4%
MANUFACTURING	3,003	25.6%	4,598	29.6%	4,849	27.4%	5,372	26.5%	4,773	22.6%	3,911	18.7%
RETAIL TRADE	1,704	14.5%	2,301	14.8%	2,940	16.6%	3,819	18.8%	4,124	19.5%	4,049	19.4%
SERVICES	1,715	14.6%	1,976	12.7%	3,257	18.4%	4,066	20.0%	4,674	22.1%	4,963	23.7%
GOVERNMENT	1,719	14.6%	2,421	15.6%	2,667	15.1%	2,627	13.0%	2,652	12.5%	2,702	12.9%
OTHER	1,434	12.2%	2,457	15.8%	2,726	15.4%	3,221	15.9%	3,776	17.9%	4,160	19.9%
TOTAL	11,752	100.0%	15,534	100.0%	17,696	100.0%	20,283	100.0%	21,151	100.0%	20,906	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

INSERT

TABLE 24
COVINGTON COUNTY
FULL-TIME AND PART-TIME EMPLOYEES BY MAJOR INDUSTRY
1969, 1979, 1989, 1995, 1999 AND 2000

	1969		1979		1989		1995		1999		2000	
FARM	1,938	12.3%	1,612	9.2%	1,254	7.0%	1,203	6.3%	1,167	6.2%	1,136	6.2%
MANUFACTURING	5,173	32.9%	5,346	30.6%	5,073	28.2%	4,878	25.4%	3,672	19.6%	3,236	17.7%
RETAIL TRADE	2,081	13.2%	2,288	13.1%	2,469	13.7%	2,915	15.2%	3,162	16.9%	3,026	16.5%
SERVICES	2,259	14.4%	2,698	15.4%	3,062	17.0%	3,763	19.6%	3,808	20.4%	3,949	21.6%
GOVERNMENT	1,865	11.9%	2,140	12.2%	2,268	12.6%	2,404	12.5%	2,487	13.3%	2,459	13.4%
OTHER	2,400	15.3%	3,404	19.5%	3,855	21.4%	4,016	20.9%	4,404	23.6%	4,480	24.5%
TOTAL	15,716	100.0%	17,488	100.0%	17,981	100.0%	19,179	100.0%	18,700	100.0%	18,286	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 26
DALE COUNTY
FULL-TIME AND PART-TIME EMPLOYEES BY MAJOR INDUSTRY
1969, 1979, 1989, 1995, 1999 AND 2000

	1969		1979		1989		1995		1999		2000	
FARM	1,384	4.1%	976	3.9%	645	2.2%	606	2.3%	582	2.1%	566	2.1%
MANUFACTURING	6,021	18.0%	3,907	15.5%	5,433	18.2%	4,761	17.8%	5,057	18.5%	5,280	19.3%
RETAIL TRADE	1,391	4.2%	2,057	8.1%	2,627	8.8%	2,930	11.0%	3,111	11.4%	2,957	10.8%
SERVICES	2,200	6.6%	3,015	11.9%	4,128	13.8%	4,025	15.1%	4,447	16.3%	4,465	16.3%
GOVERNMENT	20,780	62.2%	12,509	49.5%	14,225	47.6%	11,086	41.5%	10,176	37.2%	10,364	37.8%
OTHER	1,657	5.0%	2,792	11.1%	2,796	9.4%	3,286	12.3%	3,981	14.6%	3,776	13.8%
TOTAL	33,433	100.0%	25,256	100.0%	29,854	100.0%	26,694	100.0%	27,354	100.0%	27,408	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

INSERT

TABLE 26
GENEVA COUNTY
FULL-TIME AND PART-TIME EMPLOYEES BY MAJOR INDUSTRY
1969, 1979, 1989, 1995, 1999 AND 2000

	1969		1979		1989		1995		1999		2000	
FARM	2,231	26.8%	1,608	17.9%	1,328	14.0%	1,278	12.1%	1,268	12.9%	1,235	12.9%
MANUFACTURING	1,836	22.1%	2,157	24.1%	2,563	27.0%	2,835	26.9%	1,460	14.8%	1,285	13.4%
RETAIL TRADE	970	11.7%	1,035	11.6%	1,253	13.2%	1,505	14.3%	1,598	16.2%	1,352	14.1%
SERVICES	1,170	14.1%	1,028	11.5%	1,236	13.0%	1,204	11.4%	1,499	15.2%	1,526	15.9%
GOVERNMENT	1,041	12.5%	1,431	16.0%	1,206	12.7%	1,577	15.0%	1,626	16.5%	1,667	17.4%
OTHER	1,077	12.9%	1,701	19.0%	1,903	20.1%	2,146	20.4%	2,398	24.3%	2,541	26.5%
TOTAL	8,325	100.0%	8,960	100.0%	9,489	100.0%	10,545	100.0%	9,849	100.0%	9,606	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 27
HENRY COUNTY
FULL-TIME AND PART-TIME EMPLOYEES BY MAJOR INDUSTRY
1969, 1979, 1989, 1995, 1999 AND 2000

	1969		1979		1989		1995		1999		2000	
FARM	1,698	30.6%	1,066	18.5%	767	12.1%	648	10.2%	604	9.0%	588	8.6%
MANUFACTURING	1,239	22.3%	1,738	30.1%	2,267	35.8%	1,949	30.7%	1,934	28.7%	1,994	29.2%
RETAIL TRADE	660	11.9%	711	12.3%	780	12.3%	767	12.1%	778	11.5%	776	11.4%
SERVICES	743	13.4%	597	10.3%	732	11.6%	982	15.5%	1,111	16.5%	1,110	16.3%
GOVERNMENT	697	12.5%	894	15.5%	868	13.7%	904	14.2%	897	13.3%	912	13.4%
OTHER	518	9.3%	771	13.3%	922	14.6%	1,099	17.3%	1,419	21.0%	1,442	21.1%
TOTAL	5,555	100.0%	5,777	100.0%	6,336	100.0%	6,349	100.0%	6,743	100.0%	6,822	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 28
HOUSTON COUNTY
FULL-TIME AND PART-TIME EMPLOYEES BY MAJOR INDUSTRY
1969, 1979, 1989, 1995, 1999 AND 2000

	1969		1979		1989		1995		1999		2000	
FARM	3,114	11.6%	1,873	4.7%	1,333	2.7%	1,236	2.2%	1,032	1.7%	1,005	1.7%
MANUFACTURING	5,354	19.9%	8,036	20.3%	8,553	17.3%	8,570	15.5%	8,181	13.6%	7,167	12.0%
RETAIL TRADE	4,475	16.6%	7,035	17.7%	9,536	19.3%	11,439	20.7%	12,537	20.9%	12,279	20.5%
SERVICES	5,057	18.8%	6,308	15.9%	10,744	21.8%	13,961	25.3%	16,411	27.4%	16,939	28.3%
GOVERNMENT	3,274	12.2%	4,962	12.5%	6,509	13.2%	7,381	13.4%	7,610	12.7%	7,708	12.9%
OTHER	5,659	21.0%	11,456	28.9%	12,676	25.7%	12,663	22.9%	14,216	23.7%	14,809	24.7%
TOTAL	26,933	100.0%	39,670	100.0%	49,351	100.0%	55,250	100.0%	59,987	100.0%	59,907	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 28A
SOUTHEAST ALABAMA
FULL-TIME AND PART-TIME EMPLOYEES BY MAJOR INDUSTRY
1969, 1979, 1989, 1995, 1999 AND 2000

	1969		1979		1989		1995		1999		2000	
FARM	14,094	12.7%	10,104	8.2%	7,338	5.2%	6,802	4.5%	6,405	4.0%	6,235	3.9%
MANUFACTURING	24,496	22.0%	28,190	23.0%	32,401	22.8%	32,359	21.4%	30,052	19.0%	28,207	17.8%
RETAIL TRADE	12,320	11.1%	16,670	13.6%	21,128	14.8%	25,186	16.7%	27,346	17.3%	26,525	16.8%
SERVICES	15,406	13.9%	17,114	14.0%	25,025	17.6%	30,203	20.0%	34,553	21.8%	35,723	22.6%
GOVERNMENT	30,728	27.6%	26,104	21.3%	29,533	20.7%	28,338	18.7%	27,679	17.5%	28,055	17.7%
OTHER	14,092	12.7%	24,395	19.9%	26,969	18.9%	28,278	18.7%	32,368	20.4%	33,503	21.2%
TOTAL	111,136	100.0%	122,577	100.0%	142,394	100.0%	151,166	100.0%	158,403	100.0%	158,248	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

FIGURE 10
BARBOUR COUNTY EMPLOYEES (FULL & PART TIME) BY MAJOR INDUSTRY

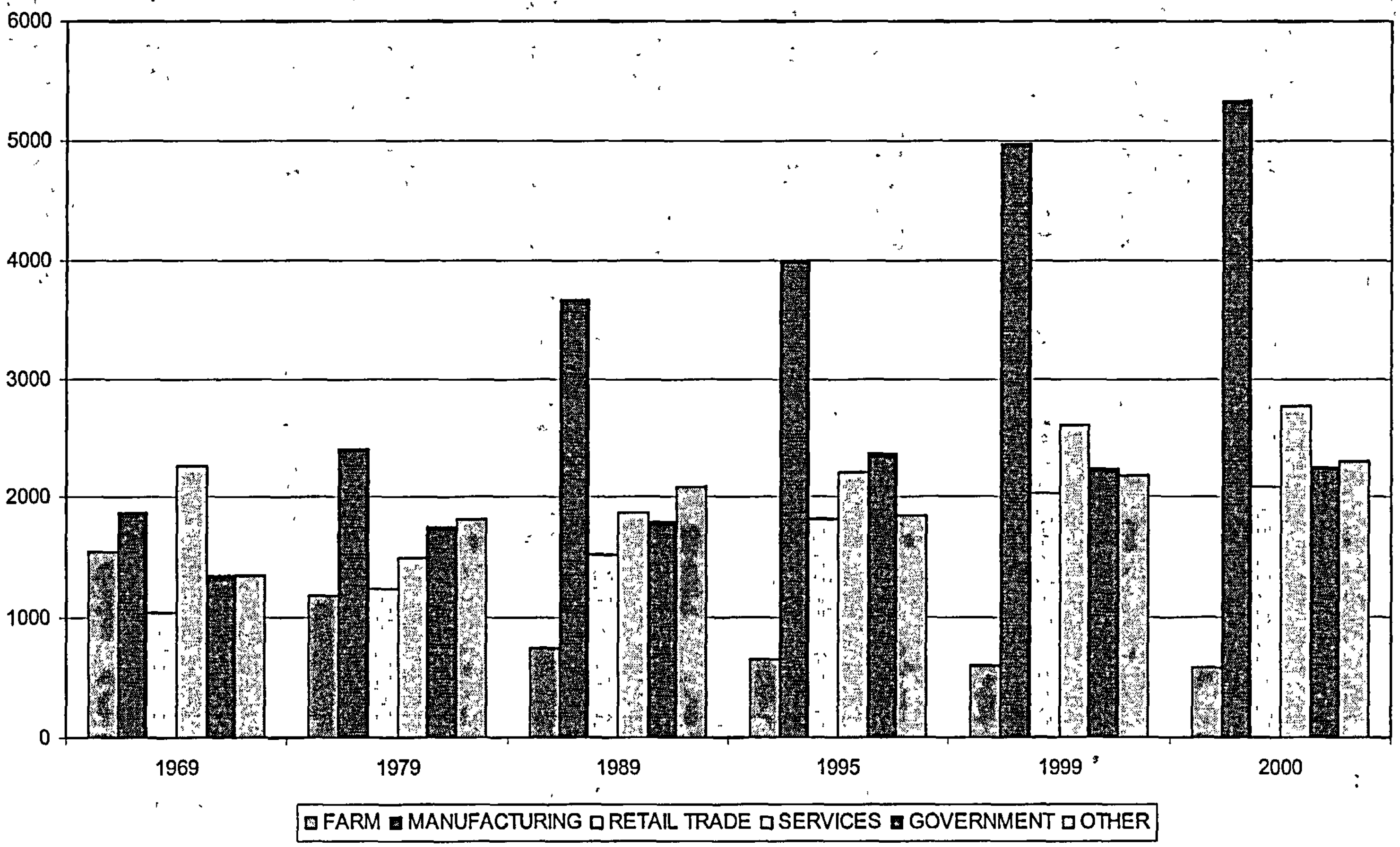


FIGURE 11
COFFEE COUNTY EMPLOYEES (FULL & PART TIME) BY MAJOR INDUSTRY

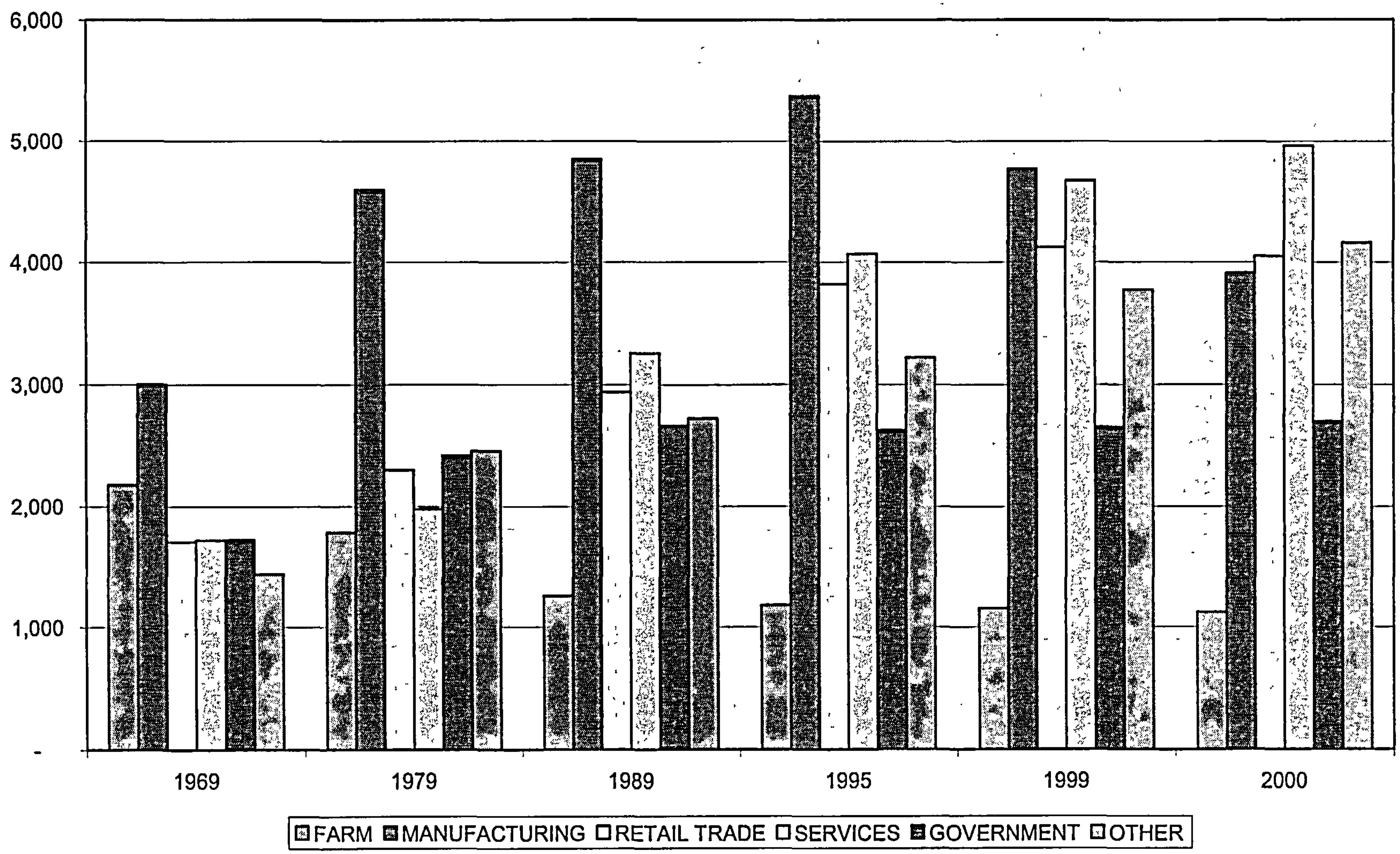


FIGURE 12
COVINGTON COUNTY EMPLOYEES (FULL & PART TIME) BY MAJOR INDUSTRY

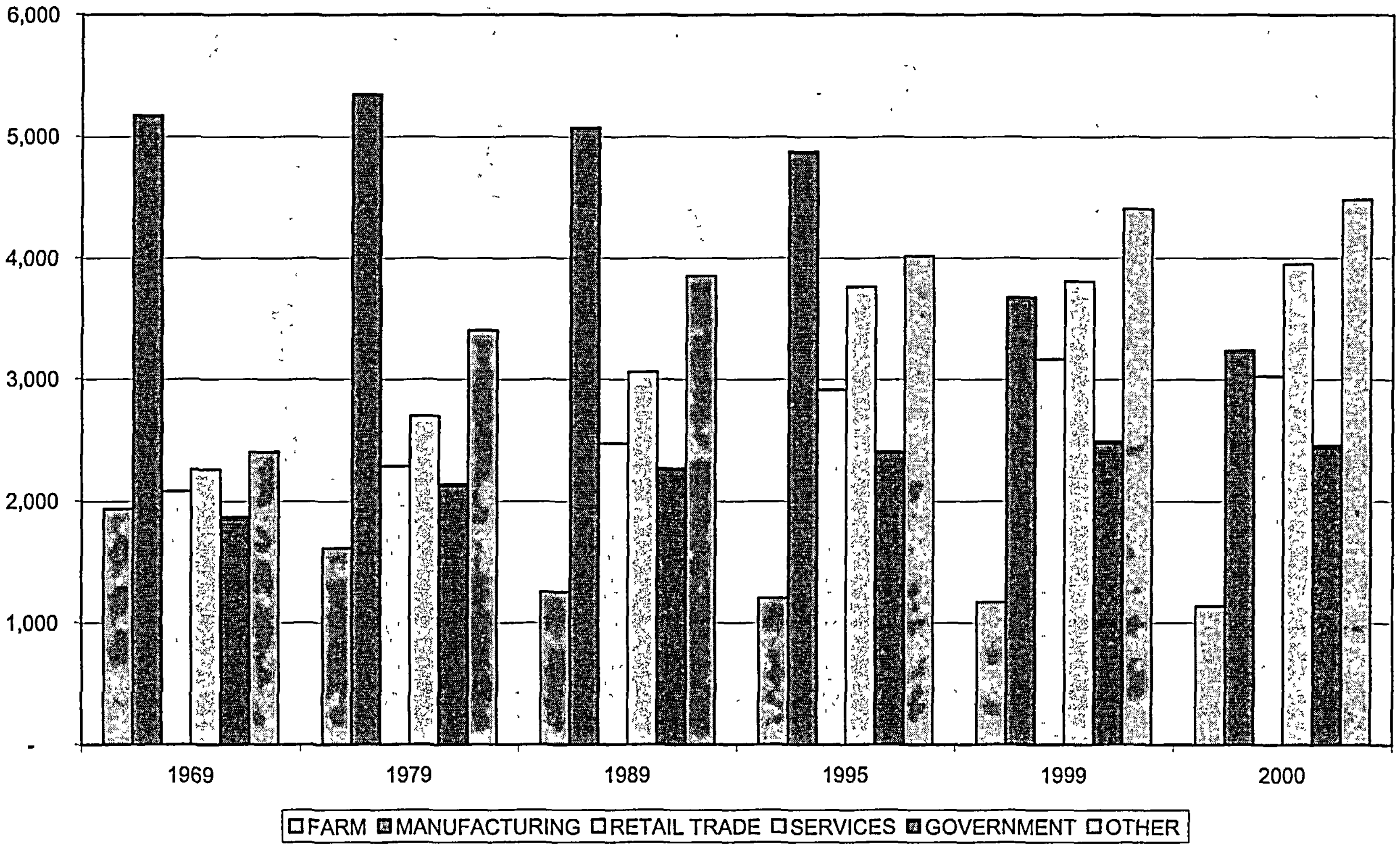


FIGURE 13
DALE COUNTY EMPLOYEES (FULL & PART TIME) BY MAJOR INDUSTRY

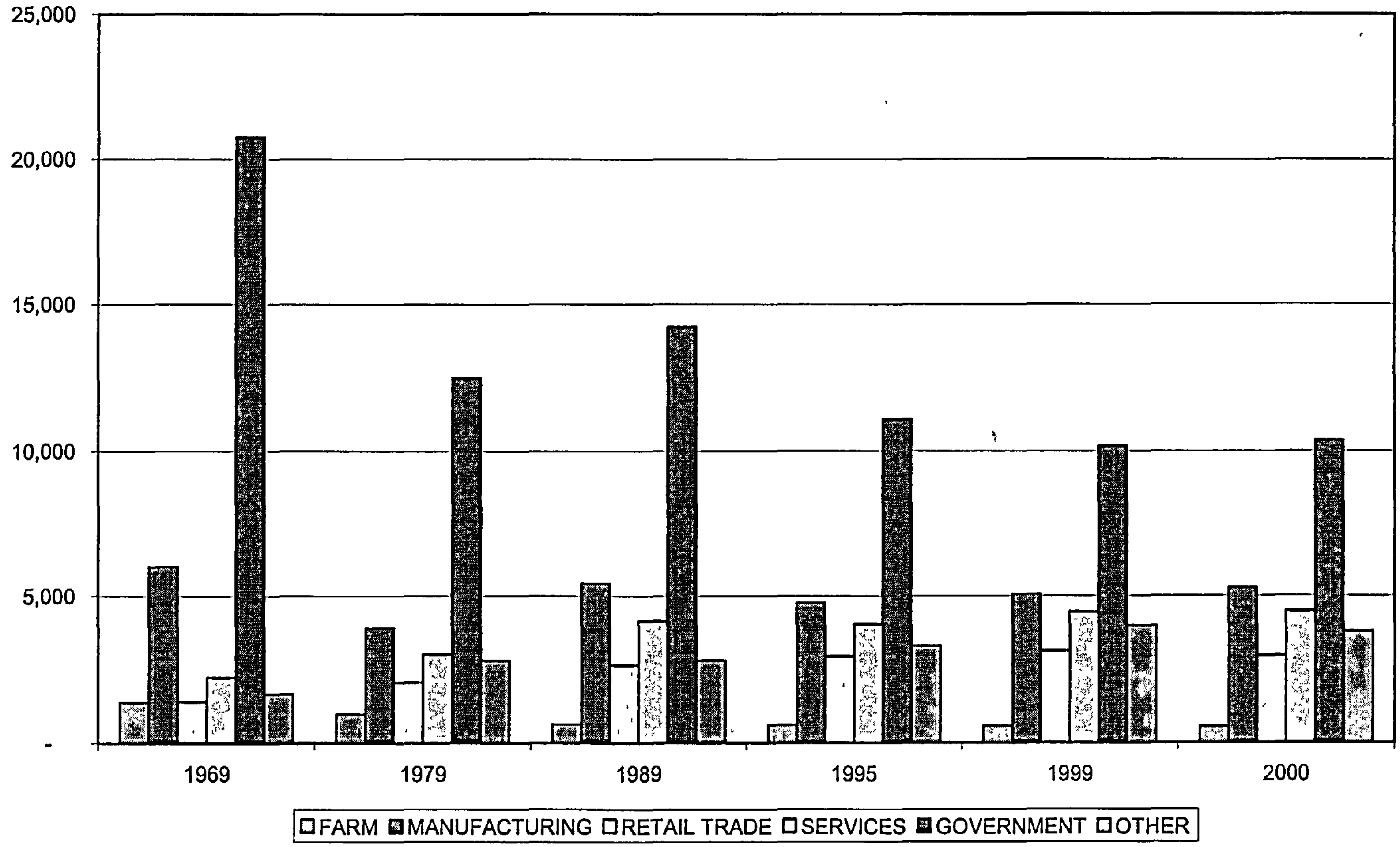


FIGURE 14
GENEVA COUNTY EMPLOYEES (FULL & PART TIME) BY MAJOR INDUSTRY

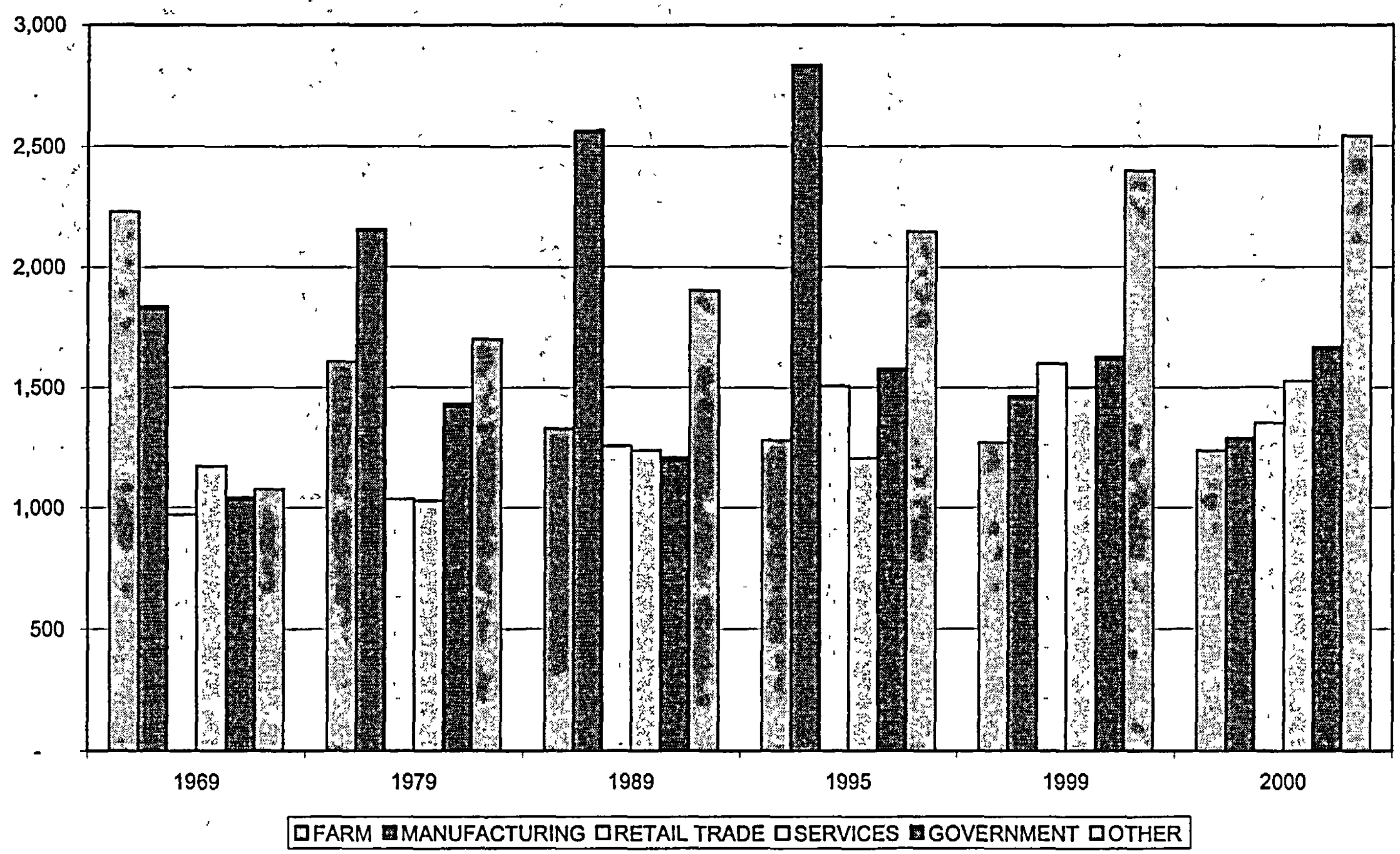


FIGURE 15
HENRY COUNTY EMPLOYEES (FULL & PART TIME) BY MAJOR INDUSTRY

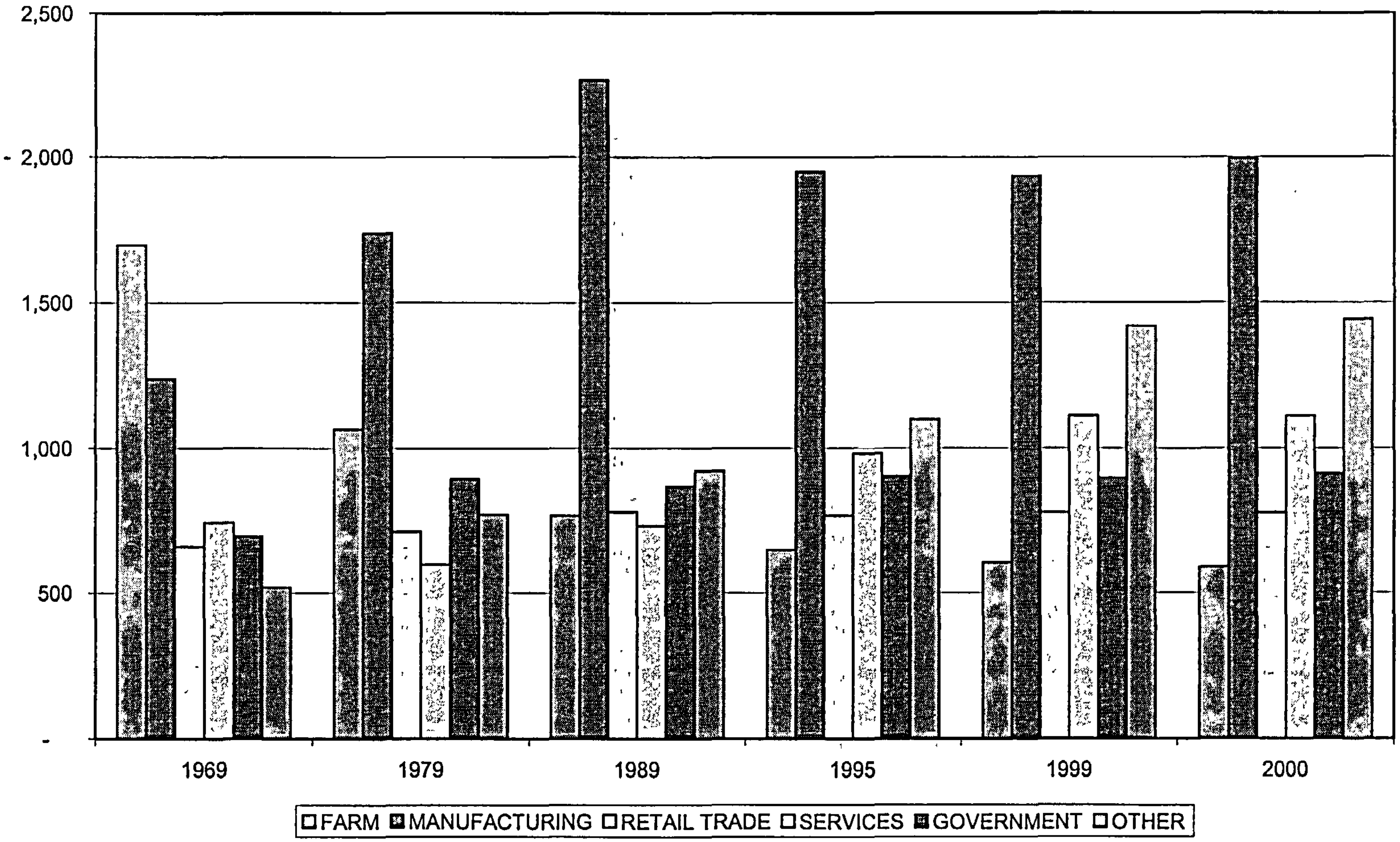


FIGURE 16
HOUSTON COUNTY EMPLOYEES (FULL & PART TIME) BY MAJOR INDUSTRY

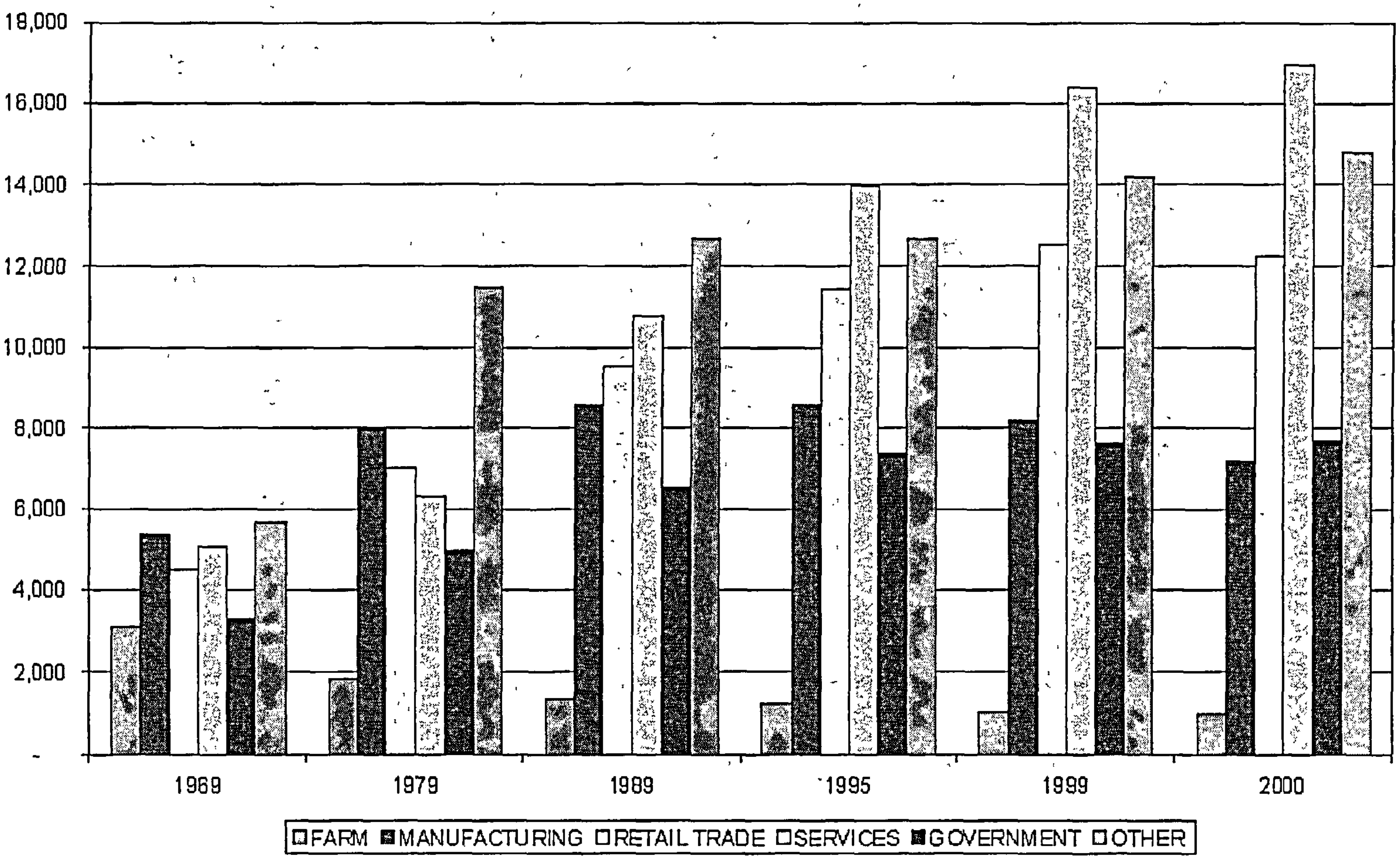


FIGURE 17
SUMMARY TABLE
SOUTHEAST ALABAMA REGION EMPLOYEES (FULL & PART TIME) BY MAJOR INDUSTRY

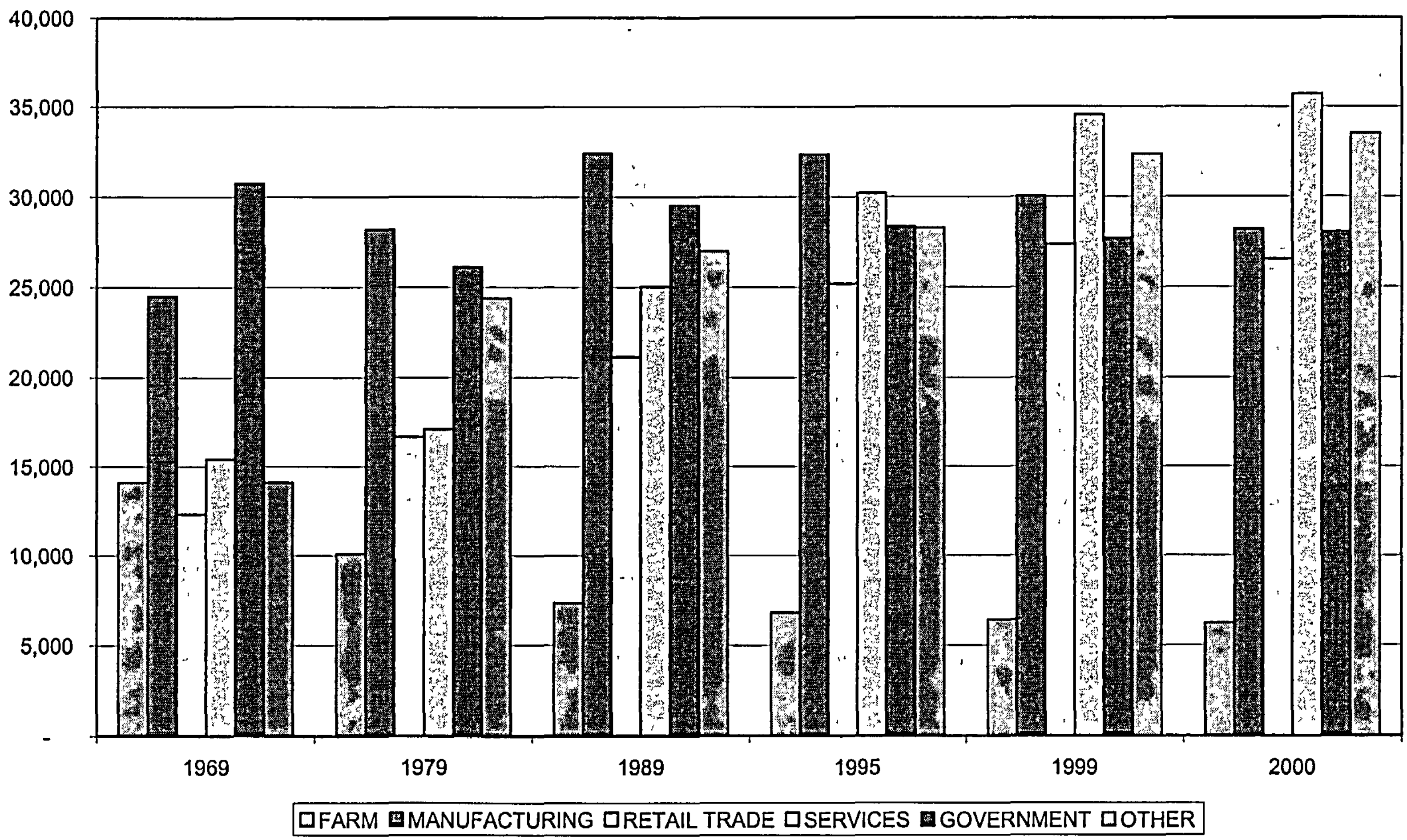


TABLE 29
BARBOUR COUNTY
PERSONAL INCOME EARNINGS BY INDUSTRY
SELECTED SEGMENTS BY PERCENT OF ECONOMY

	1969	1979	1989	1995	1999	2000
FARM	12.1%	11.8%	8.0%	5.7%	9.0%	7.2%
MANUFACTURING	24.7%	30.8%	38.6%	36.4%	39.1%	39.5%
RETAIL TRADE	9.4%	9.5%	7.8%	8.1%	7.4%	7.6%
SERVICES	17.9%	10.3%	10.5%	11.5%	12.6%	12.2%
GOVERNMENT	14.9%	16.7%	14.4%	18.1%	16.3%	16.5%
OTHER	21.0%	20.9%	20.7%	20.2%	15.6%	17.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 30
COFFEE COUNTY
PERSONAL INCOME EARNINGS BY INDUSTRY
SELECTED SEGMENTS BY PERCENT OF ECONOMY

	1969	1979	1989	1995	1999	2000
FARM	8.9%	5.4%	11.6%	6.0%	10.9%	6.0%
MANUFACTURING	33.0%	36.1%	28.8%	30.8%	23.4%	22.2%
RETAIL TRADE	14.6%	13.2%	10.7%	12.5%	12.3%	12.7%
SERVICES	13.6%	12.7%	16.3%	18.0%	18.7%	21.8%
GOVERNMENT	14.6%	15.7%	15.4%	14.2%	15.6%	17.1%
OTHER	15.3%	16.9%	17.2%	18.6%	19.1%	20.2%
TOTAL	100.0%	100.0%	100.0%	100.1%	100.0%	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 31
COVINGTON COUNTY
PERSONAL INCOME EARNINGS BY INDUSTRY
SELECTED SEGMENTS BY PERCENT OF ECONOMY

	1969	1979	1989	1995	1999	2000
FARM	8.9%	6.3%	5.2%	4.6%	7.5%	6.6%
MANUFACTURING	34.2%	29.9%	27.8%	27.1%	21.4%	20.2%
RETAIL TRADE	12.0%	10.8%	10.4%	10.3%	10.6%	10.7%
SERVICES	12.1%	13.8%	16.0%	18.2%	18.5%	18.7%
GOVERNMENT	11.0%	12.6%	14.2%	14.1%	15.9%	15.9%
OTHER	21.8%	26.6%	26.4%	25.7%	26.1%	27.9%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 32
DALE COUNTY
PERSONAL INCOME EARNINGS BY INDUSTRY
SELECTED SEGMENTS BY PERCENT OF ECONOMY

	1969	1979	1989	1995	1999	2000
FARM	1.4%	2.1%	1.8%	0.8%	2.4%	1.8%
MANUFACTURING	21.2%	19.9%	25.5%	24.2%	23.2%	23.1%
RETAIL TRADE	3.1%	4.8%	4.3%	5.0%	4.4%	4.1%
SERVICES	5.6%	7.9%	10.4%	10.6%	9.3%	9.5%
GOVERNMENT	64.1%	57.1%	51.7%	49.7%	51.8%	52.9%
OTHER	4.6%	8.2%	6.3%	9.7%	8.9%	8.6%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 33
GENEVA COUNTY
PERSONAL INCOME EARNINGS BY INDUSTRY
SELECTED SEGMENTS BY PERCENT OF ECONOMY

	1969	1979	1989	1995	1999	2000
FARM	19.9%	26.3%	26.1%	19.3%	23.6%	17.6%
MANUFACTURING	24.6%	22.3%	24.9%	24.7%	17.3%	16.3%
RETAIL TRADE	13.7%	10.7%	9.3%	9.1%	9.4%	9.3%
SERVICES	10.5%	7.7%	9.1%	8.7%	9.5%	11.0%
GOVERNMENT	12.7%	13.6%	11.6%	15.6%	18.2%	20.5%
OTHER	18.6%	19.4%	19.0%	22.6%	22.0%	25.3%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 34
HENRY COUNTY
PERSONAL INCOME EARNINGS BY INDUSTRY
SELECTED SEGMENTS BY PERCENT OF ECONOMY

	1969	1979	1989	1995	1999	2000
FARM	20.4%	5.2%	10.0%	1.9%	9.1%	6.2%
MANUFACTURING	29.1%	37.1%	43.9%	41.8%	34.0%	36.8%
RETAIL TRADE	14.3%	11.7%	9.7%	9.7%	7.9%	7.4%
SERVICES	9.0%	12.3%	8.8%	12.5%	11.9%	11.4%
GOVERNMENT	13.8%	15.7%	13.9%	15.6%	15.6%	16.0%
OTHER	13.4%	18.0%	13.7%	18.5%	21.5%	22.2%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 35
HOUSTON COUNTY
PERSONAL INCOME EARNINGS BY INDUSTRY
SELECTED SEGMENTS BY PERCENT OF ECONOMY

