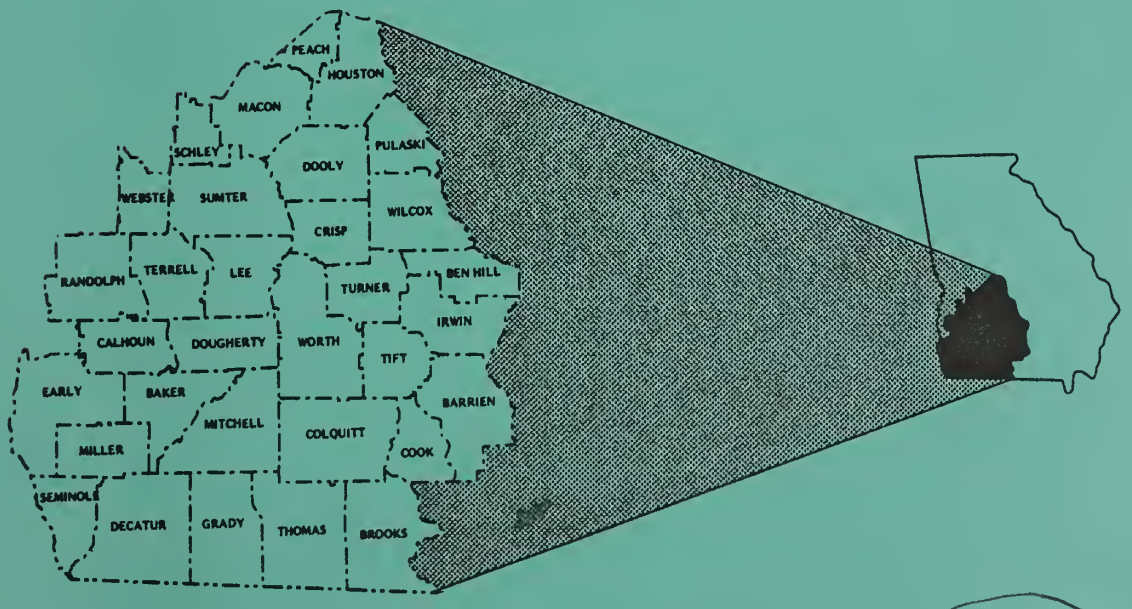
SOUTHWEST GEORGIA LAND AND WATER RESOURCE COOPERATIVE STUDY

MAIN REPORT



SOUTHWEST GEORGIA REPORT

Prepared as a Part of the

SOUTHWEST GEORGIA LAND AND WATER RESOURCE COOPERATIVE STUDY

UNITED STATES DEPARTMENT OF AGRICULTURE
ECONOMIC RESEARCH SERVICE
FOREST SERVICE
SOIL CONSERVATION SERVICE

In Cooperation With

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
SOIL AND WATER CONSERVATION COMMITTEE

December 1982

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PREFACE

The 32-county southwest Georgia area was identified in the 1976 Georgia Water Quality Plan as having the greatest potential for pollution problems relative to agriculture within the State. Tremendous increases in irrigated cropland as well as substantial increases in municipal and industrial water usage concerns area residents about the potential of the area's land and water resources to meet future needs.

These concerns prompted the State of Georgia to request this study under the authority and provisions of Section 6 of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, as amended). The study was conducted by representatives of the Soil Conservation Service (SCS), Forest Service (FS), and Economic Research Service (ERS) within the U.S. Department of Agriculture.

This report is the result of 3 years of study. Impacts of future land use patterns, expansions in irrigated cropland, and proposed land treatment systems on levels of soil erosion, water use, land use, and economic returns to agriculture in 1990 are projected.

A major thrust is to provide basic data needed to develop land and water management strategies for the future. The emphasis is on cropland use and its resulting impact on land and water resources and the area's economy.

STUDY PARTICIPANTS AND CONTRIBUTORS

U.S.
- Agricultural Research Service
- Agricultural Stabilization and Conservation Service
- Army Corps of Engineers
- Economic Research Service
- Forest Service
- Fish and Wildlife Service
- Geological Survey
- National Oceanic and Atmospheric Administration
- Soil Conservation Service

Georgia
- Office of Governor
- Office of Planning and Budget
- Department of Agriculture
- Cooperative Extension Service
- Forestry Commission
- Department of Natural Resources
- Soil and Water Conservation Committee
- University System

Local

Area Planning and Development Commissions
- Heart of Georgia
- Lower Chattahoochee
- Middle Georgia
- Middle Flint
- South Georgia
- Southwest Georgia

Soil and Water Conservation Districts
- Alapaha
- Flint River
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SUMMARY

Southwest Georgia is considered the "breadbasket" of the State. Agriculture produces much of the economic activity of the region, with agricultural income amounting to about $1 billion each year. This is one-third of the total for the entire State. Agriculture is the mainspring of southwest Georgia. The area's future is tied closely to the future of agriculture, and the future of agriculture depends on the soil and water resources.

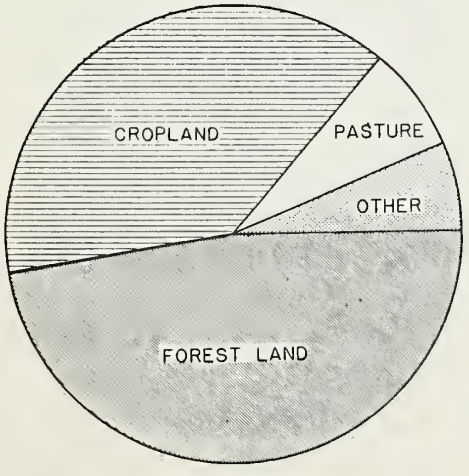
Recent shifts to more intensive farming and more irrigation along with increases in municipal and industrial water use have caused concerns about the quantity and quality of soil and water resources in the future. Conservation leaders wanted some answers before resource problems got out of hand. They encouraged the Governor to request a formal study of this 32-county southwest Georgia area. In April 1979 the U.S. Department of Agriculture began a resource study of the area.

The main study objective was to develop land and water resource management strategies and recommendations for implementation. Study activities included conducting inventories of land use, prime farmland, areas with excessive erosion, irrigable acres, and acres irrigated. These were used as bases for projecting land and water use to 1990 and evaluating the impacts of alternative land treatment programs on those projected conditions.

The 1979 based inventories showed that of the area's 7.7 million acres, about 47 percent of the area is in agriculture and 47 percent in timber. The remaining 6 percent is in urban use, water bodies, and miscellaneous uses.

FIGURE S-1

LAND USE (1979)



LAND USE	ACRES	PERCENT
CROPLAND	2,972,540	39
FOREST LAND	3,636,390	47
PASTURELAND	573,090	8
OTHER	479,080	6
TOTAL	7,661,100	100

About 3 million acres, or 39 percent of the land, is cultivated and producing mainly soybeans, corn, peanuts, cotton tobacco, sorghum, nuts, fruits, and vegetables. Another 8 percent is used for pasture. Sawtimber and pulpwood are the major timber products.

The inventory showed that the area has good soils. About 40 percent of the study area is prime farmland, land that is best for growing crops. Only 57 percent of the prime farmland is actually cultivated. About 10 percent of the land being cropped is not suitable for cultivation.

Significant land and water use changes are occurring. Since 1971, nearly a quarter-million acres of forest have been converted to cropland. About 200,000 acres of wetlands have been converted to other uses since 1953. Extending existing fields to permit operation of center pivot systems accounts for many of these changes. The area has a good water supply, a major factor in the growth of industry and intensive agriculture. Irrigation has grown from approximately 100,000 acres to well over 500,000 acres between 1970 and 1979.

Basic trends of the last decade are expected to continue. Projected increases in cropland and irrigated acreage and more intensive farming will further expand the area's economy and place more stress on basic resources. Irrigated acreage is projected to increase by 300,000 acres during 1979-1990, bringing the total to 800,000 acres.

About 64 percent of the 683.1 million gallons per day (MGD) of water used for all purposes in 1979 was withdrawn from ground water systems. The estimated annual recharge is 684 MGD. Only the Clayton aquifer which has a very limited recharge area is showing evidence of aquifer mining. Water use in 1990 is projected to increase to 876.1 MGD. About two-thirds of this would be used in agriculture. The additional irrigation will require that about 1,200 new wells be added to the 2,400 in use in 1979.

Assessment of the water resources indicates that areawide, the ground water supply is apparently adequate for the projected 1990 condition. Only about 18 percent of the estimated supply of 4.8 billion gallons per day would be needed for all uses. But the total supply is limited, and concentrated pumping by all users will put pressure on water availability in some areas at times of peak usage. Existing pumps in a few communities may have to be lowered, and some wells might fail during periods of continuous irrigation.

Cropland acreage has been increasing annually since early 1970. Cropland in 1990 is projected to be 3.2 million acres, about 202,000 acres above the 1979 level. All resources will be affected by this change, as well as by management changes on existing land uses.

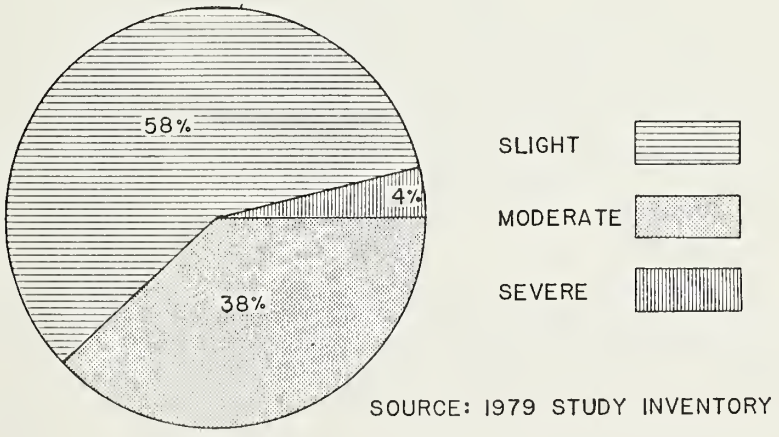
About 240,000 acres of timber land are projected to be converted to other uses which would reduce income from wood sales. However, better management of the remaining stands could, in time, replace production from the acreage lost. Some land now in crops should be shifted to trees.

Loss of prime farmland will continue along the I-75 corridor and around towns. Better land use planning practices would reduce this problem. More wetlands will be converted to other uses. Planning could help retain these important areas. In fact, all resources will be affected by the changes projected for "1990 conditions." Some will be lost; others can be managed to reduce the damage.

The study clearly shows that cropland erosion is now, and will likely continue to be, the most critical resource problem. Concerns such as adequate water supplies; water quality; recreation; roadbank erosion; and loss of forest land, wetlands, and prime farmland constitute less significant area problems.

Of the area's 3 million acres in cropland, about 2.6 million acres are cultivated, with 1.1 million acres eroding at a rate faster than the soil can renew itself. This rate is approximately 5 tons per acre per year. About 102,400 acres are eroding 3 to 5 times the renewable rate. Much of the latter is on land not suitable for row crops.

FIGURE S-2:
CULTIVATED CROPLAND NEEDING TREATMENT



SOURCE: 1979 STUDY INVENTORY

The excessive erosion areas are identified on the map in Chapter II. This map, along with individual county maps, shows all cropland erosion. These maps and county maps of land use, irrigated areas, and prime farmlands are available in county Soil Conservation Service offices and the SCS staff office in Athens, Georgia.

Estimated erosion from cropland produces an average annual soil movement of about 6 tons per acre. The 102,400 cropland acres eroding at more than 15 tons per acre per year annually displace one-quarter of an inch of topsoil or 1 inch every 4 years. Some 10 percent of the soil material annually eroded from cropland leaves the source areas, thereby creating offsite deposition equivalent to 87,200 dump trucks filled with soil, lined up bumper to bumper from Albany, Georgia, to Columbus, Ohio, approximately 600 miles.

The loss of productive topsoil requires extra fertilizer, more water, and better management to maintain high yields. These items are expensive and reduce profits.

For 1979, erosion in excess of 5 tons per acre on 1.1 million acres of cropland resulted in an estimated average annual loss in net returns of $2.65 for each ton. Continued erosion further reduces yield potential year after year. Over the 21 years it would take the ongoing conservation program to treat the excessive erosion, $344 million would be foregone. The farmer's loss becomes the local business community's loss.

If conservation practices in place in 1979 were maintained and no additional practices were installed by 1990, there would be about 1.2 million cropland acres with excessive erosion producing 13.9 million tons of erosion as compared with the 1.1 million acres and 12.4 million tons in 1979. About 12 percent more land would have excessive erosion, which is reflected not only in erosion and sedimentation but production loss as well.

To assess the 1990 projected condition, three levels of cropland erosion treatment were developed: ongoing, redirected, and accelerated.

The ongoing program represents a continuation of current programs with no change in emphasis of technical assistance or new or accelerated programs by 1990. With the redirected program, all existing technical assistance would be concentrated on installing erosion control practices only. With the accelerated program, technical assistance would be provided to adequately treat all land with erosion and water management problems by 1990.

Nearly 50 percent of the land needing treatment in 1979 would be treated with the ongoing program by 1990. Erosion would be reduced by about 4.1 million tons per year in 1990, a 30-percent reduction over the 1979 level. About 630,000 acres would still need treatment in 1990. Installation cost exclusive of drainage cost for the ongoing program is estimated at $35,756,700.

TABLE S-1

COMPARISON OF ALTERNATIVES ON EROSION
FOR TREATMENT APPLIED IN ADDITION TO 1979 BASE
(11-Year Treatment Period: 1979-1990)

Comparison Item	Ongoing Program	Redirected Program	Accelerated Program
Erosion Treatment Needed (acres)	1,192,360	1,192,360	1,192,360
Land Treated for Erosion (acres)	563,060	550,680	1,192,360
Total Erosion Reduction (tons by 1990)	22,668,910	39,314,660	56,960,860
Installation Cost of Added Erosion Treatments (dollars)	22,993,930	58,644,920	71,900,270
Total Cost (dollars)	35,756,680	71,486,420	92,345,520

Source: Table III-2

With a redirected program, about the same number of acres would be treated as with the ongoing program. However, erosion would be reduced by 7.1 million tons per year in 1990, about half the 1979 level. In addition to erosion control practices, this reduction in erosion would be achieved by converting 150,000 acres of cropland to hayland-pasture and 92,500 acres of cropland to woodland during the 1979-90 period. Installation cost of the redirected program is estimated to be $71,486,400.

With the accelerated program, all land would be adequately treated, and erosion in 1990 would be reduced by 10.4 million tons per year. This represents nearly a 75-percent reduction over the 1979 level. Technical assistance for this program would be more than double that for the ongoing and redirected programs, and would include other technical services that are now being provided. Conversions of cropland to permanent vegetation would be identical to those in the redirected program. The accelerated program would also include treatments to improve drainage on nearly 100,000 acres. Installation cost of this alternative is estimated to be $92,345,500, exclusive of drainage cost.

In addition to the installation cost, area farmers have a $19-million annual maintenance cost for measures already installed in the base. The redirected and accelerated programs would both require cost sharing considerably above the present $1.1 million per year provided through the Agricultural Conservation Program (ACP). Continuation of this level would provide cost sharing for only 17 percent of the estimated $6.5 million per year needed for the 1990 projected condition.

The combined effects of land treatments, expansions in cropland base and irrigated acres, and improved technology on net returns to land management and risk for production of six major crops were evaluated. Costs of land treatment and land conversions were included. Costs of technical assistance and payments for cost sharing were excluded. Two levels of expansion in irrigated acres were considered. With a moderate expansion in irrigation of 30,000 acres per year, annual net returns in 1990 with the ongoing land treatment program were estimated to be $240.7 million, about 50 percent above the 1979 base level. All values were in terms of 1975-79 normalized prices. Comparable annual returns with the accelerated land treatment program were $257.9 million, about 7 percent higher than returns with the ongoing program. Net returns were even larger with a high expansion in irrigation of 60,000 acres per year. Net returns were not estimated for the redirected program.

Many on the study area steering committee and with the soil and water conservation districts felt that the ongoing program is inadequate, and a more positive action for resource management is needed. They also felt that an accelerated program approach would be the most desirable to resolve the cropland erosion problem. Maintaining good water quality in the future would also be more likely. Many recognized that initially a form of the redirected program may have to be implemented until additional funding and some type of incentive program can be developed.

It was felt that a voluntary program is greatly preferred to a regulatory program. Present USDA policy for its assistance programs is to target conservation funds and people into identified or designated areas which have the worst soil erosion problems. This policy will probably continue throughout the 1980's. Therefore, the first major step or action in the implementation strategy is to develop an information and education program to present the erosion control components to the general public as well as the landowners and farm operators. Priorities should be established with consideration given to existing programs, financial arrangements, and the need for new or revised programs.

To aid in this development, the Soil Conservation Service has proposed to assign a person full time within the study area. The study team recommends the contents of Table IV-1, Recommended Action Plan, as a tentative guide prioritizing the needs.

An application for an accelerated erosion control program is expected. A request for new or amended programs or legislation that will provide more funds and incentives for installing and maintaining conservation practices on most of the excessively eroding cropland as well as some of the other components of the recommended action plan is also anticipated. Other recommendations such as water conservation, wetland protection, and prime farmland preservation will require technical inputs from concerned agencies and institutions. In some cases, legislation may be needed to effectively protect the resources.

If the local leaders and land managers take appropriate actions on the resource problems presented in this report, the soil resource will be protected and enhanced to provide for continued and greater economic well-being of southwest Georgia. Such actions will also reduce the impact of future agricultural demands on the water resource. These actions will be important, not only to the area, but to the rest of the state and region as well, for they will be providing leadership to solving problems that are common to the whole southeastern region.

DESCRIPTION OF THE STUDY AREA

LOCATION AND SIZE

The study area consists of 32 counties composed of approximately 7.7 million acres located in southwest Georgia. The area is bounded along the south by the Georgia-Florida state boundary and along the west by the Chattahoochee River, which is also the Georgia-Alabama state boundary. The northern boundary roughly approximates the outcrop area of several geologic formations that produce a very sandy and somewhat agriculturally unproductive surface mantle. The eastern study area boundary follows the Ocmulgee River southeastward to a point where the river turns eastward toward the Atlantic Ocean. The study boundary then follows county boundaries basically south to the Georgia-Florida line (Figure I-1).

The area, in the base year 1979, had the following distribution:

Land	Water	Total (acres)
7,584,180	76,920	7,661,100

Land area comprises 99 percent of the total study area.

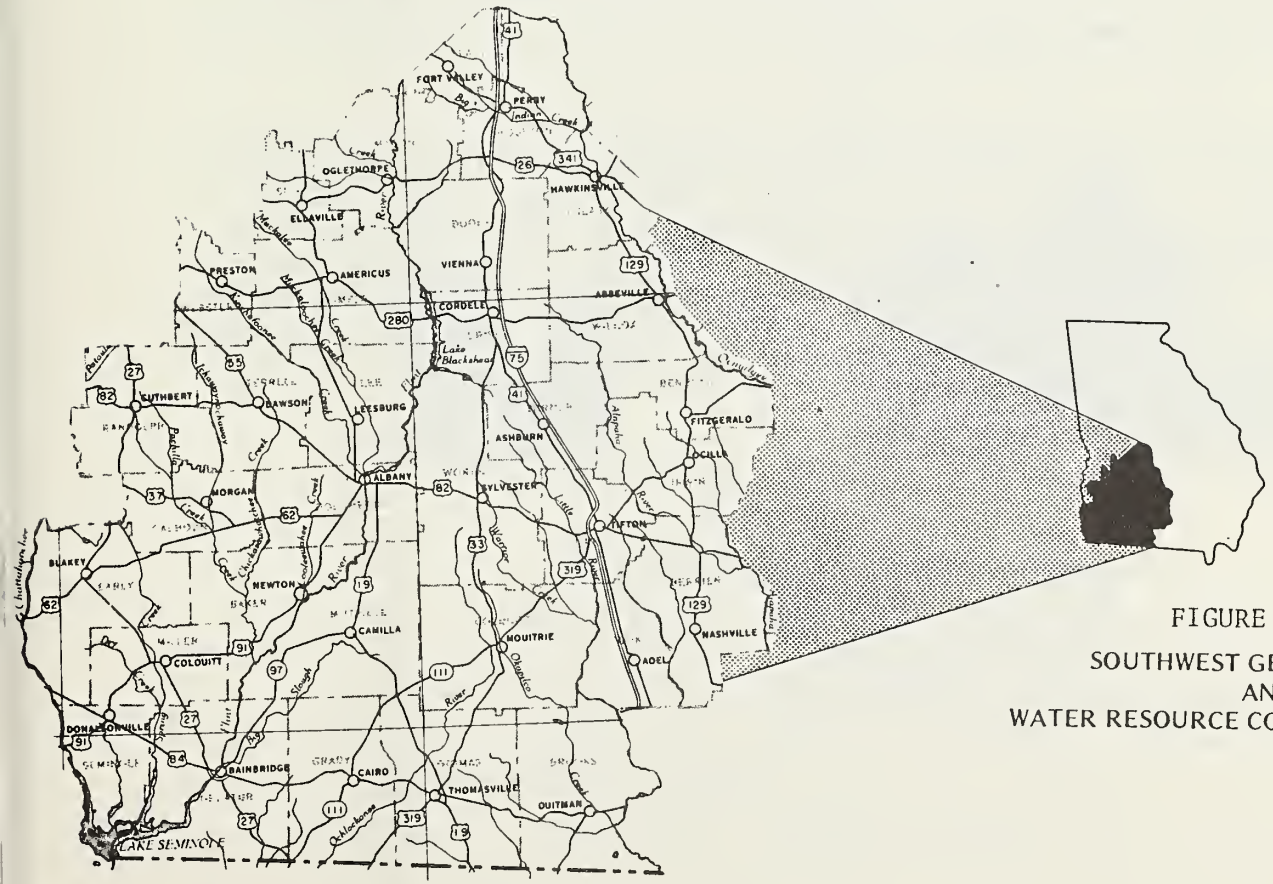


FIGURE I-1

SOUTHWEST GEORGIA LAND
AND
WATER RESOURCE COOPERATIVE STUDY

CLIMATE

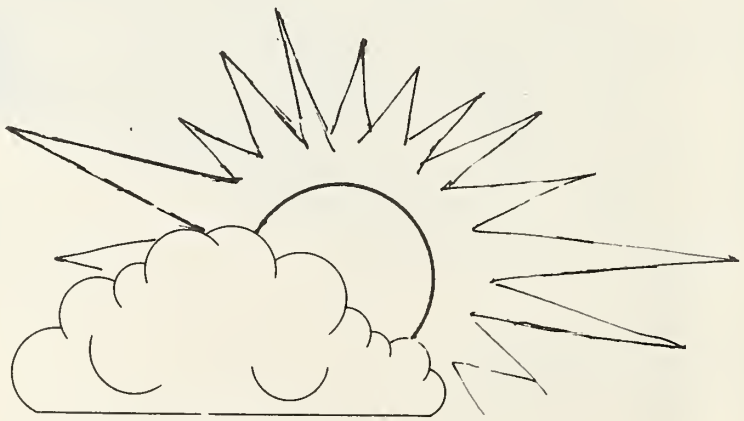
Climate varies somewhat within the 32-county area; therefore, average conditions for the area are described.

Summers are hot and humid. Daytime temperatures reach or exceed 90°F on about 90 days during an average year. More than half the summers have one or more days with a temperature of 100°F or above. Minimum temperatures during summer are normally near 70°F. The average relative humidity is lowest in midafternoon at near 55 percent; it is highest at dawn at about 90 percent.

Winters are usually mild. Daily maximum temperatures average about 65°F. Temperatures of 32°F or lower are reached on about 30 days during an average winter. At times temperatures drop below 20°F, but usually moderate in 1 or 2 days. Only about two winters in ten have as many as 4 days with a low temperature of less than 20°F. The freeze-free growing season is typically about 240 days, extending from mid-March to mid-November. The mean annual temperature is approximately 66 degrees.

Average annual rainfall is about 49 inches, with 30 percent of the annual total falling during June, July, and August. Showers and thundershowers are responsible for most rain during the summer, and large variations in amounts are evident from place to place. On the average, rainfall amounts of 0.1 inch or more will be recorded on 25 to 30 days during the summer months. One inch or more will be recorded on 5 to 6 days during an average summer.

July is the wettest month with an average rainfall of nearly 6 inches. Shower activity decreases after mid-September, and fall is normally the driest season. During winter, most rain is associated with cyclonic storms and weather fronts. Winter rainfall is usually widespread and evenly distributed. Spring brings an increase in showers and thundershowers. March is the second wettest month with about 5 inches of rainfall. Amounts decrease successively in April and May before increasing again in June. Climatological data for three cities within the area are presented in the following map.

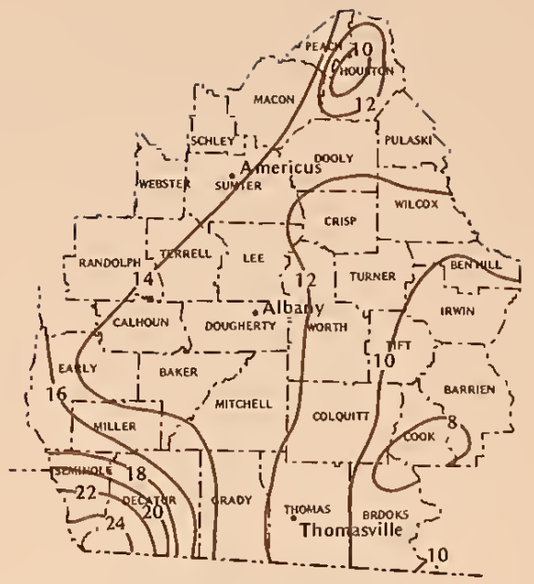


TEMPERATURE, RAINFALL AND RUNOFF

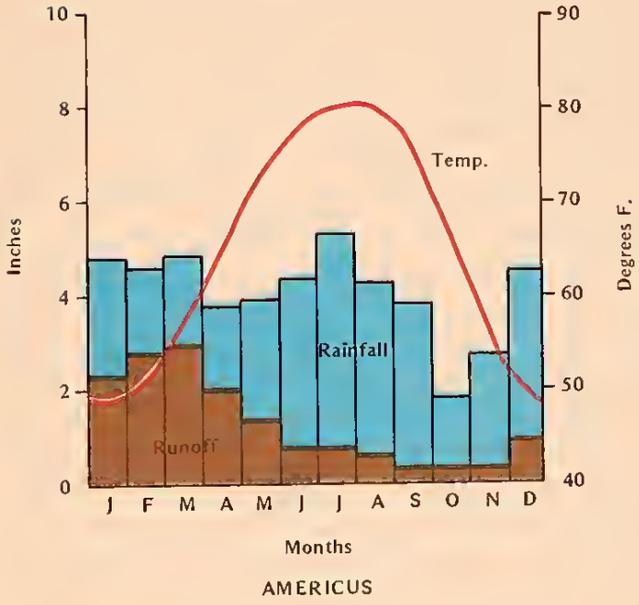
AVERAGE DISTRIBUTION FOR SELECTED LOCALITIES

MEAN ANNUAL TEMPERATURE - °F

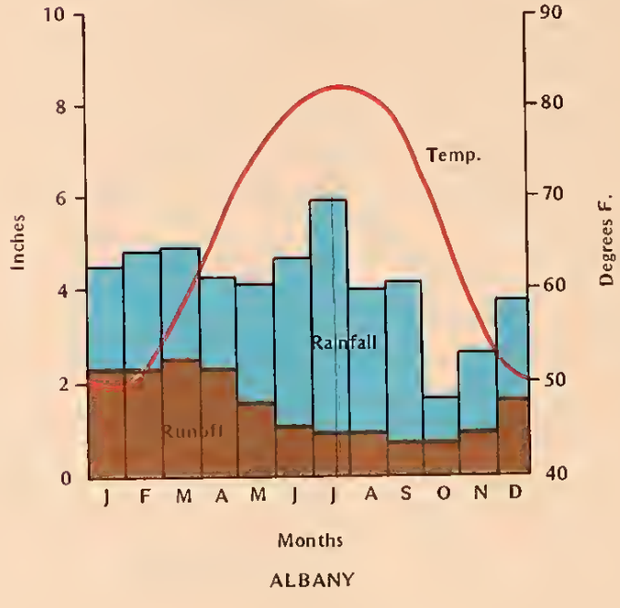
MEAN ANNUAL RAINFALL - IN.



