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PLAN FOR DEVELOPMENT OF THE LAND AND WATER RESOURCES OF THE SOU--ETC(U)
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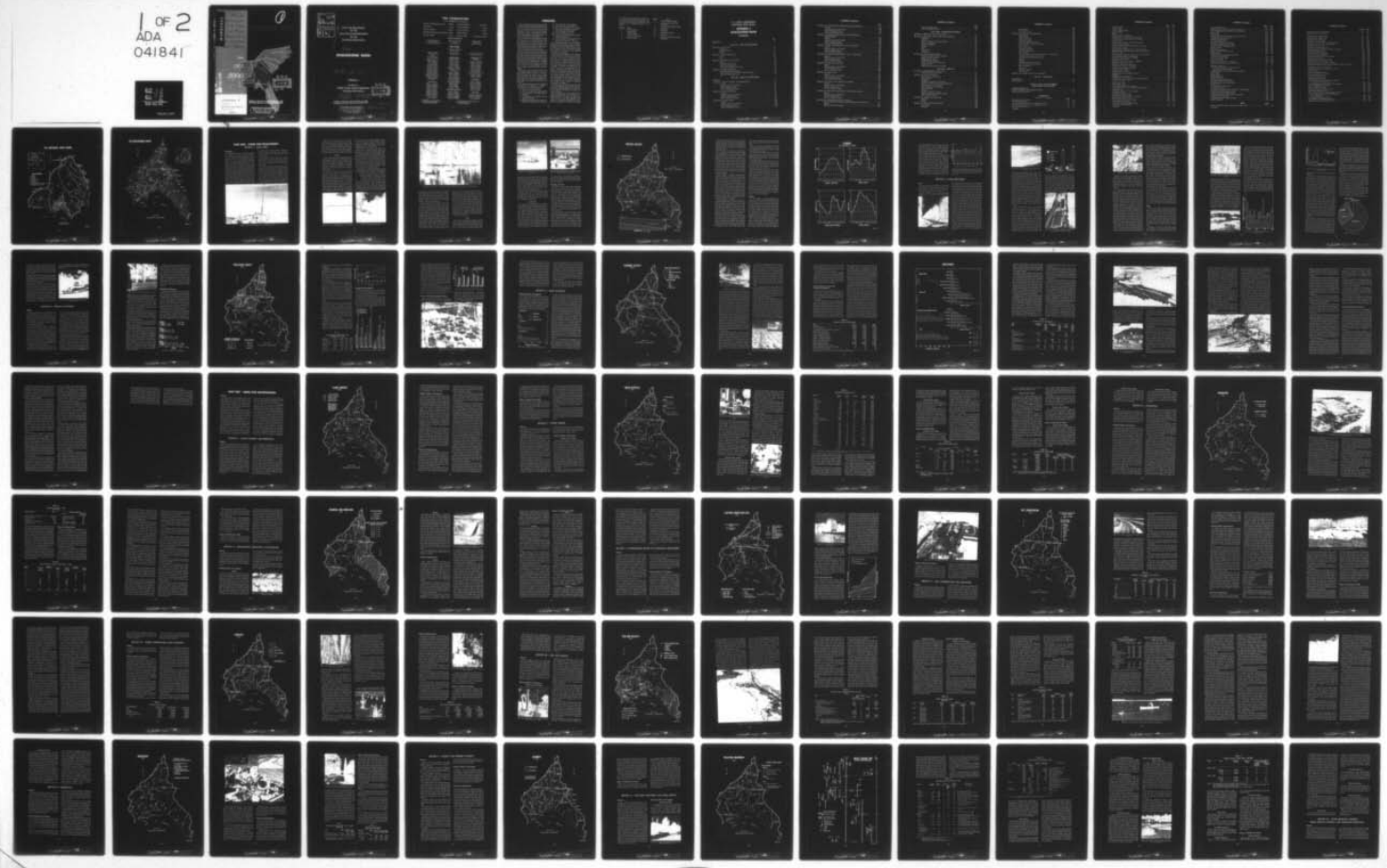

Plan for Development of the Land and Water Resources of the Southeast River Basins

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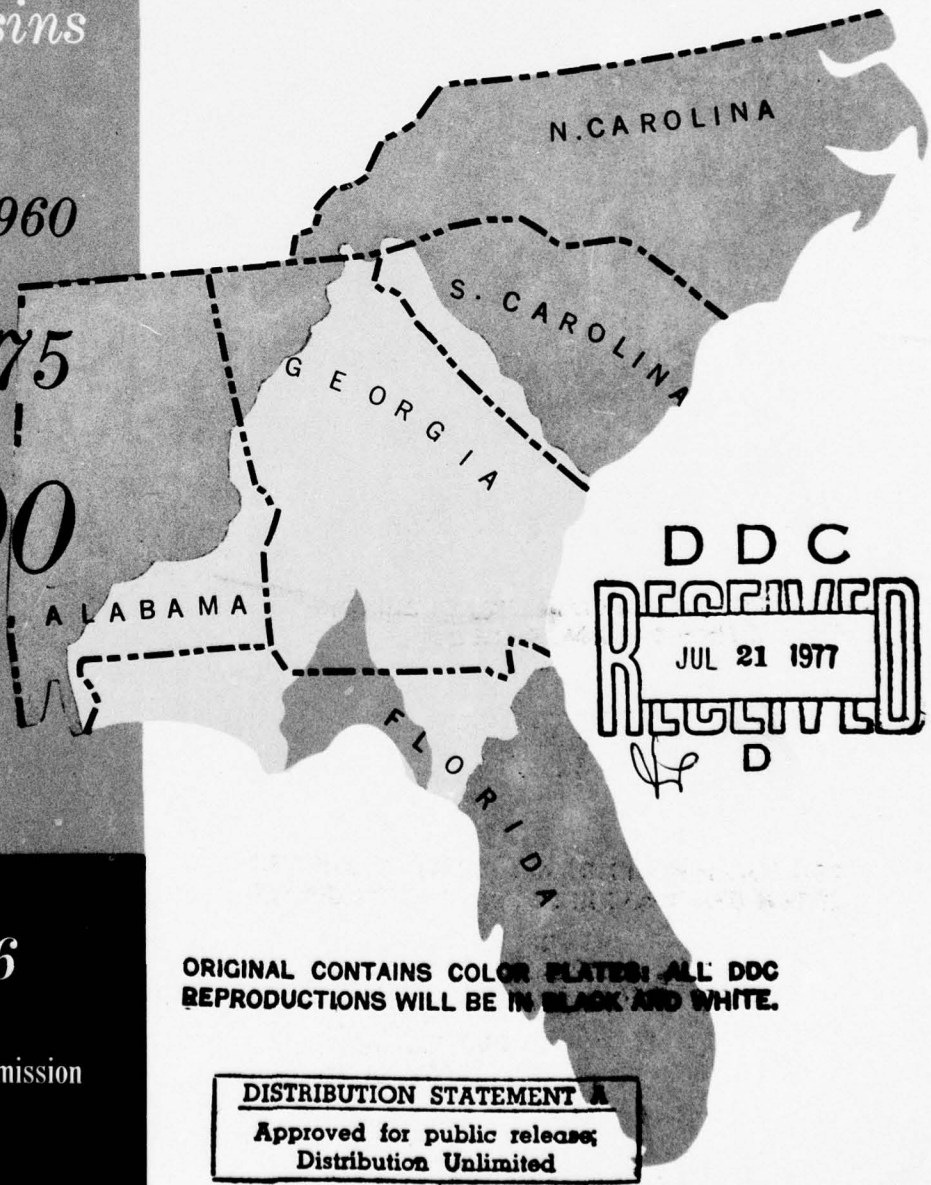

OCHLOCKONEE BASIN

APPENDIX 6

To report of...

United States Study Commission

Southeast River Basins

1963

(6) PLAN FOR DEVELOPMENT
OF THE
LAND AND WATER RESOURCES
OF THE
SOUTHEAST RIVER BASINS,

Appendix 6.

OCHLOCKONEE BASIN,

(9) Final rept.

APPENDIX 6

TO REPORT OF
UNITED STATES STUDY COMMISSION
SOUTHEAST RIVER BASINS

(11) 1963 (12) 184p.

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FOREWORD

This Appendix summarizes the results of studies made in formulating a comprehensive plan for the conservation, utilization, and development of the land and water resources of the Ochlockonee basin. The plan for the Ochlockonee basin is a part of the comprehensive plan for the development of the land and water resources of the Southeast River Basins.

Data relevant to the development of the land and water resources of the Ochlockonee basin are summarized in six interrelated parts. The matter contained in each part is pertinent to the comprehensive plan. The reader is urged to consider the Report in the aggregate rather than to consider selected material out of context.

Part One includes a description of the area, a discussion of its resources, and a presentation of the present and future population and economy. Part Two presents the level of needs by purpose. Part Three describes planning procedures as applied to this study. Part Four presents the Ochlockonee basin comprehensive plan, including a separate listing of improvements warranting early action; Part Five contains the conclusions; and Part Six acknowledges the assistance of public and private agencies and individuals.

The Report of the United States Study Commission summarizing the plan for the Southeast River Basins is made in response to the provisions of Public Law 85-850 (72 Stat. 1090) dated August 28, 1958, which established the United States Study Commission, Southeast River Basins. Public Law 85-850 is reproduced in Appendix 13.

The authorizing Act provides for an integrated and cooperative investigation to formulate a comprehensive and coordinated plan for:

(1) Flood control and prevention;
(2) domestic and municipal water supplies;
(3) the improvement and safeguarding of navigation;
(4) the reclamation and irrigation of land, including drainage;
(5) possibilities of hydroelectric power and industrial development and utilization;
(6) soil conservation and utilization;
(7) forest conservation and utilization;
(8) preservation, protection, and enhancement of fish and wildlife resources;
(9) the development of recreation;
(10) salinity and sediment control;
(11) pollution abatement and the protection of public health; and
(12) other beneficial and useful purposes not specifically enumerated in the Act.

The comprehensive plan for the Southeast River Basins is formulated to meet the projected needs of the area for land and water resources development to the year 2000. Projects and programs existing and under construction in 1960 are included in the plan, but only 1960-2000 developments are evaluated.

The plan for the development of the resources of the Southeast River Basins and the Ochlockonee basin is the result of cooperative work of Federal, State, local, and private agencies having interest in the area and knowledge of its needs and requirements. Public hearings were held early in the planning process to obtain firsthand knowledge of conditions and problems in the study area and to secure suggestions for their solution. Throughout the study, liaison was maintained with interested groups and agencies by means of conferences and committee and advisory group meetings. When a tentative plan was developed, public presentations were made by the Commission to inform interested persons and organizations and to request comments. These comments were considered in preparing the final plan and Report.

Although many individuals, groups, and agencies have participated in the studies, the Commission takes full responsibility for the plan and for the projections, assumptions, and analyses on which it is based.

The Commission plan for the Southeast River Basins is supported by data contained in 13 appendixes. Data on the plan for development of the resources in the eight geographic areas studied in the Southeast River Basins are contained in Appendixes 1 through 8. Technical

data and information applicable to both the entire study area and the several geographic areas are contained in Appendixes 9 through 13. The appendixes to the Commission Report are as follows:

Appendix	Title
1	Savannah Basin
2	Ogeechee Basin
3	Altamaha Basin
4	Satilla-St. Marys Basins
5	Suwannee Basin
6	OCHLOCKONEE BASIN
7	Apalachicola-Chattahoochee-Flint Basins
8	Choctawhatchee-Perdido Basins
9	Economics
10	Hydrology
11	Engineering and Cost
12	Planning
13	History and Organization of the Commission

U. S. STUDY COMMISSION
SOUTHEAST RIVER BASINS

APPENDIX 6
OCHLOCKONEE BASIN

CONTENTS

CONTENTS—Continued

CONTENTS—Continued

CONTENTS—Continued

PART FIVE – CONCLUSIONS

PART SIX – LOCAL, STATE, AND FEDERAL PARTICIPATION AND ASSISTANCE

ILLUSTRATIONS

(some titles are abridged)

* Photograph

CONTENTS—Continued

* Photograph

CONTENTS—Continued

TABLES

* Photograph

CONTENTS—Continued

THE SOUTHEAST RIVER BASINS

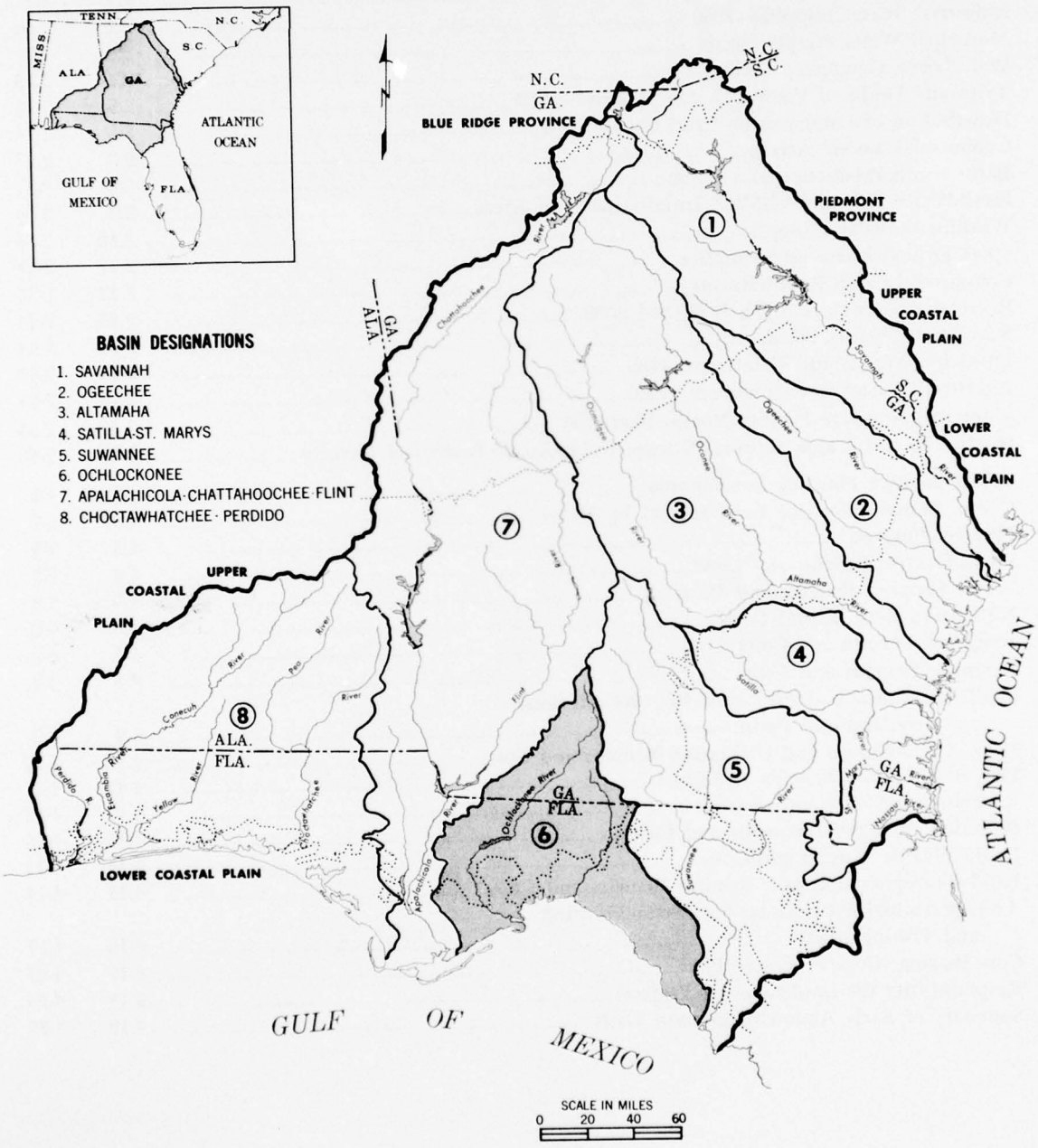

Figure 1.1

THE OCHLOCKONEE BASIN

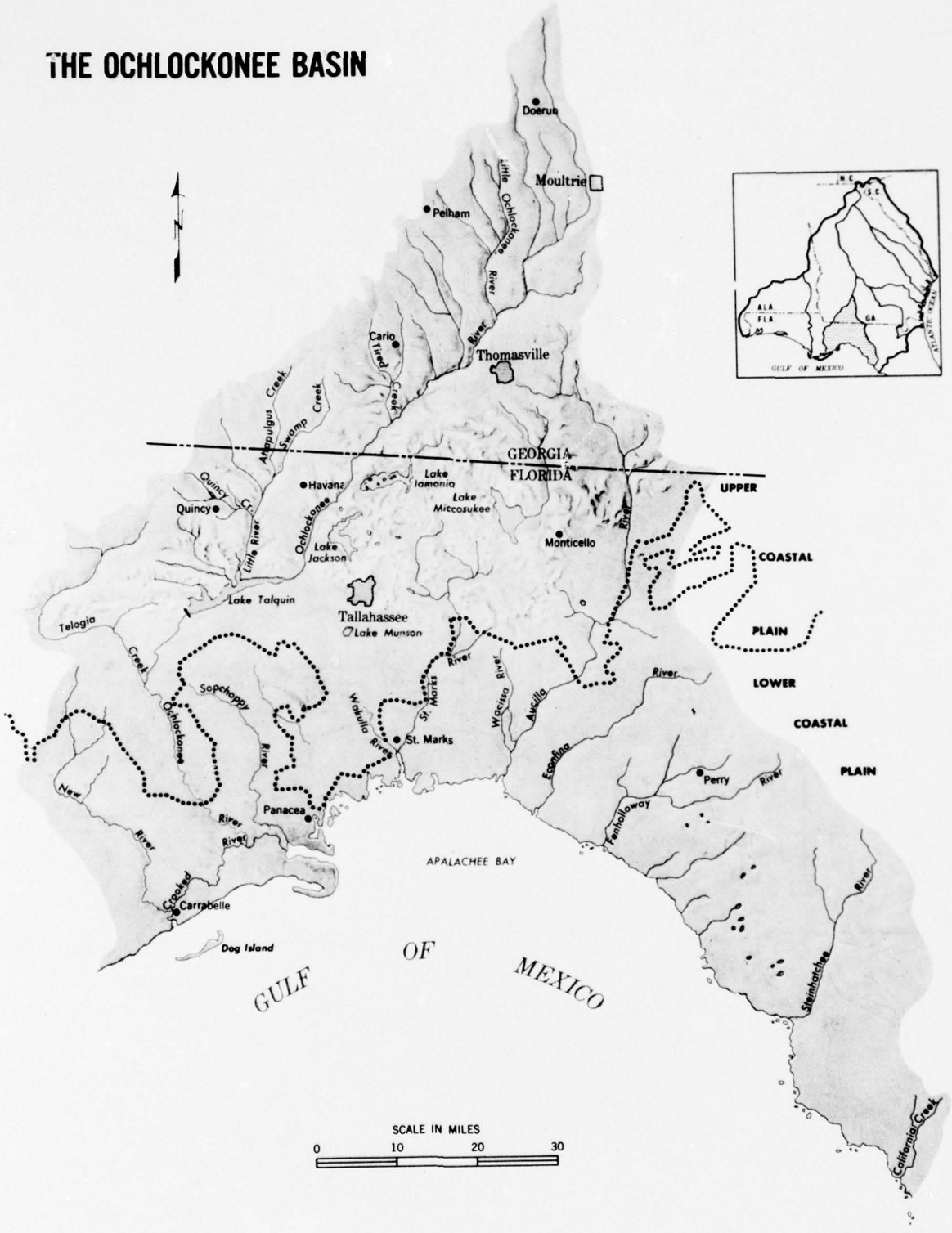

Figure 1.2

PART ONE – STAGE FOR DEVELOPMENT

SECTION 1 – BASIN AREA

Description

The Ochlockonee basin, as used in this Appendix, contains all the coastal drainage areas between the Suwannee River drainage on the east and the drainage of the Apalachicola-Flint River system on the west. This roughly triangular-shaped area includes the drainage areas of several rivers of which the Ochlockonee River is the largest. Its apex is in Worth County, Georgia, and its base extends around the Apalachee Bay on the Gulf of Mexico. About one-fourth of the 6,329 square miles in the basin lies in southwest Georgia and the remaining three-fourths of the area is in the Big Bend portion of north Florida. Excluding 40 square miles in small water bodies and 126 square miles in large water bodies, the net land area in 1960 totaled 6,163 square miles. There are 7 Georgia counties and 10 Florida counties all or partly within the basin. Tallahassee, the capital of Florida, with a 1960 population of 48,174 is the largest city in the basin and Thomasville is the principal city in the Georgia portion.

The basin lies entirely within the Coastal Plain. About 56 percent of the basin, or 3,541 square miles, is in the Upper Coastal Plain and 44 percent, or 2,788 square miles, is in the Lower Coastal Plain.

The Upper Coastal Plain portion of the basin, characterized by rolling terrain with broad ridges and gentle slopes, is particularly suited to agricultural uses. The streams are sluggish and flow in low-banked, tree-choked, meandering channels. The flood plains of the streams are flat, poorly drained, and densely wooded. A very small amount of these flood plains has been cleared for cropland use or pasture, and the trees are principally small, low quality hardwoods.

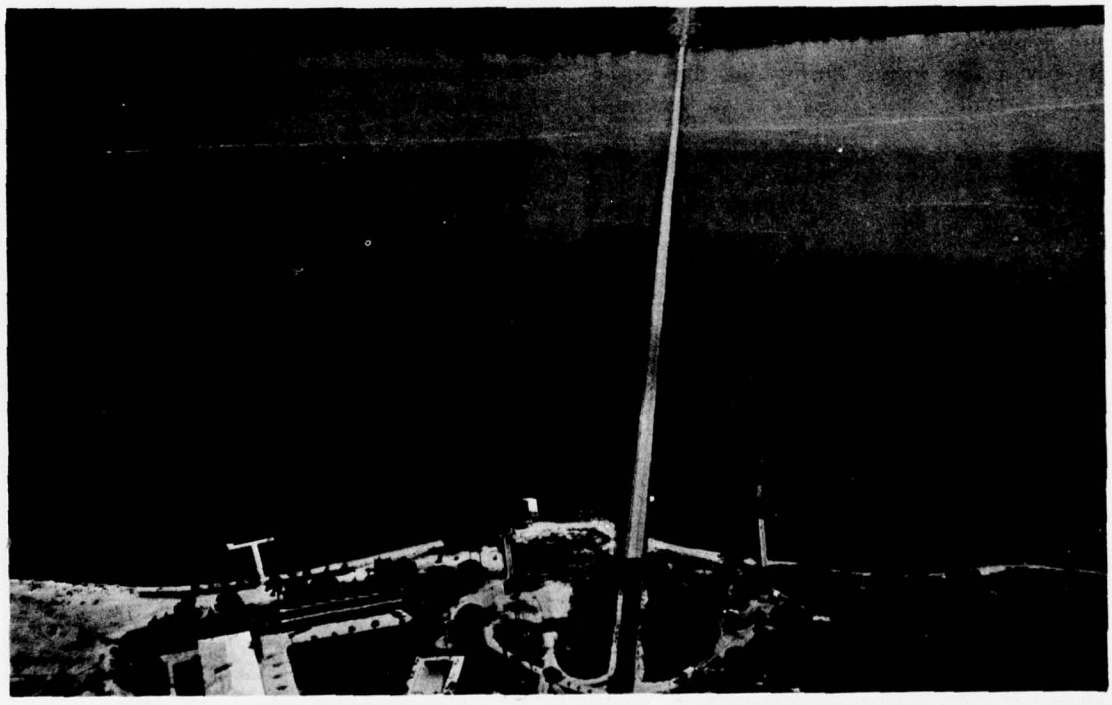

Figure 1.3 *Mouth of Ochlockonee River at U. S. Highway No. 98.*

The Lower Coastal Plain consists of nearly level land that is often referred to as the flatwoods area. This land is frequently swampy. The soils are predominantly light gray sands, and there has been very little separation of soil particles. Occasionally, low sandy ridges separate the flat swamps. Limestone, which outcrops in many places near the coast, underlies the sands.

Rivers

All the rivers and streams in the basin drain into the Gulf of Mexico. The Ochlockonee and Aucilla Rivers originate in Georgia. Other basin streams, lying entirely in Florida, are the Carrabelle, New, Crooked, Sopchoppy, St. Marks, Econfina, Fenholloway, Steinhatchee, and Wakulla Rivers, California Creek, and numerous smaller creeks.

Ochlockonee River—This river is about 190 miles long and originates in Worth County, Georgia, at an elevation of 420 feet mean sea level and flows south and southwest past Thomasville and Tallahassee into Lake Talquin. From the lake it makes a westerly semicircle and enters the Gulf of Mexico in an easterly direction through Ochlockonee Bay. The watershed totals about 2,677 square miles. In the upper reaches the depth of flow over the bars is only a few inches during the dry season. This normally occurs from June to November. Below Lake Talquin, depths gradually increase to about 5 feet at the mouth. Principal tributaries of the Ochlockonee River are the Little Ochlockonee River, Tired Creek, Little River, Telogia Creek, and Crooked River.

Aucilla River—The origin of this river is in Thomas County, Georgia, 10 miles northeast of Thomasville. It drains about 800 square miles as its flows southerly across south-central Georgia and northwest Florida to the Gulf of Mexico. The headwaters are at an elevation of 250 feet mean sea level. The channel meanders listlessly through a flat area of dense brush. The water goes underground several places along its course, and at the lower end of the river it flows through a wide marsh. The principal tributary is the crystal clear waters of Wacissa River.

St. Marks River—This stream originates in the rolling upland of the Tallahassee Tertiary Highlands, about 12 miles northeast of Tallahassee [illegible] elevation of 120 feet above sea level. It [illegible] 26.5 miles almost due south from its origin to [illegible] the Gulf of Mexico 4.4 miles below the to[illegible] St. Marks. It has a drainage area of about 220 square miles. After the stream enters the Lower Coastal Plain, it flows through swampland until it reaches a point near the Leon-Wakulla County line. Here the stream goes underground in a series of sinks. It later emerges in a definite channel about one-half mile down-

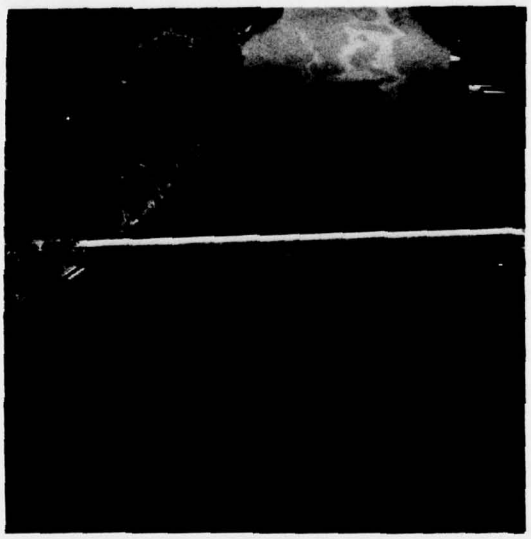

Figure 1.4 *Lower Ochlockonee River at U. S. Highway No. 319.*

Figure 1.5 *Steinhatchee River Falls.*

Figure 1.6 *The Large Flow of Crystal Clear Water from Wakulla Spring Is the Source of Wakulla River.*

stream. The river has been improved for modern barge traffic upstream to the port of St. Marks and for shallower draft vessels upstream to Newport. There is a drawbridge at Newport to allow passage of fishing craft and pleasure boats. The Wakulla River, originating from Wakulla Spring, is the principal tributary.

Fenholloway River—The origin of this river is in the San Pedro Bay Swamp in Taylor County, about 10 miles northeast of Perry, Florida, and it has a drainage area of 350 square miles. The swamp lies between 90 and 95 feet above sea level. There are numerous springs and sinking creeks which flow into the river along the midsection of the watershed in the vicinity of Perry. The Fenholloway River has been declared an industrial stream by the Florida legislature, and it is polluted with effluent from the cellulose plant about 4 miles southeast of Perry.

Steinhatchee River—This river originates in the Still Bay Swamp area, Lafayette County, about 25 miles southeast of Perry, Florida, at an elevation of 70 feet mean sea level. It has a drainage area of 580 square miles. The river flows generally south for 28.5 miles, then turns and flows almost due west for 3.5 miles to enter Dead Man Bay in the Gulf of Mexico. Near river mile 10 is a small 2-foot waterfall over a limestone or dolomite ledge. Downstream from this point the gradient is about 0.3 foot per mile.

Carrabelle River—This river, only 4.5 miles long, lies below the juncture of the New and Crooked Rivers. It is tidal throughout its entire length. The river ranges from 500 to 1,500 feet in width and is navigable for intracoastal barges and fishing boats to the port of Carrabelle, about 1 mile from the mouth.

Lakes

There are four large lakes and numerous small lakes within the basin. Lake Talquin, created by Jackson Bluff Dam on the Ochlockonee River, is the largest lake in the basin. Other large lakes are Lake Jackson and Lake Iamonia near

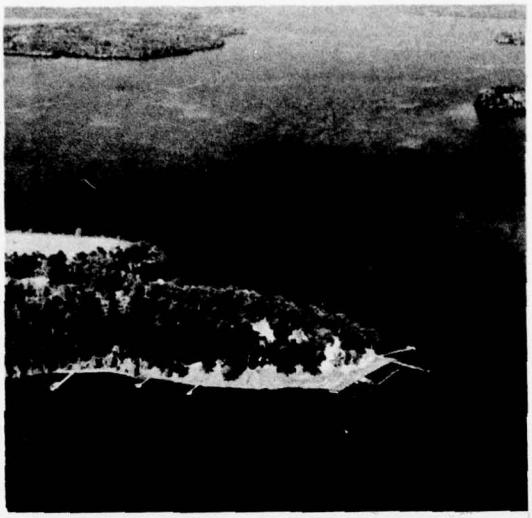

Figure 1.7 *Lake Talquin Has a Surface Area of 9,750 Acres.*

Figure 1.8 *Beach on Apalachee Bay — About 200 Miles of Shoreline in the Basin Extend from Carrabelle to near the Mouth of the Suwannee River.*

Tallahassee and Lake Miccosukee near Monticello. The last three lakes are natural, perched water-table lakes in a limestone area. Occasionally, a hole in the limestone develops which results in total drainage of these lakes until the hole is either sealed or isolated by dikes. Each of these natural lakes has extensive shallow areas that are choked with aquatic plants.

There are many small lakes in the central and southeast portions of the basin. Some of these are permanent; others are often dry during drought periods. The many small lakes that dot the landscape in the central part of the basin occur in limestone sinkholes.

Gulf Coast

The basin has about 200 miles of shoreline extending from Carrabelle, Florida, easterly to a point near the mouth of the Suwannee River.

The coastal waters are shallow for some distance offshore. Generally, the coast consists of low, swampy, tidal marsh underlain with limestone. There are, however, some excellent white sand beaches. These are usually found on the eastern side of the points or capes. Heretofore, these tidal marshes were relatively inaccessible and undeveloped, in spite of the pleasant climate and other potentials. This condition, however, is changing. Small coastal developments are beginning to dot the area and are expected to grow as the demand for coastal homesites continues to increase. In addition, the many creeks, inlets, bays, and coves along the coast provide excellent waters for fishing.

Geology and Soils

The surface soils and bedrock in the Ochlockonee basin are derived entirely from sediments. Bedrock formations in the Upper Coastal Plain are unconsolidated sands, sands cemented into sandstone, and stratified sandy limestone. In some areas the limestone contains appreciable amounts of clay. These strata vary in thickness. Well logs show thicknesses of slightly over 200 feet near Quincy in Gadsden County, Florida, and nearly 1,500 feet in Mitchell County, Georgia. Under these sandy strata are deep deposits of soluble limestone. The sand and limestone strata rest on granite and associated hard rock which occur at a depth of about 4,000 feet in Mitchell County.

In the eastern two-thirds of the Lower Coastal Plain and along the fringes of the Upper Coastal Plain, soluble limestones are at the surface or under a shallow mantle of marine sands. Steeper slopes in this section are generally the result of depressions in the form of sinkholes or lake basins made by the solution of limestone and, less often, the result of recent stream action. Solution is favored by the porous sandy mantle,

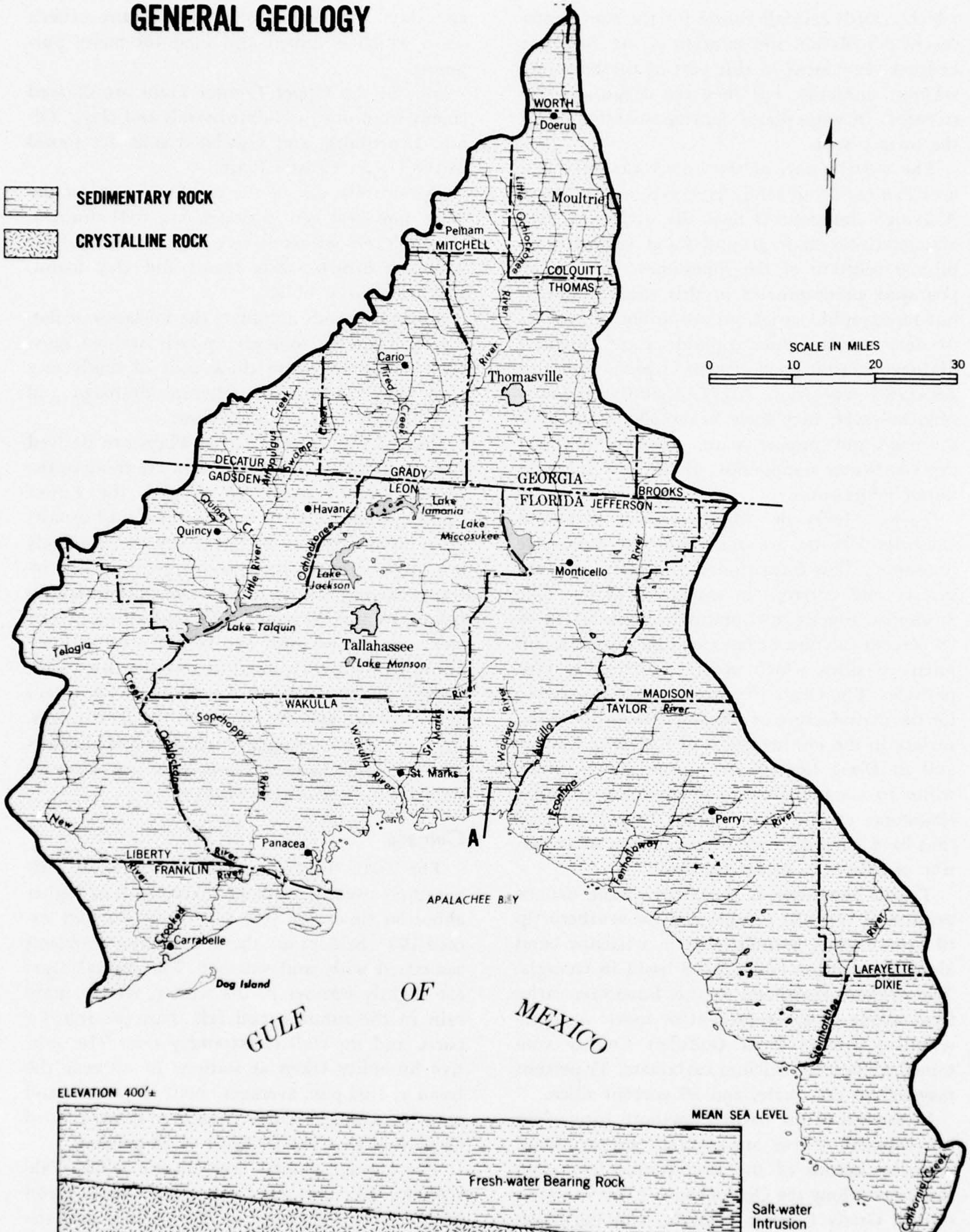
GENERAL GEOLOGY
SEDIMENTARY ROCK
CRYSTALLINE ROCK
SCALE IN MILES
0
10
20
30
WORTH
Doerun
Moultrie
Pelham
MITCHELL
COLQUITT
THOMAS
Cairo
Thomasville
DECATUR
GADSDEN
GRADY
LEON
GEORGIA
FLORIDA
JEFFERSON
BROOKS
Havana
Quincy
Lake Iamonia
Lake Miccosukee
Lake Jackson
Monticello
Lake Talquin
Tallahassee
Lake Munson
Telogia
WAKULLA
MADISON
TAYLOR
St. Marks
Perry
Panacea
LIBERTY
FRANKLIN
Carrabelle
Dog Island
APALACHEE BAY
A
LAFAYETTE
DIXIE
GULF OF MEXICO
ELEVATION 400'±
MEAN SEA LEVEL
Fresh-water Bearing Rock
Salt-water Intrusion
SECTION A-A (NOT TO SCALE)

Figure 1.9

which retards rainfall runoff for the slower process of percolation and solution of the limestone bedrock. Few areas in this part of the basin are without sinkholes, but they are irregularly distributed. In some places depressions occupy half the surface area.

The western part of the Lower Coastal Plain area is a region of sand, flatwoods, and swamps. Although limestone is near the surface, a high and relatively static ground water table has inhibited solution of the limestones. Terrace topography predominates in this western section but topographic variations are minor. Flat areas of deep sands, which provide rapid internal drainage, permit good growth of pinewoods and associated vegetation. Areas of similar topography, however, may have heavy clay soils, poor drainage, and support swamp woods of gum and cypress. Water stands most of the year in many minor depressions.

Taylor, Jefferson, Madison, and Lafayette Counties, Florida, are underlain with Suwannee limestone. This formation is generally near the surface and outcrops in numerous places. The Suwannee limestone contains from about 91 to 98 percent calcium carbonate. The principal impurity is silica which occurs as irregular flint particles. The Ocala limestone, which is suitable for the manufacture of cement, is found near the surface in the southern part of Lafayette County and in Dixie County. It is a relatively clean, white to cream-colored, and uniform granular limestone, except where it has been converted into hard compact rock by deposition of travertine or calcite in its interspaces.

Tampa limestone is prevalent in the eastern portion of Wakulla County and the southern tip of Leon County and outcrops in a narrow band along the western edge of the basin in Georgia. The calcium carbonate in this limestone varies from about 15 to 74 percent or more. A representative sample from Gadsden County contained 41 percent calcium carbonate, 35 percent magnesium carbonate, and 20 percent silica.

In the rest of the basin, Hawthorn formations are exposed. These are overlain in two small areas by islands of the Brandywine formation that occur along the Ochlockonee River in south-central Grady County, Georgia, and northwest Leon County, Florida. The Hawthorn formation in northern Florida consists chiefly of gray sands and clays with lenses of green or gray fuller's earth which is mined and used for many purposes.

Soils of the Upper Coastal Plain are derived chiefly from unconsolidated sands and clays. Tifton, Lynchburg, and associated soils are found in the Upper Coastal Plain.

Tifton soils, one of the dominant soils of the ridge tops and gentle slopes, are well drained, although seldom excessively so. They are usually yellowish brown sandy loams and clay loams, and are quite pebbly.

Lynchburg soils dominate the lowlands or flatwoods. These are somewhat poorly drained, grayish soils formed from thick beds of sandy clay loam and sandy loam. Internal drainage and runoff from these areas are slow.

Soils of the Lower Coastal Plain are derived from more recent sediments than are those in the Upper Coastal Plain. In general, the Lower Coastal Plain soils are gray in color and usually sandy. They tend to be either dry or excessively wet, depending on topographic position and internal drainage. Some of the more dominant soils belong to the Plummer Klej association. Plummer soils extend over the largest area and are found in the poorly drained sections. Klej soils, though not so extensive, are the most important agriculturally and are found on the sand ridges. Also, extensive acreages of swamps and marshes in the Lower Coastal Plain have not been assigned a soil series classification.

Climate

The basin climate is mild. Summertime temperatures usually reach 90° Fahrenheit or higher about 80 times per year but rarely do they exceed 100°. Seldom are there any major problems associated with cold weather. The coastal areas are slightly warmer in the winter, receive more rain in the summer and fall than the interior parts, and snowfall is extremely rare. The relative humidity taken at stations in or near the basin at 1:00 p.m. averages about 59 percent and monthly averages range from a peak in July of 65 percent to a low in April of 48 percent.

The average annual temperature is 68° Fahrenheit. The average daily temperature varies from 53° in December to 82° in July and the frost-free growing season ranges from 280 days in the interior of the basin to 320 days along the

CLIMATE

TALLAHASSEE, FLORIDA

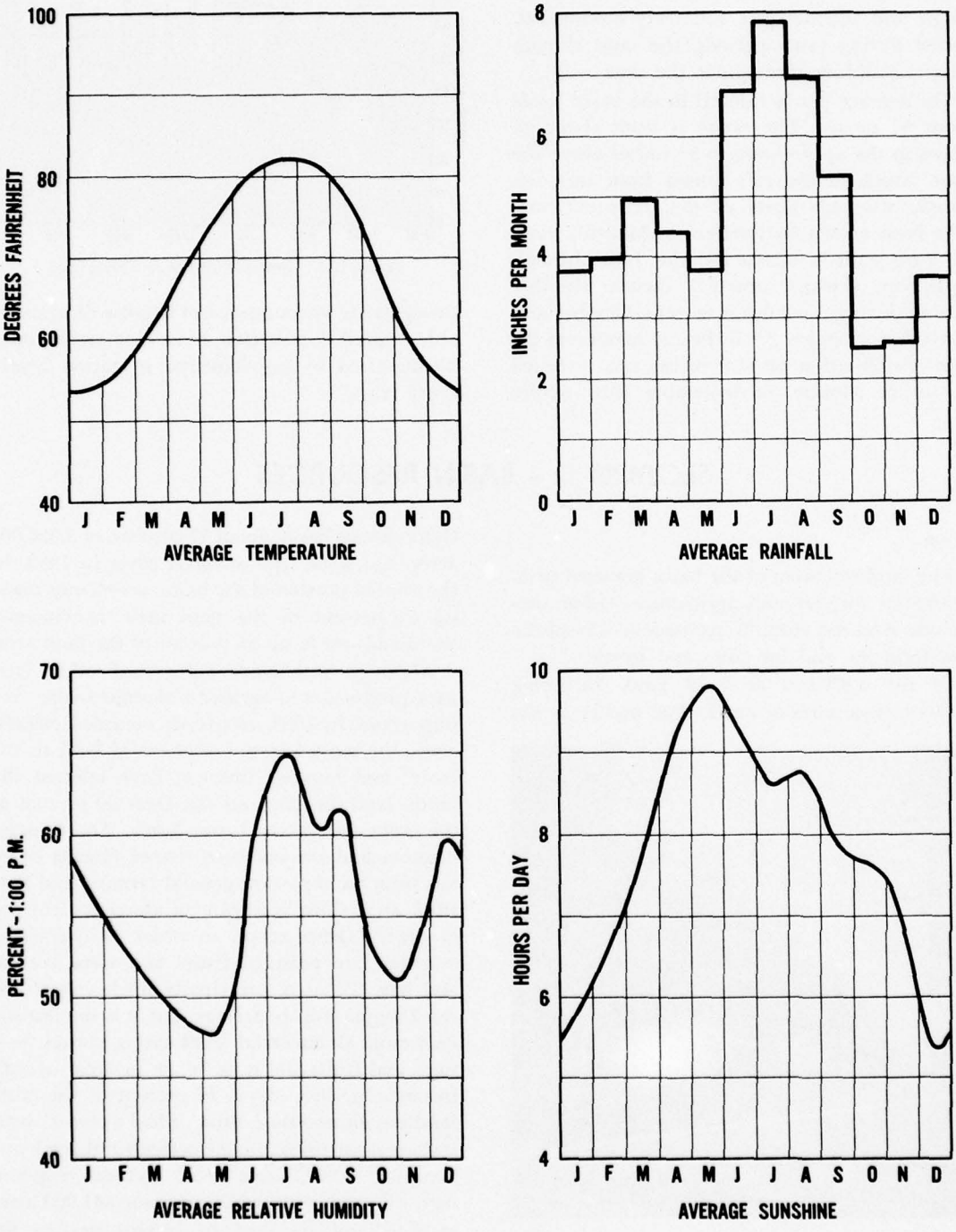

Figure 1.10

coast. Normal highway and waterway use is not curtailed because of winter temperatures or snow, and the frost-free soil makes structural design and maintenance relatively economical. Except during rainy periods, the mild climate permits building throughout the year.