	1969	1979	1989	1995	1999	2000
FARM	5.8%	1.6%	2.6%	1.4%	1.3%	0.4%
MANUFACTURING	22.9%	21.0%	17.9%	16.7%	15.5%	14.0%
RETAIL TRADE	15.7%	13.0%	12.4%	12.5%	12.8%	12.2%
SERVICES	15.9%	15.7%	22.2%	27.2%	26.9%	27.9%
GOVERNMENT	11.5%	11.1%	13.2%	14.0%	15.3%	15.0%
OTHER	28.2%	37.6%	31.7%	28.2%	28.2%	30.5%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

TABLE 35a
SOUTHEAST ALABAMA
PERSONAL INCOME EARNINGS BY INDUSTRY
SELECTED SEGMENTS BY PERCENT OF ECONOMY

	1969	1979	1989	1995	1999	2000
FARM	11.1%	8.4%	9.3%	5.7%	9.1%	6.5%
MANUFACTURING	27.1%	28.2%	29.6%	28.8%	24.8%	24.6%
RETAIL TRADE	11.8%	10.6%	9.2%	9.6%	9.3%	9.1%
SERVICES	12.1%	11.3%	13.3%	15.3%	15.3%	16.1%
GOVERNMENT	20.4%	20.4%	19.3%	20.2%	21.2%	22.0%
OTHER	17.5%	21.1%	19.3%	20.4%	20.3%	21.7%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Economic Analysis, Regional Economic Information System, and SEARP&DC

FIGURE 18
BARBOUR COUNTY PERSONAL INCOME BY MAJOR INDUSTRY
Percentage of Total Income

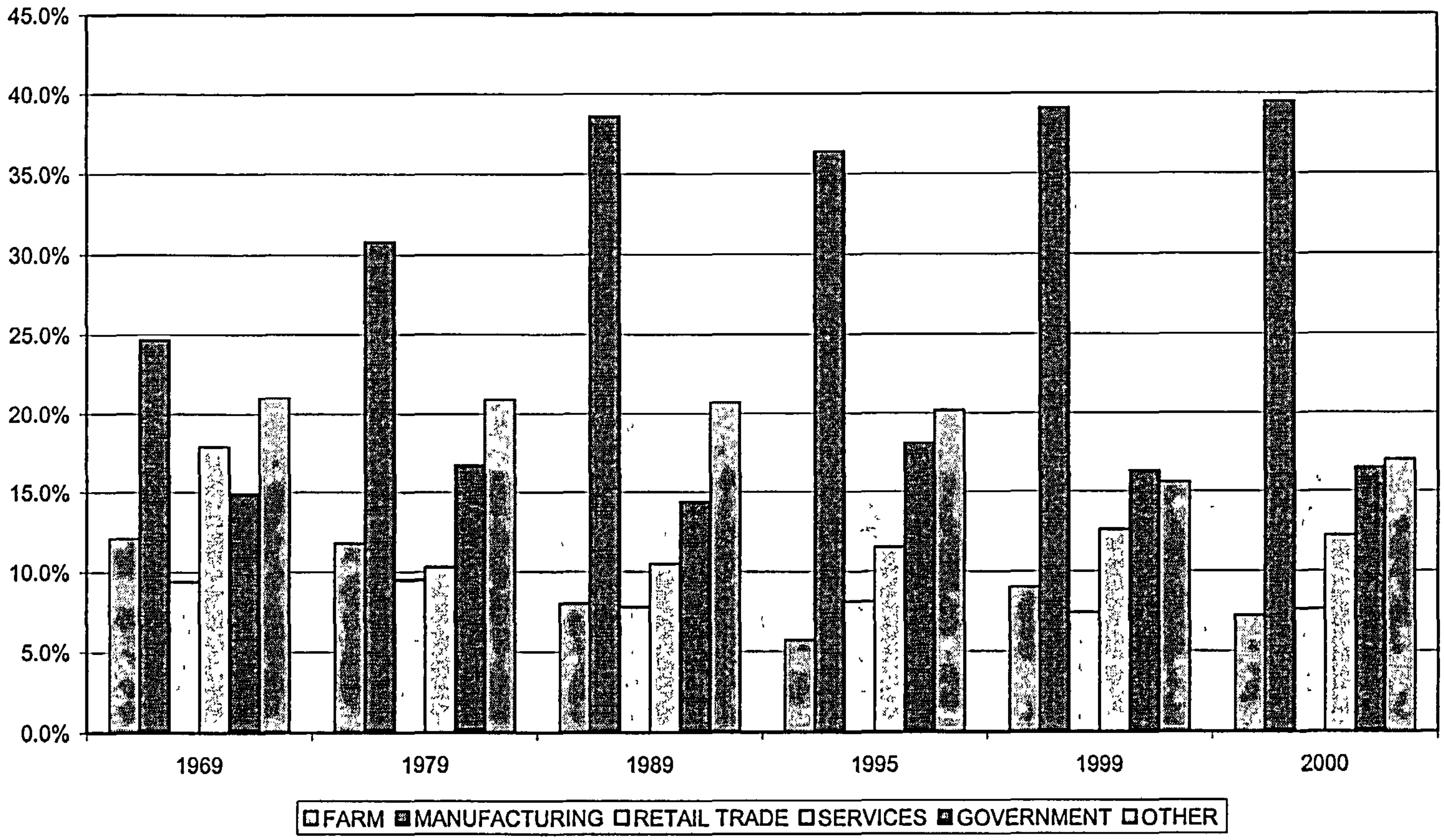


FIGURE 19
COFFEE COUNTY PERSONAL INCOME BY MAJOR INDUSTRY
Percentage of Total Income

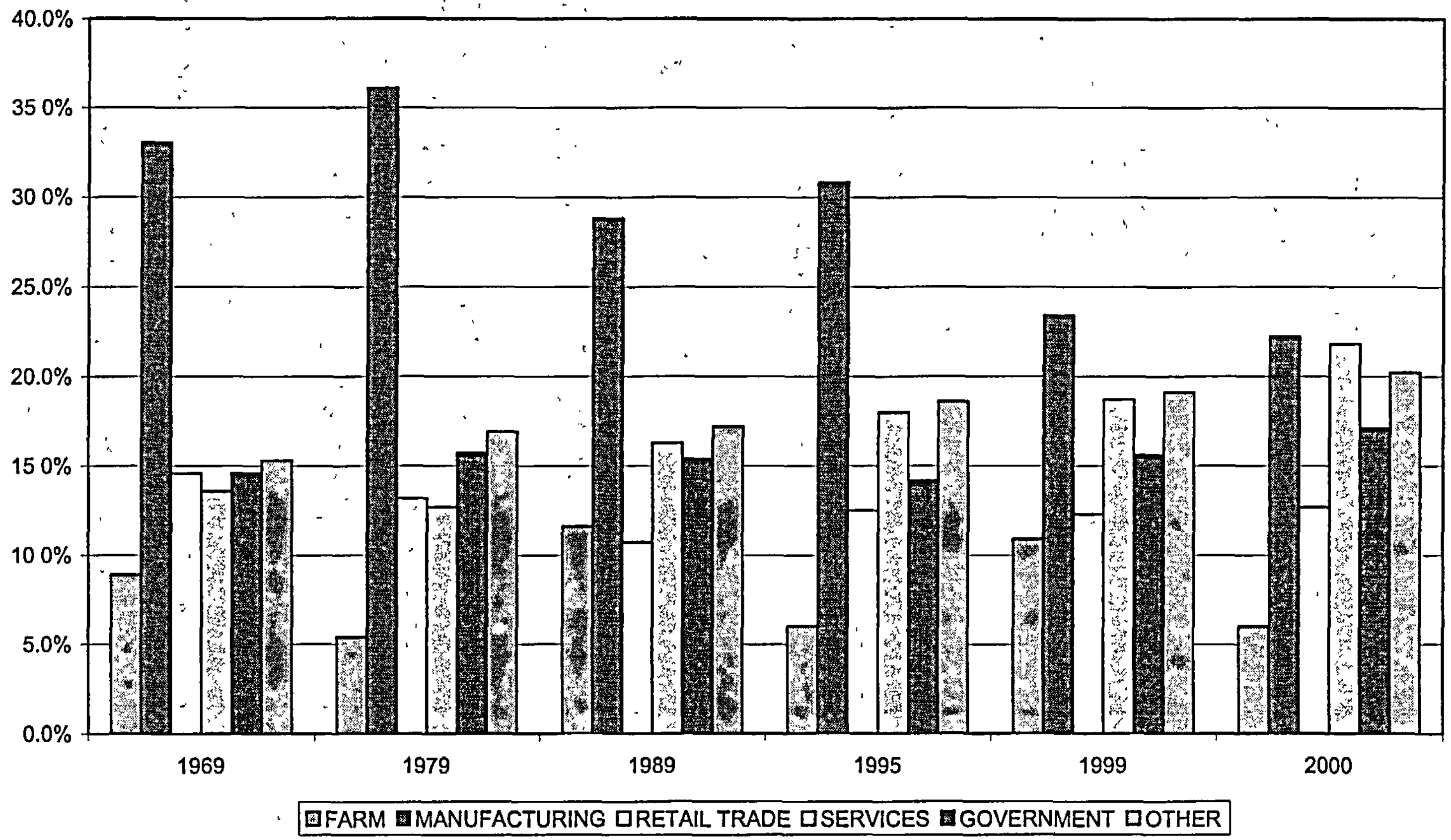


FIGURE 20
COVINGTON COUNTY PERSONAL INCOME BY MAJOR INDUSTRY
Percentage of Total Income

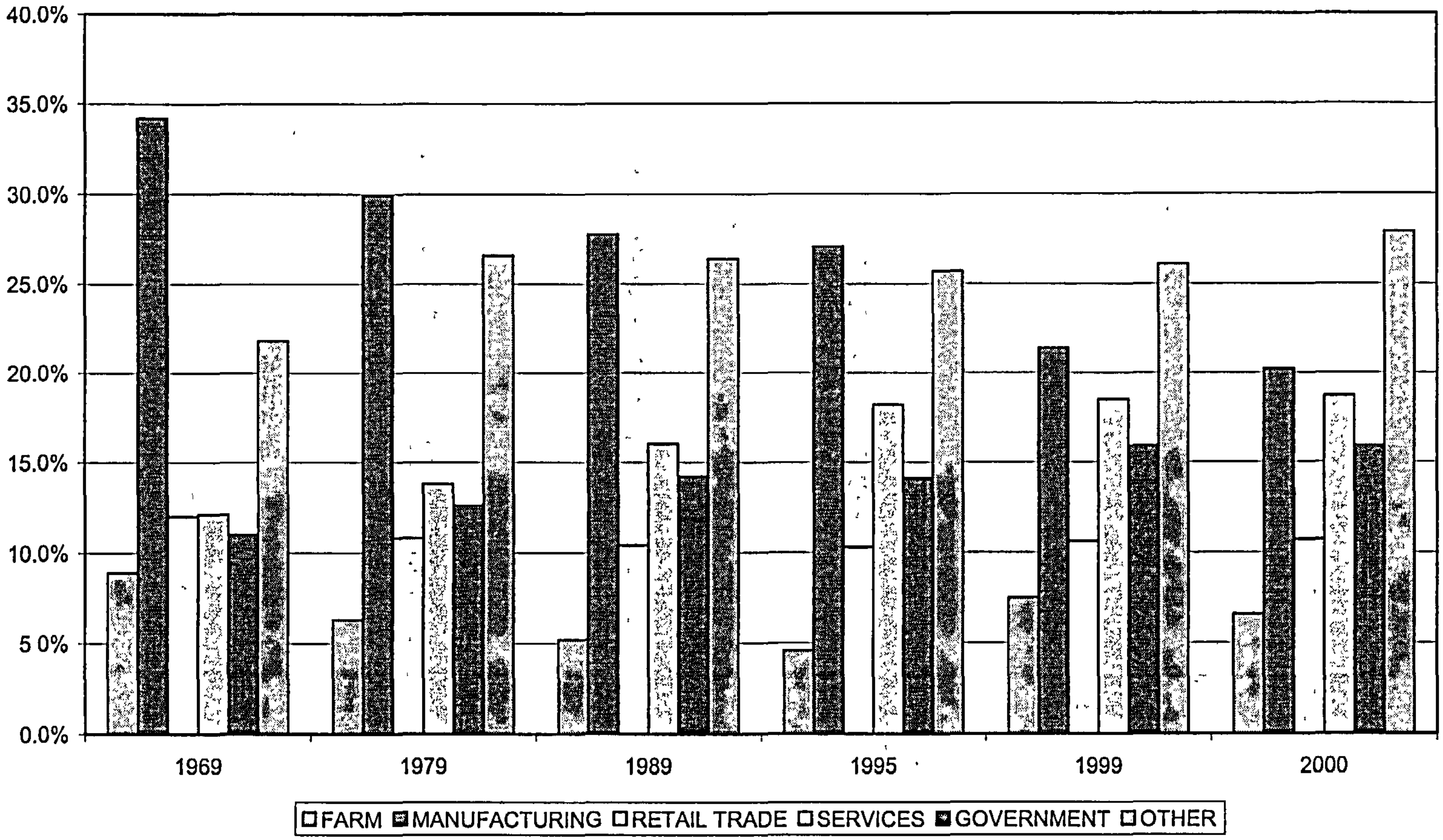


FIGURE 21
DALE COUNTY INCOME BY MAJOR INDUSTRY
Percentage of Total Income

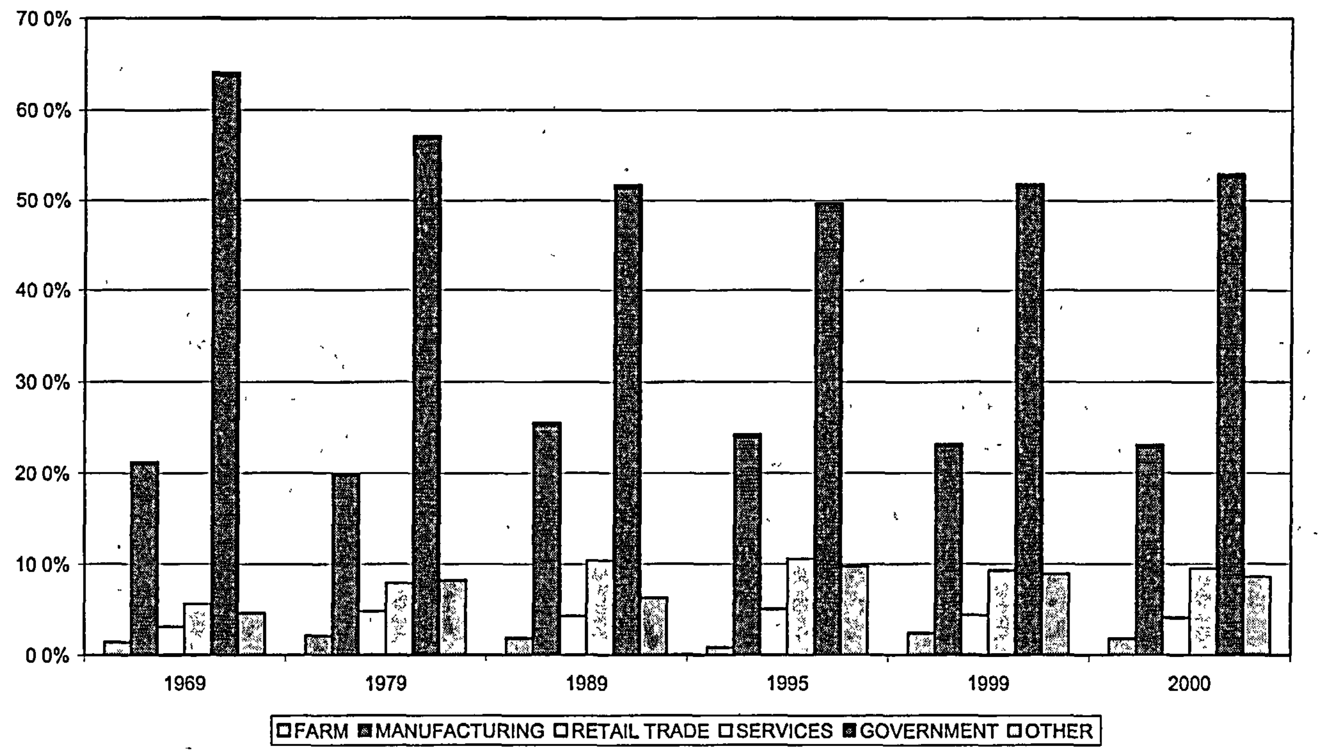


FIGURE 22
GENEVA COUNTY PERSONAL INCOME BY MAJOR INDUSTRY
Percentage of Total Income

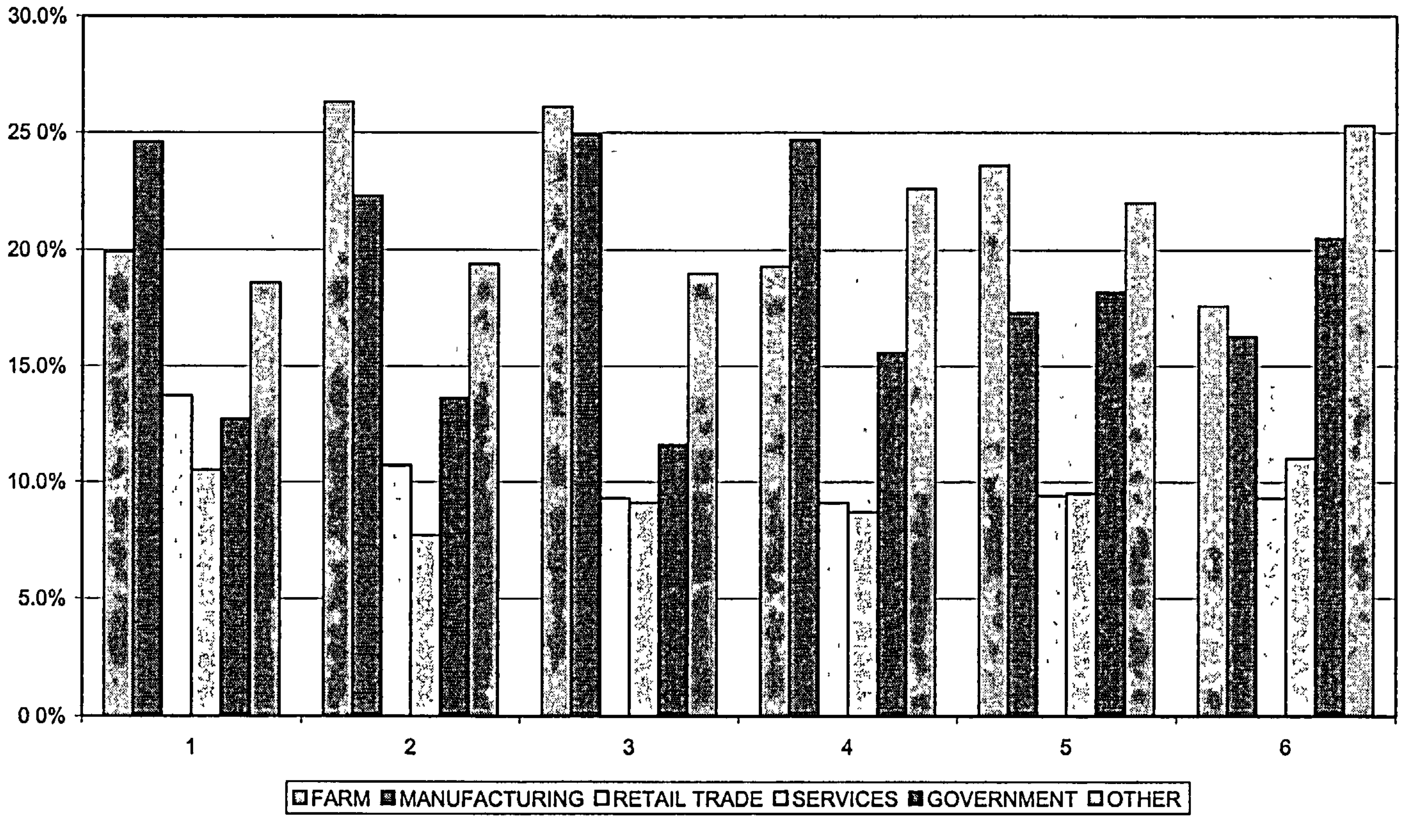


FIGURE 23
HENRY COUNTY PERSONAL INCOME BY MAJOR INDUSTRY
Percentage of Total Income

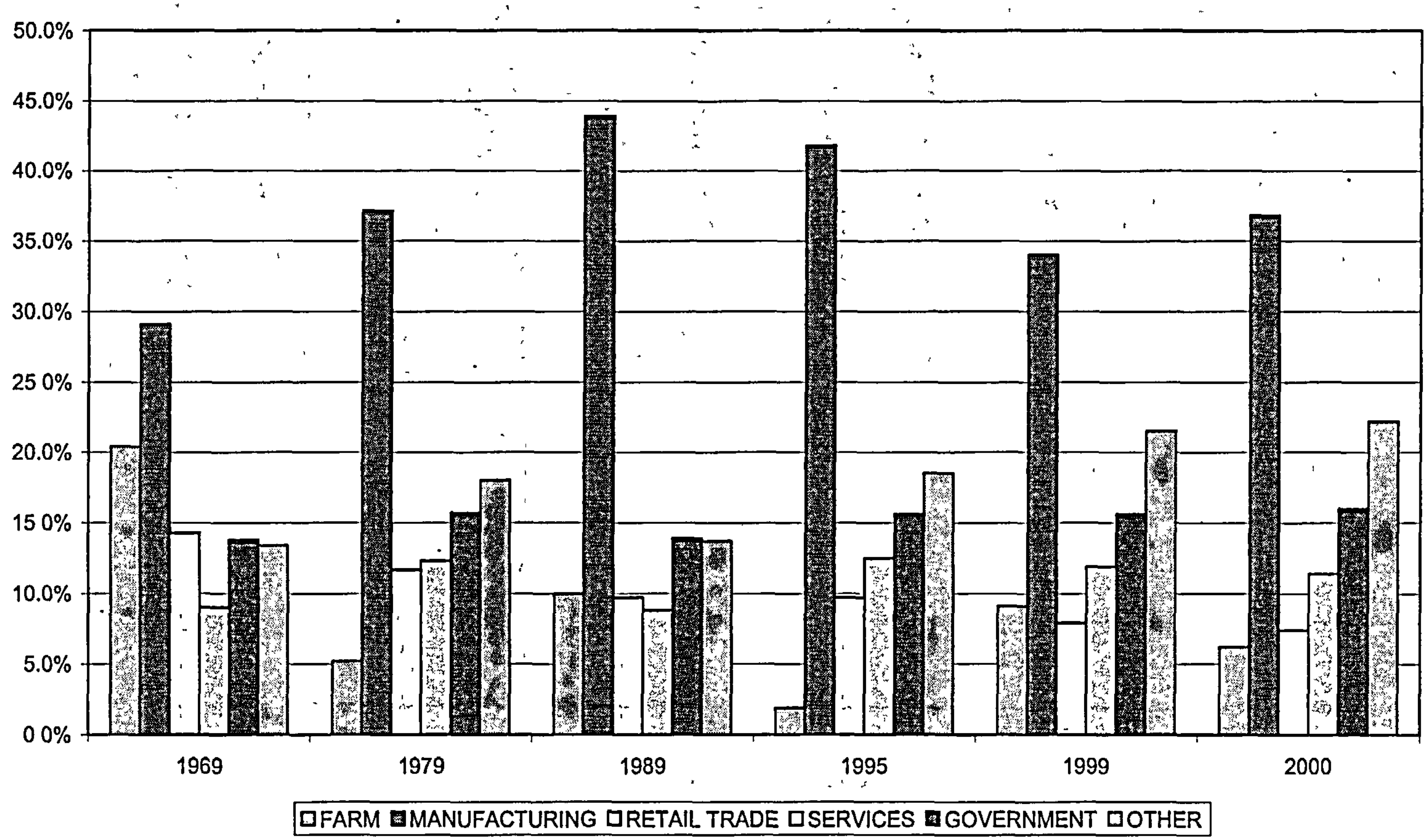


FIGURE 24
HOUSTON COUNTY PERSONAL INCOME BY MAJOR INDUSTRY
Percentage of Total Income

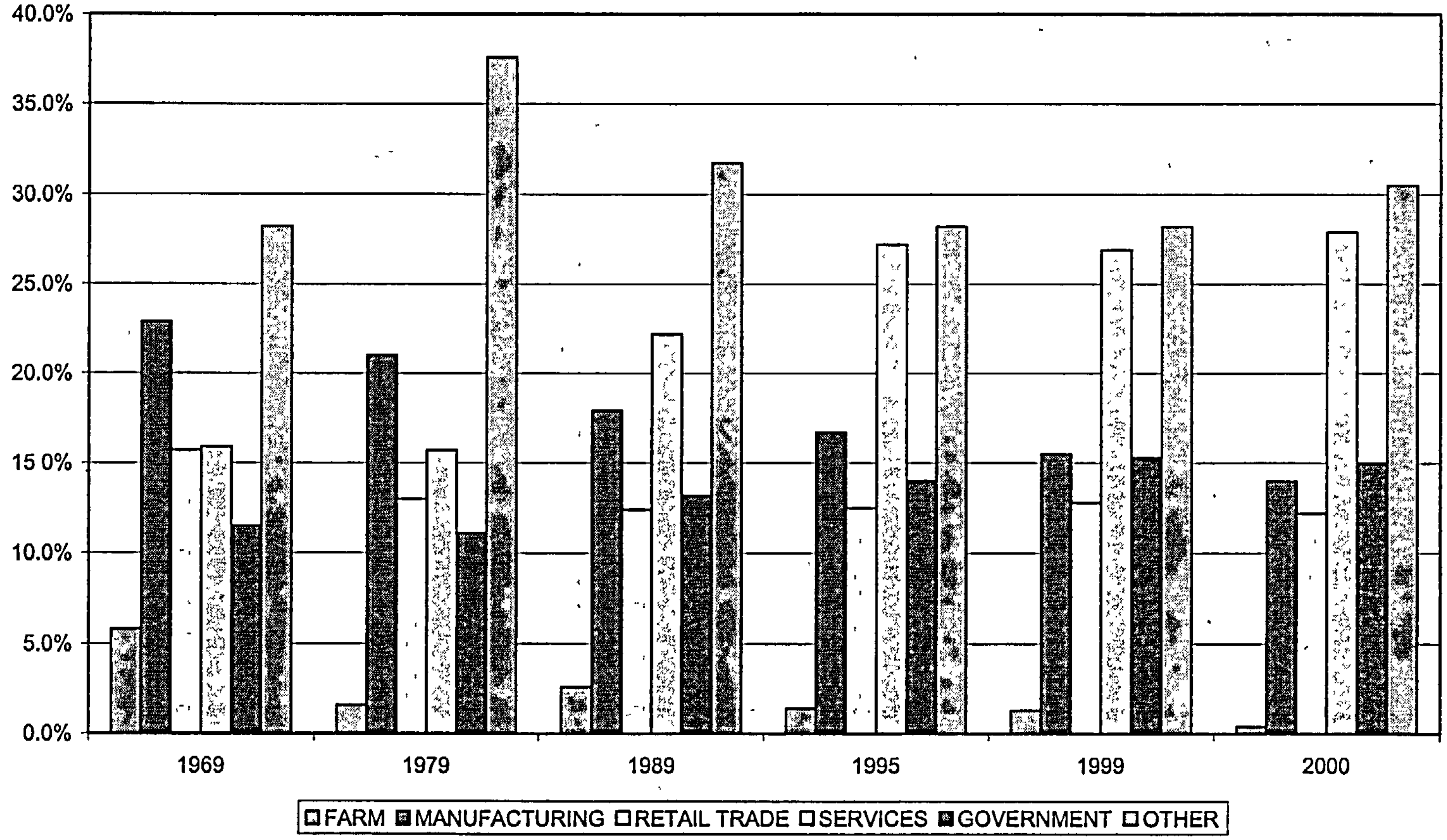
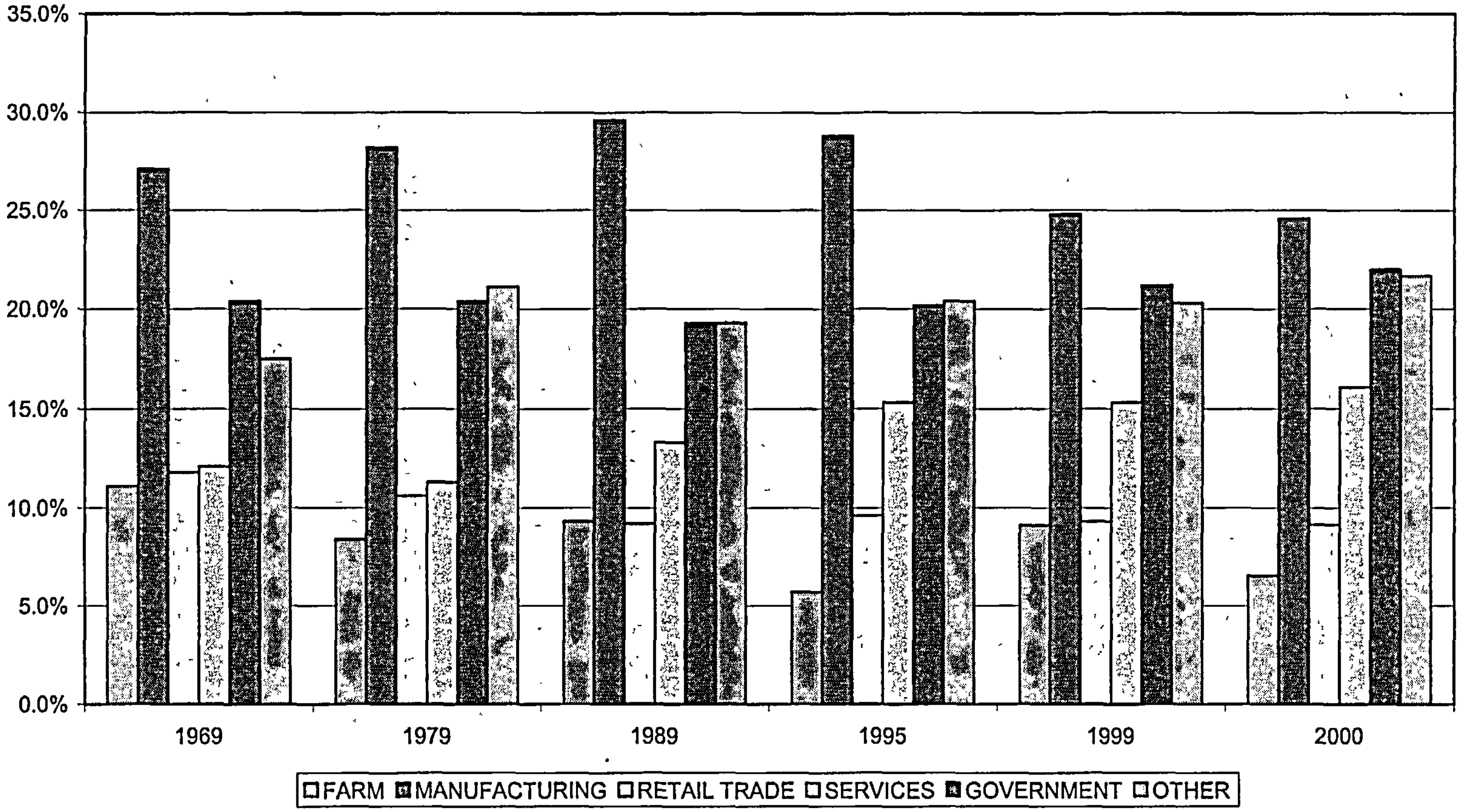


FIGURE 25
Summary Table
SOUTHEAST ALABAMA REGION PERSONAL INCOME BY MAJOR INDUSTRY Percentage of Total Income



RETAIL SALES

Retail Sales data provide reasonably current information on spending within a given economy. Spending reflects the availability of funds; i.e., do people have discretionary income? If so, how much discretionary income is available? Spending also acts as a psychological barometer of consumer confidence.

Within this section, the most current information that is available is given even though there is a four to five month time lag in getting the data. Our source for this information is the University of Alabama's Center for Business and Economic Research. The Center has had problems gathering data that directly reflects sales within a county since the information is derived from sales tax data. In the past, sales taxes that were reported from a business in a given county were credited to that county. This practice created some vast discrepancies. In no case was the need to solve this statistical problem more apparent than was the case in Geneva County. With a large corporate wholesale grocery operation in the County, the company's sales taxes were credited to Geneva County even though the taxes reported came from other company operations throughout the State. This is clearly evident in the tables and figures that follow. Beginning with 1992, a new method for assessing county sales was put into effect, so future data should prove to be more accurate and reliable. In many other cases, the past system served as a reasonable indicator. Using available data, Tables 36-37 and Figure 10 were developed to present the best retail sales information we have at the present time.

In looking at the State and Regional sales from Tables 36-37, it is obvious that in 1991 retail sales were dismal. Looking at these tables and Figure 10, a considerable increase in retail sales seems apparent throughout the District. This is in sharp contrast to other recessionary data presented in this narrative. The increase is so dramatic that it may only prove that the conversion to a new statistical method as previously mentioned may be the primary culprit although there has been some improvement.

2001 data shows a decrease in retail sales for all counties within the region, with the exception of Coffee and Houston County. The highest percentage decrease occurred in Barbour County with a 10.1% decline. Covington County also had a decrease of 5.6% in retail sales in 2001. Houston County experienced the largest increase at 1.2%, while Coffee County increased by 0.7%.

In summary, retail sales did show signs of the recession especially in 1991; however, 1992-2001 figures are much improved, albeit many have seen a decline in recent years. With the new changes in the accumulation of sales tax data, retail sales trends within the District will be more accurately monitored. There will, however, be a lag time of five to six months. More precise data will be available in the future with improved data methodology, and thus, better trend lines should result.

FIGURE 26
RETAIL SALES FOR SOUTHEAST ALABAMA REGION 1987-1995
(In Thousands)

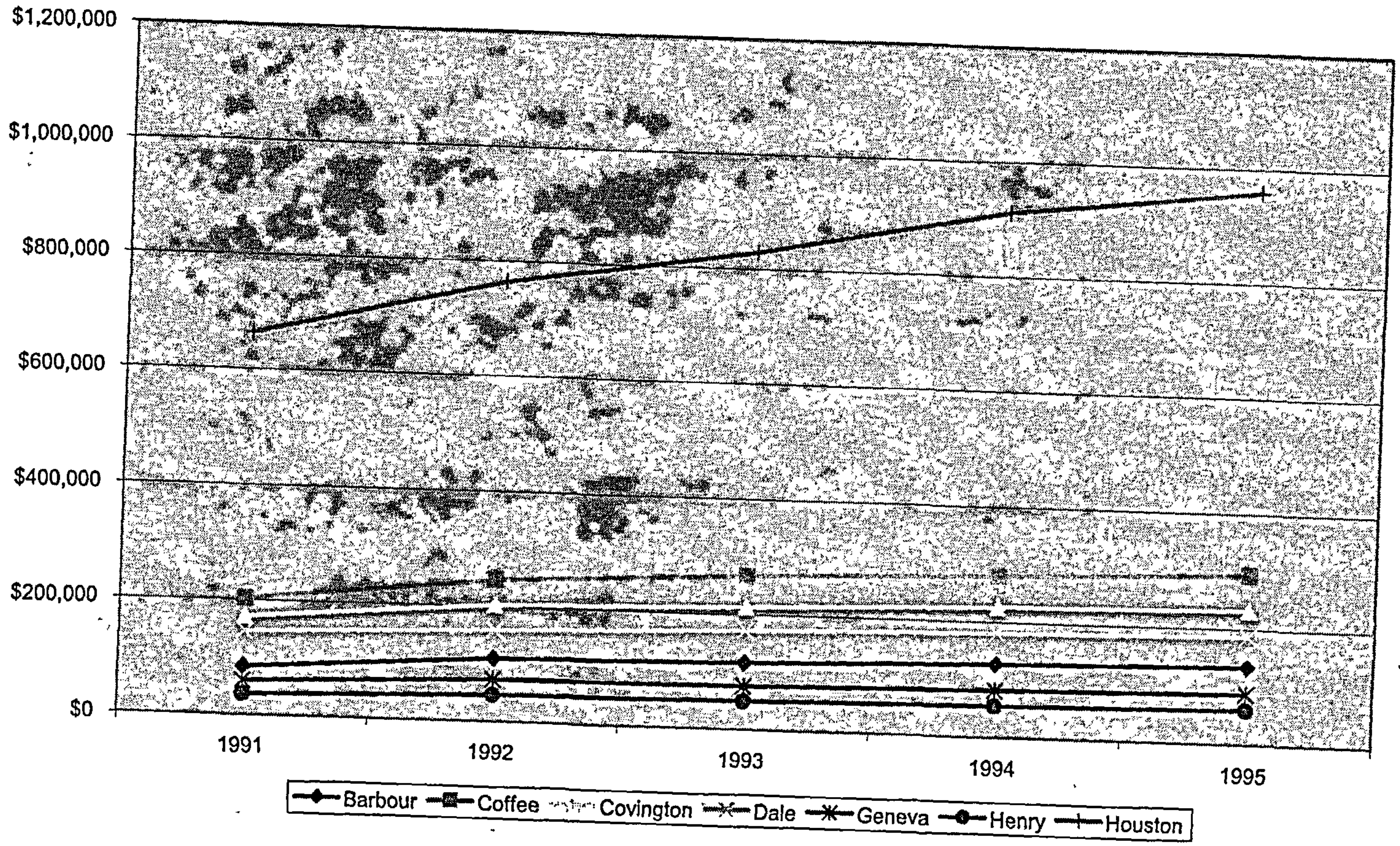


FIGURE 26A
TAXABLE RETAIL SALES FOR DISTRICT COUNTIES IN ALABAMA 1991-2001
COMPARISONS TO REGION AND STATE (In Thousands)

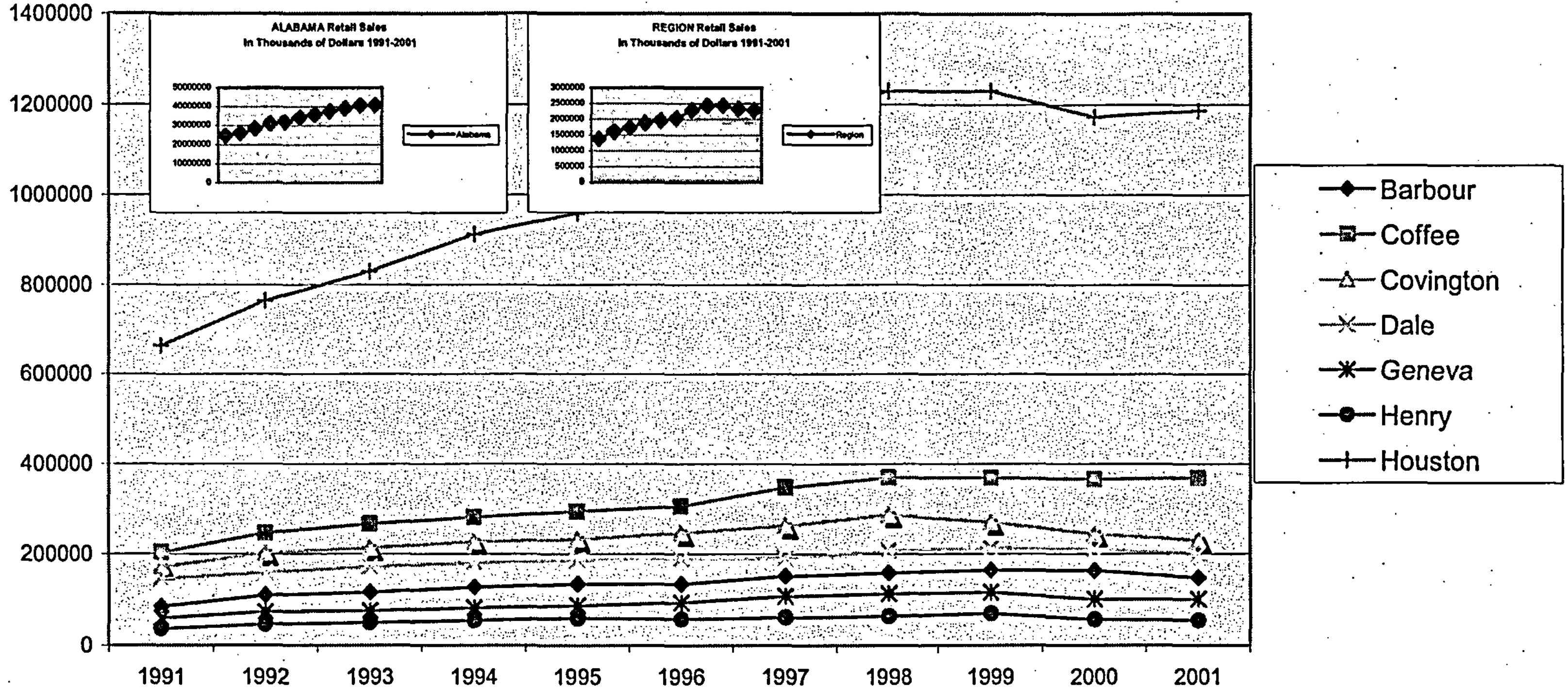


TABLE 36
RETAIL SALES FOR DISTRICT COUNTIES IN ALABAMA*

Place	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Barbour	84,730	109,691	116,226	126,987	134,075	133,733	151,211	158,797	164,035	163,859	147,391
Coffee	203,395	246,413	266,892	280,842	283,975	305,667	347,452	369,867	369,050	366,204	368,833
Covington	171,598	202,649	213,127	226,767	232,810	246,384	262,197	286,744	270,304	244,209	230,598
Dale	146,580	159,439	172,066	180,988	187,120	189,366	191,010	207,540	213,531	210,181	200,178
Geneva	60,139	73,392	75,852	81,888	87,469	94,024	107,243	112,840	116,340	100,770	100,710
Henry	36,924	46,317	49,460	55,034	59,781	57,585	61,413	64,003	70,054	56,693	54,685
Houston	663,948	763,870	829,538	911,975	959,282	996,684	1,160,295	1,229,538	1,229,770	1,172,048	1,185,690
Region	1,367,314	1,601,771	1,723,161	1,864,479	1,954,512	2,023,443	2,280,821	2,429,329	2,433,084	2,313,964	2,288,085
Alabama	24,608,740	26,023,035	28,302,518	30,910,549	31,977,911	34,143,144	35,675,209	37,493,309	39,059,712	40,538,803	40,740,220

*In Thousands

Source: Center for Business and Economic Research, University of Alabama

TABLE 37
PERCENT CHANGE IN RETAIL SALES FOR DISTRICT COUNTIES IN ALABAMA

	% Change	% Change	% Change	% Change	% Change	% Change	% Change	% Change	% Change	% Change	% Change
Place	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	1991-2001
Barbour	29.50%	6.00%	9.30%	5.60%	-0.30%	13.10%	5.00%	3.30%	-0.10%	-10.10%	74.00%
Coffee	21.10%	8.30%	5.20%	4.70%	4.00%	13.70%	6.50%	-0.20%	-0.80%	0.70%	81.30%
Covington	18.10%	5.20%	6.40%	2.70%	5.80%	6.40%	9.40%	-5.70%	-9.70%	-5.60%	34.40%
Dale	8.80%	7.90%	5.20%	3.40%	1.20%	0.90%	8.70%	2.90%	-1.60%	-4.80%	36.60%
Geneva	22.00%	3.40%	8.00%	6.80%	7.50%	14.10%	5.20%	3.10%	-13.40%	-0.10%	67.50%
Henry	25.40%	6.80%	11.30%	8.60%	-3.70%	6.60%	4.20%	9.50%	-19.10%	-3.50%	48.10%
Houston	15.00%	8.60%	9.90%	5.20%	3.90%	16.40%	6.00%	0.00%	-4.70%	1.20%	78.60%
Region	17.10%	7.60%	8.20%	4.80%	3.50%	12.70%	6.50%	0.20%	-4.90%	-1.10%	67.30%
Alabama	5.70%	8.80%	9.20%	3.50%	6.80%	4.50%	5.10%	4.20%	3.80%	0.50%	65.60%

Source: Center for Business and Economic Research, University of Alabama

CHAPTER III

BASIC RESOURCES

Chapter III

BASIC RESOURCES

Land

The previous chapter outlined various human resources available in the Southeast Alabama Economic Development District and raised questions regarding the value of the resource in comparison to values for the same resource in other areas of the economy. The question of value or best use of other resources is inherent in studying other resources and these resources best and highest use. This approach also serves as a starting point in searching for regional development potential.