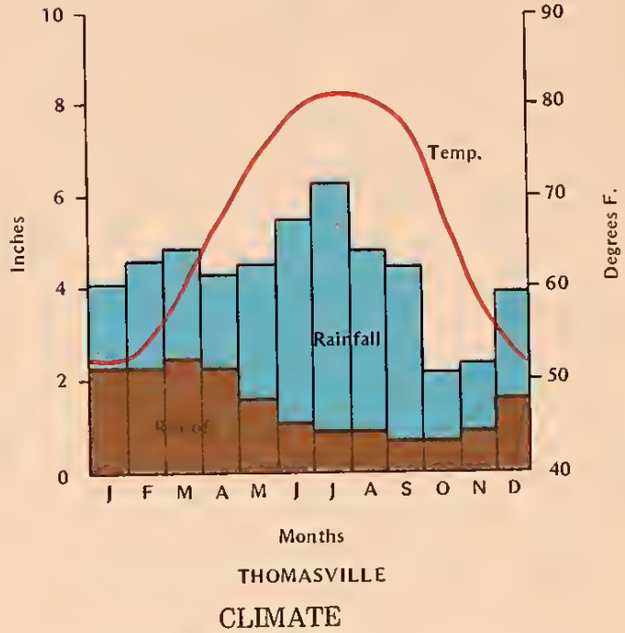
MEAN ANNUAL RUNOFF - IN.



AMERICUS



ALBANY



THOMASVILLE

SOURCE: Environmental Data Service, N.O.A.A. & U.S.G.S.

CLIMATE
SOUTHWEST GEORGIA LAND
AND
WATER RESOURCE COOPERATIVE STUDY

JUNE 1981 4-R-36777

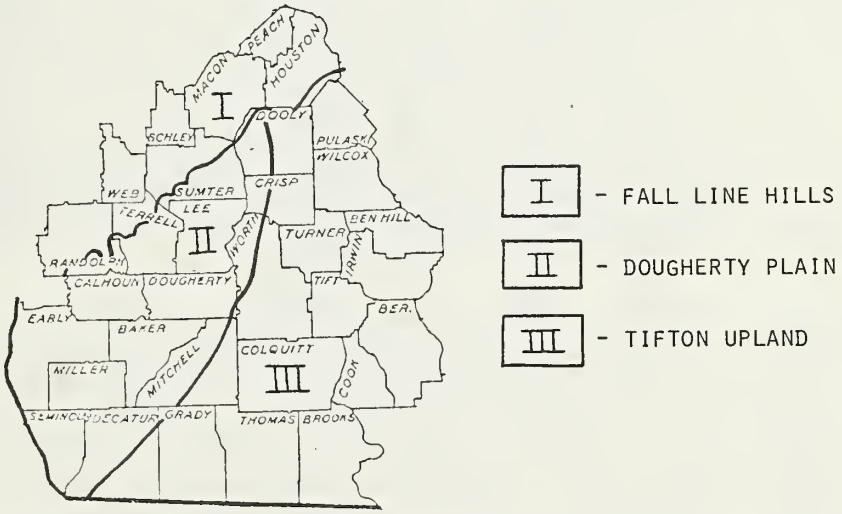
USDA-SCS-FORT WORTH TEXAS 1981

LAND RESOURCES

PHYSIOGRAPHIC AND GEOLOGIC DEVELOPMENT

The study area contains some 1.2 million acres within the Fall Line Hills Physiographic District and 2.5 million acres within the Dougherty Plain Physiographic District. The Tifton Upland Physiographic District contains the remaining 4.0 million acres (Figure I-2).

FIGURE I-2 PHYSIOGRAPHIC DISTRICTS



The geological and ground water discussions presented below are supported by the Area Geology Map on the following page.

The northern part of the study area is represented by the Fall Line Hills District and is characterized by flat-topped hills or ridges and deep gullies or washes. The district is highly dissected by streams, with the larger having cut courses 200 to 350 feet below the level of the upland plain through unconsolidated sands, clays, and gravels. The softness of the strata together with high altitude of the plain above the rivers, timber removal, and cultivation of the land have helped cause extensive erosion. Some upland gullies in excess of 100 feet in depth have formed since settlement of the district. Elevations range from approximately 250 to 525 feet above mean sea level (MSL) in this district (Figure I-3).

The geology of the Fall Line Hills District is comprised of sedimentary rock composed of sands, clays, and gravels which were deposited over a basement complex of crystalline rocks similar to those in the Georgia Piedmont. The exposed sediments are of late Cretaceous to early Tertiary Age, 100 million to 65 million years ago.

The formations dip gently to the south or southeast. Some sand and gravel members have permeabilities such that they are charged with water where exposed and become aquifers when confined below the land surface. Skillfully developed wells can yield up to 1,200 gallons per minute (GPM) from some of these sand aquifers. High-yield wells normally range in depth from 200 to 1,000 feet.

The Dougherty Plain District is bounded by the Fall Line Hills on the northwest and the Tifton Upland to the southeast. It is characterized as flat to gently rolling land with few streams. The district is primarily underlain by limestone which contains networks of solution cavities. When large cavities collapse, pulling the materials from above into the void, sinkholes are created on the land surface. These may vary in size from small, shallow depressions a few feet in diameter to several hundred acres. The sinks usually contain water, forming shallow ponds or lakes that have seasonal water level changes. Many of these sinkholes transmit surface water and runoff into the limestone, making the area drainage, by a large measure, subterranean. The elevations range from approximately 125 feet to 250 feet MSL (Figure I-3).

The geology of this district has sands and limestone of Upper Cretaceaus Age to Middle Eocene Age (65 million to 40 million years ago) overlying the youngest Fall Line Hills formation. The next younger deposits are carbonate rocks, primarily limestone of late Eocene and Oligocene Age (40 million to 26 million years ago).

The gentle dip to the southeast is maintained with this depositional sequence. The limestone forms part of the principal artesian aquifer and supplies most of the ground water to the study area and most of the coastal plain of Georgia. This aquifer is recharged primarily by precipitation in the area where the formations intersect the land surface (Figure I-3). The major rivers in the outcrop area contribute recharge when regional rainfall is low. When rainfall is high, the aquifer charges the rivers. Normally, shallow wells less than 200 feet deep can be developed that produce up to 3,000 GPM of high quality water.

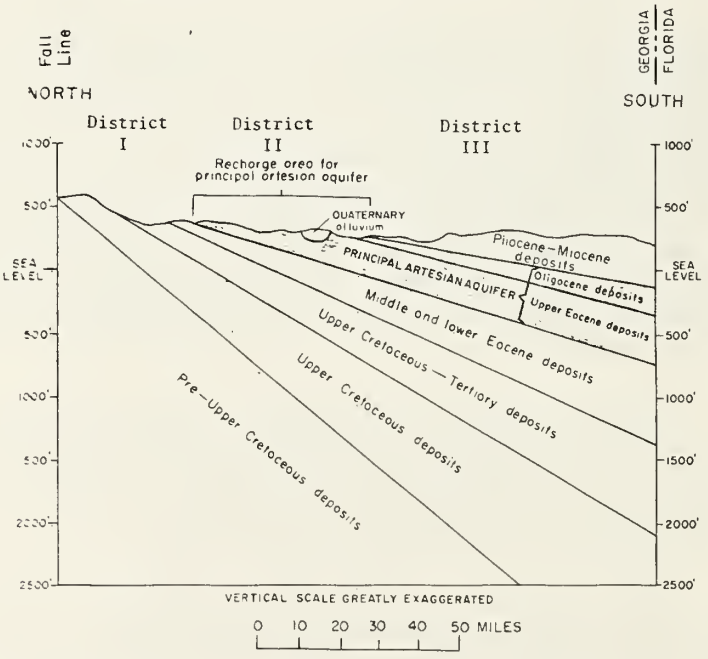


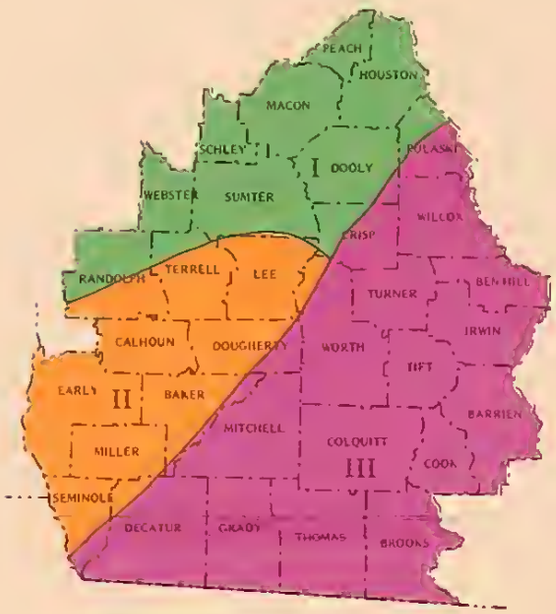
Figure I-3 Relation of the principal artesian aquifer to overlying and underlying deposits.

Source: USGS Water Resources Investigations 79-7

AREA GEOLOGY

WITHDRAWAL AREAS

SUBSURFACE DELINEATION OF PRINCIPAL GROUNDWATER AQUIFERS



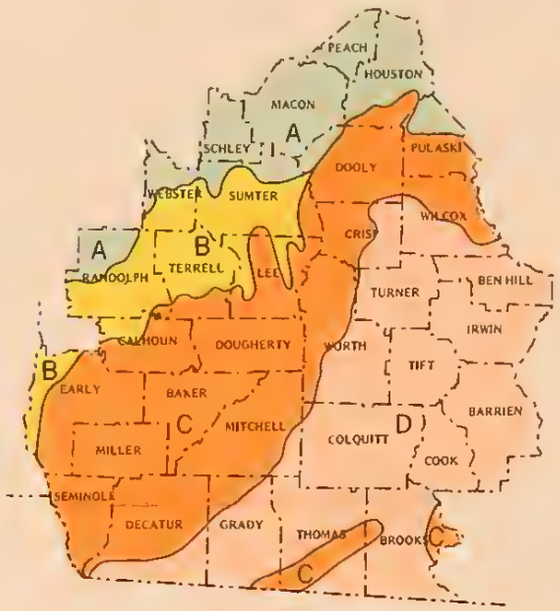
I — CRETACEOUS
Sand and Gravel
Yields 50-1200 GPM
Maximum Reported Yield 1800 GPM

II — CLAYTON-LOWER TERTIARY
Sand and Limestone
Yields 250-600 GPM
Maximum Reported Yield 1400 GPM

III — PRINCIPAL ARTESIAN
Limestone and Sand
Yields 1000-5000 GPM
Maximum Reported Yield 11,000 GPM

RECHARGE AREAS

OUTCROP AREAS OF FORMATIONS COMPRISING THE PRINCIPAL GROUNDWATER AQUIFERS



A — PALEOCENE AND CRETACEOUS SEDIMENTS, (Clayton, and Tusahoma Sand Formations), Mostly sands, recharge area for portion of South Georgia Sand Aquifer.

B — EOCENE SEDIMENTS, (Tallahatta and Lisbon Formations), Mostly sands and clays with some remnant Limestones, recharge area for portion of the South Georgia Sand Aquifer.

C — EOCENE, MIOCENE, AND OLIGOCENE SEDIMENTS, (Ocala, Suwannee, and Tampa Limestones), Mostly limestones, recharge area for the Principal South Georgia Aquifer.

D — MIOCENE AND OLIGOCENE SEDIMENTS, (Hawthorn Formation), Mostly sandy clays, Aquiclude over Principal South Georgia Aquifer.

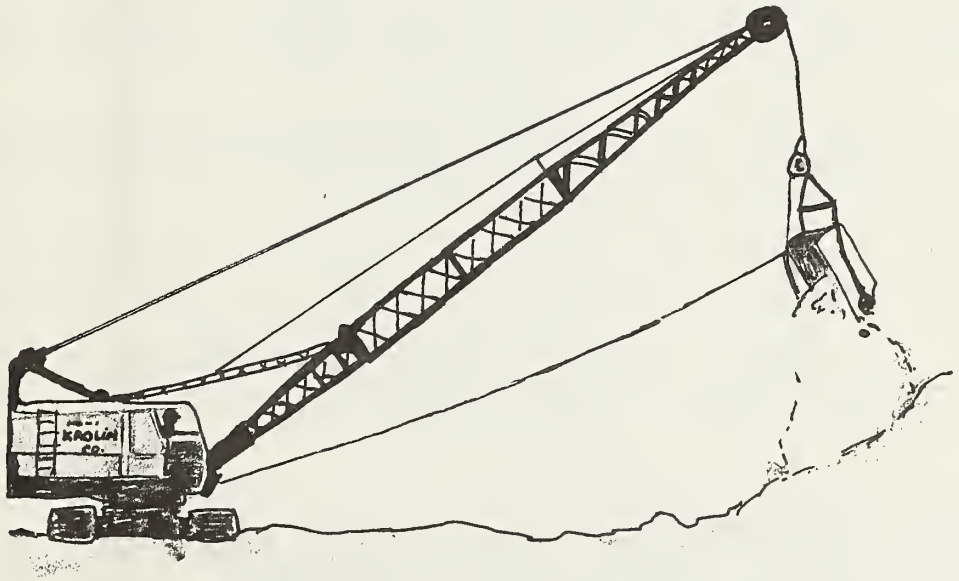
Source: Geologic Division, Ga. Dept. Nat. Res. & U.S. Geologic Survey

USDA-SCS-FORT WORTH, TEXAS 1981

JUNE 1981 4-R-36773

The Tifton Upland District represents the eastern portion of the study area. This district is an upland only in comparison with the low coastal plains on the southeast and the adjacent Dougherty Plain on the west. Elevations range from 125 feet to 470 feet MSL. A characteristic of the topography is low, rolling hills which, with the exception of the major rivers, do not rise more than 40 to 50 feet above the valleys. Streams are numerous but are generally sluggish with no defined or poorly defined channels, and flow through broad, swampy bottoms. Surface formations are mainly sands and clays of Miocene and Pliocene Age (26 million to 2 million years ago). The materials serve as a confining layer to the underlying principal artesian aquifer. Locally some sand members will produce very limited water. Larger water needs are supplied from wells developed into the underlying principal artesian aquifer. These wells normally range from 200 to 700 feet in depth (Figure I-3).

The geology contributes significantly to the natural resources of the study area. Raw materials being mined are bauxite and high alumina clays, fuller's earth, kaolin, refractory clays, structural clays, sands, gravels, peat and humic products, and limestone. The more important geologically related resource is the ground water system.



SOILS

The study area consists of sands, sandy clays, and limestone formations which give rise to a wide variety of soils. There are 40 soil associations and 269 soil mapping units represented.

These soils are distributed over four Major Land Resource Areas (MLRA). An MLRA is defined as a unit of land having similar physical characteristics such as land use, climate, water, soil elevation, and topography. The four areas represented are the Sand Hills, Black Lands, Southern Coastal Plains, and Atlantic Coast Flatwoods. These are displayed on the map on the following page.

The following groups of soil series are dominant within the study area:

Lakeland, Troup, Lucy - Excessively drained or well drained upland soils that are sandy throughout or that have a thick sandy surface layer and a loamy subsoil. Slope is mostly 0 to 8 percent.

Norfolk, Orangeburg, Tifton - Well drained upland soils that have a sandy or loamy surface layer and a loamy subsoil. Slope is mostly 0 to 8 percent.

Faceville, Greenville, Carnegie - Well drained upland soils that have a sandy or loamy surface layer and a clayey subsoil. Slope is mostly 0 to 8 percent.

Esto, Susquahanna - Well drained and somewhat poorly drained upland soils that have mainly a loamy surface layer and a very firm clayey subsoil. Slope is mostly 2 to 12 percent.

Leefield - Somewhat poorly drained low-lying upland soils that have a thick sandy surface layer and a loamy subsoil. Slope is 0 to 3 percent.

Grady, Rains, Pelham - Poorly drained soils in depressions or drainageways of uplands that have a sandy or loamy surface layer and a loamy or clayey subsoil. Slope is 0 to 2 percent.

Kinston, Bibb, Osier - Poorly drained flood plains soils that are mainly loamy or sandy throughout.

Kershaw, Lakeland - Excessively drained upland soils that are sandy throughout. Slope is 0 to 8 percent.

Vaucluse - Well drained upland soils that are mostly loamy throughout but have a dense, brittle subsoil. Slope is mostly 8 to 17 percent.

All the above soils are low in natural fertility, but crops generally respond well to plant nutrient additions and water management. Of the

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VICINITY MAP

LEGEND

	No.	ASSOCIATION	SLOPES
Sand Hills	1	Lakeland, Troup, Lucy	2-10%
	5	Cowarts, Sawyer, Susquehanna	2-8%
	10	Chewacla, Wehadkee, Rains	0-2%

	No.	ASSOCIATION	SLOPES
Blacklands	1	Oktibbeha, Sumter, Susquehanna	1-12%

	No.	ASSOCIATION	SLOPES
Southern Coastal Plains	1	Kershaw, Lakeland	0-8%
	2	Lakeland, Troup, Lucy	0-8%
	6	Americus, Lucy, Troup	8-17%
	9	Esto, Susquehanna, Cowarts	3-12%
	10	Boswell, Duplin, Susquehanna	0-8%
	11	Cowarts, Norfolk, Wagram	0-8%
	12	Dothan, Tifton, Fuquay	0-8%
	13	Cowarts, Carnegie, Fuquay	3-12%
	16	Wagram, Lucy, Troup, Norfolk	0-8%
	17	Fuquay, Grady, Tifton	0-8%
	18	Gilead, Norfolk	0-8%
	20	Norfolk, Tifton, Wagram	0-8%
	21	Orangeburg, Faceville, Lucy, Dothan	0-8%
	22	Tifton, Alapaha, Norfolk	0-8%
	23	Tifton, Grady, Norfolk	0-9%
	24	Orangeburg, Red Bay, Norfolk	0-8%
	25	Tifton, Greenville, Faceville	0-8%
	26	Orangeburg, Faceville, Red Bay	0-8%
	27	Carnegie, Henderson	8-17%
	28	Orangeburg, Faceville, Greenville	8-17%
	29	Greenville, Faceville, Orangeburg	0-8%
	32	Carnegie, Sawyer, Tifton	0-8%
	34	Esto, Vaucluse, Boswell	8-17%
	35	Bladen, Duplin	0-3%
	38	Leefield, Stilson, Pelham	0-3%
	40	Leefield, Irvington, Pelham	0-3%
	42	Kinston, Bibb, Osier	0-2%
	43	Chewacla, Wehadkee, Rains	0-2%
	44	Angie, Meggett, Wahee	0-2%
	45	Meggett, Bladen, Rains	0-2%
	46	Grady, Troup, Ocilla	0-5%
	47	Goldsboro, Ardilla, Rains	0-2%

	No.	ASSOCIATION	SLOPES
Atlantic Coast Flatwoods	3	Lakeland, Chipley, Surrency	0-8%
	5	Leefield, Irvington, Pelham	0-2%
	9	Mascotte, Pelham, Leon	0-2%
	14	Johnston, Rains, Ellabelle	0-2%

MAJOR LAND RESOURCE AREA AND SOIL ASSOCIATIONS MAP

SOUTHWEST GEORGIA LAND AND WATER RESOURCE COOPERATIVE STUDY

0 10 20 30 40 50 MILES

0 10 20 30 40 50 60 KILOMETERS

BASE COMPILED FROM 1:500,000 U.S.G.S. STATE BASE MAP, LAMBERT CONFORMAL CONIC PROJECTION.

APRIL 1981 4-R-36695

APRIL 1981 BASE 4-R-37392-A

USDA--SCS--FORT WORTH, TEXAS 1982

7.6 million acres of soils in the study area, some 5.5 million acres would respond to irrigation. These include soils currently in nonconvertible uses such as highways, soils needing some drainage, and soils susceptible to erosion problems. About 4.1 million acres are convertible to irrigation with only minor erosion and drainage problems.

About 3.4 million acres are classified as prime farmland. (See map following page I-8.) Prime farmland is described as land best suited and available for producing food, feed, forage, fiber, and oilseed crops. The land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built up land or land under water. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

Twenty-one of the thirty-two counties have published important farmland maps which identify the prime farmland. The current status of soil maps and prime farmland maps is available in the Soil Conservation Service county offices.

Irrigation of Prime Farmland

LAND CAPABILITY UNITS

Capability classes are used to group soils by varying degrees of hazards of use and similar responses to land treatment. Class I soils have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. Class VIII soils and land forms are rough, shallow, or otherwise limited so that they do not produce worthwhile yields of crops, forage, or wood products. Classes I, II, and III are suitable for cropland; Class IV is marginal for cropland; and Classes V through VIII are unsuitable for cropland.[1]

Capability subclasses show soils in the same class that have similar problems (Table I-1). They are designated by adding a small letter "e," "s," or "w." The letter "e" shows that the main limitation is risk of erosion unless close growing plant cover is maintained; "s" shows that the soil is limited because it is shallow, droughty, or stony; and "w" shows that water in or on the soil surface interferes with plant growth or cultivation.[2]

TABLE I-1

ACREAGE BY LAND CAPABILITY UNITS, 1979

Land Capability Units	Acreage in Study Area
I	770,220
IIe	2,128,940
IIw	587,060
IIs	733,450
IIIe	509,290
IIIw	174,680
IIIs	294,210
IVe	311,190
IVw	276,850
IVs	115,710
Vw	1,058,160
VIe	150,590
VIw	288,250
VIs	118,890
VIIe	10,340
VIIw	41,490
VIIs	66,710
VIIIs	560
	7,636,590[a]

a/ Slight acreage difference from the 7,661,100 in the study area due to survey method.

1/ U.S. Department of Agriculture, Soil Conservation Service Land Capability Classification, Agriculture Handbook No.210, pp.6-10.
2/ Ibid., pp. 10-11.

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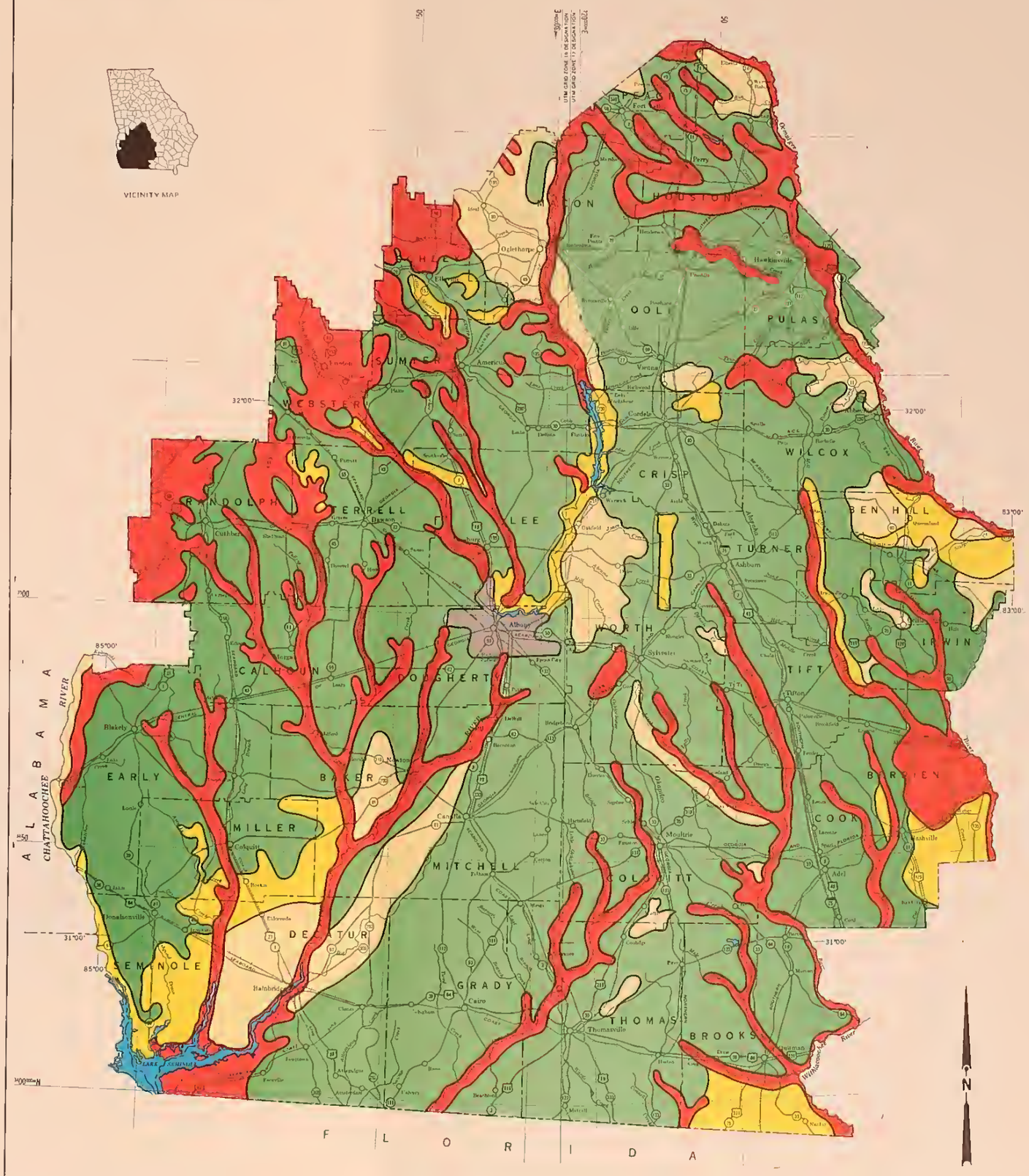


LEGEND

PRIME FARMLANDS MAP

- Over 50% Prime
- 35-50% Prime
- 5-15% Prime
- 0 - 5% Prime
- Water
- Urban

NOTE:

This map is for general planning purposes only. Each area outlined on this map may consist of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

For the locations of specific soil map units that may qualify as important farmland, consult the published soil survey of the county. If the publication does not specify important farmland categories of each soil unit, the state or local office of the Soil Conservation Service can furnish you a list of detailed important farmland map units.

A soil survey publication can be obtained from the appropriate state or local office of the Soil Conservation Service, the county agent, or the congressman for that district. Many libraries keep published soil surveys on file for reference.