The average yearly rainfall in the basin totals about 52 inches. The range is from about 46 inches in the upper basin to 56 inches along the coast. Much of the rain comes from thunderstorms, although many of the daily extremes have been caused by hurricanes. Monthly rainfall during the 4 wettest months, June through September, averages nearly 7 inches. Monthly rainfall during the 2 driest months, October and November, averages 2.5 inches. A maximum 24-hour precipitation of 11.8 inches was recorded at Quincy, Florida, in September 1928. Severe droughts are uncommon, but because of unfavorable rainfall distribution, most crop yields could be increased by supplemental irrigation nearly every year.

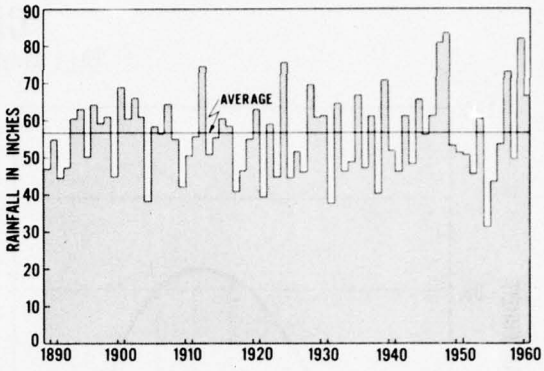

Figure 1.11 *Annual Rainfall at Tallahassee.*

SECTION II – BASIN RESOURCES

Land

The land resources of the basin are used principally for forestry and agriculture. Other uses include land for wildlife, recreation, transportation facilities, and for cities and towns.

Of the 3,970,000 acres of land, including 26,000 surface acres of small water bodies, in the Ochlockonee basin, about 77 percent, or 3,056,000 acres, had some type of forest cover in 1959. In the Florida portion of the basin, woodlands made up 84 percent of the land area; in Georgia, woodlands made up 55 percent of the land area.

Figure 1.12 *Longleaf Pine in Apalachicola National Forest.*

Although woodlands far exceed other land uses, production of agricultural crops is also very important. In 1959, croplands occupied 469,000 acres, the second largest segment of land in the basin, and farming interests have selected the better land for cropland use. Over 90 percent of the crops are on the better lands. The Georgia counties and the northern tier of Florida counties form an important general farming and livestock area. Corn is grown on about half of the cropland. Other crops, in order of decreasing acreages, are peanuts, fruits and nuts, cotton, and hay. Tobacco, principally shade tobacco, is not a major crop in acreage, but it is the leading cash crop. Commercial truck crops, cotton, peanuts, and fruits and nuts follow in order of cash income. In 1959, about 20 percent of the cropland was either idle, fallow, or had a crop failure.

Pasture, the next major agricultural land use, occupied 193,000 acres which includes cropland used for pasture. In addition, some 631,000 acres of woodland are used in varying degrees for pasture.

Figure 1.13 *Corn Is Grown on About Half of the Cropland.*

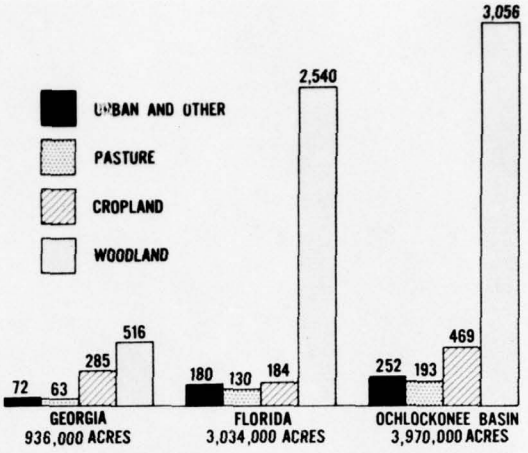

Figure 1.14 *Land Use—1959.*

The west-central portion of the basin is the principal area in the Southeast River Basins used for producing shade grown tobacco. The northern part of the basin is one of the leading areas in the Nation for starting tomato, pepper, and other plants for sale mainly as transplanting stock in more northern areas. Climate and soils in the northern half of the basin are generally well suited for general farming and for growing melons, pecans, and commercial vegetables. Many varieties of vegetables can be grown in the basin, and at least five varieties mature during every season of the year. This area offers a good opportunity for increased production of commercial truck crops in support of an expanded freezing and canning industry. There is also a significant number of livestock farms in the basin. Cattle ranching is particularly important in Grady County, Georgia, and Gadsden County, Florida.

Approximately 252,000 acres in the basin are classed as special use or other land. This includes some 26,000 acres of land inundated by small water bodies and about 90,000 acres devoted to transportation facilities. Although the basin is sparsely populated, there is a good network of improved county, State, and Federal highways. The 9,025 miles of road occupy 64,000 acres of land. Streets and alleys in the cities and towns require an additional 13,000 acres. Most of the principal towns have railway connections with trade and industrial centers and the principal seaports. There are 368 miles of railroad in the basin. Tallahassee has the only major commercial airport, but several smaller cities, communities, companies, and individuals have noncommercial airports. The railroads and airports occupy about 10,000 and 3,000 acres of land, respectively. Land used for transportation is expected to increase 250 percent by the year 2000 to meet the needs for additional streets in municipal areas and for the interstate and State highway systems. Residential areas occupy about 16,500 acres. Another 14,000 acres are used for schools, churches, and service areas.

Figure 1.15 *Transportation Facilities and Small Lake (upper right)—Thomasville, Georgia.*

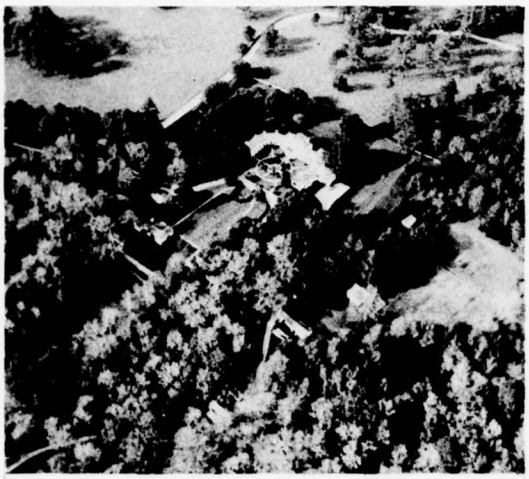

Figure 1.16 *Estate near Lake Jackson.*

Industries in the basin process and manufacture lumber and wood products, textiles and apparels, stone, clay, and glass, and metal and chemical products. In addition to these processing industries, there are several printing and publishing businesses in and near Tallahassee. These basin industries occupy about 4,100 acres of land.

In 1959, 11 small strip mine operations in the basin occupied about 200 acres. The principal products are fuller's earth, miscellaneous clays, limestone, and sand and gravel. Fuller's earth and other clays are mined in Decatur and Grady Counties, Georgia, and Gadsden County, Florida, and a silica-sand mine is located near Ochlockonee in Thomas County, Georgia. This sand is used as a foundry sand, glass sand, and for ordinary building use. A deposit of sand in Wakulla County is also suitable for similar uses, and one of the best dolomite deposits in the Southeast is located near the Steinhatchee River. The Gulf coast sands and inland sand deposits may contain ilmenite, rutile, and zircon in commercial quantities, but this has not been definitely determined. The petroleum potential of the basin is unknown, but exploratory work is being carried on in some areas, both inland and off-coast. The location and extent of other mineral deposits of commercial value are unknown.

The basin has a vast and relatively undeveloped recreational potential. Existing public recreation areas include one Florida State park, one Florida State memorial, recreation developments of the Florida universities, and small recreation sites in both the Apalachicola National Forest and St. Marks National Wildlife Refuge. These total about 2,000 acres. In addition, there are wayside and local parks, boating and swimming areas, numerous scenic and historic sites, and about 200 miles of coastline.

The remaining 99,200 acres of land in the basin consist of (1) other farmland, such as unused corners of fields, farm homesites, and other nonproducing land, and (2) nonfarm swamp and marshland. Practically all of these lands are suitable for wildlife habitats.

The Upper Coastal Plain in the basin corresponds in general to the topographic division of Tallahassee Hills or Tallahassee Red Hills. This is the most intensively cultivated and the most highly populated area of the basin. The western part of the Tallahassee Hills produces quantities of cotton and tobacco. The northern and eastern sections of these hills contain a number of hunting plantations which are important as fish and wildlife areas. These tracts of forested and interspersed lands are managed principally for big and small game.

In the Lower Coastal Plain, farms are few and the population is sparse. Hardwood hammock swamp, titi swamp, and pine flatwoods cover much of the area. The coastal areas contain about 29,000 acres of marsh, of which 27,000 acres are classed as saline marsh and 2,000 acres are considered fresh marsh. The vast complex of forests, swamps, streams, and tidal marshes forms an excellent habitat for deer and turkey. The open piney woods afford excellent quail hunting.

Water

Because of its climate and physical characteristics, an ample supply of surface and ground water is normally available throughout the basin. The flows, however, in the upper reaches of the Ochlockonee River get very low during dry periods. The permeable limestone which underlies the entire basin is the major source of water for deep wells. Layers of sand, gravel, and clay interposed between the ground surface and this permeable limestone provide water for shallow wells.

Streamflow of the rivers in the basin is influenced greatly by large springs and limestone sink conditions. In several locations, where

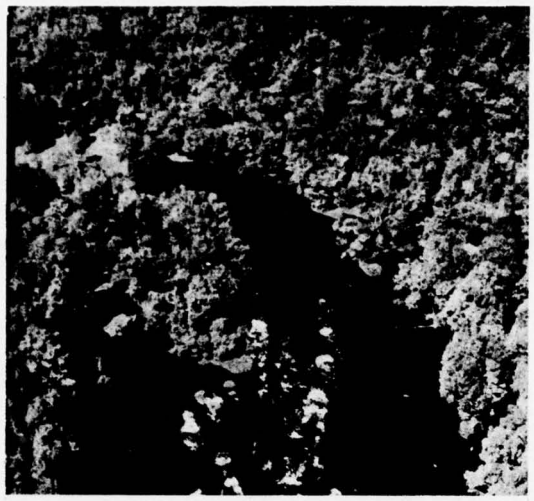

Figure 1.17 *Springs near Natural Bridge State Memorial, Florida.*

springs and limestone sinks are common, streamflow and ground water are nearly indistinguishable. Short-term fluctuations of flow are smoothed out by the vast ground water storage and by the large storage in the widespread depressions. The rivers generally average from 1 to 2 feet of fall per river mile and have flood plains ranging up to 2 miles in width in their lower reaches.

Lakes Talquin, Iamonia, Jackson, and Miccosukee store considerable amounts of water. In addition, there are many small lakes, small reservoirs, and farm ponds; however, these smaller water bodies have little effect on streamflow. The withdrawal of ground water and its diversion into streams is greater than withdrawal of water from streams, but the total amount is negligible, compared to the total streamflow.

Figure 1.18 *Lake Iamonia, Florida.*

The annual runoff averages about 3.5 million acre-feet, or about 550 acre-feet per square mile. This average runoff per square mile is more than the United States average but less than that of the Southeast as a whole. Annual runoff from the basin ranges from an average of less than 5 inches on the upper Aucilla River to over 17 inches on Telogia Creek. This wide variation is largely a result of the underground movement of water. The 42-inch yearly average difference between rainfall and runoff is the result of evaporation, transpiration, and deep seepage into the ground. Total streamflow varies greatly from year to year. The highest flow of the Ochlockonee River at Havana, Florida, was in 1948. The flow was equal to 32 inches average depth over the drainage area. The lowest flow of the river was in 1955 and amounted to 3 inches average depth over the area.

In addition to the year-to-year variability in flow, there is also great variation within a year. Streams in the basin are particularly high in late winter and early spring. In May and June the flows diminish. They rise slightly in middle and late summer, and recede until the combination of winter rains and low evaporation and

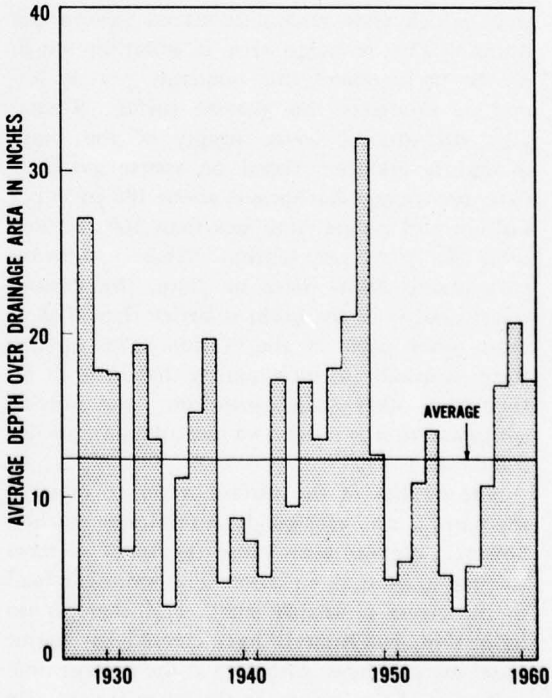

Figure 1.19 *Annual Runoff, Ochlockonee River at Havana, Florida.*

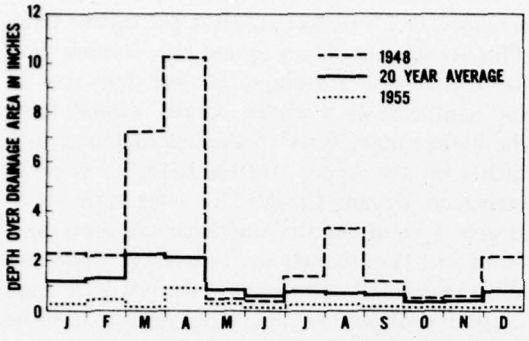

Figure 1.20 *Monthly Runoff, Ochlockonee River Above Havana, Florida.*

transpiration rates bring about the typical late winter rise.

The principal artesian aquifer, which in Florida is known as the Floridian Aquifer, is the deep-well ground water source. The depth to water in the zone of artesian aquifer varies from less than 100 to nearly 500 feet. The water-bearing formation varies in thickness from a few feet to several hundred feet. In general, the formation is both deeper and thicker near the coast. There are many large springs and wells which yield several thousand gallons per minute. The recharge area is generally north of the basin where this relatively porous formation intersects the ground surface. Generally, the ground water supply of the basin is slightly alkaline. Based on sparse available data, the average hardness is about 180 parts per million and ranges from less than 100 to more than 300 parts per million. While conditions vary greatly from place to place, the ground water quality of the basin is better than that of most other parts of the Nation. The ground water is usually of such quality that little or no treatment other than protection from outside contamination is needed to meet drinking water standards.

The quality of the surface water in most of the basin is also very good. In the lower reaches, however, organic acids cause the water of most streams to be dark in color. The sediment load in the rivers is usually small, and there is no indication that bacteria have created any major water-use problems. Although at the present time pollution of the streams in the basin is generally not a serious problem, some sections in the upper reaches of the Ochlockonee River have limited use because of polluted waters, and the Fenholloway River is badly polluted. Preliminary data indicate the hardness of the surface waters in the basin usually varies between 8 and 150 parts per million and the average hardness of the surface water is about 45 parts per million. This compares very favorably to an average of about 300 parts per million for the United States.

Sediment concentrations of about 20 parts per million are considered typical. The sediment load increases with increased flows and about 90 percent of the load is carried 10 percent of the time.

Tidal effects extend upstream about 5 miles on most of the rivers. The salt-water wedge extends nearly as far, depending on the direction and intensity of the wind and the flushing action of the stream. The only serious salinity problem appears to be the intrusion of salty ground water into the fresh-water aquifer where excessive pumping occurs along the coast.

The temperature in the larger streams varies from 53° Fahrenheit in winter to 82° in summer. The smaller streams have an even greater range and a more rapid fluctuation. The ground water temperature ranges only from 65° to 70°.

The abundant supply of good quality water

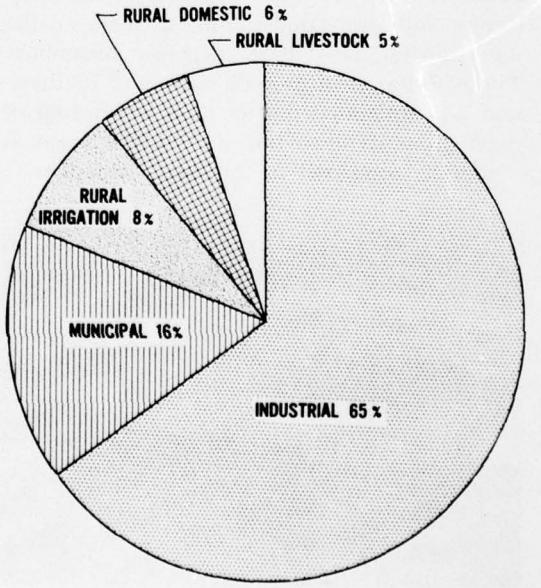

Figure 1.21 *Water Use — 1960.*

in the basin is used for many purposes. The total of nearly 24 billion gallons of water withdrawn from wells and streams each year represents about 1 percent of the average sustained supply available from both surface and ground water sources.

Surface waters are used largely for recreation and fishing. The rivers have considerable natural beauty and are used extensively for boating and fishing, particularly in the lower reaches where there are many fishing camps.

Commercial navigation extends about 4.5 miles upstream from the mouth of the St. Marks River to St. Marks, and along protected routes of the Gulf Intracoastal Waterway easterly to Carrabelle, Florida. Shallow-draft pleasure boats can navigate 10 miles up the St. Marks River to Newport. Other shallow-draft facilities for fishing and pleasure boats are provided at various locations such as Alligator Harbor, Ochlockonee Bay, Panacea, Steinhatchee, Keaton Beach, Horseshoe Point, and Shell Island near the mouth of Wakulla River. These and other locations with small boat facilities are shown on Figure 2.5.

Figure 1.22 *Fishing Camp and Boat Landing, Lower Econfina River.*

SECTION III – PEOPLE IN THE BASIN

History

The first recorded entry of Europeans into the Ochlockonee basin is contained in the narratives of the De Soto expedition. De Soto and his men entered the basin in 1539 and spent the winter near the Apalachee Indian settlement of Tallahassee, or Old Town. These Indians were engaged in agriculture and had founded many thriving communities.

The Spanish did not attempt to establish a mission until 1633. At that time two Franciscan friars arrived to begin missionary work. The good farming land became an important source of food supply for the Spanish garrison. Fort San Luis was built near Tallahassee in 1640 and served as headquarters for seven missions. Spanish settlers arrived and trade flourished, but the English occupation ended this development. Between 1763 and 1783 little was accomplished by the English, except to establish Tallahassee as the headquarters for West Florida.

The Creek Indians of Georgia sided with the English in their raids against the Spanish, and were firmly settled on Apalachee lands by the time the English colonists arrived. These Creeks were known as Seminole Indians or Outlanders.

England soon ceded Florida back to Spain and the English settlers fled to the West Indies. Spain attempted to resettle the plantations with immigrants from the United States. General Andrew Jackson made several punitive expeditions into West Florida against the British, who were using the Spanish authority as a cover for their military activities. The Spanish subsequently sold Florida to the United States for $5 million. Payment was made in the form of damage settlements to American settlers. Tallahassee became the territorial capital in 1823.

Indian affairs furnished the most serious problem of the new territory. When the area became a territory of the United States, pressure was brought by the white settlers to remove the Indians to the West. Although a removal treaty was signed, attempts to enforce this treaty precipitated a 7-year struggle involving great losses of life and property. Most of the Seminoles were eventually transported west to Oklahoma, but a

Figure 1.23 *Natural Bridge, Florida State Memorial.*

small group fled to the Everglades of southern Florida where their descendants still reside.

Expansion of agriculture in the territory was rapid after fighting with the Seminole Indians ended in 1842. Cotton, cattle, hogs, sugar cane, and tobacco were raised. The port of St. Marks became the cotton shipping center for the area and quantities of naval stores and timber were also shipped from the basin.

During the Civil War, Tallahassee was the only uncaptured Confederate State capital and the last battle of the Civil War in Florida was in 1865 at the natural bridge on the St. Marks River. This area is now the Natural Bridge, Florida State Memorial.

The Reconstruction Period was particularly difficult for the large plantation owners, and recovery of the economy was encumbered with a military administration.

Immigrants gradually moved into the basin, and the infant transportation facilities were expanded. The economic structure was and is still based on agriculture including forest products. Many of the large plantations, particularly around Thomasville, Georgia, and Tallahassee, Florida, became winter homes for northern industrialists. After World War I, cotton was produced extensively. Cotton was the only crop grown on many farms until a new menace, the boll weevil, plagued the South. This disaster caused the agricultural picture to gradually change. Farms became more diversified and more nearly self-sustaining.

Tallahassee's main function has been that of Florida's capital, but Leon County is still an important cotton and tobacco producing area, as are Gadsden and Jefferson Counties. In Georgia, near Pelham, large quantities of tobacco and tomatoes are produced. In the vicinity of Thomasville intensive gardens and nurseries are common and hundreds of truck loads of vegetables are shipped from this area each year. Thomasville also has an annual rose festival which attracts thousands of visitors each spring. The entire basin produces quantities of wood products.

Population Development

Population development in the Ochlockonee basin has been less rapid than population growth in the Nation and Southeast River Basins area. The population of the Ochlockonee basin totaled 207,800 in 1960. This was a 31 percent increase over the 1930 population. During the same period, the population of the United States increased by 45 percent and that of the Southeast River Basins area by 34 percent. Since 1930, the population of Georgia has increased 35 percent and the population of Florida has tripled.

Population in the basin is expected to increase substantially by the year 2000, even though the rate will probably be slightly less than that of the Southeast River Basins or the Nation. The Ochlockonee basin population is expected to increase to 258,700 by 1975 and to about 347,900

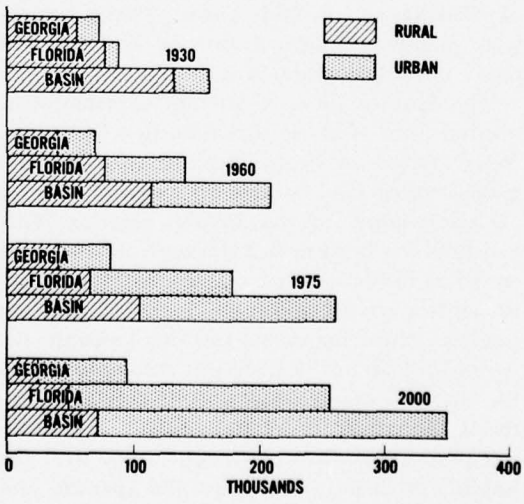

Figure 1.24 *Ochlockonee Basin Population.*

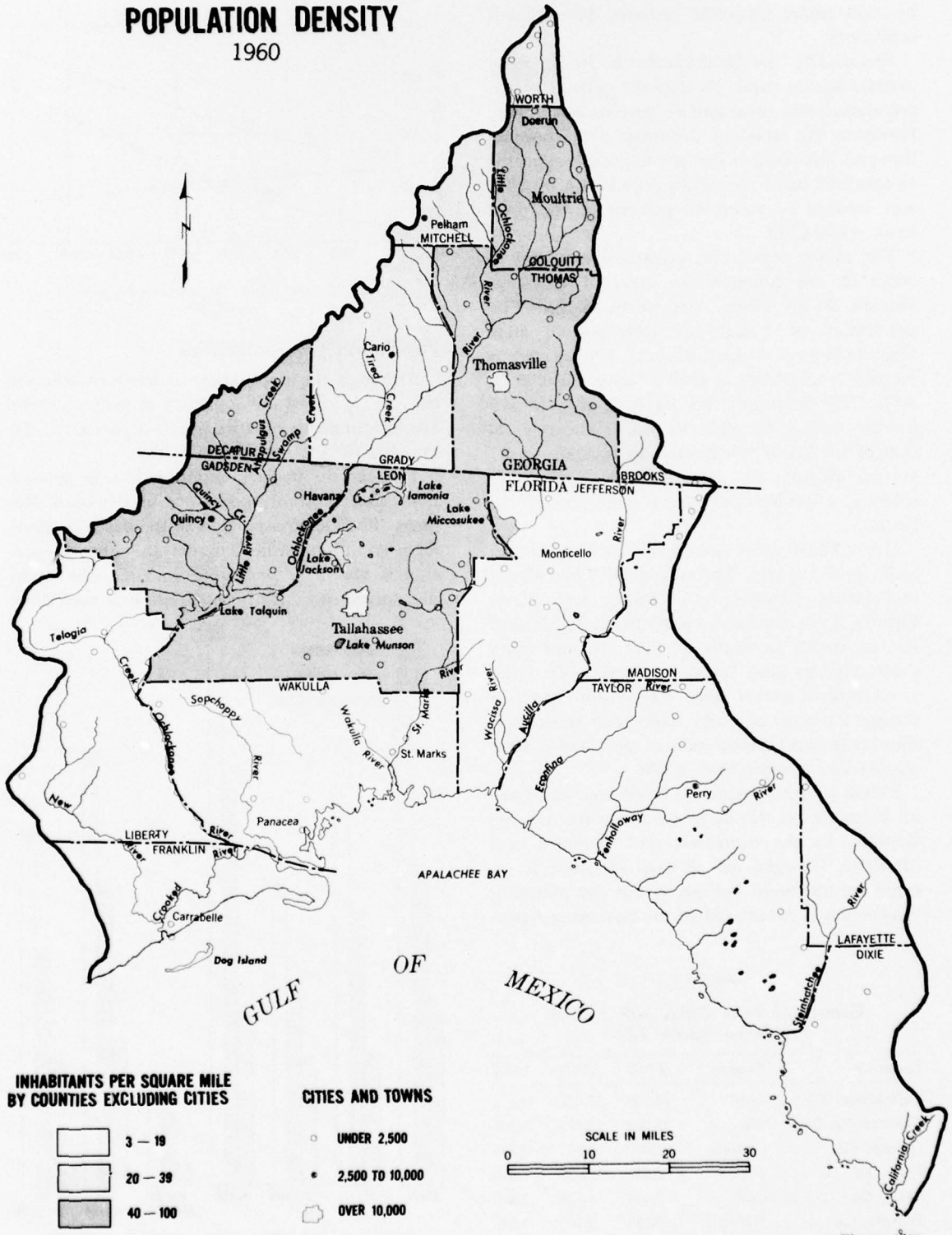
POPULATION DENSITY
1960
N
WORTH
Doerun
Moultrie
Little Ochlockonee River
Pelham
MITCHELL
COLQUITT
THOMAS
Cario
Tired Creek
Thomasville
Ochlockonee River
Attapulgus Creek
Swamp Creek
DECATUR
GADSDEN
GRADY
LEON
GEORGIA
FLORIDA
JEFFERSON
BROOKS
Havana
Lake Iamonia
Lake Miccosukee
Quincy
Quincy Cr.
Little River
Ochlockonee River
Lake Jackson
Monticello
River
Lake Talquin
Tallahassee
Lake Munson
Telogia Creek
Ochlockonee River
WAKULLA
Sopchoppy River
Wakulla River
St. Marks River
St. Marks
Wacissa River
Aucilla River
MADISON
TAYLOR
Econfina River
Perry
River
New River
LIBERTY
FRANKLIN
River
Panacea
Tenmile Creek
APALACHEE BAY
Crooked River
Carrabelle
Dog Island
GULF OF MEXICO
Steinhatchee River
LAFAYETTE
DIXIE
California Creek
INHABITANTS PER SQUARE MILE
BY COUNTIES EXCLUDING CITIES
3 — 19
20 — 39
40 — 100
CITIES AND TOWNS
UNDER 2,500
2,500 TO 10,000
OVER 10,000
SCALE IN MILES
0
10
20
30

Figure I-25

by 2000, under favorable resource development conditions.

Historically, the Ochlockonee basin has been predominantly rural. In 1960, 54 percent of the population was rural and 46 percent was urban. However, the trend of declining rural population and increasing urban population is expected to continue until the urban population by 2000 will amount to about 80 percent of the total basin population.

The major population growth is expected to occur in the larger urban areas. Tallahassee, Florida, is the largest city in the basin. The population of Tallahassee metropolitan area, considered as all of Leon County, is projected to increase from 74,200 in 1960 to about 205,000 by 2000. This represents an increase of over 175 percent during the next 40 years. The population of the basin is expected to increase by 67 percent during the same period. Tallahassee serves as a service center for a large part of the basin.

Other basin cities and towns are expected to grow quite rapidly. The growth of Thomasville and Cairo, Georgia, and Quincy and Perry, Florida, is expected to be particularly significant. Recent trends in highway travel to and from south Florida have favored several basin cities as convenient tourist stops. Population increases during the past 20 years have been quite substantial in most urban centers that had a 1940 population of more than 2,500.

Urban centers outside the basin area that have an influence on the basin economy are Albany, Georgia, to the northwest and Valdosta and Moultrie, Georgia, to the east. Moultrie is located on the basin boundary, but for planning purposes it is considered in the Suwannee basin.

TABLE 1.1

Growth of Basin Cities with a 1940 Population Above 2,500

Location	County	1940	1950	1960
Tallahassee, Fla.	Leon	16,240	27,237	48,174
Thomasville, Ga.	Thomas	12,683	14,424	18,246
Quincy, Fla.	Gadsden	3,888	6,505	8,874
Perry, Fla.	Taylor	2,688	2,797	8,030
Cairo, Ga.	Gray	4,653	5,577	7,427
Pelham, Ga.	Mitchell	2,579	4,365	4,609

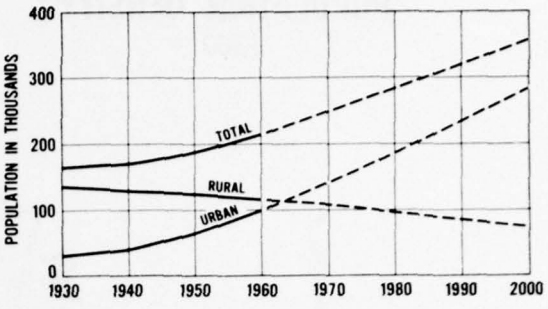

Figure 1.26 *Population Trends and Projections — 1930-2000.*

Population Characteristics

Although the population of the Ochlockonee basin is typical of the Southeast in general, there are certain characteristics which depart from the averages for the region and Nation.

In 1960, the basin population was 35 percent nonwhite; most of these were native-born Negroes. The Georgia portion of the basin is about 42 percent nonwhite whereas the Florida portion is about 31 percent nonwhite. The basin percentage of nonwhite population is over three

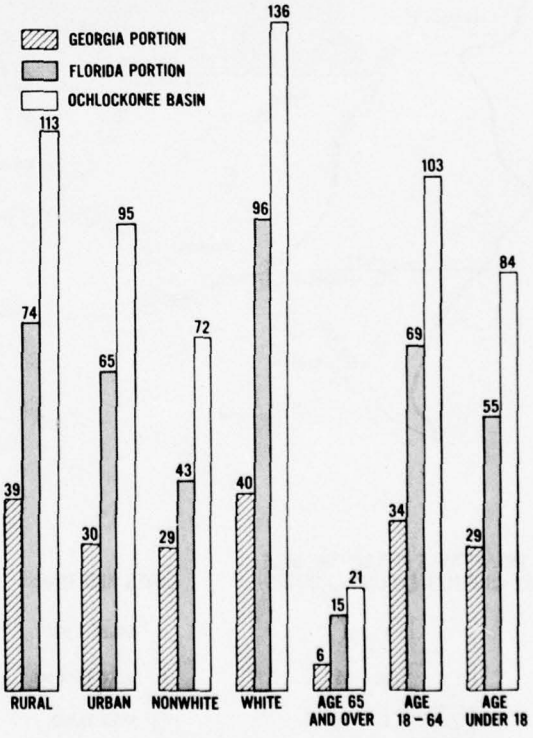

Figure 1.27 *Population Characteristics (1,000)—1960.*

times the national average, twice the Florida average, and well above the Georgia average.

With the high percentage of rural people and a high percentage of nonwhites, there has been, relative to national averages, high birth rates and low death rates. The resultant high natural increase, however, has been significantly diminished by out-migration. A large proportion of those migrating from the area has been young and middle-aged adults seeking employment opportunities. These circumstances have resulted in a population with relatively high percentages of children and elderly people.

In 1960, only about 40 percent of the total population of the basin was in the working age group of 25 to 65, whereas Georgia had 44 percent in this group and the average for both Florida and the Nation was 46 percent.

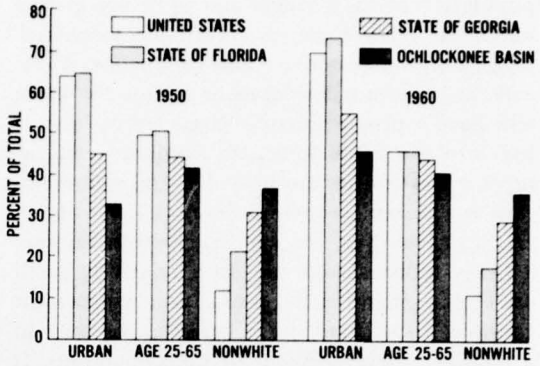

Figure 1.28 *Comparative Population Characteristics.*

Factors Affecting Population Change

Basic factors affecting changes in population are directly related to the age of the population and the age of the in-migrants and out-migrants. Migration is affected by many factors such as employment opportunities inside and outside the basin, climate, natural resources and their development, educational opportunities, and social and political considerations.

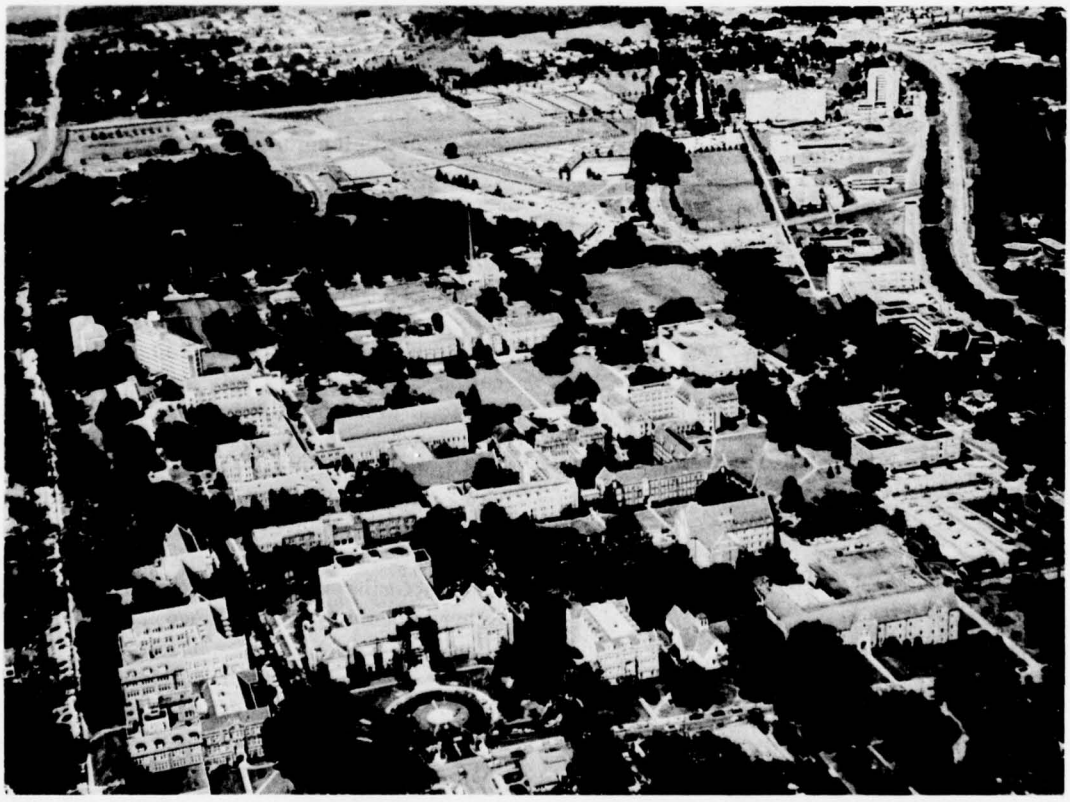

Figure 1.29 *Florida State University — Tallahassee.*

The relatively high concentration of the basin population in the younger and older age groups limits the labor force now available to participate in economic activity and production. However, as economic development occurs, the basin will have a proportionately larger group maturing into the labor force. As adequate employment opportunities are provided and out-migration is reduced, economic development can accelerate. However, the age distribution imposes a heavy economic burden on a relatively small working segment of the population which must continue to educate, train, govern, and sustain a relatively large segment of the population. If adequate employment opportunities are not available, large numbers of the better educated and better trained people will continue to be lost to competing areas. Conversely, if such opportunities are to be provided by economic development, an adequately educated and trained labor force must be made available. Continued improvement of the relatively low educational level of the basin will be required. At the present time, a concentrated effort is being made to prepare the young people for current and future employment needs.

The projections of future basin population used in this Appendix reflect the assumption that the factors that have led to heavy out-migration in the past will be overcome.

SECTION IV – BASIN ECONOMY

Existing Economic Development

The economy of the Ochlockonee basin is fairly typical of the coastal areas of the Southeast. In addition to producing large quantities of forest products, the basin also produces and processes a varied assortment of agricultural and manufactured products. The general characteristics of the economy are reflected by the 1960 distribution of the 77,700 basin employees.

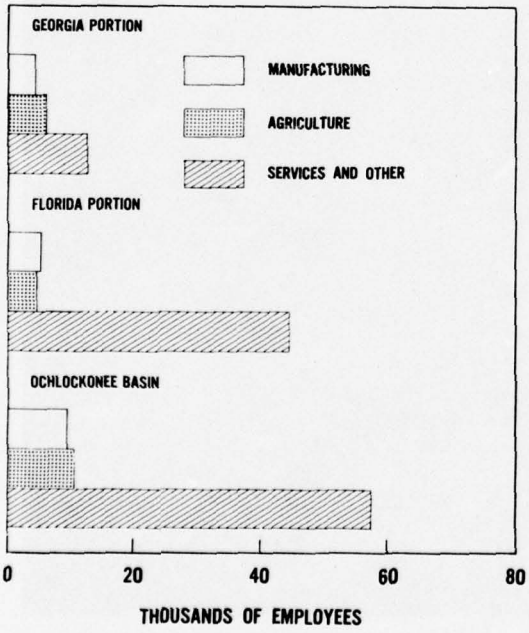

Figure 1.30 *Ochlockonee Basin Employment – 1960.*

There are significant differences in the nature and extent of economic activities in the Georgia and Florida portions of the basin. Although the Georgia area comprises about 25 percent of the total area, this portion of the basin has about 60 percent of the agricultural employment, more than 45 percent of the current manufacturing employment, and only about 22 percent of all nonagricultural-nonmanufacturing employment.

Nonagricultural-nonmanufacturing employment was over 58,000 in 1960. This amounted to 75 percent of total employment in the basin. By order of magnitude, the major categories were trade, government, services, construction, and mining. Although mining makes a minor contribution to the basin economy and the 500 mining employees represent a very small percentage of the total nonagricultural-nonmanufacturing employment, significant quantities of fuller's earth and lime rock are being mined. In 1959, quarried products, principally fuller's earth and limestone, were valued at over $9 million. About 12,000 people in the nonagricultural and nonmanufacturing category of employment were either self-employed or engaged in miscellaneous activities.