Basic resources include water, land and location. Land is the primary resource and has a number of basic economic uses including agricultural production, forestry, commercial and residential development, mineral value and recreational use. Lakes, ponds and streams provide utility to the land resources in the district.

Table 38 below, summarizes the district's estimated basic land uses. The Southeast Alabama Economic Development District contains some 3,122,432 acres or 4,878.8 square miles of land resources. Over 50% of the district's total land area is forestland making it the largest land use category. The land use pattern found in the district is typical of rural areas in Alabama.

Table 38

Land Use, 2000
(acres)

County	*Residential*	*Commercial*	*Industrial*	*Transportation*	*Public * Semi-Public*	*Agricultural*	*Forest*	*Total Acreage*
Barbour	5,561	600	950	9,835	1,200	97,654	450,600	566,400
Coffee	5,150	650	700	9,450	2,200	114,638	301,900	434,688
Covington	4,900	380	425	11,900	1,100	137,703	505,800	662,208
Dale	6,750	400	625	8,000	2,000	103,129	238,200	359,104
Geneva	3,600	275	530	9,975	750	150,166	203,600	368,896
Henry	3,700	410	488	8,100	600	121,882	224,500	359,680
Houston	12,900	1,550	1,600	17,000	5,400	166,906	166,100	371,456
Region	42,561	4,265	5,318	74,260	13,250	892,078	2,090,700	3,122,432

Source: SEARP&DC Estimates, 2003

AGRICULTURE

Agriculture continues to be a major sector in Alabama and of the Southeast Alabama Economic Development District economy in terms of cash income. 2001 total farm receipts in Alabama totaled $4.4 billion, a gain of about $430 million (11%) from 2000. Cash receipts included returns for livestock and poultry, crops, government agricultural payments, farm forest products, and other farm related income. Farm and forestry receipts climbed to a record high $4.83 billion compared with $4.52 billion in 2000 and the previous record of $4.78 billion in 1999.

Receipts for all 2001 agricultural commodities included $2.81 billion for livestock and poultry and $705.2 million for crops. Higher returns were realized for broiler chickens, eggs, dairy and most crop commodities, including greenhouse, sod and nursery products, while receipts for cattle and calves, hogs and catfish were off rather sharply from 2000.

Cash receipts for livestock and poultry production steadily climbed during the last decade from $2.13 billion in 1990 to a record high of $2.81 billion for 2001. Broiler chickens continue to lead the way as Alabama's # 1 agricultural commodity with cash receipts of $2.0 billion, a record high amount. These receipts compared with $1.75 billion the previous year and accounted for 41% of total farm and forestry receipts statewide. Cattle and calves contributed $362.8 million in sales, down 17% from the previous year. Receipts for eggs amounted to $265.4 million compared to $259.6 million in 2000.

Greenhouse, sod and nursery returned $221.1 million, while Alabama cotton farmers took in $217.2 million in cash receipts. The leading agricultural producing counties in terms of cash receipts in the state for 2001 were: Cullman County, $459.2 million; Dekalb County, $314.8 million; Marshall County, $213.5 million; **Coffee County, $164.1 million (4th);** Blount County, $161.2 million; Baldwin County, $152.8 million; **Geneva County, $143.4 million (7th);** Franklin County, $132.8 million; Jackson County, $115.5 million and **Covington County, $115.0 million (10th).** Other regional counties and their total agricultural cash receipts in 2001 were: **Dale County, $79.1 million (20th); Houston County, $74.1 million (22nd); Barbour County, $74.0 million (23rd) and Henry County, $60.2 million (27th).** Broiler chicken cash receipts for the region in 2001 was $321.2 million making this category the largest cash income agricultural commodity. This compares to 2000 cash receipts of $285.7 million or an increase of 11%.

The Southeast Alabama region has seen some dramatic changes in agriculture over the last decade, some of which have contributed negatively to the regional agricultural economy. The net effect of negative impacts in the regional agricultural economy has resulted in traditional commodities returning fewer dollars to producers. Alabama as well as regional agricultural producers are looking at other sources of farm income with many diversifying into other more profitable cash commodities. Producers now more than ever are looking at domestic and world markets to determine where their production of commodities can be shifted to earn a profit. A major traditional farm program, the peanut quota program, (price supports) has been eliminated and others are undergoing modifications that may have the effect of reducing net farm income regionally. The forecast of how these changes will ultimately affect agricultural incomes in Alabama and particularly Southeast Alabama is unclear at this time. However, with all of the negative changes occurring in agriculture, it remains a major source of income for the state and district. Regional farmers and producers have begun the process of adapting to new programs and are exploring new ways to diversify their operations to continue to generate farm income. The economic challenges facing agricultural producers in Alabama and the district are greater than ever before.

The four major sources of Alabama farm income for 2001 are: livestock & poultry $2.81 billion; crops $705.2 million; forest products $362.0 million and private non-farm commercial timber $326.0 million (see Table 39). According to the latest available data from the Alabama Agricultural Statistics Service, Alabama farmers received $3.5 billion in farm marketings and related activities in 2001. Total farm and forestry receipts, including non-farm commercial timber, topped $4.4 billion in 2001. Total cash receipts are up 12% from 1996 and 29% from 1990. The top six commodities for 2001 cash receipts compared to 1990 were: (1) broilers $2.0 billon/$1.2 billion; (2) cattle & calves $362.8 million/$554.8 million; (3) eggs $265.4 million/$170.4 million; (4) nursery, sod and greenhouse products $221.1 million/$185.5 million; (5) cotton $217.2 million/$136.8 million and (6) peanuts $128.8 million/$104.8 million.

Statewide, livestock and poultry continue to be the major source of farm income in 2001. This category returned $2.8 billion in total cash receipts to Alabama producers, up 19% from $2.4 billion in 1996 and up 28% from $2.1 billion in 1990. Broiler receipts continued to trend steadily higher as the largest individual commodity in Alabama's total farm cash receipts, at $2.0 billion in 2001 up 15% over 2000. Broiler receipts were up 23% over 1996 receipts of $1.6 billion and up 72% from 1990 total receipts of $1.2 billion. Alabama ranked third in broiler production with production of 1,038,700,000 in 2001 behind Georgia (1,229,700,000) and Arkansas (1,191,700,000). District-wide, **Coffee County** continues to lead in cash receipts and also in broiler production. **Coffee County** totaled **$102.8 million** in broiler cash receipts in 2001, which represented 63% of the county's total agricultural cash receipts. Another regional county that has shown strong growth in the broiler market is **Geneva County**, with 2001 cash receipts of **$69.1 million.** Other regional counties that are involved in broiler production with 2001 cash receipts are: **Covington County $48.8 million; Barbour County, $34.9 million; Dale County, $35.7 million; Henry County, $10.0 million and Houston County, $3.8 million.** The district has three poultry processing plants located in Enterprise (2) (Coffee County) and Baker Hill (Barbour County).

The growth of the broiler industry in the region is dependent upon these processing plants so that this sector of the agricultural economy can continue to expand and provide stable income for regional producers. The following table depicts the growing demand for chicken in the U.S.

Table 39
Per Capita Consumption (lb.)

Year	Beef	Pork	Total Chicken
1960	63.3	59.1	28
1970	84.4	55.8	40.3
1980	76.6	57.3	48
1990	67.8	49.7	61.5
1995	67.5	52.4	70.4
2000	69.6	52.4	77.8
2001	66.2	53	79.4
2002	64	53	81.5

Egg receipts statewide in 2001 totaled $265.4 million, up 18% from 1996 and up 56% from 1990. Leading regional egg producing counties in 2001 were: **Covington County, $12.3 million** and **Geneva County, $5.4 million.**

Poultry Facts:

- ✓ *A cockerel is a male chicken under one year of age; cock or a rooster is a male more than one year old; pullet is a female under one year, and a hen is a female over one year of age;*
- ✓ *A broiler or fryer is a young meat-type chicken that can be cooked tender by broiling or frying and usually weighs between 2 ½ and 3 ½ pounds;*
- ✓ *A roaster is a young meat-type chicken that can be cooked tender by roasting and usually weighs 4 pounds or more;*
- ✓ *Laying hens will start to lay eggs at about 20 weeks of age.*

2001 Alabama cattle receipts were $362.8 million, down 20% from 2000 receipts of $438.0 million. Cattle were up 27% compared to 1996 receipts of $286 million but were 38% below 1990 receipts of $589 million. Leading regional cattle cash receipts counties in 2001 were: **Covington County, $7.5 million; Geneva County, $7.3 million; Houston County, $7.0 million and Coffee County, $6.9 million.** The regional cattle cash receipts trend is lower compared to 1999 receipts indicating this commodity is in a low price cycle for the period. 2002 cattle inventory region-wide was 155,500 head compared to 2001 inventory of 160,000 head or a reduction of 2.9`%. **Covington County** had a cattle inventory of **28,500 head**; followed by **Geneva County, 27,500 head; Houston County, 26,500 head; Coffee County, 26,000 head; Barbour County and Dale County, 16,000 head each and Henry County, 15,000 head.**

Hogs and pigs were sharply depressed down to record lows for the State. Hog receipts fell to $31 million and were down 57% from 1996 and 75% from 1990 levels. This magnifies the decline in hog inventories in the state due to low prices. Leading regional hog inventory counties in 2001 were: **Coffee County 2,500 head; Henry County, 1,600 head and Geneva County, 800 head.** Other regional counties had inventories of less than 500 head. 2001 hog and pig inventories compare to 1998 inventories of 3,500 head; 3,000 head and 2,200 head respectively for the above listed counties. Cash receipts in

2001 from hog marketings accounted for $400,000 in Coffee County and $256,000 in Henry County.

Dairy receipts also fell to $50 million in 2001 compared to $70 million, loss of 29% from 1996, and below 1990 receipts of $81 million a decline of 38%. Regionally, **Geneva County had cash receipts of $2.4 million and Covington County $1.4 million.** Catfish continue to make a climb in overall farm receipts statewide and in the district. Statewide, catfish production has grown from $14.2 million in 1987. Catfish receipts increased to $70 million in 2001 in Alabama compared to $53 million in 1996 and $31 million in 1990 increases of 32% and 126% respectively. Barbour County is the most advanced county in the region with 290 acres in catfish breeding ponds. Currently, there is no catfish processing facility located in the Southeast Alabama region. The location of a processing facility in the region would open up new income streams for regional producers and provide diversity in agricultural operations as well as an additional source of farm income.

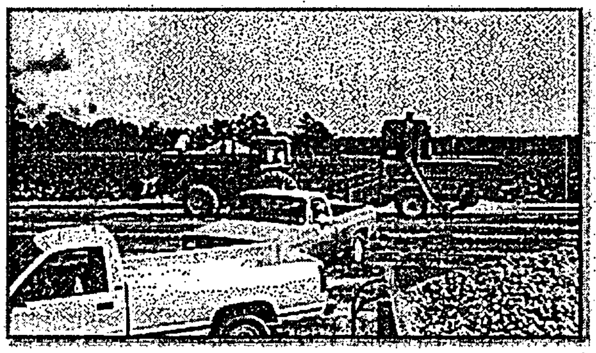
Cotton continues as a major cash crop for Alabama and district producers but has slowed its rapid growth during the 1990's. Cash receipts statewide were $217 million in 2001, down 18% from $265 million in 1996 but up 59% from 1990 receipts of $137 million. As a state, Alabama ranks 9th in the United States in cotton production. Limestone County is the leading cotton producing county in Alabama with 1999 production of 79,000 bales. Regionally, **Covington County** is the leading cotton production county ranking 8th statewide in 1999 production with 21,200 bales up 28.5% from 1998 production of 15,160 bales. **Geneva and Houston Counties** tied for 10th position with production of 18,900 bales each. The district has seen the construction of several cotton gin/warehouse facilities over the past decade that have sparked renewed interest regionally in cotton as an agricultural cash crop. There now appears to be adequate capacity regionally to gin and process cotton acreage plantings, however, producers must closely consider world market prices and production costs as with other crops in planning for cotton production. Nursery and greenhouse receipts continue strong up to $221 million in 2001, an increase of 16% over 1996 level of $190 million and up 22% from $181 million in 1990.

Table 40

Alabama Cotton Production, 1999

Leading Counties	Bales
Limestone	79,000
Madison	51,500
Escambia	45,000
Monroe	43,100
Lawrence	36,600
Baldwin	27,500
Colbert	26,400
Covington	**21,200**
Mobile	19,900
Geneva & Houston	**18,900**

Source: Alabama Dept. of Agriculture, 2000



Historically the region's top cash crop, peanuts continued slow growth in cash income for the state. Cash receipts for 2001 totaled $129 million, up only 8% from 1996 receipts of $119 million and 23% above 1990 receipts of $105 million. In the seven county southeast Alabama region, peanuts returned $97 million in cash receipts in 2001 as compared to $55.7 million in 2000 or an increase of 42.6%. Leading regional counties in terms of acreage, yield and production in 2001 were: **Houston County** with 41,800 harvested acres, yield per acre of 2,415 pounds and production poundage of 101 million; **Geneva County**, 30,300 acres, 2,525 pounds per acre and 76.5 million pounds; **Henry County,** 27,400 acres, 2,570 pounds per acre and 70.4 million pounds. However, there are major changes ahead for the peanut industry that may have negative impacts on this commodity as far as cash incomes are concerned. All district counties ranked among the leading counties in Alabama in peanut production in 1999 as shown in the table below.

Table 41

District Peanut Production, 1999 & 2001
(1,000 lbs)

County	*1999*	*2001*
Barbour	33,532	32,695
Coffee	53,191	57,651
Covington	27,058	30,639
Dale	33,961	31,746
Geneva	63,539	76,516
Henry	61,077	70,417
Houston	104,185	101,002

Source: Alabama Agricultural Statistics Service

Houston County topped all other Alabama counties in peanut production for 2001 with 101,002,000 pounds. The 41,800 acres harvested by the county's producers averaged 2,415 pounds per acre.

The future of the peanut industry in Southeast Alabama is now uncertain. The 2002 Farm Act substantially revamped the peanut program. Under previous legislation, the peanut program was a two-tier price support program based on non-recourse loans. Production for domestic edible consumption was limited to an annually established quota designed to uphold prices at the $610 per ton quota loan rate. Non-quota ("additional") peanut production was permitted only for export or domestic crush, and was eligible for an "additionals" loan rate of $132 per ton (in 2001). Under the 2002 Farm Act, the marketing quota system is eliminated and peanuts are treated similarly to "program" crops such as grains and cotton with identical marketing loan provisions available to all peanut producers. Farmers no longer have to own or rent peanut marketing quota rights to produce for domestic edible consumption. Compensation (a "buy-out") has been provided to peanut quota holders for elimination of the peanut quota system. All farmers with a history of peanut production during 1998-2001, whether quota-holders or not, are eligible for fixed direct payments for counter-cyclical payments based on an established target price.

Some of the major provisions of the 2002 Farm Act relative to peanuts are:

- A marketing assistance program is available for peanut producers- with or without a history of peanut production- for any quantity of peanuts produced on the farm. The peanut loan rate is fixed at $355 per ton. Producers can pledge their stored peanuts as collateral for up to 9 months and then repay the loan at a rate that is the lesser of 1) $355 per ton plus interest or 2) a USDA-determined repayment rate designed to minimize loan forfeiture, government-owned stocks, and storage costs. Alternatively, the producer may forgo the marketing loan and opt for a loan deficiency payment (LDP) at a payment rate equal to the difference between the loan rate and the loan repayment rate.

- For producers with a history of peanut production, a direct payment of $36 per ton of eligible base-period (1998-2001) production is available. Eligible production would equal the product of average or assigned base-period yields (with the option of substituting average 1990-1997 county yields for up to three of the base years) and 85% of base-period acres ("payment acres") planted to peanuts (with provisions for prevented plantings). These payments are made regardless of current prices or the actual crop planted so long as the farm remains in approved agricultural uses.
- Producers with base acreage are also eligible to receive a counter-cyclical payment (CCP) when market prices are below an established target price of $495 per ton minus the $36 per ton direct payment. These payments are not related to current production, so long as the farm remains in approved agricultural uses. The payment rate is the difference between the target price and the "effective price", calculated as follows:

  Payment rate = (target price) – (direct payment rate) – (higher of peanut market price or loan rate)

  The total counter-cyclical payment to each eligible producer equals the product or the payment acres (85 percent of base acres), the payment yield, and the payment rate specified above:

  CCP= 0.85 x (base acres) x (payment yield) x (payment rate).
- Owners of peanut quota under prior legislation will receive a quota buy-out as compensation for the loss of quota asset value. Payments may be made in five annual installments of $0.11 per pound ($220 per short ton) during fiscal years 2002 through 2006, or the quota owner may opt to take the outstanding payment due to them in a lump sum at $0.55 per pound. Payments are based on the quota owner's 2001 quota, regardless of temporary leases or transfers of quota, so long as the person owned a farm eligible for the peanut quota. Continued eligibility for compensatory payments remain with the established quota owner regardless of their future interest in the farm or whether the person continues to produce peanuts.

2003 Alabama peanut acreage is expected to remain steady at 190,000 acres however the U.S. Department of Agriculture is predicting that about 1.26 million acres of peanuts are expected to be planted in 2003, down 8 percent from 2002 and 19 percent from 2001. These estimates are the lowest peanut acreage to be planted since 1915.

The changes in the peanut industry will affect the Southeast Alabama region as growers, bankers, landowners and agribusiness concerns struggle with how these changes will affect the 2003 crop and future crop years. All in all, the peanut industry now is in limbo as it faces unprecedented change and uncertainty. Regional farmers who have survived primarily on peanuts for a cash crop for decades will be charting new and uncertain waters in the next few years. Quite a change for a commodity program that has been regarded as stable and effective for nearly 70 years.

From 1991 to 2001, the number of Alabama farms increased from 46,000 to 47,000 and total farmland declined from 9.9 million acres to 8.9 million acres. This indicates the size of the average farm in Alabama is becoming smaller. In 1991 the average size of an Alabama farm was 215 acres compared to an average of 189 acres in 2001, a reduction of 13.8%. District wide, **Geneva County** led in the number of farms and acres in farmland with 206, 615 or an average of 237 acres on 872 farms. District counties averaged 300 acres per farm as compared to 189 acres statewide.

With respect to the climate, the entire district is located in the Alabama coastal plain where precipitation averages 59.09 inches per year and the average temperature is 64.9 degrees. The climate is temperate but rather humid as is typical of the southeastern United States. Severe droughts are rare; however, extended periods of dry weather is common during the summer months and may last from 4 to 6 weeks between measurable rainfall. This contributes to low crop yields on non-irrigated plantings. The mean average temperature is 67°, with an average of 29 days per year with minimum temperatures at or below 32° and 96 to 120 days per year with temperatures at or above 90°. This weather pattern translates into a longer growing season in south Alabama of approximately 236 days as compared to northern Alabama's growing season of approximately 170 days.

The following tables depict total annual precipitation and average annual temperatures in the coastal plain of Alabama which includes all of the district counties.

Precipitation-Inches of Water

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
4.10	2.34	13.93	3.53	3.25	8.32	3.63	6.20	4.49	2.98	3.67	2.65	59.09

Average Temperatures- Degrees Fahrenheit

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Avg.
43.5	55.5	53.7	66.2	72.4	77.4	80.4	79.2	73.6	62.4	61.5	52.9	64.9

According to the Soil Conservation Service and Auburn University, the southeast Alabama region comprises the largest contiguous area of prime farmland in Alabama. The predominate soil types are: Troup-Luverne-Dothan-Orangeburg, which is well drained, deep and moderately deep soils on gently sloping to sloping ridge tops and sideslopes. The Luverne soils are clayey and Troup soils have thick (40 to 60 inches) sandy surface layers. These soils are found in eastern and northern **Barbour County**, eastern and western **Henry County** and over most of **Dale County**. Predominate soils found in central and southern **Henry County** and in much of central and southern **Coffee County** and northern **Covington County** are Orangeburg-Red Bay-Dothan-Troup, which are well drained deep soils on broad gently sloping to sloping ridge tops. Dothan-Orangeburg-Esto, are well drained deep soils on broad nearly level to gently sloping plateaus and are found covering **Houston County,** eastern and western **Geneva County** and southern **Covington County.**

Problems associated with the district soils include erosion, sedimentation, low fertility and droughtiness. Sheet erosion of soils in the district is due primarily to poor farming practices. Low fertility is characteristic of Coastal Plains soils because the subsoil contains a high sand content that causes rapid leaching of mineral elements. Water holding capacities are also low for the same reason, resulting in drought damage to crops in certain areas during times of either limited or unevenly distributed rainfall. Most of the problems associated with soil conditions can be overcome with proper planning and conservation techniques.

There is an estimated 1.6 million acres of land in the district classified as prime farmland. This represents nearly 40% of the total land area in the district. The Alabama Soil Conservation service describes prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, fuel, fiber, forage and oilseed crops and is available for these uses. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods". Some factors considered in classifying prime farmland are adequate soil moisture, favorable temperature and growing season, acceptable pH, few or no rocks, not excessively erodable, not saturated with water for long periods of time, and not prone to frequent flooding events during the growing season.

The district continues to have a valuable resource in its high quality prime farmland, which could be used as a regional advantage in attracting new and diversified agricultural partners for economic development and job growth. This potential development advantage needs to be fully explored to determine how new investment and jobs can be brought to the region. Diversification efforts have begun and farm producers are looking into new ways to develop additional cash incomes from other crops. This diversification efforts must continue and be accelerated in order to develop new strategies to sustain and grow the agricultural base in the district. With the dramatic end of the peanut quota program, producers are uncertain of the future profitability of peanuts, and other crops may be considered that have the potential of earnings above production costs.

Table 42

ALABAMA CASH RECEIPTS FROM FARM & FORESTRY MARKETINGS: COUNTY TOTAL AND RANK FOR EACH COUNTY

2001

RANK	COUNTY	CASH INCOME ($1,000)		RANK	COUNTY	CASH INCOME ($1,000)
1.	Cullman	$459,289		35.	Cherokee	51,212
2.	DeKalb	314,805		36.	Randolph	51,159
3.	Marshall	213,557		37.	St. Clair	50,880
4.	**Coffee**	**164,141**		38.	Montgomery	49,439
5.	Blount	161,292		39.	Dallas	49,349
6.	Baldwin	152,887		40.	Lauderdale	48,886
7.	**Geneva**	**143,417**		41.	Calhoun	44,010
8.	Franklin	132,881		42.	Tuscaloosa	42,317
9.	Jackson	115,534		43.	Conecuh	42,049
10.	**Covington**	**115,077**		44.	Wilcox	39,766
11.	Crenshaw	110,044		45.	Bullock	39,084
12.	Pike	108,245		46.	Clay	38,723
13.	Lawrence	107,922		47.	Marion	37,486
14.	Morgan	94,091		48.	Choctaw	36,339
15.	Hale	92,678		49.	Talladega	34,366
16.	Pickens	91,188		50.	Washington	33,731
17.	Limestone	89,364		51.	Perry	33,584
18.	Mobile	88,148		52.	Sumter	31,678
19.	Winston	87,742		53.	Greene	28,177
20.	**Dale**	**79,113**		54.	Chilton	27,476
21.	Butler	78,765		55.	Lee	26,486
22.	**Houston**	**74,035**		56.	Elmore	23,856
23.	**Barbour**	**74,017**		57.	Autauga	22,766
24.	Walker	65,208		58.	Russell	22,667
25.	Etowah	64,51		59.	Shelby	18,546
26.	Monroe	64,521		60.	Tallapoosa	18,136
27.	**Henry**	**60,208**		61.	Chambers	17,239
28.	Clarke	56,376		62.	Macon	17,014
29.	Escambia	55,818		63.	Fayette	16,639
30.	Cleburne	54,656		64.	Bibb	14,892
31.	Lowndes	53,412		65.	Lamar	14,837
32.	Madison	52,855		66.	Coosa	14,701
33.	Colbert	52,546		67.	Jefferson	12,929
34.	Marengo	51,949				

Source: Alabama Agricultural Statistic Service, 2003 (Includes private non-farm timber, forestry industry timber and Government timber)

TABLE 43
CASH INCOME RECEIVED BY ALABAMA FARMERS
1990, 1996, 2001

COMMODITY	1990 ($1,000)	1996 ($1,000)	2001 ($1,000)		1990-2001 % Changed	1996-2001% Changed
LIVESTOCK & POULTRY						
Broilers	1,165,334	1,634,800	2,004,100		0.72	0.23
Cattle & Calves	588,800	286,100	362,800		-38.30	26.80
Eggs	170,414	225,400	265,400		55.70	17.70
Hogs	125,582	71,900	31,200		-75.10	-56.60
Dairy	81,090	70,500	50,200		-38.00	-28.80
Catfish	30,954	52,800	70,000		126.00	-32.60
Other Livestock	31,097	21,600	30,800		-1.00	42.60
Total for L&P	2,193,271	2,363,100	2,814,500		28.32	19.10
CROPS						
Peanuts	104,758	118,700	128,800		22.90	8.50
Cotton	136,756	264,800	217,200		58.80	-18.00
Corn	17,564	51,600	22,700		29.20	-56.00
Soybeans	51,236	53,500	17,500		-65.80	-67.20
Wheat	19,192	17,100	9,400		-51.00	-45.00
Hay	15,335	17,800	19,700		28.50	10.70
Greenhouse/Nursery	180,593	190,000	221,100		22.40	16.40
Irish Potatoes	18,316	11,100	6		-99.00	-99.00
Sweet Potatoes	4,904	9,500	8,300		69.20	-12.60
Other Vegetables	0	53,200	29,200			-45.10
Other Crops	8,348	11,000	4,200		-49.70	-61.80
Total for Crops	557,002	798,300	678,106		21.70	-15.00
Farm Forest Products	287,100	150,800	144,600		-49.60	-4.10
Nonfarm Comm. Timber	299,050	552,500	577,400		93.00	4.50
Government Payments	82,241	75,600	230,700		180.00	205.00
Total Cash Receipts	3,418,664	3,940,300	4,425,306		29.40	12.30

Source: Alabama Agricultural Statistics Service, 2003

Table 44

Number, Land and Value of Farms
Southeast Alabama Economic Development District

County	1987				1996				1997			
	Number of Farms	Acres in Farms	Avg. Farm Size (acres)	% of Land in Farms	Number of Farms	Acres in Farms	Avg. Farm Size (acres)	% of Land in Farms	Number of Farms	Acres in Farms	Avg. Farm Size (acres)	% of Land in Farms
Barbour	498	207,906	417.0	36.8%	421	177,189	421.0	31.0%	417	153,775	369.0	27.15%
Coffee	842	179,311	213.0	41.2%	760	175,209	231.0	40.0%	788	186,981	237.0	42.62%
Covington	870	175,735	202.0	26.5%	831	166,490	200.0	25.0%	899	180,056	200.0	27.19%
Dale	490	129,105	263.0	35.9%	403	134,555	334.0	37.0%	422	130,975	310.0	36.47%
Geneva	881	200,162	227.0	54.1%	806	195,536	243.0	53.0%	872	206,615	237.0	56.0%
Henry	421	171,444	407.0	48.1%	357	166,949	468.0	46.0%	334	153,529	460.0	42.68%
Houston	862	207,817	241.0	56.3%	753	191,310	255.0	52.0%	690	198,215	287.0	53.36%

Source: Alabama Agricultural Statistics Service, 2003

Table 45

Farm, Non-Farm Employment for the United States, Alabama & District Counties: 1991, 1996 & 2000
Southeast Alabama Economic Development District

Area	1991				1996				2000			
	Farm	*Farm %*	*Non-Farm*	*Non-Farm %*	*Farm*	*Farm %*	*Non-Farm*	*Non-Farm %*	*Farm*	*Farm %*	*Non-Farm*	*Non-Farm %*
United States	3,104,000	2.23%	135,559,800	97.76%	3,073,000	2.01%	149,534,200	97.96%	3,103,000	1.85%	164,362,300	98.15%
Alabama	60,756	2.93%	2,013,016	97.07%	57,281	2.49%	2,240,414	97.50%	55,887	2.30%	2,373,376	97.70%
Barbour	695	5.68%	11,536	94.32	604	4.65%	12,367	95.34%	584	3.81%	14,729	94.95%
Coffee	1,220	6.79%	16,273	93.07%	1,151	5.68%	19,112	94.37%	1,121	5.36%	19,785	94.64%
Covington	1,211	6.93%	16,273	93.07%	1,168	6.23%	17,567	93.76%	1,136	6.21%	17,150	93.79%
Dale	635	2.24%	27,697	97.75%	583	2.21%	25,794	97.79%	566	2.06%	26,842	97.93%
Geneva	1,291	13.22%	8,469	86.71%	1,259	12.23%	9,036	87.77%	1,235	12.86 %	8,371	87.14%
Henry	705	10.95%	5,734	89.05%	602	9.22%	5,925	90.78	588	8.61%	6,234	91.38
Houston	1,288	2.50%	50,058	97.49%	1,062	1.86%	55,863	98.13%	1,005	1.68%	58,902	98.32%

Source: Bureau of Economic Analysis, Regional Economic Information System, 2003

Table 46

Alabama, District Cattle and Hog Inventories
1991, 1996, 1999

	1991			1996			1999		
District & County	*All Cattle*	*Beef Cattle*	*Hog & Pig Inventory*	*All Cattle*	*Beef Cattle*	*Hog & Pig Inventory*	*All Cattle*	*Beef Cattle*	*Hog & Pig Inventory*
Barbour	35,300	12,000	11,000	24,000	12,500	2,900	19,000	11,000	2,000
Coffee	39,400	19,900	7,600	30,000	16,000	4,200	29,000	16,000	3,400
Covington	38,900	20,100	10,500	32,000	15,500	1,000	34,000	17,000	800
Dale	23,800	11,200	5,300	18,000	9,500	1,000	16,500	9,000	*
Geneva	36,100	14,500	8,200	38,000	18,000	3,300	30,000	16,000	1,300
Henry	23,500	13,100	3,800	18,000	9,500	3,800	14,000	8,000	2,200
Houston	42,000	17,900	11,000	37,000	16,500	5,000	28,000	15,500	*
District	239,000	108,700	64,100	197,000	97,500	21,400	170,500	92,500	9,700
State	1,800,000	917,000	375,000	1,600,000	829,000	200,000	1,460,000	793,000	175,000

Southeast Alabama Economic Development District

Source: Alabama Agricultural Statistics Service, 1991, 1996 & 2003

Table 47

Alabama, District Corn Production
1991, 1996, 2001
Southeast Alabama Economic Development District

	1991			1996			2001		
District & County	*Acres Harvested for Grain*	*Bushel Yield/Acre*	*Production*	*Acres Harvested for Grain*	*Bushel Yield/Acre*	*Production*	*Acres Harvested for Grain*	*Bushel Yield/Acre*	*Production*
Barbour	3,100	85.2	264,000	4,700	54.0	255,000	1,700	99.0	169,000
Coffee	8,000	73.5	588,000	7,700	74.0	570,000	*	*	*
Covington	4,200	84.0	353,000	3,600	75.0	270,000	*	*	*
Dale	5,700	83.0	473,000	5,200	61.0	315,000	2,700	68.0	183,000
Geneva	10,400	66.7	694,000	10,400	70.0	730,000	*	*	*
Henry	8,700	87.0	757,000	5,700	50.0	287,000	2,900	88.0	254,000
Houston	13,000	91.5	1,190,000	10,800	67.0	720,000	*	*	*
District	53,100	81.6	4,319,000	48,100	64.4	3,147,000	7,300	85.0	606,000
State	210,000	80.0	16,800,000	260,000	82.0	22,960,000	150,000	107.0	16,050,0 00

Source: Alabama Agricultural Statistics Service, 1991, 1996 & 2003

*-Counties with less than 500 harvested acres or insufficient data are included in State Total.

Table 48

Alabama, District Cotton Production
1991, 1996, 2001
Southeast Alabama Economic Development District

	1991			*1996*			*2001*		
District & County	*Acres Harvested*	*Pound Yield/Acre*	*Production (Bales)*	*Acres Harvested*	*Pound Yield/Acre*	*Production (Bales)*	*Acres Harvested*	*Pound Yield/Acre*	*Production (Bales)*
Barbour	4,290	934	8,700	8,600	723	12,960	5,300	652	7,200
Coffee	1,350	685	3,680	21,650	608	27,410	16,500	524	18,000
Covington	4,000	1,015	13,000	13,540	672	18,960	16,000	780	26,000
Dale	570	600	1,500	10,700	412	9,190	11,200	600	14,000
Geneva	710	656	5,250	29,220	536	36,620	24,200	674	34,000
Henry	3,470	779	9,500	24,600	499	25,570	22,300	581	27,000
Houston	1,130	625	2,800	38,660	427	34,410	28,700	518	31,000
District	15,520	813	44,430	146,970	554	165,120	124,200	618	157,200
State	313,000	655	553,000	516,000	734	789,000	605,000	730	920,000

Source: Alabama Agricultural Statistics Service, 1991, 1996 & 2003

Table 49

Alabama, District Peanut Production
1991, 1996, 2001
Southeast Alabama Economic Development District

	1991			1996			2001		
District & County	*Acres Harvested*	*Pound Yield/Acre*	*Production*	*Acres Harvested*	*Pound Yield/Acre*	*Production*	*Acres Harvested*	*Pound Yield/Acre*	*Production*
Barbour	21,350	2,375	50,705,000	13,950	2,710	37,781,000	12,550	2,605	32,695,000
Coffee	32,350	2,340	75,666,000	23,390	2,510	58,700,000	24,550	2,350	57,651,000
Covington	14,400	2,525	36,345,000	10,210	2,930	29,900,000	11,350	2,700	30,639,000
Dale	22,750	2,400	54,554,000	16,330	2,225	36,300,000	12,350	2,570	31,746,000
Geneva	40,350	2,285	92,180,000	27,540	2,275	62,700,000	30,300	2,525	76,516,000
Henry	43,550	2,390	103,976,000	32,730	2,185	71,522,000	27,400	2,570	70,417,000
Houston	62,600	2,235	139,947,000	41,040	2,100	86,200,000	41,800	2,415	101,002,000
District	237,350	2,364	553,373,000	165,190	2,094	383,103,000	160,300	2,534	400,666,000
State	277,000	2,305	638,485,000	191,000	2,355	449,805,000	199,000	2,675	532,325,000

Source: Alabama Agricultural Statistics Service, 1991, 1996 & 2003

Table 50

Alabama, District Poultry Production
1991, 1996, 2001
Southeast Alabama Economic Development District

	1991			1996			2001		
District & County	*Broilers Produced*	*All Chickens (000)*	*Annual Egg Production (million)*	*Broilers Produced*	*All Chickens (000)*	*Annual Egg Production (million)*	*Broilers Produced*	*All Chickens (000)*	*Annual Egg Production (million)*
Barbour	3,236	**	**	3,241	**	**	17,535	**	**
Coffee	52,970	127	28.3	49,952	192	42	51,703	553	29.8
Covington	18,592	247	55.3	17,328	254	52	24,535	1156	109.4
Dale	13,731	12	2.6	12,619	**	**	23,160	**	**
Geneva	30,409	258	57.7	33,295	246	53	35,732	660	48.2
Henry	**	**	**	**	**	**	6,692	**	**
Houston	1,835	131	29.3	1,739	114	26	2,146	**	**
District	120,773	775	173.2	118,174	806	173	161,503	2,369	187.4
State	875,300	9,835	2,186	873,300	10,610	2,401	1,007,600	26,293	2,359

Source: Alabama Agricultural Statistics Service, 1991, 1996 & 2003
****- Not published to avoid disclosing individual operations.**

Table 51

Alabama, District Soybean Production
1991, 1996, 2001
Southeast Alabama Economic Development District

	1991			*1996*			*2001*		
District & County	***Acres Harvested for Grain***	***Yield Per Harvested Acre (Bushels)***	***Production***	***Acres Harvested for Grain***	***Yield Per Harvested Acre (Bushels)***	***Production***	***Acres Harvested for Grain***	***Yield Per Harvested Acre (Bushels)***	***Production***
Barbour	**	**	**	**	**	**	**	**	**
Coffee	600	21.7	13,000	800	31.0	25,000	**	**	**
Covington	1,700	21.2	3,600	1,800	36.0	65,000	**	**	**
Dale	**	**	**	**	**	**	**	**	**
Geneva	4,300	20.9	90,000	5,000	24.0	122,000	**	**	**
Henry	800	21.3	17,000	1,000	26.0	26,000	**	**	**
Houston	8,300	21.4	178,000	7,300	26.0	193,000	**	**	**
District	15,700	15.2	334,000	15,900	28.6	431,000	**	**	**
State	350,000	23.0	8,050,000	315,000	34.0	10,710,000	135,000	35	4,725,000

Source: Alabama Agricultural Statistics Service, 1991, 1996 & 2003
****- Counties with less than 500 planted acres or insufficient data included in State Total.**

Table 52

Alabama, District Wheat Production
1991, 1996, 2001
Southeast Alabama Economic Development District

	1991			1996			2001		
District & County	*Acres Harvested for Grain*	*Yield Per Harvested Acre (Bushels)*	*Production*	*Acres Harvested for Grain*	*Yield Per Harvested Acre (Bushels)*	*Production*	*Acres Harvested for Grain*	*Yield Per Harvested Acre (Bushels)*	*Production*
Barbour	500	36	18,000	**	**	**	**	**	**
Coffee	1,900	34.2	65,000	800	31.0	25,000	**	**	**
Covington	1,200	16.7	20,000	1,800	36.0	65,000	**	**	**
Dale	1,700	28.2	48,000	**	**	**	1,000	50	50,000
Geneva	2,000	15.0	30,000	5,000	24.0	122,000	1,500	53	79,000
Henry	2,500	34.4	86,000	1,000	26.0	26,000	2,100	40	85,000
Houston	4,100	26.6	109,000	7,300	26.0	193,000	**	**	**
District	13,900	27.3	376,000	15,900	28.6	431,000	4,600	20.4	214,000
State	110,000	25.0	2,750,000	315,000	34.0	10,710,000	70,000	48	3,360,000

Source: Alabama Agricultural Statistics Service, 1991, 1996 & 2003
****- Counties with less than 500 planted acres or insufficient data included in State Total.**

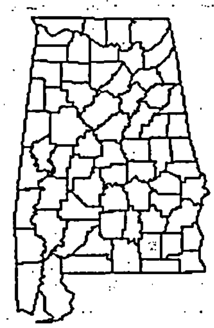
BARBOUR

Crops-2001	Ac Hvst	Yield	Production
Cotton	5,300	652 lb.	7,200 bales
Corn	1,700	99 bu	169,000 bu
Soybeans	*	* bu	* bu
Peanuts	12,550	2,605 lb.	32,695 thou lb.
Wheat	*	* bu	* bu
Hay	9,400	3.2 tons	30,000 tons
Pecans	-	-	700,000 lbs

Cash Receipts-2001	Thou Dol	Livestock	Ref Date	Number	*State Ranking* Cotton- 25
Crops	12,071	All Cattle & Calves	Jan 02	16,000 head	Corn- 24
Livestock & Poultry	40,249	Beef Cows	Jan 02	9,000 head	Soybeans-*
Forest Products	10,522	Milk Cows	Jan 02	* head	Peanuts- 6
Total, Farm & Forestry/1	74,017	Milk Prod.	2001	* thou lb	Wheat-*
/1 Includes govt payments & other farm income		Hogs & Pigs	Dec 01	1,600 head	Cattle-38
Census of Agriculture-1997	Number	Catfish Sales	2001	* thou dol	Milk-*
Number of Farms	417	Poultry			Hogs-*
Land in Farms (Acres)	153,775	Hens & Pullets	Dec 01	* thou birds	Eggs-*
Average Farm Size (Acres)	369	Egg Prod.	2001	* mil eggs	Broilers-20
		Broilers	2001	17,535 thou birds	Catfish-*

*-Insufficient data for publication. Source: Alabama Agricultural Statistics, 2002

COFFEE

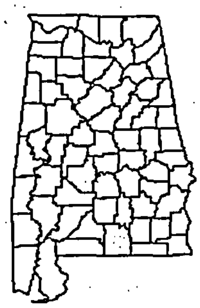


Crops-2001	Ac Hvst	Yield	Production
Cotton	16,500	524 lb.	18,000 bales
Corn	*	* bu	* bu
Soybeans	*	* bu	* bu
Peanuts	24,550	2,350 lb.	57,651 thou lb.
Wheat	*	* bu	* bu
Hay	15,100	2.3 tons	35,000 tons
Pecans	-	-	200,000 lbs

Cash Receipts-2001	Thou Dol	Livestock	Ref Date	Number	*State Ranking* Cotton- 16
Crops	19,773	All Cattle & Calves	Jan 02	26,000 head	Corn- *
Livestock & Poultry	116,723	Beef Cows	Jan 02	14,000 head	Soybeans-*
Forest Products	4,170	Milk Cows	Jan 02	900 head	Peanuts- 4
Total, Farm & Forestry/1	164,141	Milk Prod.	2001	16,300 thou lb	Wheat-*
/1 Includes govt payments & other farm income		Hogs & Pigs	Dec 01	2,500 head	Cattle-19
Census of Agriculture-1997	**Number**	Catfish Sales	2001	* thou dol	Milk-4
Number of Farms	788	Poultry			Hogs-11
Land in Farms (Acres)	186,981	Hens & Pullets	Dec 01	133 thou birds	Eggs-19
Average Farm Size (Acres)	237	Egg Prod.	2001	29.8 mil eggs	Broilers-5
		Broilers	2001	51,703 thou birds	Catfish-*

*-Insufficient data for publication. Source: Alabama Agricultural Statistics, 2002

COVINGTON

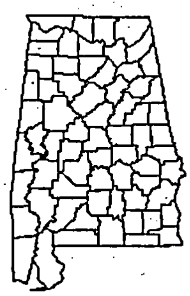


Crops-2001	Ac Hvst	Yield	Production
Cotton	16,000	780 lb.	26,000 bales
Corn	*	* bu	* bu
Soybeans	*	* bu	* bu
Peanuts	11,350	2,700 lb.	30,639 thou lb.
Wheat	*	* bu	* bu
Hay	16,400	3.0 tons	49,000 tons
Pecans	-	-	1,000,000 lbs

Cash Receipts-2001	Thou Dol	Livestock	Ref Date	Number	*State Ranking*
					Cotton- 13
Crops	19,134	All Cattle & Calves	Jan 02	28,500 head	Corn- *
Livestock & Poultry	70,773	Beef Cows	Jan 02	15,000 head	Soybeans-*
Forest Products	9,859	Milk Cows	Jan 02	600 head	Peanuts- 8
Total, Farm & Forestry/1	115,077	Milk Prod.	2001	8,500 thou lb	Wheat-*
/1 Includes govt payments & other farm income		Hogs & Pigs	Dec 01	* head	Cattle-15
Census of Agriculture-1997	**Number**	Catfish Sales	2001	* thou dol	Milk-13
Number of Farms	899	**Poultry**			Hogs-*
Land in Farms (Acres)	180,056	Hens & Pullets	Dec 01	505 thou birds	Eggs-6
Average Farm Size (Acres)	200	Egg Prod.	2001	109.4 mil eggs	Broilers-14
		Broilers	2001	24,535 thou birds	Catfish-*

*-Insufficient data for publication. Source: Alabama Agricultural Statistics, 2002