PRIME FARMLAND MAP

SOUTHWEST GEORGIA LAND AND WATER RESOURCE COOPERATIVE STUDY

0 10 20 30 40 50 MILES

0 10 20 30 40 50 60 KILOMETERS

BASE COMPILED FROM 1:500,000 U.S.G.S. STATE BASE MAP, LAMBERT CONFORMAL CONIC PROJECTION.

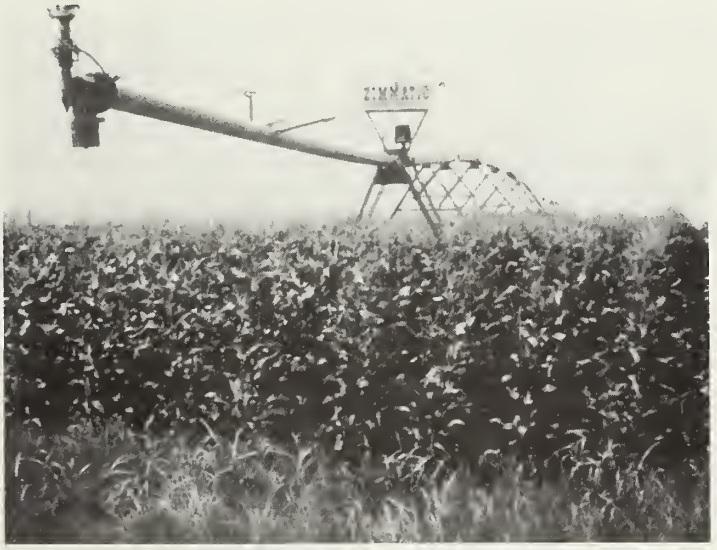
MAY 1981 4-R-36694

MAY 1981 BASE 4-R-37392-A

USDA-SCS-FORT WORTH, TEXAS 1981

SOIL RESOURCE GROUPS

Each of the 269 soil mapping units was placed into one of 17 soil resource groups (SRG). Each SRG consists of one or more land capability units that have similar crop yield characteristics, responses to fertilizers, and soil and water management requirements (Appendix C). The soils included in a soil productivity group may occur in one or more major land resource areas. These groups were developed to be used in the analysis of county or study-wide conditions and impacts.



Irrigated Corn on Tifton Soil
in Soil Resource Group 2

LAND USE

Cropland, orchards, pasture, forest land, water, urban, and other are the main categories (Table I-2). Minor land uses such as strip mine and quarries, government land, and recreation land are grouped into other and combined with urban.

TABLE I-2

MAJOR LAND USE, 1979

Land Use	Acres	Percent of Area
Cropland	2,972,540	39
Pasture	573,090	8
Forest Land[a/]	3,636,390	47
Water	76,920	1
Urban and Other	402,160	5
Total	7,661,100	100

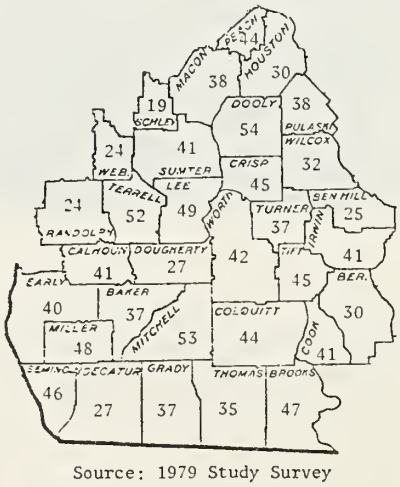
Source: 1979 Study Survey - Appendix B

a/ Acreage represents adjustments of forest inventory data dictated by difference in time periods and other land use changes identified during this study. See "FOREST STATISTICS FOR SOUTHWEST AND CENTRAL GEORGIA" for current forest survey data.

A Land Cover Map is provided on the following page. It gives a good representation of the major land uses and their distribution.

Approximately 3 million acres, 39 percent of the area, are utilized for cropland, including orchards. The percent of cropland for the counties within the study area is represented in Figure I-4.

FIGURE I-4 PERCENT CROPLAND



Source: 1979 Study Survey

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LEGEND OF MAJOR LAND USE

- Coniferous Forest
- Mixed Forest
- Pasture, Upland Grasses
- Cultivated, Exposed Earth
- Forested Wetland
- Water

LAND COVER
SOUTHWEST GEORGIA LAND AND WATER RESOURCE COOPERATIVE STUDY

0 10 20 30 40 50 MILES

0 10 20 30 40 50 60 KILOMETERS

SOURCE: LANDSAT FEB. – MAR 1977

BASE COMPILED FROM 1:500,000 U.S.G.S. STATE BASE MAP, LAMBERT CONFORMAL CONIC PROJECTION.

VICINITY MAP

UTM GRID ZONE 16 DESIGNATION
UTM GRID ZONE 17 DESIGNATION

4-R-37599

MARCH 1980 4-R-37392

Corn, soybeans, cotton, tobacco, and peanuts are the major crops (Table I-3). Pecans, peaches, apples, and some grapes represent the orchards. Vegetables or truck crops include snapbeans, field peas, butterbeans, cabbage, tomatoes, cantaloupes, watermelons, onions, and sweet potatoes. Wheat is the primary grain crop; sorghum, rye, and oats are of secondary importance.

TABLE I-3

CROPLAND USE, 1979

Crops	Acres
Corn	855,510
Soybeans	758,390
Cotton	94,650
Peanuts	423,290
Tobacco	23,450
Sunflowers	1,390
Vegetables	27,100
Grains	142,000[a/]
Sorghum	40,000
Hayland	75,000
Cropland Pasture	330,000
Other Cropland	217,700
Orchards	126,060
	2,972,540

a/ Acreage double-cropped

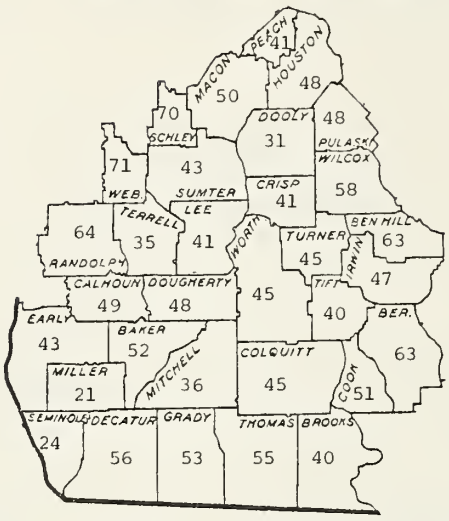
Source: 1979 Study Survey with adjustments - Appendix B.

Of the 3 million acres of cropland, about 500,000 acres are irrigated. The main crops irrigated are corn (185,000 acres), soybeans (110,000 acres), and peanuts (132,000 acres). A sizeable acreage of orchards, mainly pecans and peaches, is also irrigated.

Approximately 0.6 million acres are in permanent pastures which support some 576,400 head of cattle. Bahiagrass and common and coastal bermudagrass predominate. Hay is used to supplement fall and winter grazing of grain cover crops.

There are 3.6 million acres of commercial forest land in the study area. Forest acreages within the individual counties range from 21 percent of the total land area in Miller County to 71 percent in Webster County, with an average of 47 percent for the study area (Figure I-5). Highest forest land densities are in the eastern, southern, and northwestern border counties.

FIGURE I-5 PERCENT FOREST LAND



Source: 1977 LANDSAT and 1979 Study Survey

Forest lands are predominantly under private ownership. About 57 percent are associated with farming operations. Nonfarmers and corporations control 33 percent, while forestry-related industries own another 10 percent. Less than 1 percent is under public ownership.

Forests of southwest Georgia are comprised of natural associations of forest vegetation. Longleaf, shortleaf, slash, and loblolly pine, along with oak, make up 59 percent of all timber stands. Hardwood types such as oak-hickory, oak-gum-cypress, and elm-ash-cottonwood make up the remaining 41 percent.

More than 1 million acres (27 percent) of the area's timber stands have either under-utilized growing space or are stocked with noncommercial tree species. Natural stand establishment has occurred on 3.1 million acres (85 percent) of all timber stands. The remaining 15 percent, or about 500,000 acres, originated by artificial planting or direct seeding.

Net annual growth in 1972 averaged 60 cubic feet per acre. Growth in pine and cypress accounts for 72 percent of the total net annual growth. Hardwood timber growth makes up the remaining 28 percent. The potential growth capacity of natural stands is 80 cubic feet per acre per year. Forest areas planted or seeded artifically have an average growth potential of 100 cubic feet per acre per year.

Good growing stock is the net wood volume found in desirable or acceptable commercial timber trees with diameter at breast height (d.b.h.) of 5.0 inches and greater. Additional volumes of usable wood fiber occur in rough and rotten trees and in salvageable dead trees. Total current estimated volumes are as follows:

Good growing stock	3,842,701,000 cubic feet
Rough and rotten trees	417,600,000 cubic feet
Salvageable dead trees	7,070,000 cubic feet

Urban and other land uses total 402,160 acres, of which 147,830 acres are in urban use. Main urban areas are located in Dougherty, Houston, Sumter, Thomas, and Tift Counties. Government land, recreation land, mines and quarries, roads, rural industries, and farmsteads make up the remaining acreage in this category.

Pine Cut in Pulp Lengths Ready for Processing Mill

WATER RESOURCES

SURFACE WATER

There are 83 watersheds and 31 partial watersheds of less than 250,000 acres in size delineated in the study area. Within the same area, the State has delineated 19 complete and 17 partial water quality management units.

An estimated 9,220 miles of streams or waterways with drainage areas greater than 1 square mile occur in the study area. A portion of the Chattahoochee River and the Ocmulgee River form the western and eastern study area boundaries (Figure I-6). They have a mean annual discharge of 13,010 cubic feet per second (cfs.) and 4,050 cfs. respectively in the study area. The Flint River flows through the study area with a mean annual discharge of about 6,340 cfs. at Albany near the center of the study area.

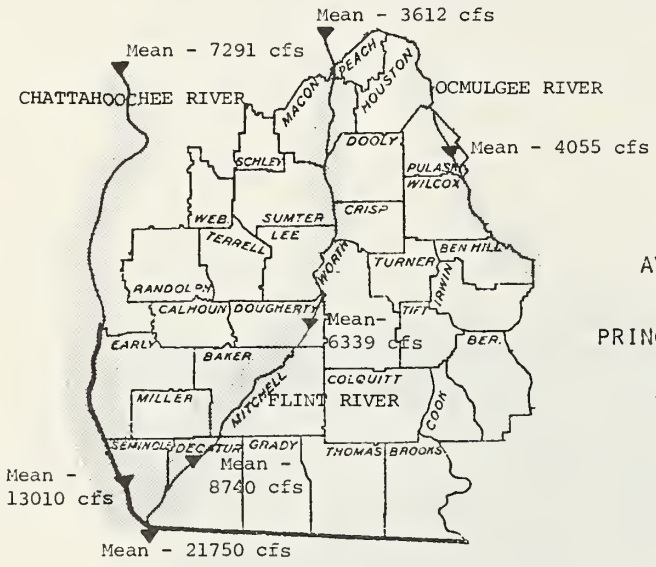


FIGURE I-6
AVERAGE DISCHARGE
OF
PRINCIPAL RIVER SYSTEMS

▼ RECORDING STATION

Source: USGS - Water Resources Investigation in Georgia - 1979

There are two large lakes in the area. Lake Seminole on the Chattahoochee River covers some 37,500 acres and stores 367,300 acre-feet at normal water level. The lake was built for navigation and power. Lake Blackshear on the Flint River was built by Crisp County for power and covers some 9,510 acres. Georgia Power Company has a smaller lake on the Flint River above Albany. In addition to the large lakes, there are about 39,650 acres of water in smaller constructed ponds and natural lakes.

The State of Georgia has established water quality standards and water use classifications for the waters of the State. The State also designates appropriate waters as trout waters.[1/]

Nine water use classifications are recognized. These are drinking water supplies; recreation; fishing, propagation of fish, shellfish, game, and other aquatic life; wild river; scenic river; urban stream; agricultural; industrial; and navigation. Specific criteria apply to each classification. In nearly every case, the criteria relate to the levels of dissolved oxygen, pH, fecal coliform, and temperature. All the major streams in the study area are classed as drinking water supplies, recreation, or fishing.

A number of general criteria also apply to all waters regardless of the water use classification. These relate to the prohibition of materials which cause sludge deposits or scums; materials which produce turbidity, odor, color, or other objectionable conditions; substances which would be harmful to aquatic life; radioactive substances in amounts which exceed Federal and State regulations; and streambed alterations which may result in the violation of stream water quality standards. The standards also address the approach to be followed to maintain existing high quality waters.[2/]

In addition to the four specific parameters mentioned above, the State does regulate, on a case-by-case basis, all pollutants that could have a detrimental impact on the beneficial uses of the waters. Many of the pollutants, although significant, can appear in such low concentrations that they are not measurable in the stream water. Therefore, the State has found it better to control these pollutants through the establishment of adequate effluent limitations at the source rather than through the use of in-stream water quality standards. This is done using guidelines produced by the U.S. Environmental Protection Agency.

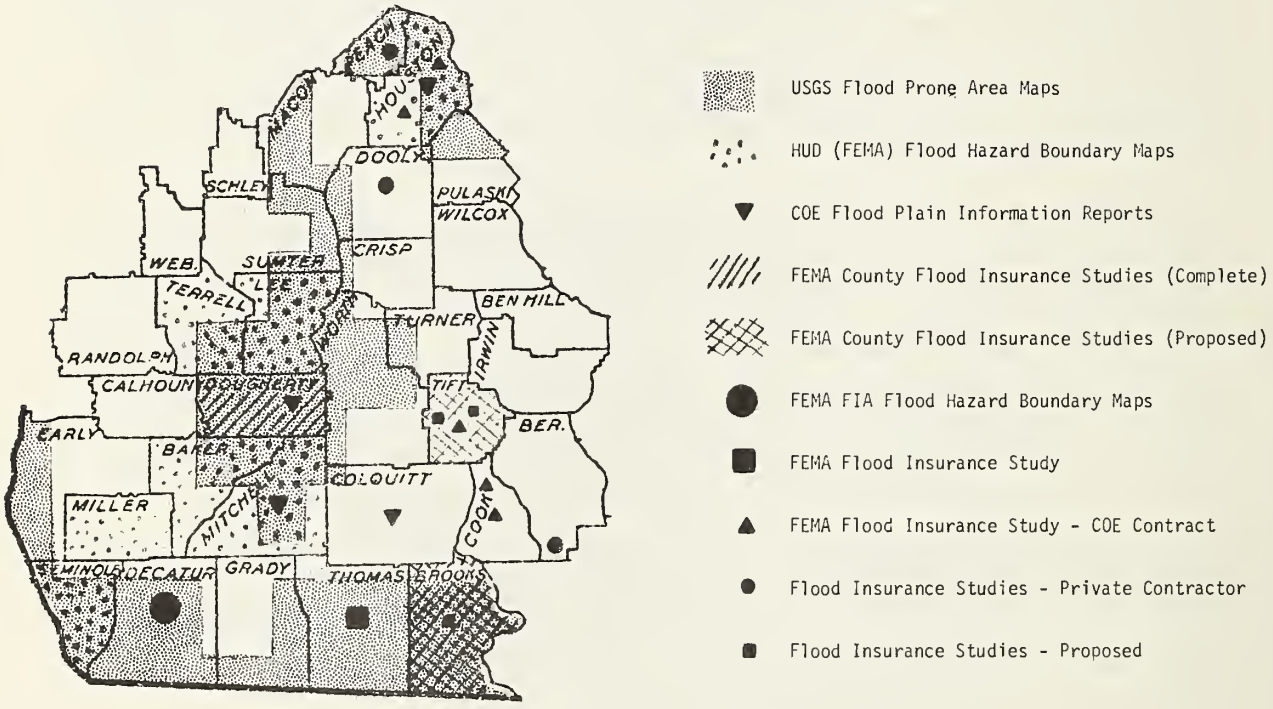
Water quality assessments are made from data collected through state and other agencies' monitoring and sampling programs. There are 23 data-gathering stations within the study area. Generally, the overall surface water quality is good to excellent. Specific water quality information on each monitoring station can be found in the Environmental Protection Division's Annual Water Quality Report.

1/ Chapter 391-3-6, "Rules and Regulations for Water Quality Control," Georgia Department of Natural Resources.
2/ Ibid.

Flooding is not a major problem. In areas where development has encroached upon the flood plain of the major streams and rivers, there are flood damages. The smaller streams are for the most part waterways that remain wet or have wet soils from upslope subsurface drainage the year around. These areas are normally not developed except when cleared for cropland in dry years or cleared for irrigation systems.

Areas for which studies and flood maps are available are identified in Figure I-7. Information on additional or specific studies is available through the Georgia Geological Survey, Environmental Protection Division.

FIGURE I-7 AVAILABLE FLOOD MAPS AND REPORTS

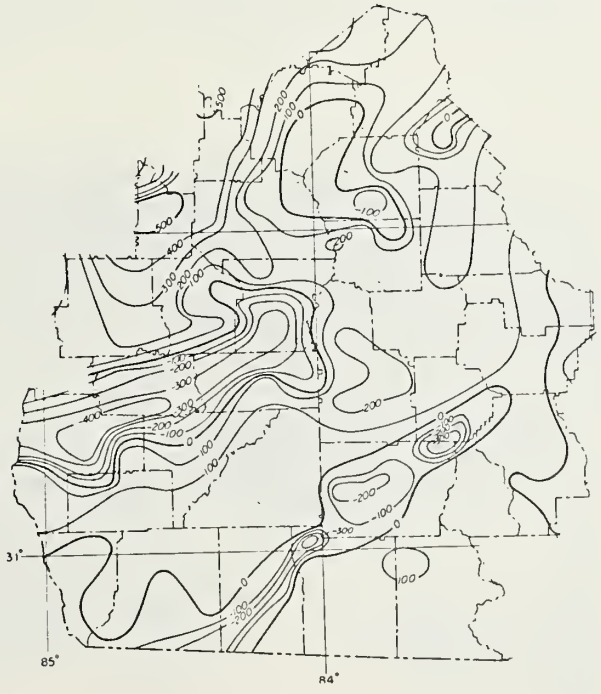


GROUND WATER

Ground water is available within reasonable developmental depths throughout the study area (Geology Map following page I-3 and Figure I-8). The amount of water available within the three main aquifer systems is not presently known but is being studied by USGS and EPD. Portions of the sand aquifer system are showing a decline in water level. The carbonate system (principal artesian aquifer) within the study area is fairly stable, but over the last 10 years there has been a slight downward trend in the level of the aquifer system. There are several USGS and EPD studies underway of which one of the products is to develop models specifying operation of the aquifer systems. The results should be available in 1983.

The ground water in the area is generally of good to excellent quality and is suitable for agricultural, municipal, domestic, and most industrial uses. Very little, if any, treatment is needed before utilization. All the ground water acquires minerals from the formations where they are located. A few isolated wells have produced water that is of high salinity and alkali content, making it poor for irrigation.

FIGURE I-8 Altitude of the top of the first major ground-water reservoir for Southwest Georgia



EXPLANATION

—200— LINE OF EQUAL ALTITUDE OF THE TOP OF THE GROUND-WATER RESERVOIR (AQUIFER)— Interval 100 feet (30 meters) Datum is mean sea level.

To obtain depth from land surface to the top of reservoir
ADD—Negative map values to land surface altitude
SUBTRACT—Positive map values from land surface altitude

Source: USGS

USE AND MANAGEMENT

Water use during 1979-80 is summarized in Table I-4. Nonconsumptive use relates to water returned to streams upon usage. Consumptive use relates to water that is lost for further use through evaporation, transpiration, or transportation from the source area. The major consumptive use is for irrigation. About 70 percent of the daily use of 405 MGD for irrigation is from ground water.

TABLE I-4

WATER USE 1979-80
Million Gallons Per Day (MGD)

Nonconsumptive Use

	Ground Water	Surface Water
Energy	0.0	2.6
Public Supply	53.3	0.0
Nonresidential	0.4	0.0
Rural Use Domestic	9.0	0.0
Subtotal	62.7	2.6

Consumptive Use

	Ground Water	Surface Water
Public Supply	15.9	0.0
Nonresidential	0.7	0.0
Rural Domestic Use	14.6	0.0
Livestock	4.4	2.4
Irrigation	288.1	116.6
Industrial Self Supply	49.1	126.0
Subtotal	372.8	245.0
TOTAL	435.5	247.6

Source: "Water Use Data Collection Project," USGS and Georgia EPD - 1981

The Environmental Protection Division of the Department of Natural Resources is the regulatory agency charged with management of Georgia's water resources. The General Assembly has enacted four laws authorizing rules to be promulgated. These laws are briefly summarized as follows:

Safe Drinking Water Act - enables the State to carry out the Federal Safe Drinking Water Act.

Water Quality Control Act - enables the State to implement the Federal Water Quality Control Act and conduct the permit program relative mainly to wastewater.

Surface Water Withdrawal Act - a 1977 Amendment to the Water Quality Control Act that requires a permit for users taking more than 100,000 gallons per day on a monthly average from a body of surface water in the state. The amendment also establishes priorities and action to be taken in emergency water shortages. Those using water for agricultural and poultry processing purposes are exempted.

Ground Water Use Act - establishes procedures to be followed to obtain a permit to withdraw ground water in excess of 100,000 gallons per day. It also requires an evaluation of the ground water system relative to application for permits. Agricultural uses are exempt from the permit requirement but require qualifying agricultural users to report use to the county agents.

Free Flowing Well in Dougherty Plain District
Discharging Water from the Principal Artesian Aquifer

BIOLOGICAL RESOURCES

FISH HABITAT

The study area abounds with high quality fishing streams. Studies by biologists of the Georgia Game and Fish Division revealed the following streams support high populations of game fish:

Flint River	Ochlocknee River
Chattahoochee River	Spring Creek
Kinchafoonee Creek	Withlacoochee River
Muckalee Creek	Ichawaynochaway Creek

Important game fish species occurring in these streams are:

Suwannee bass	Spotted sunfish
Largemouth bass	Bluegill sunfish
Striped bass	Redear sunfish
Flint River smallmouth bass	Redbreast sunfish
Striped-white bass hybrid	Warmouth
Black crappie	Chain pickerel
White crappie	Grass pickerel
American shad	Redfin pickerel
Hickory shad	Channel catfish
Flier	Flathead catfish

Important commercial fish species are:

Channel catfish
Flathead catfish
White catfish

The study area contains two large lakes: Seminole (37,500 acres) and Blackshear (9,515 acres). Lake Seminole is considered one of the best largemouth bass fishing lakes in the Nation.

There are an additional 39,650 acres of water contained in small lakes, farm ponds, and limestone sinks. Fish populations in these water bodies depend on the degree of management. Managed ponds support from 300 to 400 pounds per acre, while some ponds without management support as low as 50 pounds per acre.

WILDLIFE HABITAT

Wildlife habitat includes land in pine, mixed pine and hardwood, upland hardwood, bottomland hardwood, pastureland, and cropland. Clearing woodland for row crops is having a considerable adverse impact on the quantity of woodland wildlife habitat.

The most important wildlife habitat remaining in the study area is located in the flood plains of streams, especially the Flint River, Kinchafoonee Creek, Muckalee Creek, Ocmulgee River, and the Chattahoochee River.

The steep ridges that border the Dougherty Plain, especially on the south and east sides, also provide important habitat for woodland wildlife species.

Deer is the most numerous big game animal. Turkeys are present in about 18 counties. Bobwhite quail and mourning dove are the most prevalent small game species. Waterfowl concentrations occur near Lake Seminole, Lake Blackshear, and the Thomas County plantations. All the larger public land holdings have some type of fish and game management plan. There are also large private land holdings under wildlife management plans. Six wildlife areas representing some 80,000 acres are managed by the State (Table I-5).

TABLE I-5

WILDLIFE MANAGEMENT AREAS

County	WMA Name	Acreage
Seminole and Decatur	Lake Seminole Waterfowl Management Area	5,700 acres plus additional shoreline and small islands
Dougherty	Chickasawhatchee	21,000 acres
Dougherty	Albany Nursery	300 acres
Houston and Macon	Houston and Macon County	8,853 acres
Houston	Oaky Woods	36,000 acres
Miller	Miller County	5,430 acres

WETLAND

The last National Wetlands Inventory (1953) revealed six wetland types[1/] having a total of 1,242,830 acres in the study area. Type 1 (54 percent) and Type 7 (41 percent) comprise the majority of the wetland. Types 3, 4, 5, and 6 make up the remaining 5 percent. The 1979 Study Area Inventory indicates some 1,058,160 acres of wetland with Type 1 (frequently flooded) and Type 7 (saturated soil condition) predominating.

1/ "Wetlands of the United States" - U.S. Department of the Interior, Fish and Wildlife Service, Circular 39, 1956.

Most of the 200,000 acres lost since 1953 were depressions in upland soils and small bays or waterways that have been drained and included in cropland fields. In the past few years, large tracts of land, many containing wetland, have been converted to irrigated cropland with land leveling and drainage.

THREATENED AND ENDANGERED SPECIES

The Endangered Species Act of 1973 (Public Law 93-205) establishes two categories of endangerment: (1) Endangered Species - those species in danger of extinction throughout all or a significant portion of their range; and (2) Threatened Species - those species which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. In Georgia no critical habitat has been defined for endangered and protected species.

There are 19 plants and 7 wildlife species that have a history of occurring in the area (Table I-6) that are either listed by the State Department of Natural Resources as protected species or by the U.S. Department of the Interior as endangered or threatened.

TABLE I-6

PROTECTED SPECIES

Plants

Bumelia thornei	Physostegia veroniciformis	Torreya taxifolia
Elliottia racemosa	Silene polypetala	Rhodendron prunifolium
Myriophyllum laxum		Croomia pauciflora
Cacalia diversifolia	Sarracenia flava	Salix floridana
	S. leucophylla	
Lythrum curtissii	S. minue	Veratrum woodii
Panicum hirstii	S. psittacina	Litsea aestivalis
Oxypolis canbyi	S. purpurea	Fothergilla gardenii
Fimbristylis Perpusilla	S. rubra	
Hymenocallis coronaria		

Wildlife

American alligator (F)[a/]	Brown pelican (F)
Southern bald eagle (F)	Red-cockaded woodpecker (F)
Peregrine falcon (F)	Georgia's blind cave salamander (F)
Indigo snake (F)	

a/ F denotes Federal list.

NATURAL AREAS

NATURAL AND SCENIC AREAS

The State has four registered natural areas within the study area. They are:

Spooner Springs (Seminole County)
Greenwood Plantation (Thomas County)
St. Joe Wilderness Pond (Dougherty County)
Osewichee Springs (Wilcox County)

There are additional areas of natural, ecological, and aesthetic value which are not on the Register at the present time.

Limestone Spring in Dougherty County is
An Example of A Type 7 Wetland

CULTURAL RESOURCES

ARCHAEOLOGICAL

This discussion of the prehistory of the area starts with the end of the last glacial advance some 20,000 years ago. The area was dominated by the mammoth, mastodon, bison, and ground sloth. These mammals ruled until 10,000 to 11,000 years ago when a drying climate and accompanying vegetational changes forced their decline. During this time another mammal arrived on the scene and began to assert his presence, the Paleo Indian. While occupying the area for a considerable period of time, he left little evidence of his existence. He was nomadic, following the big game. His hunting methods, such as fire drives, may have contributed to the extinction of the giant mammals. This early man ranged and foraged in oak-dominant forest or oak savannahs until about 8,000 years ago when upland areas began changing to longleaf pine forest, and rising water tables in the low areas resulted in cypress swamps and bayheads much like modern environments.