Most of the industrial development in the basin is related to lumber and wood products and food processing. A large part of the agricultural products that are processed in the basin is shipped outside both the basin and the Southeast River Basins area. Considerable amounts of

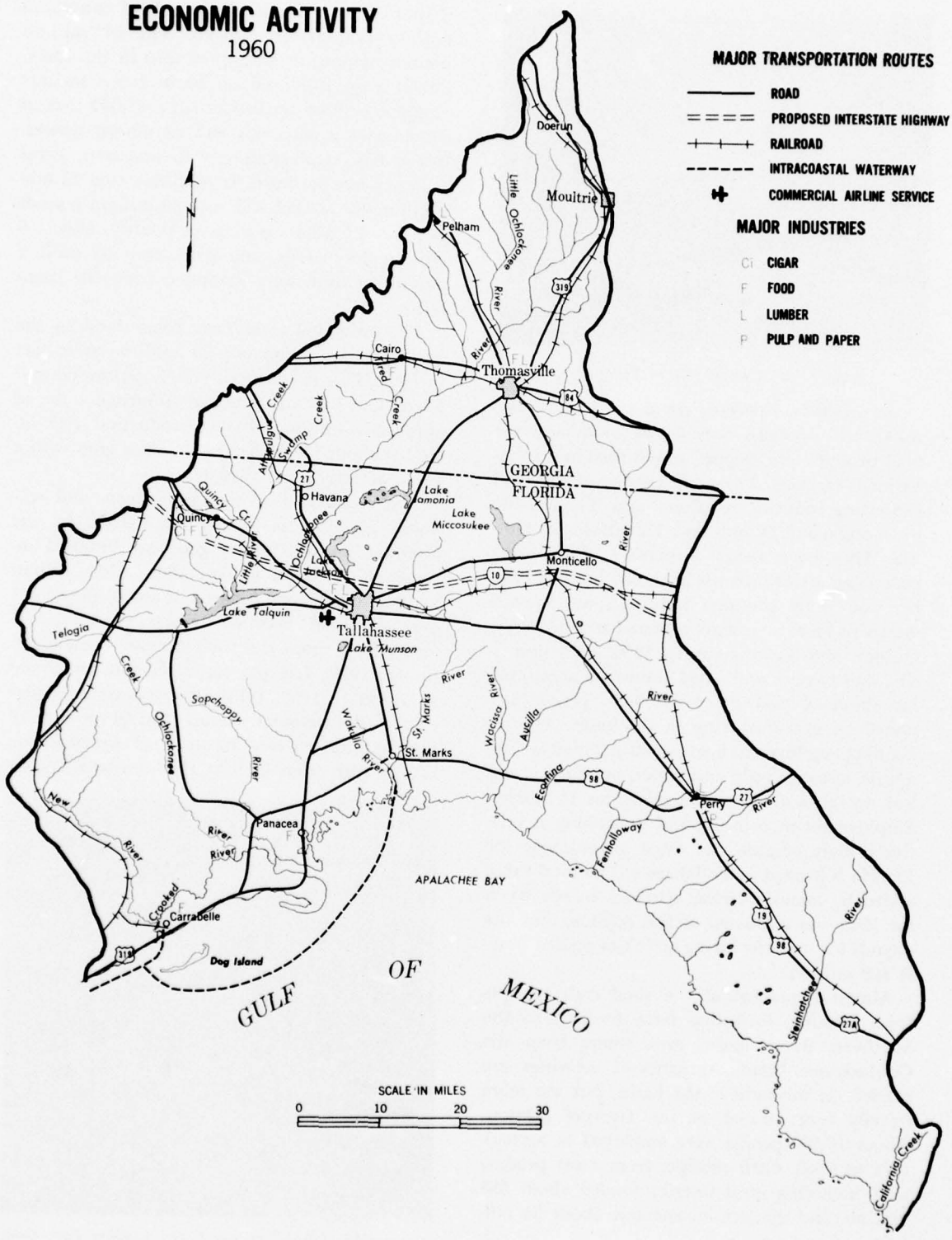
ECONOMIC ACTIVITY
1960
MAJOR TRANSPORTATION ROUTES
ROAD
PROPOSED INTERSTATE HIGHWAY
RAILROAD
INTRACOASTAL WATERWAY
COMMERCIAL AIRLINE SERVICE
MAJOR INDUSTRIES
CI CIGAR
F FOOD
L LUMBER
P PULP AND PAPER
N
Doerun
Moultrie
Pelham
Little Ochlocknee River
Cairo
Thomasville
Red Creek
Attapulgus Creek
Swamp Creek
GEORGIA
FLORIDA
Havana
Quincy
Quincy Cr.
Little River
Ochlocknee River
Lake Iamonia
Lake Miccosukee
Monticello
Lake Talquin
Tallahassee
Lake Munson
Telogia Creek
Sopchoppy River
Ochlockonee River
Wakulla River
St. Marks River
St. Marks
Wacissa River
Aucilla River
Econfina
Perry
Fenholloway River
New River
Panacea
Crooked River
Carrabelle
APALACHEE BAY
Dog Island
GULF OF MEXICO
Steinhatchee River
California Creek
SCALE IN MILES
0 10 20 30

Figure 1.31

Figure 1.32 *Lumber Mill in Tallahassee.*

forest products, especially naval stores and pulpwood, are processed outside the basin and the final products are shipped to national and international markets. The main centers of the food processing industry are Cairo and Thomasville in Georgia, and Quincy and Tallahassee in Florida. They have about 70 percent of the food processing establishments in the basin. The lumber and wood products industries are located mostly in Florida, and are centered around Perry, Quincy, and Tallahassee. In 1960, food processing and lumber and wood industries accounted for about 60 percent of the 9,100 people employed in manufacturing in the basin. The remaining employment is widely distributed among textile, apparel, pulp and paper, printing, chemical, metal, and other miscellaneous industries. Employment in printing and publishing is relatively high because the State government for Florida is located in Tallahassee. The total value added by manufacturing activities in the basin for 1960 was estimated at $66 million, and the payroll for manufacturing activities totaled nearly $28 million.

Almost 5 percent of the total cash receipts from farming, including farm forestry, in the Southeast River Basins area comes from the Ochlockonee basin. Agricultural activities are carried on throughout the basin, but are more heavily concentrated in the Georgia portion. About 10,500 people were employed in agriculture in 1960. Cash receipts from farm production, including farm forestry totaled about $38 million, and the net income was about $4 million.

In 1959, over 8 million pounds of cotton, 15 million pounds of tobacco, and 27 million pounds of peanuts were produced in the basin. Other crops produced on basin farms include almost 6 million bushels of corn, 53,000 tons of commercial truck crops and significant quantities of hay, small grains, fruits and nuts, sweet potatoes, and soybeans. In addition, over 23 million pounds of beef and veal, 30 million pounds of pork, 4 million pounds of poultry, almost 6 million dozen eggs, and more than 55 million pounds of milk were marketed from the basin farms.

The estimated yield from forest land in the basin was approximately 74 million cubic feet in 1959. This production, largely pulpwood and sawtimber, had an estimated stumpage value of about $7.4 million. Forest production also included about 15,000 barrels of crude gum with a value of more than $600,000.

The importance of the employment and economic activities is further emphasized by the total income which they generate. Personal income in the basin totaled about $300 million in 1960; this was an increase of about 40 percent over the total personal income of 1950, and about four times the total personal income of prewar 1939. The per capita income amounted to $1,444 in 1960. While this was only 65 percent of the national average and 91 percent of the Southeast River Basins area average, the rate of gain from 1939 to 1960 has been higher

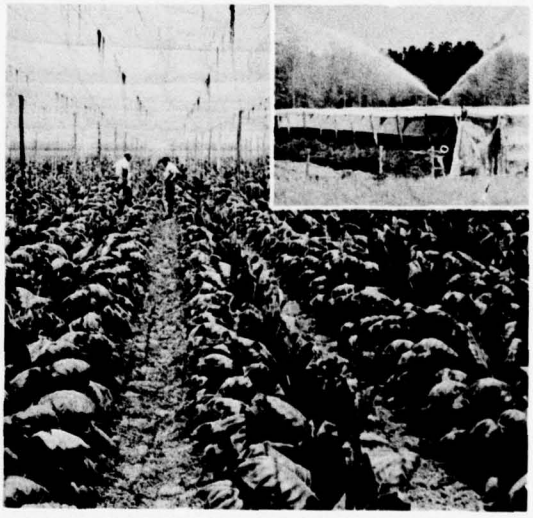

Figure 1.33 *Shade Tobacco Is the Leading Cash Crop.*

for the Ochlockonee basin than for the entire Southeast River Basins area. The rate of gain since 1950, however, has been somewhat less than for the Southeast River Basins area.

Although the level of economic development in the Ochlockonee basin is below the national average and below that of the Southeast River Basins area, the present basin economy with its abundant land and water resources is an excellent base upon which to continue and accelerate economic growth and development.

Future Economic Growth And Industrial Development

The economy of the Ochlockonee basin is related not only to that of the Southeast but is also dependent upon the economy of the Nation. National trends in population, per capita income, and employment will affect related trends in the basin.

The basic information used in establishing the goals for the basin is contained in an Economic Framework established for the Southeast River Basins. This framework, discussed in Part Three, Appendix 9, Economics, includes projections of the important elements which are expected to shape the economy of both the Nation and the area. These social and economic elements include population, gross national product, labor force and employment, income, and food and fiber requirements. The resource utilization and development needs are delineated to fit this social and economic environment and become the planning goals. The projections are not presented as precise predictions of future conditions, but are considered adequate as planning guides. To the extent that the projections may be too optimistic or conservative, the projected level of economic growth may be reached earlier or later, but the goals would not be greatly altered.

After the national projections had been made and production requirements established, similar projections were made for the Southeast River Basins area and each of the river basins. Needs were determined in relation to these national, regional, and basin projections, physical resources and the production requirements. Table 1.2 lists some of the more important Economic Framework figures for the Ochlockonee basin.

Future agricultural employment in the basin is expected to continue to decline to nearly one-half the 1960 employment, but with continued mechanization, consolidation, and improved production technology, agricultural production is expected to increase substantially. A portion of the projected national food and fiber production requirements was allocated to this basin on the basis of its resource potentials. Basin farmers will continue to concentrate on production for which there is adequate demand and for which the basin resources are best suited. Production

TABLE 1.2

Economic Indicators and Projections

Item	1960*	1975	2000
Population	207,800	258,700	347,900
Urban population	95,400	155,400	276,700
Per capita income (1960 dollar equivalent)	1,444	1,929	3,360
Employment (workers)	77,700	100,000	138,100
Cotton (thousand pounds)	8,500	15,600	15,000
Corn (thousand bushels)	5,900	6,200	9,600
Peanuts (thousand pounds)	27,900	52,200	81,900
Tobacco (thousand pounds)	15,300	24,500	36,900
Truck crops (thousand tons)	53	116	180
Meat (thousand pounds)	58,300	110,600	178,800
Milk (thousand pounds)	55,200	103,400	150,600
Timber (million cubic feet cut)	74	114	181
Farm production (gross value–$ million)	38	63	90
Net farm income ($ million)	4	21	32

* Agricultural products and net farm income are based on 1959 production.

EMPLOYMENT

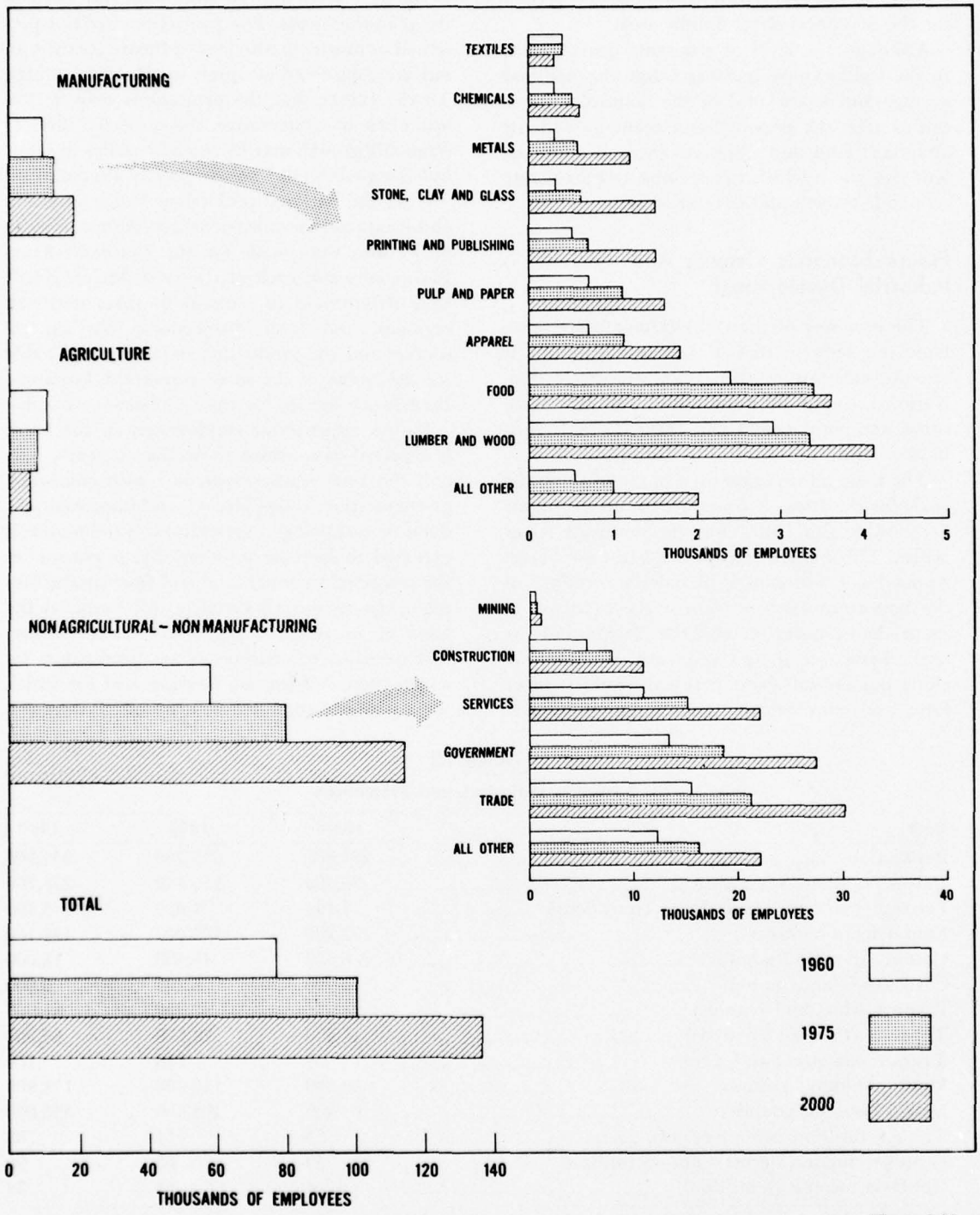

Figure 1.34

increases are expected to be most rapid in the higher income enterprises, such as livestock products, peanuts, tobacco, and commercial truck crops; and the net farm income is expected to increase quite rapidly.

Farming activities are more heavily concentrated in the Georgia portion of the basin. This area contains some of the most productive soils in the Southeast River Basins area. Although only about 25 percent of the basin is in Georgia, in 1959 nearly 70 percent of the corn acreage, about 90 percent of both the cotton and peanut acreages, and about two-thirds of all cropland harvested were in Georgia. Also, slightly more than one-half of the beef and veal in the basin and two-thirds of the milk were produced in Georgia on less than one-fourth of the pastureland, including woodland pasture.

A large part of the basin population growth will probably occur in or near the basin cities, particularly Tallahassee, Florida, and Thomasville, Georgia. Based on projected population increases, employment and income were developed for the years 1975 and 2000, assuming favorable resource-development conditions. Employment gain is expected to compare closely with population growth, and per capita income is expected to increase at a faster rate. Acceleration of favorable economic development, however, will require leadership and a concerted effort on the part of the local people in seeking ways to systematically develop and wisely use the resources in the basin.

Current employment patterns indicate the potentials and nature of the future economy of the basin. Growth and development in some economic activities are expected to far exceed that of other activities. Economic activities for which the basin has greater potential should develop more rapidly.

The rural farm population and agricultural employment in the Nation have been declining for years. The decline in the basin has been quite rapid in recent years. This trend is expected to continue, and significant numbers from the rural farm population will be available for and dependent on nonagricultural employment.

The basin is not a highly industrialized area, but the potential for continued expansion is good, and such expansion is needed to provide adequate employment opportunities for the growing population. In anticipation of this continued expansion, manufacturing employment is expected to double in the next 40 years.

As economic development proceeds, employment in nonagricultural-nonmanufacturing activities will continue to grow. The more rapid and larger increases are expected in the categories of trade, services, and government. In general, the rapid growth in these categories reflects the characteristics of a more highly developed economy. Expansion of the tourist trade would

TABLE 1.3

Economic Factors and Projections

Year and area	Population (1,000)	Increase over 1960 (percent)	Employment (1,000)	Increase over 1960 (percent)	Per capita income*	Increase over 1960 (percent)
1960						
United States	180,000	....	67,000	....	$2,222	....
Southeast River Basins	4,948	....	1,753	....	1,582	....
Ochlockonee basin	208	....	78	....	1,444	....
1975						
United States	235,000	31	89,000	33	3,012	36
Southeast River Basins	6,408	30	2,343	34	2,202	39
Ochlockonee basin	259	24	100	29	1,929	34
2000						
United States	380,000	111	148,000	121	4,733	113
Southeast River Basins	10,050	103	3,789	116	3,922	148
Ochlockonee basin	348	67	138	78	3,360	133

* 1960 dollar equivalent.

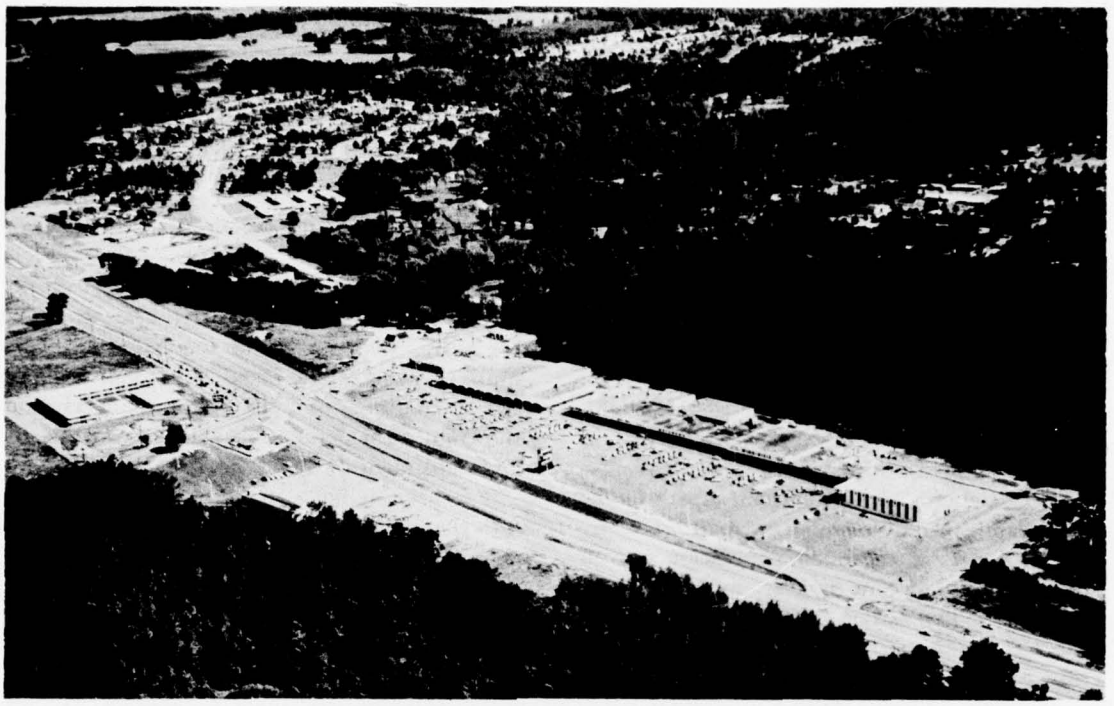

Figure 1.35 *Shopping Center — Tallahassee.*

particularly be needed. Government employment in this basin is expected to continue to increase because of the concentration of governmental activities in the State capital at Tallahassee.

Construction is an integral part of total economic growth, and employment is expected to parallel expansion of the total economy.

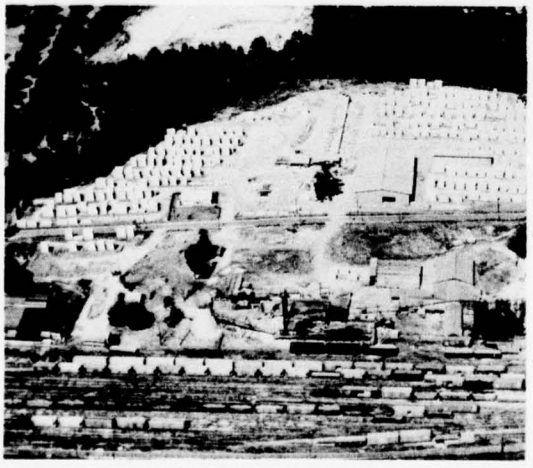

Figure 1.36 *Lumber and Wood Industry near Thomasville, Georgia.*

Employment in mining is somewhat limited and is expected to show only modest increases, unless some presently unforeseen development occurs.

Manufacturing is a prime factor in economic growth and development. The future economy of the Ochlockonee basin will be determined to a considerable extent by the nature of the manufacturing industry and its potential for growth and expansion.

Inasmuch as the basin is heavily forested, the lumber and wood industries are a significant part of the basin economy and employ more than 40 percent of all people engaged in manufacturing in the basin. Despite a recent general decline in employment in these industries, resulting from modernization and mechanization, further growth in employment in these industries is expected. The forest resources of the basin, particularly in the southern part of the basin, provide potential for expansion of industrial activities utilizing and processing these wood products.

The food-products industries have been growing rapidly throughout the Southeast. The Och-

lockonee basin has kept pace with this expansion and is expected to continue to contribute substantially to the national needs for processed foods. Technology in the food industries will very likely result in plant enlargement and increased output per employee. Nevertheless, because of the very favorable food processing potential, employment in food industries is projected to increase by about 50 percent in the next 40 years. Large increases in agricultural production in the basin will furnish the raw materials for expanded fruit, vegetable, poultry, and livestock processing industries.

Substantial employment increases in the apparel industries in the basin are based on the adaptability of the industries to rural areas and the growing popularity of the informal lines of apparel manufactured for the expanding local and national markets. The availability of a labor supply in the area and the market accessibility will aid continued growth.

The Ochlockonee basin, with its heavily forested areas and plentiful water supplies, provides an excellent environment for expected employment increases in the pulp and paper products industries.

Employment in the printing and publishing industries is expected to grow in conjunction with the rising level of economic development and the concentration of statewide educational and governmental units in Tallahassee.

In 1960, the textile industries accounted for slightly more than 4 percent of all manufacturing employment in the basin. By 1975, even in the expanding economy of the area, it is estimated that employment in textiles will account for only about 3 percent and by 2000 it will probably decrease to less than 2 percent of manufacturing employment. National and regional statistics also indicate a declining employment trend in the textile industries. In the past, the textile industries required a large amount of low-skill labor, but with increasing competition from synthetics and from foreign supplies, there has been a marked trend toward automation.

In terms of employment, the metal industries are the most important industries in the economy of the United States. In the Southeast and the Southeast River Basins area, metalworking is the third largest industry. Although only 3 percent of the manufacturing employees in the basin are now in the metalworking industries, an ample available labor force and the growing urban markets are expected to result in dou-

Figure 1.37 *Pulpmill near Perry, Florida.*

bling the number of employees by 1975 and doubling again by 2000. By the latter date, the estimated number of persons employed will be over 6 percent of the total manufacturing employment.

About 300 people are now employed in the chemical industries in the basin. While the chemical industries of the basin do not now employ as large a proportion of the total manufacturing labor force as they do in the Nation or the Southeast River Basins area, their potential in the basin forms the basis for increased employment in this category, based on the assumption that a normal chemical market will develop as the Southeast River Basins area becomes more industrialized.

Natural resources exist for further development in the stone, clay, and glass industries. These resources have barely been touched, and as the area develops, such industries are expected to undergo substantial growth.

As economic development and manufacturing expansion continue, miscellaneous manufacturing activities will expand also. About 600 people are now employed in such activities. This employment should more than triple in the next 40 years.

Economic growth and industrial expansion in the basin is urgently needed to afford adequate employment opportunities and raise the income and level of living for a growing population.

The problem of lagging economic growth in underdeveloped areas has been present for a long time and has been brought into sharper focus by the rapid transitions underway in our national economy. Although this problem has been given attention for many years, there is currently increased concern in all levels of government. The people of the Ochlockonee basin should avail themselves of every opportunity to obtain assistance in solving their problems of economic development.

Assistance is available under the Rural Development Program established in 1955, now renamed the Rural Areas Development Program, and the Area Redevelopment Act of 1961. These programs are directed toward achieving lasting improvement in depressed areas by creating new employment opportunities through the expansion of new and existing facilities and additional development of natural resources in the area.

The Small Business Administration, U. S. Department of Commerce, can make loans to finance the construction, conversion, or expansion of industrial plants and shipping centers for ownership or tenancy by small business concerns.

Also, there is increased opportunity under the Federal Housing Act to rehabilitate blighted residential, industrial, and commercial areas and to obtain technical assistance and planning aid in cities, towns, and counties.

Under provisions of the Job Training Act of 1962, trainable unemployed workers, members of farm families with low income and youths between 16 and 22 may be trained in those skills found to be in short supply.

The focal point in obtaining and utilizing assistance under these programs rests with local groups organized to effectively delineate the interests and objectives of the community and initiate action toward obtaining these objectives.

Social And Institutional Factors

The physical resources of the Ochlockonee basin are abundant; however, the most important resource in any area is its people. In the final analysis, the economic and social environment will mainly depend upon the desires and actions of the people themselves. The projections will materialize only to the extent that the people in the basin apply themselves in achieving adequate economic development. Also, along with the many advantages of the basin there are some disadvantages which must be surmounted to achieve desirable economic development and progress.

An important institutional problem in the basin which requires immediate consideration and improvement is the generally low level of education and training. This is particularly evident among the nonwhites who comprise a large part of the population. The problem is becoming more acute because economic advancement involves more mechanization, automation, complex record keeping, and high-speed output. The economic history of the United States demonstrates that economic growth, rate of increase in per capita income, and development proceed more rapidly in areas where all segments of the population are adequately equipped and trained

to contribute to and participate in the total economy. If opportunities for employment are developed in the basin to attract the youth now in school, as well as those that follow, and improvements in education and training are continued, the labor force of the basin would soon be more adequately prepared to meet the demands of modern industry.

The nature and stability of local governmental structure are important factors in economic development. They are particularly important in some parts of the Ochlockonee basin which have lost population and where local governmental services rest upon an extremely low tax base. In such areas, improving educational facilities and providing local governmental services are difficult. Fixed costs, such as provision and operation, maintenance, and replacements of the necessary buildings, consume an increasing percentage of available revenues. As population declines, per capita costs go up, and the area becomes less attractive for new enterprises. Even with careful management, the cost of public services continues to rise, often more rapidly than the tax base. A systematic program of tax equalization, however, would probably produce additional revenue in most areas without an increase in the tax rate.

In view of these circumstances, it is apparent that a means must be found to improve local services within the limits of available revenue. Cooperative efforts among neighboring towns or even counties may permit some appreciable savings. Actual consolidation, which is being considered in some areas, may prove to be advantageous. To save time and money, more efficient methods might be employed including the use of electronic equipment in fiscal record keeping. By whatever method, improvement in the pattern of local services appears to be required before some areas in the basin can improve local economy to the extent desired.

On the other hand, there are many areas in the basin where local services are excellent and being improved each day. These areas are attracting the new developments, and the disparity in the level of economic activity between communities continues to widen. Competition is wholesome and desirable, but joint effort for a common good does not necessarily limit competitive endeavor. Development of the physical resources of the basin, such as water, may not be economically feasible when considered only on the basis of each potential use individually. Nevertheless, when developments for all uses of the resource on a cooperative basis are combined under a common objective, each of the potential uses can often bear its proportionate share of the cost and return a profit. The same analytical procedures can be applied to nonphysical resources and similar results achieved.

The Wakulla County Development Authority in Florida has recently been established to promote new development of industrial, residential, and recreational facilities for a relatively small area. This and similar existing organizations are good, but there is also a great need for a coordinated effort in basinwide resource development. Some of the community leaders realize the need for such a basinwide, consolidated effort, and it is believed to be well within the capabilities of the people to put such a program into effect.

Rapid transitions in agriculture have resulted in a surplus of farm labor. This condition has caused some out-migration because an insufficient number of nonagricultural employment opportunities were available for the large numbers of people whose labor was not needed in agriculture. Efforts, however, are being made to establish new industries, trades, and services in the basin which tend to reduce out-migration. These new enterprises have improved the economies of the areas in which they are located, but the basin as a whole has barely been able to hold its own in terms of relative per capita income. The Ochlockonee basin, being a predominantly rural area, has the problem of having to mitigate losses in its economic structure before it can begin to make overall gains.

A trend now apparent in developing areas is rapid extension of urban functions into rural areas along transportation routes. In this urban sprawl, residences and industrial developments scatter around the landscape as farms once did. The problem of this urban sprawl could become acute in the Ochlockonee basin when the new interstate highway and other main highways that are expected to cross the basin are completed, or when other developments encroach on the streams, gulf coastal areas, lakes, and potential reservoir sites. If service facilities, such

as water supplies, sewers, schools, and roads, are to be limited to areas of reasonable concentration and thus reasonable cost, some type of rural zoning may be necessary. While zoning can be implemented on a local or county basis, a basin-wide zoning plan would probably provide a better means of obtaining the best possible uses of all areas in harmony with transportation routes, esthetic values, and other related factors. Without zoning, attempts to keep local service costs down could be extremely difficult.

While these and other problems do and will occur in the basin, they are not insurmountable. All of them are more than offset by the reserve of resources, including land, water, and people. Income potentials of the basin are not being realized under present conditions, but there are significant, and fairly obvious, opportunities for augmenting those productive resources that promise to raise the level of per capita income.

PART TWO – NEEDS AND OPPORTUNITIES

General

Existing facilities and programs, needs and opportunities, and means of meeting the needs of the Ochlockonee basin are discussed for each of the purposes considering that purpose only. The discussion of this Part does not attempt to indicate or analyze the interrelationships of each purpose with the other purposes.

Discussion of the existing programs and facilities generally provide inventory data and briefly outline programs in which Federal and State agencies participate. Private and other public interests participate and cooperate in many of the same activities and, in addition, carry out many programs and projects not listed.

Desirable resource development is limited by (1) the projected needs for each purpose geared to the number of people and the economic level of activity that are expected to prevail in the Ochlockonee basin as well as the rest of the Nation, and (2) the physical and financial abilities of the basin to produce the material goods that are needed. These limits are intended to insure that unneeded material goods will not be produced and developments beyond the capabilities of the basin will not be proposed.

In the discussion of means of meeting the projected needs, the measures that probably could be effectively used are based on the assumption that available resources could be used for each purpose without regard to competition from other purposes. This was done to demonstrate what is economically feasible in meeting the projected needs of each purpose and to permit treating all purposes on an equal basis when they are combined into a comprehensive plan.

There are no known reports that attempt to portray the entire resources and economy of the Ochlockonee basin. However, several reports on specific studies, mainly navigation, and some general information reports that are applicable to the area are available. Data in these reports were used as supplemental information wherever practicable. A summary of the more important studies are included in Appendix 12, Planning.

SECTION 1 – FLOOD CONTROL AND PREVENTION

General

There are extensive marsh and swamp areas, which have poor natural drainage, in the Florida portion of the basin. These areas have substantial flood-detention storage because of natural depressions that dot the area. However, major streams often overflow after storms, when the soils have been saturated by rains. While the Georgia portion of the basin has more rolling hills and fewer swamp areas, its floods are widespread. Major flood damage problems, however, are uncommon because the flood prone areas are wooded except for about 0.3 percent in cropland and pasture and about 0.3 percent in urban development. Streamflow records, including flood stages and volumes, are being collected at the 10 river gaging stations shown on Figure 2.1. The length of record at these stations varies from 12 to 36 years.

Periods of high runoff generally occur in the months of February through May and in September and October. Sixty-five percent of the floods have occurred during the period February through May and 18 percent in September and October. Other floods have been rather evenly distributed throughout the remaining months. The highest flood of record on the Ochlockonee River near Thomasville, Georgia, occurred on April 2, 1948, with a discharge of 7[illegible] cubic feet per second. The highest flood just below Lake Talquin, Florida, occurred on September 30, 1957, with a discharge of 55,000 cubic feet per second. This latter amount was based on a maximum daily discharge computed from change in storage in Lake Talquin during failure of earth embankment of Jackson Bluff Dam 3,000 feet upstream from the gage.

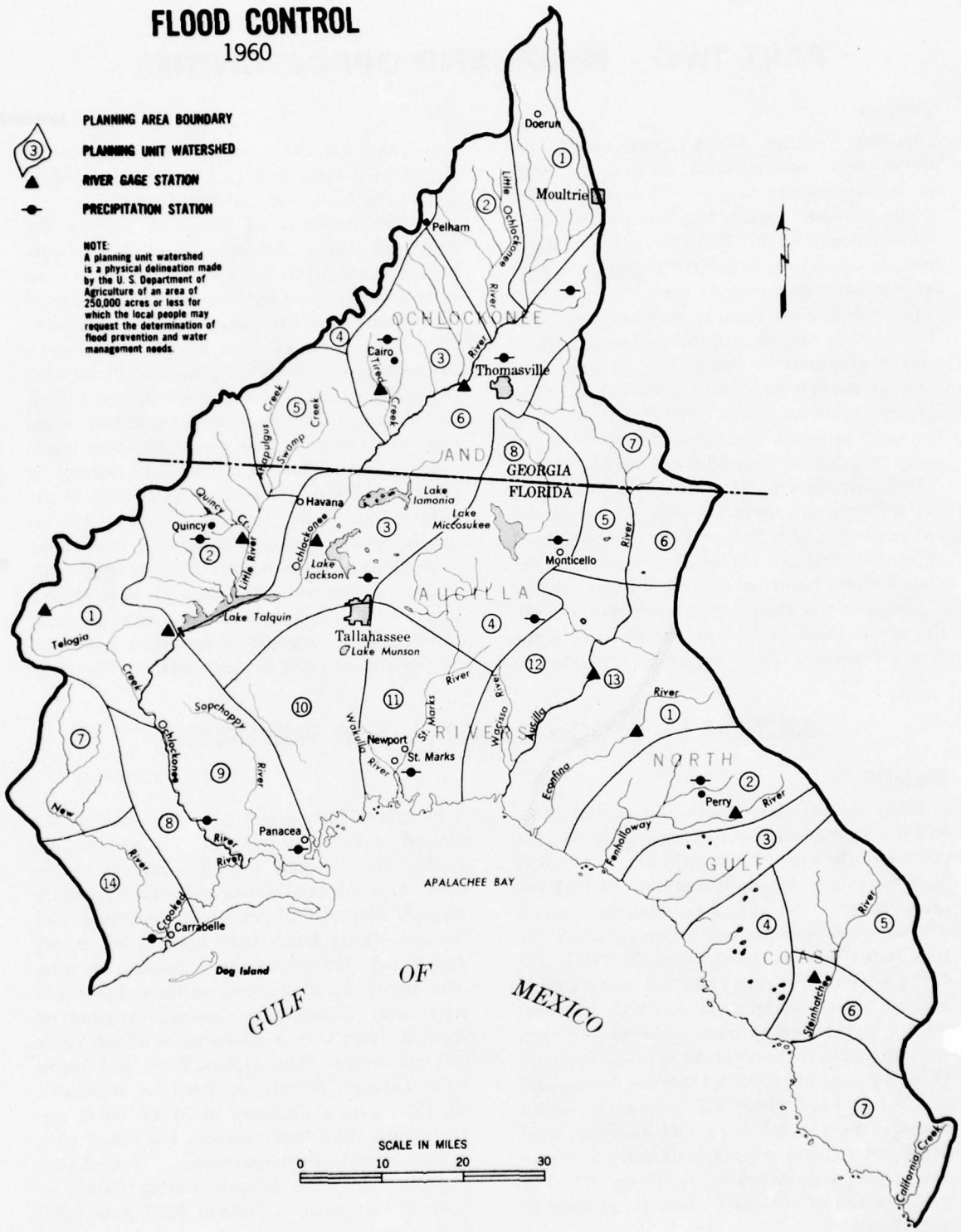
FLOOD CONTROL
1960
PLANNING AREA BOUNDARY
PLANNING UNIT WATERSHED
RIVER GAGE STATION
PRECIPITATION STATION
NOTE:
A planning unit watershed is a physical delineation made by the U. S. Department of Agriculture of an area of 250,000 acres or less for which the local people may request the determination of flood prevention and water management needs.
Doerun
Moultrie
Pelham
Little Ochlockonee River
OCHLOCKONEE
Cairo
Thomasville
Tired Creek
Attapulgus Creek
Swamp Creek
GEORGIA
FLORIDA
Lake Iamonia
Havana
Lake Miccosukee
Quincy
Quincy Cr.
Little River
Ochlockonee
Lake Jackson
Monticello
Lake Talquin
Tallahassee
Lake Munson
AUCILLA
Telogia Creek
Sopchoppy River
Newport
St. Marks
St. Marks RIVER
Wakulla River
Wacissa River
Aucilla River
Econfina River
Fenholloway River
Perry
NORTH GULF COAST
New River
Panacea
Crooked River
Carrabelle
APALACHEE BAY
Dog Island
GULF OF MEXICO
Steinhatchee River
California Creek
SCALE IN MILES
0 10 20 30

Figure 2.1

Urban flood problems have mostly affected the towns of St. Marks and Newport, Florida, on the St. Marks River and the town of Perry, Florida, in the Fenholloway River drainage.

Existing Facilities and Programs

There are no known existing Federal or State flood protection projects in the Ochlockonee basin. Ten stream gaging stations in the basin measure streamflows. Six of these stations are located in the Ochlockonee River drainage and the remaining stations are located on four separate rivers. The Soil Conservation Service has assisted local groups in constructing drainage facilities for seven areas ranging in size from slightly more than 500 to about 46,000 acres. These drainage facilities also provide some flood protection. No projects under the Watershed Protection and Flood Prevention Act, Public Law 566, 83d Congress, have been installed; however, the U. S. Department of Agriculture, through its regular conservation programs, has contributed to the improvement of hydrologic conditions and to the control of runoff and erosion in the basin.

The town of Perry, Florida, and the Buckeye Cellulose Corporation have worked jointly to develop a plan of improvement for alleviating the flood problems in the Fenholloway River. Under this plan, Perry increased the channel capacities and removed bridge restrictions on two tributary streams, and the Buckeye Cellulose Corporation has constructed a major drainage system to reclaim extensive areas for pine reproduction and has diverted part of the Fenholloway River headwaters into the Econfina River watershed.

Needs And Opportunities

Flood prevention studies made on the 29 upstream planning unit watersheds in the basin, as part of the Conservation Needs Inventory conducted by the U. S. Department of Agriculture, indicate that watershed projects totaling about 2.5 million acres need project action. Project action is that cooperative effort which is normally effected through formal organizations that have legal status under State law.

The towns of St. Marks, Newport, and Perry, Florida, need some type of urban flood control improvement. The existing and planned improvements for the Fenholloway River at Perry, Florida, are expected to aid in reducing the flood problem, however, the effectiveness of the plan has not been fully evaluated.

Areas subject to flood damages are somewhat extensive because of the generally flat topography, even though the depth of floodwater runoff is relatively low. These topographic conditions generally favor channel-type improvements for flood control.

Flood damages and land use in the flood plains have been determined for the main streams of the Steinhatchee, Fenholloway, Econfina, Aucilla, St. Marks, Sopchoppy, Ochlockonee, and New Rivers. Eighty-eight percent of the flood damages for the first four rivers listed occurred in the Fenholloway drainage area. It is estimated that, without flood control improvements or effective zoning, the annual flood damages would nearly double in the next 50 years. This estimate, however, did not consider planned flood control and drainage improvements at Perry, Florida, which would reduce, considerably, future flood damages. The urban area in the flood plains of these four rivers is expected to increase by about 100 acres in the next 50 years. The cropland is expected to decrease by 50 acres and pasture to increase by 150 acres. Unless flood plain management or zoning modifies projected estimates of flood plain use, most of the changes are expected to occur in the Fenholloway drainage area.

In the rest of the basin, which includes the drainage areas of the St. Marks, Sopchoppy, New, and Ochlockonee Rivers, flood plain acreages for cropland and pasture total 200 acres for the Ochlockonee drainage area, 25 for the Sopchoppy drainage area, and none for the remaining two. Flood damages in this four-river area have been minor, except those to the towns of St. Marks and Newport, Florida, and to roads and bridges.

Under existing conditions flood damages and potential benefits from reduction of flood damages to pasture, crops, public and farm roads and bridges, and farm buildings in upstream tributaries of the basin are minor.

A study of the Georgia portion of the Ochlockonee River below the mouth of the Little Ochlockonee River indicates that about 15,000 acres, nearly half of the bottom lands, are suitable for general farming and truck crops, provided flood hazards can be sufficiently reduced.

Topographic conditions in the drainage areas of the Steinhatchee, Fenholloway, Econfina, and Aucilla Rivers favor combined channel-type projects on upstream watersheds for flood control and drainage. Flood protection and drainage on these watersheds would be needed to permit more intensive utilization of land.

Means of Meeting the Needs

Additional flood forecast points for the St. Marks, Fenholloway, and Ochlockonee Rivers could help reduce flood damages in the basin and a levee system could provide protection for the town of St. Marks.

A detailed hydrologic analysis of the present plan for drainage and flood protection by the Buckeye Cellulose Corporation and by the local people at Perry, Florida, should be made before considering any additional plans for flood protection on the Fenholloway River.

Flood protection could permit better utilization of about 15,000 acres of flood plain lands along the Ochlockonee River between Thomasville, Georgia, and the Georgia-Florida State line that are suitable for crop production or general farming. Installation of channel-type project works in upstream watersheds would provide direct benefits from flood prevention and drainage. In addition, land-use adjustments according to land capabilities which are necessary to conserve and more effectively utilize and develop the land and water resources of the basin would be encouraged.

Cooperation between the local people and State representatives is needed, particularly in the towns of St. Marks, Newport, and Perry, Florida, to assure that the principles of flood plain management are given due recognition in regulating future development and redevelopment of these areas.

SECTION II – WATER SUPPLIES

General

The Ochlockonee basin has an abundance of good quality water which can provide adequate water supplies for the projected foreseeable development of the basin.

Beneath the basin are hydrologically connected limestone beds which form productive aquifers. Most of the 1960 water requirements in the basin were obtained from this source. The ground water is usually of uniformly good quality; however, in certain areas iron content and/or dissolved solids exceed the recommended drinking water standards, and treatment has been or should be provided to improve its potability. The quality of the surface water in the basin is also consistently suitable for municipal and industrial use. It provides two-thirds of the supply for one municipality and is currently used very sparingly for industrial purposes.

The development and protection of safe adequate water supplies necessary for the growth of the basin are important parts of the broad program of public health. The treatment, chlorination, and continuous surveillance of the public water supplies by the health departments are required to safeguard the water quality and public health. Assistance in developing water supplies for groups of rural homes is available under the Farmers Home Administration program and municipalities may obtain assistance from the Housing and Home Finance Agency.

Existing Facilities and Programs

Domestic Water Supplies

Domestic water supplies are defined as private supplies designed primarily to serve a single rural family. In 1960, an estimated 18,000 domestic water supplies served a rural population of about 84,000 people. An estimated 4 percent of the rural population does not have private supplies; they obtain water from neighboring wells. In 1960, the rural residents served by domestic systems used an average of about 50 gallons per capita per day or a total of about 4.2 million gallons per day. In addition, farms withdrew an average of 6,200 acre-feet per year for irrigation and approximately 3.3 million gallons a day for livestock. Water from domestic supplies, used for all purposes, totaled about 14,600 acre-feet in 1960 or about 20 percent of the total water used in the basin.