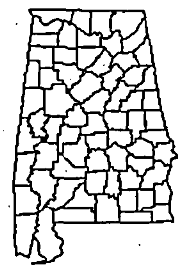
DALE



		Crops-2001	Ac Hvst	Yield	Production
		Cotton	11,200	600 lb.	14,000 bales
		Corn	2,700	68 bu	183,000 bu
		Soybeans	*	* bu	* bu
		Peanuts	12,350	2,570 lb.	31,746 thou lb.
		Wheat	1,000	50 bu	50,000 bu
		Hay	9,300	2.0 tons	21,000 tons
		Pecans	-	-	190,000 lbs
Cash Receipts-2001	**Thou Dol**	**Livestock**	**Ref Date**	**Number**	*State Ranking* Cotton- 17
Crops	12,212	All Cattle & Calves	Jan 02	16,000 head	Corn- 22
Livestock & Poultry	50,650	Beef Cows	Jan 02	8,500 head	Soybeans-*
Forest Products	4,646	Milk Cows	Jan 02	*head	Peanuts- 7
Total, Farm & Forestry/1	79,113	Milk Prod.	2001	* thou lb	Wheat-16
/1 Includes govt payments & other farm income		Hogs & Pigs	Dec 01	* head	Cattle-38
Census of Agriculture-1997	Number	Catfish Sales	2001	* thou dol	Milk-*
Number of Farms	422	**Poultry**			Hogs-*
Land in Farms (Acres)	130,975	Hens & Pullets	Dec 01	*thou birds	Eggs-*
Average Farm Size (Acres)	310	Egg Prod.	2001	* mil eggs	Broilers-16
		Broilers	2001	23,160 thou birds	Catfish-*

*-Insufficient data for publication. Source: Alabama Agricultural Statistics, 2002

GENEVA



Crops-2001	Ac Hvst	Yield	Production
Cotton	24,200	674 lb.	34,000 bales
Corn	*	* bu	* bu
Soybeans	*	* bu	* bu
Peanuts	30,300	2,525 lb.	76,516 thou lb.
Wheat	1,500	53 bu	79,000 bu
Hay	9,200	3.0 tons	28,000 tons
Pecans	-	-	200,000 lbs

Cash Receipts-2001	Thou Dol
Crops	30,033
Livestock & Poultry	86,901
Forest Products	2,542
Total, Farm & Forestry/1	143,417
/1 Includes govt payments & other farm income	
Census of Agriculture-1997	**Number**
Number of Farms	872
Land in Farms (Acres)	206,615
Average Farm Size (Acres)	237

Livestock	Ref Date	Number
All Cattle & Calves	Jan 02	27,500 head
Beef Cows	Jan 02	14,000 head
Milk Cows	Jan 02	1,000 head
Milk Prod.	2001	14,500 thou lb
Hogs & Pigs	Dec 01	800 head
Catfish Sales	2001	* thou dol
Poultry		
Hens & Pullets	Dec 01	210 thou birds
Egg Prod.	2001	48.2 mil eggs
Broilers	2001	35,732 thou birds

State Ranking

Cotton- 10

Corn- *

Soybeans-*

Peanuts- 2

Wheat-11

Cattle-16

Milk-5

Hogs-19

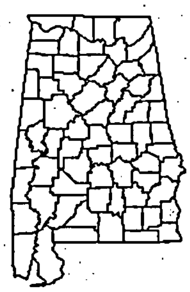
Eggs-14

Broilers-8

Catfish-*

*-Insufficient data for publication. Source: Alabama Agricultural Statistics, 2002

HENRY

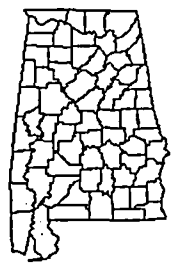


Crops-2001	Ac Hvst	Yield	Production
Cotton	22,300	581 lb.	27,000 bales
Corn	2,900	88 bu	254,000 bu
Soybeans	*	* bu	* bu
Peanuts	27,400	2,570 lb.	70,417 thou lb.
Wheat	2,100	40 bu	85,000 bu
Hay	5,800	2.1 tons	12,000 tons
Pecans	-	-	130,000 lbs

Cash Receipts-2001	Thou Dol	Livestock	Ref Date	Number	*State Ranking* Cotton- 12
Crops	25,552	All Cattle & Calves	Jan 02	15,000 head	Corn- 17
Livestock & Poultry	17,652	Beef Cows	Jan 02	8,000 head	Soybeans-*
Forest Products	3,579	Milk Cows	Jan 02	* head	Peanuts- 3
Total, Farm & Forestry/1	60,208	Milk Prod.	2001	* thou lb	Wheat-10
/1 Includes govt payments & other farm income		Hogs & Pigs	Dec 01	1,600 head	Cattle-48
Census of Agriculture-1997	Number	Catfish Sales	2001	* thou dol	Milk-*
Number of Farms	690	Poultry			Hogs-14
Land in Farms (Acres)	198,215	Hens & Pullets	Dec 01	* thou birds	Eggs-*
Average Farm Size (Acres)	287	Egg Prod.	2001	* mil eggs	Broilers-31
		Broilers	2001	6,692 thou birds	Catfish-*

*-Insufficient data for publication. Source: Alabama Agricultural Statistics, 2002

HOUSTON



Crops-2001	Ac Hvst	Yield	Production
Cotton	28,700	518 lb.	31,000 bales
Corn	*	* bu	* bu
Soybeans	*	* bu	* bu
Peanuts	41,800	2,415 lb.	101,002 thou lb.
Wheat	*	* bu	* bu
Hay	10,800	1.7 tons	18,000 tons
Pecans	-	-	230,000 lbs

Cash Receipts-2001	Thou Dol
Crops	40,120
Livestock & Poultry	13,861
Forest Products	1,537
Total, Farm & Forestry/1	74,035
/1 Includes govt payments & other farm income	
Census of Agriculture-1997	**Number**
Number of Farms	690
Land in Farms (Acres)	198,215
Average Farm Size (Acres)	287

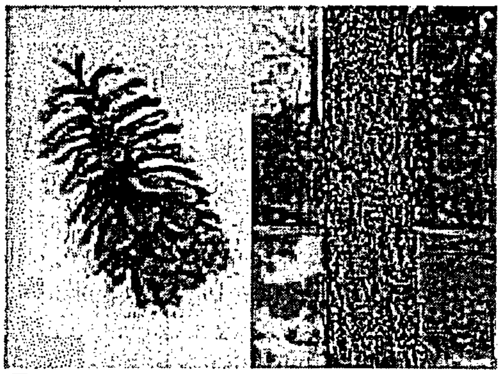
Livestock	Ref Date	Number
All Cattle & Calves	Jan 02	26,500 head
Beef Cows	Jan 02	13,500 head
Milk Cows	Jan 02	* head
Milk Prod.	2001	* thou lb
Hogs & Pigs	Dec 01	* head
Catfish Sales	2001	* thou dol
Poultry		
Hens & Pullets	Dec 01	* thou birds
Egg Prod.	2001	* mil eggs
Broilers	2001	2,146 thou birds

State Ranking
Cotton- 11
Corn- *
Soybeans-*
Peanuts- 1
Wheat-*
Cattle-18
Milk-*
Hogs-*
Eggs-*
Broilers-37
Catfish-*

*-Insufficient data for publication. Source: Alabama Agricultural Statistics, 2002

FORESTRY

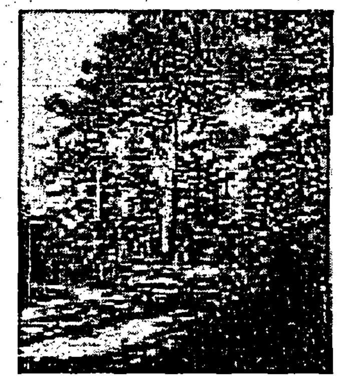
There are nearly 23 million acres of forest growing over 16 billion trees in Alabama, an increase of one million acres since 1990. Alabama's forestland is roughly equal to the size of the state of Indiana. Alabama is the second largest commercial forest in the United States with some 71% of the land area in the state covered with forests. Alabama's forestland is diverse, with 46% being hardwood, 35% pine and 19% mixed hardwood and pine. Ninety-five percent (95%) of Alabama's forests are privately owned. Only 5% of Alabama's 23million acres are owned by government. The Alabama state tree is the longleaf pine.



Longleaf Pine: Alabama State Tree

Forestry is big business in Alabama with over 1,100 forest manufacturing operations based in the state. Timber is the dominant crop harvested in 34 of the 67 counties in Alabama. The forest industry directly employs approximately 70,000 and 100,000 indirectly with an annual payroll of $2.2 billion in 2001. In all, the forestry industry in Alabama employs about 13% of Alabama's total workforce either directly or indirectly. With the presence of vast timber resources in Alabama, forestry holds much potential as a major economic sector to be more fully developed in the future.

Total timber harvested in Alabama for 2001 was 1.08 billion cubic feet, down 4% from 2000. The 2001 harvest was down by 51 million cubic feet as compared to 2000. The actual estimated 2001 per acre harvest for all of Alabama was 51.7 cubic feet, up from 49.3 cubic feet per acre in 2000. There was a 6% increase for hardwood sawtimber volume over the 2000 harvest, an 8% decrease for pine sawtimber volume, a 7% increase for pine pulpwood and a 20% decrease for hardwood pulpwood. The total stumpage paid out to timber owners in Alabama was $722.1 million for an 18% decrease in revenue over 2000. Pine sawtimber harvested in 2002 was 1.6 million board feet while hardwood sawtimber was 284 million board feet. The pine sawtimber market remains strong as the country continues to experience high housing starts with historically low mortgage rates. The top five counties for revenue produced from timber sales in 2001 statewide were Clarke, Hale, Monroe, Marengo and Wilcox.



Alabama forestry cash receipts continues to be a significant source of economic activity with farm forestry products returning $144.6 million and non farm commercial timber $577.5 million for a total of $722.1 million in 2001. Income from this agricultural segment ranked second behind broilers statewide in terms of agricultural industry cash income.

Sawtimber prices have dropped slightly over the past three-year period. However, between 2001 and 2002, pine sawtimber gained back some earlier losses to end up at $331 per thousand board feet, Scribner. Oak sawtimber rates declined slightly over the last two years to approximately the same level as pine. Pine pulpwood prices leveled off in 2002 after dropping to a ten-year low of around $16 per cord. Hardwood pulpwood prices have remained steady and averaged around $21 per cord. The total estimated value of stumpage harvested in 2002 is $735.8 million dollars. This is an increase of 2% from 2001 estimates. Pine sawtimber harvest value went up 9% to $536 million dollars, while pine pulpwood value went down 26% to $69.8 million dollars and hardwood pulpwood went down 11% to $54.5 million dollars. The other main primary products remained fairly steady.

Timber continues to rank second in Alabama in all agricultural commodities and includes almost 15% of all commodities, with broilers leading the state in cash receipts. Forestry has consistently ranked second in cash receipts for agricultural commodities, and during the past 25 years has increased 600%, higher than any other agricultural commodity.

In 2000, forestry manufacturing amounted to approximately 18% of the total manufacturing in Alabama. Alabama's forests supported approximately $5.2 billion dollars value added and $12.2 billion dollars in value of shipments to the economy. During 2002, there were 46 announcements of new and expanding investments, creating

1,242 new jobs, and investing $289 million dollars. The majority of these capital investments are for a new plant in north Alabama.

For most species, growth is greater than removals. According to 2002 forest survey data, only 65,500 acres were considered non-stocked (0.3%), while 11.9 million acres are in sawtimber or pole timber-size classifications. The remaining 10.9 million acres consists of younger, but aggressively growing timber. Alabama and the district's forests are in good shape. Approximately 12 million acres (56%) of the state's commercial forest are under an identified certification program or are managed by government entities that require sound forest management.

District wide, **Barbour County** was the leading producer of farm related forestry cash receipts in both 2000 and 2001. **Barbour County's** cash receipts were $10.5 million in 2001, down 37% from 2000 receipts of $14.4 million. **Covington County** was second behind **Barbour County** with cash receipts of $12.1 million and $9.9 million in 2000 and 2001. Cash receipts for farm related forestry was down in 2001 indicating a soft market for forestry products. The chart on the following page indicates cash receipts for farm related forestry products for all of the district counties in 2000 and 2001.

Table 53
District Cash Receipts: Farm Forestry 2000-2001

County	Farm Forest Products		Private Non-Farm Timber		Forest Industry Timber		Government Timber		Total Farm Forestry		Rank
[redacted]	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	
Barbour	1,251	915	6,874	5,030	5,422	3,967	834	610	14,381	10,522	1
Coffee	2,638	1,589	2,970	1,789	1,149	692	166	100	6,923	4,170	4
Covington	4,217	3,421	2,321	1,883	4,241	3,441	1,373	1,114	12,152	9,859	2
Dale	552	358	5,149	3,335	373	242	1,097	711	7,171	4,646	3
Geneva	1,637	989	2,104	1,271	349	211	118	71	4,208	2,542	6
Henry	1,595	852	4,310	2,301	798	426	0	0	6,703	3,579	5
Houston	1,339	532	2,384	947	0	0	147	58	3,870	1,537	7

Source: Alabama Agricultural Statistics Service, 2002

Table 54 indicates that a majority of forestland in the district is owned by private individuals shown in percentage (%) of ownership. The two leading timber producing counties in the district, **Barbour County** and **Covington County** indicate sizable forest industry ownership at 37.7% and 34.9% respectively.

Table 54
Commercial Forestland by Ownership Category
(as a percent of all commercial forest land)

County	Farm	Other Private	Forest Industry	Government	Total Acres (1000)
Barbour	8.7%	47.8%	37.7%	5.8%	450.6
Coffee	38.1	42.9	16.6	2.4	301.9
Covington	34.7	19.1	34.9	11.3	505.8
Dale	7.7	71.8	5.2	15.3	238.2
Geneva	38.9	50.0	8.3	2.8	203.6
Henry	23.8	64.3	11.9	0.0	224.5
Houston	34.6	61.6	0.0	3.8	166.1

Source: Alabama Forestry Commission, 2002

Table 55
Land Area by County and Land Class in District, 2000
(Thousand acres)

		Forest land		
County	Total land area	Total forest	Timberland	Other land
Barbour	566.4	450.6	450.6	115.8
Coffee	434.7	301.9	301.9	132.8
Covington	662.2	505.8	505.8	156.4
Dale	359.1	238.2	238.2	120.9
Geneva	368.9	203.6	203.6	165.2
Henry	359.6	224.5	224.5	135.2
Houston	371.5	166.1	166.1	205.4

Source: Alabama Forestry Commission, 2002

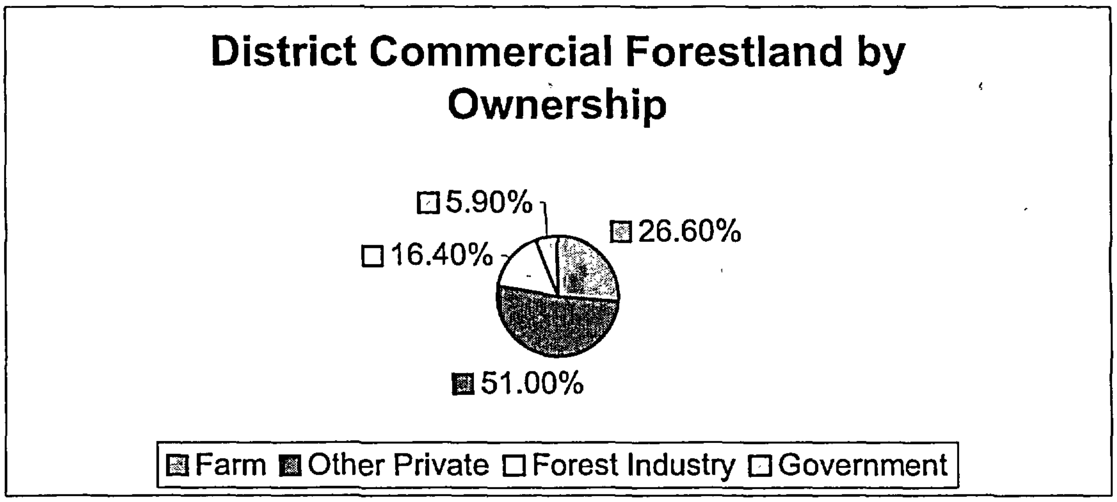
Total forestland in the district totals 2.0 million acres, accounting for approximately 64.5% of the total 3.1 million acres of land area in the southeast Alabama district. **Covington** and **Barbour** counties lead the district in the number of forestland acres and percentage of land area in forestland with 505,800 acres (76.4%) and 450,600 acres (79.6%) respectively. **Houston County** has the fewest acres in forestland of any county in the district with 166,100 acres (44.7%) of its total land area in forests, but has the most land dedicated to agricultural production acreage and urbanized areas. The chart on the following page shows forestland by county and ownership class in the district.

Table 56
Area of Timberland by County and Ownership Class in District, 2000
(thousand acres)

		Forest-type group						
County	All Classes	National Forest	Misc. Federal	State	County & Municipal	Forest Industry	Corporate	Individual
Barbour	450.6	-	10.7	13.8	-	76.2	-	349.8
Coffee	301.9	-	6.8	-	-	32.5	30.7	231.8

Covington	505.8	52.1	-	-	-	30.2	106.0	317.6
Dale	238.2	-	34.5	-	1.4	8.6	5.7	187.9
Geneva	203.6	-	-	6.2	-	6.2	-	191.2
Henry	224.5	-	-	-	-	26.5	10.6	187.4
Houston	166.1	-	5.3	-	-	-	12.0	148.8
Total	2,090.7	52.1	57.3	20.0	1.4	153.2	165.0	1,614.5

Source Alabama Forestry Commission, 2002



Source: Alabama Forestry Commission, 2002

The following table points out the production of forest products by product and county in the district in 2001.

Table 57
Production of Forest Products by Product and County, 2001

County	Pine Sawtimber	Hardwood Sawtimber	Pine Pulpwood	Hardwood Pulpwood	Poles and Piles	Stumpwood
	(mbf Scribner)	(mbf Doyle)	(cords)	(cords)	(mbf Doyle)	(tons)
Barbour	17,466	2,620	159,752	60,457	72	0
Coffee	4,736	395	86,969	38,588	227	0
Covington	21,197	529	120,680	58,515	2,167	0
Dale	7,883	2,311	49,180	28,440	158	0
Geneva	3,079	762	40,504	25,853	155	0
Henry	6,483	1,016	43,344	19,730	53	0
Houston	1,924	1,030	25,547	9,690	52	0

Source. Alabama Forestry Commission, 2002

Total stumpage revenues for district counties in 2001 are shown in Table 58 below, and reveal that **Barbour County** led the district in timber revenues with $10.5 million followed by **Covington County** with $9.8 million dollars. Compared to state wide totals, **Barbour County** ranked 22nd and **Covington County** 23rd in total stumpage revenues in 2001. Clarke County led Alabama in 2001 total stumpage revenues with $52.9 million dollars.

Table 58
Stumpage Revenue From Sale of Forest Products by Product and County, 2001
(thousands of dollars)

County	Pine Sawtimber	Hardwood Sawtimber	Pine Pulpwood	Hardwood Pulpwood	Poles & Piles	Stumpwood	Total
Barbour	$5,746	$519	$2,880	$1,343	$34	$0	$10,522
Coffee	1,558	78	1,568	857	108	0	4,169
Covington	6,062	93	1,739	1,013	951	0	9,859
Dale	2,594	458	887	632	75	0	4,645
Geneva	1,013	151	730	574	74	0	2,542
Henry	2,133	201	781	438	25	0	3,579
Houston	633	204	461	215	25	0	1,537

Source: Alabama Forestry Commission, 2002

Timberland in the district is comprised of a mixture of hardwood and pine varieties. Loblolly-shortleaf pine is the dominant species accounting for 634,200 acres or 30.3% of the total timber district wide compared to the oak-hickory class with 585,700 acres or 28%. Oak-pine class accounted for 15% and oak-gum-cypress 14.7% of the district timberlands. The following table indicates the dominant types of species typically found in the seven county district as of 2000.

Table 59
Area of Timberland by County and Forest-Type Group, 2000
(Thousand acres)

		Forest-Type Group						
County	All groups	Longleaf-slash	Loblolly-shortleaf	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Nonstocked
Barbour	450.6	18.9	189.2	72.0	134.3	33.1	3.1	-
Coffee	301.9	6.8	98.6	28.5	131.2	36.2	-	0.5
Covington	505.8	133.0	150.1	78.5	71.0	71.3	-	2.0
Dale	238.2	14.2	64.6	43.1	90.9	25.4	-	-
Geneva	203.6	20.1	39.6	15.6	49.9	72.2	6.2	-
Henry	224.5	9.3	65.3	45.9	78.8	19.9	5.3	-
Houston	166.1	22.1	26.8	31.4	29.6	50.1	6.0	-
Total	2,090.7	224.4	634.2	315.0	585.7	308.2	20.6	2.5

Source: Alabama Forestry Commission, 2002

Alabama and the district have been blessed with great forestry resources from which its forest industry has grown. With the district's expansive forestlands this important resource has historically been a major economic factor and has provided significant employment opportunities in the region. The district's forest industry is an industry with a future. Because it is based on renewable resources and because world demand for forest products is expected to grow into the foreseeable future, the continued importance and growth of this industry within the district and state is highly probable. The future well-being of the district and the state economy and its citizens will be heavily influenced by the health and growth of the forest products industry.

WATER RESOURCES

Three main river basin systems flow through Southeast Alabama. The Apalachicola basin consists of the Chattahoochee and Chipola Rivers in the region. It encompasses the eastern sections of Barbour, Henry, and Houston counties. The Choctawhatchee basin consists of the Choctawhatchee, Pea, and Yellow Rivers. It encompasses Dale County entirely, nearly all of Coffee and Geneva counties, the western sections of Barbour, Henry, and Houston counties, and southeastern Covington County. The Escambia basin consists of the Conecuh and Blackwater Rivers. It encompasses most of Covington County and a small portion of Coffee County.

The Chattahoochee River is the only navigable waterway in the district. It has two inland docks, in Eufaula and Columbia. A nine foot deep by 100 foot wide channel is available to barge traffic at most times. However, times of low water levels occur that impede navigation.

The largest reservoir of the region, Walter F. George Lake (Lake Eufaula), covers 45,200 acres and borders Barbour and Henry Counties. The lake has the seventh highest visitation of any impoundment in the country. It provides considerable economic benefit to Barbour and Henry Counties. Lake George W. Andrews covers 1,540 acres bordering Henry and Houston Counties. Lake Seminole primarily is in Florida and Georgia, but the Chattahoochee River up to the Andrews Lock and Dam is considered part of that reservoir. All three reservoirs are part of the Apalachicola-Chattahoochee-Flint River (ACF) system. The ACF system provides hydroelectric power, flood control, and recreation. Currently, there are more than 3,500 man-made small ponds and lakes in the district that provide water for fish and wildlife, livestock, fire control, spray purposes and recreational uses.

Due to the critical importance of the region's water resources, maintenance and enhancement need to be coordinated. A regional water authority can address these needs by assessing the quality and supply of water in Southeast Alabama. An authority would also integrate planning and implementation of grants and other forms of funding to coordinate management of the region's water resources.

CHAPTER IV

DEVELOPMENT PROBLEMS AND POTENTIALS

CHAPTER IV

DEVELOPMENT PROBLEMS AND POTENTIALS

The Southeast Alabama Regional Planning and Development Commission has invested in its staff with nationally recognized economic training from the American Economic Development Council, the National Development Council and the Economic Development Institute. There have been numerous changes in community economic developers throughout the district and many of these new people are also pursuing advanced professional training. The district is experiencing positive results by improving its professional economic development capabilities and plans for more positive results are underway.

In this chapter, some of the primary factors that tend to either enhance or impede development are discussed. The factors considered in this discussion are: education, transportation/location, labor force, business, development infrastructure, crime, health services, the cost of living, external policy forces, infrastructure, and housing. Most of these factors are consistently ranked in the top ten economic factors considered by business location officials. Crime rates are beginning to be a relevant factor given the nation's accelerating crime problems.

EDUCATION

It is now almost a universal consensus that education is the key to economic development today and will be for the future. Indeed the Southern Growth Policies Board, the Council of State Governments, and many other organizations have done ample research to document the great importance education is now having and will continue to have on economic development. The Southern Growth Policies Board has directly linked job growth or the lack of job growth to rates of adult illiteracy in a twelve southern state study covering over a decade of experience. Education is now considered to be a part of a community's economic infrastructure. States and communities that have not invested adequately in this critical infrastructure, either currently have or will have economic development problems. The infrastructure problem that literacy presents is compounded by the fact that quick fixes are not possible. Overcoming educational system problems takes community support, time, and investment.

Corrective measures require considerable time before the desired results can be achieved, sometimes decades. Too often, economic developers and community leaders have looked for short-term results and thus the constant push for more "incentives". This has been a result of developers trying to help their communities compete in the economic development environment.

In this section of this chapter, an assessment of some of our educational statistics is presented. The topic and data are vast. Very possibly, location officers of many companies look at similar data when assessing a community's potential for development projects. Many times areas or communities are eliminated from competition on sheer data, the basic process of elimination. That is a factor that often "incentives" cannot cure. Incentives generally come into use later in the site selection process.

An indication of how well the district is doing can be ascertained by examining the district's educational statistics. The State Department of Education has numerous reports detailing aspects of education for each school's performance. These records are kept on file for use as needed. For the purpose of this report, data are primarily limited to county and city school systems. Issues covered include: school enrollments, drop-out rates, revenues, expenditures, and testing.

School Enrollments K-12

Table 60, compares two school periods, 88-89 and 00-01, and also breaks down race related numbers. The Barbour County School System had the highest percentage of non-whites with 88.8%. There was a 7.8% increase over the ten year period. Coffee and Covington Counties had the lowest percentage of non-whites with 10.9% and 10.2%, respectively. Coffee County decreased by 3.1% and Covington County decreased by 1.8%. All of these systems have private school competition. This table should be kept in mind when reviewing test scores later in this section. Funding, economic deprivation, the lack of opportunity and other factors affect test results.

Enrollment declined in most of the systems; however, seven systems had good growth in student enrollment: Houston County - 907, Covington County - 433, Eufaula - 238, Daleville - 195, Geneva – 49, Dale County – 36, and Coffee County - 27. More prominent among those with declining enrollments were: Dothan with (-)1,148, Ozark with (-)655, and Barbour County with (-)608. The dramatic loss of enrollment has a serious impact on school funding determined by Average Daily Membership (ADM).

Dropout Rates

Data on dropout rates was obtained from the Alabama State Department of Education. The dropout rates were found on the annual Report Cards that the department published over the Internet. The dropout rates are a projected 4-year dropout rate based on the percent of students in the ninth grade in 2001-2002 who are projected to leave school prior to graduation in 2004. The dropout rates provided on the following page are not annual dropout rates. Dropouts, as a percentage looks dramatically poor for the district as a whole.

Andalusia had the lowest projected 4-year dropout rate with 11.87% followed by Geneva County with 12.81% of ninth graders expected to leave school prior to graduation in 2001. Covington County School System had the highest projected 4-year dropout rate with 27.83%.

TABLE 60
ENROLLMENT IN PUBLIC SCHOOL SYSTEMS K-12, 1988-89 AND 2000-2001

	1988-1989				2000-2001			
	White	Other	Total	% of Other	White	Other	Total	% of Other
Barbour County	416	1,805	2,221	81%	181	1,432	1,613	88.8%
Eufaula	1,639	1,179	2,818	42%	1,422	1,634	3,056	53.5%
Coffee County	1,642	260	1,902	14%	1,719	210	1,929	10.9%
Elba	823	424	1,247	34%	638	389	1,027	37.9%
Enterprise	3,944	1,351	5,295	26%	3,309	1,743	5,052	34.5%
Covington County	2,500	345	2,845	12%	2,944	334	3,278	10.2%
Andalusia	1,533	596	2,129	28%	1,245	523	1,768	29.6%
Opp	1,325	350	1,675	21%	1,122	314	1,436	21.9%
Dale County	2,125	505	2,630	19%	2,135	531	2,666	19.9%
Daleville	961	501	1,462	34%	971	686	1,657	41.4%
Ozark	2,373	1,281	3,654	35%	1,728	1,271	2,999	42.4%
Geneva County	2,388	620	3,008	21%	2,222	563	2,785	20.2%
Geneva	1,038	269	1,307	21%	1,114	242	1,356	17.8%
Henry County	1,521	1,534	3,055	50%	1,424	1,370	2,794	49.0%
Houston County	4,034	1,233	5,267	23%	4,940	1,234	6,174	20.0%
Dothan	5,758	4,078	9,836	41%	4,178	4,510	8,688	51.9%
Alabama	452,312	263,896	716,208	37%	456,702	282,619	739,321	38%

Source: Alabama State Department of Education, Annual Report 2001

PART 2 OF TABLE 60 (on previous page)

PROJECTED 4-YEAR DROPOUT RATE	
Barbour County	27.12%
Eufaula	15.59%
Coffee County	23.00%
Elba	21.31%
Enterprise	16.94%
Covington County	27.83%
Andalusia	11.87%
Opp	25.46%
Dale County	27.59%
Daleville	14.94%
Ozark	13.95%
Geneva County	12.81%
Geneva	25.26%
Henry County	25.16%
Houston County	15.62%
Dothan	22.04%

Source: Alabama State Department of Education

Note: This is a projected 4-year dropout rate, percent of students in the 9th grade in 2001-2002 who are projected to leave school prior to graduation in 2004. *This is not an annual dropout rate.*

Enrollment for the District's Post Secondary Institutions

Table 61 summarizes the historical enrollment data for the district's post secondary institutions from 1991 through 2001. Over the 10-year period, new colleges have emerged and colleges in the economic development district have consolidated, which accounts for some of the differences in the numbers from year to year. Four year institutions have seen a decrease in enrollment over the 10-year period. Of the four-year institutions, Troy State University Dothan had a 10.00% decrease, which is higher than the state's average decrease for four-year institutions of 3.37%. State junior and community colleges had an increase of 17.09% for the period; however, Wallace Community College was the only college in our region to experience an increase of 10.32%. Enterprise State and Lurleen B. Wallace experienced decreases of 35.92% and 40.74%, respectively. Douglas MacArthur Technical College also experienced a decrease in enrollment of 28.79%. Generally, these schools are working well with industry, changing curriculums to meet ever changing needs, and providing continuing education for many who want to upgrade skills, but are not seeking a degree. Having a four-year college and progressive post secondary institutions in the district is a locational plus.

TABLE 61
HEADCOUNT ENROLLMENT FOR SOUTHEAST ALABAMA'S POST SECONDARY INSTITUTIONS

Institutions	1991	1995	2001	Percentage Change from 1991-2001
Four Year				
TSUD	2,039	2,303	1,855	-10.0%
Alabama Total	128,890	127,465	124,687	-3.37%
State Tech				
Alabama Aviation	582	293	See Wallace	
MacArthur	586	587	455	-28.79%
Sparks	609	635	See Wallace	
Alabama Total	13,502	8,655		
Jr. & Comm. College				
Enterprise	2,123	1,800	1,562	-35.92%
L.B.W.	1,102	1,092	783	-40.74%
Wallace	3,643	3,421	4,062	10.32%
Bevill Center			3,504	
Alabama Total	64,163	63,087	77,389	17.09%

Source: Alabama Commission on Higher Education, Statistical Abstract: Higher Education in Alabama.

Note: The Wallace College 2001 enrollment numbers include Alabama Aviation College and Sparks Technical College

Revenues and Expenditures

These two topics go hand-in-hand since almost all revenues are spent and revenues limit expenditures for school improvement in most cases.

To see where the revenues come from Table 63 was developed. This table is divided into four categories: state revenues per student, local revenues per student, federal revenues per student, and other revenues per student. The table covers the school year 2000-2001 per ADM.

Geneva County, Daleville, and Opp received the highest percentages of state funding with 70.15%, 69.59%, and 68.15% respectively. Daleville had the highest percentage of funds from the federal government at 14.24%. Andalusia had the highest percentage of dollars from local sources, 30.01%.

To developers seeking an educated workforce and a place for children to get a quality education, statistics alone could easily cut the state and the district from location consideration. The district, compared to the Southeastern States and the Nation, is among the bottom of the list in funding for schools. In sum, as technologies continue to change and get more complex, some existing industries may encounter difficulties with the district's workforce. These are concerns that Alabama is taking seriously especially with the ongoing North American Free Trade Agreement. The district's post-secondary institutions are taking steps to try to reach adults that need re-training. Many of the high schools are now involved in the Tech Prep programs. Hopefully, educational improvements will, over time, make a dramatic change in the state.

TABLE 62
EXPENDITURES PER PUPIL IN THE DISTRICT'S PUBLIC SCHOOLS

2000-2001		**Highest to Lowest**
Barbour County	$7,009.86	Andalusia $9,683.27
Eufaula	$6,597.22	**Barbour Co. $7,009.86**
Coffee County	$6,468.97	Geneva $6,784.31
Elba	$6,427.78	**Henry Co. $6,779.14**
Enterprise	$6,531.98	**Dale Co. $6,673.28**
Covington County	$6,211.36	Eufaula $6,597.22
Andalusia	$9,683.27	Enterprise $6,531.98
Opp	$6,390.12	**Geneva Co. $6,502.48**
Dale County	$6,673.28	**Coffee Co. $6,468.97**
Daleville	$6,301.76	Dothan $6,464.97
Ozark	$6,143.01	Elba $6,427.78
Geneva County	$6,502.48	Opp $6,390.12
Geneva	$6,784.31	Daleville $6,301.76
Henry County	$6,779.14	**Houston Co. $6,262.03**
Houston County	$6,262.03	**Covington Co. $6,211.36**
Dothan	$6,464.97	Ozark $6,143.01

Source: Alabama Department of Education

TABLE 63
2000-2001 REVENUES PER STUDENT - AVERAGE DAILY MEMBERSHIP

System	State Revenue Per Student	Percent State	Local Revenue Per Student	Percent Local	Federal Revenue Per Student	Percent Federal	Other Revenue Per Student	Percent Other
Barbour County	$4,655.39	66.32%	$973.21	13.86%	$890.53	12.69%	$217.28	3.09%
Eufaula	$3,767.47	60.79%	$1,787.48	28.84%	$591.62	9.55%	$50.66	0.82%
Coffee County	$4,065.26	64.31%	$1,500.07	23.73%	$700.79	11.09%	$54.95	1.00%
Elba	$4,286.43	65.89%	$1,448.16	22.26%	$683.43	10.50%	$84.76	1.30%
Enterprise	$4,237.17	65.31%	$1,706.45	26.30%	$526.66	8.12%	$17.97	0.28%
Covington County	$4,076.81	64.70%	$1,433.10	22.74%	$736.63	11.69%	$54.70	0.87%
Andalusia	$4,373.42	56.92%	$2,305.92	30.01%	$661.31	8.61%	$342.57	4.46%
Opp	$4,420.32	68.15%	$1,395.58	21.52%	$573.17	8.84%	$97.30	1.50%
Dale County	$3,894.15	65.92%	$1,314.84	22.26%	$519.27	8.79%	$178.93	3.03%
Daleville	$4,368.63	69.59%	$986.06	15.71%	$894.27	14.24%	$29.02	0.46%
Ozark	$4,004.44	65.87%	$1,337.78	22.00%	$691.28	11.37%	$45.37	0.75%
Geneva County	$4,054.45	70.15%	$978.73	16.93%	$662.34	11.46%	$84.12	1.45%
Geneva	$4,705.44	66.27%	$1,527.32	21.51%	$515.08	7.25%	$352.71	4.97%
Henry County	$4,071.76	56.56%	$1,254.24	17.42%	$681.66	9.47%	$1,191.88	16.55%
Houston County	$3,546.82	48.41%	$1,601.91	21.86%	$557.65	7.61%	$1,620.86	22.12%
Dothan	$3,913.47	59.08%	$1,728.60	26.09%	$821.02	12.39%	$161.22	2.43%

Source: Alabama Department of Education, Annual Report, 2001

Figure 27
2000-2001 School System Revenues Per Funding Source

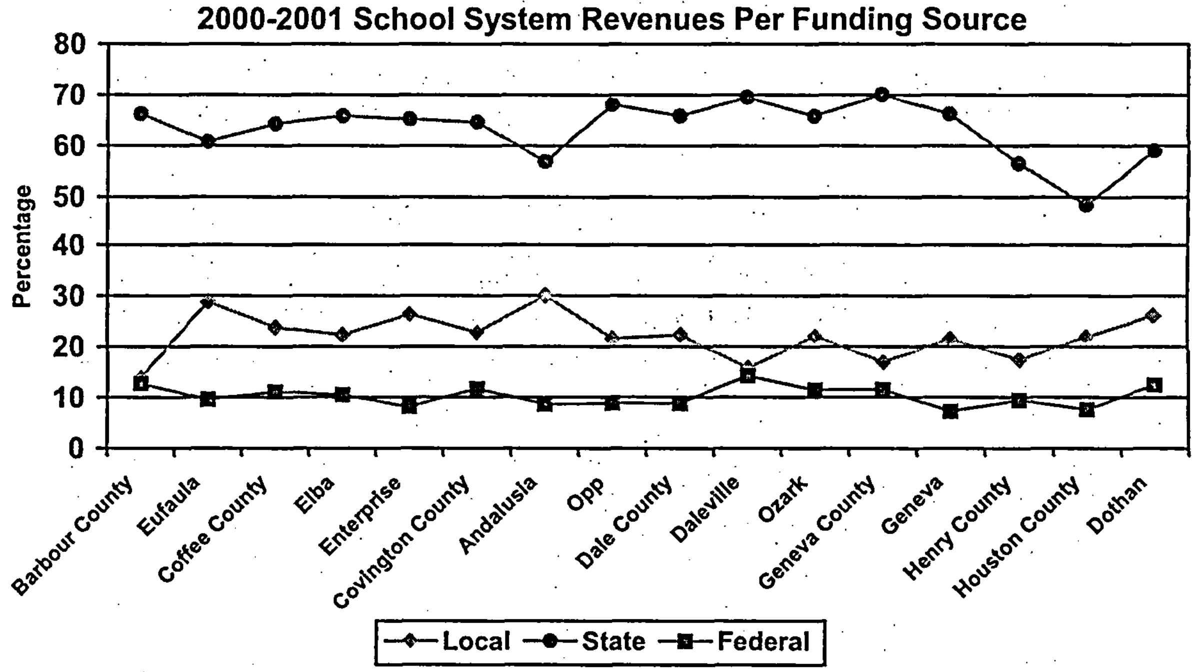


Table 64
TOTAL REVENUE PER STUDENT FOR 2000-2001

Barbour County	$7,019.41
Eufaula	$6,197.24
Coffee County	$6,321.06
Elba	$6,505.77
Enterprise	$6,488.25
Covington County	$6,301.24
Andalusia	$7,683.22
Opp	$6,486.37
Dale County	$5,907.20
Daleville	$6,277.97
Ozark	$6,078.87
Geneva County	$5,779.63
Geneva	$7,100.56
Henry County	$7,199.54
Houston County	$7,327.24
Dothan	$6,624.32

Source: Alabama Department of Education, Annual Report, 2001.

Test Scores

Test scores from all of the schools within the district are available, so a school by school evaluation can be completed. For the purpose of this report, school systems rather than individual schools will be reviewed. Three test scores will be discussed: (1) the American College Test (ACT), (2) the Stanford Achievement Test (SAT) scores, and (3) the State high school exit exam. These scores used in the following tables pertain to both county and city public school systems.

Table 65 presents the average test scores for the district schools for the ACT for school year 2001-2002. The state average is 20.3. Half of the school systems (8) scored above the state average while two (2) scored the same as the state average. The best school system score was attained by the Enterprise City School System with 21.8. The best score by a county system was attained by Covington County with 21.0. Barbour County School System had the worst score with a 17.0.

From Table 66, which lists the 2000-2001 and 2001-2002 SAT scores, it can be seen that Covington County, Andalusia and Opp achieved the most progress within the one year. Only six school systems improved their score while nine dropped. Geneva City had no change between the school years.

Table 67, presents State of Alabama High School Graduation Exam average test scores for the district's school systems. This is done by four categories: Reading, Language, Math and Science. In reading, Andalusia and Enterprise had the best scores with 98 and 97, respectively. In language, Opp and Enterprise had the best scores with 97 and 96, respectively. In math, Opp had the best score with a 97; Geneva and Enterprise each had a 95. In science, Enterprise and Geneva had the best scores with 97 and 96, respectively. The worst scores in reading, language, math and science were 76, 75, 67 and 58 all from Barbour County.

In summary, some of the district's school systems are doing a good job exceeding national and state averages. For these communities, they have a positive marketing tool. Hopefully, significant progress will occur in the future by investing in educational infrastructure that will have long-term economic benefits for the state.

TABLE 65
ACT AVERAGE TEST SCORES FOR DISTRICT SCHOOLS 2001-2002

Barbour County	17.0
Eufaula	20.2
Coffee County	20.2
Elba	19.8
Enterprise	21.8
Covington County	21.0
Andalusia	20.3
Opp	20.9
Dale County	20.3
Daleville	20.6
Ozark	19.9
Geneva County	20.4
Geneva	20.9
Henry County	20.1
Houston County	20.5
Dothan	20.7
Alabama	**20.3**

Source: Alabama Department of Education

TABLE 66
STANFORD ACHIEVEMENT TEST AVERAGE BATTERY (GRADES 3-11)

	2000-2001	2001-2002	Change
Barbour Co.	34	33	-1
Eufaula	52	51	-1
Coffee Co.	57	56	-1
Elba	55	56	1
Enterprise	66	65	-1
Covington Co.	61	64	3
Andalusia	66	69	3
Opp	57	60	3
Dale Co.	54	55	1

Daleville	56	54	-2
Ozark	53	52	-1
Geneva Co.	51	49	-2
Geneva	56	56	0
Henry Co.	49	48	-1
Houston Co.	51	53	2
Dothan	56	54	-2
Total Region Average	55	55	0

Source: Alabama Department of Education

TABLE 67
HIGH SCHOOL EXIT EXAM 11TH AND 12TH GRADE ON FIRST ATTEMPT
2001-2002

	Reading	Language	Math	Science
Barbour Co.	76	75	67	58
Eufaula	90	91	92	86
Coffee Co.	94	95	89	92
Elba	91	87	85	92
Enterprise	97	96	95	97
Covington Co.	92	92	89	92
Andalusia	98	95	95	95
Opp	93	97	97	93
Dale Co.	92	93	93	88
Daleville	89	89	86	85
Ozark	93	89	86	89
Geneva Co.	94	91	92	95
Geneva	92	89	95	96
Henry Co.	91	91	90	95
Houston Co.	95	94	94	95
Dothan	90	90	89	89
Total Region Average	92	91	90	90

Source: Alabama Department of Education

TRANSPORTATION

A quality transportation infrastructure is important to economic development. Without a comprehensive and maintained infrastructure along which to move goods and other resources between industries and users, the area in question will not be appealing to a company that wants to move or expand in that area. The Southeast Alabama region has a mixture of roads, rail, air, and water transportation. This section evaluates these modes of transportation within Southeast Alabama.

Highway Transportation

The Southeast Alabama region does not have any existing interstates within it. Interstate Highway 10 (I-10), a primary route across the southern United States, passes 15 miles south of Houston County (35 miles from Dothan). Interstate Highway 65 (I-65), an important route between the Gulf Coast and the Great Lakes, passes 10 miles northwest of Covington County (30 miles from Andalusia). These two areas are the nearest to the interstate highway system in the Southeast Alabama region. Many visitors travel down the interstate system to Montgomery and then travel U.S. 231, a four-lane highway, south through Dale and Houston Counties to connect with I-10. U.S. 231 is a heavily traveled highway and in some locations has a higher traffic count than the nearby interstates. Federal highways are present in every county in the region but Geneva County (Figure 28).

It is obvious from viewing a U.S. Interstate Highway map (Figure 29) that an interstate highway connector needs to be built from Montgomery to I-10. This is in part due to the fact that U.S. 231 wasn't designed for the increasingly heavy traffic and its quality has diminished over the years. This fact has begun to contribute to the fact that travelers are beginning to seek other routes to Florida. An interstate highway connector route from Dothan to Panama City, FL that crosses I-10 is in the planning stages at present. The proposed interstate connector will eventually extend northwest to Montgomery.

With the continued growth of both Georgia and Florida, there should be excellent regional business and development opportunities for the region. While most of the region is within three to four hours from Atlanta, Birmingham, and Mobile by auto or truck, the proximity of these two emerging states allows for increased activity for interstate commerce and development.