Conjunctive with the changing vegetation and disappearance of big game, early man adapted to become dependent on local game and plants. He began to settle rather than roam. This time is referred to as the Meso-Indian or Archaic Period and is defined to span a period between 8,000 and 2,000 years ago. A number of sites have been found in the study area that are designated from this period.

The final period of Indian occupancy of the area is called Neo-Indian or Woodland Period. There are a number of sites representative of this period that reveal much about the life during these times. Earthen mounds and artifacts yield evidence of complex societies. These societies prevailed until Europeans began to push their culture into the area.

The National Register of Historic Places (NRHP) lists three archaeological sites (Table I-7) occurring within the study area. Many additional sites have been identified which are not included on the Register at the present time.

TABLE I-7
ARCHAEOLOGICAL SITES

County	Site Name/Nature	Location
Crisp	Cannon Site (9Cp108) tentatively identified as a Blackshear Phase Component which is a Late Woodland Cultural Phase heretofore unidentified in Georgia.	East shore of Lake Blackshear
Early	Kolomoki Mounds - a National Historic Landmark, a multicomponent site with Swift Creek, Weeden Island, Kolomoki, and Lamar Cultures represented.	Near Blakely (Kolomoki State Park)
Macon	Andersonville National Historic Landmark. Site of the largest Confederate military prison, officially named Camp Sumter; 12,000 Union prisoners died here.	Andersonville vicinity

HISTORICAL

History of Southwest Georgia dates back to the Spanish explorer, Hernando deSoto, when he traversed the area in 1540. In 1686 the British established a trading post in central Georgia from which European influences slowly spread. The area remained under the influence of the Indians, principally the Creek Indians, until the early 1800's when trading posts and small settlements were being established by white settlers. Much of the study area was declared a "buffer territory" through a series of treaties after a major defeat of the Creek Indians in 1814 during the conflict with Spaniards, Seminoles, and Creeks.

The Georgia Legislature in 1818 created three large south Georgia counties: Early in the west, Irwin in the center, and Appling in the east. Later divisions of Early and Irwin Counties, along with new lands from later treaties, gave rise to new counties until 1906. The Indians lost final control of the area with treaties following the Creek Indian War in 1836.

Without fear from Indian conflicts, settlers moved progressively into the wilderness. The area offered a new start for many who suffered the ravages of the Civil War.

Around 1870 timbered landscape began to fall to axes and saws, to be followed by the plow and cotton. Railroads pushed into the area, bringing light industries and trades and exporting timber products and cotton. Transportation of goods on the major rivers, along with rail centers, led to the development of stable towns. By the late 1920's most of the major forest had been cut over, with the remaining forest producing naval stores. Cotton, which had been on a slight decline since its height in 1916, suffered a greater loss from the boll weevil infestation. Peanuts became important during this period and later decades.

World War II brought about the development of industries in the area as well as an economic boost from military installations. The war and the 1940's also helped to produce a major agricultural change. Heavy equipment like bulldozers and grasses named "bahia" and "coastal bermuda" changed the landscape into pasture. Agriculture of the area was now cattle, hogs, and poultry. Many areas were reforested under the Soil Bank Program. This combination of livestock, cropland (mostly corn, peanuts, and cotton), and woodland remained fairly stable until the 1970's. The excessive erosion of the early part of the century was beginning to heal, and soil conservation measures were helping to reduce active erosion.

The 1970's brought another major shift in agriculture. Increased agricultural production to supply export commodities in the early 1970's was encouraged at the national level. This, coupled with rapid expansion into irrigated agriculture, resulted in approximately 360,000 acres of timberland and pastureland converted to row crops in this decade.

Many of the sites and structures that were important to the development of the area are being preserved and maintained for the future. There are 39 historic structure sites in the study area currently appearing on the National Register of Historic Places (NRHP). A listing is included in Appendix F.

Preliminary field surveys in Pulaski, Randolph, Thomas, and Wilcox Counties have identified additional structures that will be evaluated for future inclusion in the NRHP.

There are several Heritage Trust Hallmark Status Sites in the study area. These sites are of a sensitive nature, and the Soil Conservation Service has been requested to refrain from listing the areas in the study report. Information on these is available from the Georgia Historic and Preservation Officer, Environmental Protection Division.

I. W. Callahan House, Decatur County
A Neoclassical Design of the Late 1800's

RECREATION

OUTDOOR RECREATION FACILITIES

There is a wide diversity of outdoor recreation in the study area. Facilities range from a single roadside picnic table to recreational complexes servicing hundreds of people simultaneously. Water-based recreation and hunting provide the major impetus to the area's rural outdoor recreation development. Play areas provide the major impetus in the more urban areas.

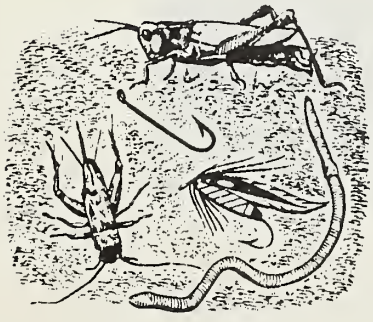
Lake Seminole and Lake Blackshear provide numerous recreational facilities and opportunities. Many smaller man-made lakes and natural ponds provide fishing opportunities. The larger streams also provide fishing, boating, and canoeing. Deer, bobwhite quail, dove, and waterfowl hunting are popular over most of the study area.

Many of the historical and cultural resources of the area are enhanced by recreational facilities. Most of the state and local parks are developed around cultural resources. Some natural areas are also included in parks or controlled by state management areas.

Five state parks exist within the study area, along with several other parks managed by local governments. The state parks are:

Georgia Veterans State Park (Crisp County)
Seminole State Park (Seminole County)
Kolomoki Mounds State Park (Early County)
Reed Bigham State Park (Colquitt County)
Lapham-Patterson House (State-managed historic site in Thomasville (Thomas County)

The Georgia recreation planning process in the State Comprehensive Outdoor Recreation Plan (SCORP) provides for a recurring inventory system and a method to estimate current and projected future needs (Table I-8).



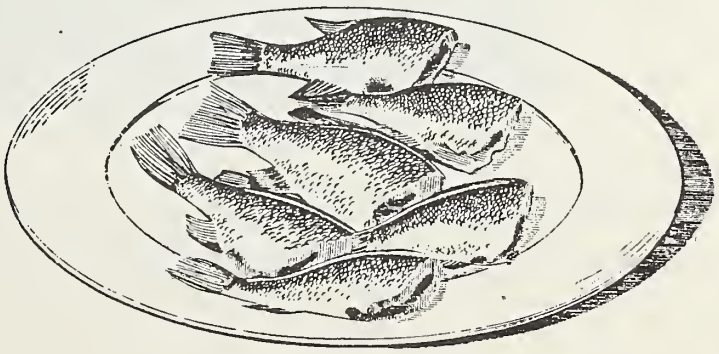


TABLE I-8

SUPPLY AND RECREATION NEEDS - 1980 and 1990
Southwest Georgia Study Area

Activity Name	Unit of Measure	1980 Area Supply	1980 Area Needs	1990 Area Supply	1990 Area Needs
Group Camps	beds	409	556	409	816
Primitive Camps	sites	194	485	194	620
Tent Camps	sites	780	0	780	0
Trailer Camps	sites	1,137	29	1,137	109
Warmwater Fishing	100 acres	530	12	530	35
Golf	9-hole	11	14	11	18
Motorboat/Sailing	100 acres	538	18	538	32
Outdoor Courts	courts	439	84	439	209
Outdoor Fields	fields	444	16	444	58
Playgrounds	playgrn.	434	95	434	157
Swimming Pools	pools	11	9	11	11
Swimming/Other	100 sq.ft.	909	1,439	909	2,115
Tennis	courts	460	422	460	859
Bicycle Trails	miles	3	53	3	62
Canoe Trails	miles	49	4	49	9
Hiking Trails	miles	48	31	48	52
Horse Trails	miles	6	59	6	87
Motorcycle Trails	miles	5	111	5	179
Interpretive Trails	miles	12	258	12	347

Source: 1980 Update, Georgia SCORP

ECONOMY

GENERAL DESCRIPTION

The study area is the State's most prolific producer of agricultural and forestry products. Sumter County leads in cattle production, Dooly in cotton, Early in peanuts, and Colquitt in tobacco. Earnings derived from agricultural and forestry production form a significant proportion of the income of most study area counties. Government facilities at Albany and Warner Robins also influence the area's economy.

Industrial growth in the study area has been weaker than in the northern portion of the State. This, in part, is due to widespread outmigration, poorly developed community infrastructure, and unskilled labor force. This is not to say that the area does not possess certain advantages for greater industrial growth. It is relatively rich in natural resources (water, wood, and food); and has a potentially valuable, though largely unskilled, labor supply, a well-distributed network of urban growth centers, and an extensive transportation network. These factors appear to hold the key to its long-range prosperity.

Rural Grain Storage Complex Operated by A Local Farming Group

POPULATION

Population of the study area was 633,500 in 1980, an increase of 13.8 percent from the 556,600 persons in 1970. This is less than the state-wide increase of 19.0 percent for the same period, but it reflects the rural nature of the area. The study area comprises 21 percent of the State's land area, while being inhabited by only 12 percent of the population.

The trend has been an increase in the urban population from 34 percent in 1950 to 51 percent by 1970. These people tended to concentrate around the urban centers of Albany, Americus, Moultrie, Thomasville, and Warner Robins, and those urban areas located along Interstate 75 such as Cordele, Perry, and Tifton (Figure I-9).

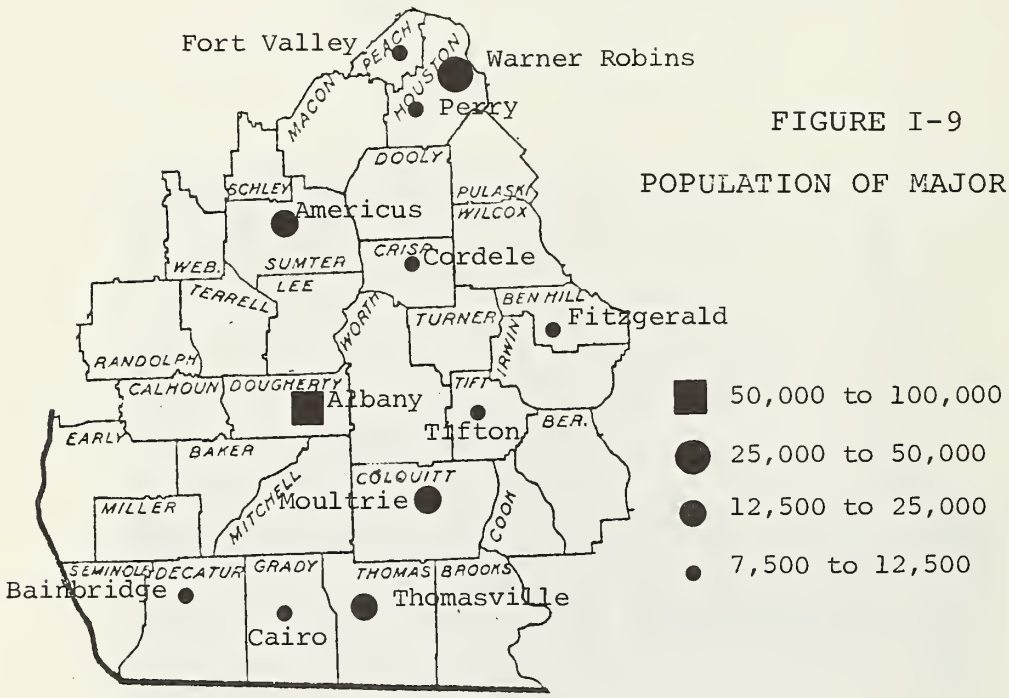


FIGURE I-9

POPULATION OF MAJOR CITIES

Source: 1972 County and City Data Book, Bureau of Census

EMPLOYMENT

Employment for the study area in 1979 was basically agricultural, industrial, manufacturing, and public administration. The latter three groups represent about 33 percent of the employed, with agricultural (onfarm workers) making up about 8 percent (49,000) of the work force and 59 percent of the total earning. There was also some 6 percent of the available work force unemployed.

According to an estimate made by the Southeastern Forest Experiment Station, there were 8,570 persons employed during 1979 in wood-using industries located in Southwest Georgia. A majority of workers, 83 percent, were employed in lumber and wood products manufacturing; 17 percent were located at pulp and paper plants and wood furniture factories.

New Wood Processing Plant Near Oglethorpe, Georgia

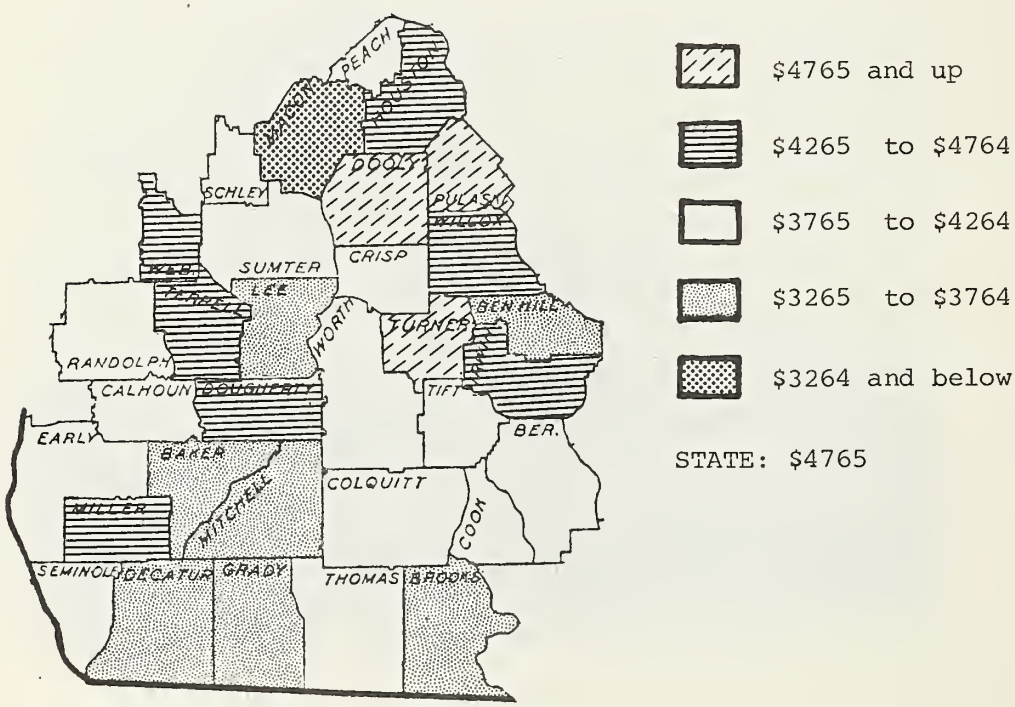
INCOME

Agriculture provides the predominant income for the study area. Some $803.8 million of gross income was generated in 1979 through crop production and $213.4 million from livestock and poultry enterprises, for a total value of over $1.0 billion.[1/] This was generated on some 12,240 farms with an average size of 400 acres. Forest products generated another $71.4 million of gross income.

Industrial and manufacturing enterprises had a value of some $492.9 million.[2/] The majority is related to support industries for agriculture and forestry. It was estimated that some $110.0 million was produced in forest and forest products industries. The income from mining was estimated at $20.5 million. Hunting and fishing provided some $600,000 in 1979 for permits.

Even with sizable gross income from agriculture and forestry, per capita incomes in the study area are low relative to the rest of the State. In 1974, only 3 of 32 counties had per capita incomes above the State average (Figure I-10).

FIGURE I-10 1974 PER CAPITA INCOME



Source: DNR, Comprehensive Recreation Planning

1/ Georgia Agricultural Facts, Georgia Crop Reporting Service 1979 and Census of Agriculture 1978

2/ County and City Data Book, Statistical Abstract Supplement, 1979

PROBLEMS, IMPACTS, AND EVALUATIONS

GENERAL

The rapid expansion of agriculture during the mid-70's caused State and local leaders concern over the impacts of significantly increased demands on the area's land and water resources relative to the quantity and quality of resources for future use.

Four major areas of concern were expressed through public meetings held in each county during 1978. These were (1) a decrease in net farm income, (2) land use, (3) water management and supply, and (4) soil erosion.

This study does not attempt to specifically address the decrease in net farm income even though it is a major problem and concern facing those in the agricultural sector. The problem is multifaceted and goes beyond the scope of a land and water resource study.

Many concerns are related to land conversion. While significant increases in cropland acreage and use of supplemental irrigation have greatly increased the economic base of the area, it has produced some adverse impacts. Losses of acres in woodland, wetlands, wildlife habitat, and fish habitat have resulted. Levels of water quality and quantity may change. Cropland increases have added to an existing erosion problem. Conversion of prime farmland to nonconvertible land uses is also a concern in the area.

The problems, impacts, and evaluations were developed with assistance and guidance from a 30-member steering committee of concerned area citizens.1/

Problems and concerns were determined for 1979 and projected to 1990. The maximum potential growth of irrigated cropland was estimated to produce an upper limit on agricultural water needs to be used in EPD and USGS water management model studies. There is presently insufficient data available to assess the adequacy and quality of water to meet potential maximum needs; hence the question marks in Table II-1 related to water supply.

Present conditions, projected changes, and impacts on land use, soil erosion, and water use are summarized in Table II-1. Cropland acreage in 1990 is projected to be 3.2 million acres, about 202,000 acres above the 1979 level.

1/ Appendix E

TABLE II-1
SUMMARY OF MAJOR CONCERNS, PROJECTED RESOURCE CHANGES, AND IMPACTS

Concerns	Units	1979 Present Conditions	1990 Projected Present Trend[1]	Potential Maximum
Land Use Changes				
Cropland[2]	Acres	3.0 million	3.2 million	
Forest Land	Acres	3.6 million	3.4 million	
Changes Within Land Uses				
Wetland	Acres	1.1 million	1.1 million[3]	
Prime Farmland in Nonconvertible Uses	Acres	87,000	109,600	
Irrigated Land	Acres	0.5 million	0.8 million	4.7 million[4]
Soil Erosion				
Cropland Soil Erosion[5]	Acres	3.0 million	3.2 million	
	T/Yr.	17.3 million	19.0 million	
Sediment Delivered to Streams from Cropland	T/Yr.	1.7 million	1.9 million	
Cropland Needing Treatment (+5 t/a/y)	Acres	1.1 million	1.2 million	
	T/Yr.	12.4 million	13.9 million	
Lost Returns[6] Resulting from Excessive Cropland Erosion	Dol/Yr.	32.7 million	36.9 million	
Water Use and Supply				
Water Requirements for Ag/Irrigation[7]	MGD	411.5	568.8	3,156.0
	(AcFt/Yr)	(0.4 million)	(0.7 million)	(3.5 million)
Water Requirements for Other Uses[8]	MGD	271.6	307.3	319.3
	(AcFt/Yr)	(0.3 million)	(0.3 million)	(0.4 million)
Totals	MGD	683.1	876.1	3,475.3
	(AcFt/Yr)	(0.7 million)	(1.0 million)	(3.9 million)
Water Supply				
Quantity		Very Good	Good	?
Quality		Very Good	Good	?

1/ Without any land treatment systems beyond 1979 levels.
2/ Includes orchards, hay, and cropland pasture.
3/ 22,000 acres are projected to be lost during 1979-1990.
4/ Based on soils having potential for irrigation.
5/ Appendix I.
6/ Appendix H.
7/ Irrigation estimates based on crops from 1979 River Basin Inventory and water requirements for crop identified.
8/ Water Use in Georgia-1980, USGS and EPD, Table I-4.

The expansion in the cropland base is expected to come from conversions of forest land to cropland. An additional 300,000 acres of cropland are projected to be under irrigation by 1990. Water use for irrigation in 1990 is projected to be 568.8 MGD, about 38 percent higher than the use level in 1979. If all soils suitable for irrigation were irrigated, about 4.7 million acres would be under irrigation. Water use is projected to increase substantially to 3,156 MGD. A sizeable amount of the potentially irrigable land is currently in pasture and forest land and is expected to remain largely in these uses unless the economic returns to cropland increase relative to returns from pasture and forest land.

EROSION PROBLEMS, IMPACTS, AND EVALUATIONS

GENERAL

Total erosion from the 7.6 million acres of land is estimated for the 1979 base year at 19.6 million tons per year (Appendix I). Eleven percent, or 2.1 million tons of sediment leave the source areas filling waterways, reservoirs, and wetlands, thereby creating water quality and flooding problems. Cropland is the principal source of soil erosion and sediment delivered.

Sediment Filled Road Ditch Resulting From Cropland Erosion

To counteract some impacts of erosion, the soil and water conservation districts, county governments, and the Georgia Environmental Protection Division administer a statewide law for restricting erosion and sediment from urban sources. Erosion from mines is under the jurisdiction of the Surface Mineral Land Use Board. The soil and water conservation district program supplemented by USDA agencies is geared toward controlling erosion from cropland.

Control of erosion from mining has improved greatly over the past 10 years. Control of erosion from urban sources is improving with more county governments becoming aware of the problem and taking corrective actions. Only minor gains have been made in controlling erosion from cropland in the last 10 years. Increased cropland under cultivation and changes in farming practices have made the soil and water conservation districts' and the Soil Conservation Service's programs inadequate.

CROPLAND EROSION

Cropland erosion is currently producing 1.7 million tons of sediment per year or the equivalent of 87,200 dump trucks of topsoil. The majority of this is produced from some 1.1 million acres that are eroding at a rate greater than 5 tons per acre per year (Appendix I).

The 5 tons per acre erosion rate approaches the average soil loss tolerance value (T) for the soils in the area. Soil loss tolerance (T), sometimes called permissible soil loss, is the maximum rate of soil erosion that will permit a high level of crop productivity to be sustained economically and indefinitely. The average erosion value of the 1.1 million acres eroding above (T) is 11.6 tons per acre per year or more than twice the (T) value. The economic impact of the topsoil erosion greater than 5 tons per acre and the associated chemical and nutrient losses in the area are estimated at $32.7 million annually.1/

To plan and apply the needed conservation measures to get the 1.1 million acres of cropland into the less than 5 tons per acre erosion range would require 21 years with present conservation application rates. The estimated loss to the area's farmers would be some $343.8 million.2/ This equates to $2.653/ per ton per year on cropland eroding greater than 5 tons per acre.

1/ 12,355,140 tons times $2.65 per ton (see Appendixes H and I).
2/ 32.7 million per year times 10.5 years, the midpoint. Values are in terms of 1979 normalized dollars. See Appendix G for description of normalized dollars.
3/ Appendix H.

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

LEGEND

Cropland with erosion rates 16 to 30 tons/ac/yr

Cropland with erosion rates greater than 31 tons/ac/yr

Generalized land area where extensive gully erosion exists especially along streams and rivers where deep sandy formations are exposed.

PEACH
HOUSTON
MACON
SCHLEY
DOOLY
PULASKI
SUMTER
WEBSTER
WILCOX
RANDOLPH
TERRELL
LEE
CRISP
BEN HILL
TURNER
WORTH
IRWIN
TIFT
CALHOUN
DOUGHERTY
BERRIEN
EARLY
BAKER
MILLER
COOK
MITCHELL
COLQUITT
SEMINOLE
DECATUR
GRADY
THOMAS
BROOKS

Fort Valley
Perry
Hawkinsville
Oglethorpe
Elloville
Preston
Americus
Vienna
Cordele
Abbeville
Smithville
Leesburg
Albany
Sylvester
Ashburn
Fitzgerald
Ocilla
Tifton
Morgan
Blakely
Newton
Camilla
Colquitt
Moultrie
Nashville
Adel
Bainbridge
Cairo
Thomasville
Quitman

ALABAMA
CHATTAHOOCHEE
FLINT
RIVER
LAKE SEMINOLE
FLORIDA

CRITICAL CROPLAND EROSION MAP
SOUTHWEST GEORGIA
LAND AND WATER RESOURCE COOPERATIVE STUDY

0 10 20 30 40 50 MILES
0 10 20 30 40 50 60 KILOMETERS

BASE COMPILED FROM 1:500,000 U.S.G.S. STATE BASE MAP, LAMBERT CONFORMAL CONIC PROJECTION.

UTM GRID ZONE 16 DESIGNATION
UTM GRID ZONE 17 DESIGNATION

N

VICINITY MAP

SOURCE: Southwest Georgia Area Study

JUNE 1981 4-R-37630

MARCH 1980 4-R 37392

USDA SCS FORT WORTH TEXAS

Evaluation of data shows that cropland erosion is presently a serious problem in the study area. The "Critical Cropland Erosion Map" on the preceding page shows the distribution of cropland exceeding three times the soil loss tolerance.

A continuation of present cropland acreage trends to 1990 would add about 202,000 acres to the cropland base. This will increase the cropland erosion average rate to 6.00 tons per acre per year, and the cropland sediment yield to 1.9 million tons per year or the equivalent of 96,170 dump trucks of topsoil.1/ The majority of this will be produced from some 1.2 million acres eroding at an average rate of 11.7 tons per acre per year. This increase in cropland which will be gained mainly at the expense of forest land will increase the area's total sediment load to 2.3 million tons.

The economic impact of topsoil erosion greater than 5 tons per acre and the associated chemical and nutrient losses in the area are estimated at $36.9 million annually. To effectively control the 1990 excessive cropland erosion would take the ongoing program 24 years. This relates to a loss of some $442.8 million to the farmers over the time period.2/

ROADBANK EROSION

The soil and water conservation districts are also concerned over soil erosion from roadbanks in the area. An estimated 1,570 acres of eroding roadbanks are producing some 50,200 tons of sediment each year. Most of this immediately fills channels and wetland areas.

Erosion of Unstable Soils in Roadway from Concentrated Water Flow

1/ Appendix I.
2/ $36.9 million per year times the 12-year midpoint in 1979 normalized dollars.

WATER RESOURCE PROBLEMS, IMPACTS, AND EVALUATIONS

WATER QUALITY

Surface water in the area is generally of good quality. It requires treatment for municipal use but can generally be used for agricultural and most industrial uses. Water quality problems that do exist are normally found associated with point discharges from urban or industrial sources. Water quality violations during 1975-77, as reported by EPD, were reported in sections of the Flint River below Albany and Bainbridge; Ochlocknee River and tributaries in the vicinity of Moultrie, Thomasville, and Cairo; Ocmulgee River below Macon; Okapilco Creek near Moultrie and Quitman; and Turkey Creek near Fitzgerald. There were some scattered reports of water quality problems related to pesticides being discharged directly into streams or lakes. Reports of nonpoint source water quality problems were generally rare. Studies conducted on agricultural areas by USGS, EPD, and Georgia Experiment Stations generally conclude that, with the possible exception of pesticides, agricultural chemicals are having no significant effect on stream water quality related to standards for public water supply sources.1/ Evaluations indicate that agricultural conservation systems and wetland type filter strips and embayments are very effective in improving water quality.