Based on a limited survey, none of the domestic supplies reported shortages; only about one-

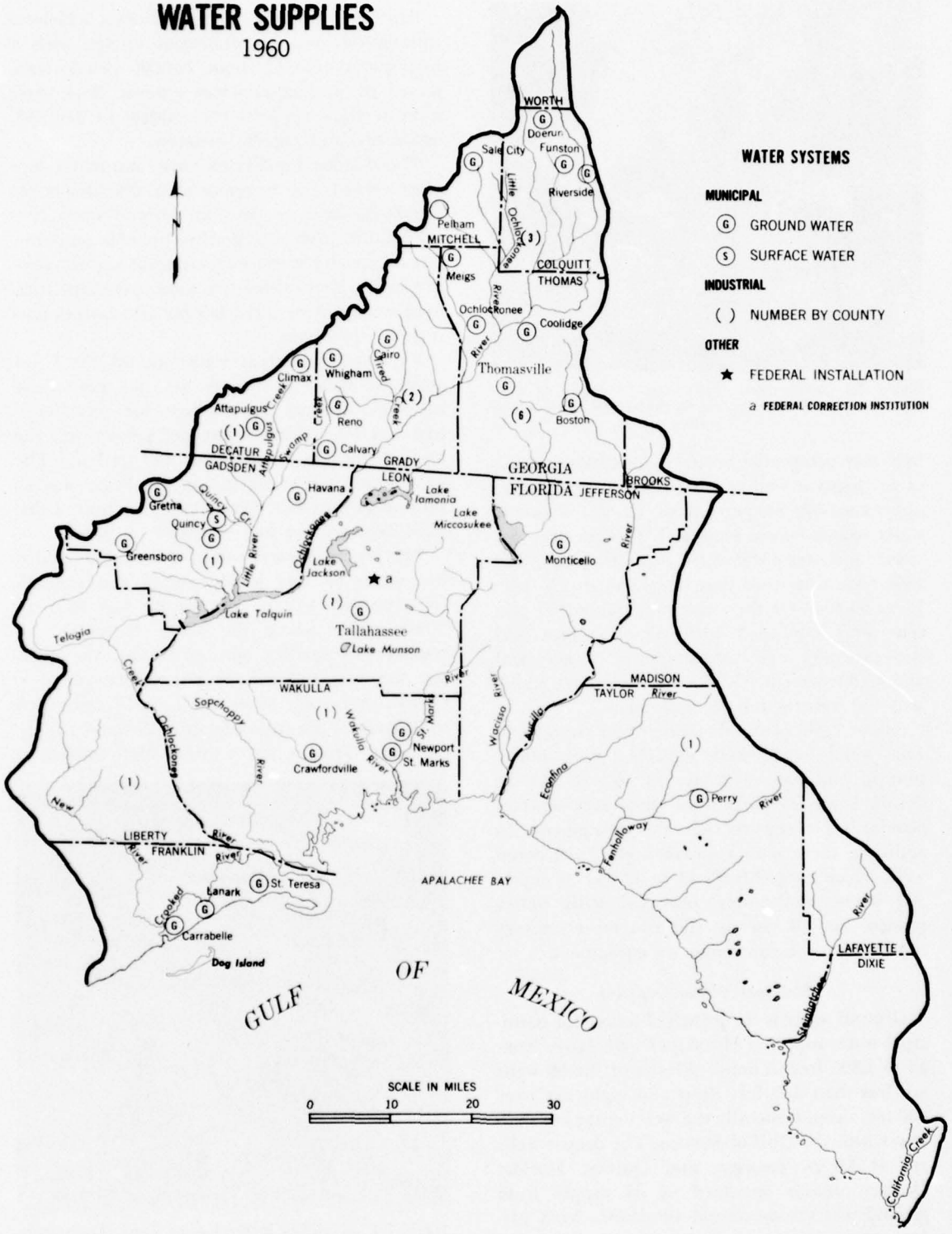
WATER SUPPLIES
1960
WATER SYSTEMS
MUNICIPAL
G GROUND WATER
S SURFACE WATER
INDUSTRIAL
( ) NUMBER BY COUNTY
OTHER
★ FEDERAL INSTALLATION
a FEDERAL CORRECTION INSTITUTION
WORTH
Doerun
Sale City
Funston
Riverside
Pelham
MITCHELL
COLQUITT
THOMAS
Meigs
Ochlocknee River
Little Ochlocknee River
Coolidge
Thomasville
Cairo
Climax
Whigham
Attapulgus Creek
Attapulgus
Reno
Boston
DECATUR
GADSDEN
Attapulgus Swamp
Calvary
GRADY
LEON
GEORGIA
FLORIDA
JEFFERSON
BROOKS
Havana
Lake Iamonia
Lake Miccosukee
Gretna
Quincy
Quincy Cr.
Greensboro
Little River
Ochlocknee River
Monticello
Lake Jackson
a
Lake Talquin
Tallahassee
Lake Munson
Telogia Creek
WAKULLA
MADISON
TAYLOR
Aucilla River
Wacissa River
St. Marks River
Sopchoppy
Wakulla River
Newport
St. Marks
Crawfordville
Ochlocknee River
New River
LIBERTY
FRANKLIN
Perry
Econfina River
Fenholloway River
APALACHEE BAY
Lanark
St. Teresa
Crooked River
Carrabelle
Dog Island
LAFAYETTE
DIXIE
Steinhatchee River
California Creek
GULF OF MEXICO
SCALE IN MILES
0 10 20 30

Figure 2.2

Figure 2.3 *Substandard Wells Require Improved Construction with Proper Sealing to Protect Domestic Water Supplies.*

half met acceptable sanitary standards because of inadequate well construction or equipment; approximately 83 percent of all the domestic water supplies were equipped with pressure systems; and over 8,000 of the domestic supplies in 1960 were dug wells that ranged in depth from 18 to 63 feet. Of these dug wells about 70 percent were equipped with power pumps and the remainder used hand pumps or buckets, and almost 90 percent did not meet sanitary standards for construction or equipment.

About 7,000 of the domestic water supplies in 1960 were drilled wells equipped with power pumps, and ranged from 145 to 470 feet in depth. Some 93 percent of these met sanitary standards for construction and equipment. In addition, there were approximately 2,500 bored wells which ranged from 48 to 60 feet in depth. All bored wells were provided with power pumps, but 60 percent did not meet sanitary standards for construction or equipment.

Municipal Water Supplies

Ground water is the principal source for municipal water supplies. Municipal wells range from 65 to 1,395 feet in depth. Eleven of the 86 wells are less than 200 feet deep and eight are over 800 feet deep. Generally the well depths are shallower near the Gulf of Mexico. The deeper wells are at Meigs, Georgia, and Quincy, Florida. Quincy obtains one-third of its supply from ground water sources and two-thirds from surface water.

In 1960, municipalities, subdivisions, a Federal installation, and an industrial village with a total population of about 124,000 people were served by municipal water systems. Basic data indicate these supplies vary widely in demand, treatment, and percent metered.

The dissolved solids of some municipal supplies exceed the recommended drinking-water standards. In some cases, the ground water contains sulfur and iron in objectionable amounts. Treatment to remove such elements and improve potability is provided by some municipalities. Similar treatment is needed for all supplies having such problems.

Reported municipal water use in the basin averaged about 98 gallons per day per capita in 1960, whereas the average for the Southeast was 116 gallons a day per person and the average for the Nation was 147 gallons. The total municipal water use in the basin was 12 million gallons each day. About 9 percent of this total demand was for industrial purposes.

The reported water use in Tallahassee, which has water of very good quality and potability, was 105 gallons per capita per day. In Thomasville, where the water is treated to improve its quality and potability, the average use was 100 gallons per capita per day. Cairo's per capita water use in 1960 amounted to 78 gallons per day. The ground water supply of Cairo, Georgia, has a rather high concentra-

Figure 2.4 *Municipal Water Storage Tank, Thomasville, Georgia.*

TABLE 2.1

Municipal Water Supplies—1960

Municipality	Population served	Percent metered	Treatment[1]	Design capacity[2] (m.g.d.)	Average demand (m.g.d.)
Florida					
Carrabelle	950	100	A, S, D	0.504	0.072
Crawfordville	90	0	None	0.086	0.010
Greensboro	550	90	D	0.252	0.050
Gretna	440	92	None	0.396	0.020
Havana	2,490	5	D	0.720	0.160
Lanark	800	9	D	1.728	0.064
Monticello	2,680	70	None	2.160	0.300
Newport	75	0	None	0.900	0.020
Perry	7,480	100	A, S, F, D	1.500	0.626
Quincy	9,070	100	P, D	1.500	0.718
St. Marks	100	0	None	0.100	0.006
St. Teresa	250	0	None	0.070	0.016
Tallahassee	57,000	100	D	25.200	6.000
Tallahassee subdivisions	2,800	--	None	2.586	0.237
Federal Correction Institution	870	0	D	1.100	0.200
Georgia					
Attapulgus	670	67	None	0.216	0.030
Boston	1,020	50	D	1.080	0.070
Cairo	7,620	100	A, D	--	0.591
Calvary	75	0	None	0.072	0.003
Climax	330	0	D	0.144	0.015
Coolidge	695	90	None	--	0.047
Doerun	1,070	90	D	0.645	0.060
Funston	290	0	None	--	0.014
Meigs	1,250	90	D	0.792	0.063
Ochlockonee	600	75	D	--	0.020
Pelham	4,630	75	D	2.100	0.680
Reno	90	80	None	0.140	0.003
Riverside	325	0	D	0.664	0.025
Sale City	250	80	None	--	0.034
Thomasville	18,510	100	H, D, V	1.500	1.840
Wigham	510	90	D	0.288	0.023
Industrial Village	100	0	None	0.104	0.005
Total	123,680				12.022

NOTES: [1] A = aeration; S = sedimentation; D = disinfection; F = filtration; P = purification; H = softening; V = fluoride adjustment.
[2] Design capacity of treatment plant or pumps in million gallons per day.

tion of dissolved solids. Two of Cairo's newer wells have been abandoned because of the high sulfur content and because of sand problems. The city has considered developing a surface water supply. Perry, Florida, which partially treats its water supply to improve its potability, had a per capita water use in 1960 of 84 gallons a day.

Many privately owned wells serve municipal and industrial needs throughout the basin. These wells augment other supplies, and consequently, the above per capita values are not a good indicator of the 1960 municipal water use in the basin. No estimate has been made of the number of semipublic water supplies, but a large number of these supplies serve motels, State parks, public work camps, and resort areas.

The surface waters in the basin are now being used to provide only part of the supply for the town of Quincy, Florida. However, in the future, Cairo, Georgia, and possibly other municipalities may supplement or replace existing ground water supplies with surface water supplies. The quality of the surface water, with a minimum of treatment, is consistently suitable for most uses.

The quality of all municipal supplies is

checked by the State health departments. Seventeen municipal supplies are chlorinated routinely for added protection. Chlorination of all municipal supplies is desirable provided sulfur is first removed by aeration.

Industrial Water Supplies

A few of the industrial establishments in or near municipal areas obtain water supplies from municipal systems. Others have developed private wells to supply their needs.

Water used for drinking, processing, and in the boilers of 17 industrial plants is obtained exclusively from ground water sources. Well water is also used by one industry for cooling purposes. Two industrial plants use surface water for cooling purposes, and one plant has a closed recirculating system. Water requirements in 1960 for industrial purposes totaled about 45 million gallons per day. About 2 percent of this total was furnished by municipalities. These are primarily nonconsumptive uses.

Needs and Opportunities

Domestic Water Supplies

Many wells are improperly sealed, uncovered, without pumps, or have pumps which are not self-priming. Poor construction or improper equipment permits contamination of the supply. All wells should be properly cased, sealed, and equipped with a satisfactory pump. Pressure systems, comparable to or better than those currently provided on about 83 percent of the domestic water supplies, should be installed on the remaining wells to provide benefits from an adequate pressurized water supply.

Many of the domestic supplies are subject to possible bacteriological pollution because of improper construction or improper handling of the water. Surface runoff entering unprotected wells after heavy rains results in turbid water. Improved construction and proper sealing of the wells will provide protection against both contamination and turbidity.

There are some reports of objectionable amounts of sulfides, iron, and hardness in the water. Removing these undesirable characteristics is practicable but the expense involved may be more than the individual owner desires to pay. Unless the quality is seriously impaired, the water users usually adapt themselves rather quickly to the available supply and give little consideration to improvement of its quality.

The average per capita domestic water use is expected to increase from 50 gallons per day in 1960 to 70 gallons a day by 1975. With the population projection of 84,700 by 1975, the total daily use would be 6 million gallons. By the year 2000, the per capita use is expected to increase to 100 gallons per day, but only 50,000 people will

TABLE 2.2

Industrial Water Supplies—1960

Industry		Water use							
Type	No. of plants	Drinking, process, and boiler[1]				Cooling			
		Source[2]		Treatment[3]	Average demand (m.g.d.)[4]	Source[2]		Treatment[3]	Average demand (m.g.d.)[4]
		No.	Type			No.	Type		
Chemical	2	1	W	None	0.051		--	--	--
		1	W	C, D	35.940	1	R	None	[5](13.000)
Food	7	1	M	None	0.086		--	--	--
		2	M&W		0.975		--	--	--
		4	W		0.828		--	--	--
Mining	4	2	W	None	0.001	2	S	None	2.600
		1	W	None	0.001	1	W	None	0.021
		1	W	None	3.606		--	--	--
Textile	1	1	W	D	0.138		--	--	--
Wood	1	1	W	None	0.032		--	--	--
Miscellaneous	2	1	W	H	0.035				
		1	W	None	0.013	1	S	H	0.012

NOTES: [1] All boiler water is treated.
[2] Source: W = private well; M = municipal; R = recirculated; S = surface.
[3] Treatment: C = lime and activated silica; D = disinfection; H = softening.
[4] Million gallons per day.
[5] Not included in total use.

be served by domestic supplies; the total use will amount to 5 million gallons per day.

Municipal Water Supplies

Estimated water supply requirements, based on population projections, total 26 million gallons a day for 1975, and 60 million gallons per day for 2000. Municipal water systems are expected to serve 174,000 people in 1975 and 298,000 people by the year 2000. Requirements for the year 1975 were based on an estimated water demand of 150 gallons per capita per day. Water use by the year 2000 was estimated to total 200 gallons a day per capita.

The ground water resources in the basin, except in some coastal areas, are adequate in quantity for both existing and future water needs. In a few areas the quality is somewhat impaired by the dissolved solid content. Overdevelopment of the aquifers near the coastline could create problems of salt-water intrusion. Development of surface water supplies may be necessary as an alternative measure when the quality of the ground water is questionable or when the hazards of salt-water intrusion exist.

Several municipalities have reported the need for improvements to their water supply systems to insure an adequate supply for estimated population growth.

Studies showed that three new municipal supply systems were needed in 1960. Prior to 1975, many of the municipal water systems are expected to need an expanded or improved source of water, additional treatment, more elevated storage capacity, and extensions to their distribution systems. Similar improvements will be needed between 1975 and 2000 if the quality and quantity of available water are to keep pace with the demand.

The projected needs will continue to be met predominantly from ground water sources, however, prior to year 2000, new surface water supplies may be developed and more water for reserve purposes will need to be stored for the existing surface water supply.

Industrial Water Supplies

Most of the basin industries are expected to expand and new industries will be added. Estimated daily water requirements will be about 85 million gallons by 1975 and 154 million gallons by 2000. The major source of supply will continue to be the ground water aquifers, but the use of surface water is expected to increase.

Means of Meeting the Needs

Domestic Water Supplies

Wells properly sealed and each equipped with a pressure system are needed on all domestic water supplies to satisfactorily meet sanitary requirements. To achieve this need by 1975 would require construction of 600 new wells, sealing about 9,000 wells, and installing approximately 3,000 pressure systems. If the 1975 goal for improving domestic water supplies is met, a continuing maintenance and rehabilitation program will be needed to provide adequate water for an estimated 11,100 domestic supplies in the year 2000.

TABLE 2.3

Municipal Water Supply Needs[1]

Period	State	Population served at end of period	Number of places	Number of places requiring new or enlarged		
				Source or treatment	Elevated storage	Distribution system
1960 to 1975	Florida	124,000	17	10	14	14
	Georgia	50,000	16	8	6	11
	Total	174,000	33	18	20	25
1975 to 2000[2]	Florida	220,000	17	3	4	14
	Georgia	78,000	14	---	2	13
	Total	298,000	31	3	6	27

NOTES: [1] Includes Federal and State installations and the people they serve.
[2] Places shown for this period may also be included in the 1960-75 period.

Municipal Water Supplies

Municipalities must study, plan, and provide for their own needs. Technical assistance can be obtained from Federal, State, and private sources. Needs can be met by using readily available equipment and following standard water works practices. There are no apparent unusual problems in supply or treatment.

Industrial Water Supplies

Expansion of the facilities to provide adequate water supplies for the normal growth of existing industries and the development of new industries will be required prior to 2000. Needed facilities will include new sources, additional treatment, increased storage, and improved water handling equipment.

SECTION III – NAVIGATION

General

Commercial and recreational navigation facilities are confined principally to coastal locations and the lower reaches of streams. When the authorized Cross-Florida Barge Canal is completed, the only major unprotected part of the entire Intracoastal Waterway system will be between Carrabelle and Tampa Bay, Florida.

Existing Facilities and Programs

Existing navigation facilities include the reach of the Gulf Intracoastal Waterway from the western boundary of the basin eastward to the terminus of the protected channel near Carrabelle, Florida, and a number of shallow-draft harbors or side channels tributary to the waterway or to the coast. All navigation traffic between Carrabelle and the eastern boundary of the basin must travel in unprotected open water.

The Gulf Intracoastal Waterway, which provides a project depth of 12 feet and a width of 125 feet, follows a protected route as far east as Carrabelle. From Carrabelle to St. Marks River the present barge route follows the open waters of the Gulf and Apalachee Bay. Comparatively short sections of this latter reach have present controlling depths of less than 12 feet deep. Congress has authorized its completion to project dimensions via Crooked River and Ochlockonee Bay, however, studies leading to construction have not been initiated. From St. Marks River southward to Anclote River near Tampa Bay, vessels use the open Gulf.

Carrabelle Harbor was at one time a deepwater port. A channel 27 feet deep and 200 feet wide to the town and a 500-foot square turning basin were completed in 1939. A channel 8 feet deep and 60 feet wide from the turning basin to a point 1,200 feet upstream was completed in 1951. A survey to determine if an extension further upstream is justified is under consideration by the Corps of Engineers. Coast charts indicate that the controlling depth from the Gulf to Carrabelle is now 14 feet and that the controlling width is 100 feet.

Panacea Harbor lies east and north of Ochlockonee Bay at the head of King Bay. A channel 8 feet deep and 100 feet wide to improve the entrance to Panacea for small commercial fishing vessels and recreation craft has been approved under provisions of Section 107 of the River and Harbor Act of 1960. Completion of construction is scheduled for January 1963.

A channel 10 feet deep and 100 feet wide from St. Marks, Florida, on the St. Marks River to Apalachee Bay was provided in 1947 and included a 200-foot square turning basin at St. Marks. Channel clearing from the turning basin upstream to Newport, Florida, was also completed. The natural depth between St. Marks and Newport is 7.5 feet. A modification was authorized in 1960 to provide for a 12-foot deep, 125-foot wide channel from Apalachee Bay to St. Marks. This included enlargement of the turning basin to 300 feet square and 12 feet deep, and extension of a 12-foot by 100-foot channel to a point 3,400 feet upstream. Estimated completion date is January 1964. Seven establishments, including the wharves for the Tallahassee steamplant, have terminal facilities at the town of St. Marks. Other facilities provide for servicing or storing recreational craft. Public boat launching ramps are available for trailer-transported small craft. A study to determine the merits of a proposed barge canal between the St. Marks River and Tallahassee is under con-

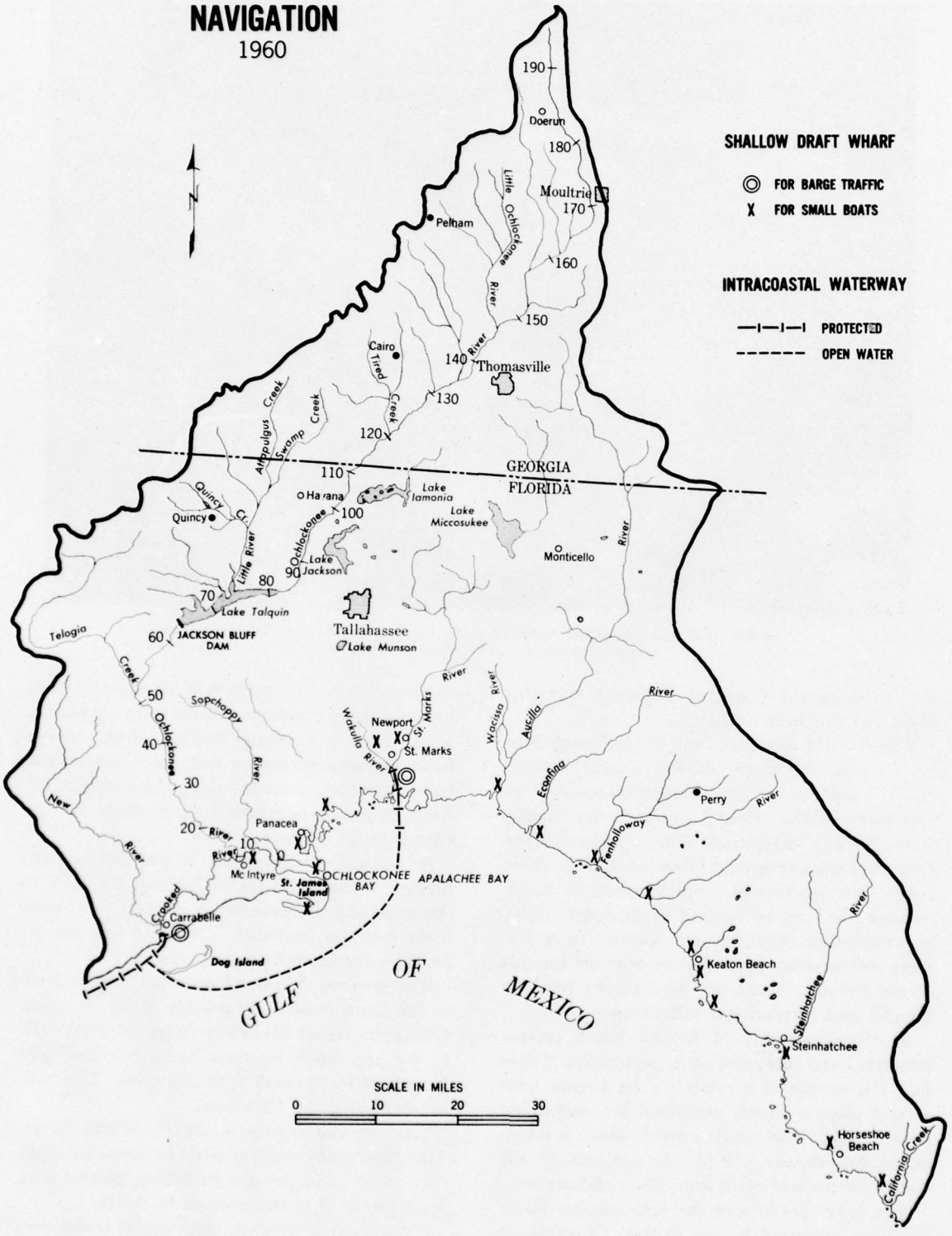
NAVIGATION
1960
SHALLOW DRAFT WHARF
FOR BARGE TRAFFIC
FOR SMALL BOATS
INTRACOASTAL WATERWAY
PROTECTED
OPEN WATER
N
190
Doerun
180
Moultrie
170
Pelham
160
150
Cairo
140
Thomasville
130
120
110
GEORGIA
FLORIDA
Quincy
100
Lake Iamonia
Lake Miccosukee
Monticello
90
80
70
Lake Talquin
Tallahassee
Lake Munson
60
JACKSON BLUFF DAM
Telogia
50
Sopchoppy
40
30
20
10
Newport
St. Marks
Panacea
Mc Intyre
St. James Island
OCHLOCKONEE BAY
APALACHEE BAY
Carrabelle
Dog Island
GULF OF MEXICO
Perry
Keaton Beach
Steinhatchee
Horseshoe Beach
SCALE IN MILES
0 10 20 30

Figure 2.5

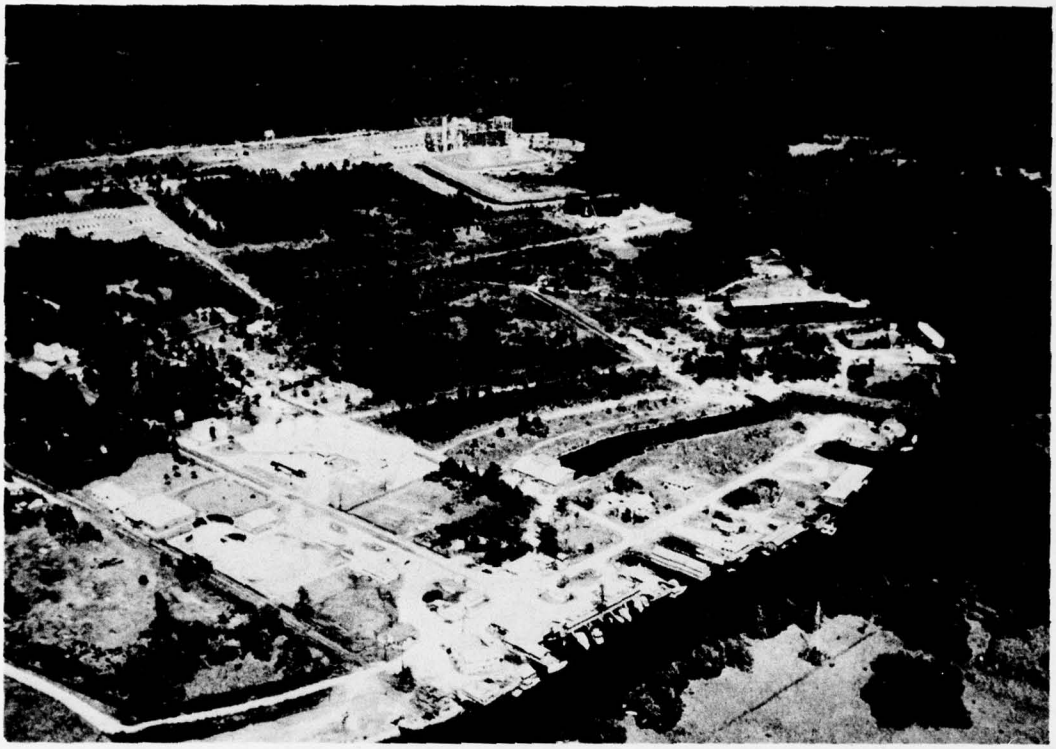

Figure 2.6 *Enlarged Navigation Facilities at St. Marks, Florida, Would Provide Many Opportunities for Additional Development.*

sideration by the Corps of Engineers but this study has not been initiated.

The Aucilla, Econfina, and Fenholloway Rivers are relatively short, shallow coastal streams. In 1949, the Federal Government removed snags and rocks in the lower 2 miles of the Aucilla River to aid navigation. This constitutes the only public improvement provided in these three rivers. No permanent improvement or maintenance has been authorized by Congress. Existing navigation facilities are limited to a few piers and landings located at or near the mouths of the streams. These are used chiefly by commercial and recreational fishermen.

At the community of Keaton Beach private interests have excavated short waterways. These join the mouth of a small coastal stream with several interior canals excavated for real estate development. The canals provide about a 6-foot depth, but depths of 2 feet or less exist at the stream mouth and in the immediate offshore area.

The lower portion of the Steinhatchee River has been improved by the Federal Government to provide 6-foot navigation to the town of Steinhatchee, about 2 miles upstream from the mouth. Facilities for servicing shallow draft sponge boats, commercial fishing craft, and recreational boats have been provided along the town's waterfront. A public boat-launching ramp is also included in the facilities.

At Horseshoe Cove, the Federal Government dredged a channel 6 feet deep from the Gulf to the town of Horseshoe Beach in 1959. A turning basin was also provided. The town has limited facilities for servicing small craft.

The greatest volume of waterborne commerce in the basin is carried by barge along the open Gulf Intracoastal Waterway route. In 1960, traffic for the reach between Apalachee Bay and Panama City totaled 1,036,446 tons. This was nearly double the 1954 total.

Next in importance is the St. Marks River. The 1960 traffic totaled 410,212 tons. In addition, some 7,052 persons in fishing parties were accommodated at the town of St. Marks.

Navigation other than commercial traffic con-

TABLE 2.4

Waterborne Commerce – 1960
(short tons)

Port or waterway	Ton	Principal commodity	
		Type	Percent of total tonnage
Gulf Intracoastal Waterway	1,036,446	Petroleum products	68
St. Marks River	410,212	Petroleum products	93
Carrabelle	9,515	Flour	72
Steinhatchee River entrance	523	Fish and ice packing	99
Horseshoe Cove	609	Fish and ice packing	100

sists of sport fishing parties, recreational boating, and minor commercial fishing operations. This traffic utilizes boat facilities at all the commercial ports listed above and the ports at McIntyre, Panacea, Aucilla River entrance, Fenholloway River entrance, Keaton Beach, and lower Econfina River. Numerous recreational craft and charter boats are based in the Ochlockonee River below McIntyre and along the north shore of the Ochlockonee Bay. There is considerable small craft activity on the St. Marks River, including the operation of 6 commercial fishing boats, 13 charter boats, and many pleasure craft.

A recreational boat count in January 1961 revealed that 458 powered recreational craft were based between St. Marks, Florida, and the Withlacoochee River. The area included the Suwannee basin coastline. Transient recreational craft make about 50,000 visits annually along the same reach of coast.

Needs and Opportunities

The basin topography is not conducive to inland navigation development. Inland commercial areas are adequately served by rail and highway. Future industrial activity is not expected to result in a need for inland waterways above the tidewater on any stream. A traffic analysis of the Steinhatchee River tributary area revealed no prospective inland waterborne commerce on that river, although it was considered to have greater possibilities for waterborne commerce than the other streams in the basin.

Traffic on the St. Marks River is expected to increase from 410,212 short tons of commerce in 1960 to about 885,000 tons by the year 1975 and to 1,980,000 tons by the year 2000. Waterborne commerce on the Gulf Intracoastal Waterway is projected to increase from the 1,036,446 short tons in 1960 to nearly 3,200,000 tons by

TABLE 2.5

Trips and Drafts of Vessels, St. Marks River – 1960

Draft (foot)	Inbound			Outbound		
	Passenger and dry cargo	Towboats	Barges (tank)	Passenger and dry cargo	Towboats	Barges (tank)
10	----	4	15	----	4	----
9	----	17	128	----	17	29
8	----	43	45	----	45	1
7	----	37	27	----	36	----
6	80	34	1	80	36	1
5	120	----	1	120	----	----
4	196	----	----	100	----	1
3	80	----	21	176	----	5
2	----	----	6	----	----	120
1	----	----	2	----	----	89
Total	476	135	246	476	138	246

1975 and 6,100,000 tons by 2000. The Intracoastal Waterway statistics include local commerce between the coastal locations on the lower reaches of the streams in the basin, which totaled 176,000 tons in 1959. Projected to the year 1975, this totals 420,000 tons, and to the year 2000 the total expected is 600,000 tons.

The authorized route of the Gulf Intracoastal Waterway through Crooked River will require extensive dredging, channel straightening, replacement of a small fixed bridge across the Crooked River by a movable span, alteration of a swing span across the Carrabelle River, and alteration or replacement of two other fixed spans. One of these spans crosses the Ochlockonee River, and the other crosses Ochlockonee Bay. Providing clearances for recreational craft, including small cruisers, would be needed only at the bridge across the Crooked River. Study on an alternate route across St. James Island has been authorized.

Controlling depths of 4 feet at mean low tide exist at the mouth of the Ochlockonee River. This depth decreases to about 3 feet at the confluence with the Crooked River 8.5 river miles upstream. Above that point, the river gradually becomes shallower to Jackson Bluff Dam at river mile 65. Thus, navigation is limited to small recreational craft. Between the Crooked River and Jackson Bluff Dam are two highway crossings. One of these is at mile 39 and the other is at mile 64. The lower bridge has a horizontal clearance of 57 feet and a vertical clearance of 10 feet.

The rapid increase in sport fishing and other forms of recreational boating has created a need for small boat harbors and approach channel developments at various locations along the coast. Commercial fishing would also benefit if such development were provided at some of the harbors.

Completion of the authorized Cross-Florida Barge Canal would provide a sheltered barge route from the Mexican border to Norfolk, Virginia, with the exception of short sections of open water on the Atlantic coast and the 170-mile reach of open Gulf between Carrabelle and Withlacoochee Bay. About 110 miles of this reach is within the seaward extension of the basin boundaries. For vessel protection and to avoid delays awaiting favorable weather, development of a less exposed route between Apalachee Bay and the western terminus of the authorized barge canal is desirable.

Four alternative plans have been previously considered for a protected route for barge traffic from Apalachee Bay to Tampa Bay along the following contours, below mean low water:

(1) A dredged channel along the 3-foot depth contour, protected by a breakwater on the seaward side.

(2) A dredged channel along the 9-foot depth contour with two manmade islands located about 5 miles offshore at points about 35 and 70 miles south of St. Marks. These would be in lieu of a breakwater.

(3) Three manmade refuge islands located about 10 miles offshore in water about 10 feet deep. Two islands would be 35 and 70 miles south of St. Marks and the third would be opposite Cedar Key 20 miles south of the Ochlockonee basin boundary. This route would be without a dredged channel.

(4) Refuge harbors at Fenholloway River, Steinhatchee River mouth, and Horseshoe Cove would be accompanied by entrance channels 10 feet deep and 100 feet wide and have suitable turning basins of like depth at the shore ends of the channels.

Based on analysis of estimated costs and benefits to navigation, none of the above four schemes appears to be justified.

A fifth alternative in addition to the four routes studied for the Gulf Intracoastal Waterway extension would benefit fish and wildlife and land and water recreation as well as navigation. It would also have a large land enhancement value. This plan would include a dredged channel inland from the coastline with an adjacent scenic coastal highway on an embankment formed from spoil and developments at various locations for recreation and fish and wildlife purposes.

Eleven other harbors or harbor improvements for small craft only along the coast appear desirable, but economic analyses need to be made to determine if any are justified. These areas are Alligator Harbor, Aucilla River, Fenholloway River, Keaton Beach, Big Rocky Creek, Shired Creek, Spring Creek, Econfina River, Spring Warrior Creek, Dallus Creek, and improvement of Horseshoe Cove.

Other improvements considered include:

(1) A small craft channel from the existing turning basin at Carrabelle via the Carrabelle River, Crooked River, and Ochlockonee River to Ochlockonee Bay;

(2) a small craft channel through Ochlockonee Bay from the mouth of the Ochlockonee River to adequate depths in Apalachee Bay; and

(3) improvement of the Steinhatchee River for small craft from the head of the existing 6-foot channel at the town of Steinhatchee to the small waterfalls about 1 mile downstream from the Steinhatchee River bridge for U. S. Highway No. 19 and 98.

Means of Meeting the Needs

Projected traffic increases in the basin could be met by the following: (1) Improvement of St. Marks River channel as authorized in 1960 to provide for a 12-foot deep and 125-foot wide channel from Apalachee Bay to St. Marks, enlargement of the turning basin to 300 feet square and 12 feet deep, and extension of a 12-foot by 100-foot channel to a point 3,400 feet upstream; (2) provision of the approved small craft access to Panacea Harbor; (3) provision of an inland route for the Gulf Intracoastal Waterway from St. Marks to the Withlacoochee Bay; (4) development of the needed small craft channels and harbors along the basin coastline; (5) extension of Gulf Intracoastal Waterway from Carrabelle to Apalachee Bay via St. James Island; (6) improvement of the Steinhatchee River from the head of the existing channel to the small waterfalls about 1 mile downstream from the bridge crossing for U. S. Highway No. 19 and 98; and (7) by extension of the present 8-foot deep and 60-foot wide Carrabelle River channel a short distance upstream to provide additional docking facilities.

SECTION IV – RECLAMATION, IRRIGATION, AND DRAINAGE

General

Drainage is the principal method of reclaiming land for agriculture, forestry, and other uses in the basin. Reclamation and drainage are considered synonymous in this Appendix. In the humid Southeast, irrigation properly used to supplement rainfall provides opportunities for more efficient farming operations and stabilizing income.

Existing Facilities and Programs

Irrigation

There are more than 1.75 million acres of land that are suitable for irrigated agriculture use in the Ochlockonee basin. In 1960, about 6,200 acre-feet of water were used to irrigate approximately 9,800 acres in the basin. Irrigation, principally by sprinkler systems, was entirely on an individual farm basis; none was by large group or project-type development. Nearly 1,500 existing farm ponds supplied irrigation water for about 8,300 acres, streams for 300 acres, and wells for 1,200 acres. In 1960, more than half of the irrigated land in the basin was in Gadsden and Leon Counties, and 93 percent was in the Upper Coastal Plain. Some 492 farms out of 6,200 farms in the basin used a total of 437 irrigation systems.

Nearly 5,500 acres of tobacco were irrigated in 1960. Vegetable crops, pasture, corn, other field crops, and grass and hay constituted most of the remaining irrigated acreage.

Technical, loan, and cost-sharing aids for installation of farm irrigation systems are available under going programs of the U. S. Department of Agriculture.

Figure 2.7 *Sprinkler Systems Are Used as the Principal Method of Irrigation.*

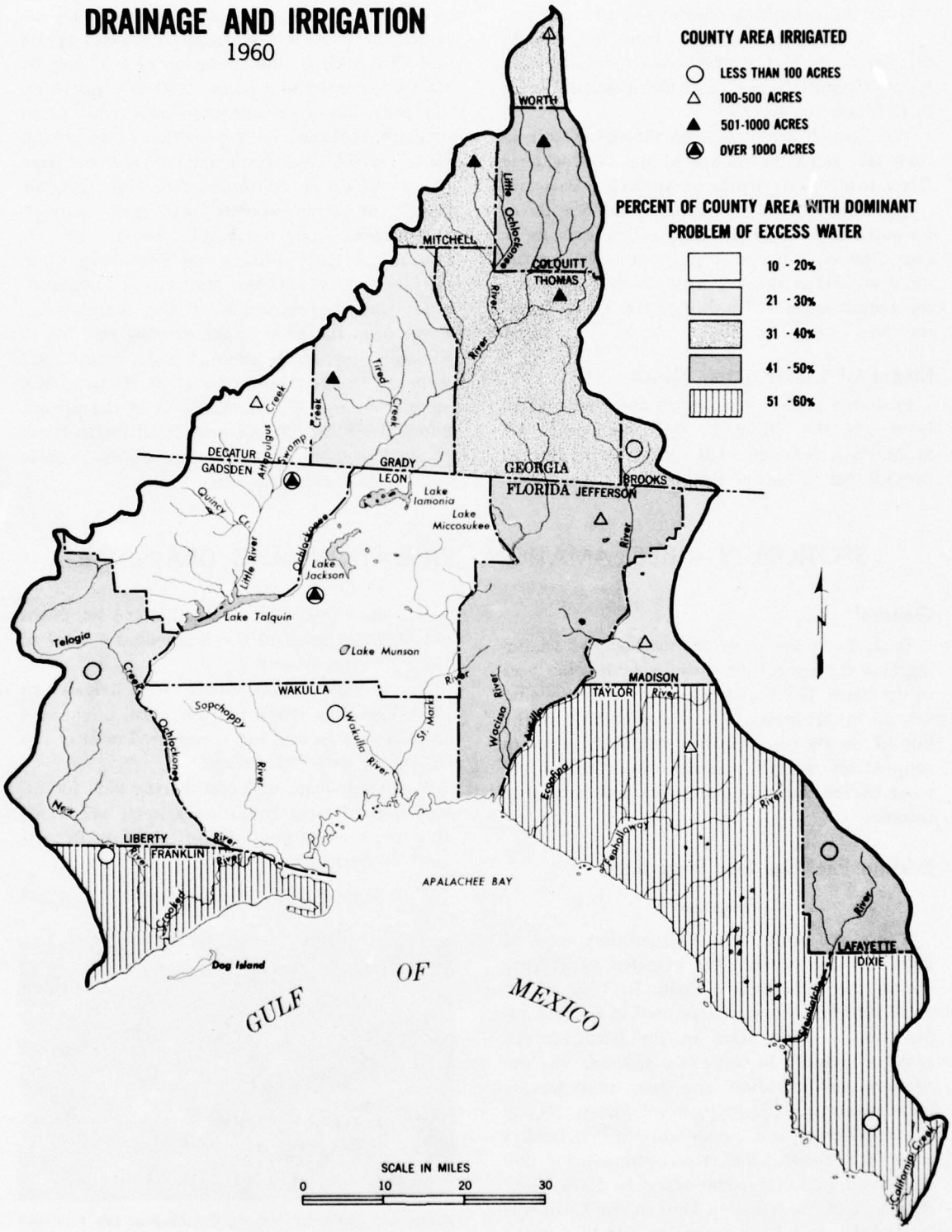
DRAINAGE AND IRRIGATION
1960
COUNTY AREA IRRIGATED
LESS THAN 100 ACRES
100-500 ACRES
501-1000 ACRES
OVER 1000 ACRES
PERCENT OF COUNTY AREA WITH DOMINANT PROBLEM OF EXCESS WATER
10 - 20%
21 - 30%
31 - 40%
41 - 50%
51 - 60%
WORTH
MITCHELL
COLQUITT
THOMAS
DECATUR
GADSDEN
GRADY
LEON
GEORGIA
FLORIDA
JEFFERSON
BROOKS
Lake Iamonia
Lake Miccosukee
Lake Jackson
Lake Talquin
Lake Munson
WAKULLA
MADISON
TAYLOR
LIBERTY
FRANKLIN
APALACHEE BAY
Dog Island
GULF OF MEXICO
LAFAYETTE
DIXIE
SCALE IN MILES
0
10
20
30

Figure 2.8

Drainage

More than 1.3 million acres of non-Federal land in the basin have a dominant problem of excess water. In 1960, more than 25,000 acres were adequately drained by onfarm or small individual type drainage projects, and seven large drainage projects affecting more than 500 acres each were partially completed. When these large drainage projects are complete, a total of 189,000 acres of land subject to excess water will be benefited. Six of these large drainage systems were installed on single farms by individual action, and one facility was installed by a small group of landowners. All of the installed facilities for these large drainage projects are in the Lower Coastal Plain in Taylor, Lafayette, and Dixie Counties, Florida. Drainage facilities consist of open main and lateral ditches, surface field ditches, and limited amounts of tile drain. Most of the existing drainage facilities are on woodlands, particularly on industry-owned woodlands.

No major drainage improvement has been constructed or authorized for construction by the Federal Government.

Needs and Opportunities

Irrigation

Only a small percentage of the farms in the Ochlockonee basin now have streams, ponds, or wells sufficiently reliable to supply irrigation water when it is most needed. However, in view of ample water available, no serious water supply problems are foreseen. Some years the results of irrigation show a marked increase in crop yields and in other years show little or no increase. Costs and returns also vary greatly from farm to farm. Therefore, the feasibility and potential of irrigation has to be individually analyzed.

The combinations of such factors as soils, farm and field size, and proximity to water supply indicate that the Upper Coastal Plain has the better potential for future irrigation expansion, but some increase in the irrigated acreage of tobacco and truck crops will undoubtedly occur in the Lower Coastal Plain.

Of the total land that is suitable for irrigation, disregarding the availability of water, about 533,000 acres are in cropland, 132,000 acres are in pastureland, 998,000 acres are in woodland, and 88,000 acres are in other uses. Of the cropland, some 363,000 acres are in the Upper Coastal Plain of Georgia; 144,000 acres are in the Upper Coastal Plain of Florida; and 26,000 acres are in the Lower Coastal Plain of Florida. Preliminary data indicate a potential for irrigation projects of about 100,000 acres.

Figure 2.9 *Drainage Project, Thomas County, Georgia — Drainage Offers Extensive Opportunities.*

Estimated future requirements for irrigation were established on the basis that incremental returns to the farmer resulting from irrigation would at least equal the incremental operation, maintenance, and replacements costs using long-term projected prices and without consideration of secondary effects or intangibles. Using these criteria, and based upon meeting projected production demands, about 9,600 acre-feet of water, in addition to the 6,200 acre-feet of irrigation water used in 1960, will be required for the irrigated acreages in 1975 and approximately 16,000 more acre-feet are expected to be needed in the year 2000. By the year 2000, about 34,000 acres or nearly 3.5 times as many acres will need to be irrigated in the basin than there was in 1960. However, based on a trend from 1954 to 1960, a total of about 58,000 acres would be irrigated by the year 2000. There will be an estimated 2,000 farm ponds in the basin by 1975 and nearly 3,000 ponds by the year 2000. It is

estimated that 63 percent of the demand for irrigation water will be supplied by these ponds.