Figure 28
Major Roads in SEARP&DC

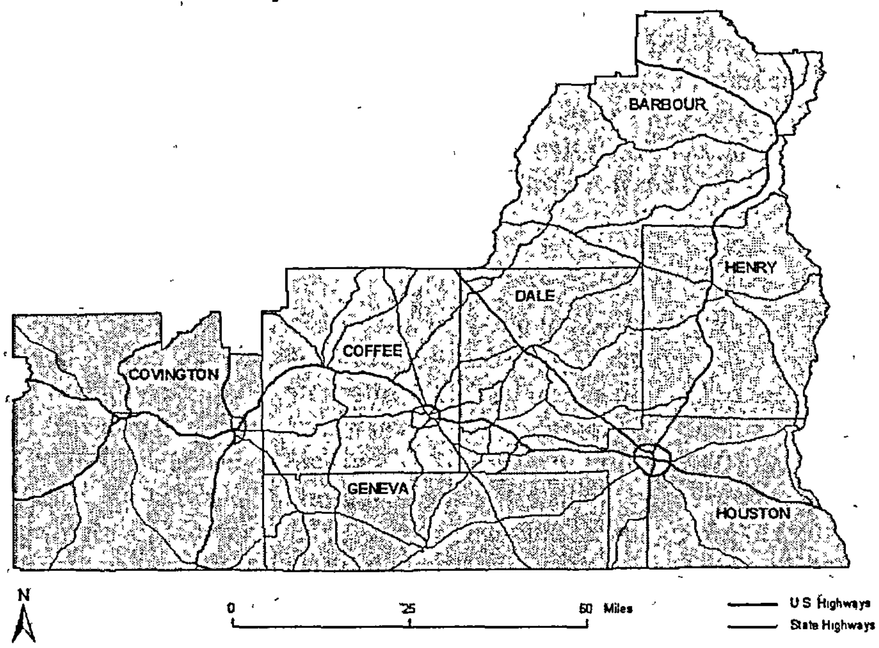
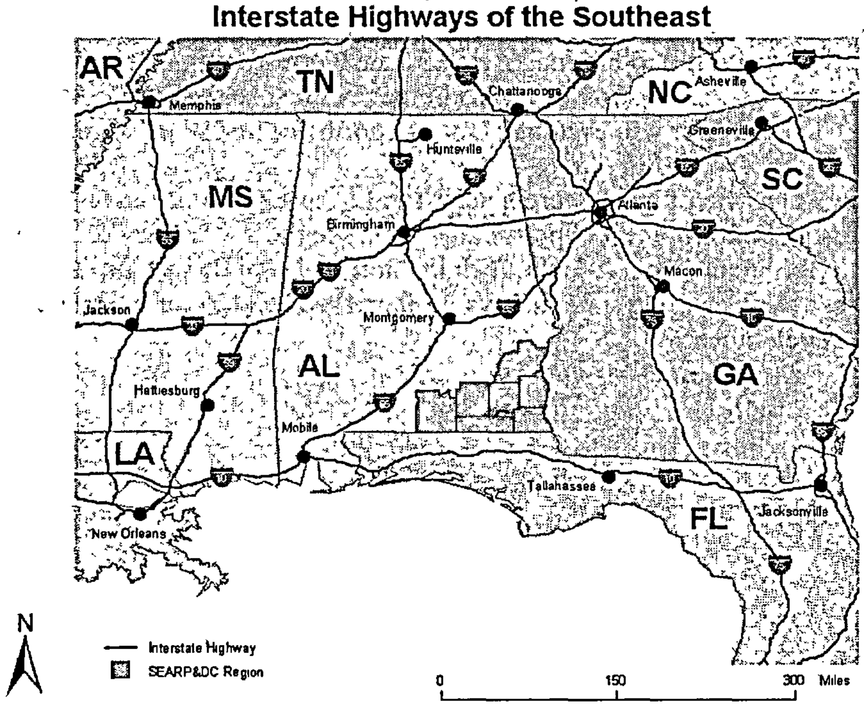


Figure 29
Interstate Highways of the Southeast



During the early 1990's, the Alabama Legislature approved a developmental highway program for the State. The passage of this act and the revenues to support it is having positive results for the state and will have a greater impact in the following years as many planned projects have been completed and are under construction.

There are many projects ongoing and being planned in the southeastern corner of the state. A brief review of the major projects that will have or already are having positive impacts for the development of our economic development is as follows:

1. U.S. 231 from Montgomery, through Ozark and Dothan, to the Florida line has been improved by widening, shoulder paving, turn lanes, and road surfacing. The Dothan bypass, known as the Ross Clark Circle, is planned to be widened to six lanes. A Western Connector route (possibly upgrading an existing route) is also being considered.

2. An interstate spur to connect the Dothan area (U.S. 231) directly to I-10 in Florida is still in the planning stages. This four-lane, high-speed connector route will greatly enhance the region with faster access to the interstate system and the Florida Gulf Coast. Distant future plans are to expand the connector to Montgomery.

3. U.S. 431, a north-south route, is completely four-laned from Dothan through Barbour County. Additional construction is already underway to widen U.S. 431 to four lanes from Barbour County north to Seale. Completion of this section will give Southeast Alabama a four-lane connection to Columbus, GA, which ultimately gives four-lane access to Atlanta.

4. U.S. 84 is an east-west route going through the southern counties in the region. Construction is underway to completely four-lane U.S. 84 through the region. Projects designed to complete the widening of U.S. 84 from Enterprise through Elba, Opp, and Andalusia are ongoing. A bypass around Opp is also being planned. These existing projects, in addition to widening the bridge over the Chattahoochee River at the Georgia state line, will complete this objective.

5. Improvements to State Highway 55, including the four-laning from Andalusia north to U.S. 31, are underway. This will give quicker access to I-65. With this project and the improvements to U.S. 84, the western section of the region is also being linked to the interstate system.

6. U.S. 331, from Montgomery through Covington County, is being improved. Construction around Opp began in mid-1995. The addition of sections from Crenshaw County and Montgomery began in 1994. This has had a positive impact on Opp, now being served with both north-south and east-west four-lane highways.

7. State Highway 167 from Troy to the Florida state line will be widened, giving the central section of the region a four-lane highway.

8. State Highway 52 from Dothan westward to the Geneva County line has been widened to four lanes. A future objective is to widen State Highway 52 to State Highway 167 in Hartford.

Within the past decade, many highway improvements have taken place and development barriers have been reduced greatly. This has not only helped economic development efforts, but also has created numerous construction jobs throughout the District providing an economic stimulus to the region. Continued improvements and additions have become a major priority for the state and for local officials.

Air Transportation

The Southeast Alabama Region has twelve state licensed airports (Figure 30). Runway lengths are from near 3,000 feet in some of the more rural communities to 8,500 feet in Dothan. Andalusia/Opp, Enterprise, and Eufaula all have 5,000-feet runways. The Dothan Regional Airport is the only airport with scheduled passenger service.

Airport industrialized parks exist or are underway in Headland, Dothan, Andalusia, and Ozark. The Dothan and Andalusia projects have been completed, and are already being served by new industries. Both are EDA funded projects and continue to have favorable economic development potential.

Commercial air service is important to the attractiveness of the region as employee travel is necessary for most businesses. The Dothan Regional Airport currently lists one major link service connecting with Delta Airlines, as Northwest Airlink stopped their service in 2001. The Atlantic Southeast Delta Connection provides a link to the Delta Airlines hub in Atlanta, Georgia with several flights daily. An additional carrier would be advantageous to the customers of the airport. Currently, the Dothan/Houston County Airport Authority has a public awareness program to inform citizens of the important of planning trips from Dothan rather than the other nearby regional airports located at Panama City, Columbus, and Montgomery. Together with the increased air travel of recreational and occasional travelers, this service is expected to remain for an indefinite period.

The advent of several air based industries in the area over the past few years has greatly enhanced the district's ability to market itself as an air flight service and maintenance base. The Dothan Regional Airport has industries, such as Pemco and Aerostar World, that provide needed services for pilots and airport customers.

Rail Transportation

Railroads have become a limited and almost non-existent resource to the region over the past decade (Figure 31). There are, however, two primary long haul carriers in the region: Norfolk Southern and CSX. The region is also serviced by several "short line" carriers: Alabama and Florida R.R., Andalusia and Conecuh R.R., the Bay Line R.R., the Georgia Southwestern R.R., the Hartford and Slocomb R.R, Three Notch R.R., and Wiregrass Central R.R. The Hartford and Slocomb R.R. was partially abandoned from Hartford to Taylor. From Taylor, it was sold to the Wiregrass Central R.R.

With right of ways continuing to be sold, it is unlikely that communities that have lost service will have railroad services in the future, however, the upside to this is that those communities with the remaining rail service are more becoming more viable for heavy industrial project sites that require heavy load, long hauling, such as steel mills, fabricators, boat building or other large product manufacturers.

Figure 30
Airports In SEARPDC

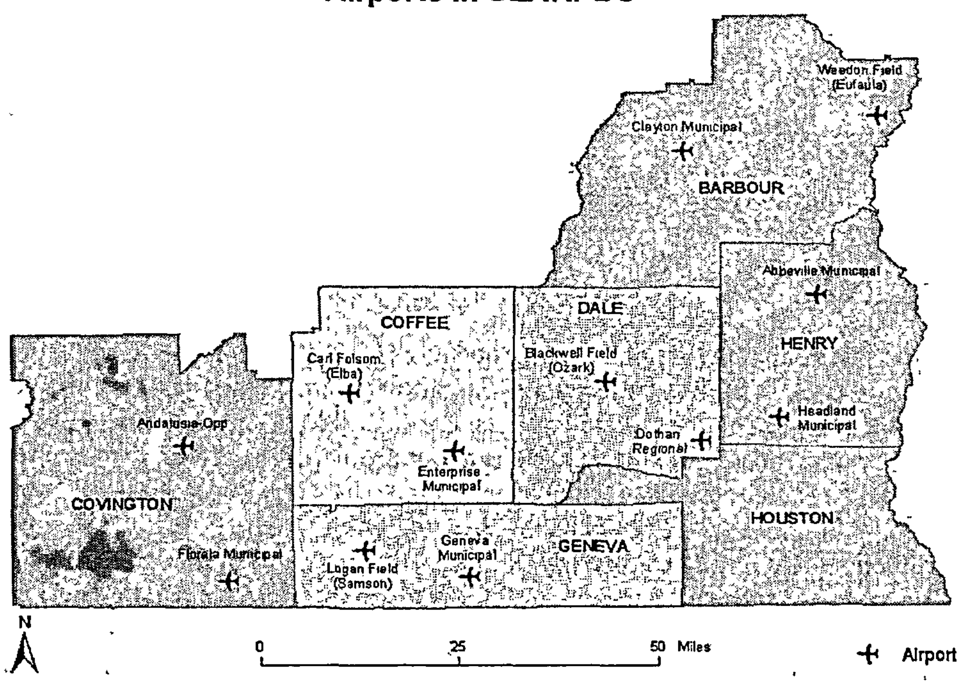
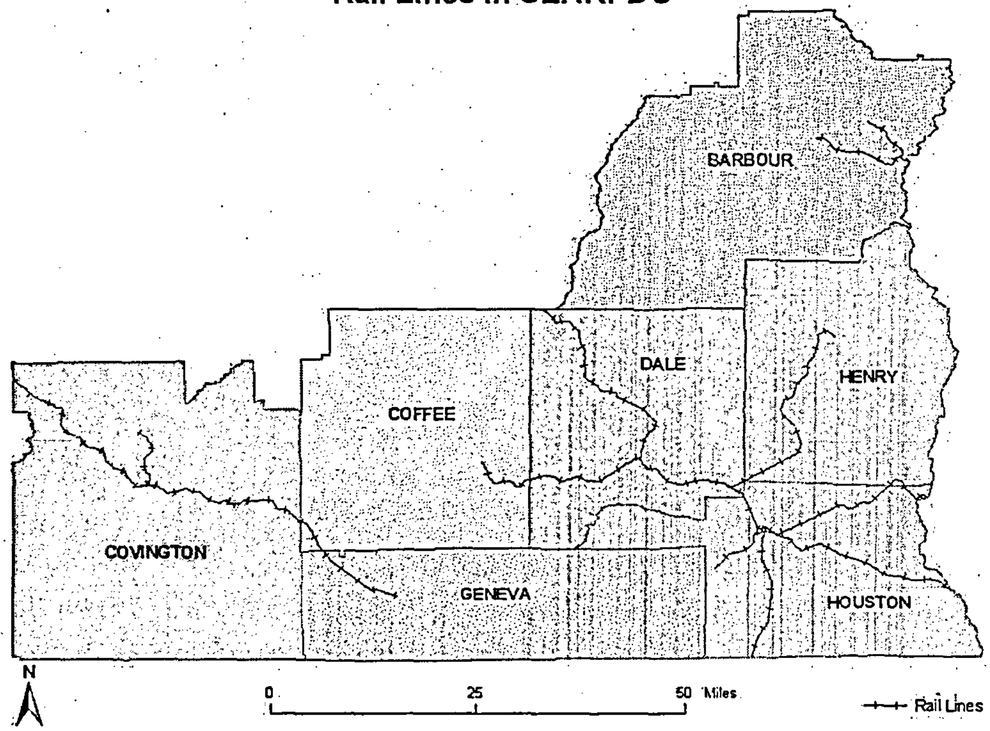


Figure 31
Rail Lines In SEARPDC



Water Transportation

The Southeast Alabama Region has only one navigable waterway, the Chattahoochee River. State dock facilities are located at Columbia in northern Houston County and Eufaula in Barbour County. There has been considerable discussion among water transportation advocates and organizations about problems related to waterway traffic, particularly the lack of traffic.

The problems surrounding the use of the Chattahoochee System for agricultural and industrial barge usage are many. First of all, Alabama leaders are in an ongoing feud with Georgia over Georgia's attempt to withdraw more water from the Chattahoochee River and the discharging of large amounts of wastes back into the system that cause effluent levels that fail to meet acceptable standards of water discharge quality. Also related is the lack of sufficient water flow that is necessary in order to maintain the minimal depth of water necessary for barge traffic. This has become an environmental concern to both Alabama and Florida. Florida additionally has numerous other environmental concerns about the dredging and industrial pollutants that affect their fishing industry.

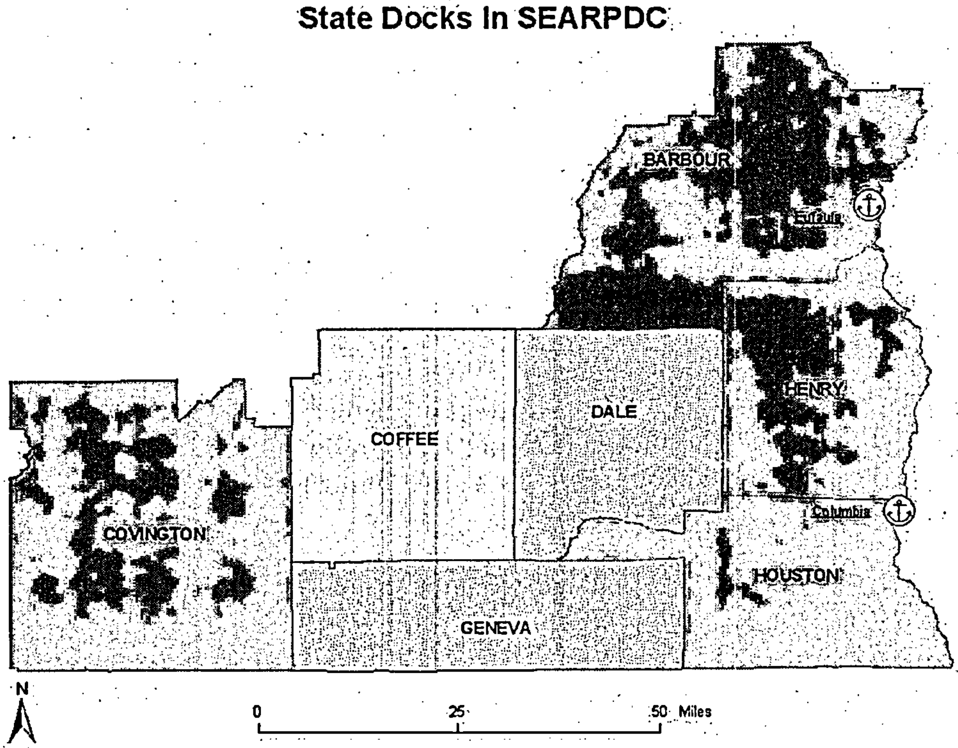
Several other issues are of concern to the waterway including the development of sites along the route. The Houston County Port Authority has over 200 acres of land available adjacent to the state dock facility. This site is adequately served with good highways and the Norfolk-Southern Railroad. This has excellent potential, but marketing remains dormant at this time. The Eufaula State Docks Facility has very limited acreage available for industrial expansion.

On a positive note, the Chattahoochee, Choctawhatchee, Pea, and Conecuh Rivers, as well as other fisheries throughout the District, provide valuable recreational and tourism economic development benefits and are all undergoing transition development in which to enhance the usage of these waterways as secondary development markets.

Summary

In summary, the Southeast Alabama Region has both positive and negative trends that concern its transportation infrastructure. The developmental highway program is a positive to improve the roads that are within the region. The negative is the lack of interstates and large highways. The outlook for waterways and railroads is not as promising as trucking, but it is fortunate to have two stable primary railroads that pass through the district. New airport parks offer hope for new, better paying jobs. Commuter air service is important to the district and efforts are being made to increase departures that are necessary to keep the current level of service. The region is optimistic that it will continue with the existing airline's service in Dothan.

Figure 32
State Docks In SEARPDC



INFRASTRUCTURE DEVELOPMENT

During the last several years, infrastructure improvements have accelerated in the Southeast Alabama district. Communities throughout the district have implemented infrastructure improvements for community and economic development. There have been many infrastructure projects designed to assist new as well as expanding industries in the district. Moreover, many communities have implemented infrastructure projects to improve the quality of life, which is an important component of economic development.

Below is a summary of infrastructure improvements in each county of the district over the past 5 years:

Barbour County

Barbour County Commission

The Barbour County Commission was recently awarded a Community Development Block Grant (CDBG) ED Infrastructure grant to assist Charoen Pokphand USA, Inc. (CP) with the construction of a wastewater wetland to treat effluent from the CP plant located near Bakerhill, Alabama. Implementation of the project will allow the company to retain 1,400 existing jobs and allow 200 new jobs to be created.

City of Eufaula

The City of Eufaula received a 2000 Comprehensive CDBG project to implement a water, sewer and paving project. The project was implemented in the Randolph Street area. The project consisted of 1,000 L.F. 3" PVC water mains. Moreover, the project replaced 150 L.F. of 8" PVC sanitary sewer. Finally, the project paved ¾ mile of street as well as storm drainage improvements.

The City of Eufaula receives approximately $150,000.00 a year from the Federal Aviation Agency (FAA) for improvements at the local municipal airport. The funds are used to improve the lighting, aprons for parking airplanes, runway extension, and rehabilitation of the taxiway.

Eufaula was also awarded a EDA Public Works Grant in 1997. However, the project was implemented in 1998. This project allowed the City of Eufaula to construct two (2) deep wells and a 1 million gallon elevated storage tank for industrial expansion and new job growth.

The City of Eufaula received funding from the Alabama Department of Transportation in 2002 to resurface streets citywide.

The Alabama Department of Transportation also awarded Eufaula a grant to implement storm drainage improvements in the Randolph Street area.

Eufaula also received a grant from the Alabama Department of Transportation to four lane Lake Drive, located in the north section of the city.

Town of Clayton

The Town of Clayton received a 2001 CDBG Community Enhancement Grant to implement a town revitalization project. The project will provide interrelated infrastructure improvements to include replacement of sidewalks, upgrades to the water system, storm drainage improvements, street improvements, street lighting, and landscaping. The Town of Clayton also received a 2003 Community Development Block Grant. These funds will supplement the project mentioned above.

Coffee County

The Coffee Water Authority is in the process of implementing a water system improvements project. The project is being financed by USDA/Rural Development funds. The project will install 850,000 L.F. of 3" and 6" PVC water mains. Furthermore, the project will install two deep wells. One deep well will pump 500 gallons per minute (GPM) and the second well will pump 350 (GPM). The project will also construct two elevated water tanks. Both of the water tanks have a storage capacity of 125,000 gallons. Moreover, the project will install 133 fire hydrants. This project is being implementing in the southeast section of Coffee County.

City of Enterprise

The City of Enterprise implemented a Community Development Block Grant project to replace water and sewer lines in the Doster Street area in 1998. This project replaced old existing sewer lines in the area with 8" and 10" PVC gravity sewer. Moreover, the project replaced old existing waterlines with 6" and 3" PVC water mains.

The City of Enterprise also implemented a Community Development Block Grant project in the Methodist Side Community in 2000. This project replaced old sewer lines with 10,000 L.F. of 8" PVC gravity sewer. The project also replaced old water lines with approximately 7,000 L.F. of 6" PVC water mains.

Enterprise was recently awarded a 2002 Community Development Block Grant to implement water and sewer system improvements in the Baptist Hill Community. The project will replace old sewer lines with approximately 10,000 L.F. of 8" PVC sewer mains. Moreover, the project will replace old water lines with 6" PVC water mains.

The City of Enterprise drilled three new water supply wells over the past few years. A 750 GPM well was installed for the Coffee Gin Company, which is located in the south section of Enterprise. Furthermore, the City of Enterprise installed a 900 GPM water well off Shellfield Road. In addition, the City of Enterprise installed a 1,000 GPM well off of State Highway 167 North. This project also extended 10 miles of water mains in the area.

The City of Enterprise recently resurfaced 30 miles of streets within its corporate limits. The project was financed through the issuance of municipal bonds.

City of Elba

The City of Elba was recently awarded an FY 2003 $886,500.00 EDA Public Works Grant for municipal water system improvements. The proposed project will construct a new 300,000 gallon elevated water storage tank. Moreover, the project will install a 500 GPM deep well. Furthermore, the project will install 8" by 10" connecting mains and related appurtenances. Implementation of this project will allow 500 new jobs to be created in the Elba economy.

The City of Elba implemented a sewer system improvements project with a financial assistance award from USDA/Rural Development in 2001. The sewer project replaced 22,500 L.F. of 8" PVC sewer lines in the Brookdale subdivision and The Brunson Circle subdivision. The project also installed 159 manholes and 13 relay stations citywide.

The City of Elba also implemented a sewer system improvements project along U.S. Highway 84 West (Old Curtis Road). This project was funded in part with a Special Fund Community Development Block Grant. The project consisted of 3,300 L.F. of 8" PVC gravity sewer, two pump stations, and 13 manholes.

The City of Elba was awarded a 2003 CDBG ED Infrastructure grant to assist Kelly Foods of Alabama, Inc. with an expansion project. The proposed project will provide 500 L.F. of 8" PVC gravity sewer, 5,100 L. F. of 6" PVC force main, 48 manholes, and one pump station. The expansion project by Kelley Foods of Alabama will allow 15 new jobs to be created.

The City of Elba implemented a storm drainage project in the Putman Street and Martin Luther King area in reference to flooding that occurred in a March 1998 flood. Elba installed 11,150 L.F. of 36" reinforcement concrete pipe. The project was partially financed by a Community Development Block Grant.

Town of New Brockton

The Town of New Brockton implemented a water system improvements project with financial assistance from ADEM's State Revolving Loan Fund in 1999. The project installed a new tank and well, which was designed to benefit all the citizens within the corporate limits. Moreover, the project extended 30,000 L.F. of water mains throughout New Brockton.

Town of Kinston

The Town of Kinston implemented a water system improvement project with financial assistance from USDA/Rural Development. The water system improvements project consisted of 6,300 L.F. of water mains along County Road 117, County Road 20, and

Alabama State Highway 52. The project also strategically located fire hydrants in the project area.

The Town of Kinston also implemented a Phase Two Water System Improvements project with financial assistance form USDA/Rural Development. This project extended 171,000 L.F. of water mains south of the Kinston town limits. Furthermore, this project strategically located fire hydrants in the project area.

Covington County

The Covington County Commission received a 2001 CDBG ED Infrastructure grant to implement a water, sewer, and storm drainage improvements project for the location of Service Zone Corporation. The project installed 1,200 L.F. of 6" PVC water mains, a water storage tank and fire pump, and two fire hydrants. Moreover, the project installed 800 L.F. of 8" PVC gravity sewer and one pump station. The project also installed 5 manholes. In addition, the project also installed 12", 15", and 18" storm sewer pipe. A large retention pond was also installed. Implementation of the project allowed over 200 new jobs to be created.

The Covington County Commission also received an Industrial Assess Grant from the Alabama Department of Transportation to provide a turn lane to the site of Service Zone Corporation. The project consisted of approximately 2,200 feet of paving improvements.

Town of Lockhart

The Town of Lockhart received a 2001 Community Development Block Grant to replace old sewer lines in the north section of the town. The project installed 7,560 L.F. of 8" PVC sanitary sewer and 30 manholes.

City of Florala

The City of Florala received a 2002 Community Development Block Grant to implement a sewer system improvement project along State Highway 54. The project will install 10,836 L.F. of 8" PVC sanitary sewer mains, one pump station, and 36 manholes.

The City of Florala also received a 2002 CDBG ED Infrastructure grant to install a lift station for the Florala Rehabilitation and Nursing Facility.

City of Andalusia

The City of Andalusia received a Community Development Block Grant in 2000 to conduct sewer system improvements. The project was implemented in the west central section of Andalusia. The project replaced old sewer lines in the aforementioned area. The project rehabilitated 8,700 L.F. of sewer lines and installed 4,800 L.F. of 8" PVC gravity sewer and 20 manholes.

The City of Andalusia also received a Community Development Block Grant 2001 to conduct a sewer system improvements project. The project was conducted in the northwest section of Andalusia and installed 3,050 L.F. of 8" PVC gravity sewer. The project also installed one (1) pump station and 19 manholes.

The City of Andalusia received a 1999 Community Development Block Grant for sewer rehabilitation in the central section of Andalusia. The project replaced 2,000 L.F. of 12" PVC gravity sewer.

The City of Andalusia resurfaced Dunson Street in 2002. The project was financed by the Alabama Department of Transportation. The project consisted of curb and gutter work.

The City of Andalusia is in the process of installing turn lanes on Presswood Bridge Road. This will provide access onto State Highway 29 South. This project was funded with local funds.

The City of Andalusia received State Revolving Loan funds from ADEM to construct a 750,000 water storage tank. The project was constructed in the central section of Andalusia.

The City of Andalusia also received an EDA Public Works Grant in 2000 to construct two (2) new deep wells to provide infrastructure improvements to support industrial expansion and the creation of new jobs in Andalusia, Alabama.

City of Opp

The City of Opp resurfaces three miles of streets annually. Streets are paved throughout the corporate limits. The resurfacing projects are funded by local and State funds.

Dale County

City of Ozark

The City of Ozark obtained a 2002 Community Development Block Grant to implement a sewer system improvements project along State Highway 123. The project installed 12,800 L.F. of 8" PVC sanitary sewer mains and 44 manholes.

In 1999, the City of Ozark received a Special Community Development Block Grant to extend municipal sewer in the Marley Mill community. The project installed approximately 8,000 L.F. of 8" PVC sanitary sewer pipe, and one pump station. The project also installed 36 manholes.

In 2000, the City of Ozark conducted a storm drainage project in the Grimes Road area. The project installed 818 L.F. 60" corrugated plastic pipe (CPP). The project also installed 460 L.F. of 53" CPP, 400 L.F. of 48" CPP, and 20 L.F. 42" of CPP to eliminate localized flooding.

The City of Ozark recently received a grant from the Federal Aviation Administration (FAA) to extend the municipal airport runway. The project will extend the existing runway by 1,135 feet. The project will also consist of a taxiway being constructed, as well as additional airplane parking aprons.

City of Daleville

The City of Daleville recently implemented a water system improvements project along Dale County Road 24 (Tank Hill Road). The project replaced the existing three quarter inch lines with 6" PVC water mains in the area. The project was financed in part by a 2000 Community Development Block Grant.

City of Midland City

In 1998, Midland City implemented a water system improvement project. The project constructed a 250,000 gallon storage tank, which was designed to benefit the entire population within the corporate limits. Moreover, the project installed a 400 gallon per minute (GPM) supply well. The project extended approximately 1,087 L.F. of 6" PVC water mains and 5,130 L.F. of 8" PVC water mains community-wide.

In 1999, Midland City received a Community Development Block Grant to implement a sewer system improvement project in the east section of town. The project consisted of 3,163 L.F. of 8" PVC sewer lines and 2,854 L.F. of 6" PVC sewer lines. In addition, one (1) pump station was installed. The project also installed 34 manholes.

Town of Pinckard

The Town of Pinckard received an EDA Public Works Grant in 2001 to construct a new deep water supply well and an elevated storage tank. The project was approved to assist Pinckard with an industrial expansion.

Town of Napier Field

The Town of Napier Field was awarded a 1999 Community Development Block Grant for sewer system improvements. The town replaced old sewer lines in the central and eastern section of Napier Field. The project consisted of 6,000 L.F. of 8" PVC sanitary sewer pipe. The project installed 6,500 L.F. of 4" PVC service laterals, 1,060 L.F. of 6" service laterals, and 20 manholes. The project also resurfaced the streets that were impacted by the sewer system improvements.

Geneva County

Geneva County Commission

The Geneva County Commission is in the process of implementing a $3,000,000.00 Environmental Protection Agency (EPA) project to interconnect all of the water system within the county. In order to implement the project, 210,000 L.F. of 6", 8" and 12"PVC water mains will be installed. The project will install two 500 gallon per minute (GPM) wells. The project will also include the construction of one 250,000 gallon storage tank and the project will install approximately 60 fire hydrants.

The Geneva County Commission also received a 1999 Community Development Block Grant to extend municipal water to the Mims Hill Community, which is located in southeast Geneva County. The project installed 11,500 L.F. of 8" PVC water mains and 5,000 L.F. of 6" PVC water mains and 18 fire hydrants.

City of Geneva

The City of Geneva received a 2000 Community Development Block Grant to extend municipal sewer to the Devco community. The project installed 6,850 L.F. of 8" PVC sewer mains. The project installed one pump station and 30 manholes.

The City of Geneva also received $885,000.00 EDA Public Works Grant in 2000 to allow the city of construct a new deep well and an elevated storage tank. The project included a new sewer pump station upgrade to provide infrastructure improvements to support industrial expansion and the creation of new jobs.

City of Samson

The City of Samson received a 2000 Community Development Block Grant for water system improvements. This project was designed to replace old water lines in the northeast section of town. The project installed 24,500 L.F. of 6" PVC water mains and 20 fire hydrants. The project installed a 200,000 gallon storage tank in order to be in compliance with ADEM's water storage reserve requirements.

The City of Samson also received a 2002 Community Development Block Grant to continue the replacement of water lines in the south section of town. The project was designed to replace water lines that caused Samson to experience an average water loss of 23,351,455 gallon of water over a six (6) month period. This project will install 14,200 L.F. of 6" PVC water mains and 16 fire hydrants.

City of Hartford

The City of Hartford received a 2002 Community Development Block Grant to replace old water and sewer lines in the Commerce Street area. The project will install 2,885 L.F. of 12" PVC sanitary sewer pipe. The project will install 4,751 L.F. 8" PVC sanitary sewer pipe. The project will also install of 4,700 L.F. of 6" PVC water mains and 1,020 L.F. of 3" PVC water mains and five fire hydrants.

The City of Hartford was recently awarded a CDBG Economic Development Infrastructure Grant from ADECA to install 4,750 L.F. of 8" and 10" PVC water main and 4,400 L.F. of 6" and 8" PVC sewer force main to the new industrial park as a part of a new industry location.

Henry County

The Henry County Commission received a 2001 Community Development Block Grant and USDA/Rural Development funds for water system improvements. The project extended 120,000 L.F. of 3" PVC water mains, 200,000 L.F. of 6" PVC water mains, and 99 fire hydrants.

The Henry County Commission has been approved for a 2003 Community Development Block Grant for water system improvements. The project will extend water to County Road 46, Bethlehem Church community, Highway 173 area, Sandy Creek area, and Omussee Creek area. Furthermore, the project will install 113,180 L.F. of 6" water mains and 8,586 L.F. of 3" water mains and 37 fire hydrants will be installed.

City of Abbeville

The City of Abbeville received a 2000 Community Development Block Grant to revitalize the downtown area. The project resurfaced streets in the downtown area and provided sidewalks. The project replaced old water lines with 4,000 L.F. of 8" PVC water mains.

Abbeville recently used local funds to extend municipal sewer out State Highway 27. The project installed 200 L.F. of 6" sanitary sewer.

City of Headland

The City of Headland received a 2003 Rural Business Enterprise Grant for sewer system improvements. The project will design to supply emerging businesses at the municipal airport. The project will install 7,400 L.F. 8" PVC sanitary sewer and 8,700 L.F. of 6" PVC sanitary sewer, one pump station, and 19 manholes.

Houston County

The Houston County Water Authority implemented a water system improvements project in the south section of the county in 2001. The project was financed in part with USDA/Rural Development funds. The project installed 40,000 L.F. of 3" and 6" water mains, and 19 fire hydrants.

Town of Cottonwood

The Town of Cottonwood recently replaced an elevated water storage tank that was constructed in 1943. Cottonwood constructed a new 150,000 gallon elevated water storage tank that will benefit all of the citizens within its corporate limits. The project was funded in part by a 2002 Special Fund Community Development Block Grant.

The Town of Cottonwood also implemented a water system improvement project in the north section of the town. The project installed 68,000 L.F. 6" PVC water mains and 12 fire hydrants. This project was financed by USDA/Rural Development.

Town of Ashford

The Town of Ashford implemented a water system improvement project in 2002 with the assistance of USDA/Rural Development funds. The project installed a 400 gallon per minute (GPM) water supply well and a 250,000 gallon storage tank. The project extended water mains to 70 homes in the Church Street area and along U.S. Highway 84 in the Pansey community.

Town of Gordon

The Town of Gordon recently constructed a new sewer system throughout the corporate limits. The project installed 35,000 L.F. of gravity sewer. The project installed a new lagoon system to treat the wastewater. The project installed nine pump stations and was financed by UDSA/Rural Development and CDBG funds.

Town of Cowarts

The Town of Cowarts implemented a sewer system improvement project in 2002. The project extended sanitary sewer along South Broad Street, Crimson Road, and a portion of North Broad Street. This project was financed with local funds.

Water Supply

All water used in the Southeast Alabama Region comes from groundwater out of aquifers. Historically, the region has had a plentiful supply of groundwater for its uses. Recently, groundwater overdraft areas have developed in the region. During the past several years, increasing withdrawals of groundwater, especially in larger population areas, have caused significant declines. The increased demand for water compounded with the increase in population of the area is placing strains on ground water supply. The Dothan area has seen declines of 150 feet in the Nanafalia aquifer, according to the Geological Survey of Alabama, the largest decline in the region. Though declines are present near the withdrawals areas for major pumping stations, the aquifers remain stable away from them. There is no surface water supply in operation in the Southeast Alabama Region to provide potable water; therefore, a need exists to look at the long range application of such a system due to future groundwater issues. The Geological Survey of Alabama is conducting an in-depth study of water resources of the Choctawhatchee-Pea-Yellow Rivers watershed

Agricultural irrigation is a future concern as well. The majority of land in Southeast Alabama is not irrigated. Soil suitability studies indicate that approximately 200,000 acres are suitable for irrigation within the district. The concern stems from possible expansion of irrigation in the future. Since 90% of all irrigation agriculture use comes from surface water supplies, this will alleviate demand on ground water supply. Overall water quality in the Southeast District is good with only high iron and hardness problems associated with the supply. Water quality problems present in the district are attributed to one of the following factors: (1) malfunctioning septic tanks, attributed to only 50% of residents in the area being on public sewer service, (2) potential contaminants from pesticides entering drinking water in rural wells, and (3) contamination of surface water supplies from effluent discharged by waste water treatment plants.

A county by county analysis of ground water supply factors is provided.

Barbour County

The Eutaw and Tuscaloosa aquifers, the Providence and Ripley aquifers, and the Nanafalia and Clayton aquifers are the sources of ground water for Barbour County. These aquifers can yield up to 700 gpm throughout the county. The Eutaw Formation yields a small amount of water in the northern half of the county, while the Tuscaloosa Formation is a source of large supplies of water in the northern two-thirds of the county. There is no evidence of depressions on the potentiometric surfaces of the aquifers, however; water levels have declined over the past 25 years. Overall water quality is good with iron and hardness being problems throughout the area.

Coffee County

The major sources of water supply in Coffee County come from the Nanafalia and Clayton aquifers and the Providence and Ripley aquifers. Future development of wells in the Providence and Ripley aquifers is contingent upon equilibration of the aquifer in the vicinity. There has been evidence of a depression on the potentiometric surface of the Nanafalia and Clayton aquifers in the southwest section of Enterprise. With continued growth as the city has experienced and a possible declining water table, overdraft problems will be a future concern. Water quality is good, with excessive iron and hardness.

Covington County

The Upper Floridian aquifer is a source of water supply in the southern area of Covington County. It is the sole water source for the Town of Lockhart and a water supply for the Town of Florala. Depressions on the potentiometric surface of the Upper Floridian have not developed. The Lisbon aquifer is pumped extensively in the area and it is used in conjunction with the upper Floridian aquifer. As a result, long-term withdraws of ground water from the Lisbon aquifer at Opp, a depression on the potentiometric surface has developed. The Lisbon aquifer is the major water supply source for the City of Opp. The water quality is good with excessive iron and hardness being problems associated with water in this area.

Dale County

Dale County water supply is dependent on the Nanafalia and Clayton aquifers and the Providence and Ripley aquifers. According to the Geological Survey of Alabama, the Nanafalia and Clayton aquifers around Ozark have declining water levels due to pumpage. The water quality is good with excessive iron and hardness being the only problems.

Geneva County

The Nanafalia and Clayton aquifers and the Lisbon and Tallahatta aquifers are the major aquifers used in Geneva County. If current demand increases significantly in the City of Geneva, there may be an overdraft problem in the future. Overall, water quality is good with occasional excessive iron, hardness, and chloride. Excessive iron is most common in the Lisbon and Tallahatta aquifers.

Henry County

The Nanafalia and Clayton aquifers and the Providence and Ripley aquifers provide water in Henry County. There is no evidence of major depressions on the potentiometric surface of the aquifers however, there is a potential for future overdrafts in Headland and Abbeville if increases substantially. Ground water levels have substantially declined during the past 30 years. Overall water quality is good with excessive hardness being the only drawback.

Houston County

Water problems are the most critical in Houston County due mainly to the area accommodating the largest population base in Southeast Alabama and the high amount of water use. Depressions have already formed in the potentiometric surface of the Nanafalia aquifer in and near Dothan. Water levels have declined 150 feet during the past 25 years and continue to decline. Groundwater overdraft problems will continue to be a major problem in the area as population and usage increase. Water quality of the ground water is good, with locally high iron content and occasional excessive hardness. In the Eutaw aquifer which is at a depth of 1,500 to 2,000 feet, high chlorides are sometimes encountered.

Water Regulations

The main federal regulations for safe water mostly are from the Clean Water Act and the Safe Drinking Water Act mandated from the Environmental Protection Agency. The Clean Water Act regulates surface water protection in the United States. It sets standards regarding pollutants entering surface water. Over time, the Clean Water Act has shifted its goals from point source pollution (direct) to nonpoint source pollution (indirect). The main way the Clean Water Act is regulating nonpoint source pollution is through the Section 303(d) regulation to make waters fishable and swimmable by monitoring Total Maximum Daily Loads (TMDLs). This process has been difficult, because monitoring TMDLs on the waters requires timely, quality data that many waters do not have and requiring polluters to share the costs of cleaning the polluted waters due to the tough task of equitably punishing offenders. Clean Water Act programs also have shifted to more comprehensive-based watershed programs, instead of separate programs classified by pollutants or streams.

The Safe Drinking Water Act (SDWA) regulates the public drinking water supply, which includes groundwater wells, except private wells that serve fewer than 25 people. Originally, the focus of SDWA was on treatment. According to the Environmental Protection Agency (EPA), in 1996, SDWA was heavily amended to provide for source water protection, training, and public information. Continual assessment of the water source is required, which can strain small public water systems, but the EPA has grant and loan systems that cater to small systems that do not have the financial resources of a larger system.

State regulations include the Alabama Agricultural Nonpoint Source Financial Assistance Act of 1998, which acts to control soil erosion, prevent pollution in streams, and work to improve forest health. There is also the Alabama Underground Storage Tank and Wellhead Protection Act that regulates tanks that are stored underground to prevent leakage into drinking water sources. The state has developed a source water assessment program, according to the Geological Survey of Alabama, that assesses source water recharge area delineation, potential contaminant source identification, and how much a water recharge area is threatened by contamination.

Water Distribution Systems

Most of the incorporated areas within the district are served by water systems that vary in capacity and quality. Additionally, there are gaps in the service of various rural areas, but service is continuously expanding. The region's water distribution systems and customer bases are identified in Table 68.

TABLE 68
Southeast Alabama Water Systems

County	System	Average Production (MGD)	Capacity Production (MGD)	Customers
Barbour				
	Baker Hill	1.75	2.16	2,285
	Blue Springs	.523	.620	203
	Clayton	.375	.743	950
	Clio	.400	.435	658
	Cowikee	.115	.156	693
	Elamville	.102	.146	250
	Eufaula	2.53	3.82	6,000
	Eufaula Youth Center	.032	.034	12
	Louisville	.252	.536	460
	Mt. Andrew	.050	.056	243
	West Barbour	.081	.142	460
				12,214
Coffee	Coffee County	.025	.104	165
	ConAgra Poultry	1.70	2.16	2
	Elba	.706	.857	1,959
	Enterprise	3.86	5.29	10,000
	Jack	.107	.127	345
	Kinston	.130	.158	727
	Mt. Pleasant-Batten	.062	.075	213
	New Brockton	.569	.766	981
	New Hope	.106	.141	474
	Tabernacle-Clintonville	.099	.129	352
	Wayne Farms	1.00	1.40	1
				15,219
Covington	Andalusia	2.16	2.89	4,750
	Covington County	.847	.982	2,872

	CRS Water, Inc	.172	.227	897
	Florala	.377	.455	1,095
	Gantt	.058	.093	230
	Heath	.035	.056	150
	Lockhart	.076	.088	249
	Opp	1.15	1.43	3,240
	Opp and Micolas Mills	.110	.288	2
	Red Level	.073	.093	291
	River Falls	.078	.104	300
	Sanford	.030	.047	118
				14,194
Dale				
	Ariton	.130	.178	400
	Dale County	.432	.571	1,957
	Daleville	.829	.990	2,500
	Fort Rucker	1.92	2.52	40
	Level Plains	.287	.375	963
	Midland City	.288	.560	870
	Napier Field	.133	.161	681
	Newton	.212	.233	717
	Ozark	2.29	2.98	6,299
	Pinckard	.099	.135	338
				14,765
Geneva				
	Bellwood	.029	.042	131
	Black	.024	.037	133
	Coffee Springs	.026	.030	156
	Geneva	.568	.645	1,957
	Hartford	.376	.547	1,230
	Malvern	.115	.146	400
	North Geneva County	.025	.032	132
	Samson	.328	.400	1,187
	Slocomb	.227	.269	1,180
				6,506
Henry				
	Abbeville	.845	1.10	1,518
	Headland	.483	.654	1,669
	Henry County	.740	1.13	2,445
	Newville	.103	.123	150
	Willis Cross Roads	.048	.072	150
				5,932

Houston				
	Ashford	.319	.381	950
	Avon	.047	.082	150
	Columbia	.094	.138	400
	Cottonwood	.280	.361	1,006
	Cowarts	.301	.386	624
	Dothan	13.6	18.8	28,300
	Gordon	.048	.056	185
	Houston County	.266	.337	1,056
	Kinsey	.177	.217	500
	Taylor	.528	.649	2,200
	Webb	.148	.192	494
				35,865

Source: Alabama Department of Environmental Management, 2003

Sewage Treatment Systems

Sewage treatment systems normally do not exist far outside the municipal limits of communities that have them. The following figures, in Table 69, identify the sewage treatment systems within the region:

TABLE 69
Southeast Alabama Sewage Treatment Systems

County	Municipality	Treatment Capacity Design Flow (MGD)	Current Daily Use (MGD)
Barbour	Eufaula	2.70	1.70
	Clio	.200	.240
	Clayton	.400	.291
	Louisville	.100	.041
Coffee	Enterprise	4.80	2.60
	Elba	.600	.289
	New Brockton	.176	.010
Covington	Opp	2.40	1.30
	Florala-Lockhart	.350	.291
	Andalusia	2.84	1.64
Dale	Ozark	2.60	1.97
	Daleville	.700	.368
	Newton	.025	.013
	Ariton	.100	.025

Geneva	Slocomb	.244	.120
	Samson	.500	.090
	Hartford	.500	.331
	Geneva	1.22	.398
Henry	Headland	.500	.417
	Abbeville	.750	.347
Houston	Dothan	21.14	11.05
	Cottonwood	.155	.175
	Columbia	.180	.125
	Ashford	.250	.281

Source: Alabama Department of Environmental Management, 2003

Solid Waste Disposal Systems

Southeast Alabama has 14 public state-permitted landfills and one (1) private state-permitted landfill. The 15 state permitted landfills in the districts are listed on Table __. Currently, there are two (2) permitted Municipal Solid Waste landfills in the district and 13 Construction/Demolition landfills. In addition, there are numerous recycling programs in several Southeast Alabama cities to reduce the amount of waste being deposited in landfills and consequently saving space.