EPD is predicting a three-fold increase in stream segments with water quality problems in the next 20 years, predominantly from point sources, if present facilities are not expanded and/or upgraded.2/ By 1990, another 202,000 acres of intensively used cropland and associated sediment, chemical, and nutrient constituents in runoff are expected to occur in the study area.

As usage of surface water increases, waste water management facilities, agricultural conservation systems, and wetlands protection will become even more important to aid in offsetting treatment cost for surface water.

Ground water resources in the area are generally of very good to excellent quality and suitable for agricultural, municipal, domestic, and most industrial uses. Maintenance of ground water quality requires good surface water quality in recharge areas and management of withdrawals from aquifer zones subject to contamination. Some aquifers have poor quality water zones that leak into good quality zones because of excessive withdrawal. Increased ground water use will require a complete management program including monitoring of aquifer withdrawal.

1/ USGS - Water Resources Investigation-Open File Report 80-771, 1981.
2/ Georgia Water Quality Management Implementation Strategy, EPD, October 1978

WATER QUANTITY

Assessment of published data and reports[1/] indicate that water quantity over the area is generally very good. Large streams and rivers have dependable flows. The ground water aquifers in the area are presently adequate and tend to renew through recharging in years with ample rainfall. Some aquifer levels tend to fluctuate somewhat with heavy withdrawals in the summer; but fall, winter, and spring rains normally recharge them. In particular geographic areas, water shortages occur in droughty years. These heavy withdrawals manifest the water quantity concerns.

The availability of surface water is presently of lesser concern than that for ground water. There have been concerns expressed regarding the effects on wetlands and wildlife habitat resulting from drainage of water bodies. There will likely be future concerns over availability of surface water for dilution of public waste discharge and for irrigation in areas with poor aquifer development. As the public becomes more aware of the interrelationships between ground water and surface water in the area, concerns and conflicts will arise, especially if irrigation, municipal, and industrial water needs continue to grow as projected. If future ground water use approaches the recharge, then conditional use of untreated surface water for irrigation and construction of treatment facilities for municipal usage of surface waters would be likely considerations. Accelerated pressures on either system will require water management of both systems. They must be managed together for effective water management.

Current data are not available to show whether or not present irrigation water usage is a major areawide problem. However, these presently are localized problems that are attributed to increased irrigation. These problems prompted the ongoing studies by USGS and EPD which are to define the capacity of the aquifer systems and the impacts of withdrawals. Information on present irrigation and future irrigation water requirements for the southwest Georgia area were provided to USGS and EPD.

Based on published hydrological and hydrogeological reports,[2/] ground water recharge of the major aquifers occurs over half of the study area,[3/] some 4.6 million acres. An estimated 13 inches of rainfall are available for runoff and infiltration in the aquifer recharge area, and approximately 7 inches infiltrate. However, about 6 inches of the infiltration are discharged as stream flow, leaving 1 to 2 inches (684 million gallons per day (MGD)) to move through the aquifers. This does not reflect transfer between aquifers, recharge from Tifton Upland Area, and aquifer mechanics in which heavy withdrawal induces steeper gradient, thus higher recharge.

1/ USGS and EPD annual water resource data and special studies in SW Ga.
2/ Primary source: USGS Water Supply Paper 1669-W; 1964.
3/ See Area Geology Map following page I-3.

The area's estimated 1979 water usage was 683.1 MGD.1/ Sixty-four percent, or 435.5 MGD, were withdrawn from the ground water systems. This annual aquifer withdrawal was within the annual recharge of the estimated 684 MGD. Only the Clayton Aquifer system, which has a very limited recharge area, is showing evidence of aquifer mining.

The rate at which water can be withdrawn without changing the quality or depleting the supply from the aquifer systems available in the area is on the order of 4.8 billion gallons per day (BGD).2/ This estimate includes allowances for aquifer transfer, mechanics, and recharge through confining formations. There is also estimated a near equal amount in aquifer storage.

Present ground water usage is only approximately 9 percent of the available daily supply. Maximized development of the area which includes irrigating a potential 4.7 million acres, 18 percent population growth, and intensive industrial water needs, would utilize some 3.5 BGD mainly from the ground water systems (Table II-1). This would represent about 70 percent of the estimated available supply.

The more withdrawals from aquifer systems approach available supply, the more there will be impacts such as decreased flow in major streams, drying up of flow of some minor streams, less water losses to evaporation and transpiration, increased recharge, decreased discharge to the seas, and mining of water at some places during some seasons. Also, there will be a need for careful management of pumpage in areas adjacent to saltwater bodies to avoid contamination of the aquifers.

The conditions most prevalent in southwest Georgia are heavy pumping concentrated in the warmer months of crop growing seasons and the periods of food processing. The estimated 1980 installed pump capacity for the area's 2,400 irrigation wells was 3.3 BGD.3/ This represents two-thirds of the total available daily ground water supply from the whole study area. When large numbers of the irrigation wells are operating at or near their pump capacity in the same time frame, there are some adverse impacts. The main impacts to date have been temporary lessening of water available to the shallower wells and reduction of flow in surface streams. An additional 330,000 acres of irrigation are projected by 1990. This would add another 1,200 wells within the area.

If irrigation were to reach a potential maximum of 4.7 million acres, some 18,000 wells will be drawing water from the ground water system. With more irrigation systems projected in the future, regional and local coordination and management of some systems appears to be the solution to avoid major problems and conflicts.

1/ Table I-4 and Table II-1.
2/ Developed from data reported in USGS-Water Supply Paper 1669-W-1964.
3/ Developed from data present in Preliminary Summary of the Impact of Agriculture on the Water Resources of Southwest Georgia, USGS, 1981.

FORESTRY PROBLEMS, IMPACTS, AND EVALUATIONS

Forested areas in southwest Georgia have been on the decline for the past two decades. Timberland occupied 4.1 million acres in 1961; in 1979 that figure was 3.7 million acres. This downward trend is likely to continue. By 1990 the forest land base is expected to decline by an additional 234,700 acres, to 3.4 million acres.

The reforestation rate is also declining. It is estimated that only one-third of all harvested timber tracts are replanted. Prompt regeneration of harvested timber stands is essential to a sound forestry system.

A declining forest land base and an inadequate rate of reforestation can have serious impacts on the economy.1/ Each forest acre withdrawn lessens annual stumpage values (dollars paid to the grower) by $56. The 1990 return from forest land in southwest Georgia will decline by $13.1 million.2/

Reduction in forest cover also creates significant environmental problems. Soil is exposed to the erosive effects of wind and rain. Removal of forest cover reduces the soil's infiltration capacity and ultimately the recharge of surface streams and ground water aquifer systems. Drastic changes also occur in habitat suitable for maintenance of wildlife populations.

Intensive management becomes critical as the commercial forest lands are withdrawn from lumber production. Capacity of southwest Georgia's forest lands to supply timber market demands for the next 20 to 30 years hinges on a high level of management on the remaining commercial forest land.

1/ For detailed analysis of forestry problems, see Appendix J "Forestry in Southwest Georgia."

2/ 234,700 acres of forest land cleared times $56 per acre.

WETLAND PROBLEMS, IMPACTS, AND EVALUATIONS

Since 1953, an estimated 200,000 acres of wetlands in the study area have been converted to other uses. Individual county figures are not available. Most of the wetland lost was related to rapid increases in irrigated cropland during the 1970's. The loss of depressed surface hydric features such as "grady ponds" and small black water branches or creek swamps adversely affected wildlife habitat and the environment to support unique species dependent upon those environments.

Extrapolation of present trends in cropland and urban land growth indicate that 22,000 additional acres of wetland will be lost from the present 1.1 million-acre base by 1990.

Recent experiments at the Agricultural Experiment Station in Tifton, Georgia, indicate that wetlands play an important role in filtering agricultural chemicals and sediments contained in runoff. Their capacity for assimilating or filtering chemicals is not fully known, but studies suggest they are extremely effective. The present wetland, representing some 14 percent of the area, appears to be effectively assisting in controlling discharges from a cropland base representing 39 percent of the area.

PRIME FARMLAND PROBLEMS, IMPACTS, AND EVALUATIONS

Encroachment of nonconvertible land uses on the prime farmland base does not appear to be a significant areawide problem. Counties having the highest potential for encroachment problems are Ben Hill, Colquitt, Crisp, Decatur, Dougherty, Houston, Lee, Peach, Sumter, Thomas, and Tift. Housing subdivisions and light industries are the predominant uses to which prime farmland is being converted. Of the 3.4 million acres of prime farmland, only 87,000 acres are in nonconvertible uses. Some 1.7 million acres, 50 percent, are used for cropland. There are also some 1.2 million acres of woodland and pasture on prime farmland. These could be converted to cropland if the need arose. By 1990 about 22,600 additional acres are expected in the nonconvertible category.

Sediment from Cropland Filling A Wetland Area

Industrial Complex Built on Prime Farmland

FISH AND WILDLIFE CONCERNS, IMPACTS, AND EVALUATIONS

There are 24 plants and 7 wildlife species listed as threatened and endangered species occurring or having a history of occurrence in the study area. Twenty-one of the plant species inhabit aquatic or woodland areas. Six of the 7 wildlife species inhabit aquatic and/or woodland areas.

The reduction in woodland and pastureland along with drainage of wetlands associated with the increases of cropland acreage during the 1970's are having an adverse impact on wildlife and fish habitat in the area. Clearing for row crop production results in the loss of many acres of vegetation serving to filter sediment and other pollutants from lakes and streams.

Sediment movement is much greater from cultivated fields than from forested areas. This results in a direct loss of fish habitat. Sediment and pesticides reduce spawning conditions and destroy aquatic organisms at the lower level of the food chain.

As the acreage of row crops increases, the increased demand for irrigation water will follow. This will reduce water tables and decrease stream flows, especially with irrigation systems using surface water. As the amount of water decreases, there will be less dilution of sediment and other pollutants.

Cropland in the area consists of large fields to accommodate modern machinery. The use of this machinery, including irrigation systems, requires elimination of "brushy" fence rows, ditchbanks, wetlands, and other areas providing cover for wildlife. Further clearing and land leveling will not serve to benefit any wildlife species.

Agricultural expansion is accompanied by an increased use of pesticides. Many of these pesticides are poisonous to wildlife, especially the smaller birds and animals.

RECREATION CONCERNS, IMPACTS, AND EVALUATIONS

Water based recreational needs were not found to be an areawide problem. The 1980 updated State Comprehensive Outdoor Recreation Plan showed only Peach and Tift Counties with present needs. Colquitt, Dougherty, Houston, and Thomas Counties were shown to have 1990 projected needs.

ALTERNATIVE PROGRAMS

GENERAL

Cropland erosion and water quantity are addressed in this chapter. Solutions to erosion problems are either directly or indirectly related to the other concerns identified in Chapter II. Control of erosion and resulting sedimentation contribute directly to improvements in water quality and fish habitat. Pressure to convert wetlands and prime farmland will be lessened by solving some of the severe erosion problems on cropland. Conversion of marginal cropland to permanent cover with the purpose of reducing erosion will also enhance forestry opportunities and could improve wildlife habitat. Water based recreation will be enhanced by cropland erosion control to the extent that water turbidity will be decreased.

The area steering committee and study team identified cropland erosion as the most significant resource problem in the study area. The concerns about cropland erosion and water conservation highlighted in this report are reflective of the top national priorities for USDA, soil and water conservation activities. These priorities are:

1. Reduce excessive soil erosion on crop, range, pasture, and forest lands.
2. Conserve water use in agriculture, and reduce flood damages in small upstream watersheds.

Three alternative programs for reducing cropland erosion are evaluated to the year 1990. They are referred to as:

1. Ongoing
2. Redirection
3. Accelerated

The alternative erosion control programs are directed toward reducing cropland soil loss so as to maintain or improve resource productivity toward meeting food and fiber needs in the future. With each alternative, the mechanisms for addressing the erosion problem are combinations of management decisions and conservation practices.1/ For some conditions, crop rotations with contouring or terracing will reduce erosion to acceptable levels. For highly eroding cropland, the only solution is conversion to pasture or woods.

Planning elements for each alternative are shown in Table III-1. Effectiveness of land treatment, technical assistance needs, and cost are compared in Table III-2. Economic analyses for 1979 (base condition) and for 1990 with two levels of irrigation expansion are summarized in Table III-3. These analyses are limited to the six major crops of the area. The "redirection" alternative was not evaluated from an economic viewpoint and is not shown in Table III-3. The area steering committee and district supervisors' responses to the three alternatives are depicted in Table III-4.

1/ Appendix D.

ASSUMPTIONS AND PROJECTIONS

The agricultural and nonagricultural sectors of the economy in southwest Georgia have undergone significant changes in the past 10 years. Agriculture has changed toward more cropland under cultivation and larger farming operations. Nonagricultural developments have been mainly in the area of light industries and trades, catering toward the agricultural sector. Water availability has prompted two large breweries to locate processing plants in the area. The change, as well as projected future changes, will continue to influence land and water use decisions.

Projections indicate that cropland and urban areas will continue to expand to 1990. Cropland is expected to increase approximately 202,000 acres, and urban expansion will require an additional 32,000 acres. This expansion in cropland and urban areas will reduce forest land by approximately 234,000 acres. Acres in pasture and hayland uses are expected to increase about 15,000 acres.

A diversified type of agriculture is expected to continue in the immediate future. Soybeans and corn will continue to be the dominant crops, with peanuts continuing as the major cash crop. Soybean acreage will increase moderately, while corn acreage will decrease slightly. Peanut acreage is expected to remain about the same. Other increases are expected in cotton, sorghum, vegetables, and orchards.

For 1990, two levels of expansion in irrigation have been evaluated. The lower or "moderate" level is a 30,000-acre per year increase, while the higher expansion is 60,000 acres per year. Irrigation requirements by crop were used to calculate irrigation water use. Crop yields and cost return budgets were developed for each soil resource group. Yields for the study area were compared to yields reported by the Georgia Crop Reporting Service. Land treatment practices used in each alternative are similar to those presently available, but differ in their emphasis toward critical erosion areas. Cropping patterns and net returns in 1990 are affected by the interaction of higher yields resulting from improved technology and implementation of land treatment programs, more cropland being irrigated, an expansion in the cropland base, and more intensive use of cropland through higher levels of multiple cropping. Appendix G provides additional detail on the economic procedures used.

ALTERNATIVES

ALTERNATIVE 1 - ONGOING PROGRAM

This alternative represents no change in emphasis of technical assistance or new or accelerated programs by 1990. Projected conditions were developed using historical data to establish trends in types of treatment and acres treated. Cropland is projected to increase approximately 202,000 acres.

TABLE III-1

COMPONENTS AND TREATMENT LEVEL ELEMENTS
IN ADDITION TO TREATMENTS IN PLACE IN 1979 BASE

Components & Treatment Level Elements	Units	1990 Projection Plan Element Quantities-1990 Ongoing Program	Redirected Program	Accelerated Program
Cropland Erosion Reduction:				
Contouring	acres	253,120	143,740	457,260
Crop rotations w/cover crop	acres	106,920	-	122,440
Conservation tillage (no-till)	acres	90,170	164,390	164,390
Filter strip or field borders	acres	NQ[a/]	NQ	NQ
Terraces	acres	112,850	143,740	205,720
Waterways	acres	2,030	2,600	4,940
Tile outlets	miles	100	120	230
Sediment debris basins	number	NQ	NQ	NQ
Conversions:				
Cropland to hayland/pasture	acres	-	150,080	150,080
Cropland to woodland	acres	-	92,470	92,470
Drainage	acres	36,000[b/]	NQ	99,500[b/]
Other Alternative or Program Elements:				
Improved Production Efficiency:				
Forest land stand improvement[c/]	acres	61,600	61,600	800,000
Reforestation[c/]	acres	151,200	243,700	1,214,400
Irrigation water management	acres	50,700	50,700	300,000

a/ Not quantified.
b/ With expansion in irrigated acreage of 30,000 acres per year.
c/ Appendix J.

TABLE III-2

COMPARISON OF EFFECTS OF ALTERNATIVES ON EROSION
FOR TREATMENT APPLIED IN ADDITION TO 1979 BASE
(11-Year Treatment Period - 1979-1990)

Comparison Item	Ongoing Program	Redirected Program	Accelerated Program
1. Erosion Treatment Needed			
(acres)	1,192,360	1,192,360	1,192,360
(tons/year)	13,933,600	13,933,600	13,933,600
2. Land Treated for Erosion (acres)	563,060	550,680	1,192,360
3. Remaining Land Needing Erosion Treatment (acres)[a/]	629,300	641,680	29,600[b/]
4. Total Erosion Reduction			
(tons/year)	4,121,620	7,148,120	10,356,520
(tons by 1990)[c/]	22,668,910	39,314,660	56,960,860
5. Sediment Reduction (tons by 1990)	2,266,890	3,931,470	5,696,090
6. Technical Assistance (TA)			
a. man-years/year	45.5	45.5	97.0
b. Total TA dollars[d/]	12,762,750[e/]	12,762,750[e/]	20,366,500[e/f/]
7. Special Education and Information Program (dollars)[g/]	0	78,750	78,750
8. Installation Cost of Added Erosion Treatments (dollars)[h/]	22,993,930	58,644,920	71,900,270
9. Total Cost	35,756,680	71,486,420	92,345,520

a/ Treating present cropland and new cropland that is in excess of 5 tons per acre per year.
b/ Acreage of cropland eroding at a rate greater than 5 T/Ac/Yr reverting from treated condition during last year of accelerated treatment.
c/ Tons per year times 5.5, the average number of years treatments are in place during 1979-1990.
d/ Includes cost for treating reversion from 1979 base.
e/ $25,500 per staff year times 11 years.
f/ Additional 39.5 persons at $17,500 per year times 11 years.
g/ Includes 1 staff year for information and implementation programs.
h/ Does not include cost of drainage conversions of woodland to pasture or cropland, nor costs of forest treatments.

TABLE III-3

"BASE" CONDITIONS AND 1990 CONDITIONS WITH MODERATE AND HIGH EXPANSIONS IN ACRES IRRIGATED FOR ONGOING AND ACCELERATED LAND TREATMENT PROGRAMS

	1979 "base"	1990 Moderate Irrigation Expansion[1]		1990 High Irrigation Expansion[2]	
		Ongoing Land Treatment	Accelerated Land Treatment	Ongoing Land Treatment	Accelerated Land Treatment
All Cropland (acres)[3]					
0-5 t/ac/yr	1,236,800	1,836,800	2,338,000	1,836,200	2,338,900
6-10 t/ac/yr	682,000	349,800	0	349,500	0
11-15 t/ac/yr	100,000	84,800	0	86,100	0
16+ t/ac/yr	74,100	53,000	0	53,000	0
Irrigated Cropland (acres)[3]					
0-5 t/ac/yr	263,300	572,300	665,800	810,300	952,200
6-10 t/ac/yr	180,400	113,500	0	148,300	0
11-15 t/ac/yr	12,300	24,000	0	34,000	0
16+ t/ac/yr	11,500	12,900	0	18,200	0
Value of Production ($)	652,875,000	839,514,000	866,564,000	895,607,000	921,460,000
Production Costs ($)	474,305,000	564,812,000	560,896,000	600,629,000	595,278,000
Land Treatment Costs ($)[4]	19,140,000	25,517,000	29,344,000	27,367,000	30,609,000
Land Conversion Costs ($)					
Woods to Cropland	0	8,488,000	13,467,000	8,488,000	13,467,000
Cropland to Pasture	0	0	4,248,000	0	4,248,000
Cropland to Woods	0	0	717,000	0	717,000
Net Returns ($)[5]	159,430,000	240,697,000	257,892,000	259,123,000	277,141,000

1/ 30,000 acres/year within the 32 county area during 1979-90.

2/ 60,000 acres/year within the 32 county area during 1979-90.

3/ Major crops only--corn, soybeans, peanuts, tobacco, cotton, and grain sorghum. All small grains are double cropped with soybeans or grain sorghum.

4/ Treatments for erosion control and improved drainage.

5/ Annual returns to land, management, and risk in terms of 1975-79 normalized prices.

Plan Elements

Plan elements are those used in existing programs. Conservation practices will include contouring, crop rotation with cover crops, conservation tillage, drainage, and terraces (Table III-1). Plan elements are:

1. Conservation land treatment and management measures to adequately treat about 563,060 acres of cropland.

2. Silviculture treatment to improve growing stock on 213,000 acres of forest land.

Impacts

Cropland erosion would be reduced by 4.1 million tons annually or an average of 1.3 tons per acre on all 3,175,000 acres in cropland. Some 563,060 acres would be adequately protected by 1990. About 629,300 acres of cropland with excessive erosion would remain untreated. Technical assistance requirements are 45.5 man-years annually. Total installation cost is estimated to be 35.8 million, two-thirds of which is required for construction costs of the land treatment systems.

Net returns for the six major crops are projected at about $240.7 million annually by the year 1990 with the moderate expansion of irrigation. With the high expansion in irrigation, net income is estimated to be $259.1 million annually (Table III-3). About $8.5 million would be used to convert 157,200 acres of woods to cropland. Water requirements for the moderate rate of expansion in irrigation are 6.4 million acre-inches per year, compared to 4.4 million acre-inches used in 1979. With the high rate of expansion in irrigation, the water requirements would be 9.0 million acre-inches annually.

ALTERNATIVE 2 - REDIRECTION PROGRAM

This alternative redirects all the present area technical assistance toward cropland erosion control practices only, without any new or accelerated programs. No service would be provided on such practices as farm ponds, drainage, waste management systems, irrigation assistance, assistance to units of government, and so on.

Plan Elements

Plan elements are selected to reduce erosion on the most critically eroding cropland. The treatment practices include conservation tillage, contouring with terraces, and land use conversions. The most significant change in this alternative from the ongoing program is the addition of land use conversions. Some cropland in Class IIIe (clayey) and all cropland in Class IVe, VIe, IIIs, IVs, VIs, and VIIs soils would be converted to hayland, pasture, or woods. These shifts are projected to

involve about 243,000 acres currently in cropland. This loss of cropland would be offset by conversion of hayland, pasture, or woods on, for example, Class I and IIe soils to cropland.

Plan elements are:

1. Conservation land treatment and management measures to adequately treat about 550,680 acres of cropland.

2. Silviculture treatment to improve growing stock on 305,000 acres of forest land.

Impacts

Cropland erosion would be reduced by 7.1 million tons annually or about 2.3 tons per acre on the entire cropland base. Some 550,680 acres would be adequately protected by 1990. Approximately 641,680 acres of cropland with excessive erosion would still require treatment. Technical assistance requirements would be the same as for the ongoing program (Table III-2). However, total installation costs at $71.5 million are nearly double the costs of the ongoing program.

The effects of this alternative on net income or change in production costs for the six major crops were not evaluated.

ALTERNATIVE 3 - ACCELERATED PROGRAM

This alternative is formulated to more adequately treat all land with erosion and water management problems. The elements in this plan are similar to the redirection, but include more use of crop rotation and contouring. Additional technical assistance is also included to treat a greater portion of the area needing conservation and water management treatment.

Plan Elements

Plan elements are those needed to reduce erosion to a level that will not deteriorate the resource base and to improve drainage on wet soils. The treatment practices include contouring, crop rotation with cover crops, conservation tillage, terraces, land conversions, and surface and subsurface drainage. The land use conversions in this alternative are the same as in the redirected program.

Plan elements included in this alternative are:

1. Conservation land treatment and management measures to adequately treat about 1,192,360 acres of cropland (Table III-1).

2. Silviculture treatment to improve growing stock on 2,014,000 acres of forest land.

Impacts

Cropland erosion will be reduced by 10.4 million tons annually or about 3.3 tons per acre on all cropland. Some 1.2 million acres would be adequately protected. Technical assistance needed to accomplish this task will be 97.0 man-years annually. New programs and realignment of present State SCS personnel, or additional personnel from the national workforce, would be needed to accomplish this alternative. The estimated total installation cost of this alternative would be $92.3 million, about $20.9 million above the redirected program and $56.6 million above the ongoing program.

Net returns for the six major crops are projected to be about $257.9 million annually by the year 1990, with a moderate expansion in irrigation. This is $17.2 million and 7 percent higher than net returns with the ongoing program. With the high level of expansion, net returns are projected to be $277.1 million annually. About $18.4 million would be needed to convert 262,400 acres of severely eroding cropland to woods and pasture and 249,000 acres of woods to cropland. Water requirements for the moderate irrigation expansion are 5.8 million acre-inches per year. With the high irrigation expansion, the water requirement would be 8.5 million acre-inches annually.

In addition to the installation cost for each alternative, the area farmers have an estimated $19 million maintenance cost for measures in the 1979 base.

PUBLIC RESPONSE

The results of this evaluation and analysis were presented to the area steering committee and district supervisors for their response and evaluation. A summary of their responses to the three alternatives is shown in Table III-4.

Discussing Study Progress with Area Steering Committee

TABLE III-4

MEASURE OF PUBLIC RESPONSE

Evaluation Factors[1/]	Alternatives		
	Ongoing Program	Redirection Program	Accelerated Program
Completeness	0	-	+
Effectiveness	-	0	+
Efficiency	-	+	+
Acceptability	+	-	+

1/ Evaluation Factors:
Completeness - Services all requests.
Effectiveness - Accomplishes the erosion control needs.
Efficiency - Needs are resolved in least costly manner.
Acceptability - Program is popular with land users.

Rating: - weak point
0 neutral point
+ positive or strong point

The consensus of the group was that the goal for the area should be directed toward an accelerated program to achieve the desired results: protect the resource base, increase future income, and protect the environment.

Grassed Waterway Providing Runoff Protection in a Cotton Field

IMPLEMENTATION STRATEGIES

GENERAL

Design and implementation of programs for managing the area's land and water resources should be developed jointly by county governments, soil and water conservation districts, area planning and development commissions, and divisions of State and Federal agencies. The Georgia Soil and Water Conservation Committee, representing the soil and water conservation districts, and the Soil Conservation Service normally assume the major responsibilities for implementing erosion reduction programs. The Georgia Department of Natural Resources has responsibility for managing water resources.

Three cropland erosion control alternatives have been identified. These alternatives vary primarily in the type and quantity of practices applied to achieve protection of the cropland resources. Concerns relating to prime farmland retention, wetland retention, water quality and quantity, forest land losses, and water-based recreation have also been identified.

The alternatives were reviewed by the area steering committee and soil and water conservation districts for their recommendations on a direction to pursue. Not only was the ongoing program viewed as inadequate to control the erosion problem, but incentives in the form of cost sharing are insufficient. Only about $1.1 million in ACP cost sharing funds were available in 1979 to apply toward a conservation program that costs $2.1 million to install. To apply the needed conservation measures in the 1990 projection, about $6.5 million per year would need to be expended. Costs of technical assistance and annual maintenance cost of conservation practices in place in 1979 are not included.

Many felt that more positive action is needed and that an accelerated program approach would be the most desirable to resolve the cropland erosion problem and thus improve the chances of maintaining good quality water as well as resource productivity. Many recognized that a form of the redirected alternative may have to be initially implemented until additional funding and some type of incentive program for an accelerated program can be developed. A voluntary program is greatly preferred to a regulatory program. Representatives of the six area planning and development commissions had no adverse responses regarding implementation of the accelerated conservation program.