Improvements needed in some of the existing irrigation facilities include efficient irrigation practices and improved equipment. Additional studies and more dissemination of information is needed so that farm operators who irrigate may obtain the facts required for proper use of irrigation water.

Drainage

Drainage problems in the basin are caused by the accumulation of excess water in depressions and water tables near the land surface. Clogging of natural and artificial drains as a result of vegetative growth and siltation and undeveloped natural drains are the major causes of adverse drainage conditions in the basin.

There are extensive opportunities in the basin to construct additional drainage facilities. As of 1960, preliminary data indicate about 700,000 acres could be effectively drained by individual farm drainage systems, and it is practical to drain about 600,000 additional acres by project action.

Under conditions of land use expected in the year 2000, over 20,000 acres of cropland, about 30,000 acres of pasture and range, about 1,200,000 acres of woodland, and more than 50,000 acres of other land would be susceptible to treatment for drainage. These acreages take into consideration an expected 8-percent increase in land use for nonagricultural purposes.

Alleviation of the excess water problem on agricultural land would permit favorable land-use conversions by converting these wetlands from a less intensive use to a more intensive use, by changing land in a nonproductive state to one of reasonable production, and replacing marginal farmland. It would also provide opportunities for improving the efficiency of farm operations, increasing the farm income, and increasing production. Although the need for maximum production is not expected prior to the year 2000, if this becomes necessary, drainage facilities for the removal of excess water could ultimately be provided on a practical basis for most of the wetlands not previously drained. Pump-type drainage has a potential where gravity outlets are not available in the Lower Coastal Plain and more intensive land uses may permit installation of tile drains on some soil types.

Means of Meeting the Needs

Irrigation

From the standpoint of meeting the national or regional production needs, basic data indicate there is no great need to promote large-scale irrigation in the Ochlockonee basin, until large acreages of agricultural land are shifted to nonagricultural uses. Even though studies show that crop production requirements, at least to year 2000, can be met by other management practices, irrigation cannot be ignored as a means of increasing crop yields, improving quality of produce, replacing marginal farmlands, and serving as insurance against crop losses during drought periods. Wisely used, irrigation can also make other applied technologies more effective and can help stabilize net returns.

Local interests in some areas will prefer to undertake irrigation in lieu of alternative means of increasing net returns and meeting individual farm needs and desires. Most of the irrigated acreages are expected to be scattered throughout the upland area and along minor tributaries. Sprinkler irrigation systems will continue to be the major type of systems used because topography and soil conditions limit use of other methods.

Studies of the upstream watershed areas in the basin indicate that some have potential for development of irrigation water supplies by project action. Most of the potential projects involving irrigation could be developed by small groups or individual enterprises. The projected demand for agricultural products alone, however, does not indicate a need for any single-purpose irrigation water supply projects in the foreseeable future.

Accelerated educational services would facilitate irrigation development by making known the results of studies and field trials on irrigation practices, water requirements, consumptive uses of water by variety and types of crops, soil moisture holding capacities, proper timing of irrigation, and advances in equipment.

Drainage

Development of farm drainage systems and farm-by-farm application of water management principles and techniques should be considered to realize the full benefits of drainage. These programs would result from private initiative and expenditures. Onfarm outlet channels, mains,

laterals, and surface field ditches would continue as the major types of systems used.

In addition to the individual drainage systems, multiple-purpose drainage and flood prevention projects in small watershed areas could be used to alleviate drainage problems requiring project facilities. There are probably other projects and considerable acreages requiring local drainage work for which additional studies are required. Most of the projects in the Lower Coastal Plain would primarily benefit woodland. In the Upper Coastal Plain, projects would benefit cropland, pastureland, and woodland. Development of the mutiple-purpose projects depends upon future national, regional, and local needs, changing economic conditions, and the desires and determination of the potential beneficiaries. The existing technical and financial assistance programs of the U. S. Department of Agriculture would assist in the installation of drainage facilities.

Alternative plans for drainage would involve essentially a change in areas drained and adoption of other technological improvements or other management practices. Alternative uses for wetlands include use for production of hardwoods and as wildlife habitat. It is not intended to imply, in this Section, that drainage development of wetlands for agricultural purposes is necessarily more desirable than other uses or improvements. Full consideration should be given to all alternative uses by both landowners and interested governmental agencies before detailed plans are decided upon.

Accelerated educational services would facilitate drainage developments by making known the results of studies and field trials on drainage practices, methods, problems, solutions, equipment, operations, and management.

Surface water control on woodlands is discussed in Section VII, Forest Conservation and Utilization.

SECTION V – HYDROELECTRIC POWER AND INDUSTRIAL DEVELOPMENT

General

Land that readily responds to the addition of fertilizer, an abundant supply of water, a long growing season, and a plentiful labor supply, joined with the availability of electric energy has fostered manufacturing development that is based principally on food processing and forest products. In addition, the industrial development in the basin is stimulated by activity in Florida's capital at Tallahassee. Extension of electrical energy into rural areas has changed the standard of living, employment patterns, and communications. These changes are continuing as electrical energy is being used in more and more processes and as new and diversified activities are being attracted to the area.

Food processing and lumber and wood enterprises are major employers in the basin, and these enterprises should continue to be important segments of the economic picture. However, as economic activities continue to broaden, additional industries such as chemicals, printing, metals fabricating, and enterprises oriented around recreation and tourism should be attracted to the area. The availability of an adequate source of electric energy will be one of many important factors considered in the location of such new industries.

The Federal Power Commission electric power market area in the Southeast River Basins covers several States and is composed of several power supply areas. The Ochlockonee basin lies within parts of two of these power supply areas; one is in Florida and one is in Georgia.

Existing Facilities and Programs

Electric generating facilities in the Ochlockonee basin are few. The Florida Power Corporation operates an 8,800-kilowatt capacity hydroelectric plant on the Ochlockonee River at Lake Talquin and a 1,000-kilowatt internal combustion plant, on a standby basis, at Perry, Florida. The city of Tallahassee operates a 52,000-kilowatt capacity steam-electric plant at St. Marks, Florida. The Buckeye Cellulose Company near Perry, operates a steam-electric plant in conjunction with its process steamplant. Thomasville, Georgia, has operated a 15,500-kilowatt capacity steam-electric plant but has retired the

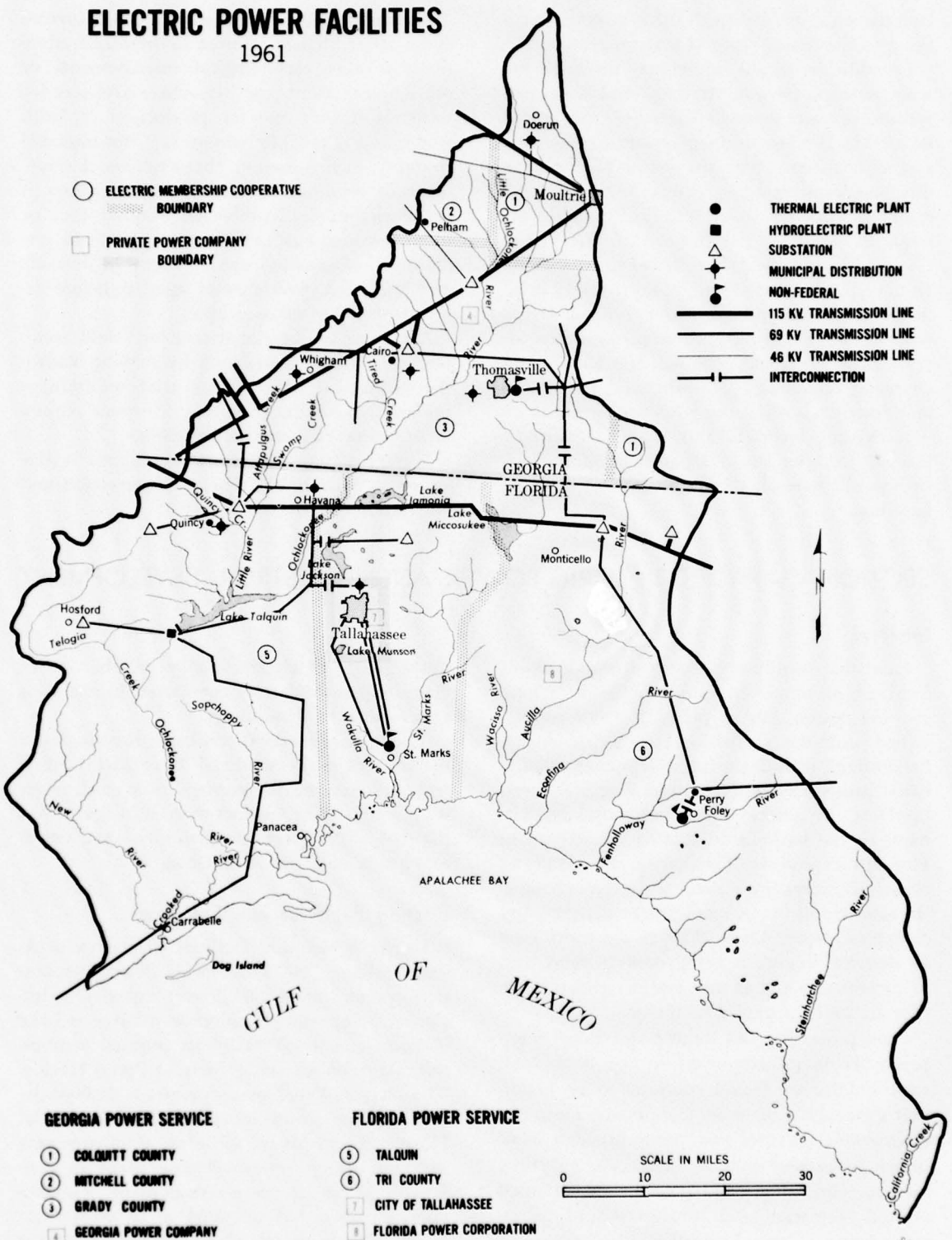
ELECTRIC POWER FACILITIES
1961
ELECTRIC MEMBERSHIP COOPERATIVE BOUNDARY
PRIVATE POWER COMPANY BOUNDARY
THERMAL ELECTRIC PLANT
HYDROELECTRIC PLANT
SUBSTATION
MUNICIPAL DISTRIBUTION
NON-FEDERAL
115 KV. TRANSMISSION LINE
69 KV TRANSMISSION LINE
46 KV TRANSMISSION LINE
INTERCONNECTION
Doerun
Moultrie
Pelham
Whigham
Cairo
Thomasville
GEORGIA
FLORIDA
Havana
Quincy
Lake Iamonia
Lake Miccosukee
Monticello
Lake Jackson
Hosford
Telogia
Lake Talquin
Tallahassee
Lake Munson
Sopchoppy
St. Marks
Wakulla River
Wacissa River
Aucilla River
Econfina
Perry
Foley
Panacea
Fenholloway River
APALACHEE BAY
Carrabelle
Dog Island
GULF OF MEXICO
Steinhatchee River
California Creek
N
SCALE IN MILES
0 10 20 30
GEORGIA POWER SERVICE
(1) COLQUITT COUNTY
(2) MITCHELL COUNTY
(3) GRADY COUNTY
(4) GEORGIA POWER COMPANY
FLORIDA POWER SERVICE
(5) TALQUIN
(6) TRI COUNTY
(7) CITY OF TALLAHASSEE
(8) FLORIDA POWER CORPORATION

Figure 2.10

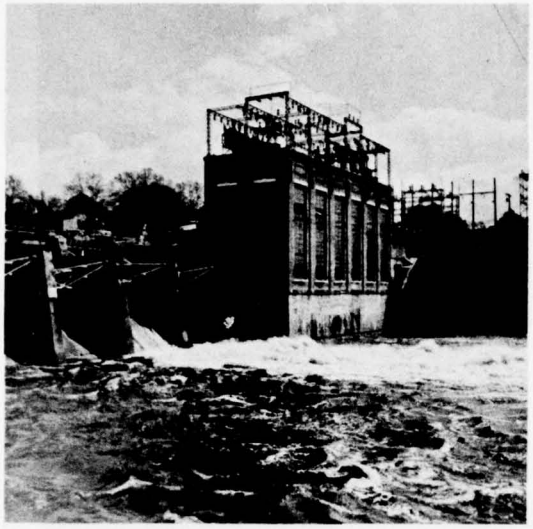

Figure 2.11 *Jackson Bluff Hydroelectric Plant at Lake Talquin.*

facility, except for cold standby, in favor of purchasing energy from the Georgia Power Company and the Southeast Power Administration. Most of the electric requirements are obtained by imports from generating facilities located outside the basin boundaries.

Within the Georgia portion of the basin, the area is served by four municipalities which operate their own electric distribution systems, three electric membership cooperatives, and the Georgia Power Company. In the Florida portion of the basin, the area is served by three municipalities with their own distribution systems, the Talquin and Tri-County Electric Membership Cooperatives, the city of Tallahassee, and the Florida Power Corporation.

Needs and Opportunities

To establish future electric energy requirements, an analysis of historical load growth was made as to type of customer and as to use per customer. Based on these analyses, projected demands were estimated for 1975 and 2000, at the same time recognizing the projected population growth and shifts, saturation of electrical appliances, changes in agricultural patterns, changes in industrial and commercial activities, and saturation of electric service. Rapid electrical load growth has occurred in several basin urban areas which are commercial and industrial centers. This growth can be expected to continue until at least 1975. Projections of future power load growth take into consideration the long-range factors that will tend to slow down the explosive electrical load growth which has occurred during the past three decades. For short periods, extending over a decade, it can be assumed that the historical rate of growth will prevail. Although total power needs will continue to increase quite rapidly for a long-range projection, load saturation, especially in residential loads, must be recognized. Commercial establishments will tend to level off as installation of improved lighting, air conditioning, and self-service equipment reaches a high level of saturation. The use of electric labor-saving equipment, including automation and improved manufacturing methods, will continue to increase the industrial load.

The 1959 electric demand totaled 93,700 kilowatts, based on a 56.3 percent load factor. The projected electric energy demands for 1975 total 274,700 kilowatts, based on a 56.8 percent load factor, and for 2000, at least 810,600 kilowatts, based on a 56.9 percent load factor.

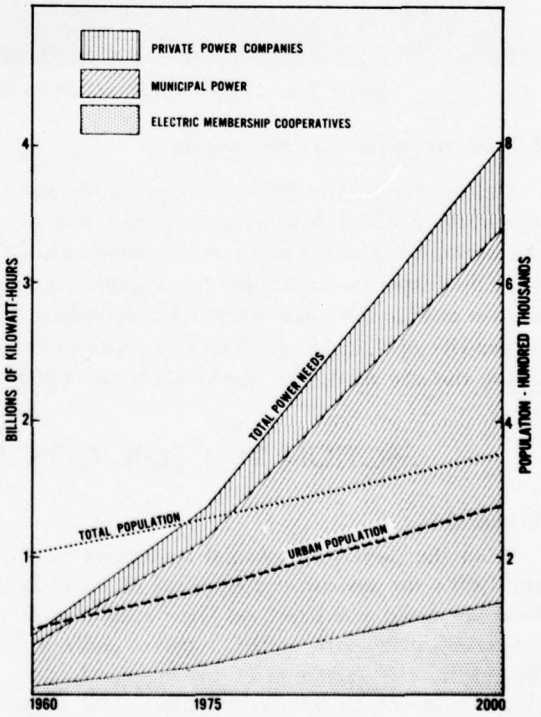

Figure 2.12 *Power Needs and Population.*

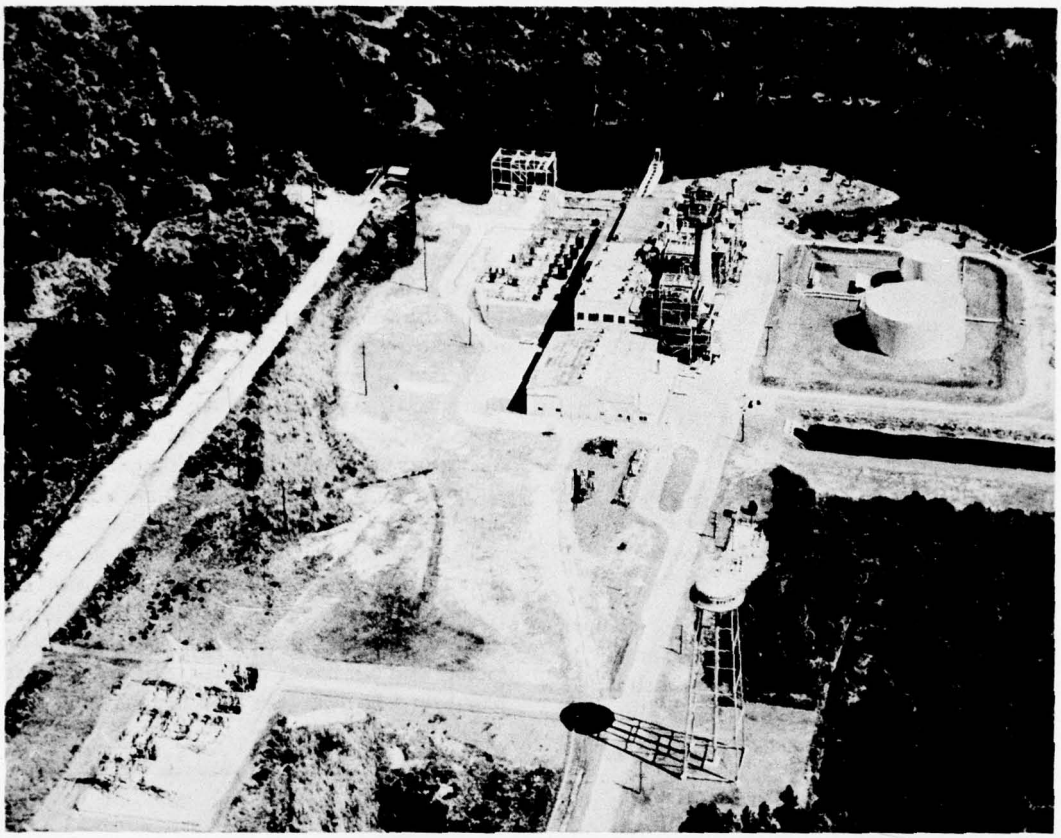

Figure 2.13 *City of Tallahassee Steam-Electric Plant Located at St. Marks, Florida.*

Means of Meeting the Needs

Preliminary studies indicate there is no economically justified hydroelectric power site in the basin. Additional electric requirements until 1975 are expected to be met by imports from sources outside the basin except for requirements of the city of Tallahassee. The city plans to increase the size of the St. Marks plant to 74,000 kilowatts and will probably construct additional facilities as its load grows. The Florida Power Corporation will probably construct a thermal-electric plant near a source of cooling water to serve its service area in the basin when the electric load justifies such additional capacity. As the load increases, new transmission lines and new distribution lines will be constructed and existing lines will be improved.

SECTION VI – SOIL CONSERVATION AND UTILIZATION

General

From the period of colonial settlement until the 1930's, the agricultural economy of the Ochlockonee basin was based on the production of row crops, principally cotton, tobacco, and corn. By the mid-1930's, much of the cropland, particularly in the Upper Coastal Plain, had been damaged severely by erosion of the topsoil.

Since the 1930's, interest in conservation has grown steadily. Considerable progress has been made in conservation and utilization of agricultural land. This has been aided by the combined efforts of Federal, State, and local agricultural groups. Improved farming methods that reduce soil loss and increase production have been developed and are being widely adopted. General

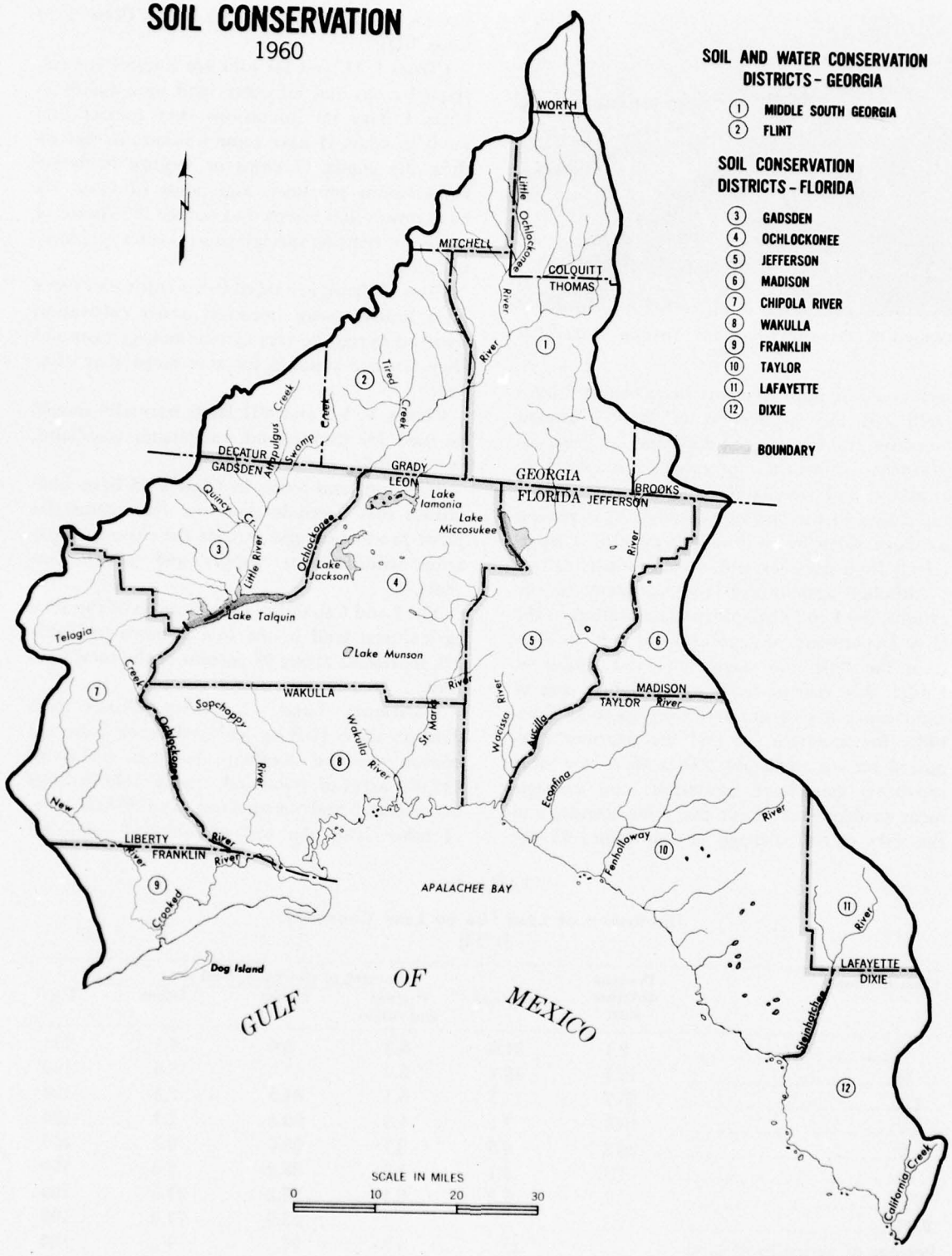
SOIL CONSERVATION
1960
SOIL AND WATER CONSERVATION DISTRICTS - GEORGIA
1 MIDDLE SOUTH GEORGIA
2 FLINT
SOIL CONSERVATION DISTRICTS - FLORIDA
3 GADSDEN
4 OCHLOCKONEE
5 JEFFERSON
6 MADISON
7 CHIPOLA RIVER
8 WAKULLA
9 FRANKLIN
10 TAYLOR
11 LAFAYETTE
12 DIXIE
BOUNDARY
N
WORTH
MITCHELL
COLQUITT
THOMAS
DECATUR
GADSDEN
GRADY
LEON
GEORGIA
FLORIDA
JEFFERSON
BROOKS
WAKULLA
MADISON
TAYLOR
LIBERTY
FRANKLIN
LAFAYETTE
DIXIE
Little Ochlockonee River
Tired Creek
Ochlockonee River
Quincy Cr.
Little River
Lake Iamonia
Lake Miccosukee
Lake Jackson
Lake Talquin
Lake Munson
Telogia Creek
Sopchoppy River
Wakulla River
St. Marks River
Aucilla River
Econfina River
Fenholloway River
New River
Spooked
Dog Island
APALACHEE BAY
GULF OF MEXICO
Steinhatchee River
California Creek
SCALE IN MILES
0 10 20 30

Figure 2.14

Figure 2.15 *Parallel Terraces and Stripcrops Reduce Soil Losses.*

technological improvements in agriculture have facilitated the application of land treatment measures and encouraged desirable land use adjustments. Conversion of erodible cropland to grassland and woodland use has occurred at a rapid rate in the last two decades. This process has been aided by an economic cycle of comparatively high livestock and wood-products values.

Although agricultural land has many classifications, the Land Capability Classification of the U. S. Department of Agriculture is used to illustrate the type and degree of land problems. Under this system, lands are assigned one of eight capability classes according to their capability for intensive use and the treatments required for sustained use. All lands in the same capability class have limitations and management problems of about the same degree, and the risks of soil damage or limitations in use become progressively greater from Class I to Class VIII.

Classes I, II, and III soils are suitable for cultivated crops and all other land uses. Lands in Class I have no limitations that restrict use; lands in Class II have some limitations that reduce the choice of crops or require moderate conservation practices; and lands in Class III have severe limitations that reduce the choice of crops or require special conservation practices or both.

Class IV lands are suitable for cultivated crops on a limited basis; however, under cultivation these lands require very careful management and they are not suitable for row crops year after year.

Classes V, VI, and VII lands normally should be used for pastureland, rangeland, woodland, and wildlife.

Soils and land forms in Class VIII have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, and esthetic purposes.

The Land Capability Classification of the 1958 agricultural land in the basin, shown in Table 2.6, represents about 93 percent of the total land area.

Additional Land Capability Classification data on these 1958 agricultural lands indicated erosion was the dominant problem on about 447,000 acres of woodland, nearly 417,000 acres of cropland and pastureland, and 95,000 acres of other land. An unfavorable soil condition

TABLE 2.6

Distribution of Land Use by Land Capability (1958)

Classification	Percent distribution	Percent of classes by land use				
		Cropland	Pasture and range	Forest	Other	Total
I	2.1	81.0	6.5	8.4	4.1	100
II	19.7	45.7	8.0	43.8	2.5	100
III	26.7	11.3	5.1	81.3	2.3	100
IV	19.9	7.1	4.5	86.3	2.1	100
V	26.8	0.6	0.7	98.0	0.7	100
VI	1.4	3.1	1.9	88.2	6.8	100
VII	2.1	0.2	0.1	78.2	21.5	100
VIII	1.3	---	---	23.0	77.0	100
Percent of agricultural land	---	15	4	77	4	100

was the dominant problem on about 1,286,000 acres of woodland, nearly 189,000 acres of cropland and pastureland, and 39,000 acres of other land. Some 21,000 acres of woodland, 53,000 acres of cropland and pastureland, and about 5,000 acres of other land had no problems that limited use.

Existing Facilities and Programs

In 1960, nearly 1,500 farm ponds occupying about 5,500 acres had been installed in the basin for use either singly or in combination for livestock water, irrigation, fire protection, sediment control, and fishing. They ranged in size from about 3 surface acres to a little over 9 acres. About 58 percent of these ponds were used partially or entirely for livestock water and other domestic use, about 33 percent for irrigation, and almost all of the ponds provided some fishing.

In the Ochlockonee basin, erosion problems are not as great as they are in other basins in the Southeast River Basins area. Wise land-use conversions and improved farming methods have drastically reduced the severity of erosion hazards. About 20 percent of the total land area in the basin, principally in the Upper Coastal Plain, has soils considered high in erosion hazards, and about 374,000 acres of land in the basin have less than 75 percent of the original topsoil remaining. In 1959, however, only slight erosion was evident on over half of these soils. About 84 percent of the agricultural land in the basin needing conservation treatment is located in the Upper Coastal Plain.

There are several major soil and water conservation and utilization programs in operation in the basin. These programs provide services in cost sharing, credit, technical assistance, education, and information. The 12 soil and water conservation districts operating in the basin are under State charter and coordinate various kinds of State and Federal aids that are available to farmers. Many private organizations and groups also make their services available to these districts.

Needs and Opportunities

To meet estimated food and fiber production needs for the basin by year 2000, agricultural production including wood products must be increased nearly 2.5 times and the land available for this use will be about 2 percent less than the 1960 acreage. Expanding nonagricultural uses of land such as urban and industrial areas, transportation facilities, and storage of water will continue to reduce the acreages available for agricultural uses. Absorption of land into these special uses has been about one-third each between cropland, pastureland, and woodland. Future agricultural requirements, however, can readily be met with continued resource development and more efficient land uses. Integral parts of resource development consist of soil conservation measures and other technical improvements.

Sufficient quantities of the proper types of vegetative cover to maintain desirable soil characteristics and satisfactory plant nutrients are considered to exist on much of the pastureland, rangeland, and forest land and on about 40 percent of the cropland. Continued conservation of the soil resource for future use is vitally important. By year 2000, about 62 percent of the land expected to be used for cropland and pastureland could be benefited by conservation treatments. About 184,000 acres of cropland are expected to have erosion problems, and 115,000 acres of cropland are expected to have unfavorable soil conditions. Conservation measures would benefit a total of nearly 214,000 acres of pastureland and rangeland. Some of the treatments for lands expected to be used for pasture by year 2000 and the estimated acres that would be benefited are as follows:

Treatment or control*	Acres
Establish or reestablish vegetation	121,000
Improve vegetative cover	86,000
Reduce overgrazing	133,000
Protection from fire	72,000
Erosion control	20,000
Rodent control	12,000
Noxious plant control	127,000

* Several treatments or control measures may occur on the same acreage.

By year 2000, about 79 percent of the soil conservation problem areas on cropland and pastureland are expected to be in the Upper Coastal Plain.

It is estimated that by year 2000 about 18,000

Figure 2.16 *Good Grassland Conserves Land and Water Resources.*

acres of other agricultural land, such as farmsteads, farm roads, and wildlife areas, not included in cropland, pastureland, rangeland, or woodland would be benefited by conservation treatment measures for erosion problems and unfavorable soil conditions. Due to the small area involved, no further studies were made of the problems or the solutions.

Soil conservation measures for woodlands are included in Section VII, Forest Conservation and Utilization.

Land-use conversion, or the shift in type of land use, is expected to be a continuous process. About 7,200 acres in Land Capability Classes V to VII were planted to crops in 1959. Most of this acreage in the future will likely shift to more adaptable uses and other shifts will be needed to fit a particular crop to a specific soil type. By 2000, some 72,000 acres of land now in pasture, woods, and other uses are expected to be converted to cropland. Also, 94,800 acres of cropland, woodland, and other land will likely shift to pastureland and rangeland.

Two small watershed protection applications had been submitted to the State Soil and Water Conservation Committees as of January 1960 for assistance under the provisions of Public Law 566 on about 180,000 acres in Mitchell, Colquitt, and Worth Counties, Georgia, and Taylor County, Florida. Project-type action under the watershed protection program may involve either singly or in combination, flood control, sediment-damage reduction, erosion control, drainage, irrigation, recreation, agricultural water management, or other purposes. A total of nearly 251,000 acres in the upstream watershed projects have the problem of erosion damage but only about 38,000 acres would be benefited by project action for erosion control.

Suitable sites are generally available for any additional farm ponds that may be needed to provide water for livestock, irrigation, and small impoundment sport fishing. By 2000, the number of farm ponds is expected to increase to about 3,000. This would add some 5,500 acres of additional surface water on farms.

Means of Meeting the Needs

The degree and rapidity of installing conservation measures will be affected by such factors as changing needs for agricultural products, general economic conditions, and future policies of Federal, State, and local agencies. Comprehensive soil conservation and utilization programs for large areas with many variations in physical

and economic conditions and many types of ownerships and managements cannot be expected to be applied in their entirety. Estimates as to the intensity of installation of conservation measures would be only an approximation which could not include all future influencing factors. The difference between complete installation of measures on areas that would be benefited by conservation treatments and the degree of actual installation would entail a corresponding reduction in costs, quantities, and resulting effects. Installations generally are carried out by the farmer either with or without assistance from agricultural agencies or organizations.

The systematic use of gainful soil and water conservation techniques should be encouraged to avoid costly losses of the soil resource and develop the lands for future uses, to provide efficient and continuing production of food and fiber, and to improve watersheds and water resources for both agricultural and urban uses.

High-level management in connection with selection and application of soil conservation practices would be necessary to accomplish desirable land-use changes and improve the soil resource to the minimum point where satisfactory levels of production would continue to be attainable.

High-level management of croplands includes the following: (1) Proper selection and rotation of crops; (2) control of excess water with drainage, vegetated waterways, and structures; (3) improvement of soil productivity and workability by using correct amounts of fertilizer and lime and maintenance of organic matter at high levels; (4) conservation of soil materials, plant nutrients, and soil moisture by proper combinations of soil and water conservation measures; (5) selection of proper planting and seeding times; (6) correct tillage methods; (7) control of weeds, insects, and plant diseases; and (8) additional farm ponds as needed.

High-level management for pasture and range includes management of soil, water, livestock, and vegetation. Soil and range management includes the application of lime, nitrogen, phosphate, potash, and other nutrients in the proper amounts as indicated by the results of soil tests. Nutrients should be applied in sufficient quantities to grow plant cover that will protect the soil and provide livestock forage. The number of livestock and the grazing periods should be regulated so that the pasture plants will grow vigorously during the grazing season. Vegetative management should include proper mowing, the use of chemicals for weed and brush control, and fire protection. Water management should include an adequate number of properly distributed farm ponds. Needed management practices for woodlands are included in Section VII.

To aid in providing the most efficient soil conservation program, additional studies are required. Data on costs and returns of conservation farming practices and systems are needed. Intensive studies should be made on how to reduce and, if possible, avoid the detrimental effects of land-use shifts. Studies are needed of the institutional, educational, and social factors that influence farmers to apply, or not to apply, soil conservation practices and plans. Studies are needed to enable technicians to make improved estimates of the need for cost sharing for various practices in watershed programs.

Selected plant-management studies are needed to insure that livestock production continues as an important enterprise.

Technical assistance available under current programs will be sufficient to carry out the soil and water conservation practices involved in the anticipated land-use changes to the year 2000. In many cases, however, technical assistance is limited to planning. Within justifiable cost limitations, increased emphasis should be given to financial assistance programs to encourage gainful conservation practices which provide the most enduring conservation benefits obtainable.

Land treatment measures usually improve hydrologic conditions, reduce sediment production, and assist in the reduction of runoff. Soil conservation practices are normally applied farm by farm under existing agricultural and conservation programs. These measures would be facilitated by continuing the various Federal programs which include additional studies, technical and educational assistance, and cost-sharing aids. Accelerated project actions that provide land treatment and stabilization of critical areas may be undertaken under the provisions of Public Law 566, 83d Congress, the Watershed Protection and Flood Prevention Act, where such action is justified and needed to help solve the problem in designated watersheds. Local leader-

ship available in all communities should continue to be utilized as fully as possible in the planning and implementation of a sound soil conservation program.

The soil conservation and utilization measures as presented for cropland, pasture, and range are based substantially on continuation of the 1960 rate of development.

SECTION VII – FOREST CONSERVATION AND UTILIZATION

General

The Ochlockonee basin is an important wood-producing area and wood production is expected to continue to play a major role in the basin economy.

Existing Facilities and Programs

Forests occupied 3,056,000 acres or 77 percent of the land area in the basin in 1959. There are approximately 481,000 acres of forest land in Federal ownership, including 444,000 acres in the Apalachicola National Forest in Florida and 37,000 acres in other Federal holdings. Public non-Federal ownerships include nearly 4,000 acres of forest land. The remaining 2,571,000 acres of forest land are privately owned; 1,168,000 of these acres are owned or under long-term leases by pulp and paper companies, 1,138,000 acres are part of farm enterprises, and 265,000 acres are held by nonresident owners.

About 56,000 acres of forest land are classed as noncommercial because sites are not capable of producing stands of merchantable timber, or because the lands have been reserved for other uses that preclude harvesting of wood products. The remaining 3 million acres are commercial and are in varying stages of production.

Four major forest-type groups are found in the basin—pine, oak-pine, upland hardwood, and bottom land hardwood.

Pine forests make up about one-half of the commercial forest area. Longleaf and slash pine are the principal species. Bottom land hardwoods cover about one-third of the forested area and are normally confined to areas bordering major rivers and tributaries. Principal species in this group are black gum, cypress, ash, maple, and oaks. Oak-pine types are found scattered throughout the basin and are mostly hardwoods of the sweet gum, hickory, and oak species that are mixed with occasional pine. The remainder of the forested area consists of hardwood species, mainly oaks and hickories, which are scattered throughout the basin.

In 1960, the commercial forest land contained about 1,052 million cubic feet of merchantable softwoods and 727 million cubic feet of merchantable hardwoods. Some 74 million cubic feet of growing stock were cut in 1959. Sawlogs were the major product harvested, followed by pulpwood. The remainder of the growing stock was cut into barrel staves and bolts, fuelwood, pilings, posts, and ties. The stumpage value of the wood harvested in 1959 was about $7.4 million. The forest conservation and utilization goal in the Ochlockonee basin is to increase this annual cut by the year 2000 to at least 181 million cubic feet and still maintain a favorable ratio between growth and cut.

Less than 15 percent of the slash and longleaf pine trees of workable size are now being faced for gum-naval stores. Approximately 56 crops,

TABLE 2.7

Commercial Forest Acreage

Forest-type group	Georgia portion	Florida portion	Basin total
Pine	257,000	1,242,000	1,499,000
Oak-pine	42,000	149,000	191,000
Upland hardwood	69,000	323,000	392,000
Bottom land hardwood	148,000	770,000	918,000
Total	516,000	2,484,000	3,000,000

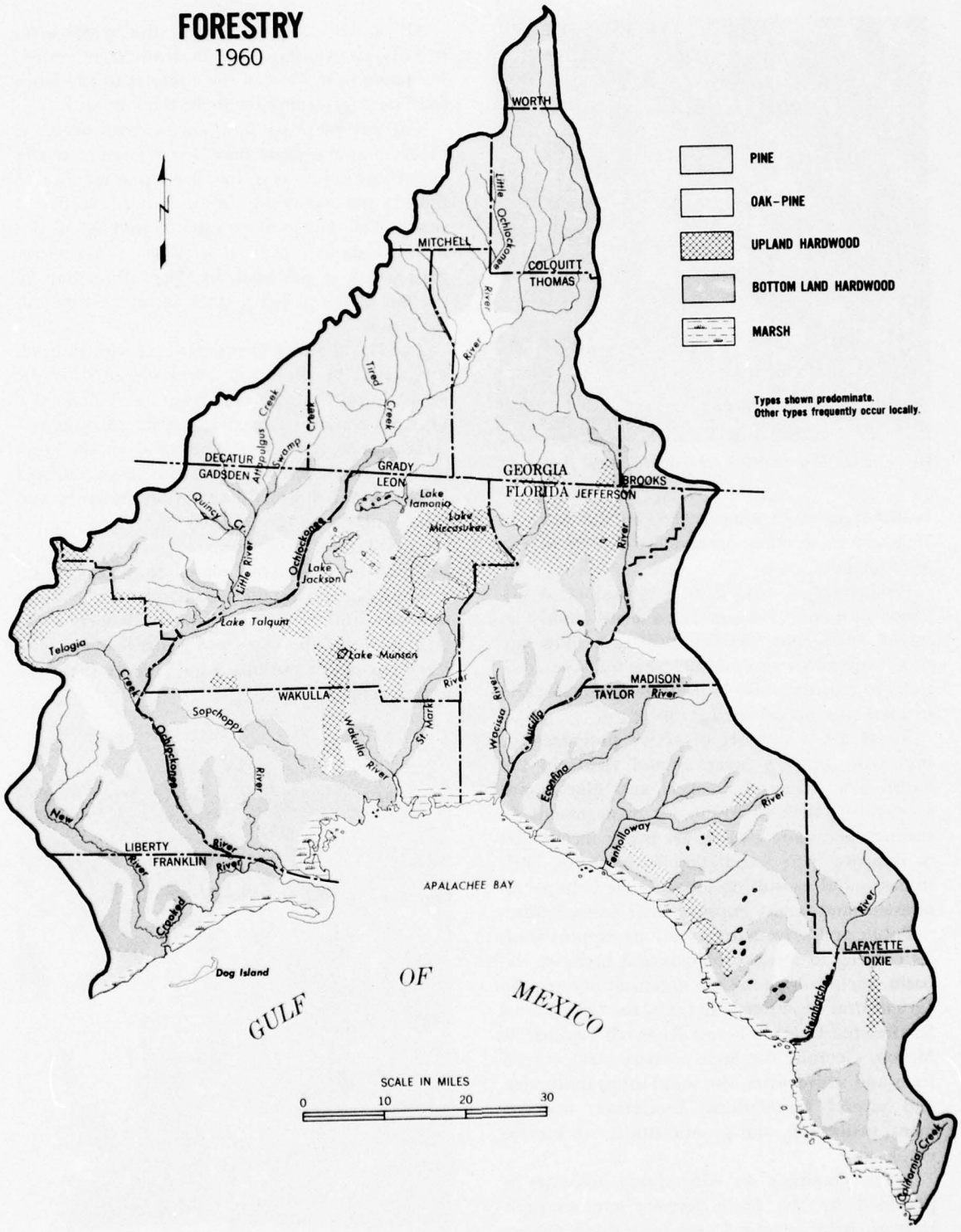
FORESTRY
1960
N
PINE
OAK-PINE
UPLAND HARDWOOD
BOTTOM LAND HARDWOOD
MARSH
Types shown predominate.
Other types frequently occur locally.
WORTH
MITCHELL
COLQUITT
THOMAS
DECATUR
GADSDEN
GRADY
LEON
GEORGIA
FLORIDA
JEFFERSON
BROOKS
WAKULLA
MADISON
TAYLOR
LIBERTY
FRANKLIN
LAFAYETTE
DIXIE
Lake Iamonia
Lake Miccosukee
Lake Jackson
Lake Talquin
Lake Munson
Little Ochlockonee River
Tired Creek
River
Ochlockonee River
Quincy Cr.
Little River
Telogia Creek
Sopchoppy River
Wakulla River
St. Marks River
Wacissa River
Aucilla River
Econfina River
New River
Crooked River
Fenholloway River
Steinhatchee River
Suwannee River
Dog Island
APALACHEE BAY
GULF OF MEXICO
SCALE IN MILES
0 10 20 30

Figure 2.17

Figure 2.18 *Mature Pine—Forests Occupy About 77 Percent of the Land Area.*

10,000 faces each, were worked in the basin in 1960 and production amounted to 15,000 barrels of crude gum.