TABLE 70
Permitted Landfills

Name	Type	County
Barbour County C/D Landfill	Construction/Demolition	Barbour
Coffee County Sanitary Landfill	Municipal Solid Waste	Coffee
Elba C/D Landfill	Construction/Demolition	Coffee
Lockhart C/D Landfill	Construction/Demolition	Covington
Andalusia C/D Landfill	Construction/Demolition	Covington
Opp C/D Landfill	Construction/Demolition	Covington
Little's Tire Reclamation and Disposal Center	Construction/Demolition	Covington
Dale County C/D Landfill	Construction/Demolition	Dale
Rose Hill Landfill	Construction/Demolition	Dale
Hartford Landfill	Construction/Demolition	Geneva
City of Geneva Landfill	Construction/Demolition	Geneva
Geneva County Landfill	Construction/Demolition	Geneva

Farley Nuclear Plant Landfill	Construction/Demolition	Houston
City of Dothan Sanitary Landfill	Municipal Solid Waste	Houston
Southeast Alabama Regional C/D Landfill	Construction/Demolition	Houston

Source: Alabama Department of Environmental Management, 2003

Zoning Controls

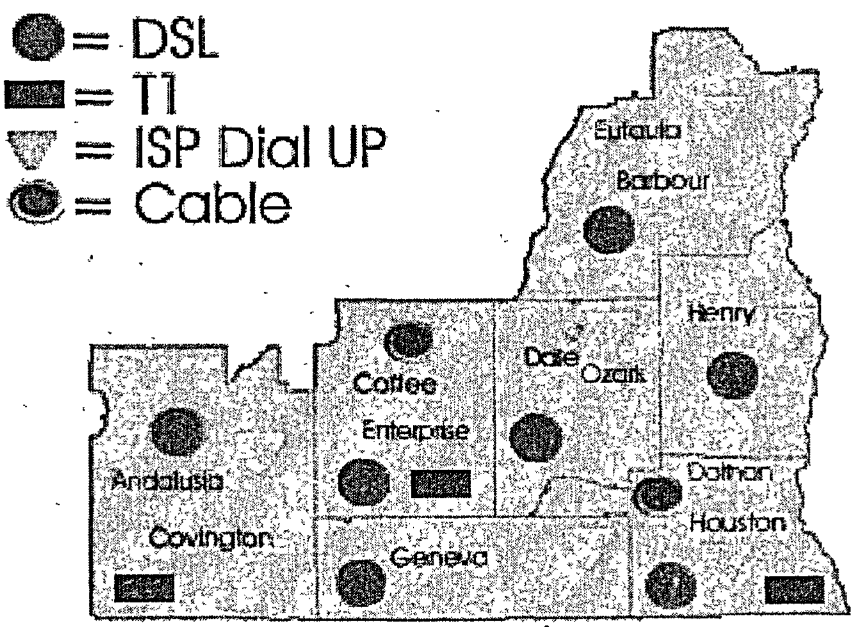
Zoning designates permissible land uses and restrictions within a defined area. Communities, through the adoption of specific ordinances and planning commissions, have limited control over what happens to their environment. This limited control can result in impacts that vary depending on how they use their planning and zoning powers. The majority of the larger communities have zoning ordinances. The counties and many of the smaller communities do not. A list of the municipalities in Southeast Alabama counties with zoning ordinances follows:

Barbour County -- Baker Hill, Clayton, Clio, Eufaula
Coffee County -- Enterprise, Elba, New Brockton
Covington County -- Florala, Andalusia, Opp
Dale County -- Ariton, Daleville, Newton, Ozark
Geneva County – Geneva, Hartford, Malvern, Samson, Slocomb
Henry County -- Abbeville, Headland
Houston County -- Ashford, Dothan, Kinsey, Rehobeth, Taylor, Webb

Telecommunications and Technology

In the last ten years technology and telecommunications have played a major role in the innovation of businesses. The availability of information to businesses allows them to operate more efficiently and productively. In most cases the technological capabilities of a business is the differentiator in this highly competitive market. As advances are made, people reach out to the internet to conduct research and access a large mass of information in a more timely manner. Currently there are approximately 352.1 million users on the internet world wide, approximately 135.7 million of those users are right here in the United States. To keep up with the need of prospective businesses in Southeast Alabama, the region is making strides to stay competitive in the continuously evolving technology and telecommunications market. It has been related that areas that do not make information available via the internet are often left out of consideration when companies are researching where to place their business. Southeast Alabama has information sources such as www.southeastalabama.com to help in the research process.

Each county in the region has services available (as illustrated on the map below). Countywide dial up connections to the internet are offered. Barbour, Coffee, Covington, Dale, Geneva, Henry, and Houston counties all offer access to high speed internet connections. However, in some counties the access is limited to certain areas. Potential customers may contact individual providers directly about available site-specific telecommunication services.



*Information for this diagram was obtained from an informal telephone poll and is intended only to give an illustration of services available in the region.

In this the technology age, computers and networks are quickly becoming commodities to growing businesses across the world. To maintain competitiveness the region will need to expand available technologies to meet these needs. Southeast Alabama believes in continuing the advancement of technology resources in our area. Developers in the region are already implementing change and are working to offer more technologically advanced services. Some of the services that are currently available are; Dial up access, DSL, Broadband, Web hosting, data transmission systems, fiber optics and many others.

Below is a list of service providers in the Region. The list is not exhaustive, it is presented only to give an idea of the telecommunication infrastructure the region has to offer.

Long Distance Carriers

- Graceba Total Communications
- Deltacom
- AT&T
- Sprint
- CenturyTel

Wireless Communications

- Verizon Wireless
- Alltel
- Nextel
- Southern Linc
- Sprint
- AT&T

Internet Service Providers

- Alanet
- Cybersouth
- Alaweb
- Deltacom
- Comcast
- Bellsouth
- Mindspring

BUSINESS DEVELOPMENT ASSISTANCE FINANCING PROGRAMS AT THE SOUTHEAST ALABAMA REGIONAL PLANNING & DEVELOPMENT COMMISSION

Revolving Loan Fund (RLF):

Small business development is an important economic development initiative of the Southeast Alabama Development District. The Southeast Alabama Regional Planning & Development Commission was instrumental in the establishment of Revolving Loan Fund (RLF) programs not only in Southeast Alabama but in other regional commissions in the entire state of Alabama. The SEARP&DC RLF is the leading RLF in Alabama in terms of the number of loans and jobs created. This resource is available to any qualified small business entity located in the Southeast Alabama Regional Planning & Development Commission service area consisting of Barbour, Coffee, Covington, Dale, Geneva, Henry and Houston counties.

The RLF is a locally controlled source of business capital that can be used by small businesses to finance start-up or expansions that will leverage private and borrower investment and create or retain permanent jobs within the region. The SEARPDC RLF was capitalized through Economic Development Administration (EDA) and state of Alabama seed capital. As borrowers repay their loans, principal and interest "revolves" back into the lending pool and is used to fund additional small business loans creating more investment and employment opportunities. Targeted businesses for RLF financing are: small manufacturing, manufacturing related services and new technologies that have a uniqueness that will add value to the regional economy. Other types of businesses may be eligible that can demonstrate the ability to help a community's development potential. Generally, retail businesses are not eligible. RLF funds may be used for a variety of purposes including the purchase, construction or renovation of land or buildings, purchase of machinery and equipment or inventory or provide for permanent working capital. Loan terms are available to match the source and use of funds of the project normally up to 15 years on fixed assets and 5 years on working capital. Interest rates are generally below prime and can be fixed for the term of the loan. RLF funds are not intended to fund an entire project but are used to fill in "financing gaps" that may exist in a projects financial structure. Applicants must provide a minimum of 10 to 25 percent of the project cost in cash equity. RLF loans are capped at $125,000 or one-third of the total project cost.

Microloan Program:

The microloan program is available through the Southeast Alabama Regional Planning & Development Commission and is designed to provide a direct source of capital to smaller entrepreneurial projects located in rural areas of the Southeast Alabama district. This program, funded through the U.S. Department of Agriculture/Rural Development, provides assistance under the Microenterprise (MicroE) and Microcapital (MicroC) funds are available depending on project needs. The MicroE program funds direct loans from $4,000 to $7,500. The Micro E with loans to $10,000 is a gap financing program for projects up to $30,000 in which a private lender participates. Both the MicroE and MicroC programs require owner's equity as part of the financing structure. As with the

RLF program, as borrowers repay their loans principal and interest are returned to fund additional loans thus helping to create more investment and jobs.

Intermediary Relending Program (IRP):

The Intermediary Relending Program (IRP) is another capital resource available for small rural business financing that can be accessed by regional businesses. The IRP is however a more conservative fund and requires that all loans be secured by acceptable real estate. Loans are available up to $150,000 on extended terms. Interest rates are typically at or below prime. Eligible uses of funds include purchase, construction or renovation of buildings, purchase of land, purchase of machinery and equipment or inventory. Projects must create or retain rural jobs and leverage private investment and borrower equity.

For more information on these programs, contact the Southeast Alabama Regional Planning & Development Commission, P.O. Box 1406, Dothan, AL 36302 or send email to economic@sanman.net.

CRIME

In October 1975, Act 872 passed both houses of the Alabama Legislature creating and establishing the Alabama Criminal Justice Information Center (ACJIC) which is commissioned to collect, store, retrieve analyze and disseminate criminal justice data. The Uniform Crime Reporting (UCR) Division utilizes data collected from local law enforcement agencies to provide a comprehensive picture of crime in the state. Crime rates are dependent upon the cities and counties accurately reporting the number of crimes committed. Therefore, there is really no way to determine if the number of crimes reported to the ACJIC is completely accurate.

Crime rates in the southeast Alabama region are low compared to the state and nation. The one problem area is Houston County, which is much higher in both violent and property crimes than the other counties in the district. This may be a barrier to the region since Houston County is the highest populated county with Dothan, located in Houston County, being the highest populated city in the region. The crime rate in Houston dropped from 1999 to 2000; however, rose slightly during 2001. Coffee and Covington Counties also reported a drop in crime rates from 1999 to 2000. However, Dale was the only county in the district to report a drop from 2000 to 2001 going from 1,268 to 1,207. Table 71 contains the number of violent and property crimes that were reported for the district counties from 1999 to 2001. ACJIC classifies homicide, rape, robbery and assault as violent crimes whereas burglary, larceny and auto theft are classified as property crimes.

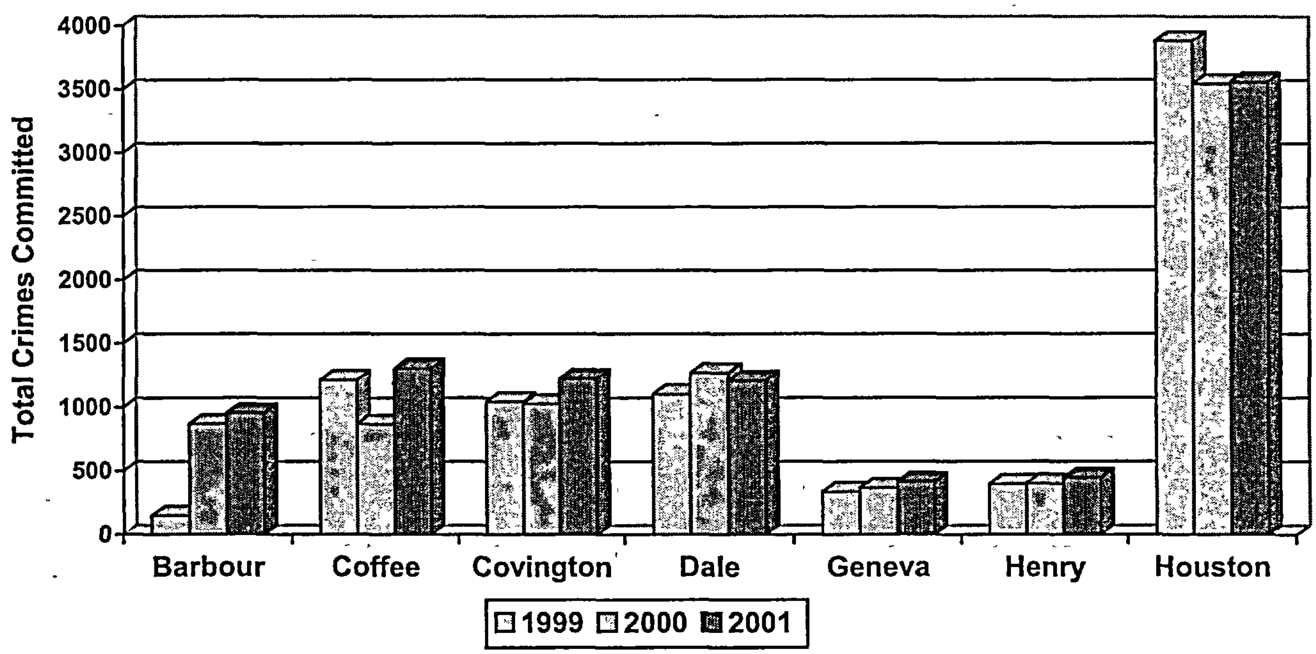
TABLE 71
CRIME RATES FOR THE DISTRICT COUNTIES 1999-2001

	1999		2000		2001	
	Violent	Property	Violent	Property	Violent	Property
Barbour County	21	129	110	758	96	860
Coffee County	90	1,123	109	756	117	1,187
Covington County	186	858	87	940	115	1,109
Dale County	178	924	206	1,062	134	1,073
Geneva County	47	291	61	306	71	345
Henry County	46	352	56	345	55	392
Houston County	398	3,483	357	3,186	228	3,331

Source: Alabama Criminal Justice Information Center, Crime in Alabama

FIGURE 33

TOTAL CRIME RATES FOR THE DISTRICT COUNTIES 1999-2001

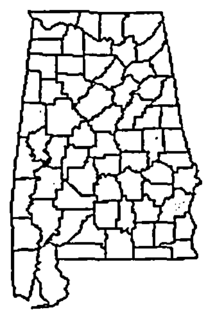


Health Care Statistics

Healthcare in the district is considered to be one of the economic strengths of the area. Dothan is considered to be a healthcare "hub" with state of the art facilities and a community of skilled physicians and specialists. The district has seen an increase in the number of physicians and medical facilities in the past decade.

The following profiles of each county in the district depict basic healthcare statistics in each county as of 2001.

BARBOUR



2001 Health Profile of Barbour County

2001 Population	
Total	29,326
White	14,926
Black & Other	14,400
Median Age	36.1
Marriages	242
Rate [1]	8.3
Divorces	148
Rate [1]	5.0
Life Expectancy at Birth	72.8
Total Fertility Rate Per 1,000 Women 10-49	2396.3

[1] Per 1,000 population

BIRTHS BY AGE OF MOTHER

	Total	10-14	15-17	18-19	20-44
All Births	409	0	37	57	315
Rate [2, 3]	74.7	0.0	59.5	137.3	58.1
White	191	0	6	18	167
Rate [2, 3]	74.8	0.0	22.6	101.7	63.7
Black &	218	0	31	39	148
Other Rate [2, 3]	74.6	0.0	87.1	163.9	52.9

Selected Notifiable Diseases	New Cases
AIDS	3
Syphilis	6
Gonorrhea	66
Chlamydia	116
Tuberculosis	2

Source: Center for Health Statistical Analysis Division, 2003

NATALITY				
	All Women		Women 10-19	
	Total	*Rate*	*10-19*	*Rate* [3]
Est. Pregnancies	565	103.2 [2]	128	60.8
Births	409	13.9 [1]	94	44.7
Abortions	67	12.2 [2]	14	6.7
Est. Fetal Losses	89	-	20	-
	Total	*Pct* [4]	*10-19*	*Pct* [5]
Births to Unmarried Women	208	50.9	76	80.9
Low Weight Births	35	8.6	8	8.5
Multiple Births	9	2.2	0	0.0
Medicaid Births	218	53.3	80	85.1

2 Total Rate per 1,000 females 15-44. Rate for Total is the General Fertility Rate.
3 Age-specific rate per 1,000 females in age group.
4 Percent of total births.
5 Percent of all teen births.

2001 Population Projections by Age Group, Race and Sex									
	Total			*White*			*Black & Other*		
Age	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	29,326	15,198	14,128	14,926	7,774	7,152	14,400	7,424	6,976
0-4	1,797	934	863	749	408	341	1,048	526	522
5-9	2,007	1,048	959	839	456	383	1,168	592	576
10-14	2,155	1,087	1,068	910	453	457	1,245	634	611
15-44	12,726	7,249	5,477	5,933	3,379	2,554	6,793	3,870	2,923
45-64	6,754	3,386	3,368	4,020	2,065	1,955	2,734	1,321	1,413
65-84	3,373	1,370	2,003	2,196	954	1,242	1,177	416	761
85+	514	124	390	279	59	220	235	65	170

MORTALITY									
	Total	Male	Female	White	White Male	White Female	Black & Other	Black & Other Male	Black & Other Female
Deaths	330	151	179	193	92	101	137	59	78
Death Rate [1]	11.3	9.9	12.7	12.9	11.8	14.1	9.5	7.9	11.2
Selected Deaths	Total	Total Rate [6]	Male	Female	White	Black &			

						Other			
Heart Disease	91	310.3	39	52	53	38			
Cancer	86	293.3	42	44	49	37			
Stroke	24	81.8	11	13	12	12			
Accidents	19	64.8	12	7	9	10			
Chronic Lower Resp. Dis.	14	47.7	8	6	10	4			
Diabetes	3	10.2	3	0	3	0			
Influenza & Pneumonia	9	30.7	3	6	6	3			
Alzheimer's	9	30.7	4	5	7	2			
Suicide	3	10.2	3	0	3	0			
Homicide	5	17.0	4	1	1	4			
HIV	2	6.8	0	2	1	1			

6 Per 1,000 population.

Source: Center for Health Statistical Analysis Division, 2003

DEATHS BY AGE GROUP		
Age Group	Total	Rate [1]
Total	330	11.3
0-14	2	0.3
15-44	28	2.2
45-64	75	11.1
65-84	151	44.8
85+	74	144.0*

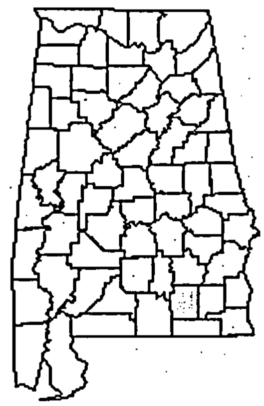
1 Per 1,000 population

Accidental Deaths				
	Total	**Rate [6]**	**Children Under 20**	**Rate [6]**
All Accidents	19	64.8	1	12.3
Motor Vehicle	7	23.9	1	12.3
Suffocation	1	3.4	0	0.0
Poisoning	2	6.8	0	0.0
Smoke, Fire & Flames	1	3.4	0	0.0
Falls	2	6.8	0	0.0
Drowning	1	3.4	0	0.0
Firearms	0	0.0	0	0.0
Other Accidents	5	17.0	0	0.0

6 Per 100,000 population

Source: Center for Health Statistical Analysis Division, 2003

COFFEE



2001 Health Profile of Coffee County

2001 Population	
Total	43,911
White	33,653
Black & Other	10,258
Median Age	37.5
Marriages	523
Rate [1]	11.9
Divorces	246
Rate [1]	5.6
Life Expectancy at Birth	75.7
Total Fertility Rate Per 1,000 Women 10-49	1760.1

[1] Per 1,000 population

BIRTHS BY AGE OF MOTHER

	Total	10-14	15-17	18-19	20-44
All Births	489	0	30	64	395
Rate [2, 3]	55.0	0.0	32.2	103.2	44.0
White	371	0	18	43	310
Rate [2, 3]	56.6	0.0	27.2	97.7	46.3
Black &	118	0	12	21	85
Other Rate [2, 3]	50.4	0.0	44.3	116.7	37.2

Selected Notifiable Diseases	New Cases
AIDS	2
Syphilis	1
Gonorrhea	84
Chlamydia	146
Tuberculosis	4

Source: Center for Health Statistics, Statistical Analysis Division, 2003

NATALITY				
	All Women		Women 10-19	
	Total	*Rate*	*10-19*	*Rate* [3]
Est. Pregnancies	668	75.1 [2]	138	45.0
Births	489	11.1 [1]	94	30.6
Abortions	74	8.3 [2]	23	7.5
Est. Fetal Losses	105	-	21	-
	Total	*Pct* [4]	*10-19*	*Pct* [5]
Births to Unmarried Women	136	27.8	53	56.4
Low Weight Births	39	8.0	9	9.6
Multiple Births	15	3.1	2	2.1
Medicaid Births	219	44.8	72	76.6

2 Total Rate per 1,000 females 15-44. Rate for Total is the General Fertility Rate.
3 Age-specific rate per 1,000 females in age group.
4 Percent of total births.
5 Percent of all teen births.

2001 Population Projections by Age Group, Race and Sex									
	Total			*White*			*Black & Other*		
Age	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	43,911	21,449	22,462	33,653	16,537	17,116	10,258	4,912	5,346
0-4	2,727	1,392	1,335	1,901	972	929	826	420	406
5-9	2,903	1,493	1,410	1,989	1,028	961	914	465	449
10-14	3,176	1,658	1,518	2,292	1,183	1,109	884	475	409
15-44	18,057	9,164	8,893	13,416	6,866	6,550	4,641	2,298	2,343
45-64	10,788	5,195	5,593	8,680	4,259	4,421	2,108	936	1,172
65-84	5,490	2,362	3,128	4,743	2,075	2,668	747	287	460
85+	770	185	585	632	154	478	138	31	107

MORTALITY									
	Total	Male	Female	White	White Male	White Female	Black & Other	Black & Other Male	Black & Other Female
Deaths	426	192	234	357	161	196	69	31	38
Death Rate [1]	9.7	9.0	10.4	10.6	9.7	11.5	6.7	6.3	7.1
Selected Deaths	Total	Total Rate [6]	Male	Female	White	Black & Other			
Heart Disease	128	291.5	56	72	106	22			
Cancer	104	236.8	44	60	88	16			
Stroke	32	72.9	17	15	27	5			
Accidents	20	45.5	11	9	18	2			
Chronic Lower Resp. Dis.	27	61.5	11	16	25	2			
Diabetes	8	18.2	4	4	4	4			
Influenza &	9	20.5	5	4	9	0			

Pneumonia									
Alzheimer's	19	43.3	5	14	16	3			
Suicide	7	15.9	7	0	7	0			
Homicide	1	2.3	0	1	1	0			
HIV	1	2.3	1	0	0	1			

6 Per 1,000 population.

Source: Center for Health Statistics, Statistical Analysis Division, 2003

DEATHS BY AGE GROUP		
Age Group	Total	Rate [1]
Total	426	9.7
0-14	1	0.1
15-44	29	1.6
45-64	63	5.8
65-84	210	38.3
85+	123	159.7*

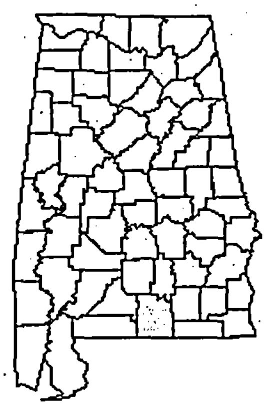
1 Per 1,000 population

Accidental Deaths				
	Total	**Rate [6]**	**Children Under 20**	**Rate [6]**
All Accidents	20	45.5	4	33.4
Motor Vehicle	8	18.2	4	33.4
Suffocation	3	6.8	0	0.0
Poisoning	1	2.3	0	0.0
Smoke, Fire & Flames	1	2.3	0	0.0
Falls	2	4.6	0	0.0
Drowning	0	0.0	0	0.0
Firearms	0	0.0	0	0.0
Other Accidents	5	11.4	0	0.0

6 Per 100,000 population

Source: Center for Health Statistics, Statistical Analysis Division, 2003

COVINGTON



2001 Health Profile of Covington County

2001 Population	
Total	37,694
White	32,474
Black & Other	5,220
Median Age	40.2
Marriages	480
Rate [1]	12.7
Divorces	117
Rate [1]	3.1
Life Expectancy at Birth	73.6
Total Fertility Rate Per 1,000 Women 10-49	1999.9

[1] Per 1,000 population

BIRTHS BY AGE OF MOTHER

	Total	10-14	15-17	18-19	20-44
All Births Rate [2, 3]	442 61.5	0 0.0	20 26.1	62 121.1	360 49.6
White Rate [2, 3]	356 59.0	0 0.0	15 23.8	52 123.8	289 47.1
Black & Other Rate [2, 3]	86 74.3	0 0.0	5 36.2	10 108.7	71 63.3

Selected Notifiable Diseases	New Cases
AIDS	2
Syphilis	1
Gonorrhea	54
Chlamydia	70
Tuberculosis	1

Source: Center for Health Statistics, Statistical Analysis Division, 2003

NATALITY				
	All Women		Women 10-19	
	Total	*Rate*	*10-19*	*Rate* [3]
Est. Pregnancies	566	78.7[2]	104	40.8
Births	442	11.7[1]	82	32.2
Abortions	32	4.5[2]	5	2.0
Est. Fetal Losses	92	-	17	-
	Total	*Pct* [4]	*10-19*	*Pct* [5]
Births to Unmarried Women	146	33.0	52	63.4
Low Weight Births	34	7.7	7	8.5
Multiple Births	12	2.7	2	2.4
Medicaid Births	254	57.5	74	90.2

2 Total Rate per 1,000 females 15-44. Rate for Total is the General Fertility Rate.
3 Age-specific rate per 1,000 females in age group.
4 Percent of total births.
5 Percent of all teen births.

2001 Population Projections by Age Group, Race and Sex									
	Total			*White*			*Black & Other*		
Age	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	37,694	18,038	19,656	32,474	15,652	16,822	5,220	2,386	2,834
0-4	2,234	1,146	1,088	1,773	921	852	461	225	236
5-9	2,415	1,238	1,177	1,946	1,003	943	469	235	234
10-14	2,585	1,317	1,268	2,150	1,092	1,058	435	225	210
15-44	14,335	7,146	7,189	12,191	6,159	6,032	2,144	987	1,157
45-64	9,351	4,492	4,859	8,265	4,016	4,249	1,086	476	610
65-84	5,875	2,472	3,403	5,327	2,261	3,066	548	211	337
85+	899	227	672	822	200	622	77	27	50

MORTALITY									
	Total	Male	Female	White	White Male	White Female	Black & Other	Black & Other Male	Black & Other Female
Deaths	488	230	258	444	206	238	44	24	20
Death Rate [1]	12.9	12.8	13.1	13.7	13.2	14.1	8.4	10.1	7.1
Selected Deaths	Total	Total Rate [6]	Male	Female	White	Black & Other			
Heart Disease	149	395.3	75	74	134	15			
Cancer	109	289.2	66	43	102	7			
Stroke	34	90.2	13	21	31	3			
Accidents	16	42.4	4	12	16	0			
Chronic Lower Resp. Dis.	27	71.6	14	13	27	0			
Diabetes	9	23.9	6	3	5	4			
Influenza & Pneumonia	18	47.8	9	9	17	1			

Alzheimer's	18	47.8	3	15	18	0			
Suicide	2	5.3	2	0	2	0			
Homicide	4	10.6	3	1	4	0			
HIV	1	2.7	1	0	1	0			

6 Per 1,000 population.

Source: Center for Health Statistics, Statistical Analysis Division, 2003

DEATHS BY AGE GROUP		
Age Group	**Total**	**Rate [1]**
Total	488	12.9
0-14	7	1.0
15-44	18	1.3
45-64	62	6.6
65-84	268	45.6
85+	133	147.9*

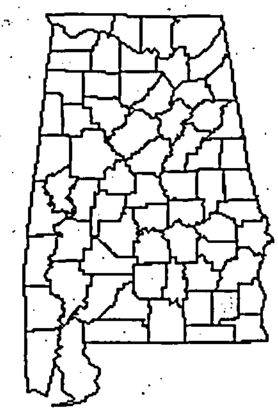
1 Per 1,000 population

Accidental Deaths				
	Total	**Rate [6]**	**Children Under 20**	**Rate [6]**
All Accidents	16	42.4	2	20.4
Motor Vehicle	5	13.3	1	10.2
Suffocation	1	2.7	0	0.0
Poisoning	1	2.7	0	0.0
Smoke, Fire & Flames	0	0.0	0	0.0
Falls	0	0.0	0	0.0
Drowning	0	0.0	0	0.0
Firearms	1	2.7	0	0.0
Other Accidents	8	21.2	1	10.2

6 Per 100,000 population

Source: Center for Health Statistics, Statistical Analysis Division, 2003

DALE



2001 Health Profile of Dale County

2001 Population	
Total	49,261
White	36,346
Black & Other	12,915
Median Age	34.6
Marriages	531
Rate [1]	10.8
Divorces	388
Rate [1]	7.9
Life Expectancy at Birth	74.9
Total Fertility Rate Per 1,000 Women 10-49	2230.5

[1] Per 1,000 population

BIRTHS BY AGE OF MOTHER

	Total	10-14	15-17	18-19	20-44
All Births	763	1	26	69	667
Rate [2,3]	72.0	0.6	24.6	97.9	63.6
White	587	0	17	44	526
Rate [2,3]	79.8	0.0	24.6	95.4	70.7
Black & Other	176	1	9	25	141
Rate [2,3]	54.5	1.8	24.6	102.5	46.2

Selected Notifiable Diseases	New Cases
AIDS	7
Syphilis	3
Gonorrhea	76
Chlamydia	138
Tuberculosis	2

Source: Center for Health Statistics, Statistical Analysis Division, 2003

NATALITY				
	All Women		Women 10-19	
	Total	*Rate*	*10-19*	*Rate* [3]
Est. Pregnancies	1,007	95.1[2]	133	39.0
Births	763	15.5[1]	96	28.1
Abortions	83	7.8[2]	16	4.7
Est. Fetal Losses	161	-	21	-
	Total	*Pct* [4]	*10-19*	*Pct* [5]
Births to Unmarried Women	191	25.0	63	65.6
Low Weight Births	51	6.7	16	16.7
Multiple Births	15	2.0	4	4.2
Medicaid Births	295	38.7	78	81.3

2 Total Rate per 1,000 females 15-44. Rate for Total is the General Fertility Rate.
3 Age-specific rate per 1,000 females in age group.
4 Percent of total births.
5 Percent of all teen births.

2001 Population Projections by Age Group, Race and Sex									
	Total			*White*			*Black & Other*		
Age	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	49,261	24,408	24,853	36,346	18,319	18,027	12,915	6,089	6,826
0-4	3,670	1,871	1,799	2,393	1,224	1,169	1,277	647	630
5-9	3,667	1,955	1,712	2,389	1,273	1,116	1,278	682	596
10-14	3,479	1,830	1,649	2,295	1,215	1,080	1,184	615	569
15-44	21,533	10,942	10,591	15,445	8,086	7,359	6,088	2,856	3,232
45-64	10,964	5,328	5,636	8,776	4,336	4,440	2,188	992	1,196
65-84	5,280	2,324	2,956	4,509	2,051	2,458	771	273	498
85+	668	158	510	539	134	405	129	24	105

MORTALITY									
	Total	Male	Female	White	White Male	White Female	Black & Other	Black & Other Male	Black & Other Female
Deaths	439	214	225	355	177	178	84	37	47
Death Rate [1]	8.9	8.8	9.1	9.8	9.7	9.9	6.5	6.1	6.9
Selected Deaths	Total	Total Rate [6]	Male	Female	White	Black & Other			
Heart Disease	143	290.3	62	81	124	19			
Cancer	109	221.3	59	50	88	21			
Stroke	23	58.9	14	15	28	1			
Accidents	22	44.7	13	9	15	7			
Chronic Lower Resp. Dis.	29	58.9	14	15	28	1			
Diabetes	14	28.4	7	7	9	5			
Influenza & Pneumonia	4	8.1	2	2	3	1			

Alzheimer's	8	16.2	3	5	4	4			
Suicide	5	10.2	4	1	3	2			
Homicide	2	4.1	1	1	1	1			
HIV	2	4.1	1	1	1	1			

6 Per 1,000 population.

Source: Center for Health Statistics, Statistical Analysis Division, 2003

DEATHS BY AGE GROUP		
Age Group	Total	Rate [1]
Total	439	8.9
0-14	2	0.2
15-44	27	1.3
45-64	103	9.4
65-84	213	40.3
85+	94	140.7*

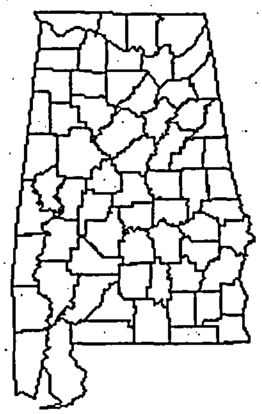
1 Per 1,000 population

Accidental Deaths				
	Total	**Rate [6]**	**Children Under 20**	**Rate [6]**
All Accidents	22	44.7	6	41.7
Motor Vehicle	12	24.4	4	27.8
Suffocation	1	2.0	0	0.0
Poisoning	4	8.1	0	0.0
Smoke, Fire & Flames	0	0.0	0	0.0
Falls	0	0.0	0	0.0
Drowning	0	0.0	0	0.0
Firearms	1	2.0	1	6.9
Other Accidents	4	8.1	1	6.9

6 Per 100,000 population

Source: Center for Health Statistics, Statistical Analysis Division, 2003

GENEVA



2001 Health Profile of Geneva County

2001 Population	
Total	25,944
White	22,590
Black & Other	3,354
Median Age	39.6
Marriages	261
Rate [1]	10.1
Divorces	83
Rate [1]	3.2
Life Expectancy at Birth	73.8
Total Fertility Rate Per 1,000 Women 10-49	2071.1

[1] Per 1,000 population

BIRTHS BY AGE OF MOTHER

	Total	10-14	15-17	18-19	20-44
All Births	308	0	17	39	252
Rate [2, 3]	61.8	0.0	32.9	113.0	49.8
White	270	0	17	33	220
Rate [2, 3]	63.7	0.0	39.3	114.2	50.7
Black &	38	0	0	6	32
Other Rate [2, 3]	50.9	0.0	0.0	107.1	44.6

Selected Notifiable Diseases	New Cases
AIDS	0
Syphilis	2
Gonorrhea	19
Chlamydia	38
Tuberculosis	2

Source: Center for Health Statistics, Statistical Analysis Division, 2003

NATALITY				
	All Women		Women 10-19	
	Total	*Rate*	*10-19*	*Rate* [3]
Est. Pregnancies	386	77.5[2]	68	38.7
Births	308	11.9[1]	56	31.9
Abortions	15	3.0[2]	1	0.6
Est. Fetal Losses	63	-	11	-
	Total	*Pct* [4]	*10-19*	*Pct* [5]
Births to Unmarried Women	66	21.4	21	37.5
Low Weight Births	24	7.8	6	10.7
Multiple Births	6	1.9	2	3.6
Medicaid Births	159	51.6	48	85.7

2 Total Rate per 1,000 females 15-44. Rate for Total is the General Fertility Rate.
3 Age-specific rate per 1,000 females in age group.
4 Percent of total births.
5 Percent of all teen births.

2001 Population Projections by Age Group, Race and Sex									
	Total			*White*			*Black & Other*		
Age	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	25,944	12,627	13,317	22,590	11,026	11,564	3,354	1,601	1,753
0-4	1,450	746	704	1,217	630	587	233	116	117
5-9	1,630	869	761	1,346	719	627	284	150	134
10-14	1,909	1,015	894	1,573	829	744	336	186	150
15-44	10,026	5,043	4,938	8,571	4,335	4,236	1,455	708	747
45-64	6,679	3,235	3,444	5,998	2,929	3,069	681	306	375
65-84	3,694	1,590	2,104	3,384	1,470	1,914	310	120	190
85+	556	129	427	501	114	387	55	15	40

MORTALITY									
	Total	Male	Female	White	White Male	White Female	Black & Other	Black & Other Male	Black & Other Female
Deaths	306	160	146	277	142	135	29	18	11
Death Rate [1]	11.8	12.7	11.0	12.3	12.9	11.7	8.6	11.2	6.3
Selected Deaths	Total	Total Rate [6]	Male	Female	White	Black & Other			
Heart Disease	88	339.2	38	50	80	8			
Cancer	58	223.6	36	22	52	6			
Stroke	18	69.4	9	9	16	2			
Accidents	16	61.7	9	7	14	2			
Chronic Lower Resp. Dis.	19	73.2	14	5	18	1			
Diabetes	8	30.8	6	2	8	0			
Influenza & Pneumonia	2	7.7	1	1	2	0			

Alzheimer's	15	57.8	7	8	14	1			
Suicide	8	30.8	7	1	7	1			
Homicide	2	7.7	1	1	2	0			
HIV	3	11.6	3	0	2	1			

6 Per 1,000 population. Source: Center for Health Statistics, Statistical Analysis Division, 2003

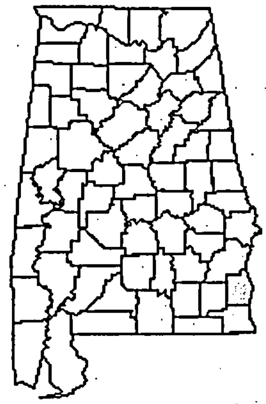
DEATHS BY AGE GROUP		
Age Group	Total	Rate [1]
Total	306	11.8
0-14	5	1.0
15-44	13	1.3
45-64	70	10.5
65-84	123	333.3
85+	95	170.9*

1 Per 1,000 population

Accidental Deaths				
	Total	**Rate [6]**	**Children Under 20**	**Rate [6]**
All Accidents	16	61.7	1	14.7
Motor Vehicle	5	19.3	0	0.0
Suffocation	0	0.0	0	0.0
Poisoning	2	7.7	0	0.0
Smoke, Fire & Flames	2	7.7	0	0.0
Falls	0	0.0	0	0.0
Drowning	0	0.0	0	0.0
Firearms	1	3.9	0	0.0
Other Accidents	6	23.1	1	14.7

6 Per 100,000 population Source: Center for Health Statistics, Statistical Analysis Division, 2003

HENRY



2001 Health Profile of Henry County

2001 Population	
Total	16,381
White	10,780
Black & Other	5,601
Median Age	39.5
Marriages	148
Rate [1]	9.0
Divorces	75
Rate [1]	4.6
Life Expectancy at Birth	74.9
Total Fertility Rate Per 1,000 Women 10-49	2066.3

[1] Per 1,000 population

BIRTHS BY AGE OF MOTHER

	Total	10-14	15-17	18-19	20-44
All Births	203	1	11	15	176
Rate [2, 3]	64.4	1.8	32.7	67.0	54.4
White	128	1	2	9	116
Rate [2, 3]	67.0	3.3	10.9	73.8	57.4
Black & Other	75	0	9	6	60
Rate [2, 3]	60.4	0.0	59.2	58.8	49.3

Selected Notifiable Diseases	New Cases
AIDS	1
Syphilis	1
Gonorrhea	27
Chlamydia	33
Tuberculosis	0

Source: Center for Health Statistics, Statistical Analysis Division, 2003

NATALITY				
	All Women		Women 10-19	
	Total	*Rate*	*10-19*	*Rate* [3]
Est. Pregnancies	273	86.6[2]	38	34.4
Births	203	12.4[1]	27	24.4
Abortions	27	8.6[2]	5	4.5
Est. Fetal Losses	43	-	6	-
	Total	*Pct* [4]	*10-19*	*Pct* [5]
Births to Unmarried Women	80	39.4	20	74.1*
Low Weight Births	20	9.9	4	14.8*
Multiple Births	6	3.0	0	0.0
Medicaid Births	93	45.8	25	92.6*

[2] Total Rate per 1,000 females 15-44. Rate for Total is the General Fertility Rate.
3 Age-specific rate per 1,000 females in age group.
4 Percent of total births.
5 Percent of all teen births.

2001 Population Projections by Age Group, Race and Sex									
	Total			*White*			*Black & Other*		
Age	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	16,381	7,791	8,590	10,780	5,246	5,534	5,601	2,545	3,056
0-4	1,020	539	481	621	339	282	399	200	199
5-9	1,056	522	534	591	304	287	465	218	247
10-14	1,103	557	546	620	315	305	483	242	241
15-44	6,255	3,104	3,151	3,930	2,020	1,910	2,325	1,084	1,241
45-64	4,269	2,028	2,241	3,015	1,456	1,559	1,254	572	682
65-84	2,297	944	1,353	1,725	739	986	572	205	367
85+	381	97	284	278	73	205	103	24	79

MORTALITY									
	Total	Male	Female	White	White Male	White Female	Black & Other	Black & Other Male	Black & Other Female
Deaths	215	105	110	159	77	82	56	28	28
Death Rate [1]	13.1	13.5	12.8	14.7	14.7	14.8	10.0	11.0	9.2
Selected Deaths	Total	Total Rate [6]	Male	Female	White	Black & Other			
Heart Disease	71	433.4	36	35	50	21			
Cancer	43	262.5	27	16	31	12			
Stroke	22	134.3	9	13	17	5			
Accidents	4	24.4	3	1	3	1			
Chronic Lower Resp. Dis.	12	73.3	6	6	11	1			
Diabetes	4	24.4	0	4	2	2			
Influenza & Pneumonia	3	18.3	1	2	2	1			

Alzheimer's	3	18.3	1	2	3	0			
Suicide	1	6.1	1	0	1	0			
Homicide	1	6.1	1	0	1	0			
HIV	0	0.0	0	0	0	0			

6 Per 1,000 population.

Source: Center for Health Statistics, Statistical Analysis Division, 2003

DEATHS BY AGE GROUP		
Age Group	Total	Rate [1]
Total	215	13.1
0-14	1	0.3
15-44	9	1.4
45-64	41	9.6
65-84	98	42.7
85+	66	173.2*

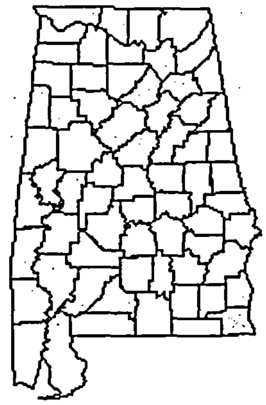
1 Per 1,000 population

Accidental Deaths				
	Total	**Rate [6]**	**Children Under 20**	**Rate [6]**
All Accidents	4	24.4	0	0.0
Motor Vehicle	3	18.3	0	0.0
Suffocation	0	0.0	0	0.0
Poisoning	0	0.0	0	0.0
Smoke, Fire & Flames	0	0.0	0	0.0
Falls	1	6.1	0	0.0
Drowning	0	0.0	0	0.0
Firearms	0	0.0	0	0.0
Other Accidents	0	0.0	0	0.0

6 Per 100,000 population

Source: Center for Health Statistics, Statistical Analysis Division, 2003

HOUSTON



2001 Health Profile of Houston County

2001 Population	
Total	89,362
White	65,043
Black & Other	24,319
Median Age	37.0
Marriages	896
Rate [1]	10.0
Divorces	687
Rate [1]	7.7
Life Expectancy at Birth	76.0
Total Fertility Rate Per 1,000 Women 10-49	2067.3

[1] Per 1,000 population

BIRTHS BY AGE OF MOTHER

	Total	10-14	15-17	18-19	20-44
All Births Rate [2,3]	1,218 64.1	6 1.9	49 26.5	124 100.4	1,039 53.7
White Rate [2,3]	789 60.6	1 0.5	21 17.1	67 81.9	700 51.7
Black & Other Rate [2,3]	429 72.0	5 4.6	28 44.8	57 136.7	339 58.2

Selected Notifiable Diseases	New Cases
AIDS	8
Syphilis	11
Gonorrhea	213
Chlamydia	287
Tuberculosis	1

Source: Center for Health Statistics, Statistical Analysis Division, 2003

NATALITY				
	All Women		Women 10-19	
	Total	*Rate*	*10-19*	*Rate* [3]
Est. Pregnancies	1,633	86.0[2]	242	38.2
Births	1,218	13.6[1]	179	28.3
Abortions	156	8.2[2]	25	4.0
Est. Fetal Losses	259	-	38	-
	Total	*Pct* [4]	*10-19*	*Pct* [5]
Births to Unmarried Women	482	39.6	140	78.2
Low Weight Births	108	8.9	18	10.1
Multiple Births	36	3.0	2	1.1
Medicaid Births	584	47.9	156	87.2

2 Total Rate per 1,000 females 15-44. Rate for Total is the General Fertility Rate.
3 Age-specific rate per 1,000 females in age group.
4 Percent of total births.
5 Percent of all teen births.