STRATEGIES

Present USDA policies place better than 50 percent of the total conservation funds directed at the three top Resource Conservation Act priorities: reduced soil erosion, improved water conservation, and reduction of upstream flood damages. Additional priorities for USDA assistance will be set at state and local levels from among the following national resource concerns: range, pasture, and forest land improvement; water

quality improvement; urban and rural community natural resources improvement; fish and wildlife habitat improvement; and organic waste management.

Conservation agencies at the local and state levels have latitude to emphasize certain priorities with the support and cooperation of the Department of Agriculture. USDA agencies will contribute resource information and technical advice to local conservation districts, state soil conservation agencies, and others.

USDA will be using a targeting concept for conservation activities for the 1980's. The concept is to target the funds and people to the areas with the worst soil erosion first. Both ASCS and SCS are presently targeting in designated areas.

The first major step is an information and education program to present the components of the alternative plans to the general public as well as the landowners and farm operators. With consideration given to existing programs, financial arrangements, and the need for new or amended programs, priorities should be established as to which plan or components should be implemented.

To aid in development and implementation of the information and education programs, the Soil Conservation Service has proposed to assign a person full time within the study area. The study team recommends the contents of Table IV-1, Recommended Action Plan, as a tentative guide for prioritizing the needs. The recommendations relating to erosion control are based on economic and environmental considerations developed through the study evaluations. Some of the steeper erosive lands being cropped are economically submarginal and have erosion rates that can be reduced to 5 T/ac/year only through conversions to permanent vegetation. In many instances these are also the higher sediment-producing lands creating adverse off-site impacts. The study team recommends that these areas, followed by cropland in the next highest erosion classification, should receive the first attention in developing and implementing remedial programs.

The "Critical Cropland Erosion Map" following page II-4 displays the location of cropland fields greater than 20 acres that had cropland erosion in excess of 15 T/ac/year. Some 127,400 acres[1/] were identified. Many of these acres need to be converted to pasture, woodland, or changed to no-till farming.

These critically eroding areas, along with the remaining 1.1 million acres identified in the 5 to 15 T/ac/year range, are displayed on individual county erosion maps included in the County Supplement Reports.[2/] These maps will aid in matching priority actions to locations with the greatest need. Later sections of this chapter will highlight available programs and some needed programs or measures.

1/ Appendix I, page 1.
2/ Available at SCS County Offices and SCS Water Resources Planning Staff Office, Athens, Georgia.

TABLE IV-1
RECOMMENDED ACTION PLAN

Priority	Needs	Actions
1	Information Program	-- Help district conservationists and district supervisors organize county advisory committees. -- With districts and county advisory committees, inform the public and landowners of study results and proposed needs through meetings, audio visuals, television and radio, and news articles. -- Display problems and conservation measures through demonstrations.
2	Erosion Control Strategies	-- With districts, area steering committes, and county committees, select areas with greatest problems for program assessments. -- Prioritize areas using factors such as district involvement, landowner interest, recharge areas, etc.
3	Develop Plans and Programs for Cropland Conversions (243,000 acres)[1/]	-- With study team, identify areas needing converting. -- Information program on merits of conversion. -- Assess present program (1) area-wide and (2) locally. -- Assist in development and enactment of an improved incentives program.
4	Develop Plans and Programs for Excessively Eroding Cropland that will Remain in Cropland, 11-31+T/Ac range (88,340 ac. remaining after reduction for Priority 3).	-- Assess existing programs as means for implementing selected projects. -- District will encourage funding of the Special Areas Conservation Program. -- Assess potential of supplementing the existing program with state funds tied to long term contracts.
5	Develop Plans and Programs for Excessive Eroding Cropland 6-10 T/Ac range (861,020 ac.)	-- Explore potential for landowners and operators funding equal percentage (50 percent) of this category. -- Districts will encourage additional availability of low interest state and federal loans for operators' share of conservation measures.

1/ Current practices will reduce erosion but not to 5 T/Ac/year.

Other strategies or recommendations which merit followup actions are outlined below. No priorities have been recommended. Some recommendations are limited to certain locations within the study area and may have higher priorities in affected counties than on an areawide basis.

ADDITIONAL RECOMMENDED ACTIONS

1. Encourage an intensive areawide information program through Georgia Forestry Commission on improvement of timber stands.

2. Promote an areawide information program by the Georgia Forestry Commission to encourage landowners to convert 92,500 marginal and submarginal acres of cropland to woodland.

3. Promote a reforestation program on existing poor stands and new land coming from cropland conversion.

4. Encourage development of new cropland on prime farmland by displaying economics of using prime vs. marginal and submarginal soils. Prime farmland maps are available for each county.

5. Encourage the Dougherty County government and zoning boards to institute a tax relief program with a payback provision to landowners who will maintain prime farmland in agricultural uses.

6. Encourage studies on loading capacities of wetlands and filter strips for filtration of agricultural runoff. Additional studies assessing impacts of buffer strips and other filtration practices on agricultural runoff. Examine availability of special conservation grant monies.

7. Provide an areawide information program (slide show) on values of wetlands emphasizing the agricultural values such as grazing on marsh grasses, watering holes, and filters for agricultural runoff.

8. Promote creation or maintenance of wetlands upslope from active ground water recharge locations to act as filtrators of runoff from intensive cropland and urban areas.

9. Encourage identification by F&WS and USGS of key wetlands in danger of drainage but that might be maintained through tax relief, purchase of development rights by easement, long term contract with annual payments as with USDA Waterbank Program, or perpetual easements through the Fish and Wildlife Services Small Wetlands Program.

10. Initiate treating the 1,750 acres of critically eroding roadbanks. This element might be included if an areawide or multicounty special project or targeted area application is one of the selected implementation measures.

11. Initiate providing facilities for water-based recreational needs identified in the State Comprehensive Outdoor Recreation Plan for Colquitt, Dougherty, Houston, Peach, Thomas, and Tift Counties through existing programs.

PROGRAMS AVAILABLE

FEDERAL AGENCIES

The principal U.S. Department of Agriculture agencies having responsibility for administering programs and providing services to promote conservation, development, and utilization of water and related land resources are the Soil Conservation Service, the Cooperative Extension Service, Agricultural Stabilization and Conservation Service, and Farmers Home Administration. The U.S. Forest Service provides financial and technical assistance on forested lands.

Soil Conservation Service

The Soil Conservation Service (SCS) has authority through several legislative actions. Under PL 74-46, the SCS has a broad program of soil and water conservation and development. Its principal function is to assist soil and water conservation districts to carry out district programs which consist of planning and applying land treatment measures with land users. As part of this authority, SCS can also provide technical assistance to groups of landowners operating in an area having high or excessive soil erosion problems and designated as an approved conservation targeted area. Under PL 83-566, the SCS provides technical and financial assistance to State and local organizations for watershed protection, flood prevention, flood plain management, fish and wildlife enhancement, public recreation, irrigation, and drainage. Loan assistance is also available for constructing municipal and industrial water supply reservoirs. To date, one watershed project has been completed in the study area and one has been approved for installation.

Resource Conservation and Development (RC&D) Program authorized under PL 97-98, Food and Agriculture Act of 1981, assist conservation districts, local governments, or individuals to improve economic, environmental, or social conditions in their communities. For accelerated conservation or land use change activities, the SCS can provide technical and financial assistance to eligible sponsors. Presently an application for the Golden Triangle RC&D project consisting of Decatur, Miller, and Seminole Counties is on file.

The Food and Agriculture Act also provides conservation provisions such as conservation grants to State and local governments, Special Areas Conservation Program, and a farmland protection policy. However, the Act does not provide funding to establish the Special Areas Conservation Program.

Cooperative Extension Service

The Cooperative Extension Service is the education agency of USDA and the land grant universities. The Extension Service provides information relating to conservation programs and practices through local office network or via specialists located at land grant universities.

Agricultural Stabilization and Conservation Service

The Agricultural Stabilization and Conservation Service (ASCS) administers production adjustment, resource protection, and farm income stabilization programs. Under authority of PL 74-76, the ASCS provides cost sharing for a wide variety of soil, water, forestry, and related conservation and pollution abatement practices. The ASCS also administers the Forest Incentives Program, PL 91-524, under which cost sharing is provided for improved forest management practices; the Water Bank Act, PL 91-559, which applies to the management of wetlands; and PL 95-240 and PL 85-58 under which cost sharing can be provided for agricultural damages or losses caused by natural disasters. The Special Areas Conservation Program, included in the 1981 Food and Agriculture Act, provides authority for cost sharing with long term contracts in specially selected project areas.

Farmers Home Administration

This agency, under authority of PL 92-219 as amended, makes loans and grants to qualified recipients. Loans are available for farm ownership and operations, emergencies, recreational enterprises, and grazing associations. Loans are also available to small communities for water and waste disposal systems. In addition to financial aid, the Farmers Home Administration provides technical and management assistance.

Forest Service

The Forest Service (FS) is under provisions of the Organic Administration Act of 1897 and PL 86-517 in which Congress established that the renewable surface resources of the National Forests (primarily outdoor recreation, forage, timber, water, wildlife, and fish habitat) shall be administered for multiple use and sustained yield. Within the framework of this legislation and dependent upon funds available, reforestation, timber stand improvement, forest fire management, and a variety of other resources protection and management activities are implemented. Public Law 85-233 reaffirmed the principles of multiple use and sustained yield by providing directives for planning, guidelines for timber harvesting, provisions for public involvement, and other aspects of National Forest System management.

State and private forestry functions are conducted under PL 95-313. Cooperative forestry programs, administered through the above authority, include management planning, timber production, insect and disease control, control of rural fires, improvement and maintenance of fish and wildlife habitat, and urban forestry assistance. Forest industries may receive assistance in forest products utilization, marketing, and management.

The Forest and Rangeland Renewable Research Act, PL 95-307, provides a broad charter for research in forest and renewable resources. Work being conducted in the basin includes inventories and assessments of forest resources, surface mine reclamation, and forest watershed management research.

Other Federal Agencies

Various other federal agencies have authority under numerous acts to contribute to the conservation and development of the basin's resources. Some of these are:

1. Department of Army - Corps of Engineers
2. Department of Housing and Urban Development - Federal Emergency Management Agency
3. Department of Interior - Heritage Conservation and Recreation Service
4. Department of Interior - Fish and Wildlife Service
5. Department of Interior - Geological Survey
6. Environmental Protection Agency

STATE AGENCIES

The State of Georgia sponsors and administers several projects and programs influencing development and use of water and related land resources.

Department of Natural Resources

This department has several divisions with activities in southwest Georgia. The Game and Fish Division and Park and Historic Sites Division carry out their legislated or promulgated rules in the area. The Environmental Protection Division (EPD) is a regulatory agency with authorities in air, land, and water protection. EPD is also charged with responsibility for the State's nonpoint source pollution program, Section 208 of PL 92-500. EPD has assisted soil and water conservation districts with financial assistance in information and education activities on some 24 conservation demonstration projects over the past 5 years. EPD also conducts a 208 nonpoint source monitoring program with three of the monitored agricultural watersheds in the study area.

Department of Transportation

The department's road construction and maintenance program has provisions for treating high sediment-producing areas such as roadbanks and borrow areas.

Georgia Forestry Commission

The major responsibility of this agency is to provide services and carry out programs to protect and improve forest resources. District personnel are assigned throughout the basin area to assist landowners with timber stand improvement, timber marking, and reforestation practices including trees for planting. They also develop management plans, prevent and suppress forest fires, provide assistance in utilizing and marketing forest products, and provide guidance for forest activity-related erosion control practices.

Georgia Soil and Water Conservation Committee

The Committee is appointed by the Governor to represent the soil and water conservation districts within the State. It maintains a staff that provides administrative, financial, educational, and informational services to the districts to assist in getting sound, long term conservation practices applied on the land. It works in cooperation with EPD on 208 activities and statewide urban erosion and sediment activities.

LOCAL AGENCIES AND ORGANIZATIONS

Area Planning and Development Commissions

Six commissions are represented in the study area. These commissions were formed to assist cities, counties, and regions in comprehensive planning and development activities.

Soil and Water Conservation Districts

All counties are represented by soil and water conservation districts. These locally organized districts are entities of State government and provide assistance and guidance for resource planning and development. In addition, the districts have authority to condemn land for flood control and related purposes and to provide certain land use regulations. Most of the districts' activities are associated with planning and assisting land users and local units of government in conservation and proper management of soil, water, and related natural resources. The local districts' programs are carried out with technical assistance provided by the Soil Conservation Service and other agencies.

County Governments

All counties have an administrative unit with legislated authorities. Each county government has the authorities for influencing land use decisions within its boundaries. Each county, upon public approval, can issue bonds for programs such as recreation and soil and water conservation or give incentives such as tax relief for preserving prime farmlands, valuable wetlands, or applying conservation measures on critically eroding areas.

Local Groups

Many local organizations and groups conduct activities and carry out programs affecting water and related land resources. Some of these include city or local governments, educational boards, schools, and planning and zoning commissions. Others are religious, financial, business, recreational, agricultural organizations or institutions, and related men's and women's clubs.

Although varying by location, the above organizations conduct and sponsor a variety of activities and programs directly or indirectly associated with natural resources. Most are readily agreeable to assist in conservation information activities.

TABLE IV-2

SUMMARY OF AVAILABLE PROGRAMS RESPONSIVE TO THE CONCERNS

Concerns/Problems	Type Program	Agencies	Type Assistance
Cropland Erosion	Cons. Planning & Application		
	Land Treatment	SCS, SWCD	TA
	Watershed Program	SCS, SWCD	FA, TA
	Agricultural Cons. Program	ASCS, SCS	FA, TA
	Conservation Targeted Areas	SCS, SWCD	TA
	ACP Special Projects	ASCS, SCS	FA, TA
	Special Area Cons. Project	SCS, ASCS, SWCD	TA, FA
	Conservation Loans	FmHA	FA
	Conservation Research	ARS, Ga.Exp.Sta.	TA
	Conservation Education	Coop.Ext.Serv., EPD	TA, FA
	District Program	SWCD	PO
	State Committee Program	SSWCC	PS
Roadbank Erosion	Critical Area Treatment		
	Resource Conservation and Development Program	SCS, SWCD	TA, FA
	Watershed Program	SCS, SWCD	TA, FA
	Highway Maintenance	DOT	TA, FA
	Special Grants	EPA	FA
	District Program	SWCD, Counties	FA, PO
	State Committee	SSWCC	PS
Prime Farmland Retention	Cons. Planning & Application		
	Identification	SCS	TA
	State Committee Program	SSWCC	PS
Water Quality	Cons. Planning & Application		
	Land Treatment	SCS, ASCS, SWCD	TA, PO
	Conservation Targeted Area	SCS, ASCS, SWCD	TA, PO
	Special Area Cons. Project	SCS, ASCS, SWCD	TA, FA, PO
	Watershed Program	SCS, SWCD	TA, FA, PO
	Rural Clean Water Program	ASCS	FA
	Ground Water Identification	USGS, EPD	TA
	208 Monitoring Project	EPD, SSWCC	TA
	Erosion & Sediment Control	SWCD,EPD,SSWCC	TA
	State Committee Program	SSWCC	PS
Water Quantity	Stream Gaging & Monitoring Program	USGS, EPA	TA
	Ground Water Modeling	USGS, EPD	TA
	Agricultural Water Use	Coop.Ext.Serv.	TA
	Water Use	USGS, EPD	TA
	Water Storage & Ground Water Recharge Watersheds	SCS	TA, FA
	Irrigation Water Management	SCS	TA

Concerns/Problems	Type Program	Agencies	Type Assistance
Forestry Improvement	Forest Incentive Program	ASCS	FA
	Reforestation and Stand Improvement	Ga.For.Comm.	TA
Wetland Retention	Identification & Information	F&WS, SCS	TA
	Perpetual Easements	F&WS	TA
	Loading Capacity Studies	ARS, Ga.Exp.Sta.	TA
	Water Bank Program	ASCS	FA
Water Based Recreation	Cons. Planning & Application		
	Watershed Program	SCS, SWCD	TA,FA,PO
	Resource Conservation and Development Program	SCS, SWCD	TA,FA,PO
	Permanent Wildlife Habitat Program	ASCS	FA
	Shallow Water Areas for Wildlife Program	ASCS	FA

FA - Financial Assistance
TA - Technical Assistance
PO - Program Oversight
PS - Program Support

ARS - Agricultural Research Service
ASCS - Agricultural Stabilization and Conservation Service
Coop.Ext.Serv. - Cooperative Extension Service
DOT - Department of Transportation
EPA - Environmental Protection Agency
EPD - Environmental Protection Division
FmHA - Farmers Home Administration
F&WS - Fish and Wildlife Service
Ga.Exp.Sta. - Georgia Experiment Station
Ga.For.Comm. - Georgia Forestry Commission
S&WCD - Soil and Water Conservation Districts
SCS - Soil Conservation Service
USGS - U.S. Geological Service

PROGRAM NEEDS

Money to carry out conservation practices is the greatest need. Most landowners and operators wish to conserve their resources, but many are just trying to survive in a climate of high production costs, particularly interest and machinery costs, low product prices, and poor weather conditions over the past 5 years. The general condition of the national economy has reduced money available for federal cost sharing.

Once the general public is informed of the seriousness of soil erosion and the long run benefits of erosion control, local steering committees along with soil conservation districts need to develop priority areas for early action (refer to Table IV-1). The consensus of the study team is that the next priority is a concerted effort to seek legislation to provide incentives to convert 243,000 acres of highly eroding cropland to grass or trees, similar to the Soil Bank Program of the 1950's. This would eliminate a large part of the total erosion, promote wise land use, and reduce surplus production to some extent. Much of this land has positive net returns to the landowner only when product prices are high and weather is very good.

Cost sharing dollars from federal, state, and county government are needed to cost share at a rate necessary to accomplish treatment of the remaining 88,340 acres 11-31+T/ac excessively eroding range. On acreage in the excessive category (6-10 T/Ac) where lower cost conservation measures such as contouring are effective, a percentage of the ACP funds might be set up to apply conservation practices in this erosion range. As an example, a 50-cent per acre contouring incentive would represent about 17 percent of the implementation cost, but help control erosion on nearly half of the acreage in the category. Low interest federal or state loans would be an incentive for implementing more expensive long term practices such as terracing.

Authorized programs, such as the Special Conservation Areas program which provides for financial and technical assistance, need to be funded, but with monies other than those presently allocated in the conservation operations program.

Other needs include identification of the primary aquifer recharge areas by USGS and EPD. This action would help in establishing priority areas for conservation systems to improve the water quality of agricultural runoff into recharge areas. Another need is identification of important wetlands, especially in areas subject to heavy agricultural and urban runoff. Since wetlands are important in improving water quality, strong consideration should be given to protective easements, long term contracts with annual payments, or tax exemptions on important wetlands. Iowa and Minnesota have enacted property tax exemptions on selected wetlands.

A tax exemption or reduced tax is used by some states to help protect prime farmland from rapid conversion to nonagricultural uses. County action followed by State legislation might be considered for Dougherty County, which is presently the principal county with high urban-suburban developmental pressures.

In West Virginia voluntary agreements have been made between landowners and county commissioners to hold land in agricultural production, if the county will in turn protect landowners from nuisance suits, keep taxes low, and otherwise favor agricultural production. Purchase of development rights or easements by the county to preclude development is another method being employed in some states. Development rights are getting some favorable publicity now, but this is being done in the very densely populated area of Maryland and New York.

Water conservation is founded on the need to protect water resources for long term utilization. Increased agricultural and industrial water usage in the area promoted action such as special studies and a movement toward legislation to bring all the major water users into a reporting system. An amendment to the existing laws to add an agricultural use reporting method has recently been enacted. Many people feel that much water used in current irrigation systems is excessive to the crop need. An information and education program showing increased income through an efficient onfarm water management system is needed. Many existing irrigation systems need to be redesigned to improve efficiency. Agricultural agency persons need to be working with irrigation equipment companies and the operators to bring about necessary improvements.

The approach to the other needs is similar to that outlined for reducing cropland erosion. Participation on a voluntary basis is likely to continue. In some states where major problems exist, penalties for mismanagement of resources have been enacted.

If the local leaders and land managers take appropriate actions on the resource problems presented in this report, the soil and water resources will be protected and enhanced to provide for the continued and greater economic well-being of southwest Georgia. These actions will be important not only to the area but to the rest of the state and region as well, for they will be providing leadership to solving problems that are common to the whole southeastern region.

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APPENDIX B

FIELD INVENTORY

County resource data coverage was evaluated from different sources:

1. ASCS county photographs at 1:24,000 scale flown during 1973 through 1978.

2. 1977 Land Satellite coverage at 1:250,000.

3. USGS 7.5-minute topographic quads sheets.

4. 1972 Forest Service data from Renewable Resources Evaluation Group, Southeast Forest Experiment Station, Asheville, North Carolina.

The emphasis of the study was on cropland erosion, irrigation expansion, land conversions, and their associated impacts. An SCS representative in each county mapped land use and erosion on all fields 20 acres and larger with soil erosion exceeding 5 tons per acre per year, and identified changes in woodland that had occurred since the ASCS photographic base was produced. This data was transferred to the Map Information Assembly and Display System (MIADS) using the USGS quad sheets and the Universal Transverse Mercator (UTM) for control. Each county was gridded into 10-acre square cells on the UTM system. Three levels of data were encoded for each cell: land cover, cropland erosion, and soils. Soil mapping units or soil associations in areas not mapped were encoded so that combinations and interpretations on any one cell or group of cells could be made.

Maps of land use, cropland erosion, irrigated and irrigable lands, and prime farmland presently in cropland and in convertible uses such as pastureland and woodland were generated for each county.

The inventory data was also aggregated into soil resource groups (SRG). Acres in major land uses were developed for each SRG. Acres of individual crops, including acres irrigated, were also tabulated for each SRG. Each SRG had from one to five of the following erosion groupings: 0-5, 6-10, 11-15, 16-30, and 30+ tons per acre per year.

SOIL RESOURCE GROUPS

The field inventory procedure described in Appendix B was used to develop the study area soil base.

Each of the 269 soil mapping units was placed into one of 17 soil resource groups (SRG). Each SRG consists of one or more land capability units that have similar crop yield characteristics, responses to fertilizers, and soil and water management requirements. The soils included in a soil productivity group may occur in one or more major land resource areas. These groups were developed to be used in the analysis of county or study-wide conditions and impacts.

Group 1

Class I. Nearly level, well-drained soils on upland ridgetops and stream terraces. Typically, the soils have a brownish sandy or loamy surface layer about 9 inches thick. The subsoil commonly extends to a depth of 60 inches or more. It is predominantly brownish or reddish and loamy or clayey. Permeability is moderate or moderately slow; available water capacity is medium or high. There is little runoff, and the hazard of erosion is slight. These soils are well suited for cultivated crops and pastures without special conservation treatment. Soils can be used continuously for row crops. Major soils are Cahaba, Dothan, Faceville, Greenville, Marlboro, Maxton, Norfolk, Orangeburg, Red Bay and Tifton.

Group 2

Class IIe. Gently sloping, well-drained soils on upland ridgetops and stream terraces. They have loamy sand or sandy loam layers less than 20 inches thick over moderately slow to moderately rapid permeable sandy loam or sandy clay loam subsoils. The root zone is more than 60 inches thick and has an average available water capacity of moderate to high. Runoff from unprotected areas is moderate to rapid, and the hazard of erosion is moderate to severe. These soils are well suited for cultivated crops and pastures, but require moderate to intensive erosion control practices. Soils can be used three out of four years. Major soils are Cowarts, Dothan, Hornsville, Maxton, Norfolk, Orangeburg, Red Bay and Tifton.

Group 3

Class IIe. Gently sloping, well-drained soils on upland ridgetops and stream terraces. They have loamy sand or sandy loam layers less than 15 inches thick over moderately slow to moderately rapid permeable sandy clay loam or sandy clay subsoils. The root zone is more than 60 inches thick and has an average available water capacity of moderate to high. Runoff from unprotected areas is moderate to rapid, and the hazard of erosion is moderate to severe. These soils are well suited for cultivated crops and pastures, but require moderate to intensive erosion control practices. Soils can be used three out of four years for cultivated crops. Major soils are Carnegie, Faceville, Greenville, Marlboro and Nankin.

Group 4

Class IIIe. Sloping, well-drained soils on upland ridgetops and stream terraces. They have loamy sand or sandy loam layers less than 15 inches thick over moderately slow to moderately rapid permeable sandy loam or sandy clay loam subsoils. The root zone is more than 60 inches thick, and has an average available water capacity of moderate to high. Runoff from unprotected areas is moderate to rapid, and the hazard of erosion is moderate to severe. These soils are well suited for cultivated crops and pasture, but require moderate to intensive erosion control practices. Soils can be used for cultivated crops two out of four years. Major soils are Cowarts, Norfolk, Orangeburg, Red Bay, and Tifton.

Group 5

Classes IIIe, IVe. Sloping, well-drained soils on side slopes of upland ridges. They have loamy sand or sandy loam layers less than 15 inches thick over moderately slowly permeable to moderately rapidly permeable sandy loam, sandy clay loam, or sandy clay subsoils. The root zone is more than 60 inches thick. Available water capacity of the root zone averages moderate to high. Runoff from unprotected areas is very rapid, and the hazard of erosion is very severe. These soils are poorly suited for cultivated crops and only moderately suited for pasture because of slope and the hazard of erosion. Soils can be used two out of four years for cultivated crops. Major soils are Carnegie, Faceville, Greenville and Nankin.

Group 6

Class IIs. Nearly level and gently sloping, well-drained soils of the uplands. They have sand, loamy sand or sandy loam layers more than 20 inches thick over moderately permeable to moderately rapidly permeable sandy loam or sandy clay loam subsoils. The root zone is more than 60 inches thick. Average available water capacity of the root zone is

low to moderate. There is little runoff from unprotected areas, and the hazard of erosion is slight. The soils are moderately suited for cultivated crops. Simple soil improving practices are needed. Soils can be used three out of four years for cultivated crops. Major soils are Fuquay, Lucy and Wagram.

Group 7

Classes IIIs, IVs. Sloping, well-drained to somewhat excessively drained soils on side slopes of low ridges. They have sand, loamy sand, or sandy loam layers more than 20 inches thick. Some have moderately permeable to moderately rapidly permeable sandy loam or sandy clay loam subsoils, and others have sand layers to more than 72 inches deep. The root zone is more than 60 inches thick. The available water capacity of the root zone averages low to moderate. The hazard of erosion is moderate on unprotected areas. These soils have only fair suitability for cultivated crops due to poor soil quality and slope. They require moderate erosion control practices and intensive soil improving practices. Soils can be used a maximum of two out of four years for cultivated crops. Major soils are Americus, Eustis, Fuquay, Lucy and Wagram.

Group 8

Classes IVe, VIe. Strongly sloping to steep, well-drained soils on side slopes of upland ridges. They have loamy sand or sandy loam layers less than 20 inches thick over moderately slowly permeable to moderately rapidly permeable sandy loam, sandy clay loam, or sandy clay subsoils. The root zone is more than 60 inches thick. Available water capacity of the root zone averages moderate to high. Runoff from unprotected areas is very rapid, and the hazard of erosion is very severe. These soils are poorly suited for cultivated crops because of slope and hazard of erosion. Major soils are Carnegie, Cowarts, Faceville, Greenville, Orangeburg and Red Bay.