Production of tall oil as a byproduct of sulphate pulpmills has increased considerably in recent years, but existing mills are now approaching maximum output. New mills, or additions to existing mills, will allow some increase in total production in the future.

There are a number of active programs for improving forestry practices and yields in the basin. The States of Georgia and Florida are accelerating their programs for management assistance, and more farmers are being encouraged to improve their woodlands. In addition, both industry and consulting foresters are helping interested landowners improve their forest lands.

Public and private organizations support studies relating to forest problems and needs of the basin. Included among the organizations are the agricultural experiment stations, the U. S. Forest Service, the Georgia Forest Research Council at Macon, Georgia, the State forestry services, colleges and universities, the wood-using industries, and several foundations. Protection, management, utilization, and genetic studies all receive emphasis.

Major emphasis on educational activities is provided by the State forestry organizations through field personnel and by trained district and central office specialists.

All of the woodland, except the 91,000 acres in Lafayette County, Florida, is under organized fire protection. Most of the counties in the basin have been protected for more than 10 years.

The tree-planting program in both States is proceeding at a rapid pace. An average of nearly 40,000 acres per year has been planted in the Florida portion of the basin during the past 5 years. The Georgia Forestry Commission distributed about 5 million seedlings in the Georgia portion of the basin in 1960. More than 95 percent of the planting stock in both States was slash pine.

The Naval Stores Conservation Program is administered by the U. S. Forest Service for the Agricultural Conservation Program. The Service provides conservation payments for carrying out certain approved forestry practices on the land. Of the 26 producers in the basin, 23 are enlisted in the Naval Stores Conservation Program and work 540,000 of the 560,000 faces now treated for naval-stores production.

There have been no major epidemics of insects or diseases in the woodlands of the basin although this is an ever-present danger. Field technicians of the State and Federal forest services help detect outbreaks and report them for appropriate action.

Figure 2.19 *Reforestation Has Been Extensive During Recent Years.*

Needs and Opportunities

The productive capacity of the projected forest acreage, if reasonably harvested, can produce the estimated production requirements for wood and gum-naval stores. It is estimated that, by the year 2000, approximately 181 million cubic feet of growing stock could be cut in the basin.

The need for total naval-stores production is not expected to increase greatly in the next 40 years. However, the source of production is expected to change. Naval-stores production obtained from virgin tree stumps will gradually diminish as available stumpwood is used up; and gum-naval stores production, obtained by tapping live trees, will need to be doubled to make up the deficit. Enough slash pine and longleaf pine trees of workable size are expected to be available to meet this increase.

The farm woodland acreage is expected to decline while nonfarm acreage is expected to increase. Overall effect will be a small decline in total forest acreage.

Forest lands in public and industrial ownerships are, on the whole, fairly well managed. However, these ownerships have not had sufficient time or funds to bring all their lands into good operable condition and much work remains to be done.

Private nonindustrial forest lands have generally not received much management and have been badly abused and over cut. Most of these lands will require major improvements before they can provide sustained yields.

Although Georgia and Florida forestry organizations have done a good job in reducing wildfire losses, they are not fully staffed or equipped to cope with critical fire periods. Some strengthening of protection on both public and private lands could help insure adequate protection.

Figure 2.20 *Plowing Line Around Forest Fire — Forests Must Be Protected.*

In recent years considerable drainage work has been done on woodlands. Surface water control in woodlands permits better management opportunities, makes it possible to improve stands and quality of selected tree species, increases production of woodland products, and facilitates harvesting and protection activities.

Means of Meeting the Needs

A 2.5-fold increase in timber production and a doubling of gum-naval stores production in the Ochlockonee basin by the year 2000 would be required to meet projected needs. Improved practices and coordinated individual and community efforts will be essential to meet this demand.

TABLE 2.8

Basin Forest Production and Value

Item	Unit	1959	1975	2000
Growing stock, annual cut	cu. ft.	74,000,000	114,000,000	181,000,000
Stumpage value	dollar*	7,400,000	11,400,000	18,100,000
Gum-naval stores	bbl.	15,000	21,000	31,000
	face	560,000	777,000	1,120,000
Net annual leasing value of faced trees	dollar*	112,000	154,000	224,000

* 1960 dollar equivalent.

On Federal lands, forest management and protection programs can be accelerated by installation of facilities, road building, planting, and carrying out timber-stand improvement measures.

The following are improvements needed on private forest land: (1) Intensifying forest-fire protection for lands already under protection and including Lafayette County, Florida, in the organized fire-protective network; (2) strengthening forest insect and disease detection and control programs; (3) fencing to control woodland grazing; (4) tree planting; (5) preparing sites for natural regeneration; (6) timber-stand improvement; (7) establishing shelterbelts; (8) installing woodland water control and management; (9) improving naval-stores practices; (10) establishing more adequate programs for forest credit and insurance; and (11) intensifying educational and management assistance programs.

SECTION VIII – FISH AND WILDLIFE

General

Fish and wildlife resources have contributed much toward meeting the needs for food, furs, and outdoor recreation of people residing inside and outside the Ochlockonee basin. The relative importance of the fish and wildlife resources has changed since early colonial times when animal pelts and fish were valuable commodities of trade. Today the primary emphasis throughout the basin is on fishing and hunting for sport. Commercial fishing, however, continues to provide a source of livelihood for many residents along the coast.

Existing Facilities and Programs

Wildlife and Sport Fisheries

The land and waters of the basin are well adapted to the production of a variety of fish and wildlife. Many areas supporting an abundance of animal and plant life are only minutes from population centers. The Wakulla and the Wacissa Rivers, which are crystal clear and flanked by jungle vegetation, provide refuge for a variety of wildlife, including water birds, alligators, otters, and white-tailed deer. In the southwest part of the basin, just north of Carrabelle and extending into the Apalachicola National Forest, is a vast swamp known as Tates Hell Swamp. The New River winds through the stunted cypress and titi shrub of this swamp to produce a weird scene without counterpart, and wildlife is abundant.

Figure 2.21 *Wakulla River Is One of Many Attractive Fishing Areas in the Basin.*

About 3.3 million acres are considered suitable for big game. Nearly all of the lands predominantly forested and much of the woodlands interspersed with cleared land are occupied by white-tailed deer and wild turkey. American black bears also inhabit the extensive swamps of the lower Ochlockonee drainage area. There are an estimated 21,000 big game animals or an average of about one animal per 157 acres of suitable habitat.

Small game habitat, totaling approximately 4 million acres, is composed of the forests, woodlands interspersed with cleared land, and marshlands. Bobwhite quail, mourning doves, squirrels, and rabbits are the principal small game species of the uplands. Rails are the dominant game bird of the coastal marshes. An estimated 2,620,000 small game animals inhabit the basin or an average density of about one animal per 1½ acres of land.

There are 375,000 acres of waterfowl habitat in the basin. The coastal fresh-water marshes, the

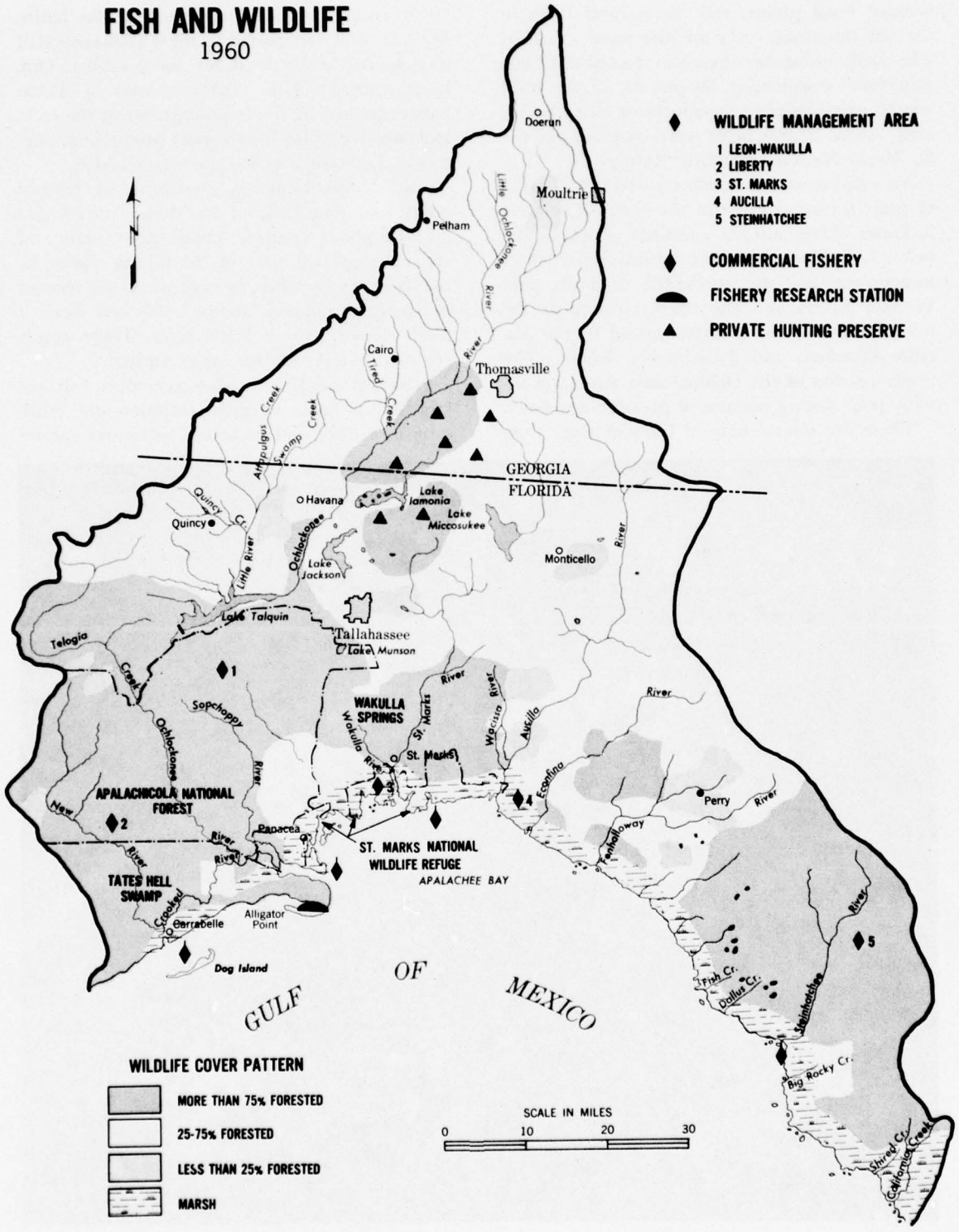
FISH AND WILDLIFE
1960
WILDLIFE MANAGEMENT AREA
1 LEON-WAKULLA
2 LIBERTY
3 ST. MARKS
4 AUCILLA
5 STEINHATCHEE
COMMERCIAL FISHERY
FISHERY RESEARCH STATION
PRIVATE HUNTING PRESERVE
N
Doerun
Moultrie
Pelham
Little Ochlockonee River
Cairo
Tired Creek
Thomasville
Ochlockonee River
Attapulgus Creek
Swamp Creek
GEORGIA
FLORIDA
Quincy
Quincy Cr.
Little River
Havana
Lake Iamonia
Lake Miccosukee
Lake Jackson
Monticello
Aucilla River
Lake Talquin
Tallahassee
Lake Munson
Telogia Creek
Sopchoppy River
WAKULLA SPRINGS
Wakulla River
St. Marks River
St. Marks
Wacissa River
Aucilla River
Econfina River
Fenholloway River
Perry
APALACHICOLA NATIONAL FOREST
New River
Panacea
ST. MARKS NATIONAL WILDLIFE REFUGE
APALACHEE BAY
TATES HELL SWAMP
Crooked River
Carrabelle
Alligator Point
Dog Island
GULF OF MEXICO
Fish Cr.
Dallus Cr.
Steinhatchee River
Big Rocky Cr.
Shired Cr.
California Creek
WILDLIFE COVER PATTERN
MORE THAN 75% FORESTED
25-75% FORESTED
LESS THAN 25% FORESTED
MARSH
SCALE IN MILES
0
10
20
30

Figure 2.22

wooded flood plains, and the natural lakes in the old limestone sinks are the most valuable. The 1960 midwinter inventory recorded 60,000 waterfowl, constituting 30 percent of the total waterfowl recorded in the Southeast River Basins area. About 23,000 birds were observed on the St. Marks National Wildlife Refuge.

An evaluation was made on about 350 miles of sport fishing streams in the basin. The Ochlockonee River affords excellent sport fishing below Lake Talquin. Other streams of particular importance are the spring-fed Wakulla and Wacissa Rivers and the black streams of the lower Coastal Plain as characterized by the Aucilla, Econfina, and Steinhatchee Rivers. The upper reaches of the Ochlockonee River are usually poor fishing because of periodic low flows.

There are several natural lakes of more than 40 acres in the Florida portion of the basin. Most of these are located in the Tallahassee Hill section. All are utilized for sport fishing. One large reservoir, Lake Talquin, west of Tallahassee, formed by the impoundment of the Ochlockonee River for hydropower production, augments the acreage of natural water bodies.

Small impoundments, consisting of natural ponds and lime sinks of less than 40 acres and all farm ponds, comprise about 26,000 acres and are an important part of the fishing waters in the basin. Farm ponds, most of which are located in Georgia, number about 1,400 and have a total surface area of 5,500 acres. These ponds are used extensively for sport fishing.

Principal kinds of fresh-water sport fish are largemouth bass, bluegills, crappies and other sunfish, catfish, and pickerels. Salt-water species

Figure 2.23 *Shoreline Facilities at Lake Talquin.*

also are taken along lower reaches of the rivers.

The coastline comprises about 200 miles, or almost one-third of the total coastline of the Southeast River Basins area, and is indented with many bays, lagoons, salt-water creeks, and estuaries. These protected and enriched waters provide excellent nursery and forage areas for finfish and shellfish. West of the Aucilla River the marshland occurs in patches between ridges of relatively high ground. Offshore there are scattered reefs, oyster bars, grass flats, and barrier islands which protect the sounds from the wave action of the open Gulf.

The surface area of inshore waters totals about 155,000 acres. By extending the boundaries of the basin seaward for 12 miles, the recognized limit of nearly all fishing activity, the offshore area contains about 750,000 acres.

Principal fishes taken inshore include speckled sea trout, mullet, redfish, white sea trout, sheepshead, grouper, whiting, flounder, and pompano. The principal offshore species include sea bass, Spanish and king mackerel, grouper, bluefish, and jacks.

The State game and fish departments of Georgia and Florida have primary responsibility for administering the wildlife and sport fishing resources. Federal agencies cooperating with the State conservation agencies in the advancement of conservation programs include agencies of the Department of Interior, Department of Agriculture, and Department of Defense.

Publicly managed wildlife areas of major importance total 732,000 acres or about 18.5 percent of the wildlife habitat in the basin. The Apalachicola National Forest is the largest single tract of land within the basin in which wildlife resources are managed for public use. The St. Marks National Wildlife Refuge provides winter habitat for a concentration of Canada geese, the remnant of a much larger population which once wintered along the Gulf coast of Florida.

Habitat improvement and public hunts are conducted within the State wildlife management areas. Both Georgia and Florida have farm game programs which encourage and aid farmers in managing wildlife resources on their lands. Fishery management has been concerned largely with technical advice, renovation, and restocking of natural lakes and farm ponds. Florida has an active program of public access development. Law enforcement and education programs are important facets of State and Federal activity.

Of special significance are the large privately owned plantations in the vicinity of Thomasville, Georgia, and north of Tallahassee, Florida, which have been developed primarily for hunting. Land-use practices on these preserves are designed to improve habitat for bobwhite quail, wild turkey, deer, ducks, and mourning doves.

TABLE 2.9

Fresh-Water Fish and Wildlife Installations and Areas (acres)

Area[1]	1960 ownership			Total
	Public		Private	
	Federal	Non-Federal		
Federally administered				
St. Marks National Wildlife Refuge	[2]95,000	0	0	[2]95,000
Apalachicola National Forest	444,000	0	0	444,000
Subtotal	539,000	0	0	539,000
State administered				
Steinhatchee Wildlife Management Area	0	0	113,000	113,000
Aucilla Wildlife Management Area	0	0	110,000	110,000
St. Marks Wildlife Management Area	[3](3,000)	0	0	—
Leon-Wakulla Wildlife Management Area	[4](67,000)	0	0	—
Liberty Wildlife Management Area	[4](100,000)	0	0	—
Subtotal	—	0	223,000	223,000
Total	539,000	0	223,000	762,000

NOTES: [1] All areas are located in Florida.
[2] Includes 30,000 surface acres of water bodies.
[3] Within St. Marks National Wildlife Refuge — this area has since been abandoned.
[4] Within Apalachicola National Forest.

Commercial Fisheries

Commercial fishing is an important coastal enterprise. The yearly average commercial catch from 1955 to 1959 totaled 5.1 million pounds and provided a gross return of $468,300 to the fishermen. Commercial catch not for human consumption constituted less than 1 percent of the total catch by weight and value. Crabs, oysters, shrimp, and mullet were the principal food fish landed at ports in the basin. Other food fishes landed include groupers, spotted sea trout, red snapper, and sea catfish. Menhaden was the principal nonfood fish for industrial purposes. A considerable portion of seafoods processed from these landings are consumed locally, but some products are marketed throughout the eastern United States.

Salt-water fisheries are administered cooperatively by the Florida State Board of Conservation and the U. S. Bureau of Commercial Fisheries. A fisheries research station is located on Alligator Point and there are numerous other programs for research, development, and service in the region, although few are headquartered in the basin. The U. S. Bureau of Commercial Fisheries has an active exploratory fishing program in the Gulf of Mexico and is testing new kinds of equipment for more efficient harvest. Technological services are also directed toward development of new markets for fishery products. The Bureau of Commercial Fisheries provides market news service and assists the industry with loans to qualified fishermen.

Needs and Opportunities

Wildlife and Sport Fisheries

In 1960, hunting and fishing afforded about 1,068,000 user-days of outdoor recreation. By the year 2000, it is expected that hunting and sport fishing will increase to 1,849,000 user-days.

The total population increase and the trend toward urbanization were considered to be decisive factors in projecting hunting and fishing demands. Per capita demand for hunting and fishing decreases as urbanization increases. This was readily apparent in comparative studies of hunting and fishing license sales in urbanized and rural counties in the Southeast River Basins.

The net effect of population growth in the basin and its service area will result in a significant increase in the total demand for hunting and fishing, in spite of an expected small decline in per capita demand after 1975. An important part of the total demand is expected to originate from nonresidents, mostly in Georgia and Alabama.

Use of publicly owned and managed areas is expected to increase at a rate greater than the general increase in population and the overall hunting and fishing effort. Closure of more private lands to public use will make it increasingly difficult for the urbanite to find a place to fish and hunt, despite increases in travel, leisure time, and personal income.

The rate of increase in hunting demand is expected to be less than that for sport fishing. The

TABLE 2.10

Wildlife Needs and Supplies (thousands)

Year	Type of resource	Needs	Supplies		Deficits
		User-days	Acres of habitat	User-days capacity*	User-days
1960	Big game	61	3,336	105	0
	Small game	240	3,951	437	0
	Waterfowl	19	375	20	0
1975	Big game	72	3,336	120	0
	Small game	283	3,951	437	0
	Waterfowl	22	375	20	2
2000	Big game	94	3,336	130	0
	Small game	365	3,951	437	0
	Waterfowl	29	375	20	9

* Based on existing and prospective numbers of game animals, with continuation of going programs.

wildlife resources which sustained about 30 percent of the total hunting and fishing effort in 1955, will probably provide less than 26 percent of the total effort by the year 2000.

Hunting goals that reflect little change in either the distribution of future use or the type of resources were established based on analyses of the needs and opportunities in relation to existing and prospective resource supplies. In general, there will be adequate numbers of both big and small game animals in 1975 and 2000 with normal expansion of going programs. A slight deficit in user-day capacity of waterfowl resources is anticipated, even though the wetlands of this basin are believed to afford the best opportunity in the Southeast River Basins area for waterfowl development. The problem of small game availability will increase with continued closure of private lands to public use. This will be particularly true in the general farming areas where the upland small game species are most abundant.

Analyses of the needs and desires for fishing in relation to resource trends and development opportunity indicate that in the future an increased emphasis will be placed on salt-water fishing. This type of sport fishing is growing in popularity as boats, motors, and other equipment are improved. Salt-water fishing, which represented 45 percent of all sport fishing in 1955, is expected to increase to 53 percent by the year 2000. Current utilization is slight when compared to the estimated user-day capacity of the coastal waters.

The distribution of fishing effort according to fishing preference indicates that deficits in user-day capacities of streams and large impoundments would be evident by 1975.

Total capacity of small impoundments, both existing and anticipated, is estimated to be adequate, however, there is a need for more ponds near urban centers.

Commercial Fisheries

Demands for food fish landed at ports in the basin are expected to be about 6.6 million pounds by 1975. By year 2000, a catch of 10.7 million pounds is expected which is slightly more than double the catch in 1960. Demands for fishes for other than human consumption are expected to increase to about 60,000 pounds by 2000. The pounds of fish which must be caught to provide the share of the United States market assigned to the basin in 1975 and 2000 was based on the annual commercial catch from 1955-59, and the assumption that both the ratio of basin catch to national market and per capita consumption of fish would remain constant.

TABLE 2.11

Sport Fishing Needs and Supplies
(thousands)

Year	Type of water resource	Needs	Supplies		Deficits
		User-days	Acres of habitat	User-days capacity*	User-days
1960	Streams	62	7	70	0
	Large impoundments	196	25	250	0
	Small impoundments	152	28	700	0
	Salt water	338	905	4,525	0
1975	Streams	75	7	70	5
	Large impoundments	266	25	250	16
	Small impoundments	209	30	750	0
	Salt water	452	905	4,525	0
2000	Streams	95	7	70	25
	Large impoundments	341	25	250	91
	Small impoundments	208	32	800	0
	Salt water	717	905	4,525	0

* Based on existing and prospective standing crop of game fish, with normal expansion of going programs.

TABLE 2.12

Commercial Catch Requirements
(thousands of pounds)

Species	1960*	1975	2000
For food			
Crabs	2,500	3,060	5,000
Shrimp	340	416	425
Oysters	320	392	640
Selected finfishes	1,805	2,209	3,555
Miscellaneous finfishes	125	153	250
Other fishes	0	400	850
Subtotal	5,090	6,630	10,720
For other than human consumption			
Miscellaneous fishes	10	14	20
Menhaden	20	26	40
Subtotal	30	40	60
Total	5,120	6,670	10,780

* Based on the average annual catch from 1955-59.

Domestic production of the commercial fishing industry in the Southeast River Basins and in the Nation declined slightly during the period from 1950 to 1960 while food fish imports have steadily increased. Analyses of resource potentials and development opportunities, however, indicate commercial fishing could keep pace with the economic growth of the Nation. Future requirements by kind of fishery resource were distributed mainly on the basis of trends in demand, resource availability, development opportunities, and expected improvements in techniques and methods.

Means of Meeting the Needs

Wildlife and Sport Fisheries

Studies of the fish and wildlife potentials within the Ochlockonee basin reveal that with more intensive management and increased availability of fish and wildlife resources the demand for hunting and fishing can be met. Some adjustment in wildlife and fish inventories and in the relative amount of pressure exerted on each resource will have to be made in recognition of the trends in preferences and in the problems and opportunities confronting the development of specific types of game and fish.

Big game development affords one of the more promising ways to meet the future demand for hunting. With more extensive management, the habitat is capable of supplying the anticipated big game demand and could accommodate the unsatisfied demand for waterfowl hunting, even though some loss of habitat is expected through urban and industrial development. Cooperation among forestry interests in management may be expected with continued emphasis on a program involving private landowners, conservation agencies, and sportsmen. This cooperation is important in maintaining big game populations because some forestry practices which involve destruction of hardwoods, planting of solid pine stands, and draining and clearing mixed forest land considerably reduce the carrying capacity of the habitat. An expected increased emphasis on hardwood production will be of value for game management.

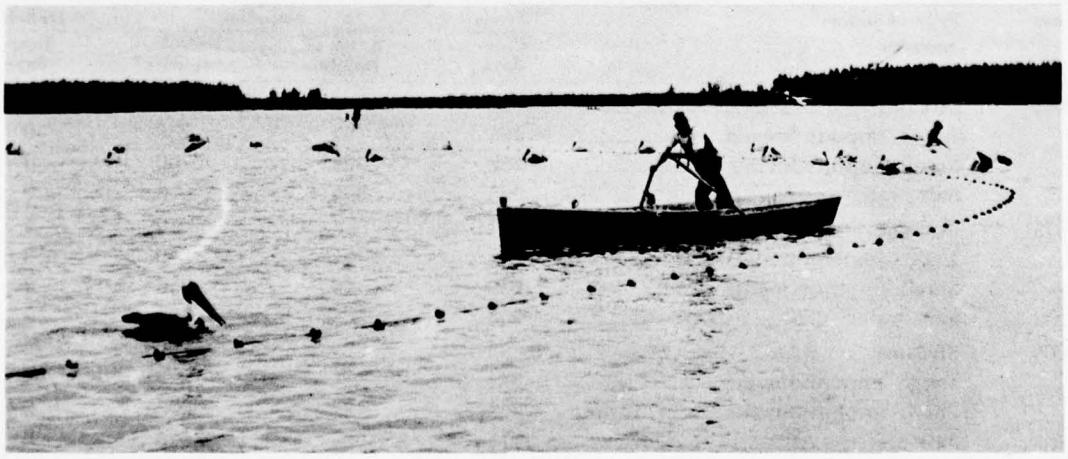

Figure 2.24 *Commercial Fishing in Gulf of Mexico Could Be Greatly Improved.*

To meet the projected demand for big game hunting, a total of 19,000 head by the year 2000 would be adequate. Actually, an inventory of around 26,000 head is expected without accelerating the going programs. For maximum benefit, however, the habitat presently occupied by deer and turkey could be managed more intensively to increase the existing population; and the unoccupied habitat could be brought into production to attain an average density of 128 acres per animal.

A big game program could be built around the five existing game management areas in Florida and a new area in Georgia. The existing areas and the new management area needed in Georgia could be improved by the State game and fish agencies in cooperation with the landowners, generally in accordance with the type of programs now in effect. The coordinated approach to timber-wildlife management in the Apalachicola National Forest needs to be accelerated and expanded.

The task of developing small game resources to meet the demand lies primarily with the landowners. The type and pattern of land uses commonly used by agricultural landowners provide favorable habitat for small game animals. Major requirements for improving small game habitat can be met by the action of individual landowners through wider employment of agricultural practices providing food and cover and by favorable forestry practices in coastal flatwoods. These include prescribed burning, roadside planting, and food and cover strip planting. Bobwhite quail and mourning dove are the most popular game species in the basin.

Meeting the demand for waterfowl hunting is a problem which cannot be effectively achieved solely by more intensive management within the basin, although this will be of some value. Basically, this is a problem of supply and originates far from the borders of the basin. The duck population in the Atlantic Flyway, after remaining essentially static for several years, has resumed a gradual decline. The waterfowl value of the Ochlockonee basin wetlands, however, can be enhanced by a program to preserve and increase the attractiveness of the habitat and by a program to increase production of resident species. Waterfowl potentials of the St. Marks National Wildlife Refuge could be more fully realized by renovation of existing water control structures, construction of new facilities, and development of additional agricultural lands for the production of waterfowl foods.

The coastal region extending from near the mouth of the St. Marks River to the mouth of the Suwannee has great waterfowl potentials which could be realized by a program designed to convert the vast saline marshes into areas with more desirable vegetation. This could be accomplished by single-purpose development or in conjunction with projects that will permit regulation of water depth and salinity.

The establishment of regulated shooting preserves by local interests for small game and waterfowl hunting is desirable because this type of sport affords reasonably satisfactory hunting without being dependent upon resident game supplies.

A balanced program of stream and lake improvement and development is needed to meet current and future fishing needs.

If the present trend in farm pond construction continues, more than enough fish are expected to be produced in small impoundments to sustain the demand for this type of fishing if public access is provided. An expansion of the current fisheries program, however, will be needed to service these and other impoundments and thereby increase the acreage which offers quality fishing.

There is a marked deficit in the acreage of large lakes in the Georgia portion of the basin and by the year 2000, the acreage will also be inadequate in Florida. New waters need to be created, particularly in the upper portion of the basin. Field surveys have revealed numerous sites well adapted to the construction of large reservoirs. A minimum of 9,100 additional acres of large impoundments, with the present management levels, will be required to produce the weight of fish necessary to meet the anticipated fishing demand. With medium level management, a minimum of 1,200 additional acres of large impoundments, established primarily for sport fishing, would suffice.

New streams to satisfy increasing demands for fishing cannot be created as can impoundments. Therefore, meeting the demand for stream fishing will depend largely upon improvement of

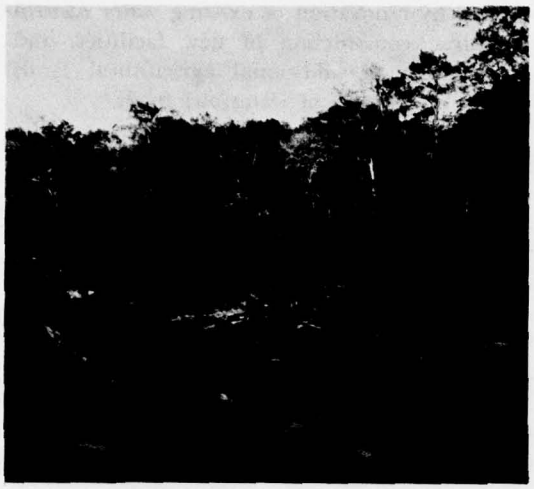

Figure 2.25 *Upper Reaches of Ochlockonee River Need Streamflow Regulation.*

existing habitat, development of additional facilities, and providing more public accesses.

Realization of the full potentials of the streams will require flow regulation to increase their productivity. The period when conditions are favorable for sport fishing will need to be extended, while permitting necessary fluctuations for best fish production and harvest. Regulated streamflow, coupled with sewage treatment and proper disposal of industrial wastes, would also abate pollution problems and enhance the stream values.

To preserve and increase the public's fishing opportunity, existing programs of access development require major expansion. Additional access points with permanent boat-launching ramps and parking areas would be required on existing lakes and streams, and camping facilities at a number of these sites would increase their utility.

Satisfying the projected demand for salt-water sport fishing is limited more by the number and type of facilities than by the extent and productivity of the habitat. There is need for improved services and accommodations, and more facilities if the abundant resources are to be more fully utilized.

At present, salt-water sport fishing is largely centered near Carrabelle, Ochlockonee Bay, St. Marks, and Steinhatchee, Florida. The coastal waters from Apalachee Bay to the mouth of the Suwannee River are mostly undeveloped. Vast stretches of the coastline, particularly south of the Aucilla River, are void of human habitation. Although these are accessible to some sport fishermen with modern craft, utilization is light. Except for the fishing center at Steinhatchee, accommodations and facilities are substandard, or are lacking altogether. Although the popularity of pier fishing is recognized, there are no new facilities of this type in the basin.

To increase the availability of the salt-water sport fishing resources, new roads are needed to key sites along the coast and many existing roads need to be improved. Four sites of particular importance are Shired Island, Big Rocky Creek, Dallus Creek, and Fish Creek. Several fishing piers are needed at these and other selected points. Many existing accommodations need to be improved and new access stations are needed along the coast.

For maximum benefit, all highways, landfills, canals, and other developments must be designed to safeguard and enhance the production capacity of the coastal waters. Navigation in the shallow, inshore waters needs to be improved in order to distribute the fishing effort; and bays and coastal impoundments need to be created whereby marine waters may be well mixed with the fresh waters of inland drainage. This action would enhance their productivity and utilization.

A definite plan of action is needed to preserve areas of special significance such as Wakulla River, Wacissa River, and Tates Hell Swamp. Wakulla Spring and the upper reaches of the river have been developed as a resort area, and great care has been exerted to preserve the natural setting. The Wacissa River has been preserved in a natural setting, mainly because most of the adjacent land is in large ownerships and managed primarily for pulp and timber production. A portion of this land is within the Aucilla State Wildlife Management Area on which wildlife is managed by the Florida State Game and Fresh Water Fish Commission in cooperation with private landowners. The major portion of Tates Hell Swamp was recently purchased and is being drained for timber purposes. It would be desirable for Federal and State conservation agencies to acquire and develop at least part of these areas for public use with special provisions for the preservation of their abundant and diversified fish and wildlife resources.

Commercial Fisheries

An analysis of commercial fishery potentials indicates the demand for seafoods in the Ochlockonee basin can be met by improving techniques, increasing facilities, and more intensive management of available habitats. The crab fishery offers the most favorable opportunity for meeting the requirements for seafoods. Crabs are abundant in the coastal waters of the basin and the market has been growing steadily.

There are suitable sites for oyster cultivation, but incentives are lacking. Oyster landings have been somewhat static because of the vagaries of weather and the precarious market conditions.

Known shrimp resources are fully utilized at present. More extensive knowledge is needed concerning the biology of the shrimp and the effects of fishing on the shrimp population. New sources of supply need to be discovered.

Conceivably, as the population increases and more food supplies are needed, a return to the sea as a source of food and employment may become more important. The catch of finfishes needs to be expanded, and the methods of processing and distribution improved. However, the economic feasibility of the commercial fishery potentials of the basin needs to be demonstrated to encourage their development in the face of foreign competition and competition with the domestic meat and poultry industries.

The commercial fishery outlook of the Ochlockonee basin, as well as that of other Southeast river basins, could be greatly improved by applying the findings of new studies and going programs aimed at determining the most economical methods of catching, handling, processing, and marketing mullet, speckled trout, other finfish and shellfish, and at developing practical marine shellfish farms for oysters, shrimp, hardshell clams, and crabs.

SECTION IX – RECREATION

General

The Ochlockonee basin population is expected to be 80 percent urban by the year 2000 as compared to less than 50 percent in 1960. With extensive forest areas, a relatively undeveloped coastline, and many rivers and lakes, the basin has an outstanding recreation potential. To satisfy projected recreation demands, the existing recreation areas and facilities would have to be expanded and new areas and facilities would have to be developed. Any development should take cognizance of the existing natural resources and the increasing urban growth in the basin, and the United States as well.

Existing Facilities and Programs

It is estimated that the existing facilities could support about 1.1 million user-days. Some areas are not sufficiently utilized and others are overcrowded. About 60 percent of the visitation is on the Gulf coast. A brief description of the existing public recreation areas in the basin follows.

Beaches from Apalachicola Bay just west of the basin to Ochlockonee Bay contain some areas reserved for public use, and others are being developed for restricted use. Offshore, Dog Island has an excellent beach. This island is privately owned and undergoing private developments. Only a small part of the island beach is being reserved for public recreation. Access to the island is by ferry.

Keaton Beach, south of Perry on the Gulf of Mexico, is being developed by pumping sand from the Gulf for the beach area. Both private lots and a public beach are being developed.

About 444,000 acres of forest and swamp in the Apalachicola National Forest occupy the southwest corner of the basin. Facilities for swimming, camping, picnicking, boating, fishing, and hunting are provided. Trailers are accommodated in some recreational areas.

St. Marks National Wildlife Refuge, with over 95,000 acres of land and water along the Gulf shore, is open to fishing and occasionally to hunting. Deer and many species of waterfowl are present. There are two picnic grounds. No motor-driven craft are allowed on the lakes.

Lake Talquin, west of Tallahassee, is a 9,750-acre reservoir owned by the Florida Power Corporation. Boating is permitted and several small areas are available for picnicking, but public access sites are developed to a minimum extent.

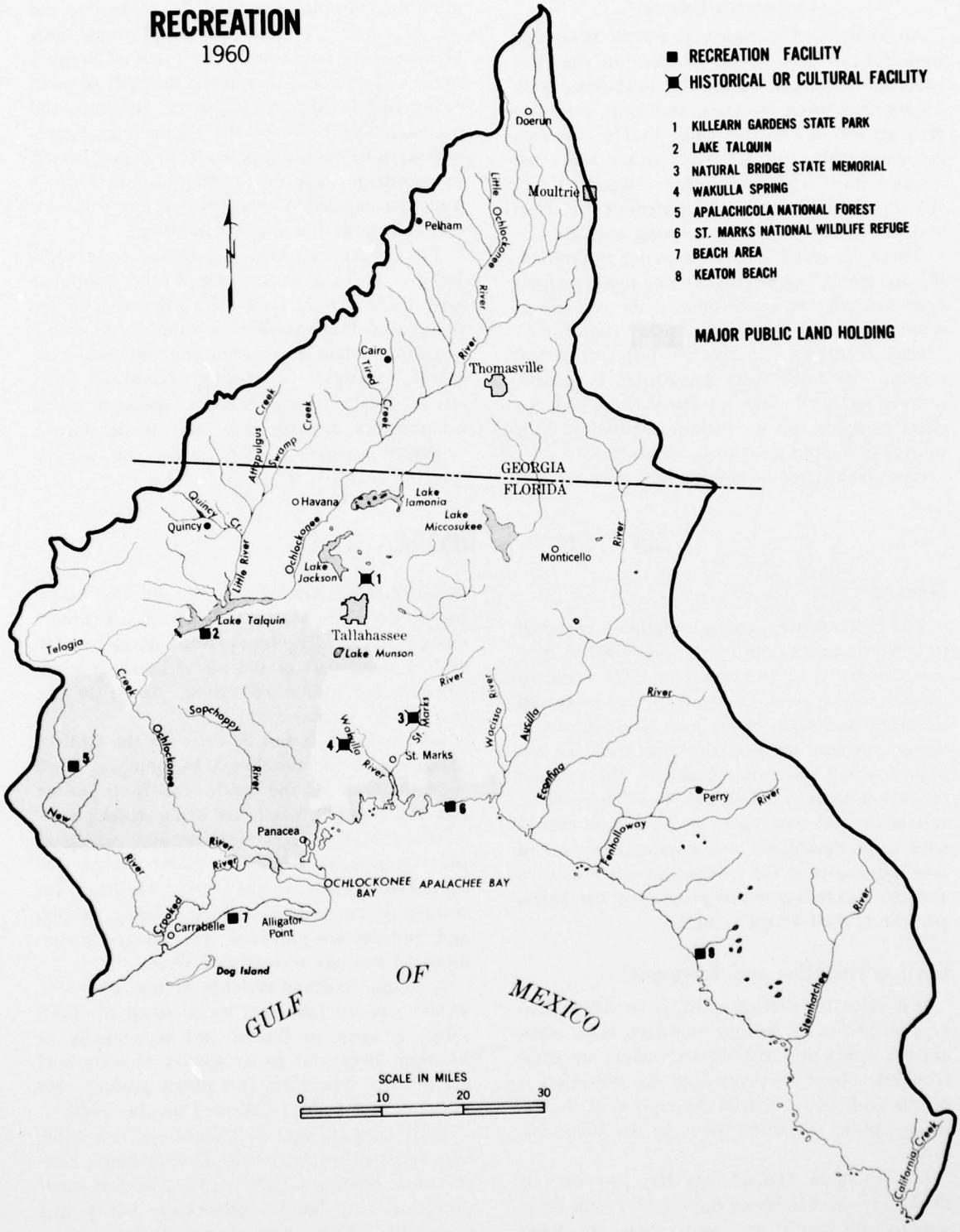
RECREATION
1960
RECREATION FACILITY
HISTORICAL OR CULTURAL FACILITY
1 KILLEARN GARDENS STATE PARK
2 LAKE TALQUIN
3 NATURAL BRIDGE STATE MEMORIAL
4 WAKULLA SPRING
5 APALACHICOLA NATIONAL FOREST
6 ST. MARKS NATIONAL WILDLIFE REFUGE
7 BEACH AREA
8 KEATON BEACH
MAJOR PUBLIC LAND HOLDING
Doerun
Moultrie
Pelham
Little Ochlockonee River
Cairo
Thomasville
Tired Creek
Ochlockonee River
Ampulgus Creek
Swamp Creek
GEORGIA
FLORIDA
Havana
Lake Iamonia
Lake Miccosukee
Quincy
Quincy Cr.
Little River
Ochlockonee
Lake Jackson
Monticello
Lake Talquin
Tallahassee
Lake Munson
Telogia Creek
Sopchoppy
Ochlockonee River
Wakulla River
St. Marks River
St. Marks
Wacissa River
Aucilla River
Econfina River
Perry
New River
Panacea
Fenholloway River
OCHLOCKONEE BAY
APALACHEE BAY
Crooked
Carrabelle
Alligator Point
Dog Island
GULF OF MEXICO
Steinhatchee River
California Creek
SCALE IN MILES
0 10 20 30

Figure 2.26

Figure 2.27 *Headed for Dog Island — A 45-Minute Ferry Ride from Carrabelle, Florida.*

Lakes Jackson and Iamonia are natural lakes located in limestone sinkholes north of Tallahassee. These lakes in their present conditions offer only limited recreation opportunity because of the undependable water-storage condition, excessive aquatic vegetation, and private ownership of the shorelines. Lake Bradford located southwest of Tallahassee is a similar but much smaller lake that has been developed by private enterprises into an attractive recreation area.

Natural Bridge Battlefield Historic Memorial is a 6-acre tract on the St. Marks River that commemorates a Civil War battle. The area is used primarily for fishing and picnicking.

Killearn Gardens State Park is a 307-acre park located on U. S. Highway No. 19 north of Tallahassee. The main attractions in this park are its beautiful formal gardens and a 10-acre lake used for fishing, boating, and swimming.

Wakulla Spring is located between Tallahassee and the Gulf of Mexico and has a flow of 183 million gallons per day. A small but attractive beach borders one side of the spring and glassbottom boats provide a view of underwater fish and plant life.

Needs and Opportunities

The recreation needs as used in this Report are based only upon public use and opportunity of nonurban outdoor recreation areas. The many user-days of recreation that take place at private facilities or urban locations are not included in the projected needs.

In estimating the future basinwide demand for public outdoor recreation, it was assumed that the number of residents in the Southeast River Basins who leave the area primarily for recreation purposes are about equal to the nonresidents who come into the area for recreation.

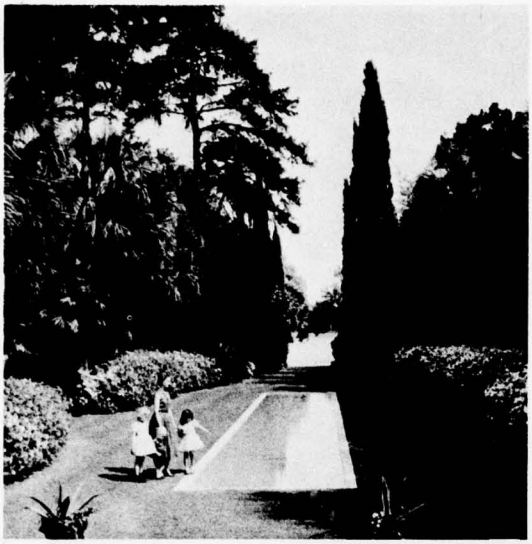

Figure 2.28 *One of Many Beautiful Scenes in Formal Gardens at Killearn Gardens State Park, Florida.*

In addition, there are many recreationists who pass through the basin and about 60 percent of these travelers are expected to participate in some type of outdoor recreation during the time they are in the Ochlockonee basin. Proper development of the many outstanding land and water resources available could make this area very attractive to recreation-seeking people.