2001 Population Projections by Age Group, Race and Sex									
	Total			*White*			*Black & Other*		
Age	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	89,362	42,438	46,924	65,043	31,210	33,833	24,319	11,228	13,091
0-4	6,047	3,090	2,957	3,886	1,996	1,890	2,161	1,094	1,067
5-9	6,268	3,195	3,073	4,037	2,065	1,972	2,231	1,130	1,101
10-14	6,641	3,401	3,240	4,381	2,236	2,145	2,260	1,165	1,095
15-44	36,675	17,688	18,987	25,776	12,749	13,027	10,899	4,939	5,960
45-64	21,428	10,215	11,213	16,806	8,133	8,673	4,622	2,082	2,540
65-84	10,769	4,451	6,318	8,883	3,711	5,172	1,886	740	1,146
85+	1,534	398	1,136	1,274	320	954	260	78	182

MORTALITY									
	Total	Male	Female	White	White Male	White Female	Black & Other	Black & Other Male	Black & Other Female
Deaths	879	436	443	693	339	354	186	97	89
Death Rate [1]	9.8	10.3	9.4	10.7	10.9	10.5	7.6	8.6	6.8
Selected Deaths	Total	Total Rate [6]	Male	Female	White	Black & Other			
Heart Disease	263	294.3	132	131	223	40			
Cancer	189	211.5	106	83	144	45			
Stroke	54	60.4	15	39	40	14			
Accidents	39	43.6	25	14	30	9			
Chronic Lower Resp. Dis.	63	70.5	35	28	56	7			
Diabetes	10	11.2	5	5	3	7			
Influenza & Pneumonia	10	11.2	6	4	9	1			

Alzheimer's	38	42.5	7	31	31	7			
Suicide	9	10.1	9	0	8	1			
Homicide	3	3.4	3	0	1	2			
HIV	3	3.4	3	0	0	3			

6 Per 1,000 population.

Source: Center for Health Statistics, Statistical Analysis Division, 2003

DEATHS BY AGE GROUP		
Age Group	Total	Rate [1]
Total	879	9.8
0-14	9	0.5
15-44	55	1.5
45-64	167	7.8
65-84	398	37.0
85+	250	163.0

1 Per 1,000 population

Accidental Deaths				
	Total	Rate [6]	Children Under 20	Rate [6]
All Accidents	39	43.6	4	15.9
Motor Vehicle	22	24.6	3	11.9
Suffocation	4	4.5	0	0.0
Poisoning	2	2.2	0	0.0
Smoke, Fire & Flames	2	2.2	0	0.0
Falls	1	1.1	0	0.0
Drowning	2	2.2	0	0.0
Firearms	0	0.0	0	0.0
Other Accidents	6	6.7	1	4.0

6 Per 100,000 population

Source: Center for Health Statistics, Statistical Analysis Division, 2003

Table 72

Regional Hospitals in Southeast Alabama

County	*Hospital*	*Number of Licensed Beds*	*Address*	*Telephone*
Barbour	Lakeview Community Hospital	74	820 W. Washington St. Eufaula, AL 36027	(334) 687-5761
Coffee	Medical Center Enterprise	135	400 N. Edwards St. Enterprise, AL 36330	(334) 347-0584
Coffee	Elba General	20	987 Drayton St. Elba, AL 36323	(334) 897-2257
Covington	Florala Memorial	23	515 E. 5th Ave. Florala, AL 36442	(334) 858-3287
Covington	Mizell Memorial	99	702 Main St. Opp, AL. 36467	(334) 493-3541
Covington	Andalusia Regional Medical Center	101	849 S. Three Notch St. Andalusia, AL 36420	(334) 222-8466
Dale	Dale Medical Center	99	100 Hospital Ave. Ozark, AL 36360	(334) 774-2601
Dale	U.S. Army Aeromedical Center	100	Building 301 Fort Rucker, AL 36362	(334) 255-7359
Geneva	Wiregrass Medical Center	83	1200 W. Maple Ave. Geneva, AL 36340	(334) 684-3655
Houston	S.E. Alabama Medical Center	400	1108 Ross Clark Circle Dothan, AL 36301	(334) 793-8111
Houston	Flowers Hospital	235	4370 W. Main St. Dothan, AL 36303	(334) 793-5000
Houston	HealthSouth Rehab Hospital	34	1736 E. Main St. Dothan, AL 36301	(334) 712-6333

Source: SEARP&DC, 2003

Table 73
Regional Patients by Location

County	Total Patients Seen	Residents Seen in County	Patients Seen Outside County	Outside County Residents Seen	Outside Alabama Patients Seen
Barbour	308	122	186	12	18
Coffee	680	376	304	134	1
Covington	665	490	175	84	28
Dale	598	186	412	44	5
Geneva	428	158	270	11	58
Henry					
Houston	1148	1071	77	1229	528

Source: Alabama Health Planning and Development Agency, 2003

Table 74

Rural Health Clinics

County	Name	Address	Telephone	Ownership	FAC ID	License	Medicare
Barbour	Louisville Clinic	31 Railroad St. Louisville, AL. 36048	(334) 266-5383	Non-Profit Corp.	B0302	Not Subject to Licensure	01-3414
Covington	Covington Pediatics Rural Health Care	109 Medical Park Dr. Suite A Andalusia, AL 36420	(334) 222-0119	Individual	B2004	Not Subject to Licensure	01-3884
Covington	Three Notch Medical Center, P.C.	835 Three Notch St. Andalusia, AL 36420	(334) 222-8421	Corporation	B2003	Not Subject to Licensure	01-3876

Source: Alabama Department of Public Health, Provider Services Directory, 2003

Table 75

Nursing Home Statistics, 2002

	Beds	*Occupancy Rate*
Barbour County	180	87.0%
Crowne Health Care		
Coffee County		
Enterprise Nursing Home	257	90.1%
Elba Nursing Home	111	80.5%
Covington County		
Andalusia Manor	112	99.0%
Opp Nursing Facility	197	99.0%
Andalusia Health Care	42	97.6%
Dale County		
Ozark Nursing Facility	149	97.8%
Oakview Manor	138	98.3%
Geneva County		
Wiregrass Nursing Home	96	93.6%
Hartford Health Care	86	92.5%
Henry County		
Henry County Nursing Home	129	99.6%
Houston County		
Extendicare	170	87.95%
Westside Terrace	165	94.2%
Wesley Manor	166	95.4%

Source: Alabama Nursing Home Assn. 2003

Table 76

TYPES OF PAYMENTS

	Private Pay %	Medicare	Medicaid	Workmen's Compensation	Blue Cross
Barbour					
Crowne Health	7.8	72.2	18.4		0.4
Coffee					
Enterprise	5.1	84.6	10.2		
Elba	4.0	57.6	38.4		
Covington					
Andalusia	2.2	74.3	21.3		
Opp	5.0	71.5	23.4		
Andalusia	8.0	50.7	37.3		
Dale					
Ozark	10.1	75.6	14.3		
Oak View	8.5	74.9	16.2		
Geneva					
Wiregrass	0.4	6.4	3.2		
Hartford	3.1	82.5	6.2		
Henry					Other Gov't
Henry Co.	23.2	58.4	14.4	0.8	3.2
Houston					
Extendicare	4.4	76.9	6.9		Other 11.9
Westside	4.4	82.5	10.6	0.2	0.2
Wesley Manor	48.5	39.7	11.8		

Source: Alabama Nursing Home Assn. 2003

Table 77

NUMBER OF HOME HEALTH VISITS AND PERSONS SERVED, 2000

	Visits	Clients
Barbour County	**24,235**	**461**
Coffee County	**17,357**	**365**
Covington County	**57,916**	**1,146**
Dale County	**13,302**	**350**
Geneva County	**14,754**	**330**
Henry County		
Houston County	**126,956**	**3,075**

Source: Alabama Department of Public Health, 2003

Table 78

ASSISTED LIVING FACILITIES

County	Name	Address	Telephone	Type	Owner/ Admin.	FAC ID	License #
Barbour	The Gardens of Eufaula	395 Lake Dr. Eufaula, AL 36027	(334) 687-0430	16-Bed Group	LLC Tania Dollar	D0303	6675
Barbour	RiverOaks East	102 Riverside Dr. Eufaula, AL 36027	(334) 687-3089	14-Bed Group	Corporation Gail Hutchins	D0301	6676
Barbour	RiverOaks West	930 W. Union St. Eufaula, AL 36027	(334) 687-6089	16-Bed Group	Corporation Gail Hutchins	D0302	6677
Coffee	Taylor Mill Oaks	2805 Taylor Mill Rd. Elba, AL 36323	(334) 897-3776	16-Bed Group	Corporation Katrina H. Calhoun	D1603	7270
Coffee	Wynnwood Personal Care Inc. (I)	201 Wynn Road Enterprise, AL 36330	(334) 347-1555	16-Bed Group	Corporation Dwight L. Adams	D1601	7514
Coffee	Wynnwood Personal Care, Inc. (II)	203 Wynn Road Enterprise, AL 36330	(334) 347-1555	16-Bed Group	Corporation Dwight L. Adams	D1604	6694
Covington	Mason's Serenity House, Inc.	601 Henderson St. Andalusia, AL 36420	(334) 222-8745	21-Bed Congregate	Corporation Delores A. Gomez	D2001	7271
Covington	Savannah Terrace	660 Moore Rd Andalusia, AL 36420	(334) 427-3010	16-Bed Group	Corporation Sally Patton	D2002	6697
Covington	Savannah Terrace II	660 Moore Rd. Andalusia, AL 36420	(334) 222-0494	16-Bed Group	Corporation Sally Patton	D2003	6698
Covington	The Woodmoore	1709 N. Main St. Opp, AL 36467	(334) 493-2821	16-Bed Group	Individual Donna W. Mack	D2004	6699
Dale	Providence Home	101 Grimes Rd. Ozark, AL 36360	(334) 774-0364	16-Bed Group	Corporation Nikki Simmons	B2301	6704
Geneva	Greenwood Place	105 S. Greenwood Geneva, AL 36340	(334) 684-0549	16-Bed Group	Individual Jan P. Dixon	D3102	6722
Geneva	Hartford Retirement Village, Inc.	# 5 Hwy 52 E. Hartford, AL 36344	(334) 588-2306	32-Bed Congregate	Corporation Sandra K. Watson	D3101	6723
Geneva	Westbrook LLC	100 W. Lake Professional	(334) 684-1072	16-Bed Group	LLC Regina	D3103	6724

		Park Suite 6 Geneva, AL 36340			Harrison		
Henry	Azalea Court Assisted Living	508 E. Church St. Headland, AL 36345	(334) 693-0358	16-Bed Group	Healthcare Auth. Sherri Nowell	D3405	6725
Henry	Dogwood Manor	301 Ward Dr. Abbeville, AL 36310	(334) 585-1114	16-Bed Group	Healthcare Auth. Sherri Nowell	D3406	6726
Henry	Twin Magnolias	1100 U.S. 431 South Abbeville, AL 36310	(334) 585-1072	16-Bed Group	Corporation Darben Kirby	D3403	6727
Houston	Gran's Home I	460 S. Foster St. Dothan, AL 36301	(334) 792-9718	14-Bed Group	Corporation Shelly A. Harden	D3505	7527
Houston	Gran's Home II	428 S. Foster St. Dothan, AL 36301	(334) 671-9486	14-Bed Group	Corporation Shelly A. Harden	D3514	7276
Houston	Grubbs Extended Care	303 Pine St. Dothan, AL 36303	(334) 794-2628	7-Bed Group	Individual Robert E. Grubbs	D3506	7389
Houston	Harmonie House	980 S. St. Andrews St. Dothan, AL 36301	(334) 792-9200	16-Bed Group	Corporation Kim Whatley	D3502	6728
Houston	Live Oaks Manor	1282 S. Beverlye Rd. Dothan, AL 36301	(334) 792-4958	15-Bed Group	Corporation Martha King	D3510	6729
Houston	Queen's Care	113 Pettus St. Dothan, AL 36301	(334) 673-5636	3-Bed Family	Individual Queen Blade	D3516	6730
Houston	Somerset East	815 John D. Odom Rd. Dothan, AL 36303	(334) 671-1176	16-Bed Group	Corporation Gail Stephens	D3507	6731
Houston	Somerset West	815 John D. Odom Rd. Dothan, AL 36303	(334) 671-9990	16-Bed Group	Corporation Gail Stephens	D3504	6732
Houston	TLC Patient Care Home	1012 Shiver Rd. Dothan, AL 36301	(334) 702-7099	3-Bed Family	Individual Darlene Dean	D3517	6734
Houston	Terrace at Grove Park	101 Tulip Lane Dothan, AL 36305	(334) 792-7349	52-Bed Congregate	Corporation Tanya Meadows	D3515	7390
Houston	Wesley Manor	718 Honeysuckle Rd. Dothan, AL 36305	(334) 792-0921	82-Bed Congregate	Non-Profit Corp. Lance H. Junkin	D3501	6733

Source: Alabama Dept. of Public Health, Provider Services Directory, 2003

Table 79

NURSING HOMES

County	Facility	Administrator	Director of Nursing	Owner	Special Care Unit?
Barbour	CrowneHealth Care 430 Rivers Ave Eufaula, AL 36027 (334) 687-6627 Fax: 687-7538 Email:	Kristie Gilmore	Cindy Bush	Crowne Investments, Inc.	No
Coffee	Elba General Hospital & Nursing Home 987 Drayton St. Elba, AL 36323 (334) 897-2257 Fax: 897-3959 Email:	Ellen Briley	Marie Lepore	Elba General Hospital & Nursing Home	No
Coffee	Enterprise Nursing Home 300 Plaza Dr. Enterprise, AL 36330 (334) 347-9541 Fax: 347-5070 Email:	Barbara Stinson	Mary Cooper	City of Enterprise	No
Covington	Andalusia Health Care 200 Hillcrest Dr. Andalusia, AL 36420 (334) 222-2101 Fax: 222-5653 Email: ahc@alaweb.com	Merle Neese	Trece Jones	Sheila Sasser	No
Covington	Andalusia Manor 670 Moore Rd. Andalusia, AL 36420 (334) 222-4544 Fax: 222-4737 Email:	Rebecca Oliver	Rebecca Simmons	Sheila Sasser	No
Covington	Opp Nursing Facility P.O. Box 730 Opp, AL 36467 (334) 493-4558 Fax: 493-6112 Email:	Yvette Welch	Anita Marlowe	Northport Health Services, Inc.	Yes-Wound Care Unit
Dale	Oakview Manor Health & Rehab. Center 1525 Mixon School Road Ozark, AL 36360 (334) 774-2631 Fax: 774-4252 Email:	Susan Williamson	Carolyn Sullivan	U.S. Health & Housing Foundation, Inc.	Yes-Alzheimer's Unit (24 bed)
Dale	Ozark Nursing Facility 201 Bryan Dr. Ozark, AL 36360	J. Warren Page	Charlotte Sexton	Northport Health Services, Inc.	Yes- Short Term Rehab/Alzheimer Unit

	(334) 774-2561 Fax: 774-3398 Email:				
Geneva	Hartford Health Care 217 Toro Rd. Hartford, AL 36344 (334) 588-3842 Fax: 588-3052 Email:	Warren Kelley	Kathy Ingalls	Diversicare, Inc.	No
Geneva	Wiregrass Nursing Home, Inc. 1200 W. Maple Ave. Geneva, AL 36340 (334) 684-3655 Fax: 684-9343 Email: www.lancej@alaweb.com	Greg Dykes	Doreen Bock	Geneva County	No
Henry	Henry County Nursing Home 212 Dothan Rd. Abbeville, AL 36310 (334) 585-2241 Fax: 585-5082 Email: doriss@cyber-south.com	Doris Smith	Cherrila Murphy	Henry County Health Care Authority	No
Houston	Wesley Manor Methodist Retirement Center 718 Honeysuckle Rd. Dothan, AL 36305 (334) 792-0921 Fax: 793-9527 Email:	Steven B. Francis	Gracie Chestnut	The Huie Group	Yes-Alzheimers Unit
Houston	Westside Terrace P.O. Box 6447 Dothan, AL 36302 (334) 794-1000 Fax: 794-5287 Email:	Christie Junkin	Patricia Scarcy	Flowers Hospital/ Quorum Health Group of Alabama	No
Houston	Extendicare Health & Rehab. Center 950 S. St. Andrews St. Dothan, AL 36301 (334) 793-1177 Fax: 793-9104	James L. Stewart	Julia Bigonoli	Extendicare, Inc.	No

Table 80

HOSPICES

County	Name	Address	Telephone	FAC ID	Ownership/Administrator	Medicare
Barbour	Wiregrass Hospice, Eufaula	831 W. Washington St. Eufaula, AL 36027	(334) 616-0061	E0302	LLC Alicia Land	01-1575
Coffee	Community Care Hospice, Inc.	300 N. Edwards St. Enterprise, AL. 36330	(334) 347-6846	E1602	Corporation Cecil Bradshaw	01-1572
Coffee	Wiregrass Hospice Inc., Enterprise	557 Glover Ave. Enterprise, AL 36330	(334) 347-3353	E1601	LLC Steven Skeen	01-1551
Covington	Countryside Hospice Care, Inc.	955 S. Three Notch St. Andalusia, AL 36420	(334) 222-7048	E2001	Corporation Elizabeth McCaskill	01-1547
Covington	Covenant Hospice Inc.-Opp	510 N. Main St. Opp, AL 36467	(334) 493-0510	E2003	Non-Profit Corporation Dona Curry	01-1588
Covington	Wiregrass Hospice-Andalusia	1835 E. Three Notch St. Andalusia, AL 36420	(334) 222-0659	E2002	LLC Shirley Lee	01-1563
Dale	Community Care Hospice-Ozark	299 Painter Ave. Ozark, AL 36360	(334) 774-7440	E2302	Corporation Cecil Bradshaw, Sr.	01-1572
Dale	Wiregrass Hospice, Ozark	1970 Andrews Ave. Ozark, AL 36360	(334) 445-1401	E2301	LLC Karen Lindsey	01-1564
Houston	Covenant Hospice, Inc.	207 W. Adams St. Dothan, AL 36303	(334) 794-7847	E3503	Corporation Rebecca Merritt	01-1577
Houston	Southerncare, Dothan	2623 Montgomery Hwy. Suite 1 Dothan, AL 36303	(334) 673-9300	E3502	Corporation Michael J. Pardy	01-1574
Houston	Wiregrass Hospice, Inc.	2740 Headland Ave. Dothan, AL 36303	(334) 792-1100	E3501	LLC Dana Rice	01-1522

Source: Alabama Department of Public Health Provider Services Directory, 2003

Table 81

COMMUNITY MENTAL HEALTH CENTERS

County	Name	Address	Telephone	FAC ID	License	Medicare
Barbour	Barbour County Day Treatment	202 E. Boundary St. Eufaula, AL 36027	(334) 794-0731	J0302	Not Subject to Licensure	01-4645
Coffee	Coffee Day Treatment	2861 Neil Metcalf Rd. Enterprise, AL. 36330	(334) 347-5905	J1601	Not Subject to Licensure	01-4648
Covington	Covington Day Treatment	P.O. Box 1028 Andalusia, AL 36420	(334) 222-2523	J2001	Not Subject to Licensure	01-4604
Dale	Dale County Day Treatment	100 Katherine Ave. Ozark, AL 36360	(334) 794-0731	J2302	Not Subject to Licensure	01-4681
Geneva	Geneva County Day Treatment	Rt. 2 Box 167 Samson, AL 36477	(334) 794-0731	J3101	Not Subject to Licensure	01-4635
Henry	Henry County Day Treatment	403 Dothan Rd. Abbeville, AL 36310	(334) 794-0731	J3401	Not Subject to Licensure	01-4636
Houston	Spectracare	104 Prevatt Rd. Dothan, AL 36301	(334) 794-0731	J3502	Not Subject to Licensure	01-4609
	Webb Day Treatment	6150 Old Webb Rd. Webb, AL 36376	(334) 794-0731	J3501	Not Subject to Licensure	01-4696

Table 82

INFANT DEATH RATE IN THE DISTRICT, 1989, 1994, 1999 & 2001

(Per 1,000 live births)

	1989	1994	1999	2001
Barbour County	12.2	12.3	10.0	5.2
Coffee County	8.9	13.8	4.7	3.0
Covington County	7.6	8.2	6.6	6.0
Dale County	10.6	7.5	12.6	7.4
Geneva County	19.2	3.1	11.7	11.9
Henry County	23.1	13.5	13.0	9.8
Houston County	5.7	11.7	9.3	6.7
Alabama				

Source: Alabama Center for Health Statistics, 2003

CHAPTER V
ENVIRONMENTAL CONSIDERATIONS

ENVIRONMENT AND RESOURCES

Geography

The Southeast Alabama Region includes Barbour, Coffee, Covington, Dale, Geneva, Henry, and Houston counties. The region is located in the southeast corner of the state, bordering Georgia on the east, Florida on the south, and other counties in Alabama on the north and west. The seven counties encompass 4,877 square miles (9.6 percent of Alabama).

The entire Southeast Alabama Region lies in the East Gulf Coastal Plain section of the Coastal Plain physiographic province. The two subsections that compose most of the region are the Southern Red Hills and the Dougherty Plain. The Southern Red Hills are mostly in the northern areas of the region, with the Dougherty Plain comprising the southern areas of the region. Elevation ranges from around 700 feet above sea level in Barbour County to around 70 feet above sea level in Geneva County.

Geology and Soils

The major geologic units in the region primarily lay east-west; with the younger units overlying older units as you go north to south. The units are sedimentary, consisting of sand, silt, clay, and some carbonate rock. The oldest geologic units are from the Upper Cretaceous period of around 144 million years ago. The youngest geologic units are from the Quaternary period of around 10,000 years old.

The geologic formations that crop out in Southeast Alabama are the Blufftown Formation, the Ripley Formation, the Providence Sand Formation, the Clayton Formation, the Nanafalia Formation, the Tuscahoma Sand Formation, the Tallahatta Formation, the Hatchetigbee Formation, the Lisbon Formation, the Ocala Limestone and Moody's Branch Formations, residuum, and alluvium and terrace deposits.

Soils in Southeast Alabama are sedimentary, in nature, and are composed of sand, silt, and clay that formed from two kinds of parent material. Most are marine sediments that have weathered over time and others are younger soils that are deposited by alluvial forces.

Climate

The Southeast Alabama Region has a humid, subtropical climate. The summers are long and hot, due to the influence of the Gulf of Mexico. Winters are generally mild with a few cold waves of one or two days. July averages a maximum temperature of 91 degrees and a minimum temperature of 70 degrees. January averages a maximum temperature of 60 degrees and a minimum temperature of 38 degrees. The highest temperature recorded in Southeast Alabama has been 108 degrees in Headland, and the lowest temperature recorded has been -7 degrees in Clayton. The first frost normally occurs in early-to-middle November, with the last frost occurring in mid-March.

Rainfall is abundant in Southeast Alabama. The region's average precipitation gradually increases from Barbour County southwest to Covington County. Clayton, in Barbour County, averages nearly 52 inches a year, while Andalusia, in Covington County, averages nearly 59 inches a year. Seasonally, precipitation is reasonably well distributed with summer normally the wettest period and autumn, the driest. Severe droughts are rare, though short periods of drought can be common.

Although a major snowstorm hit the area in 1973, snow is extremely rare. The 1973 storm dumped from 6 to 12 inches across the district. Other than this storm, weather records show very few days of measurable snowfall. In March 1993, snow also hit the district, but most of the damage from the storm was due to wind, not snow.

Flooding is perhaps the most substantial weather hazard in the district. Nearly all flooding rains are the result of either low pressure areas or hurricanes moving into the area from the Gulf of Mexico. A flood occurs on an average of two to three years. The largest flood on record occurred in March 1929, when 29.6 inches of rain fell at Elba (Coffee County) during a 3-day period with 21 inches falling during a 24-hour period. Major floods have also occurred in 1975, 1990, 1994, and 1998.

Tornadoes can also be substantial in Southeast Alabama. Fatal tornadoes over the past five years have touched down in Red Level (Covington County), Geneva (Geneva County), and Abbeville (Henry County).

Wildlife and Recreation

Wildlife and recreation opportunities are abundant in Southeast Alabama. The abundant waters of the region coupled with the rural nature of the region aids to the diversity of wildlife. There is a good mixture of open lands, forest lands, and wetlands to allow many types of plants and animals.

Opportunities for water recreation are plentiful in Southeast Alabama. The Walter F. George Lake (Lake Eufaula) on the Chattahoochee River is commonly referred to as the "Bass Fishing Capital of the World." The Eufaula National Wildlife Refuge is adjacent to the lake, which adds hunting, hiking, and bird watching options to the area. George W. Andrews Lake and Lake Seminole, also on the Chattahoochee River, provides additional fishing opportunities. There are also state-managed public lakes in Barbour, Coffee, Dale, and Geneva Counties.

Southeast Alabama has three public hunting areas. The Barbour County Wildlife Management Area (WMA) is near Clayton, the Blue Springs WMA is in Covington County near Andalusia, and the Covington WMA is in Covington and Geneva Counties near Florala.

There are five state parks within Southeast Alabama. Lakepoint and Blue Springs State Parks are both in Barbour County. Chattahoochee State Park is in Houston County. Frank Jackson and Florala State Parks are both in Covington County. Conecuh National Forest is in the southwest part of Covington County.

There are several endangered and threatened species in Alabama, as they are listed below.

Table 83
Federally Listed Endangered and Threatened Plants and Animals for Alabama

Species:	Commonly Known as:
Amphianthus pusillus	pool sprite (little amphianthus)
Clematis socialis	Alabama leather flower
Dalea foliosa	leafy prairie-clover
Ptilimnium nodosum	harperella
Sarracenia rubra alabamensis	Alabama canebrake pitcher-plant
Sarracenia oreophila	green pitcher-plant
Trillium reliquum	relict trillium
Xyris tennesseensis	Tennessee yellow-eyed grass
Clematis morefieldii	Morefield's leather flower
Eretmochelys imbricata	hawksbill sea turtle
Etheostoma nuchale	watercress darter
Etheostoma wapiti	boulder darter
Haliaeetus leucocephalus	bald eagle
Mycteria americana	wood stork
Myotis grisescens	gray bat
Myotis sodalis	Indiana bat
Notropis cahabae	Cahaba shiner
Peromyscus polionotus trissyllepsis	Perdido Key beach mouse
Peromyscus polionotus ammobates	Alabama beach mouse
Picoides borealis	red-cockaded woodpecker
Pseudemys alabamensis	Alabama red-belly turtle
Speoplatyrhinus poulsoni	Alabama cavefish
Dromus dromas	dromedary pearlymussel
Cyprogenia stegaria	fanshell
Epioblasma penita	southern combshell
Epioblasma florentina florentina	yellow blossom (pearlymussel)
Epioblasma obliquata obliquata	purple cat's paw pearlymussel
Epioblasma turgidula	turgid blossom (pearlymussel)
Fusconaia cuneolus	finerayed pigtoe
Fusconaia cor	shiny pigtoe
Hemistena lata	cracking pearlymussel
Lampsilis abrupta	pink mucket (pearlymussel)
Lampsilis virescens	Alabama lampmussel
Obovaria retusa	ring pink (mussel)
Palaemonias alabamae	Alabama cave shrimp
Plethobasus cicatricosus	white wartyback (pearlymussel)
Plethobasus cooperianus	orangefoot pimpleback (pearlymussel)
Pleurobema marshalli	flat pigtoe

Pleurobema plenum	rough pigtoe
Pleurobema taitianum	heavy pigtoe
Quadrula intermedia	Cumberland monkeyface (pearlymussel)
Quadrula stapes	stirrupshell
Toxolasma cylindrellus	pale lilliput (pearlymussel)
Tulotoma magnifica	tulotoma (Alabama livebearing snail)
Epioblasma metastriata	upland combshell
Epioblasma othcaloogensis	southern acornshell
Pleurobema decisum	southern clubshell
Pleurobema furvum	dark pigtoe
Pleurobema perovatum	ovate clubshell
Ptychobranchus greeni	triangular kidneyshell
Apios priceana	Price's potato-bean
Lesquerella lyrata	lyrate bladderpod
Marshallia mohrii	Morh's Barbara buttons
Asplenium scolopendrium var. americanum	American hart's-tongue fern
Sagittaria secundifolia	Kral's water-plantain
Acipenser oxyrhinchus desotoi	gulf sturgeon
Caretta caretta	loggerhead sea turtle
Charadrius melodus	piping plover
Cottus pygmaeus	pygmy sculpin
Drymarchon corais couperi	eastern indigo snake
Etheostoma boschungi	slackwater darter
Gopherus polyphemus	gopher tortoise (west of Tombigbee River)
Cyprinella monacha	spotfin chub
Percina tanasi	snail darter
Phaeognathus hubrichti	Red Hills salamander
Sternotherus depressus	flattened musk turtle
Potamilus inflatus	Alabama heelspitter
Thelypteris pilosa var. alabamensis	Alabama streak-sorus fern
Cyprinella caerulea	blue shiner
Percina aurolineata	goldline darter
Epioblasma brevidens	Cumberlandian combshell
Medionidus acutissimus Lampsilis perovalis	Alabama moccasinshell orangenacre mucket
Epioblasma capsaeformis	oyster mussel
Pleurobema georgianum	southern pigtoe
Lampsilis altilis	finelined pocketbook
Athearnia anthonyi	Anthony's riversnail
Helianthus eggertii	Eggert's sunflower
Spigelia gentianoides	gentian pinkroot
Alligator mississippiensis	American alligator
Villosa trabalis	Cumberland bean (pearlymussel)
Epioblasma torulosa torulosa	tubercled blossom (pearlymussel)

Campeloma decampi	slender campeloma
Pleurobema clava	clubshell
Etheostoma chermocki	vermillion darter
Elimia crenatella	lacy elimia (snail)
Lioplax cyclostomaformis	cylindrical lioplax (snail)
Quadrula fragosa	winged mapleleaf (mussel)
Conradilla caelata	birdwing pearlymussel
Lepyrium showalteri	flat pebblesnail
Lampsilis subangulata	shinyrayed pocketbook
Leptoxis taeniata	painted rocksnail
Leptoxis plicata	plicate rocksnail
Leptoxis ampla	round rocksnail
Chelonia mydas	green sea turtle
Lepidochelys kempii	Kemp's ridley sea turtle
Dermochelys coriacea	leatherback sea turtle
Notropis albizonatus	paleozone shiner
Elliptio chipolaensis	Chipola slabshell
Pyrgulopsis pachyta	armored snail
Scaphirhynchus suttkusi	Alabama sturgeon
Balaenoptera physalus	finback whale
Megaptera novaeangliae	humpback whale
Schwalbea americana	American chaffseed

Source: U.S. Fish and Wildlife Service, 2003

Historic Resources

Southeast Alabama possesses several historical sites and landmarks. Lists with the properties listed on the Alabama Register of Landmarks and Heritage, and the National Register of Historic Place are listed below.

Table 84
Properties Listed on the Alabama Register of Landmarks and Heritage

Barbour County	
Clayton Presbyterian Church, Clayton Circa 1897	Listed: 03/20/81
Copeland-Reeves House, 404 West Broad Street, Eufaula Circa 1886	Listed: 04/16/85
Eufaula High School Auditorium, 420 Sanford, Eufaula Circa 20th Century	Listed: 04/11/84
Fenn-Boyd House, Hwy. 30, 3 miles E. of Clayton, Clayton Circa 1840	Listed: 04/11/84
Joyce-Copeland-Reeves House, 420 W. Broad, Eufaula Circa 1851	Listed: 04/16/85

Kendall-Edmondson-Hallenbeck House, 609 W. Broad, Eufaula Circa 1860 Listed: 05/25/76	
McLeroy-Calton-Hurlbert House, 431 Sanford Avenue, Eufaula Circa 1882 Listed: 04/11/84	
McGee Home, 1833 Highway 131, Baker Hill 1873 Listed: 10/01/97	
Turner-Hightower Farm, 1 mile N. of Clayton-Eufaula Rd., Clayton Circa 1859 Listed: 07/06/78	
Wallace Home, Eufaula Avenue, Clayton Circa 1887 Listed: 08/14/75	
Woodlane, US 431 Listed: 12/15/89	

Coffee County
Enterprise Methodist Church (First United Methodist Church) 217 S. Main Street, Enterprise Circa 1903-04 Listed: 09/06/84
Folsom Home, 18 miles out of Elba Circa late 1800's Listed: 09/17/76
Prestwood Grist Mill, CR 82, W. of Roeton Community Circa 1848 Listed: 10/11/78
Rawl's House, 301 W. College Street, Enterprise Circa Listed 03/30/89

Covington County
Carter, W.O., Log House, 1.25 miles E. of Sanford on Hwy. 84, Rt. 3, Andalusia Circa 1830's Listed 02/27/78
Hart, Alex, House, Corner of E. Stewart Avenue and Spurlin Street, Opp Circa 1901 Listed: 10/01/76
Lloyd's, M.N., Water Mill, 6 1/2 miles N. of Red Level, inters. AL 55 & Pigeon Creek Circa 1930 Listed: 08/19/76
Macon General Store Museum Collection, 501 Sixth Avenue, Andalusia Listed: 01/19/78
River Falls Post Office U.S. 84, 1/3 mi. W. of inters. of U.S. 84 & AL Hwy 55, River Falls Circa 1898 Listed: 10/28/77
Stanley House, Hwy 55 S to Florala, Stanley community 1937 Listed: 05/19/99

Dale County
Ariton Universalist Church, Atlantic Street, Ariton Circa 1913 Listed: 03/23/90

Clopton Methodist Episcopal Church, South & Cemetery (Clopton UMC)	
1924	Listed: 09/28/00
Kolb-Chesser Home (Leonidas William Kolb House), 417 Board St., Ozark	
Circa 1908	Listed: 04/14/78
Ozark Racetrack, Ozark	
Circa 1893-1908	Listed: 05/08/75
Spring Hill Methodist Church: 6 mi. S. of Ozark on AL 123 to inter Ewell Rd., 1/2 mi. NW of intersection	
Circa 1876	Listed: 08/13/87
Veterans Memorial Bridge, U.S. 231, across Pea River, North of Ariton	
Circa 1921	Listed: 05/17/77

Geneva County	
Emma Knox Kenan Library, 312 South Commerce Street, Geneva	
Circa 1931	Listed: 02/25/85
Finks Mill, 8 mi. E. of Florala	
Circa 1932	Listed: 11/26/75
Geneva Depot (AL and FL L&N R.R. Depot), 604 East Magnolia Ave., Geneva	
Circa 1901	Listed: 04/29/77
Geneva Public Library, Corner of Commerce and East Church, Geneva	
Circa 1932	Listed: 09/09/77

Henry County	
Abbie Creek Bridge, CR 26, just off AL 95, 3 mi. N. of Haleburg	
Circa 1930	Listed: 06/16/76
Edwin Community Clubhouse, Route 1, Clopton	
Late 1930s	Listed: 09/28/00
Kennedy House, 300 Kirkland St, Abbeville (NRHP)	
1866	Listed: 07/19/76
Mount Zion Baptist Church, Route 2, Columbia	
Circa 1871	Listed: 04/16/85
Old Methodist Parsonage (Dow-Parsonage), 113 Franklin Street, Abbeville	
Circa 1880	Listed: 04/16/85
Trawick-Pinkerton House, 408 Kirkland Street, Abbeville	
1869	Listed: 07/06/78
Wright's Chapel Cemetery and Church Site, Abbeville	
1822-24	Listed: 12/19/91

Houston County	
Alabama Midland Depot, Railroad Street, Ashford (NRHP)	
Circa 1892	Listed: 01/25/77

Atlantic Coastline Railroad Depot, Powell St., Dothan (NRHP) Circa 1908 Listed: 08/03/90	
Columbia Jail, North Street, one block off Main St., Columbia Circa 1862 Listed: 10/27/75	
Dothan Municipal Light and Water Plant, 126 N. College St., Dothan (NRHP) 1912-1913 Listed: 03/23/90	
Express Car and Business Car #502, 2076 Ross Clark Circle, South, Dothan 1855 thru 1974 Listed: 03/20/81	
First Missionary Baptist Church, 370 Chickasaw St, Dothan 1912 Listed: 05/03/01	
Murphy's Grist Mill, Murphy's Mill Branch, 5 mi. N. of U.S. 231, NE of Dothan Circa 1906 Listed: 06/16/76	
NBCAR Historic District (Newton, Burdeshaw, Cherry, Adams & Range Streets), Dothan Circa 1910-present Listed: 05/03/01	

Table 85
Alabama Properties Listed on the National Register of Historic Places

Barbour County
Bray-Barron House 413 North Eufaula Avenue, Eufaula Prior to 1850 Structures: 1 Added: 05/27/71
Cato House 823 West Barbour Street, Eufaula 1858 Structures: 1 Added: 05/27/71
Clayton, Henry D. House NHL 1 mile south of Clayton, off AL BYP 30, Clayton 1850 Structures: 1 Added: 12/08/76
Drewry-Mitchell-Moorer House 640 North Eufaula Avenue, Eufaula 1867 Structures: 1 Added: 04/13/72
Fendall Hall Barbour Street, Eufaula 1854 Structures: 1 Added: 07/28/70

Grace Episcopal Church S Midway Street near Courthouse Sq., Clayton 1876 Structures: 1 Added: 09/22/95
Kendall Manor 534 West Broad Street, Eufaula 1867 Structures: 1 Added: 01/14/72
Kiels-McNab House West Washington Street, Eufaula c. 1840 Structures: 1 Added: 01/21/82
McNab Bank Building Broad Street, Eufaula Late 1850's Structures: 1 Added: 06/24/71
Miller-Martin Townhouse (Four Seasons Bed and Breakfast) Louisville Avenue, Clayton 1859 Structures: 1 Added: 12/16/74
Octagon House (Petty-Roberts-Beatty House) 103 North Midway, Clayton 1861 Structures: 1 Added: 1/21/74
Seth Lore and Irwinton Historic District (expansion of Lore Historic District (HABS) Eufaula, roughly bounded by Browder St., Van Buren Ave., Washington St., & Sanford Ave. 1836-1936 Structures: 942 (738 c, 199 nc, 5 demolished) Added: 12/12/73, expanded 08/14/86
Sheppard Cottage 504 East Barbour Street, Eufaula 1837 Structures: 1 Added: 05/27/71

Shorter Mansion 340 North Eufaula Avenue, Eufaula 1906 Structures: 1 Added 01/14/72
Sparks-Flewellen House 257 Broad Street, Eufaula 1857 Structures: 1 Added: 06/28/72
Spring Hill Methodist Church CR 89 S side, approx. 750 ft W of jct with CR 49, Spring Hill 1841 Structures: 2 (1c, 1nc) Added: 02/16/96
The Tavern HABS 105 Riverside Drive, Eufaula 1836 Structures: 1 Added: 10/06/70
Welborn House HABS Livingston Street, Eufaula 1837 Structures: 1 Added: 07/14/71

Coffee County
Boll Weevil Monument Main and College Streets, Enterprise 1919 Structures: 1 Added: 04/26/73
Coffee County Courthouse Courthouse Square, Elba 1903 Structures: 1 Added: 05/08/73
Pea River Power Company Hydroelectric Facility (Elba Dam) 4 miles south of Elba 1911-1914 Structures: 1 Added: 08/01/84

The Old Rawls Hotel 116 South Main Street, Enterprise 1903 Structures: 1 Added: 09/17/80
Seaboard Coast Line Depot Railroad and West College Streets, Enterprise 1903 Structures: 1 Added: 08/07/74

Covington County
Andalusia Commercial Historic District Andalusia 1896-1931 Structures: 64 (47 c, 17nc) Added: 01/26/89
Avant House 909 Sanford Road, Andalusia ca. 1914-1920 Structures: 2 (1c, 1nc) Added: 02/16/96
Bank of Andalusia 28 South Court Square, Andalusia 1914 Structures: 1 Added: 01/28/89
Central of Georgia Depot 125 Central Street, Andalusia 1899 Structures: 1 Added: 08/30/84
Covington County Courthouse & Jail 101 North Court Square, Andalusia 1916 Structures: 1 Added: 01/28/89
First National Bank Building 101 South Cotton Street, Andalusia 1920-1921 Structures: 1 Added: 08/26/82

Opp Commercial Historic District Portions of Covington Ave., Hart, Main, Whaley and College St., Opp 1903-1950 Structures: 75 (61c, 14nc) Added: 10/29/01
Shepard, William T., House Poley Road, Opp Added: 08/14/73

Dale County
Claybank Log Church East Andrews Avenue, Ozark 1852 Structures: 1 Added: 11/07/82
Dowling, Samuel Lawson, House 311 Owens St, Ozark c. 1870 Structures: 1 Added: 05/30/96
J.D. Holman House - Mizzell Mansion (common name 05/03/91) 409 East Board St., Ozark 1912 Added: 02/19/82
Oates-Reynolds Memorial Building Oates Street, Newton Early 1920's Structures: 1 Added: 06/13/74

Geneva County
NONE

Henry County
Kennedy House 300 Kirkland Street, Abbeville c. 1870 Structures: 1 Added: 01/05/78

Oates House
402 Kirkland Street, Abbeville
1900, 1910, 1927
Structures: 1
Added: 03/17/89

Seaboard Coast Line Railroad Depot (Demolished)
Broad Street, Headland
c. 1840
Structures: 1
Added: 09/04/80

Houston County

Alabama Midland Railroad Depot
Midland Street, Ashford
1892
Structures: 1
Added: 09/12/85

Atlantic Coastline Railroad Passenger Depot
Jct. Powell St and Headland Ave, Dothan
1908; 1941
Structures: 1
Added: 01/21/94

Dothan Municipal Light and Water Plant
126 N. College Street, Dothan
1912-1913
Structures: 2
Added: 10/03/91

Dothan Opera House
103 N. St. Andrews Street, Dothan
1915
Structures: 1
Added: 12/16/77

Federal Building and U.S. Courthouse
100 West Troy Street, Dothan
1911
Structures: 1
Added: 12/31/74

Main Street Commercial District
Dothan -- East Main, Foster, St. Andrews and Troy Streets
1800-1899, 1900
Structures: 83 (68 c & cc) Extension 01/12/95 – 80 (49c, 31nc)
Added: 04/21/83 Extended Period of Significance: 01/12/95

Purcell-Killingsworth House (W.H. Purcell Home Place)
East Side of Main Street, 3 miles North of Alabama 52, Columbia
1889-1890
Structures: 1
Added: 12/16/82

CHAPTER VI
CEDS STRATEGIC PLAN

CEDS
STRATEGIC PLAN

Alabama Commerce Commission Region 7

Southeast Alabama Economic Development District

I. Introduction

In March 2000, the Alabama Commerce Commission established Economic Development Regions across the state to target technical assistance and financial resources in a coordinated strategic planning and economic development effort to identify and remove local barriers to opportunity and economic success. The Alabama Commerce Commission Economic Region 7 is comprised of the same seven counties that comprise the Southeast Alabama Regional Planning and Development Commission: Barbour, Coffee, Covington, Dale, Geneva, Henry and Houston. Region 7 is one of eight economic development regions designated by the Commerce Commission. Historically, Region 7 has a good record of working together on economic development issues, programs, and projects. The Southeast Alabama Regional Planning and Development Commission was formed in 1969 as an Economic Development Administration District and, in recent years, the Southeast Alabama Council for Economic Development (SEACED) and the Southeast Alabama Trails (SEAT) were formed to promote traditional economic development, tourism and retiree attraction efforts. These organizations have worked together well and have been a catalyst for many regional projects.