Group 9

Classes IIw, IIIw. Nearly level to gently sloping, moderately well to somewhat poorly drained soils on flats of the lowlands and depressions in the uplands. They have loamy sand or sandy loam layers over slowly to moderately permeable sandy clay loam or sandy clay subsoil. The root zone is limited by a water table within 30 inches of the surface much of the time. Available water capacity of the root zone averages low to moderate. These soils are well suited for cultivated crops and pastures, but the nearly level areas require water control practices for best yields. Soils can be used three out of four years. Major soils are Angie, Ardilla, Clarendon, Dunbar, Duplin, Eulonia, Goldsboro, Hornsville, Irvington, Izagora, Leefield, Lynchburg, Ocilla, Olustee, Ona, Robertsdale, and Wahee.

Group 10

Classes IVw, Vw, VIw, VIIw. Nearly level to gently sloping, poorly to very poorly drained soils in depressions or on side slopes of the lowlands and undulating uplands. They have sand or loamy sand layers over moderately permeable sandy clay loam or slowly permeable clay loam or clay subsoils. The root zone is limited by a water table that is within 10 inches of the surface much of the time and by the subsoils of some soils. The available water capacity averages moderate to high in the root zone. These soils are not suitable for cultivated crops without a well designed and carefully maintained water control system. With good water control, they are very well suited for cultivated crops and pastures. Major soils are Alapaha, Alluvial, Bayboro, Bladen, Chastain, Coxville, Dasher, Grady, Herod, Istokpoga, Johnston, Kinston, Leaf, Mascotte, Meggett, Ocilla, Osier, Pelham, Plummer, Portsmouth, Rains, and Rutlege.

Group 11

Classes IIIs, IVs, VIs, VIIs. Sloping to strongly sloping, well-drained to excessively drained soils on side slopes of upland ridges. They have sand or loamy sand layers more than 40 inches thick and moderately permeable to moderately rapidly permeable sandy loam subsoils. In some places, the subsoil is below 60 inches. The root zone is more than 60 inches thick. Water moves moderately rapidly over unprotected slopes, and the hazard of erosion is moderate. The soils are not suitable for cultivated crops because of poor soils quality and steepness of slope. They are poorly suited for pastures. Major soils are Bonifay, Kershaw, Lakeland and Troup.

Group 12

Classes IVs, VIs, VIIs. Strongly sloping to steep, well drained to excessively drained soils on side slopes of low ridges. They have sand or loamy sand layers more than 20 inches thick. Some have moderately permeable to moderately rapidly permeable sandy loam or sandy clay loam subsoils and others have sand layers to more than 72 inches deep. The root zone is more than 60 inches thick. The available water capacity of the root zone averages low to moderate. The hazard of erosion is moderate on unprotected areas. These soils have only fair suitability for cultivated crops and pastures due to poor soil quality and slope. They require moderate erosion control practices and intensive soil improving practices. The soils are not suitable for cultivated crops because of poor soil quality and steepness of slopes. Major soils are Americus, Lucy, Lakeland, and Troup.

Group 13

Classes IIIe, IVe, VIe. Sloping to strongly sloping, somewhat poorly-drained to well-drained soils on side slopes and low knolls in the upland. They have loamy sand or sandy loam layers over slowly permeable clay loam or clay subsoils. The root zone is limited to less than 40 inches by the subsoil. Available water capacity of the root zone averages low to moderate. Runoff is very rapid from unprotected areas, and the hazard of erosion is very severe. The soils are poorly suited for cultivated crops because of slope and the hazard of erosion. Soils can be used one out of four years for row crops. Major soils are Boswell, Cuthbert, Esto, Henderson, Hoffman, Oktibbeha, Orangeburg, Sawyer, Sunsweet, Susquehanna and Vaucluse.

Group 14

Classes IVe, VIe, VIIe. Strongly sloping to steep, somewhat poorly-drained to well-drained soils on side slopes. They have loamy sand or sandy loam layers over moderately permeable to slowly permeable sandy clay loam or sandy clay subsoils. The root zone is more than 60 inches thick. Available water capacity of the root zone averages low to high. Runoff is very rapid on unprotected areas, and the hazard of erosion is very severe. These soils are not suitable for cultivated crops and are capable of producing only fair pastures. Soil cannot be used for row crops. Major soils are Boswell, Cuthbert, Esto, Henderson, Oktibbeha, Orangeburg, Sawyer, Sumter, Sunsweet,Susquehanna, and Vaucluse.

Group 15

Classes IIIw, IVw. Nearly level to very gently sloping, moderately well-drained to somewhat poorly-drained soils on flats of the lowlands and depressions in the uplands. They have loamy sand or sandy loam layers over slowly to moderately permeable sandy clay loam subsoil. The root zone is limited by a water table within 30 inches of the surface much of the time. Available water capacity of the root zone averages low to moderate. These soils are suited for cultivated crops and pasture, but require water control practices for best yields. Major soils are Albany, Barth, Buncombe, Chipley and Ousley.

Group 16

Classes IIw, Vw. Nearly level, moderately well-drained and well-drained loamy alluvial soils on flats of the lowlands and depressions in the uplands. They have loamy sand or sandy loam layers over slowly to moderately permeable sandy clay loam or sandy clay subsoils. The root zone is limited by a water table within 30 inches of the surface much of the time. Available water capacity of the root zone averages low to

moderate. These soils are well suited for cultivated crops and pastures, but require water control practices for best yields. Soil can be used three out of four years. Major soils are Congaree, Iuka, Local Alluvial, Ochlockonee, and Riverview.

Group 17

Classes IIe, IIIe, VIIe, VIIIe, IIw, Vw, VIIw, VIIIs. Complexes and land types not used for agriculture. Major soil complexes and land types: Alapaha urban, Leefield urban, Stilson urban, Tifton urban, dune land, gullied land, mine pits and dump, swamp, urban and water.

APPENDIX D

MANAGEMENT DECISION FOR AND EFFECT OF CONSERVATION SYSTEMS

Cropland sheet and rill erosion are occurring at an average rate of 5.8 tons per acre per year over the study area. Unless management of the land is accomplished in the next 10 years, this rate is expected to continue at the rate of 6.0 tons per acre per year.

Length and steepness of slope and and exposure have been formed by nature. Length and percent of slope, rainfall, erodibility of soil, and plant cover all affect the amount of soil erosion. Farmers can control the amount of plant cover by the kind of crops they plant and the tillage practices used. Management practices such as planting dates, controlled fertility levels, and the use of erosion control practices (such as terraces and waterways) are also applicable to protecting and maintaining the soil resource. Management is a series of interacting decisions that influence achievement of the farmer's goal. If conservation is an important goal, a farmer must make management decisions to reduce erosion to desired levels. The management system must be tailored to the individual farm, to crops grown, soils, topography, and climate.

This study has determined the rate of erosion that can be expected from various crop rotations and conservation practices anywhere in the study area. Erosion rates shown are not specific to sites. They are based on averages from field data collected in the study. Actual erosion rates will vary due to site, climate, management, cultural, and similar influences.

"Soil Resource Groups" consist of an aggregation of soil units that are relatively homogeneous with respect to erodibility, slope, depth, surface texture, subsoil permeability, and water-holding capacity, all of which influence productivity to some extent. Cropland soils in the study area have been grouped into 17 soil resource groups.

Soil erosion rates are different for each soil resource group (lowest is Group 1, and highest is Group 14). They also differ in relation to the cropping system used. The average soil erosion rates for crop rotations with no conservation management are shown in Table D-1.

Selection of Crop Rotations

The farmer must decide how he is going to farm his land. The first decision is what crops to grow and in what sequence. The crop rotation that is selected and the method of farming used have a major impact on the potential erosion rates.

As shown in Table D-1, predicted soil erosion rates vary significantly with the rotations within a soil resource group. Because of steeper slopes or more erodible soil, the erosion prediction will vary for the same crop rotation between different soil groups. Major causes of cropland erosion are production of row crops on land unsuited for crop production and inadequate conservation systems on lands suitable for cropland. Approximately 1.1 million cropland acres lack an adequate conservation system or have no conservation practices applied.

These erosion rates by soil resource groups are predicted for crop rotation with no conservation management. Different conservation practices have different levels of effectiveness in reducing erosion. Conservation practices evaluated were conservation tillage system, contour farming, and terraces.

Each of the conservation practices will reduce erosion rates to different levels. The average rate of erosion reduction resulting from each of these practices is shown on Table D-2.

Conservation Systems Recommended

Conservation Tillage System - a form of noninversion tillage that retains protective amounts of residual mulch on the surface throughout the year. These include no-tillage, strip tillage, stubble mulching, and other types of noninversion tillage.

Contour Farming - farming sloping cultivated land in such a way that plowing, preparing land, planting, and cultivating are done on the contour. This includes following established grades of terraces, diversions, or contour strips.

Terrace - an earth embankment, channel, or a confirmation ridge and channel constructed across the slope.

TABLE D-1

PREDICTED AVERAGE ANNUAL SOIL LOSSES BY CROP ROTATION
BY SOIL RESOURCE GROUPS WITH NO CONSERVATION MANAGEMENT[1/]

Crop Rotation	Soil Resource Group																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Average Erosion Rates for Each Soil Resource Group (Tons/Acre/Year)																
1. Soybeans, corn, peanuts, with small grain	6	6	18	15	40	9	24	42	4	3	19	35	33	63	3	4	-
2. Corn, corn, peanuts	5	5	16	13	32	8	21	37	4	3	17	31	29	56	3	3	-
3. Corn, with grain sorghum, peanuts, with small grain, soybeans	-	6	17	14	34	9	22	38	4	3	18	32	30	58	3	4	-
4. Grain sorghum, corn, rye (cover crop), tobacco	4	5	15	13	31	8	20	35	3	3	16	30	27	53	3	3	-
5. Cotton, cotton, peanuts	7	7	20	17	41	10	27	47	5	4	21	40	37	71	4	4	-

1/ No conservation management, as used in this section, reflects a field condition with low surface residue, excessive soil tillage, lack of conservation practices, or farming without regard to the slope of the land.

TABLE D-2

AVERAGE EFFECTIVENESS OF CONSERVATION PRACTICES ON EROSION REDUCTION
BY SOIL RESOURCE GROUPS

Conservation Practice	Soil Resource Group - Percent Reduction															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Conservation Tillage System, No-Tillage	66	67	76	67	67	67	67	67	68	70	68	68	67	67	70	69	-
Contour Farming	51	50	50	50	52	50	50	50	49	50	50	50	50	50	50	49	-
Terracing (max. 110')	75	76	75	75	75	75	75	75	75	76	75	75	75	75	76	76	-

SOUTHWEST GEORGIA AREA STEERING COMMITTEE

Consists of 30 Members With the Following Interests:

- 6 - Area Planning and Development Commission Representatives
- 5 - Soil and Water Conservation District Chairmen
- 2 - Georgia Association of Conservation District Supervisors Group Vice-Presidents
- 2 - Environmental Group Representatives
- 1 - State Soil and Water Conservation Committee Field Representative
- 1 - Soil Conservation Service Representative
- 1 - Georgia Forestry Commission Representative
- 1 - Farmers Home Administration Representative
- 1 - Georgia Extension Service Representative
- 1 - Georgia Department of Natural Resources Fish & Game Representative
- 1 - University of Georgia Experiment Station Representative
- 1 - Agricultural Stabilization & Conservation Service Representative
- 1 - Georgia Department of Agriculture Representative
- 1 - Georgia Farm Bureau Representative
- 1 - Farmer Association Representative
- 2 - County Commissioners
- 14 - Farmers
- 1 - Farm Construction Company Representative

NATIONAL REGISTER SITES
(Structures or Districts)

County	Structure or District	Location
Berrien	Berrien County Courthouse	Nashville
Brooks	Henry Gray Turner House & Grounds Eudora Plantation	Quitman 3.4 miles south of Quitman, Highway 33
Decatur	J. W. Callahan House Curry Hill Plantation	Bainbridge 6 miles east of Bainbridge, Route 84
Dooly	Stovall-George-Woodward House	Vienna
Dougherty	Municipal Auditorium Bridge House, 112 N. Front Street Union Depot Old St. Teresa's Catholic Church W. E. Smith House Samuel Farkas House U.S. Post Office & Courthouse	Albany Albany Albany Albany Albany Albany Albany
Early	Cooheelee Creek Covered Bridge	Hilton
Grady	Susina Plantation	West of Beachton
Houston	Davis-Felton Plantation	Henderson vicinity, south of Perry, west of Highway 41
Irwin	Jefferson Davis Capture Site	1.5 miles north of Irwinville
Macon	Andersonville National Historic Site (also in Sumter County) Montezuma Depot	Andersonville vicinity Montezuma
Mitchell	James Price McRee House	Camilla
Pulaski	Hawkinsville City Hall-Auditorium Taylor Hall	Hawkinsville Hawkinsville
Randolph	Cuthbert Historic District	Cuthbert

County	Structure or District	Location
Sumter	Andersonville National Historic Site	Andersonville vicinity
Thomas	Augustine Hunsell (Jefferies) House 429 South Housell Street	Thomasville
	Thomas County Courthouse West Broad Street	Thomasville
	Wright House, 415 Fletcher Street	Thomasville
	Epraim Ponder House 324 North Dawson Street	Thomasville
	Charles Hebard House 711 South Housell Street	Thomasville
	Lapham-Patterson (Scarborough) House, 626 North Dawson Drive	Thomasville
	Bryan-Davis House, 312 N. Broad St.	Thomasville
	Burch-Mitchell House 737 Remington Avenue	Thomasville
	Brandon (Hayes) House 329 North Broad Street	Thomasville
	Thomasville Historic District	Thomasville
	Eastside School	Thomasville
	Metcalf Historic District	Metcalf
	Greenwood Plantation	west of Thomasville, south of GA 38 and U.S. 84
	Millpond Plantation	south of Thomasville
Worth	Worth County Local Building	Sylvester

PROCEDURES FOR ECONOMIC ANALYSES

The impacts of alternative land treatment programs on land use, economic returns, levels of soil erosion, and usage of irrigation water in 1990 were analyzed. These impacts were examined at two levels of expansion in irrigated acres. The impacts were compared to "base" conditions in 1979. Six major crops were considered: corn, soybeans, peanuts, cotton, tobacco, and sorghum. These crops represent most of the acres in cropland. Most soil erosion is from cropland in row crops.

Linear programming was used to develop analyses for use in devising resource management strategies. The models were formulated to maximize net economic returns to land, management, and risk within the context of cropland acres, cropping patterns, irrigation systems, and land treatment systems in 1979 and projected levels in 1990.

Cost and Return Budgets for Crops

Costs of production, land treatment costs, yields, and value of production were developed for the major crops grown on each of 17 soil resource groups (SRGs) in 1979 and 1990. Crop yields associated with soil erosion at 5 and 20 tons/acre/year were identified for each SRG by SCS. Interpolations of yields between these fully treated and untreated erosion levels were made for intermediate soil erosion groupings (Appendix B). Use levels for production inputs were developed from existing crop budgets. Levels of water use with irrigation were provided by researchers at the Coastal Plains Experiment Station in Tifton. Average weather conditions were assumed.

Crop rotations and associated levels of sheet and rill erosion were formulated by SCS. Land treatments and acres treated for base and 1990 conditions were also developed by SCS. The annualized costs for installation and maintenance of these treatments were included in the budgets. Costs of production inputs and prices received by farmers were based on normalized prices. These prices are weighted averages of prices over the 1975-79 period to adjust for short-term price fluctuations.[1/] Prices for recent years are weighted most heavily in deriving the weighted average. The normalized prices were also used to analyze conditions in 1990. No cost sharing for land treatment systems was included.

The budgets were sent to crop specialists in the Georgia Cooperative Extension Service for review. The budgets were used in the programming planning models.

1/ Niehaus, Robert D., "Normalized Prices for Project Evaluation," Agricultural Economics Research, Vol. 28, No. 2, April 1976

Projections

Projections of acres in major land uses to 1990 were made for the study area. Within the cropland base, projections of acres in major crops were developed for individual SRGs. The projected conversion of woodland to newly cultivated cropland to increase the cropland base in 1990 was distributed among SRGs according to percent distributions from 1979 "base" conditions.

Acres in hay and pasture were based on projections of livestock numbers and per unit requirements for forage consumption. Forage production and livestock enterprises were not included in the planning models.

Population projections were used to estimate conversions of land, including cropland, to nonagricultural uses for supporting increased population in 1990.[2/] An average of .6 acre/person was assumed necessary for the growth in population.[3/] Acreages within SRGs were adjusted to account for these conversions to nonagricultural uses.

Projections of percentage increases in crop yields to 1990 were made by SCS. Rotations reflecting more intensive use of cropland in 1990, particularly double cropping on irrigated cropland, were constructed. Use levels of production inputs were unchanged from the base conditions. Prices received and paid in 1990 were the same as the normalized prices used in the base conditions.

Two levels of expansion in irrigated acres were analyzed. The moderate expansion represents a projected growth of 30,000 acres per year, the high expansion 60,000 acres per year. Water use requirements for supplemental irrigation of individual crops were assumed to be the same as for 1979 conditions.

Land Treatment Programs

Two alternative programs were analyzed. The ongoing program represented a projection of the current trend in types of practices being installed and acres being treated. The accelerated program was designed to fully treat all cropland to reduce sheet and rill erosion to 5 tons/acre/year or less and to adequately drain all cropland requiring drainage.

2/ Office of Planning and Budget, State of Georgia. "Population Projections for Georgia Counties, 1980-2010," September 1977

3/ An average of .25 acre/person was assumed for Dougherty and Houston Counties, the most urbanized counties in the study area.

Procedures

Base level and projected land use, cost and return budgets, land treatment systems, and irrigated acreage were incorporated into the planning models. The models were constructed for individual SRGs to reflect ongoing and accelerated land treatment systems. Each system was analyzed at the two levels of expansion in irrigation. The land treatments did not change the designation of SRGs. For example, treating Class IIIe land with terracing did not result in redesignating this land as Class I or IIe land. Consequently, each SRG could be individually analyzed. Results for individual SRGs were summed to the studywide level.

Annual net returns were adjusted for crop failure and for land conversion costs. No estimates of net returns for minor crops or for the value of forage in livestock production were made.

Estimates of net returns foregone by not adequately treating ongoing erosion in 1979 were developed for individual SRGs. All cropland having erosion exceeding 5 tons/acre/year was considered as being in the 5 tons or less group. The higher yields and net returns for cropland in the 0-5 group were then applied. No additional treatment costs or changes in cropping patterns were included in the analyses. Changes in net returns were divided by reductions in soil erosion.

COMPUTATION FOR COST OF EXCESSIVE EROSION
1979

SRG	Reduced Income ($)[4/]	Change in Erosion (tons)
1	$ 1,811,300	806,200
2	2,346,900	1,555,200
3	655,500	660,600
4	178,000	190,600
5[1/]	5,534,390	1,023,320
6	429,800	517,000
7[1/]	1,467,630	179,010
8[1/]	771,020	426,900
9[2/]	-	-
10[2/]	-	-
11[1/]	2,861,080	754,270
12[1/]	795,360	284,230
13[1/]	1,811,800	382,890
14[1/]	806,230	562,510
15[2/]	-	-
16[2/]	-	-
17[3/]	-	-
Total	$19,469,010	7,342,730

$19,469,010 ÷ 7,342,730 tons = $2.65 per ton

1/ Based on a change from cropland to pasture, hayland, and/or forest land.

2/ Soils classified as no erosion problems; mainly wet soils.

3/ Land use of this SRG primarily water, urban, or builtup areas.

4/ Loss of net income as a result of erosion exceeding 5 tons per acre. Cost and returns are in terms of 1979 normalized prices.

EVALUATION OF CROPLAND EROSION AND SEDIMENT YIELD

CROPLAND EROSION
(Including Other Cropland)
(Developed From Unadjusted 1979 County Inventory Erosion Data)
(Acres by Erosion Ranges)

County	Erosion Range in Tons/Acre/Year					Acres Over 5 T/Ac.	Percent Over 5 T/Ac.	Total Cropland Inventoried
	0-5	6-10	11-15	16-30	31+			
Baker	36,570	42,970	1,470	0	0	44,440	55	81,010
Ben Hill	25,160	8,510	3,890	1,670	0	14,070	36	39,230
Berrien	68,640	17,430	580	600	0	18,610	21	87,250
Brooks	76,980	41,940	17,880	15,920	4,510	80,250	51	157,230
Calhoun	34,060	29,080	7,090	2,420	260	38,850	53	72,910
Colquitt	113,800	36,490	6,170	1,940	0	44,600	28	158,400
Cook	42,780	16,330	1,060	400	50	17,840	29	60,620
Crisp	53,410	20,460	3,380	1,550	0	25,390	32	78,800
Decatur	50,680	51,330	6,730	2,000	270	60,330	54	111,010
Dooly	76,960	36,390	16,630	3,850	390	57,260	43	134,220
Dougherty	10,150	11,450	630	240	50	12,370	55	22,520
Early	52,870	47,220	21,270	10,380	420	79,290	60	132,160
Grady	80,940	22,900	6,770	4,130	0	33,800	29	114,740
Houston	26,850	20,080	10,790	7,880	1,100	39,850	60	66,700
Irwin	82,590	12,750	870	990	330	14,940	15	97,530
Lee	57,930	24,570	11,450	6,790	20	42,830	43	100,760
Macon	42,370	31,480	10,810	5,580	790	48,660	53	91,030
Miller	37,980	45,020	4,180	1,100	0	50,300	57	88,280
Mitchell	103,370	44,170	4,560	5,290	1,450	55,470	35	158,840
Peach	18,340	7,460	4,700	2,400	0	14,560	44	32,900
Pulaski	28,990	20,740	8,440	1,160	80	30,420	51	59,410
Randolph	30,600	24,650	9,550	2,280	40	36,520	54	67,120
Schley	14,050	5,020	1,800	1,100	160	8,080	37	22,130
Seminole	41,450	26,840	5,100	1,950	0	33,890	45	75,340
Sumter	32,890	61,200	15,060	13,210	20	89,490	73	122,380
Terrell	55,760	38,210	9,430	2,980	690	51,310	48	107,070
Thomas	87,220	22,710	3,280	1,350	250	27,590	24	114,810
Tift	50,270	18,480	3,940	2,140	140	24,700	33	74,970
Turner	50,860	12,280	3,370	1,170	20	16,840	25	67,700
Webster	17,780	8,640	2,770	800	0	12,210	41	29,990
Wilcox	32,570	27,380	10,020	5,540	240	43,180	57	75,750
Worth	60,790	69,190	14,140	6,260	1,040	90,630	60	151,420
TOTALS	1,595,660	903,370	227,810	115,070	12,320	1,258,570	44	2,854,230

EROSION AND SEDIMENTATION PROBLEMS AND IMPACTS
1979 CONDITION
STUDY AREA

Total erosion from the area is producing downslope sediment at a rate of 2.1 million tons per year. This sediment fills waterways, wetlands, and reservoirs, creating water quality and flooding problems.

Estimated Annual Erosion and Sediment Yields - Total Sources

Land Use	Units Acres	x	Erosion Rates T./Ac./Yr.	=	Gross Erosion Tons	x	Delivery Ratio	=	Sediment Total Tons
Cropland[a/]	2,972,540		5.81		17,260,530		.10		1,726,050
Pasture	573,090		0.76		435,550		.10		43,560
Woodland	3,636,390		0.24		872,730		.08		69,820
Urban	147,830		1.28		189,220		.15		28,380
Other	254,330		3.50		890,160		.25		222,540
	7,584,180[b/]				19,648,190				2,090,350

a/ Includes cropland pasture, hayland, and orchards
b/ Excludes water

Cropland erosion is currently producing 1.7 million tons of sediment per year or the equivalent of 87,170 dump trucks of topsoil. The majority of this is produced from some 1.1 million acres that are eroding at a rate greater than 5 tons per acre per year. The economic impact of the topsoil erosion greater than 5 tons per acre and the associated chemical and nutrient losses in the area are estimated annually at $32.7 million.

Cropland Erosion

Erosion Range	Cropland Acreage	Erosion Rate Sheet & Rill	Tons
0-1 T/Ac	405,000	1 T/Ac	405,000
2-5 T/Ac	1,500,130	3 T/Ac	4,500,390
6-10 T/Ac	769,550	8 T/Ac	6,156,400
11-15 T/Ac	195,510	13.5 T/Ac	2,639,390
16-30 T/Ac	90,230	33 T/Ac[b/]	2,977,590
31+ T/Ac	12,120	48 T/Ac[b/]	581,760
	2,972,540[a/]		17,260,530 (5.81 T/Ac)

a/ Acreage for each range developed from SRG listings
b/ Increased by 10 T/Ac for small gully erosion

EROSION AND SEDIMENTATION PROBLEMS AND IMPACTS
1979 to 1990 CONDITIONS WITHOUT ADDITIONAL TREATMENT
STUDY AREA

Total erosion from the county is producing downslope sediment at a rate of 2.3 million tons per year. This sediment fills waterways, wetlands, and reservoirs, creating water quality and flooding problems.

Estimated Annual Erosion and Sediment Yields - Total Sources

Land Use	Units Acres	x	Erosion Rates T./Ac./Yr.	=	Gross Erosion Tons	x	Delivery Ratio	=	Sediment Total Tons
Cropland[a]	3,175,000		6.00		19,041,520		.10		1,904,150
Pasture	573,000		0.76		435,480		.10		43,550
Woodland	3,401,720		0.24		816,410		.08		65,310
Urban	180,130		1.28		230,570		.15		34,590
Other	254,330		3.50		890,160		.25		222,540
	7,584,180[b]				21,414,140				2,270,140

a/ Includes cropland pasture, hayland, and orchards
b/ Excludes water

Cropland erosion is currently producing 1.9 million tons of sediment per year or the equivalent of 96,170 dump trucks of topsoil. The majority of this is produced from some 1.2 million acres that are eroding at a rate greater than 5 tons per acre per year. The economic impact of the topsoil erosion greater than 5 tons per acre and the associated chemical and nutrient losses in this county are estimated annually at $36.9 million.

Cropland Erosion

Erosion Range	Cropland Acreage	Erosion Rate Sheet & Rill	Tons
0-1 T/Ac	420,000	1 T/Ac	420,000
2-5 T/Ac	1,562,640	3 T/Ac	4,687,920
6-10 T/Ac	861,020	8 T/Ac	6,888,160
11-15 T/Ac	214,340	13.5 T/Ac	2,893,590
16-30 T/Ac	97,610	33 T/Ac[b]	3,221,130
31+ T/Ac	19,390	48 T/Ac[b]	930,720
	3,175,000[a]		19,041,520
			(6.00 T/Ac)

a/ Acreage for each range developed from SRG listings
b/ Increased by 10 T/Ac for small gully erosion

Southwest Georgia Land & Water Resources Cooperative Study

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

PREFACE

Forests of Southwest Georgia make significant contributions to the economic and social well-being of the area. Timberlands support a growing industrial base that in 1979 employed 8,566 workers and provided 88.2 million dollars in wages and salaries.

Forest lands contribute to the attractive landscape characteristic of southern Georgia. Visitors and residents alike find this area of Georgia ideal for many recreational activities.

Agricultural, industrial, and urban development will continue to make inroads into forest land acreage. In spite of this decline in commercial forest land, timber production can be maintained at levels sufficient to meet future needs if study area timber stands are managed for maximum yields.