The basin has a natural beauty and the resources around which recreational opportunity can be developed. Of special significance are the Gulf coast and St. Marks National Wildlife Refuge. Major transportation routes from the north and west to the Florida peninsula cross the basin and Interstate Highway No. 10 will cross in an east-west direction. The landscape is varied with farmland in the northern portion of the basin and vast pine forests in the lower portion.

TABLE 2.13

Recreation User-Days—1960, 1975, and 2000 (thousands)

Area	1960	Projected need	
		1975	2000
Ochlockonee basin	*1,050	4,000	10,000
Southeast River Basins	35,000	95,000	230,000

* Facilities available for 1,050,000 user-days. Actual use in 1959 was about 769,000 user-days.

Means of Meeting the Needs

Recreational opportunities are needed throughout the basin. Of the existing recreation areas, those along the Gulf coast will be able to absorb more visitors than those in the interior of the basin. The beaches, with a program of development, could absorb a great share of the recreation demand. Natural Bridge Battlefield Historic Memorial, Killearn Gardens, Wakulla Spring, and St. Marks National Wildlife Refuge are of interest to the student of nature and history and to the sightseer. Lake Talquin and Apalachicola National Forest offer important recreational opportunities because of the natural environment and unusual setting. Additional facility development for public use would greatly enhance the recreational value.

The type of areas offering development opportunities to meet the total demand for 10 million user-days expected by year 2000 are as follows:

(1) Archeological and historic areas offering special opportunities for development are Bird Hammock, Lake Jackson, Fort San Luis, and Fort St. Marks.

(2) Areas to provide access to both fresh water and salt water could be provided to meet the needs and would vary in size to meet local conditions. Some would be small local recreation areas and others would be areas as large as 75 acres. The 14-mile long Wacissa River, with its unique natural beauty and spring-fed waters, affords outstanding recreation possibilities.

(3) Development of several parks at suitable locations in the basin could provide opportunity for camping, picnicking, boating, and swimming. In many instances, a large swimming pool would be desirable. These recreation areas could vary as to size and as to the facilities provided, depending upon expected use.

TABLE 2.14

Recreation Facility Needs (thousands of user-days)

Facilities	1960	Increase to 1975	Increase 1975-2000	Total 2000
Enlarging existing areas	1,050	650	2,700	4,400
New areas	....	2,300	3,300	5,600
Total	1,050	2,950	6,000	10,000

SECTION X – SALINITY AND SEDIMENT CONTROL

General

Salinity and sediment problems in the Ochlockonee basin are localized and not significant at the present time.

A salinity problem occurs when enough salt accumulates in the soil to impair crop productivity, or when salt-water intrusion into fresh-water areas limits the water use.

Sediment problems result when water transports and deposits silt, sand, and other matter in reservoirs, ditches, channels, and other areas where sediment is objectionable, or when turbidity curtails the use of water.

The sediment yield of the Ochlockonee River is low, mainly because the river drains a gently rolling to almost level area of sands and sandy loams. The estimated average suspended sediment concentration in the Ochlockonee River is about 20 parts per million. Available data suggest that the bedload may constitute 10 percent of the total sediment load. Concentrations of such low magnitude do not present serious problems.

In general, erosion and thus sediment load and damage are greater per unit of area in the Upper Coastal Plain than in the Lower Coastal Plain.

Saline soils occur on a total of about 27,000 acres of salt marsh in Taylor, Dixie, Franklin, and Wakulla Counties. There have been no reports of acreages where saline problems have been created or accelerated by heavy fertilization or by irrigation with saline or brackish waters.

Saline soils represent less than 1 percent of the total basin area. Because of the small amount of land involved and the high costs associated with reclamation, no concerted effort has been made to reclaim or rehabilitate areas having saline conditions. Areas in the basin with saline soils are used largely for grazing and as habitat for wildlife.

Salt water has caused some problems by intruding into the fresh-water supplies at the Tallahassee steam powerplant at St. Marks and at Keaton Beach. Salt-water intrusion into ground water supplies may also become a problem at other coastal developments, if excessive demands are made on the ground water aquifer near the Gulf. Detailed studies of this problem as it relates to coastal cities and developments will probably be warranted prior to 1975.

Existing Facilities and Programs

There are no existing programs exclusively for sediment or salinity control. The conservation programs administered by soil and water conservation districts include features which control erosion and hence reduce sediment loads. Interest has been expressed in project-type action for flood prevention and drainage which would also reduce movement of sediments.

Needs and Opportunities

Erosion damage was a pressing problem in 1960 on about 250,000 acres of land, and project action may be needed on 38,000 acres of the more critical sediment producing land. Most of the acreages are in upland areas where intensive cultivation has resulted in accelerated rates of erosion. Erosion control in these sediment producing areas would enhance useful life of downstream water developments. One of the effects of land treatment measures shown in Section VI, Soil Conservation and Utilization, would be to reduce sediment production.

Roadside erosion problems occur predominantly along 832 miles of county maintained roads resulting in an estimated loss of about 96,000 tons of soil annually. Effective control measures consisting of vegetative plantings and similar stabilizing measures on the eroding areas would result in at least a 90-percent reduction in the rates of soil loss. The savings in cost for road maintenance would be at least great enough to offset the cost for treatment. With the expected new highway construction, roadside-erosion control needs probably will be 15 percent greater by 1975 and 25 percent greater by 2000. The measures recommended for sediment control on roadsides and other earthmoving construction areas can be installed effectively as parts of overall watershed treatment and highway programs.

Limited studies indicate that direct damage from sediment in this basin is negligible and

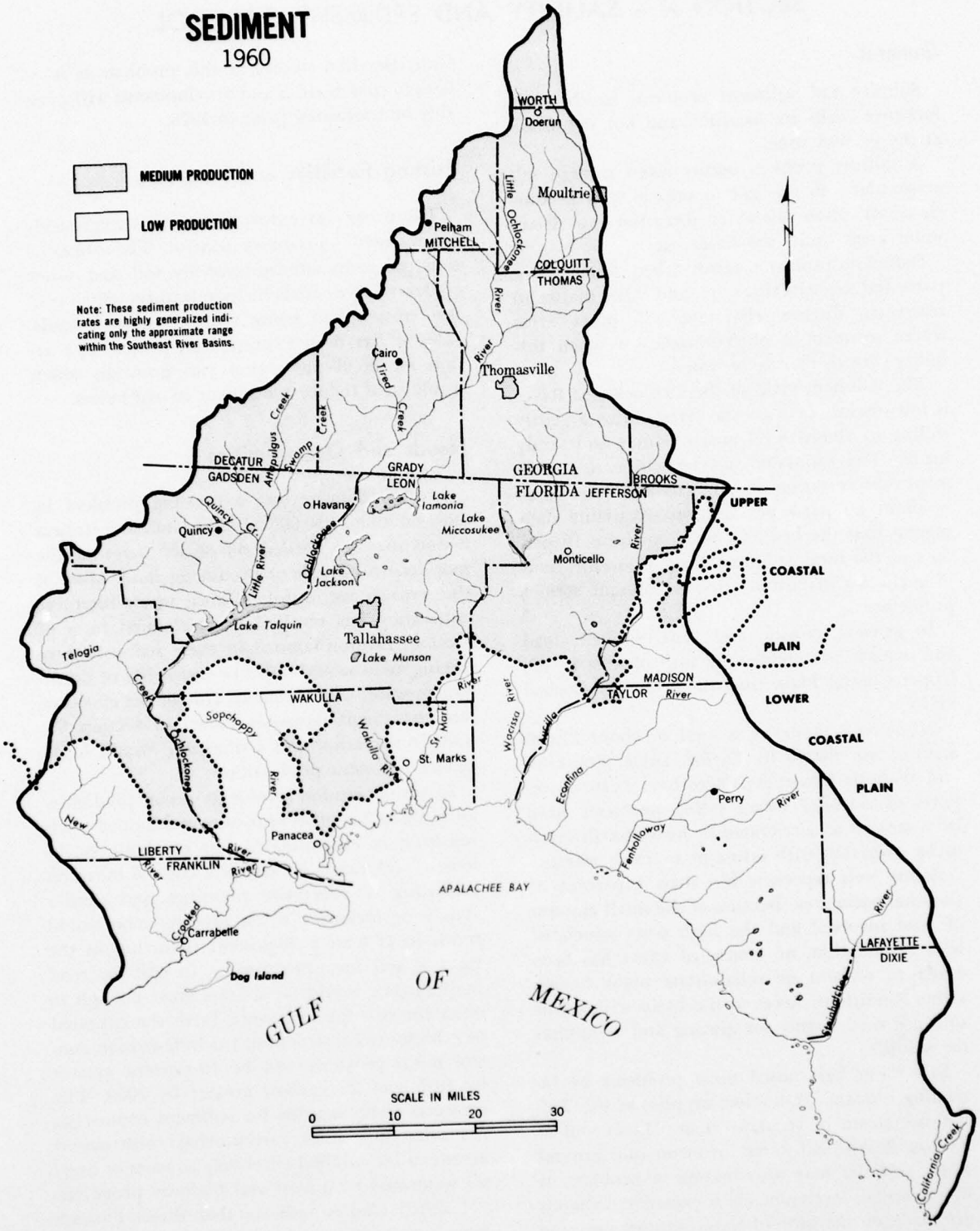
SEDIMENT
1960
MEDIUM PRODUCTION
LOW PRODUCTION
Note: These sediment production rates are highly generalized indicating only the approximate range within the Southeast River Basins.
WORTH
Doerun
Moultrie
Pelham
MITCHELL
COLQUITT
THOMAS
Little Ochlockonee River
Cairo
Tired Creek
Thomasville
Ochlockonee River
Attapulgus Creek
Swamp Creek
DECATUR
GADSDEN
GRADY
LEON
GEORGIA
FLORIDA
JEFFERSON
BROOKS
UPPER COASTAL PLAIN
Havana
Lake Iamonia
Lake Miccosukee
Quincy
Quincy Cr.
Little River
Ochlockonee River
Lake Jackson
Monticello
Aucilla River
Lake Talquin
Tallahassee
Lake Munson
Telogia Creek
WAKULLA
Sopchoppy River
Wakulla River
St. Marks River
St. Marks
Wacissa River
MADISON
TAYLOR
Aucilla River
LOWER COASTAL PLAIN
Econfina River
Perry
New River
Panacea
Fenholloway River
LIBERTY
FRANKLIN
APALACHEE BAY
Crooked River
Carrabelle
Dog Island
GULF OF MEXICO
Suwannee River
LAFAYETTE
DIXIE
California Creek
SCALE IN MILES
0 10 20 30
N

Figure 2.29

that it consists primarily of damage to drainage ditches from impaired usefulness. Over the past 20 years, conservation practices by land owners and operators and the proper selection of crops to permit better use of land resources have been effective in reducing sediment problems. Another important factor in lower sediment loads is the thousands of existing farm ponds which collectively have a large sediment-trapping capacity.

The need for agricultural land will not necessitate reclaiming or rehabilitating any major portion of the saline soils in the basin for agricultural use until well after the year 2000.

Means of Meeting the Needs

Saline soils on the agricultural lands in the basin are not currently a significant problem. Near the Gulf coast the withdrawal of ground water supplies should be controlled so that the backflow of ocean water into the aquifer does not occur. Foresight and planning can do much to prevent future damages from occurring.

Studies indicate that the needed sediment control program should be planned in conjunction with other objectives. Sediment control, insofar as it affects agricultural and other land in the basin, can best be effected as part of overall watershed treatment programs, land treatment measures on land requiring project action for erosion damage reduction, and soil and water conservation measures on an individual farm basis. Although sediment damage does occur to agricultural land in the flood plains, it is insufficient to justify the cost of installing needed land treatment and structural measures for sediment control alone.

SECTION XI – POLLUTION ABATEMENT AND PUBLIC HEALTH

General

Public health is an important factor in the development of resources. Economic growth is retarded when poor health causes a loss in production and necessitates high expenditures for personal medical attention. Programs in this field are concerned with improving the health, safety, and welfare of the entire population.

Only those phases of public health directly related to land and water resources development are included in this study. Items discussed in this Section include: The abatement of water and air pollution; radiation monitoring; the collection and disposal of community and industrial solid waste; and vector control. The development and protection of potable water supplies, as discussed previously in Section II, is also an important part of the public health program. Other public health related items are included in the appropriate sections of the Appendix. The basic objective of all these phases of public health is the protection of the community health through the control of man's environment. Establishing an adequate, coordinated public health program is essential for optimum utilization of the land and water resources of the basin.

Existing Facilities and Programs

Pollution Abatement

The Fenholloway River has been designated as an industrial stream by the Florida State Legislature and may legally be polluted with industrial waste. It is grossly polluted by the waste from a chemical cellulose plant at Foley, Florida, about 3 miles southeast of Perry. Tired

Figure 2.30 *Unabated and Unregulated Industrial Waste May Pollute Many Streams.*

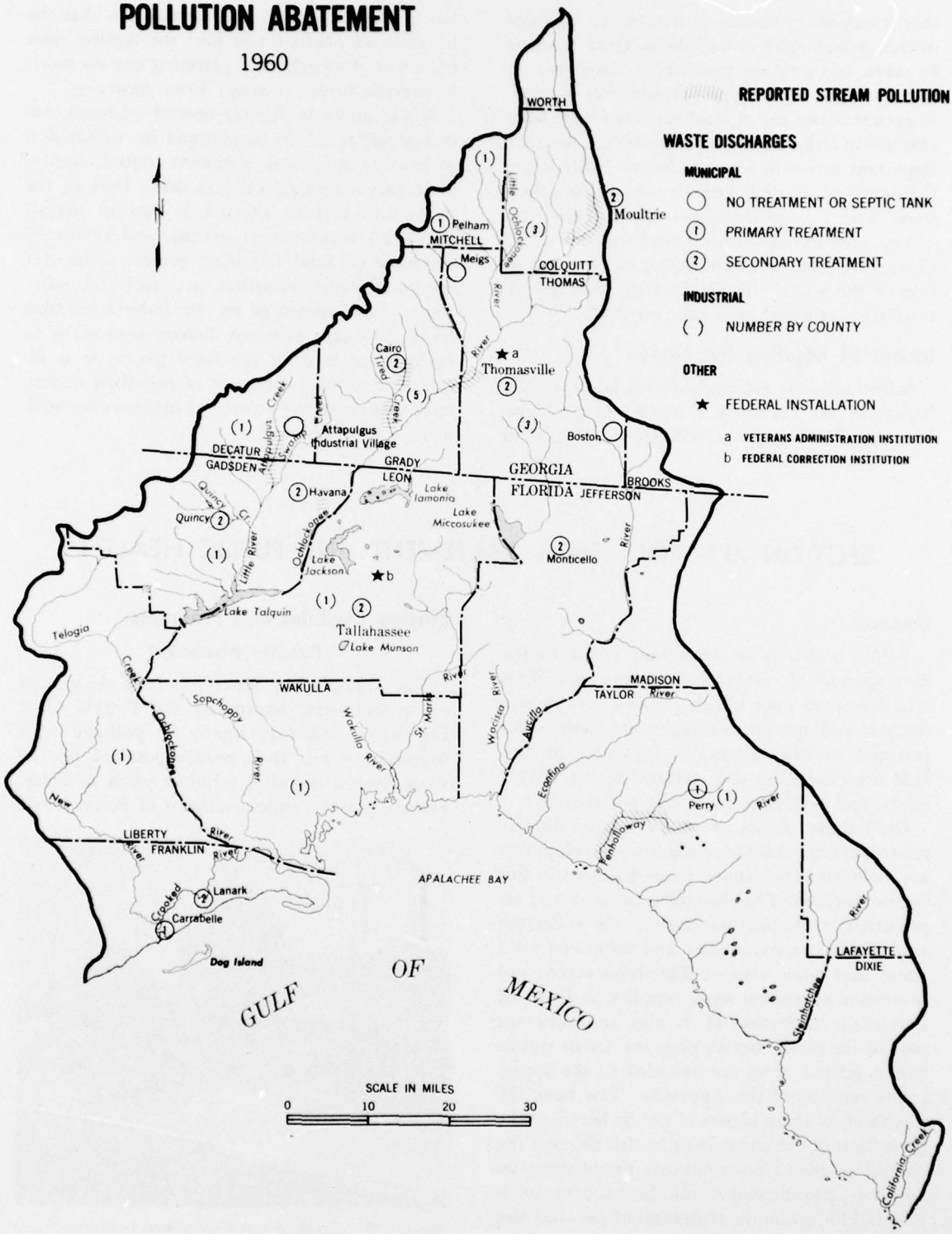
POLLUTION ABATEMENT
1960
REPORTED STREAM POLLUTION
WASTE DISCHARGES
MUNICIPAL
NO TREATMENT OR SEPTIC TANK
PRIMARY TREATMENT
SECONDARY TREATMENT
INDUSTRIAL
( ) NUMBER BY COUNTY
OTHER
FEDERAL INSTALLATION
a VETERANS ADMINISTRATION INSTITUTION
b FEDERAL CORRECTION INSTITUTION
WORTH
Moultrie
Pelham
MITCHELL
Meigs
COLQUITT
THOMAS
Cairo
Thomasville
Attapulgus Industrial Village
Boston
DECATUR
GRADY
GADSDEN
LEON
GEORGIA
FLORIDA
BROOKS
JEFFERSON
Havana
Quincy
Lake Iamonia
Lake Miccosukee
Monticello
Lake Jackson
Lake Talquin
Tallahassee
Lake Munson
Telogia
WAKULLA
MADISON
TAYLOR
Sopchoppy
Wakulla River
St. Marks River
Aucilla
Econfina
Perry
LIBERTY
FRANKLIN
Lanark
Carrabelle
Crooked
Dog Island
APALACHEE BAY
GULF OF MEXICO
LAFAYETTE
DIXIE
Suwannee River
California Creek
SCALE IN MILES
0 10 20 30

Figure 2.31

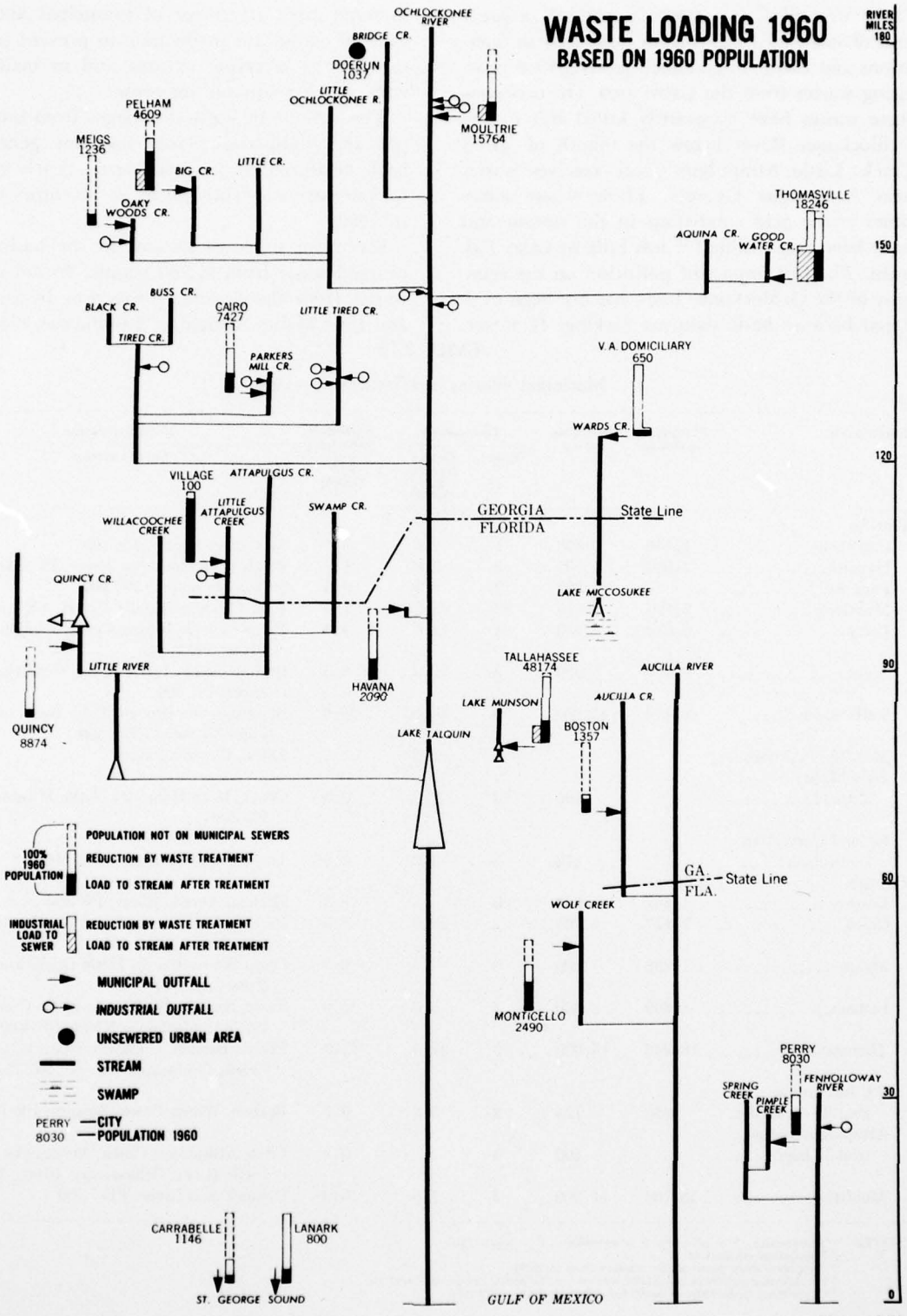
WASTE LOADING 1960
BASED ON 1960 POPULATION
RIVER MILES
180
150
120
90
60
30
0
OCHLOCKONEE RIVER
BRIDGE CR.
DOERUN 1037
LITTLE OCHLOCKONEE R.
MOULTRIE 15764
PELHAM 4609
MEIGS 1236
BIG CR.
LITTLE CR.
OAKY WOODS CR.
THOMASVILLE 18246
AQUINA CR.
GOOD WATER CR.
BUSS CR.
BLACK CR.
TIRED CR.
CAIRO 7427
LITTLE TIRED CR.
PARKERS MILL CR.
V.A. DOMICILIARY 650
WARDS CR.
VILLAGE 100
ATTAPULGUS CR.
LITTLE ATTAPULGUS CREEK
SWAMP CR.
WILLACOOCHEE CREEK
GEORGIA
FLORIDA
State Line
QUINCY CR.
LAKE MICCOSUKEE
LITTLE RIVER
HAVANA 2090
TALLAHASSEE 48174
AUCILLA RIVER
AUCILLA CR.
LAKE MUNSON
BOSTON 1357
QUINCY 8874
LAKE TALQUIN
GA.
FLA.
State Line
WOLF CREEK
MONTICELLO 2490
PERRY 8030
SPRING CREEK
PIMPLE CREEK
FENHOLLOWAY RIVER
CARRABELLE 1146
LANARK 800
ST. GEORGE SOUND
GULF OF MEXICO
100% 1960 POPULATION
POPULATION NOT ON MUNICIPAL SEWERS
REDUCTION BY WASTE TREATMENT
LOAD TO STREAM AFTER TREATMENT
INDUSTRIAL LOAD TO SEWER
REDUCTION BY WASTE TREATMENT
LOAD TO STREAM AFTER TREATMENT
MUNICIPAL OUTFALL
INDUSTRIAL OUTFALL
UNSEWERED URBAN AREA
STREAM
SWAMP
PERRY — CITY
8030 — POPULATION 1960

Figure 2.32

Creek west of Cairo, Georgia, receives a great deal of suspended solids from fuller's earth operations and Little Tired Creek receives food processing wastes from the Cairo area. On occasions these wastes have apparently killed fish in the Ochlockonee River below the mouth of Tired Creek. Little Attapulgus Creek receives wastes near Attapulgus, Georgia. These wastes sometimes create acid conditions in the stream and have been responsible for fish kills in Lake Talquin. The full impact of pollution on the economy of the Ochlockonee basin has not been evaluated because basic data are lacking. However, in some cases, treatment of municipal and industrial wastes are inadequate to prevent pollution of the receiving streams and to maintain water quality suitable for reuse.

The volume of waste discharges from municipal and industrial plants has not generally been measured, but is considered nearly equal to water use as established by an inventory made in 1960.

Seventeen sewerage systems in the basin discharged waste from 97,200 people. Included are wastes from the Federal Correction Institution and Dale Mabry Airfield at Tallahassee, Florida;

TABLE 2.15

Municipal Wastes and Treatment—1960

Municipality	Municipal Population	Population served	Treatment		Untreated waste load	Receiving stream
			Type[1]	Design capacity PE[2] (1,000)	PE[2] (1,000)	Load to stream
Florida						
Carrabelle	1,146	400	1	2.5	0.4	St. George Sound; PE 100
Havana	2,090	1,700	2	3.0	1.7	Ditch to Ochlockonee River; PE 600
Lanark	--	800	2	2.5	0.8	St. George Sound; PE 200
Monticello	2,490	1,575	[3]2	[3]3.0	1.6	Wolf Creek to Aucilla River[3]; PE 1,500
Perry	8,030	4,430	1	12.5	4.4	Pimple Creek, Spring Creek, Fenholloway River; PE 2,500
Quincy	8,874	5,000	2	12.0	5.0	Quincy Creek, Little River, Ochlockonee River; PE 800
Tallahassee	48,174	45,000	2	60.0	[4]56.0	St. Augustine Branch, Lake Henrietta, Lake Munson; PE 2,500
Municipal Airport			2	2.0	--	Ditch, Cypress Lake
Dale Mabry Airfield		500	2	2.5	0.5	Creek, Lake Henrietta, Lake Munson; PE 200
Federal Correction Institution		870	2	1.2	0.9	Ditch, Lake Lafayette; PE 600
Georgia						
Boston	1,357	300	0	--	0.3	Branch, Aucilla River; PE 300
Cairo	7,427	5,000	2	20.0	5.0	Parkers Mill Creek, Tired Creek, Ochlockonee River; PE 2,000
Meigs	1,236	200	0	--	0.2	Oaky Woods Creek, Little Ochlockonee River; PE 200
Pelham	4,609	3,600	1	5.0	[4]5.0	Town Branch, Big Creek, Little Creek, Little Ochlockonee River; PE 4,000
Thomasville	18,246	16,000	2	31.0	[4]43.0	Bruces Branch, Goodwater Creek, Aguina Creek, Ochlockonee River; PE 25,000
VA Institution near Thomasville	650	725	2	5.5	0.7	Branch, Wards Creek, Swamp; PE 100
Attapulgus Industrial Village		100	0	--	0.1	Little Attapulgus Creek, Attapulgus Creek, Little River, Ochlockonee River; PE 900
Moultrie[5]	15,764	11,000	2	7.5	[4]15.0	Ochlockonee River; PE 7,500

NOTES: [1] Treatment: 1 = primary; 2 = secondary; 0 = septic tank.
[2] Population equivalent.
[3] New secondary plant under construction in 1960.
[4] PE increase indicates industrial wastes discharged to municipal systems.
[5] Considered in Suwannee basin for other planning purposes.

TABLE 2.16

Industrial Wastes and Treatment—1960

Industry		Waste[1]		Type of treatment[2]	PE of water after treatment[1]	Receiving stream
Type	No. of plants	Average flow (m.g.d.)	PE before treatment (or type)			
Chemical	2	0.050	6,000	C	2,100	Stokes Branch, Telogia Creek
		35.449	976,000	C	880,000	Fenholloway River
Food	8	0.002	3,000	None	3,000	Creek, Ochlockonee River
		0.080	800	S	800	Branch, Ochlockonee River
		0.004	10	None	10	Branch, Ochlockonee River
		0.004	960	None	960	Little Tired Creek
		0.400	500	None	500	Little Tired Creek
		0.169	undet.	None	undet.	Little Tired Creek
		0.030	undet.	S	undet.	Parkers Mill Creek, Ochlockonee River
		0.035	90	None	90	Ditch, Ochlockonee River
Mining	4	2.000	(inorganic)	C	--	Little Attapulgus Creek, Ochlockonee River
			(silt)	None	--	Branch, Tired Creek
			(cooling)	None	--	Branch, Little Ochlockonee River
			(silt)	C	--	Ochlockonee River
Textile	1	0.060	(cooling)	None	undet.	Branch, Ochlockonee River
Miscellaneous	3	0.034	(cooling)	None	--	Ditch
		0.002	200	None	200	Undetermined
		0.001	(oils and phenols)	C	--	Swamp

NOTES: [1] m.g.d. = million gallons per day; PE = population equivalent; undet. = undetermined.
[2] C = settling tanks; S = screen or solids removal; none = no treatment.

the Veterans Administration Domiciliary at Thomasville, Georgia; an industrial village in Georgia; and the sewage from the city of Moultrie, Georgia. Although Moultrie is considered in the Suwannee basin for other planning purposes, the waste from its sewerage system is discharged into the Ochlockonee River drainage. These sewerage systems also receive industrial wastes which increased the population equivalent of the wastes to a total of 140,600.

Vector Control

The coastal area of the Ochlockonee basin has extensive tidal marshlands and, consequently, has a serious insect problem. In this area, salt-marsh mosquitoes, dog flies, and sand flies occur in large numbers and greatly annoy residents and visitors to recreational areas. The fresh-water swamps, marshes, low-lying areas subject to flooding, ditches, and creeks clogged with alligator weeds or water hyacinths are mosquito-breeding areas.

In urban areas the insect problem is frequently associated with improper disposal of waste water. In about 10 percent of the towns, overflowing septic tanks create ideal breeding places for mosquitoes. Stabilization ponds, such as those recently constructed in south Georgia, could become mosquito-breeding areas if they are not properly maintained. Shallow lakes choked with aquatic vegetation, such as Lake Miccosukee near Monticello, Florida, create mosquito problems.

In rural areas, the inadequacy of general drainage and the lack of maintenance on existing drainage systems provide favorable areas for mosquito breeding. Abandoned, unplugged artesian wells originating in limestone aquifers produce an alkaline water that is very favorable for the production of malaria mosquitoes. Several such wells exist in the basin. A lack of sanitation around farms can also create serious fly and mosquito problems.

The 1960 vector control program included six countywide mosquito control programs in Florida, costing about $190,000. Five of the vector control programs included sanitary landfill operations, and two included larviciding on beaches to control dog flies. There is a need for more emphasis on larviciding and permanent control measures.

Air Pollution Monitoring

In 1960, the Ochlockonee basin had only four minor sources of industrial air pollution. These were dust problems connected with mining operations near Thomasville, Georgia, and air contaminants in connection with a naval-stores operation and a cellulose industry in Florida. No major public health problems were involved because the areas affected were sparsely populated.

Radiation Monitoring

In 1960 there were eight licensed radioactive isotope users in the Tallahassee, Florida, area and one in Thomasville, Georgia. The State health departments, in cooperation with other agencies, have maintained monitoring programs for the public's protection, and to obtain background data. Published data for the Florida portion of the basin indicated radiation was well below the maximum permissible levels for surface and underground waters in 1959.

Corresponding with the temporary cessation of worldwide nuclear testing in 1959, radioactivity as measured from rainfall decreased sharply. After testing resumed in 1960, the fall-out again increased the radioactivity of the area. However, radioactive levels in the basin, according to the available data, are well below the point of concern; and it is not expected that any specific measures will need to be taken to counteract atmospheric contamination of surface and underground water supplies.

Solid Waste Disposal

In 1960, open dumps were commonly used as a method of solid-waste disposal by the smaller communities of the basin. This method creates health problems and nuisances. Acceptable sanitary landfills were used by Thomasville, Georgia, and by Monticello, Perry, Quincy, and Tallahassee, Florida. Modified landfills, which permitted some burning and occasional covering of the waste, were operated by six additional cities. Fifteen urban areas in Florida and three in Georgia were operating open dumps in 1960. Solid waste from two meat-packing plants, one cannery, and a bakery were also disposed of in this manner. Improper handling of these wastes caused nuisances in the vicinity of these dumps and afforded breeding places for mosquitoes and flies, and food and shelter for rodents.

Needs and Opportunities

Pollution Abatement

A policy of pollution prevention as well as abatement should be adopted and the discharge of inorganic wastes should be restricted. Treatment should be provided for all industrial and municipal wastes prior to their discharge to the water courses of the basin. The degree and type of needed treatment will depend upon the type of waste and the assimilating capacity of the receiving stream. Each case will need to be determined separately. When critical streamflows are not adequate to provide proper dilution of effluents from secondary treatment plants, either additional dilution water will need to be provided by constructing water-storage projects or a higher degree of treatment will be necessary to adjust the waste load to the minimum streamflows.

The minimum 7-day consecutive low flow expected once in 10 years has been used in estimating the degree of treatment necessary to prevent overloading the assimilative capacity of the stream.

In 1960, nine additional secondary sewage treatment plants, additions to a primary plant to provide secondary treatment, and enlargement of a secondary treatment plant were needed to provide satisfactory disposal of all waste discharges. In estimating municipal sewerage system needs, all towns with a population over 800 have been included. Also included are smaller

Figure 2.33 *Sewage Treatment Plant at Tallahassee—Adequate Treatment of Sewage Is Important in Proper Resource Development.*

TABLE 2.17

Municipal Sewerage Facility Needs—1960-2000[1]

Period	State	Population served	Number of places	Places requiring additions or new construction[2]	
				Secondary treatment facilities	Collection systems
1960 to 1975					
	Florida	123,000	15	8	12
	Georgia	47,000	8	6	7
	Total	170,000	23	14	19
1975 to 2000[3]					
	Florida	219,600	16	6	13
	Georgia	77,400	12	5	11
	Total	297,000	28	11	24

NOTES: [1] Includes Federal and State installations and the people they serve.
[2] One existing primary plant with adequate capacity will continue to serve one municipality. Secondary treatment is provided for all other municipal wastes.
[3] Places included for this period may also be included in the 1960-75 period.

towns which had sewerage systems in 1960. A minimum of primary treatment or its equivalent has been considered necessary for the proper handling of all wastes. Secondary treatment with chlorination has been added wherever the assimilative capacity of the stream is inadequate to handle the effluent from a primary treatment plant. It is estimated that, prior to 1975, an additional 83,800 people residing in the basin will be served by municipal sewerage systems and that an additional 127,000 users will be added by 2000.

Vector Control

Both Georgia and Florida have specific health regulations pertaining to the impounding of water in farm ponds insofar as they may affect mosquito breeding.

There is a need to establish four municipal programs and one new county vector control program and to expand all existing programs.

Air Pollution Monitoring

Both Georgia and Florida are obtaining factual data needed for a statewide air pollution control program. These data can be used to develop an effective program.

Radiation Monitoring

There is a need for radiation monitoring as part of expanding health programs in the Ochlockonee basin.

Solid Waste Disposal

A satisfactory program of solid-waste disposal is needed. The sanitary landfill method appears to be the most economical and desirable for the communities of the basin. Low marsh areas can be utilized for the landfill operations. Landfill disposal, properly controlled, will eliminate breeding places for flies, rodents, and roaches and the nuisance of burning open dumps.

The amount of solid waste produced nationally averages about 1 cubic yard or 650 pounds per person per year. Disposal of waste by sanitary landfill requires an average of 1 acre per 10,000 persons each year. The total per capita cost of collecting solid wastes, acquiring needed land, and operating sanitary landfills varies inversely with the size of city and usually ranges from $1.50 to $4.50 per year. The landfill method of disposal also affords an opportunity to reclaim low, marshy, or swampy areas for more valuable uses.

Means of Meeting the Needs

Pollution Abatement

Improvements to the 14 sewerage systems to handle municipal wastes prior to 1975 include

the construction of nine new complete sewerage systems with conventional secondary treatment or stabilization ponds, one new secondary treatment plant, the addition of secondary treatment at two existing primary plants, and the enlargement of two secondary treatment plants. Prior to the year 2000, other needed improvements include five new complete sewerage systems with conventional secondary treatment or stabilization ponds and the enlargement of six treatment plants. Sewage treatment plants built prior to 1960 designed with adequate design capacity for the year 2000 are not included in this study. In addition to needed treatment facilities, extension of all sewage collection systems will be required.

With the expected industrial development in the basin, it is anticipated, by the year 1975, 20 industrial plants will need waste-treatment facilities. Their wastes can be satisfactorily handled by installing 14 stabilization ponds, 5 chemical precipitation plants, and a conventional secondary treatment plant. These industrial waste-treatment facilities will need to be enlarged and treatment facilities provided for new industries prior to the year 2000.

In estimating municipal and industrial treatment facility needs, the expected development of the area was taken into consideration on a generalized basis. As development occurs, detailed studies will be necessary to determine the degree and type of treatment required in each area to prevent pollution of the receiving streams.

Vector Control

In the interest of efficiency and economy, mosquito-control programs should be carried out on a district or county basis. State or Federal Governments can best handle research, technical supervision, training, and assistance to district personnel. Legislation that would enable establishment of statewide mosquito or other vector control districts would be beneficial in Georgia; adequate legislation of this nature exists for Florida.

Air Pollution Monitoring

The responsible State agency working cooperatively with industry should develop effective air pollution control programs. To be effective the programs of both Georgia and Florida should be coordinated and have full industrial cooperation.

Radiation Monitoring

Levels of radiation should be recorded and a continuous monitoring program established to detect any increase in radiation which could directly affect development of land and water resources.

Solid Waste Disposal

The sanitary landfill method should be adopted throughout the area for solid-waste disposal. Existing landfill should be improved and a total of 26 sanitary landfill operations will be needed to serve an estimated 172,000 persons by the year 1975. Enlargement of these operations can adequately meet the needs for the year 2000.

Wherever required, sanitary regulations need to be revised or new ones adopted to enable all communities to participate in effective sanitary landfill programs.

SECTION XII – OTHER BENEFICIAL PURPOSES

BEACH EROSION CONTROL AND HURRICANE PROTECTION

General

Most of the 200-mile Ochlockonee basin shoreline is a part of the open coast which extends from Cedar Key, 15 miles south of the east boundary of the basin, to Ochlockonee Point.

The western portion of the coast is characterized by large continually shifting offshore sandbars and several elongated barrier islands, barrier spits and hooks, all showing signs of high beach mobility. This western part of the coastline is more regular than the eastern part.

On the very irregular eastern shoreline, beach composition and shore form both indicate an absence of wave erosion. The lack of waves at the shore is due to the broad and shallow offshore

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PLAN FOR DEVELOPMENT OF THE LAND AND WATER RESOURCES OF THE SOU--ETC(U)
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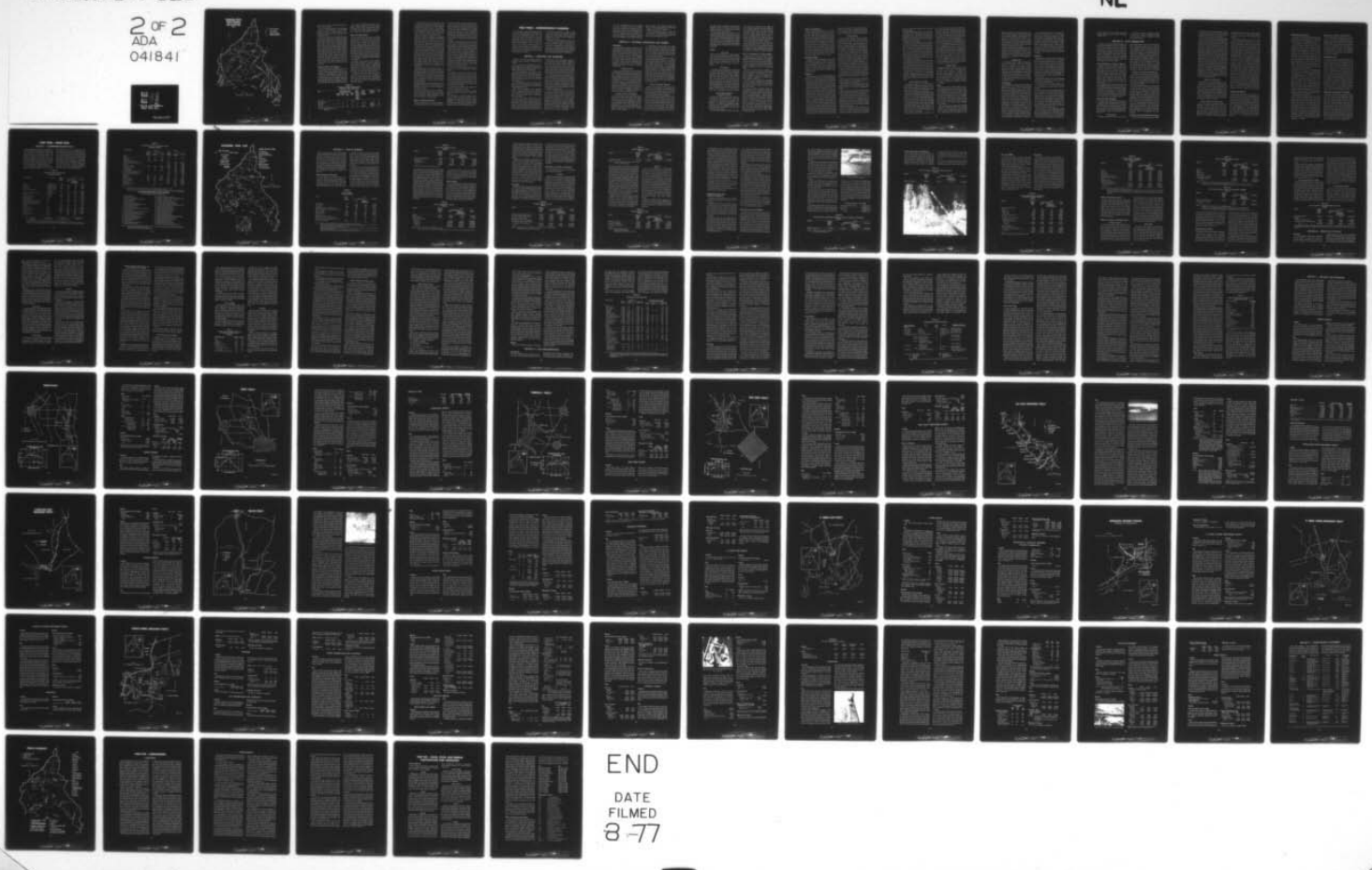

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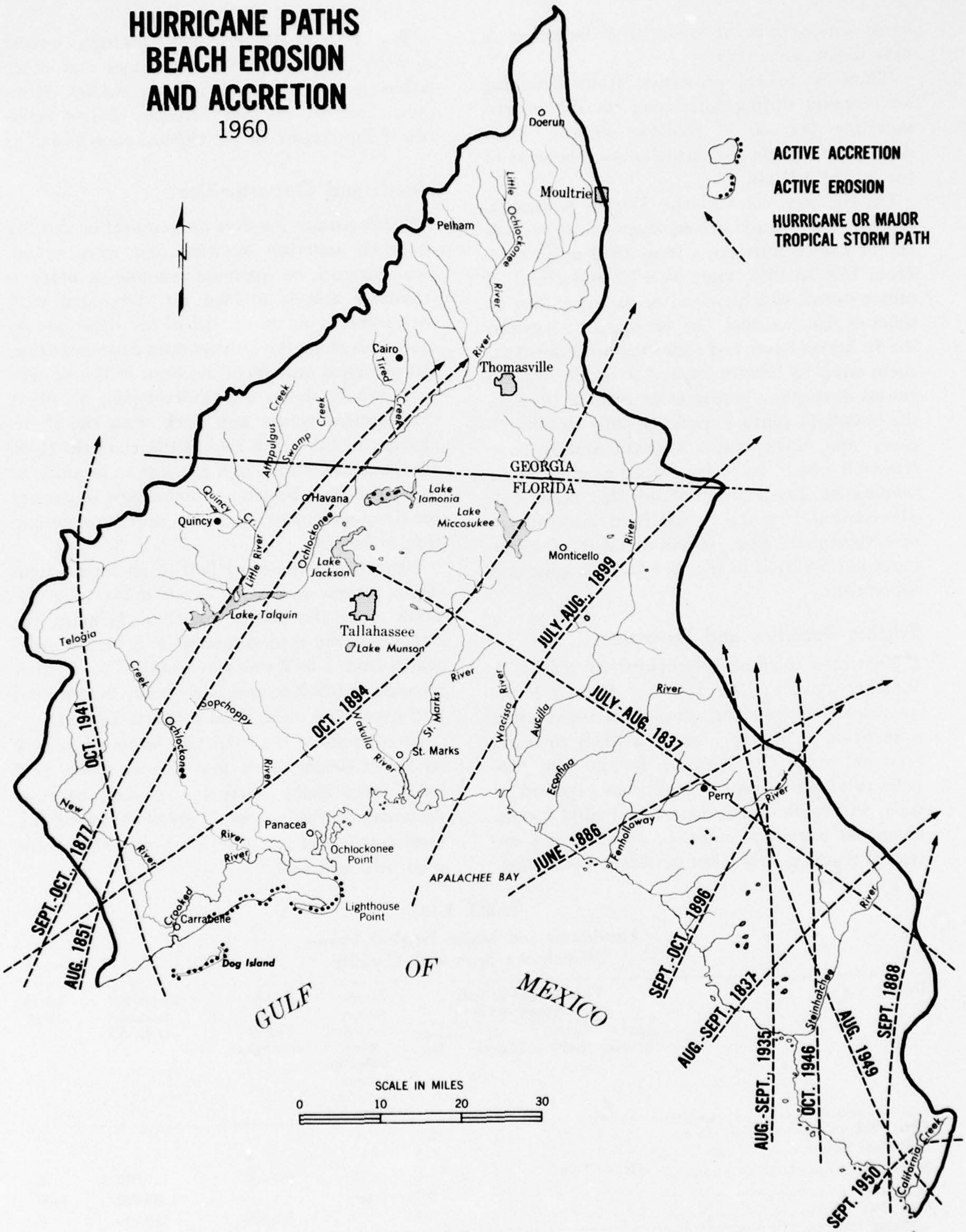

HURRICANE PATHS
BEACH EROSION
AND ACCRETION
1960
ACTIVE ACCRETION
ACTIVE EROSION
HURRICANE OR MAJOR
TROPICAL STORM PATH
N
Doerun
Moultrie
Pelham
Little Ochlockonee River
Cairo
Tired Creek
Thomasville
River
Attapulgus Creek
Swamp Creek
GEORGIA
FLORIDA
Havana
Lake Iamonia
Lake Miccosukee
Quincy
Quincy Cr.
Little River
Ochlockonee
Lake Jackson
Monticello
Lake Talquin
Tallahassee
Lake Munson
Telogia
Creek
Ochlockonee
Sopchoppy River
Wakulla River
St. Marks River
St. Marks
Wacissa River
Aucilla River
Econfina
Perry
Fenholloway
Panacea
Ochlockonee Point
Lighthouse Point
APALACHEE BAY
New River
Crooked River
Carrabelle
Dog Island
Steinhatchee
California Creek
GULF OF MEXICO
SCALE IN MILES
0 10 20 30
OCT. 1941
SEPT.-OCT. 1877
AUG. 1851
OCT. 1894
JULY-AUG. 1899
JULY-AUG. 1837
JUNE 1886
SEPT.-OCT. 1896
AUG.-SEPT. 1837
AUG.-SEPT. 1935
OCT. 1946
AUG. 1949
SEPT. 1888
SEPT. 1950

Figure 2.34

bank where resistant underlying limestone is near the water surface.