The first phase of the Statewide Strategic Plan Phase I involved a series of county-level public meetings and listening sessions to identify critical local community development issues and needs (strengths, weaknesses, opportunities and threats). The resulting report included a number of specific recommendations to further advance the economic development objectives identified by the Commerce Commission.

During the summer of 2002, the Southeast Alabama Regional Planning and Development Commission initiated the second phase of the regional/statewide economic development strategic planning process. The second phase involved the formation of a regional strategic planning stakeholder committee composed of 66 members (listed in Appendix A) to explore and develop a prioritized list of measurable economic strategies for implementation. The general recommendations identified in the Phase I plan were used as a starting point for the Phase II process. The first meeting of the State Strategic Plan Phase II (SSPPII) was held on July 16th with Dr. Joe Sumners, Director of the Economic Development Institute at Auburn University, serving as our facilitator. Key issues, opportunities and barriers were addressed at this meeting and at the end of the meeting participants were asked to complete a comprehensive survey developed from items identified in Phase I. Dr. Sumners also conducted the second and third meetings held on August 22nd and September 3rd, respectively, in which goals, objectives, projects, and priorities were finalized. The participating stakeholders were comprised of representatives of organizations having economic development, business, government, education, finance, human services and infrastructure responsibilities for each county in the region. The applicable issues and findings from the report will also be incorporated into the Southeast Alabama Regional Planning and Development Commission's Comprehensive Economic Development Strategy (CEDS), which is a continuing economic development planning process, developed with broad based and diverse community participation. Community projects, which are listed in the CEDS plan, are presented in Appendix B.

The Regional/Statewide Economic Development Strategic Plan for Region 7 includes: a summary of opportunities and barriers, a regional economic assessment provided by the Center for Business and Economic Research (CBER), regional goals and strategies, and a matrix of identified priority projects and programs for the region. From the matrix, a list of higher priority projects has been developed and is also included in the plan.

The Southeast Alabama Regional Planning Commission CEDS Committee, composed of the Commission's Board of Directors, met in a series of county-level planning meetings during the Spring and Summer of 2003 and adopted the Phase II regional plan as the CEDS strategic plan. The CEDS plan will be formally adopted by the SEARP&DC CEDS Committee at the September meeting of the Board of Directors.

II. Key Issues, Opportunities, Barriers

The following key issues, opportunities, and barriers were identified at the first meeting of the Stakeholder Committee held on July 16, 2002.

1. Transportation

Opportunities

- Controlled access roads (connectors)
- Maintenance of existing roads

Barriers

- Lack of vision
- Money
- Politics
- Conflict over location
- Regulatory requirements

2. Water Resources

Opportunities

- Lowering of aquifers
- New reservoirs (alternate sources of water)
- Education of public regarding conservation

Barriers

- Money
- Environmental regulations
- Conflict over water needs versus recreation needs (for reservoirs)

3. Workforce Development / Training

Opportunities

- Facilities
- Mismatch between skills of employees and needs of employers
- Keeping up with technologies
- Educational attainment of existing workforce
- Need for retraining
- Loss of workforce to other regions
- Adult literacy

Barriers

- Money
- Lack industry to train workers

- Lack of a regional plan
- Lack of public awareness
- Childcare issues
- Lack of public transportation
- Wide variation in quality of schools/students

4. **Infrastructure**

Opportunities

- Water and sewer systems
  - Replacing old systems
- Storm water regulations
- Airports
- 431 four-laning
- Telecommunications planning
- Emergency planning
  - Flood, hurricane, etc.
- Home rule for counties
- Continuity of efforts (little follow up on plans)

Barriers

- Money
  - Small rural communities lack money to match grants
- Environmental regulations
  - Endanger species, wetlands, etc.
- State favors new over rehabilitation projects
- Lack of political consensus on highway projects
- Over reliance on external funding

5. **Education**

Opportunities

- Pre-K, K-12, 2-year, 4-year
- Technology
- Research and development

Barriers

- Lack of commitment to public education
- Lack of coordination

6. **Tourism / Retirees**

Opportunities

- Focus on retiree attraction

- Planned developments
- Convention services
- Rural tourism
- Lake Point Resort
- Support for SEAT
- Golf / Alabama scenic byways
- Beach traffic (create destination, lodging)

Barriers

- Money
- Support from State Legislature and Department of Tourism
- Lack of comprehensive marketing plan
- Image of Alabama

7. Agriculture / Forestry

Opportunities

- Adding value (processing plants)
- Crop diversity
- Technology
- Research for agriculture (value added, e.g., peanut hulls)
- Branding / marketing

Barriers

- Global economy
- Weather
- National policy
- Resistance to change by farmers
- Environment

III. Regional Assessment-CBER

Major issues for this region focus on transportation infrastructure, critical water resource allocation, workforce development, tourism development, and diversification of the agricultural sector, and education.

- Lacking an interstate highway, this region appears isolated from the rest of the state. Significant investment is needed to link this corner to the rest of the state, to Florida and Georgia. Specific transportation projects include:
  - Complete 4-laning of U.S. 431; 4-laning of Highway 167; 4-laning of Highway 52
  - 4-lane Highway 84 to create east-west corridor
  - Construct the Alabama portion of the proposed I-10 connector

  Investigate and support navigational use of the Apalachicola-Chattahoochee-Flint Waterway.

- Workforce and human development is essential to ensuring sufficient and appropriate labor for this region. A stronger link between industry and the educational/training institutions needs to be developed, to promote career paths that are more relevant to existing and future industries. Transportation and family services are sorely needed to support the existing labor force.

- Creation of a Regional Water Authority is critical to maintain and enhance water resources and infrastructure.

- Agriculture has been central and remains important to the regional economy but diversification is essential for this sector to remain strong (e.g. alternative agriculture, intensive recruiting of value adding processing plants, and local product branding).

- Tourism has been an underutilized economic development resource. The region should inventory tourist and cultural resources, identify funding support, and develop and implement a marketing plan.

Relevant outcome measures for the region are:

Gross Regional Product
Average Wage
Per Capita Income
Poverty Rate
Employment
Road and Highway Mileage
Agricultural Output
Travel Related Employment
Manufacturing Industry Activity

IV. Goal and Strategies

1. Regional Transportation Plan

Goal: Create a broad, comprehensive, integrated, long-range regional transportation plan.

Strategies:

- Prioritize plans for:
  - Four-laning U.S. 431 from the Barbour County line to Seale;
  - I-10 connector;
  - Completing work on Highway 84 to provide an east-west corridor; four-laning the Alabama-Georgia bridge on Highway 84;
  - Four-laning Highway 167 from Troy to the Florida state line;
  - Four-laning Highway 52 from Dothan to Highway 167 in Hartford;
- Include an analysis of regional work force commuting patterns and commercial traffic patterns;
- Plan for rail, air, public transportation, and rails to trails;
- Include a program to provide transportation for workers to and from jobs;
- Coordinate transportation and land-use decisions;
- Support navigation on the Apalachicola-Chattahoochee-Flint Waterway;
  - *This would need involvement of the City of Eufaula, the Tri-rivers Authority, and the Alabama Office of Water Resources.*
- Explore the feasibility of creating a Rural Planning Organization to coordinate regional transportation planning and decision-making; and
- Identify funding sources for implementing transportation plans.

2. Regional Water Authority

Goal: Maintaining and enhancing water resources and infrastructure is a critical need for the region. In order to address regional water problems in a coordinated manner, the region needs a regional water authority. The existing regional gas district could serve as a model.

Strategies:

One of the first tasks of the newly established water authority would be the creation of a long-range, comprehensive water resources plan. Such a plan would:

- Begin with a regional assessment of: 1) water supply and quality, and 2) the existing water infrastructure. The assessment would integrate any existing regional water-related assessments/studies. This information would then be used to create a long-range regional growth plan for water resources.

The water authority would identify sources of funding to implement the regional water plan and to help local governments comply with point/non-point source water quality laws and regulations. The Authority would work to see that the State continues funding for the State Revolving Loan Program to provide "match" funding so local governments can take advantage of federal grants. This funding is needed for water and other infrastructure projects.

The water authority would support multi-jurisdictional and regional water projects. It would work with existing local and regional water systems to promote coordinated management of regional water resources.

3. **Regional Workforce Development Plan**
   Goal: Ensuring that businesses have workers with adequate skills and training is critical to the region's economic development. The key players in regional workforce development will create a strategy to ensure that southeast Alabama has a quality workforce.

   Strategies:

   - Have strong business sector involvement, with at least a 51% of funds coming from private sector investment;
   - Include a program to connect representatives of regional businesses and vocational and technical schools with high school counselors. This program will provide high school counselors with a greater awareness of employment and technical training opportunities for students.
   - Provide for a survey of local businesses and industries to identify needed skills; and
   - Assist regional vocational and technical schools adjust their training curriculums to meet needs identified in the business survey.

4. **Airport Enhancements**
   Goal: The regional general aviation airports are important economic resources for the region. These airports need increased support in order to remain competitive.
   Strategies:
   - Increased funding for the Alabama Department of Aeronautics; and
     - *(Increased funding is needed allow general aviation airports to provide matching funds for federal grants. This may be accomplished by removing the cap on the aviation fuel tax.)*
   - Recruitment of an additional air carrier for the Dothan Regional Airport.

5. **Regional Tourism and Retiree Attraction Program**
   Goal: The region has a number of tourist destinations and tourism should be an important component of the region's economic development strategy. In order to take advantage of tourism resources, the region must have a planned and integrated strategy. Southeast Alabama Trails (SEAT) will take the lead in implementing the program.

   Strategies:

   - State funding for SEAT;
   - Increased state funding to modernize Lake Point Resort;
   - Continuing state funding to provide maintenance for the region's state parks; and
   - State funding to implement a tourism marketing plan for the region (including agri-tourism).

The retiree attraction strategy would support:

- Creation of a retiree residential development in the region; and
- Funding for the Model Cities Program to attract retirees.

6. **Regional Agricultural Assessment and Plan**
Goal: Agriculture has been central to the economy of this region for many years. While the region has seen a decline in agricultural employment, this sector remains very important to the region's economy.

Strategies: In order to assist the region in developing an economic development strategy for the agriculture sector, a regional agricultural assessment is needed to examine:

- Alternative agriculture products to diversify the region's agricultural economy;
- Opportunities to recruit processing plants capable of processing locally-grown crops; and
- Opportunities for branding local agricultural products (e.g., the "Vidalia" onion) and other marketing strategies.

7. **Technology Assets Inventory and Plan**
Goal: Develop a technology assets inventory and plan for the region.
Strategies: Assess or map existing technology in the region and develop a growth plan. Expand the existing technology incubator program and establish an innovation fund to seed the initiatives of technology-related entrepreneurs.

8. **Human Development Investments**
Goal: Improve the quality of the lives of low-income citizens of the region.

Strategies:

- ***Initiating a region-wide effort to address quality of life issues;***
- ***Funding Family Services Centers (one-stop centers for intake and referral);***
- ***Supporting funding for the Southeast Crescent Authority (modeled on Appalachian Regional Commission);***
- Increase rural access to dental and medical care (e.g., increase the number of dentists who accept Medicaid); and
- Increase Head Start funding and expand the program into areas without Head Start.

9. **Economic Development Support**
Goal: Increase the level of Alabama Development Office (ADO) assistance for rural communities.
Strategies: ADO should assign a representative for the region who can provide advice, support, and industry-specific information (for marketing and recruiting). The Southeast Alabama Council for Economic Development (SEACED) should develop a regional marketing and recruitment program funded by ADO, with a local matching requirement—i.e. co-op marketing.

V. Regional Initiatives/Priorities/Projects

REGIONAL ECONOMIC DEVELOPMENT PROJECTS/PROGRAMS REGION 7						
PROJECTS/PROGRAMS	ISSUE CATEGORY	LOCATION	FUNDING SOURCE	RESPONSIBILITY	*PERFORMANCE MEASURES*	TIME FRAME*
1. Regional Transportation Plan	Land Use and Planning / Infrastructure	Region wide	ALDOT, ADO, ADECA, Local Governments	SEARPDC, ALDOT, Chambers, DAMPO, Local Governments	1) Transportation Plan completed. 2) Transportation Plan recommendations funded and completed.	1) Short Term 2) Medium and Long Term
2. Regional Water Authority and Plan	Infrastructure / Land Use and Planning	Region wide	ADECA, USDA, ADEM, EPA, Local Governments	SEARPDC, Local water systems, CPYRWMA, Local Governments, Rural Waterway Assn.	1) Regional Water Authority created. 2) Regional water resource assessment completed. 3) Long-range regional growth plan for water developed. 4) Multi-jurisdictional and regional water projects initiated.	1) Short Term 2) Short Term 3) Medium Term 4) Short Term
3. Regional Workforce Development Plan	Economic Development / Education / Land Use and Planning	Region wide	ADECA, Workforce Investment Act, Local Governments	SEARPDC, 2-Year Colleges, Chambers of Commerce, ACES, High Schools	1) Program for school counselors created. 2) Survey of businesses conducted. 3) 2-year school curriculum changes initiated.	1) Short Term 2) Short Term 3) Medium Term
4. Airport Enhancements	Infrastructure/ Economic Development	Region wide	State Legislature, ADA, USDA, Local Governments	Dothan Chamber, Airport Authority, ADA, Fort Rucker, SEARPDC, Local Governments	1) ADA funding increased. 2) New air carrier at Dothan airport.	1) Short Term 2) Medium Term

REGIONAL ECONOMIC DEVELOPMENT PROJECTS/PROGRAMS

REGION 7

PROJECTS/PROGRAMS	ISSUE CATEGORY	LOCATION	FUNDING SOURCE	RESPONSIBILITY	PERFORMANCE MEASURES	TIME FRAME
5. Regional Tourism and Retiree Attraction Program	Quality of Life/ Economic Development	Region wide	ABTT, ADECA, RSA, AHC, USDA, City of Eufaula, Local Governments	SEAT, SEARPDC, Chambers of Commerce, City of Eufaula	1) SEAT funding increased. 2) Lake Point improvements completed. 3) Maintenance funding for regional state parks assured. 4) Tourism marketing plan funded and implemented. 5) Retiree residential development created. 6) Model Cities Program funded.	1) Short Term 2) Short Term 3) Short Term 4) Short Term 5) Medium Term 6) Short Term
6. Regional Agricultural Assessment and Plan	Agriculture / Economic Development / Land Use and Planning	Region wide	USDA, ACES, ALFA, ADAI, Local Governments	SEARPDC, ACES, ALFA, Chambers, Farmers	1) Assessment completed. 2) Plan completed. 3) Projects undertaken.	1) Short Term 2) Short Term 3) Medium Term
7. Technology Assets Inventory and Plan	Infrastructure / Land Use and Planning	Region wide	ADECA, EDA, Utility providers, Regional Universities (in-kind), Local Governments	SEARPDC, Chambers, Colleges and Universities	1) Technology Assets Inventory/ Map created. 2) Technology Plan developed. 3) Technology incubator program expanded; innovation fund created.	1) Short Term 2) Medium Term 3) Medium Term
8. Human Development Investments	Quality of Life	Region wide	ADHR, Southeast Crescent Authority, Delta Regional Authority, USDA, Children's Trust Fund, Local Governments	ADHR, SEARPDC, Alabama Dental Association, Alabama Medical Association	1) Regional effort to improve quality of life for low-income citizens initiated. 2) Funding for Family Services Centers increased. 3) Rural dental	1) Short Term 2) Short Term 3) Medium Term 4) Short Term

					and medical care providers increased. 4) Funding for Head Start increased and program expanded into areas without the program.	

REGIONAL ECONOMIC DEVELOPMENT PROJECTS/PROGRAMS **REGION 7**						
PROJECTS/PROGRAMS	**ISSUE CATEGORY**	**LOCATION**	**FUNDING SOURCE**	**RESPONSIBILITY**	*PERFORMANCE MEASURES*	**TIME FRAME**
9. Economic Development Support	Economic Development	Region wide	ADO	ADO, SEARPDC, SEACED	1) ADO representative for region named. 2) Co-op marketing program created (with local economic development match for ADO funds).	1) Short Term 2) Short Term

ABTT- Alabama Bureau of Tourism and Travel ACES – Alabama Cooperative Extension System
ADA – Alabama Department of Aeronautics
ADAI- Alabama Dept of Agriculture and Industries ADECA – Ala. Dept of Economic & Community Affairs
ADEM – Alabama Dept of Environmental Management ADHR - Alabama Department of Human Resources ALDOT – Alabama Department of Transportation ADO – Alabama Development Office

ALFA - Alabama Farmers Federation AHC – Alabama Historical Commission
CPYRWMA - Choctawhatchee, Pea and Yellow Rivers
DAMPO - Dothan Area Metro. Planning Organization EDA – Economic Development Administration
Watershed Management Authority
EPA – Environmental Protection Agency RSA – Retirement Systems of Alabama
SEACED – SE Ala. Economic Development Partnership SEARPDC – SE Ala. Regional Planning & Dev. Comm. SEAT - Southeast Alabama Trails USDA – U.S. Department of Agriculture, Rural Dev

* Short Term = 0-2 years Medium Term = 2-5 years Long Term = More than 5 years

ECONOMIC DEVELOPMENT PROJECTS/PROGRAMS

STATE

PROJECTS/PROGRAMS	ISSUE CATEGORY	LOCATION	FUNDING SOURCE	RESPONSIBILITY	*PERFORMANCE MEASURES*	TIME FRAME*
1. Create legislation to form Regional Planning Organizations (for transportation).	Land Use and Planning / Infrastructure	Statewide	State Legislature, ALDOT, ADECA	State Legislature, ALDOT, Alabama Association of Regional Councils	Regional Planning Organization legislation adopted.	Short Term
2. Revise workforce development districts to match new economic development regions.	Economic Development	Statewide	ADECA	ADECA	New workforce development districts created.	Short Term
3. Increase funding for general aviation airports.	Infrastructure	Statewide	State Legislature, Alabama Department of Aeronautics	State Legislature, Alabama Department of Aeronautics	1) Aviation fuel tax cap removed. 2) Funding for general aviation airports increased.	1) Short Term 2) Short Term
4. Fund modernization of Alabama state parks.	Infrastructure / Quality of Life	Statewide	State Legislature	State Legislature, Alabama Bureau of Tourism and Travel	1) State Parks' modernization funded. 2) Continuing maintenance of State Parks funded.	1) Short Term 2) Short Term
5. Assign an ADO representative for each economic development region in the state.	Economic Development	Statewide	State Legislature, ADO	ADO	ADO representative assigned for each region.	Short Term
6. Provide home rule authority to county governments for land use control and environmental protection.	Land Use and Planning	Statewide	State Legislature	State Legislature, Association of County Commissions of Alabama	Home Rule granted to Alabama county governments.	Medium Term

ALDOT – Alabama Department of Transportation ADO – Alabama Development Office ADECA – Alabama Dept of Economic and Community Affairs

* Short Term = 0-2 years Medium Term = 2-5 years Long Term = More than 5 years

VI. Higher Priority Projects

Priority Projects for Funding	Estimated Cost
1. Regional Transportation Plan	$85,000-$100,000
2. Assessment/Plan of Regional Water Resources and Formation of a Regional Water Authority	$100,000-$200,000
3. Increased Funding for General Aviation Airports	Change in Law Required
4. Southeast Trails (SEAT) Funding Assistance Tourism Marketing Plan Funded and Implemented Retiree Residential Development Created	$200,000
5. Maintenance Funding for Regional State Parks	State Action Needed
6. Agriculture Assessment/Plan	$100,000-$200,000
7. Political and Program Support from State for Head Start Programs	
8. ADO Representative for Region 7	$200,000-$250,000
9. Coop Marketing Program Matching Funds Local (25%) to State (75%)	$300,000-$400,000
10. Technology Assets Assessment/Plan for Region 7	$50,000-$100,000
11. Create Program for School Counselors and Conduct Surveys of Regional Businesses to Assess Needs	$10,000-$20,000

Note: Funding will be needed for the coordination of and implementation of the SSPPII plans and projects.

REGIONAL/STATEWIDE ECONOMIC DEVELOPMENT STRATEGIC PLAN

Alabama Commerce Commission Region 7

Key Issues, Opportunities, Barriers
The following key issues, opportunities, and barriers were identified at the first meeting of the Stakeholder Committee held on July 16, 2002.

8. Transportation

Opportunities

- Controlled access roads (connectors)
- Maintenance of existing roads

Barriers

- Lack of vision
- Money
- Politics
- Conflict over location
- Regulatory requirements

9. Water Resources

Opportunities

- Lowering of aquifers
- New reservoirs (alternate sources of water)
- Education of public regarding conservation

Barriers

- Money
- Environmental regulations
- Conflict over water needs versus recreation needs (for reservoirs)

10. Workforce Development / Training

Opportunities

- Facilities
- Mismatch between skills of employees and needs of employers
- Keeping up with technologies

- Educational attainment of existing workforce
- Need for retraining
- Loss of workforce to other regions
- Adult literacy

Barriers

- Money
- Lack industry to train workers
- Lack of a regional plan
- Lack of public awareness
- Childcare issues
- Lack of public transportation
- Wide variation in quality of schools/students

11. Infrastructure

Opportunities

- Water and sewer systems
    - Replacing old systems
- Storm water regulations
- Airports
- 431 four-laning
- Telecommunications planning
- Emergency planning
    - Flood, hurricane, etc.
- Home rule for counties
- Continuity of efforts (little follow up on plans)

Barriers

- Money
    - Small rural communities lack money to match grants
- Environmental regulations
    - Endanger species, wetlands, etc.
- State favors new over rehabilitation projects
- Lack of political consensus on highway projects
- Over reliance on external funding

12. Education

Opportunities

- Pre-K, K-12, 2-year, 4-year
- Technology
- Research and development

Barriers

- Lack of commitment to public education
- Lack of coordination

13. Tourism / Retirees

Opportunities

- Focus on retiree attraction
- Planned developments
- Convention services
- Rural tourism
- Lake Point Resort
- Support for SEAT
- Golf / Alabama scenic byways
- Beach traffic (create destination, lodging)

Barriers

- Money
- Support from State Legislature and Department of Tourism
- Lack of comprehensive marketing plan
- Image of Alabama

14. Agriculture / Forestry

Opportunities

- Adding value (processing plants)
- Crop diversity
- Technology
- Research for agriculture (value added, e.g., peanut hulls)
- Branding / marketing

Barriers

- Global economy
- Weather
- National policy
- Resistance to change by farmers

Goal and Strategies

2. **Regional Transportation Plan**
   Goal: Create a broad, comprehensive, integrated, long-range regional transportation plan.

Strategies:

- Prioritize plans for:
  - Four-laning U.S. 431 from the Barbour County line to Seale;
  - I-10 connector;
  - Completing work on Highway 84 to provide an east-west corridor; four-laning the Alabama-Georgia bridge on Highway 84;
  - Four-laning Highway 167 from Troy to the Florida state line;
  - Four-laning Highway 52 from Dothan to Highway 167 in Hartford;
- Include an analysis of regional work force commuting patterns and commercial traffic patterns;
- Plan for rail, air, public transportation, and rails to trails;
- Include a program to provide transportation for workers to and from jobs;
- Coordinate transportation and land-use decisions;
- Support navigation on the Apalachicola-Chattahoochee-Flint Waterway;
  - *This would need involvement of the City of Eufaula, the Tri-rivers Authority, and the Alabama Office of Water Resources.*
- Explore the feasibility of creating a Rural Planning Organization to coordinate regional transportation planning and decision-making; and
- Identify funding sources for implementing transportation plans.

3. **Regional Water Authority**
   Goal: Maintaining and enhancing water resources and infrastructure is a critical need for the region. In order to address regional water problems in a coordinated manner, the region needs a regional water authority. The existing regional gas district could serve as a model.

Strategies:

One of the first tasks of the newly established water authority would be the creation of a long-range, comprehensive water resources plan. Such a plan would:

- Begin with a regional assessment of: 1) water supply and quality, and 2) the existing water infrastructure. The assessment would integrate any existing regional water-related assessments/studies. This information would then be used to create a long-range regional growth plan for water resources.

The water authority would identify sources of funding to implement the regional water plan and to help local governments comply with point/non-point source water quality laws and regulations. The Authority would work to see that the State continues funding for the State Revolving Loan Program to provide "match" funding so local governments can take advantage of federal grants. This funding is needed for water and other infrastructure projects.

The water authority would support multi-jurisdictional and regional water projects. It would work with existing local and regional water systems to promote coordinated management of regional water resources.

5. **Regional Workforce Development Plan**

Goal: Ensuring that businesses have workers with adequate skills and training is critical to the region's economic development. The key players in regional workforce development will create a strategy to ensure that southeast Alabama has a quality workforce.

Strategies:

- Have strong business sector involvement, with at least a 51% of funds coming from private sector investment;
- Include a program to connect representatives of regional businesses and vocational and technical schools with high school counselors. This program will provide high school counselors with a greater awareness of employment and technical training opportunities for students.
- Provide for a survey of local businesses and industries to identify needed skills; and
- Assist regional vocational and technical schools adjust their training curriculums to meet needs identified in the business survey.

5. **Airport Enhancements**

Goal: The regional general aviation airports are important economic resources for the region. These airports need increased support in order to remain competitive.

Strategies:

- Increased funding for the Alabama Department of Aeronautics; and
  - *(Increased funding is needed allow general aviation airports to provide matching funds for federal grants. This may be accomplished by removing the cap on the aviation fuel tax.)*
- Recruitment of an additional air carrier for the Dothan Regional Airport.

6. **Regional Tourism and Retiree Attraction Program**

Goal: The region has a number of tourist destinations and tourism should be an important component of the region's economic development strategy. In order to take advantage of tourism resources, the region must have a planned and integrated strategy. Southeast Alabama Trails (SEAT) will take the lead in implementing the program.

Strategies:

- State funding for SEAT;
- Increased state funding to modernize Lake Point Resort;
- Continuing state funding to provide maintenance for the region's state parks; and
- State funding to implement a tourism marketing plan for the region (including agri-tourism).

The retiree attraction strategy would support:

- Creation of a retiree residential development in the region; and
- Funding for the Model Cities Program to attract retirees.

7. **Regional Agricultural Assessment and Plan**

Goal: Agriculture has been central to the economy of this region for many years. While the region has seen a decline in agricultural employment, this sector remains very important to the region's economy.

Strategies: In order to assist the region in developing an economic development strategy for the agriculture sector, a regional agricultural assessment is needed to examine:

- Alternative agriculture products to diversify the region's agricultural economy;

- Opportunities to recruit processing plants capable of processing locally-grown crops; and
- Opportunities for branding local agricultural products (e.g., the "Vidalia" onion) and other marketing strategies.

7. **Technology Assets Inventory and Plan**
Goal: Develop a technology assets inventory and plan for the region.
Strategies: Assess or map existing technology in the region and develop a growth plan. Expand the existing technology incubator program and establish an innovation fund to seed the initiatives of technology-related entrepreneurs.

8. **Human Development Investments**
Goal: Improve the quality of the lives of low-income citizens of the region.

Strategies:

- ***Initiating a region-wide effort to address quality of life issues;***
- ***Funding Family Services Centers (one-stop centers for intake and referral);***
- ***Supporting funding for the Southeast Crescent Authority (modeled on Appalachian Regional Commission);***
- Increase rural access to dental and medical care (e.g., increase the number of dentists who accept Medicaid); and
- Increase Head Start funding and expand the program into areas without Head Start.

10. **Economic Development Support**
Goal: Increase the level of Alabama Development Office (ADO) assistance for rural communities.
Strategies: ADO should assign a representative for the region who can provide advice, support, and industry-specific information (for marketing and recruiting). The Southeast Alabama Council for Economic Development (SEACED) should develop a regional marketing and recruitment program funded by ADO, with a local matching requirement—i.e. co-op marketing.

REGION 7
PRIORITY PROJECTS

PROJECT **$**
RESPONSIBILITY

1. **Regional Transportation**

*A. Four- laning Hwy US431
ALDOT 5- Year Plan
from Barbour County to
Legislative delegation
Seale

*B. I-10 Connector
ALDOT 5- Year Plan

Legislative delegation

*C. Complete work on Hwy 84
ALDOT 5- Year Plan
to provide an East-West
Legislative delegation
Corridor

*D. Four-laning Hwy 167
ALDOT :&
from Troy to
Legislative delegation
Florida State line
to get in 5-Year Plan

E. Four-laning Hwy 52 West
Local Legislative
from Dothan to Samson
delegation to get
and east to Georgia
in 5-Year Plan

F. Complete Hwy 331
Local Legislative
from Montgomery to I-10
delegation to get in 5-Year Plan

*Denotes first priority

PROJECT
RESPONSIBILITY **$**

2. **Water Resources**

A. Assessment of Regional Water $200,000
ADECA, Area
Resources and formation of
Water Authorities, &
a regional Water Authority
Regional Council

B. Funding for Choctawhatchee, $200,000
ADECA
Pea & Yellow River Watershed (reservoir process
and
Management Authority funding)
State Legislature

3. **Tourism**

A. Southeast Alabama Trails $200,000
Bureau of Tourism
Funding for marketing and
and Travel, State
advertising
Legislature & Local Efforts

4. **Agriculture**

A. Establish National Agriculture
Alabama Political
Incubator
Leadership, Agriculture &

Industries, & USDA

B. Agricultural Initiatives $400,000
Local

Legislative delegation

to put as line item in

Dept. Of Agriculture &

Industries

PROJECT **$**
RESPONSIBILITY

5. **Regional Economic Development**

A. Marketing Program $400,000
ADO line item budget

6. **Telecom Infrastructure**

A. Inventory of Infrastructure $200,000
Alabama Public
GIS Based
Service Commission,
ADECA, Regional Councils, Alabama Geographic Information Council

7. **Workforce Development**

A. Implement WorkKeys $45,000/yr
Charge for services

Note: #6 Telecom Infrastructure project has been difficult to do in cases where it has been done. Gathering information from utilities and homeland security issues have been primary problems. Such a project would need to be more generic than precise, but yet a tool for community and economic developers.

COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY (CEDS)
POTENTIAL PROJECTS LIST-2003 - 2005
SOUTHEAST ALABAMA ECONOMIC DEVELOPMENT DISTRICT

The following pages contain categorized lists of identified projects submitted by local governments in the Southeast Alabama Economic Development District for the period 2003-2005. These projects are categorized in the development categories as follows:

CF- Community Facilities

Objectives:

- Promote the improvement and expansion of community facilities.
- Promote the improvement and expansion of community water and sewer facilities in order for local governments to meet compliance with the Safe Water Act, the Water Quality Management Act and other related State regulations.
- Promote improvement and expansions of regional sanitary landfills and solid waste disposal in order to meet the requirements of Subtitle D of the Conservation and Resource Recovery Act.
- Promote the expansion and improvement of health care delivery services and facilities.
- Promote recycling among local governments.
- Assist local governments with compliance with the provisions of Section 504 of the Rehabilitation Act and the Americans with Disabilities Act.

Trans- Transportation

Objectives:

- Expand and improve highway and street systems.
- Improve rural and urban transportation routes to serve the needs of the regional community especially to promote economic development and industrial expansion.
- Expand public transportation systems in the region to provide service to the elderly and low-income persons.
- Encourage and support the expansion of regional airports.
- Promote the enhancement of existing roadways and transportation systems regionally through assisting local governments to access the Intermodal Surface Transportation Efficiency Act (ISTEA) program.
- Support regional efforts to four-lane main transportation arteries in Southeast Alabama including the completion of U.S. Highway 431 from Barbour County; U.S. Highway 84 and State Highway 167.
- Support the development of a limited access highway connecting the region to Interstate 10 in the Florida Panhandle.

ID- Industrial Development

Objectives:

- Promote and encourage expansion of public infrastructure such as water, sewer, fiber, telecommunications, access roads, natural gas, rail, highways etc. in order to attract and retain the industrial base in the region.
- Promote and encourage local governments to seek federal and state grant assistance through various programs such as CDBG, EDA, Delta Regional Authority, USDA/Rural Development, FEMA and other sources to construct infrastructure facilities for industrial development and the creation and retention of jobs.
- Promote the availability of small business loan program resources through the regional planning commission to stimulate small business development and the creation of new jobs in the region.
- Work to develop and maintain working relationships with regional economic development professionals in order to effectively achieve desired results in industrial development. This includes the development of industrial sites throughout the region.
- Encourage the development of small businesses by providing technical assistance to local governments to access existing State of Alabama development grants such as the economic development infrastructure grant program through the Alabama Department of Economic and Community Affairs.
- Encourage the development of small businesses by providing technical assistance to local governments to access existing State of Alabama Community Development Block Grant loan programs such as the economic development float loan programs.
- Continue to promote and expand the existing economic development loan funds available through SEARPDC: EDA/Revolving Loan Fund; USDA/Rural Development microloan and Intermediary Relending Programs (IRP) to provide needed development gap financing capital to eligible qualified small business concerns that create and retain permanent jobs in the region.
- Promote and support the development of prepared industrial sites and parks in the region so as to provide available industrial sites for the location of new industries and expansion of existing industries. Seek development funding through various State and Federal programs such as CDBG, USDA, EDA etc.
- Continue support for the Statewide Revolving Loan Fund program.
- Continue to pursue initiatives concerning regional exporting programs to assist regional businesses interested in exporting goods and services.
- Cooperate with regional economic development corporations, Chambers of Commerce and other interested parties to develop a regional marketing program. Continue cooperative efforts with the Alabama Aviation Advantage initiative being developed to create an aviation identity for the South Alabama region.

- Support regional economic development groups and corporations through shared resources and technical assistance. Support any new economic development groups in the region through staff technical assistance.
- Promote and support the diversification of agri-business and the development of "value added" agricultural products.

NRC- Natural Resources/Conservation

Objectives:

- Promote improvement and expansions of regional sanitary landfills and solid waste disposal in order to meet the requirements of Subtitle D of the Conservation and Resource Recovery Act.
- Promote and provide technical assistance for establishment of recycling programs among local governments

EDU- Education/Workforce Training

Objectives:

- Support regional initiatives to improve the general educational systems.
- Promote and support regional planning and visioning initiatives to address fundamental inadequacies and problems associated with education programs.
- Support the development of adequate educational facilities and infrastructure in regional schools including advanced telecommunications facilities to support distance learning and high technology curriculums.
- Support the development of educational curriculums geared to the needs of business so as to promote a workforce trained with skills needed by businesses.
- Support the expansion of more adult based educational programs and "retraining" programs for displaced textile manufacturing workers who have been displaced by these jobs being moved offshore.

HUMAN- Human Services

HOUS- Housing

Objectives:

- To promote and support the preservation and improvement of the regional housing stock through housing rehabilitation programs.
- Provide comprehensive planning and technical assistance to local governments with regard to land use, code enforcement and zoning.
- Promote and encourage home ownership especially for low-moderate income persons. Explore program availability for assisting lower income persons with affordable housing ownership.

- Support regional public housing projects with technical assistance to access grant funding to promote safe and secure neighborhoods and to eliminate chronic problems such as drugs and crime.
- Encourage the development of housing for the elderly.

REC- Recreation/Culture

Objectives:

- Promote and support the expansion of recreational facilities in the region through technical assistance to local governments including the following grant programs: CDBG, Land and Water Conservation Fund (LWCF) and Recreational Trails Program.
- Ensure the developments of recreational facilities are accessible by all persons including those with physical handicaps and the disabled.
- Encourage that recreational facilities are diverse and afford a variety of activities that are of interest and use by the regional community.

Southeast Alabama Regional Planning & Development Commission

"COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY (CEDS)

EVALUATION METHOD

The Comprehensive Economic Development Strategy (CEDS) is mandated to contain an evaluation component and should be an element of an ongoing planning process. The evaluation should answer the questions of ***"How are we doing?"*** and ***"What can we do better?"*** Performance measures are to be an integral part of the evaluation process so that the progress of development activities can be identified in achieving the vision and goals of the CEDS.

The Southeast Alabama Regional Planning & Development Commission CEDS Committee and the Economic Development Staff (Economic Development Director and Economic Development Specialist) will be responsible for periodically evaluating the CEDS to ensure that regional economic development goals and objectives are being accomplished. The CEDS evaluation will be completed on an annual basis and any recommendations from the CEDS Committee will be incorporated into the annual CEDS update submitted to the Economic Development Administration (EDA). It is important to include broad and diverse regional participation into the CEDS evaluation process through the membership of the CEDS Committee.

This evaluation method will measure the performance and effectiveness of the CEDS and will include the following measurement criteria:

- Number of economic development initiatives from the Comprehensive Economic Development Strategy (CEDS) process implemented between October 1st and September 30th that led to private investment and jobs;
- Category type and number of project(s):
  - Facility Construction/Rehabilitation
  - Infrastructure
  - Technical Assistance
  - Planning
- Number of Economic Development Administration (EDA) funded investments approved for the period;
- Number of other state and/or Federally funded investments approved for the period (i.e. CDBG, USDA, ALDOT, FEMA etc.);
- Estimated number of new jobs created/retained in the region as a result of project(s);
- Estimated amount of private sector investment generated by project(s);
- Estimated amount of public sector investment generated by project(s);
- Number of project(s) that were either Technology or Brownfield.

APPENDIX

“A”

State Strategic Plan Phase II (SSPPII) Committee Members

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APPENDIX

"B"

DESCRIPTION	LOCATION	DEVELOPMENT CATEGORY	FISCAL YEAR(S)	ESTIMATED COST	PROPOSED FUNDING SOURCE
Walking trail in District 1	Coffee County	REC	2002-2003	$30,000	Recreational Trails Grant Program/Local
Improvements to Sportsplex at ESJC	Coffee County	REC	2003-2004	Unknown	LWCF/Local
Equestrian and walking trails complex	Covington County	REC	2003-2004	$300,000	LWCF/Local
14 field ball complex	Covington County	REC	2003-2004	$1,400,000	LWCF/Local
Walking trail	Abbeville	REC	2003-2004	$50,000	Recreational Trails Grant Program/Local
Coleman Park pool and playground improvements	Andalusia	REC	2002-2003	$150,000	CDBG/Local
Legends Park development	Andalusia	REC	2003-2004	$1,500,000	CDBG/Local
Cooper indoor swimming pool	Andalusia	REC	2004-2005	$1,400,000	CDBG/Local
Church St. School rehab for recreation	Andalusia	REC	2004-2005	$500,000	CDBG/Local
Johnson Park rehabilitation project	Andalusia	REC	2004-2005	$250,000	LWCF/CDBG/Local
Recreation park improvements	Ashford	REC	2003-2005	Unknown	LWCF/RTP/Local/CDBG
Municipal swimming pool & walking trail	Coffee Springs	REC	2003-2004	$125,000	LWCF/Local
Gymnasium improvements	Coffee Springs	REC	2003	$25,000	Local
Development of new recreational park complex	Daleville	REC	2003-2005	$500,000	LWCF/RTP/Local/CDBG
Eastgate Park soccer field complex	Dothan	REC	2003	$2,500,000	Local
Playground units at 5 neighborhood parks	Dothan	REC	2003	$125,000	LWCF/Local
Lincoln Center concessions and restrooms	Dothan	REC	2003	$50,000	OBG/Local
2 new ballfields at Lincoln Park	Dothan	REC	2003	$75,000	CDBG/Local
Pavillion at Colby/Bottoms Field	Dothan	REC	2003	$20,000	LWCF/Local
Pittman Field Concessions and Restrooms	Dothan	REC	2003	$100,000	Local
Girls softball complex (4 fields)	Dothan	REC	2004	$1,500,000	Local
Interactive water playground-Lincoln Park	Dothan	REC	2004	$100,000	CDBG/LWCF
Zero depth kiddie pool @ Water	Dothan	REC	2004	$100,000	Local

World					
Land acquisition in SW area for development	Dothan	REC	2004	$750,000	Local
Pavillion at Westgate Park	Dothan	REC	2004	$20,000	Local
Skateboard Park	Dothan	REC	2004-2005	$250,000	CDBG/LWCF/Local
Improvements at Westgate Tennis Center	Dothan	REC	2005	$500,000	Local
Playground construction	Elba	REC	2003-2004	$50,000	LWCF/Local/Private
Development of soccer complex	Elba	REC	2003	$100,000	State/Local
Renovation of City Parks	Elba	REC	2003-2005	$100,000	LWCF/Local/Private
Renovation of City swimming pool	Elba	REC	2003	$25,000	LWCF/Local
Construction of youth ballfields	Elba	REC	2003-2004	$500,000	LWCF/CDBG/Local
Construction of auxiliary gym/building	Elba	REC	2003-2005	$150,000	Unknown
Henderson Park wetlands trail	Enterprise	REC	2003	$100,000	RTP/LWCF/Local
Recreational walking trails	Eufaula	REC	2003	$50,000	RTP/Local
Rails to Trails program	Eufaula	REC	2005	$45,000	ISTEA/LWCF
Soccer complex development	Eufaula	REC	2003	$200,000	LWCF/Local
Youth baseball complex lighting	Eufaula	REC	2003	$100,000	LWCF/Local
Capital improvements @ Old Creek Town Park	Eufaula	REC	2005	$250,000	Congressional appropriation
Skateboard Park	Geneva	REC	2003	$75,000	LWCF/Local
Acquisition of additional land for recreation	Hartford	REC	2002-2003	$30,000	Local
Recreational trail project	Hartford	REC	2003	$20,000	RTP/Local/Private
Swimming pool at municipal park	Hartford	REC	2004	$300,000	LWCF/Local/Private
Development of Espy recreational park-Hwy 431	Headland	REC	2002-2004	$1,180,000	CDBG/LWCF/RTP/Local/Private/Foundation
Hiking/bike trail at Espy recreation park development	Headland	REC	2003-2005	$100,000	LWCF/RTP/Local/Private/Foundation
Community building at recreation park	Kinston	REC	2005	$100,000	LWCF/CDBG/Local/Private
Recreation park improvements	Malvern	REC	2003-2004	$25,000	LWCF/Local
Public walking and nature education trail	Opp	REC	2002-2003	$75,000	LWCF/RTP/Local/State appropriation
Construction of new recreational park	Midland City	REC	2003-2005	$1,000,000	LWCF/RTP/Local/CDBG

Local Historic museum at Town Hall	Midland City	REC	2003-2005	$50,000	ISTEA/Local/Private
Recreation park improvements	Newton	REC	2003-2005	$250,000	LWCF/RTP/CDBG/Local
Racetrack athletic complex	Ozark	REC	2003-2004	$950,000	CDBG/Local
Municipal soccer fields	Ozark	REC	2003-2004	$318,000	LWCF/Local
Municipal pool repair-Perry Rec. Center	Ozark	REC	2003-2004	$100,000	LWCF/Local
Museum and antique gallery-local interest	Red Level	REC	2003-2005	$250,000	Unknown
Walking trail at Rehobeth Nature Park	Rehobeth	REC	2003	$35,000	RTP/Local/Private
Development of Nature Park	Rehobeth	REC	2004	$25,000	LWCF/Local/Private
Development of Recreation Park/ballfields	Rehobeth	REC	2004-2005	$200,000	LWCF/CDBG/Local
Recreation center building	Rehobeth	REC	2005	$120,000	LWCF/CDBG/Local/Private
New concession stand/restrooms at rec. park	Samson	REC	2003	$150,000	LWCF/CDBG/Local/Private
Remodel old armory hall for recreation center	Samson	REC	2004	$750,000	Unknown
Walking trail at Town recreation park	Samson	REC	2005	$50,000	LWCF/RTP/Local/Private/Foundation
Recreation park improvements	Slocomb	REC	2003-2004	$50,000	LWCF/RTP/Local/Private/Foundation
Recreation park and walking trail	Taylor	REC	2003-2004	$200,000	LWCF/RTP/Local
Cherry Gymnasium renovation-	Wallace College	REC	2004-2005	$390,000	State/Local