ACKNOWLEDGEMENT

The Nation's forest resources have been inventoried at periodic intervals by the United States Department of Agriculture-Forest Service since 1936. In recent decades inventories have been carried out at 10-year intervals. Georgia is now undergoing its fifth survey to be completed by the end of 1982.

The Renewable Resources Evaluation Group, Southeastern Forest Experiment Station, Asheville, North Carolina, responsible for conducting all forest inventories in the southeastern states, is releasing forest inventory data within 90 to 120 days after field work is completed. Counties in southwestern Georgia are the first to be inventoried in the current survey and data on 20 of the study area's 32 counties were made available in the fall of 1981. Data on the remaining 12 counties will be made available to the study in August 1982.

The Georgia Forestry Commission assisted in the collection and tabulation of field records dealing with reforestation, management, and resource protection activities carried out during the past four decades in Southwest Georgia. The State Forester through his staff specialists provided monitorial assistance in the analysis of forestry problems and development.

FOREST RESOURCES
OF
SOUTHWEST GEORGIA

Introduction

Southern Georgia was once a wide expanse of forests and meadows, the home of the Creek and Seminole Indians and habitat of the plains buffalo, the panther and other creatures now extinct. Yet the remaining forest lands continue to supply us with timber, places for recreation, and an attractive landscape.

Only in recent times have we felt the need to find out more about our forest lands--how much is there, what is it like, and is it still growing? Systematic forest surveys were not known before 1936, so we can only surmise as to the total amount of forest land in southern Georgia before that time. Between 1936 and 1961, forested acreage remained stable,1/ but a decline occurred between 1961 and 1972.2/ The Forest Service is currently conducting a resurvey of Georgia's forest lands and early indications point to a continued decline in forest land in the Southwest Georgia study area.

In 1972,3/ pine and hardwood timber stands occupied 3.9 million acres of Southwest Georgia's land area of 7.6 million acres. By 1980, a continued decline dropped the acreage to 3.5 million acres.4/

The condition of Southwest Georgia's timber stands point to a number of problems that are related both to timber production and to other forest resource uses. Many acres of forest land are in need of reforestation. Wood fiber is wasted through rejection as logging residues. And some timber stands are producing wood fiber at less than potential capacity.

Correction of these deficiencies will enable the 32-county area to provide sufficient volume to meet market demands during the next 20 to 30 years in spite of a decline in the forest land base.

STUDY CONCERNS

STUDY CONCERN #1

Declining Forest Land Base

Background

Records from early forest inventories indicate that forest land acreage in southern Georgia remained stable between 1936 and 1961.1/ Inventories that followed after 1961, however, revealed a gradual decline in commercial forest land.3/ Preliminary figures from the current forest survey in Georgia (1980-1981)4/ indicate a drop of 10 percent in commercial forest land in the Southwest Georgia study area between 1971 and 1981.

Fear of crop losses induced by periodic droughts of the 1970's brought about a rapid increase in irrigation systems in Southwest Georgia. Many farm operators, mindful of the high cost of irrigation equipment, added cropland acreage from cleared forest land to increase income. Between 1971 and 1981, 84 percent of cleared timberland acreage went into agricultural uses.

Economic losses to the Area's forest economy follow the permanent removal of forest stands. Prime land taken out of timber production has an average annual growth rate of 85 cubic feet per acre. This volume has a net annual worth of $56 an acre on a rotation age of 30 years.

Future

Diversion of forest land to other uses is likely to continue for the next 10 to 20 years. Demands for residential and commercial development, for highway routes, and for utility rights-of-way will compete along with agricultural uses for cleared forest lands. Projections indicate commercial forest land base will be 3,345,300 acres at 1990 and 3,059,100 acres at 2000.

Solutions

Although there are programs that encourage production of food, fiber and timber, none of these programs can permanently assure the preservation of land use for these purposes.

Payment of subsidies, conservation leases, and other similar inducements can be used to encourage retention of productive forest lands. Tax incentives could also be used to preserve forested areas.

The foregoing steps offered as solutions to stopping or reducing the withdrawal of forest land are valid, but only if made a part of a vigorously applied program that has public support.

In addition to these steps, the Georgia Forestry Commission has the capability to step up its field services in support of such programs. Georgia Extension Service also has leadership capabilities in promoting forest land conservation.

STUDY CONCERN #2

Reforestation Needs

Background

Following World War II reforestation in Georgia began a long climb upward to plant forest trees on cut-over timber lands and idle lands. With the advent of the Soil Bank Program (1959-1964), tree planting in southwest Georgia jumped from an annual average rate of 20 million seedlings to an annual average of 45 million seedlings under that program.

The current average annual reforestation rate in the study area is 13,745 acres.6/ The Georgia Forestry Commission produces and distributes both pine and hardwood seedlings to forest land owners, including genetically improved varieties of slash and loblolly pines. The number of superior pine trees planted in the study area during the past 15 years reforested 80,500 acres.

Future

According to timber resource analysts*, 1,214,400 acres of forest land in the 32-county area are in need of reforestation. At the current average annual rate of tree planting in the study area, 90 to 95 years will be required to establish adequate regeneration on the 1,214,400 acres.

Additionally, restocking of harvested timberlands will continue to present problems. Current reforestation costs tend to discourage forest land owners from planting trees on their harvested lands, trusting to natural regeneration. Observations of forest conditions in southwest Georgia reveal that natural regeneration is not dependable. Under most conditions, natural regeneration will either favor hardwood seedlings when pine seedlings are desired, or provide too few pine seedlings for adequate stocking.

Solutions

Current federal and state forestry programs are designed to encourage reforestation. Technical assistance and cost-sharing are available to all private forest land owners in the study area. The Georgia Forestry Commission maintains a field force to provide technical assistance. The Commission and several forest industrial firms operate forest tree nurseries to produce seedlings for reforestation purposes.

*Forest inventory specialists assigned to the Renewable Resources Evaluation Group, Southeastern Forest Experiment Station, Asheville, North Carolina.

Cost-sharing is available under the Agricultural Conservation Program (ACP) and Forest Improvement Program (FIP) for reforestation projects. Forest land owners can also use terms of Public Law 96-451 that provide reforestation tax incentives. Together these incentives can increase the annual average tree planting rate for the area.

More funds are needed for the reforestation phase of the FIP program in Southwest Georgia study area. This will ensure greater participation in the effort to increase regeneration on cut-over and understocked timber stands. In addition a strong promotional program is needed to stimulate response to the FIP program.

The Georgia Forestry Commission through its field offices has the capability to carry out an accelerated reforestation program. Southwest Georgia leadership would do well to work with the Commission in setting up such a program.

Study Concern #3

Timber Supply and Demand

Background

The forest survey of 1972, in analyzing the condition of the basin timber stands, concluded that only 25 percent of the forest lands are in relatively good condition. The remaining 75 percent are in need of various kinds of treatment. Types of treatment needed are:

Harvest Cutting	10 percent
Salvage Cutting	1 percent
Timber Stand Improvement	20 percent
Stand Conversion	6 percent
Adverse Site Treatment (drainage)	8 percent
Treatment not involved here (regeneration)	30 percent

Almost 800,000 acres are in need of some form of timber stand improvement. Currently, forest land owners in the study area are doing timber stand improvement work at the rate of 5,600 acres annually. At this current rate, it will require more than 100 years to improve the area's timber stands.

Another factor in timber production is the kind of utilization carried out in the study area. In 1972, timber removals amounted to 141.3 million cubic feet. Only 76 percent of this volume reached primary processing mills. Slightly more than one-half of the unused wood fiber was lost in land clearing; the remainder is logging residue.

More than 300,000 acres of forest land would benefit from drainage. Some form of water control to lower water tables would aid in increasing timber growth.

Future

The study area's forest land base is expected to decline, at least during the next 20 to 30 years. This loss of land base will eventually result in lower timber volumes. Some of this volume loss can be delayed, however, through better management of the remaining forest land base. The eventual loss of timber volume can affect employment in the study area. Initially, employment will drop in harvesting and hauling operations and some losses may carry over into the primary processing mills, such as sawmills. Imported logs and pulpwood will continue to support other wood processing plants and employment in these mills could remain stable.

The study area's share of the projected national timber supply for the period beginning in 2000 is 280 million cubic feet.5/ Timber removal for that period is projected at 297.5 million cubic feet. This volume reduced by 24 percent to allow for losses occurring under current

utilization practices will yield a final supply volume of 226.1 million cubic feet; 53.9 million cubic feet below projected needs.

Market demands for forest products beyond 2000 can be supplied only with an intensively managed forest land base of 3,100,000 acres. The latter is the minimum amount of forest land growing timber at highest potential.

Solutions

There are incentives to encourage forest land owners to practice better management. Under the Agricultural Conservation Program (ACP) and the Forest Improvement Program (FIP), administered through the U. S. Department of Agriculture, cost-sharing is available for carrying out timber stand improvement practices.

The amount of timber stand improvement carried out under either of the above programs in the study area is negligible. Several factors account for low participation--labor, restrictive use of herbicides, and commitment of forest land owners.

Tax incentives could be used to stimulate interest, similar to the tax incentive program for reforestation. The commitment of time and money could be accelerated through tax incentives and through a vigorous educational program.

The Georgia Forestry Commission through its field offices has the capability to carry out an accelerated timber stand improvement program. Leadership within the Southwest Georgia study area should generate public support for additional FIP funding to enable the Commission to reach more forest landowners.

Other Forestry Concerns

Utilization and Merchandising

Background

Southwest Georgia study area can claim its share in the State of Georgia's standing as the largest timber producing state in the Atlantic coastal region. Yet there is still room for improvement if Southwest Georgia's forest-based economy is to reach its potential during the next 2 or 3 decades.

Earlier in this report (see Study Concerns #1 to #3) recommendations were given for greater efficiency in managing the area's 3.6 million acres of commercial timber land. What remains to be done--improved utilization of harvested timber and aggressive merchandising--is just as important as growing the raw material.

A report by the Southern Forest Products Association 7/ provides ample reason for urgency in the matter of improved utilization and aggressive merchandising. In 1980, according to the association, Georgia lumber distributors purchased 55 percent of their lumber supplies from Canadian mills. Other southern states fared no better; their markets also suffered the same inroads by Canadian lumber.

A number of factors account for this situation: low Canadian stumpage prices; high recovery rates in Canadian mills; and low cost water transportation. Collectively these factors gave Canadian lumber products a competitive advantage.

Conditions in Georgia further aggravate the situation: higher stumpage prices; greater wood waste (logging residues); and absence of aggressive merchandising. Also more efficient sawmilling machinery is available to those who wish to improve lumber quality and quantity.

Future

The future will hold opportunities for improving southern Georgia's position in the highly competitive lumber market. Preparations must be made now if these opportunities are to abound to Georgia's good.

Prior to the forest survey of 1972 logging residues (wood not converted into any product at time of logging) were running at 11 to 12 percent of the total harvested volume. During subsequent years improvements in utilization have taken place. There is, however, room for more improvement in utilizing wasted wood.

Sawmill methods and equipment have been improved through technological development, yet much remains to be done to get these methods adopted and the advanced machinery installed in all sawmills. Changes in traditional utilization practices, in the woods as well as at the sawmill, are slow in coming. High cost of new machinery is also a stumbling block to modernization.

Losses at the sawmill can also be reduced through the use of more efficient machinery and manpower training. Special programs carried out by the Georgia Extension Service and other federal and state programs are designed to encourage efficiencies in Georgia sawmills. These programs should be continued at an accelerated rate to reach the desired level of improvement.

The Georgia Forestry Commission actively promotes the complete utilization of the state's timber resources through its field services and research projects. Special emphasis is given to use of fuelwood for energy requirements in factories and mills. The Forestry Commission has the capability to step-up these services and research programs.

Merchandising programs extolling the advantages of southern yellow pine should develop aggressive approaches in the lumber market. Greater effort by forest industry to publicize the high qualities of southern yellow pine will do much toward increased use of this species in design and construction.

Establishment of more secondary industries in southern Georgia that will use southern yellow pine in their products will mean greater forest economic growth in the future.

REFERENCES

1/ GEORGIA'S TIMBER, Southeastern Forest Experiment Station, U. S. Department of Agriculture - Forest Service, 1963 (Resource Bulletin SE-1)

2/ Forest Service Research Note SE-189, Southeastern Forest Experiment Station, March 1973

3/ Forest Information Retrieval Tables, Renewable Resources Evaluation Group, Southeastern Forest Experiment Station, 1972

4/ Unpublished data, Renewable Resources Evaluation Group, Southeastern Forest Experiment Station, 1980

5/ OBERS Projections, Series E - adjusted to reflect current trends in timber demands

6/ Data provided by the Georgia Forestry Commission

7/ Refer to periodical Forest Industries, May 1982, page 52.

DESCRIPTION
OF
FORESTS, FOREST LANDS AND FOREST INDUSTRY

AREA

Commercial forest stands occupied fifty percent of Southwest Georgia's land area in 1972. Land use changes occurring between 1972 and 1980 are responsible for a decline in forest land acreage, from 3,877,565 acres in 1972 to 3,636,390 acres in 1977*. Forest lands are currently 45 percent of the total land area.

FOREST TYPES

Forest trees are grouped into types which are natural associations of forest vegetation. In Southwest Georgia longleaf pine is associated with slash pine. This type, and the other pine types (loblolly-shortleaf and oak-pine) make up 59 percent of all timber stands in the study area. Hardwood types make up the remaining 41 percent and consist of oak-hickory, oak-gum-cypress, and elm-ash-cottonwood types. See figure 1.

PHYSIOGRAPHIC TYPES

Forest stands are further classified into physiographic types characterized by topography, aspect, soil moisture, and drainage. There are three general classes which denote different levels of available moisture: Xeric - low or deficient in moisture; Mesic - moderate amount of moisture; and Hydric - an abundance or over-abundance of moisture. It is in this later class that forested wetlands occur.

Xeric conditions:	55,655 acres
Mesic conditions:	3,103,871 acres
Hydric conditions:	676,200 acres
Miscellaneous:	41,839 acres

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* The 1972 acreage data is from the Forest Survey of that date; the 1977 acreage data is from the LANDSAT program prepared for the State of Georgia.

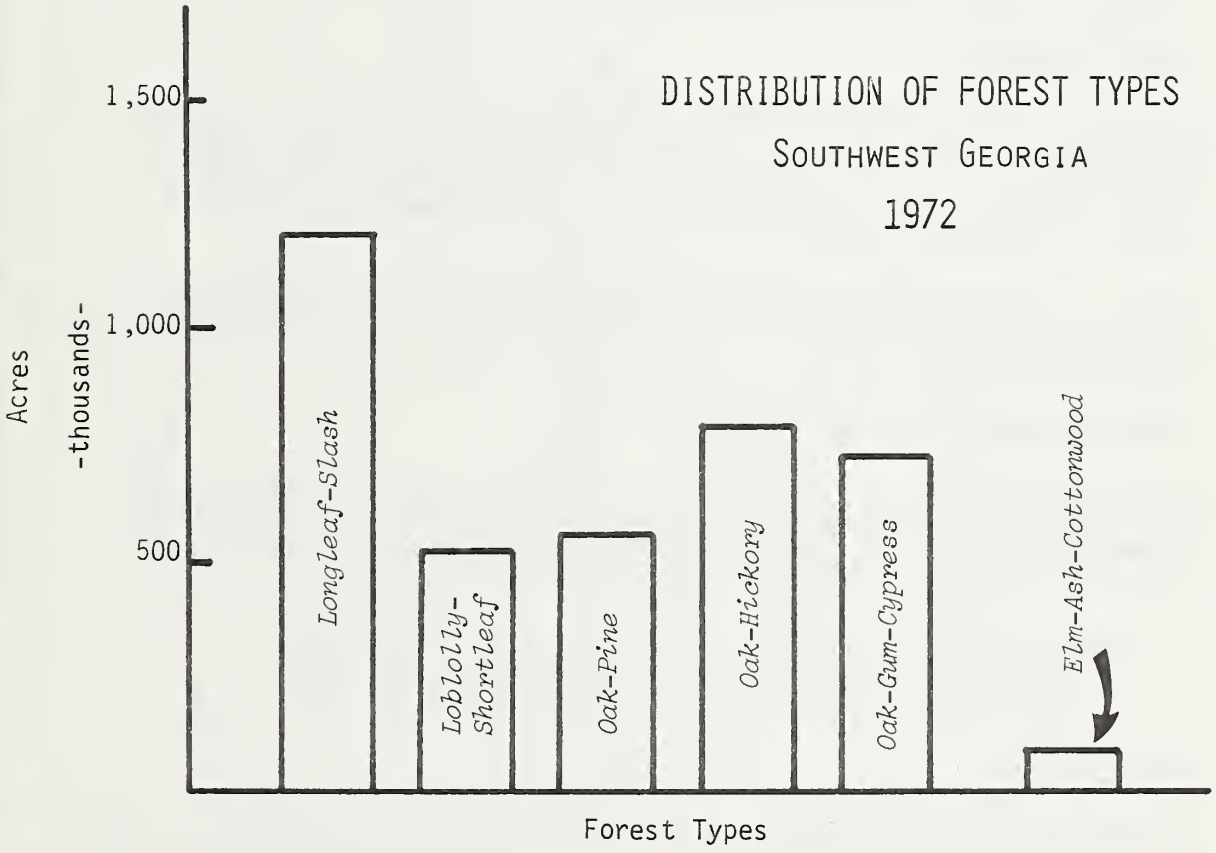

DISTRIBUTION OF FOREST TYPES
SOUTHWEST GEORGIA
1972
Acres
-thousands-
1,500
1,000
500
Longleaf-Slash
Loblolly-Shortleaf
Oak-Pine
Oak-Hickory
Oak-Gum-Cypress
Elm-Ash-Cottonwood
Forest Types

Figure 1

STOCKING

Growing space on 27 percent of the area's timber stands is not fully utilized or is stocked with unacceptable tree species. This condition is found on slightly more than 1 million acres. Stands established under natural conditions account for 85 percent of all timber stands; the remaining 15 percent, or 500,000 acres, originated by artificial planting or direct seeding. See figure 2.

OWNERSHIP

Forest lands in the study area are predominantly under private ownership. Less than 1 percent of timberlands are under public ownership.

Forest industrial ownership accounts for 383,740 acres, or 10 percent of all timberlands. Majority ownership rests with farm operations -- 57 percent. Miscellaneous private individuals and private corporations account for the remaining 33 percent.

TIMBER GROWTH

Net annual growth rate in 1972 was 60 cubic feet, per acre, per year. The potential growth capacity of natural stands in the study area is 80 cubic feet, per acre, per year. Forest areas planted or seeded artificially will have a higher growth potential, at least 100 cubic feet, per acre, per year.

Growth in southern yellow pine and cypress accounts for 72 percent of the total net annual growth. Hardwood timber growth makes up the remaining 28 percent.

TIMBER VOLUME

Good growing stock is the net wood volume found in desirable or acceptable commercial timber trees 5.0 inches d.b.h. and over. Additional volumes of usable wood fiber occur in rough and rotten trees and in salvable dead trees. Total volumes are as follows:

Good growing stock	.....	3,842,701,000 cubic feet
Rough and rotten trees	.....	417,600,000 cubic feet
Salvable dead trees	.....	7,070,000 cubic feet

UTILIZATION

Harvesting, timber stand improvement, land clearing, and changes in land use are involved in the annual removal of 141.3 million cubic feet of wood in the study area. Not all of this volume, however, is converted into forest products. Sawlogs, veneer logs, pulpwood, and other products use only 76 percent of the total removed volume. Logging residues account for 11 percent and the remaining 13 percent are lost through other causes.

STOCKING LEVELS

SOUTHWEST GEORGIA

1972

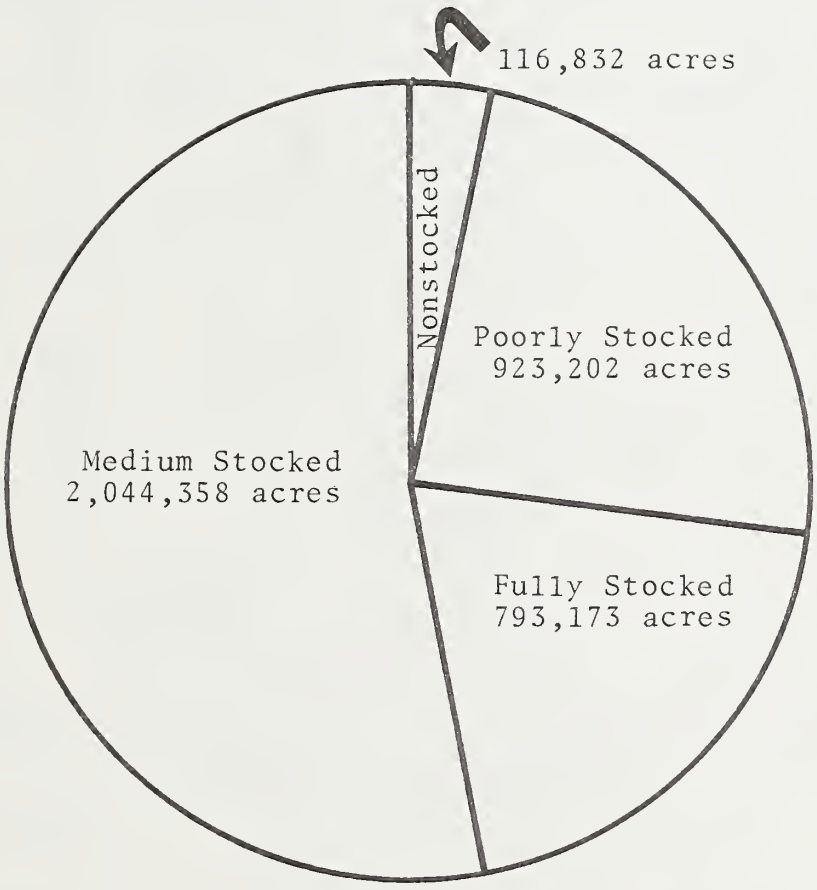


Figure 2

Pine timber made up 81 percent of the volume converted into forest products. Sawlogs used 41.8 million cubic feet; veneer logs 8.4 million cubic feet; pulpwood 54.9 million cubic feet; and 1.9 million cubic feet went into miscellaneous products.

MANUFACTURING

The study area has an active forest industrial base consisting of 1 pulpmill, 30 sawmills, 7 veneer-plywood mills, and 5 wood treating plants. Four other pulpmills exert a strong influence on pulpwood markets and the labor pool because of their proximity to the study area. See figure 3 for location of these industrial installations.

EMPLOYMENT

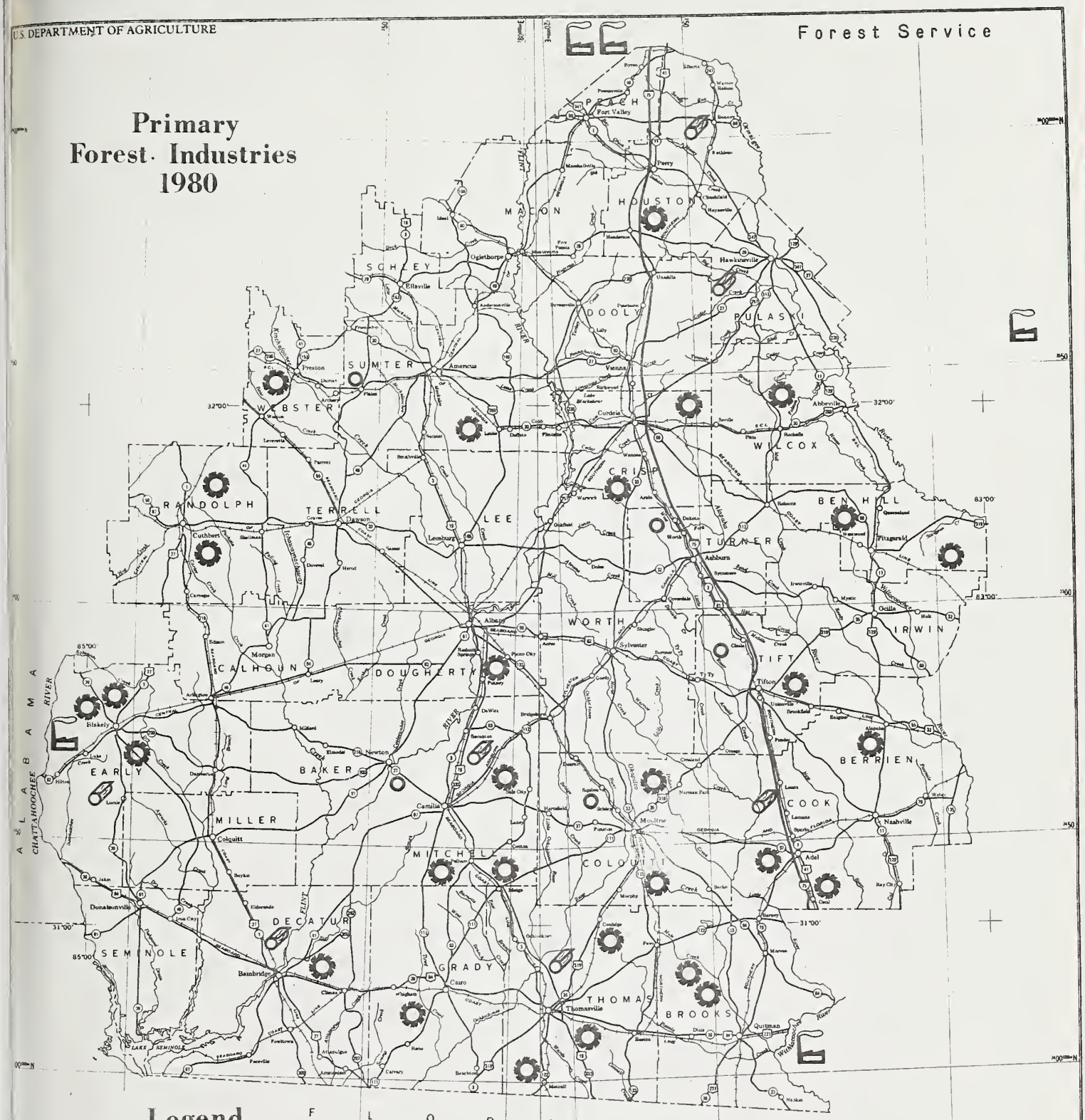
According to an estimate made by the RRE Group, Southeastern Forest Experiment Station, there were 8,566 persons employed during 1979 in woodusing industries located in Southwest Georgia. A majority of workers, 83 percent, were employed in lumber and wood products manufacturing; 17 percent were located at pulp and paper plants and wood furniture factories.

Employees earned 88.2 million dollars in salaries and wages in 1979.

U.S. DEPARTMENT OF AGRICULTURE

Forest Service

Primary Forest Industries 1980



Legend

- Sawmills
- Veneer-Plywood Mills
- Pulpmills
- Treating Plants

Figure 3

UTM GRID ZONE 16 DESIGNATION
UTM GRID ZONE 17 DESIGNATION

SOUTHWEST GEORGIA LAND AND WATER RESOURCE COOPERATIVE STUDY

0 10 20 30 40 50 MILES
0 10 20 30 40 50 60 KILOMETERS

BASE COMPILED FROM 1:500,000 U.S.G.S. STATE BASE MAP, LAMBERT CONFORMAL CONIC PROJECTION.

MARCH 1980