There is natural protection from damaging wave action during hurricanes on the eastern shoreline because of shallow offshore water depths and on the western shoreline because of the barrier islands.

On the west coast of the Florida peninsula, south of the Aucilla River, fragmentary records list 14 known hurricanes from 1830 until 1900. From 1900 to 1958, there were 22 major and 33 minor storms which crossed or passed within 50 miles of this coastline. On the coastline between the St. Marks River and New Orleans, Louisiana, there were 16 hurricanes and 3 major tropical storms during the period from 1900 to 1956. In the twentieth century, paths of only two hurricanes and three major tropical storms have crossed the basin and these crossed near the basin boundaries. The few hurricanes that occur usually come during the period from mid-June to mid-November. The greatest number of hurricanes has occurred in the months of August and September.

Existing Facilities and Programs

Hurricane warning is provided by the U. S. Weather Bureau. The Weather Bureau is responsible for furnishing advance warnings when a hurricane is approaching or is likely to reach a coastal area. The Weather Bureau also provides information on the conditions expected to occur within the hurricane, such as wind speeds, abnormal hurricane tides, probability and extent of flooding, and other pertinent storm data.

The Federal Government, through several agencies cooperates with the States and other public groups in beach erosion studies. However, there are no beach erosion control facilities of significance in the Ochlockonee basin.

Needs and Opportunities

Beach erosion involves the removal or shifting of beach materials by wind and wave action, tidal currents, or coastwise currents. A beach is transitory and is molded and remolded with each wave. Some movement of the shore has occurred all along the Ochlockonee basin coastline, but principal movement has been in the western part. Where shores are undeveloped, or where development occurs well back from the shore, changes in the beach cause little concern. However, beaches, dunes, and the low areas adjacent to the shore are becoming increasingly important for development of recreation and for construction of homes.

Generally, a low-lying belt of an intermittent dense cypress swamp, 5 to 10 miles wide, extends along the eastern coastline. Fringing the outside of the cypress swamp is a belt of tidal marsh from 1 to 2 miles in width. The beach is exposed at low tide and is generally barren sand and mud. The mean tidal range is 2.4 feet.

Along most of the coast, the bottom is only 2 to 3 feet below mean low tide as much as 2 miles from shore. Farther out, sand becomes dominant on the bottom. Many of the island surfaces exposed at low tide are a mixture of fine sand, silt, and clay.

TABLE 2.18

Hurricanes and Major Tropical Storms
Ochlockonee Basin and Vincinity

Date	Tide height in feet above mean sea level				Maximum recorded wind velocity near center (m.p.h.)	Northwest Florida damages[1]	Reported damage in U. S.[2]	Lives lost
	Apalachicola	Carrabelle	St. Marks	Cedar Key				
Oct. 1894	—	—	—	[2]6-7	—	—	—	—
Sept.-Oct. 1896	—	—	—	[2]8-9	—	—	—	—
Sept. 1915	4.0	7.0	—	—	70	$25,000	$25,000	0
Sept. 1935	—	—	—	6.5	—	—	[2]6,000,000	[2]400
Oct. 1941	1.1	4.8	6.4	—	75	340,000	675,000	5

NOTES: [1] Exclusive of Pensacola.
[2] Estimated.

Numerous bars and reefs occur within a mile or two from the shore, particularly along the southern part of this eastern coastline. Many of the reefs are narrow, linear, or crescent shaped. In places, particularly near the southern limits of the basin, these reefs form an intricate network and rise to levels as high as mean tide. These are possibly oyster-reef formations.

Because storm-wave energies are dissipated against the resistant rock platform well offshore, this reach of shore is essentially one of zero energy. Changes which have occurred to the mean high water shoreline have been relatively minor and are usually less than 100 feet laterally.

The balance between erosion and accretion on a given beach is controlled, in places, by the distribution of offshore sandbars. Several large bars are potential barrier islands. An example of this on the western portion of the coastline is Dog Island Reef to the east of Dog Island. Dog Island Reef and South Shoal, south of Lighthouse Point, provide a major source of sediment for building adjacent shores. They act both as wave deflectors and energy absorbers. If any of the offshore sand masses were to disappear or to change shape or position, the shoreline would be affected.

Shoreline changes in the past have been relatively unimportant in their impact because of the sparse population and the lack of manmade development. This is particularly true along the southeastern shore of the basin. Changes in the future will become increasingly more important as the southeastern section is developed and recreation beaches are constructed by artificial placement of sand.

Major hurricanes along the Ochlockonee basin shoreline could result in many areas being inundated by as much as 5 to 10 feet of hurricane tide and wave action.

Early evacuation of low areas is imperative since many of the evacuation routes are subject to early inundation as tides rise along the coast prior to the storm landfall. Hurricanes along the Gulf coast have taken many lives.

Means of Meeting the Needs

Beach erosion protection can be accomplished by artificial placement of sand and possibly augmented by auxiliary structures. Artificial placement of sand has the least adverse effect on a locality and appears to offer the best solution for restoring a beach, providing a sufficient quantity of sand for beach nourishment is available. Wind erosion protection can be provided by vegetation or sand fences. Both are effective in forming and stabilizing dunes. Dunes act as barriers to high water and strong onshore winds, but they are more important as a source of beach material.

Because of the many factors involved in beach erosion and the possible effects of one beach upon another, no specific remedial measures can be proposed for the erosion problems of the Ochlockonee basin beaches without a detailed study.

The recent advent of Federal assistance in hurricane protection has stimulated further research activity in coastal engineering. There is a trend toward multiple-purpose planning in solving coastal problems. This involves coordinating the development and maintenance of navigation inlet channel improvements with hurricane protection plans. Projects of this type may develop in the future along the Gulf shores where there are barrier beaches.

In plans for developing the coastline into residential or resort areas, consideration should be given to:

(1) Adequate hurricane warning systems, hurricane plan of action, and evacuation routes.

(2) Methods of reducing the potential danger or preventing additional future hazard areas by proper zoning, planning, and construction codes.

(3) Protecting sewage disposal and water supply facilities from flooding and preventing contamination of water supply.

(4) Providing auxiliary power supplies and alternative communication systems.

(5) Providing protective seawalls or similar structures to reduce the danger of damage from high waves.

It is desirable to consider the adoption of appropriate plans for shore protection after a thorough and complete study of the existing conditions and the possible measures which would provide protection for existing waterfront improvements and the remaining beach areas.

PART THREE – COMPREHENSIVE PLANNING

The procedures used in developing the comprehensive and coordinated plan are briefly summarized in the following four steps: (1) An inventory was made of basic resources and related developments within the basin; (2) needs for goods and services were projected to the year 2000 for the Ochlockonee basin; (3) alternative ways to meet needs for each purpose were studied; and (4) projects and programs that would best serve all purposes and meet requirements for resource conservation, utilization, and development were selected.

The character and effect of plans in other basins were considered in connection with the formulation of the Ochlockonee basin plan, and adjustments were made to permit optimum interbasin resource uses.

Throughout the planning process, many factors such as those associated with geology, hydrology, engineering practices, and social characteristics were expressed in economic terms for convenience in making comparisons. Additional information on planning and plan formulation is provided in the Planning, Economics, Hydrology, and Engineering and Cost Appendixes.

SECTION I – OBJECTIVES AND GUIDELINES

Objectives and specific planning guidelines adopted to govern the study and Report are as follows:

(1) A coordinated comprehensive plan for the development of the land and water resources of the Southeast River Basins through the year 2000 will be presented in the Report.

(2) The comprehensive plan will be recommended to the Governors and legislatures of the States of the study area and to the President and the Congress for use as a guide for land and water resources development in the Southeast River Basins area.

(3) The plan will set forth an early action phase which will include projects and programs found to be needed, feasible, and desirable for accomplishment by 1975.

(4) It will be recognized that additional studies of recommended projects and programs may be required to support specific requests for State and Federal support and for development by private agencies.

(5) All of the purposes enumerated in the Act will be given equal attention. In the completed plan, each purpose will be developed to that level consistent with the needs and economic capacity of the individual basin. Treatment of industrial development will be limited generally to indications of the effects of the plan on rates of development and to development implied in the projections of manufacturing employment. Recreation studies will be limited to public outdoor recreation related to land and water resources and to types beyond those normally provided by individuals and municipalities. Public health studies will be oriented toward determining the effects upon public health associated with the development of land and water resources.

(6) In determining the composition of the comprehensive plan, each separable component will be considered on the basis of the contribution that it makes in net benefits to the Ochlockonee basin, the Southeast River Basins, and the Nation. When intangible considerations play a major part in the decisions affecting an element of the program, they will be explained as fully as possible in narrative form.

(7) The comprehensive plan will: Provide information on both monetary and nonmonetary benefits and costs; contain information on the expected economic impacts created by the recommended elements of the plan; include general recommendations on cost sharing, reimbursement, and project payout; designate whether recommended developments should be implemented primarily by non-Federal or Federal entities; and designate which of the Federal agencies has the major responsibility for the Federal aspects of a project or program.

(8) The comprehensive plan will recognize and protect the rights and interests of individuals and of the States in determining the development of land and water resources and the preservation and protection of established uses.

(9) The comprehensive plan will include the existing, authorized, and formally proposed works and programs of the Federal and non-Federal agencies with proposed modifications limited to those found desirable, feasible, and consistent with the study objectives.

(10) Recommendations will be made for periodic review of the comprehensive plan. This review will serve as a basis for keeping the plan current and for subsequent action.

SECTION II – PLANNING ASSUMPTIONS AND CRITERIA

Assumptions

The comprehensive plan is based upon a series of assumptions. The broadest of these are: (1) That the Nation is entering a period of relative stability in international relations with no worsening of the cold war and no widespread outbreak of hostilities; and (2) that throughout the period covered by the plan, to the year 2000, the Federal Government and non-Federal interests will cooperate in encouraging and implementing economic growth and development throughout all segments of society and all areas of the Nation.

Population Growth

Three principal assumptions concerning the rate of national population growth were adopted: (1) The present fertility level, 1955-57 average, will remain constant to sometime between 1975 and 1980, then decline to the 1949-51 level by 2005-2010; (2) there will be moderate declines in mortality rates to the end of this century; and (3) net migration from abroad will be constant at about 300,000 per year. State and area population estimates were made in conformance with the general assumptions, but special attention was given to conditions reflected by study and analysis of individual areas.

Economic Growth and Development

The assumptions concerning trends toward world peace and United States and regional population growths are paralleled by assumptions of upward trends in employment, production, consumption, and foreign trade. For planning purposes, the gross national product was projected to increase from about $500 billion in 1960, to $888 billion by 1975, and to $2,300 billion by the year 2000.

A continuation of the trend in the human diet toward more red meats and more of some fruits and vegetables is reflected in the projections and plans for food production and land use. It was assumed that per capita consumption of food will increase until about 1975 and then remain about constant.

In line with the general expansion of the national and regional economy, it was assumed that investment capital required to attain projected industrial growth and resource development will be available and that the education and technical skills necessary for an expanding industrial economy also will be available. It was further assumed, as a working procedure for preliminary studies, that land and water resources and electric power supply would not be limiting factors in attaining the projected economy of the Ochlockonee basin. It was recognized in the study that the economy of the Ochlockonee basin is an integral part of the regional and national economies.

National and Regional Viewpoints

Because of the widespread effects of land and water resource development, a responsibility falls on all levels of government and on the private economy to participate in resource planning and in the execution of resource programs.

In developing the Southeast River Basins plan, needs for food and fiber and for services are included at those levels warranted by the comparative advantage and existing economic potential of the Southeast River Basins area in relation to national resources and needs. Thus, the primary benefits shown for projects and programs provide a means of indicating project efficiency from the national point of view as well as a

principal measure of regional and local benefits. Secondary benefits and impact studies provide additional evidence of the regional and local effects of resource development.

In developing projects and programs in the Ochlockonee basin plan, consideration was given to national policy guides pertaining to land and water resources development that have resulted from legislation and to administrative policies or decisions that have prevailed. Policy guides and statements of national objectives used in the planning processes are discussed in the technical appendixes.

Criteria

Price Levels

Price levels prevailing in or about January 1960 were used for evaluating present and future benefits and costs, except that an adjustment was made in agricultural prices based upon an assumption of a long-range parity ratio of 89 between prices paid and prices received by farmers.

Interest Rates

An interest rate of 2⅝ percent was used as far as practicable in analyzing costs and benefits in project formulation. In certain instances, benefits and costs were extracted from available data, and it was impractical to adjust this interest rate when the interest rate mix of the data was uncertain. The 2⅝ percent interest rate meets the need for a relatively risk-free and inflation-deflation-free rate for use in evaluation of the economic effects of Federal resource projects and programs. For converting certain non-Federal costs and benefits to an annual equivalent basis, a 4¼ percent interest rate was used.

Life of Projects and Period Covered by Analysis

The period of analysis used in the studies for this Report was the economic life of each project or 50 years, whichever was the lesser. The possibility of a longer maximum period, up to 100 years, was considered in recognizing certain long-range effects of intangibles and other impacts, but effects beyond 50 years were not evaluated in monetary terms.

The plan was formulated to meet only those needs expected to develop to the year 2000, and the evaluations generally reflect no increase in use of facilities after the year 2000. Needs will naturally continue to grow after the year 2000, and many of the proposed projects and programs, by adding facilities, will have the capacity to absorb some of the growth. The potential of the plan to meet needs that develop after the year 2000 has not been evaluated.

The assumptions and criteria used are considered conservatively low. If more liberal criteria had been used, such as a period of analysis of 100 years and an increasing need after the year 2000, the projects and programs included in the plan would appear even more favorable.

Basis for Comparison of Projects Effects

Comparison and evaluation of the proposed projects and programs in the plan were made to determine the most effective use of economic resources, such as land, water, labor, and materials. In this way, actions and opportunities throughout the economy form a check on what is economically justified in the way of new plans and efforts.

The value of the projects or programs included in the plan are computed on the basis of future conditions "with" the projects or programs included in the plan as compared to future conditions "without" the projects or programs included in the plan.

The future "with" conditions for individual project or program analysis include all development which would be expected to occur during the period of analysis with the project or program in existence.

The future "without" conditions include all developments that are existing or under construction as of January 1960, assuming adequate operation and maintenance of those developments. Technological gains not directly associated with the projects and programs in the basin plan were recognized as part of the "without" condition. It was assumed that no part of any project or program would develop in the absence of the project or program. This is not to deny that, in the absence of the comprehensive plan, other plans would develop which might include many features similar to those in the recommended plan.

Timing of Development

Plans covering long periods into the future provide for needs which have not yet developed. Not all developments are needed at once or at the same time. Plan implementation should, therefore, be scheduled to meet the needs as they occur. A precise schedule of year-to-year development was not considered necessary, but a general order of priority was established. Those developments needed first are included in an early action phase and are generally based on filling the needs to the year 1975. If need arises, however, projects scheduled in the 1975-2000 period may and should be initiated earlier. Likewise, the rate of project initiation may be slowed down if conditions warrant slower action.

Discount Principles

Program or project benefits and costs, which are estimated to accrue at different times and over varying periods of time, were converted to annual equivalent values by use of compound interest or discount rates. The resulting values reflect the present worth at the inception of each program or project and provide a common basis of measurement.

Benefits

The ultimate aim of resource projects and programs, in common with all other productive activity, is to satisfy human needs and desires. Goods and services are produced to achieve this end. These goods and services have value in accordance with the demand for them and their availability. Benefits are of two general kinds, primary and secondary. Primary benefits are the increase in the value of goods or services directly resulting from a project, less all associated nonproject costs incurred in their realization. Primary benefits are usually evaluated at the first point in the chain of effects of a project where the goods or services produced have an actual or estimated market value. Secondary benefits are the value of goods and services created in secondary activities affected by the project, less all associated costs incurred in their realization. The major part of the value of these goods and services is not measured from the national public point of view because it is assumed that an investment similar to that made in the project would create a similar effect in secondary activities if invested in other projects or other areas. However, overall secondary benefits are considered appropriate in illustrating the significance of projects from a regional point of view.

Primary Benefits

Primary tangible benefits, which in this Section are referred to as primary benefits, represent the estimated increase in the value of the actual goods, services, and satisfactions of a project or program expected for the period under study and from which any induced losses to other projects or programs have been deducted.

The primary benefits from drainage and flood-loss prevention, resulting from the upstream watershed projects, are derived from net values for expected changes in land use, the increased productivity of land, the reduction of direct damage to agricultural crops and fixed improvements, and reduction of management costs.

Justification of the facilities included in the plan for drainage, irrigation, and soil conservation is based on the increased net return to the farmer from the estimated production response.

Primary benefits from the forestry program are estimated as the net stumpage value of increased production and the net leasing values received from the increased number of faces expected to be worked for production of gum-naval stores.

The primary benefits from the commercial fisheries program are the estimated value of increased landings of commercial fish.

Primary benefits from the sport fisheries and wildlife program are the estimated value of projected increases in user-days of hunting and fishing.

Benefits used in the monetary evaluation of the recreation program consist of the estimated value of increased user-days of recreational activity.

The benefits from domestic, municipal, and industrial water supplies are assumed to be at least equal to the cost of obtaining water of similar quality and quantity from the cheapest alternative source, and are evaluated in monetary terms only for water supply storage in multiple-purpose reservoirs.

Primary benefits from flood control improvement are the difference between flood losses "with" and "without" protection. For upstream watershed and local protection projects, enhance-

ment and restoration benefits are also included where applicable.

Primary benefits from navigation are measured by savings in rate differential, the savings in shipping time, the reductions in operation and maintenance costs, the value of any filled land obtained through spoiling, and for recreation boating in certain instances.

Justification of programs for vector control, solid-waste collection and disposal, air pollution and radiation monitoring, and pollution abatement, except storage for augmenting low streamflows, is found in intangibles. In multiple-purpose projects, including storage to provide for low-flow augmentation, the pollution abatement benefits were considered to be equal to the average cost of tertiary treatment to provide the same improvement or protection of water quality as that obtainable by dilution.

The purposes of land transportation and landfill were included in the analyses of two projects in the Ochlockonee basin plan because no direct association of these benefits could be made with the purposes specifically listed in Public Law 85-850. For land transportation, primary benefits are assumed to be equal to the costs associated with the cheapest alternative way of providing adequate transportation facilities. In measuring benefits for landfill, only the increased value of land actually improved was considered in this study.

Secondary Benefits and Impacts

Although for purposes of this study a monetary evaluation of secondary economic effects of various resource projects and programs was not made, the importance of these secondary effects of resource development was recognized.

The projects and programs involving increased production of commodities would require additional raw materials, processing equipment, and services to sustain the processing operation. These increased activities would extend throughout the basin. Trades and services especially would be stimulated by recreation, sport fishing, and wildlife developments. These impacts would particularly affect fishing camps, marinas, commercial boat docks, motels, sporting goods stores, service stations, boat dealers, restaurants, and many related new businesses.

Construction projects create a temporary influx of workers who spend money in local areas, but at the same time, such projects will create problems of housing, schooling, transportation, and other community services. The solution of these short-term problems should result in long-range gains with construction of facilities that would be needed to meet future expansion.

There are areas in the Ochlockonee basin which have been designated redevelopment areas by the Area Redevelopment Administration of the U. S. Department of Commerce. These areas were so designated because of varying reasons such as low median family income and persistent and substantial unemployment or underemployment. Execution of the plan for the Ochlockonee basin would assist in the relief of these conditions and aid in raising the economic level of the people. Substantial net secondary benefits are most frequently realized in areas where resource development projects make it possible to utilize unemployed and underemployed labor and unused facilities and resources.

Intangible Benefits

Intangible benefits are those which are not evaluated in monetary terms. Like tangible benefits, these may be primary or secondary in character. Many programs and projects make substantial contributions to public security, to private and public health, and to public safety and tranquility, all of which include large elements of intangible value. Intangible benefits and costs are recognized in programs and projects analyses.

Costs

Costs are the value of labor, goods, and services exchanged to gain goods and services valued more highly. Where the costs are tangible values, the assumption is made that the needs of the project are taken from present uses at marginal unit prices and, therefore, the values foregone represent the least important uses that the market would allow. In a resource program as complex as that recommended for the Southeast River Basins, there are also many intangible costs involved.

The costs of proposed projects and programs include the initial investment which would be incurred in one or more stages of construction and the annual expenditures required for operation, maintenance, and replacements. Invest-

ment costs include the capital expenditures associated with constructing a project and carrying out a program. However, interest during construction is omitted where the period of construction was not expected to exceed 2 years. Where the period of construction was estimated to be more than 2 years, the investment included simple interest on one-half of the construction costs for the period of construction.

Capital investment and operation and maintenance costs of multiple-purpose projects were allocated to the several purposes served so as to form a basis for reimbursement and cost-sharing arrangements that may be required. The procedures used are summarized in Appendix 9, Economics.

Intangible Costs

In evaluating resource programs and projects, many important effects cannot be adequately measured in monetary terms. Loss of scenic values is an example of an intangible cost frequently associated with resource development. Treatment of these intangible effects has been subjected to many of the requirements applicable to tangible effects. These include: (1) Considering effects in terms of differences "with the project" and "without the project," and (2) considering intangible costs to the same degree or extent as intangible benefits.

Cost Sharing

Cost sharing is concerned primarily with the distribution of costs among the participating interests. The division of cost is shown in two groups: Federal and non-Federal. For each specific project or program, the actual division of cost among the Federal and non-Federal interests was determined by the nature of the development and on the basis of circumstances expected to prevail during the evaluation period.

Generally, where the impacts of projects and programs are largely local, the costs are the responsibility of non-Federal interests. Projects and programs of national significance are the responsibility of the Federal Government. Between these two extremes there are a number of projects and programs where the costs are to be shared by the Federal and non-Federal groups.

In determining the degree of Federal participation in programs and projects of less than national significance, consideration was given to: (1) The need for demonstrating new approaches to resource development and use; (2) the usefulness of a local project or program in additional studies and experimentation which has more than local implications; (3) the support of projects or programs which by policy or legislation have become accepted as Federal or part Federal responsibilities, such as flood control; and (4) the possible justification for Federal participation in the cost of local works and improvements where counties, areas, or regions are designated as distressed and in need of economic assistance.

Financing

Determination of effective ways for financing land and water development is an essential part of resource planning. Financing, as used here, relates to the immediate source of funds needed for construction and management of proposed works. Financing requirements were developed only as Federal and non-Federal although in the analyses, State, county, municipal, and private financing were considered. Special groupings for purposes of financing, such as development corporations and special improvement districts, are also discussed.

The following criteria were used in determining appropriate methods for financing land and water resource developments.

(1) Developments of natural resources that do not involve national consideration will be the responsibility of private, local, and State interests.

(2) Where the costs of projects and programs are to be shared between the Federal and non-Federal interests, each will provide for the financing of its share, except as noted under item (3) following. The Federal share will be provided under such laws and regulations as are applicable at the time of financing. In addition to direct government and private appropriations for the non-Federal share, development funds, authority funds, special bond issues, and revenue bonds are available for financing.

(3) For projects such as hydroelectric power and water supply, Federal financing may be needed, with provision for reimbursement from non-Federal beneficiaries, as is now practiced. Federal financing may also be required for projects of the types not adequately covered by tra-

ditional approaches. This includes large-scale recreation projects and some types of fish and wildlife work.

(4) When the Federal Government assumes the full cost of a project or program, the Federal Government will be responsible for full financing of the work.

SECTION III – PLAN FORMULATION

Selecting and fitting planning segments together and considering alternatives in the search for the proper programs, the proper number of projects, and the best size for each element of the overall plan required extensive analysis. By a series of approximations using the incremental approach and limited by consideration of alternatives and judgment, a plan was formulated containing those programs and projects that will usually result in maximum benefits above costs in meeting needs to the year 2000.

General Character of Resource Planning

Generally, resource planning recognizes the consequences of land and water resource development and the need to anticipate the future requirements for land and water essential to growth and welfare. The physical and economic aspects of the planning task have been emphasized, particularly as they relate to the scale, sequence, and timing of development plans. However, these considerations have been tempered by the recognition of social, legal, and political factors.

The plan has been developed on the basis that free enterprise persists in the area and the Nation with Federal and State Governments undertaking those tasks which are beyond individual or voluntary group capacity or which require such action for special physical, economic, social, or other reasons. Local and regional viewpoints were recognized in formulating the plan.

Guides for Plan Formulation

A number of general land and water resource development guides and planning aids were used in weighing and selecting those alternatives which were fitted into an effective plan. In all cases, the effective use of these guides and planning techniques required careful adherence to the assumptions and criteria outlined in Section II.

Plan Evaluation

Comparison of benefits with costs was one of the principal guides used in plan formulation. These comparisons attempted to cover all beneficial and adverse effects. While favorable primary tangible benefit-cost relations were the principal basis used in selecting programs and projects, intangible costs and benefits were also considered in making the plan. Measurements made reflected existing and probable future economic conditions, including estimates of the probable needs for the many goods and services which land and water development make possible. Benefit-cost data were applied to a range of interdependent physical and social possibilities and the resulting scale used for judging and selecting the means of development, the scope of facilities needed, and the site or area involved.

Increments and the Scale of Development

To achieve a reasonable scale of development, it was necessary in the formulation process to divide the work into manageable units. Planning units, usually called separable segments or increments, were the smallest units on which there was a practical opportunity for inclusion in or omission from the plan.

To meet the general objectives of maximizing net economic returns and satisfactions from the economic resources used in the plan, each part of the plan was formulated to include each separable segment or increment which would provide benefits at least equal to the cost of that segment or increment with full consideration of intangible values. Plan formulation was completed when analyses demonstrated that (1) there was need for the goods and services produced, (2) total benefits exceeded total costs, (3) each separable segment or purpose provided benefits at least equal to its cost, (4) the scale of development was such as to provide the maximum net benefits, and (5) there were no more economical means of accomplishing the same purposes.

The Nucleus Plan and the Multiple-Purpose Concept

A specific initial proposal generally was chosen

as the nucleus around which planning proceeded. This nucleus usually represented a project or program which seemed to offer promise of meeting a major objective or objectives.

After the initial proposals of development were selected for analysis, and benefits and costs measured, consideration was given to larger or smaller scales of development. Variations in the scope of each separable increment were made and tested and the possibility of additions or omissions examined. Early in this process, the possibility of multiple-purpose projects was considered. By the process of elimination, the most promising combination of projects and programs was identified and tested to determine where a justified nucleus had been found. The incremental analysis was continued by adding segments of size, purpose, or means, and by evaluating the resulting increments of benefits and costs. Thus, the incremental analysis was a series of comparisons of alternative plans "with" and "without" the inclusion of particular segments. Short cuts were frequent and necessary but these principles were followed. By this fitting process, modifications were made in the initial plan. This process was continued within practical limitations until the best combination was evolved to meet the established needs.

Sequence of Development

The sequence of project development is basic to maximizing overall project benefits. Project benefit and cost comparisons are misleading unless they represent the incremental benefits and costs of projects in a specified sequence of development. This problem was recognized in the studies by dividing proposed developments into those requiring early action and those which could be accomplished by later action. Further refinement in timing could lead to some changes in incremental benefits and costs.

General Information and Basic Data

Some of the general information essential to planning in the Ochlockonee basin was available but not always in the most useful form. Much of it required reorganization prior to analysis. While little original research was undertaken, professional interpretation of data and problems was frequently sought in the planning processes. The available data on past and current programs and on resource plans underway by Federal, State, and to some degree, private agencies became a part of the basic planning information.

As the studies progressed, the lack of certain basic data became increasingly evident. Topographic maps with a contour interval of 10 feet or less are available for about 75 percent of the basin. Many of the areas have maps with a contour interval of 50 feet. Hydrologic data, particularly streamflow, are limited. There are only 10 river gages in the numerous rivers and streams in the basin. Three of these stations are on the main stem and three others on tributaries of the Ochlockonee River. The remaining stations are located, one each, on four separate rivers. These river gage stations have records varying in length from 10 to 34 years. Practically no streamflow records are available for tributaries, except for the three stations located on tributaries of the Ochlockonee River. Water quality and ground water information is meager. Geologic information, which is very important, is limited to local areas and to generalized data. Much of the lack of data can be attributed to the fact that the basin has never approached full development of its resources. Consequently, there has been minimum effort to collect basic data. However, greater competition for resource use is beginning, and selection between uses will be increasingly important as the demands increase. Adequate basic data are essential in making proper selections; therefore, steps need to be taken to insure that information will be available when it is needed.

Single-Purpose Planning

Single-purpose planning for each purpose was carried to the point of establishing needs and determining most likely ways of meeting the needs with the least expenditure of resources. Studies for some purposes were carried into more detail than others in examining alternative ways of meeting needs. Where it was apparent that a single-purpose plan could be used without major modification in the comprehensive plan, the single-purpose studies were carried to more detail than in those cases where the purpose would be included, with perhaps major modifications, in a multiple-purpose development.

Multiple-Purpose Planning

Information developed in single-purpose planning and the special problems of the area were the initial bases for development of a multiple-purpose plan for the Ochlockonee basin.

The programs and projects which served as nuclei for the initial planning were based on the character of the resources, the nature of the problems, and the nature of the land and water projects already established or planned as portrayed in the single-purpose plans. Proposals considered for the inclusion in the plan came from many sources. Citizens throughout the area and local development organizations expressed interests in projects of many kinds and suggested combinations of resource use and development which they believed would meet particular needs. Federal and State agencies were also the source of much information on possible projects and project combinations.

Consideration was given to complementary land and water uses. Following the development of single-purpose ways for meeting needs, studies of compatible resource uses and areas of potential conflict in resource use were made. It was found that needs for forestry, recreation, and fish and wildlife could frequently be met by proper utilization of the same land resource. Similarly, water resource development plans could acceptably serve the purposes of flood control, water supply, fishing, and recreation, although operating adjustments had to be considered so that the most favorable multiple-purpose operating arrangements could be assured to maximize overall net benefits.

When sufficient preliminary study had been made, a series of detailed studies were undertaken to choose from among the alternatives those filling the needs most effectively. In this process, the problem of deciding among competing uses sometimes arose and there was always present the need to seek arrangements whereby the greatest play of complementary values would occur. This process involved a repetitious series of adjustments, in varying degrees of refinement, combined with progressively refined economic, hydrologic, and engineering comparison, until the best combination of proposed developments was found.

Nature and Treatment of Alternatives

In resources planning, comparison of alternatives is a vital part of the planning process. It is necessary to understand the nature of projects and programs rejected and the reasons for rejection, as well as the character of those accepted in the plan. Information on alternatives considered is summarized in Part Four. Additional detail concerning the nature of the alternatives considered and the reasons for their acceptance or rejection in the final plan are included in Appendix 12, Planning.

Competitive Uses

Many resource uses are competitive in character. The principal guidelines established and generally followed in determining the use of land and water resources are summarized as follows: (1) Resource utilization was based on and limited to the projected future needs, and (2) economic efficiency was a major governing criterion in deciding between alternative uses of a given resource, with due consideration given to social, political, and physical factors. Some of the situations requiring special attention are: (1) Existing, reserved, or special use land and water resources; (2) public health; (3) special requirements involving areas that provide a particular type of land or water use that cannot be duplicated elsewhere at a reasonable cost; and (4) those resources to which priority considerations should be given because of long established or firmly fixed development trends.

Adjustment Among Basins in Planning

Interbasin relations were recognized, to the extent practicable, when Southeast River Basins needs were developed and distributed among basins to provide planning objectives for each basin. For example, user-days of recreation demand for a given population center were distributed to all basins within reasonable travel distance from the center, rather than being allocated exclusively to the basin within which the center lies. A check was made to insure that the overall cost of meeting each need was not inflated by unreasonable disparities in unit costs. Adjustments between the Ochlockonee and other basins were made where reasonable alternatives were available and where overall efficiencies could be improved by the adjustments.

PART FOUR – BASIN PLAN

SECTION I – COMPREHENSIVE BASIN PLAN

The comprehensive plan for development of Ochlockonee basin land and water resources consists of projects and programs to meet basin needs projected to the year 2000. Projects and programs in the plan in addition to those in existence in 1960 are shown in Tables 4.1 and 4.2. More detailed data pertinent to developments, plans by purposes, economic analyses, physical features, and implementation of the plan are included in subsequent Sections.

The plan includes two general types of development—continuing programs such as those for public health and soil conservation that are carried on from year to year and individual projects which involve relatively large, short-term construction expenditures that will have benefits accruing over a long period of years. Many of the programs are already underway and the anticipated changes involve intensity or magnitude rather than of type of development. The projects involve facilities mainly for public outdoor recreation, fish and wildlife, pollution abatement, navigation, flood control, and drainage. Most of the specific projects are multiple purpose.

TABLE 4.1

Comprehensive Plan for Development
(thousands of dollars)

Project or program	Purpose[1]	Benefits[2]	Costs		
		Annual equivalent	Annual equivalent		Investment
			Total	Operation, maintenance, and replacements	
Doerun	R, F&W, PA	406	72	22	1,368
Quincy	R, F&W, PA, WS	277	152	64	2,519
Thomasville	R, F&W, PA, FC	704	351	151	5,695
Tired Creek	R, F&W, PA, WS	468	206	83	3,397
Gulf Coast Improvement	R, F&W, N, D, PH, T, L	7,336	4,986	1,020	110,200
Steinhatchee River Improvement	R, F&W, N, L	157	91	22	1,920
Wacissa	R, F&W	266	174	93	2,392
Water-access areas	R, F&W	2,849	758	469	7,998
Upstream watersheds	FC, D	976	713	155	15,470
St. Marks Levee	FC	13	9	1	220
Water supplies[3]	WS	[4]	2,460	1,806	27,200
Intracoastal Waterway Extension	N	243	170	34	3,785
St. Marks Channel Improvement	N	139	66	2	1,780
Panacea Channel Improvement	N	19	12	8	135
Irrigation	I	1,455	685	570	3,160
Drainage[3]	D	52	5	3	50
Soil conservation	SC	2,062	1,144	770	10,360
Forest conservation	F	3,839	2,922	1,315	64,940
Fish and wildlife[3]	F&W	1,267	695	667	1,265
Recreation[3]	R	3,869	1,361	797	19,890
Pollution abatement[3]	PA	[5]	932	219	30,550
Public health	PH	[5]	450	450	--

NOTES:[1] FC —Flood control; WS —Water supplies; N —Navigation; I —Irrigation; D —Drainage; SC —Soil conservation; F —Forest conservation; F&W—Fish and wildlife; R —Recreation; PA —Pollution abatement; PH —Public health; T —Land transportation; L —Landfill

[2] Primary tangible only; intangible and secondary benefits and impacts considered are presented in narrative.

[3] Data presented are exclusive of benefits and costs associated with multiple-purpose projects.

[4] Benefits are assumed to at least equal cost of the cheapest alternative but are assigned monetary values only for multi-purpose projects.

[5] Justification is based largely on intangibles, except pollution abatement resulting from dilution water provided by multi-purpose projects.

TABLE 4.2

Comprehensive Plan for Development by States
(thousands of dollars)

Project or program	Georgia			Florida		
	Benefits	Costs		Benefits	Costs	
	Annual equivalent[1]	Annual equivalent	Investment	Annual equivalent[1]	Annual equivalent	Investment
Doerun	406	72	1,368	--	--	--
Quincy	--	--	--	277	152	2,519
Thomasville	704	351	5,695	--	--	--
Tired Creek	468	206	3,397	--	--	--
Gulf Coast Improvement	--	--	--	7,336	4,986	110,200
Steinhatchee River Improvement	--	--	--	157	91	1,920
Wacissa	--	--	--	266	174	2,392
Water-access areas	623	161	1,654	2,226	597	6,344
Upstream watersheds	78	26	600	898	687	14,870
St. Marks Levee	--	--	--	13	9	220
Water supplies[2]	[3]	975	7,300	[3]	1,485	19,900
Intracoastal Waterway Extension	--	--	--	243	170	3,785
St. Marks Channel Improvement	--	--	--	139	66	1,780
Panacea Channel Improvement	--	--	--	19	12	135
Irrigation	976	460	2,120	479	225	1,040
Drainage[2]	33	3	29	19	2	21
Soil conservation	1,260	688	6,098	802	456	4,262
Forest conservation	649	415	7,980	3,190	2,507	56,960
Fish and wildlife[2]	84	72	--	1,183	623	1,265
Recreation[3]	--	--	--	3,869	1,361	19,890
Pollution abatement[2]	[4]	302	9,410	[4]	630	21,140
Public health	[4]	118	--	[4]	332	--

NOTES: [1] Primary tangible only; intangible and secondary benefits and impacts considered are presented in narrative.
[2] Data presented are exclusive of benefits and costs associated with multiple-purpose projects.
[3] Benefits are assumed to at least equal cost of the cheapest alternative but are assigned monetary values only for multi-purpose projects.
[4] Justification is based largely on intangibles, except pollution abatement resulting from dilution water provided by multi-purpose projects.

OCHLOCKONEE BASIN PLAN FEATURES

(key to numbers shown on Figure 4.1)

1 Doerun Reservoir
2 Tired Creek Reservoir
3 Grady County Wildlife Management Area
4 Thomasville Reservoir
5 Quincy Reservoir
6 Lake Talquin Recreation Area
7 Lake Jackson Indian Mounds Historic Site
8 Killearn Gardens State Park
9 Fort San Luis Historic Site
10 Natural Bridge Battlefield Historical Memorial
11 Wacissa Project
12 Apalachicola National Forest Recreation Area
13 Liberty Wildlife Management Area
14 Leon-Wakulla Wildlife Management Area
15 Bird Hammock Historic Site
16 St. Marks Wildlife Management Area
17 Wakulla Spring Recreation Area
18 Fort St. Marks Historic Site
19 St. Marks Levee
20 Aucilla Wildlife Management Area
21 Dog Island Recreation Area
22 Intracoastal Waterway Extension
23 Carrabelle to Alligator Point Beach Recreation Areas
24 Alligator Point Fisheries Research Station
25 Improved Seafood Cultivation
26 Panacea Channel Improvement Project
27 St. Marks Channel Improvement Project
28 St. Marks National Wildlife Refuge Recreation Area
29 Econfina River Recreation Area[1]
30 Gulf Coast Improvement Project
31 Fenholloway Beach Recreation Area[2]
32 Spring Warrior Recreation Area[1]
33 Keaton Beach Recreation Area
34 Hagens Cove Recreation Area[1]
35 Dallus Creek Recreation Area[2]
36 Steinhatchee River Channel Improvement Project
37 Steinhatchee Wildlife Management Area
38 Steinhatchee Beach Recreation Area[1]
39 Rocky Creek Recreation Area[2]
40 Pepperfish Keys Recreation Area[2]
41 Horseshoe Point Recreation Area[1]
42 Shired and Big Pine Islands Recreation Area[1]

NOTES: [1] Early action phase development considered as part of recreation program; subsequent development included as part of Gulf Coast Improvement project.
[2] Included in the Gulf Coast Improvement project.

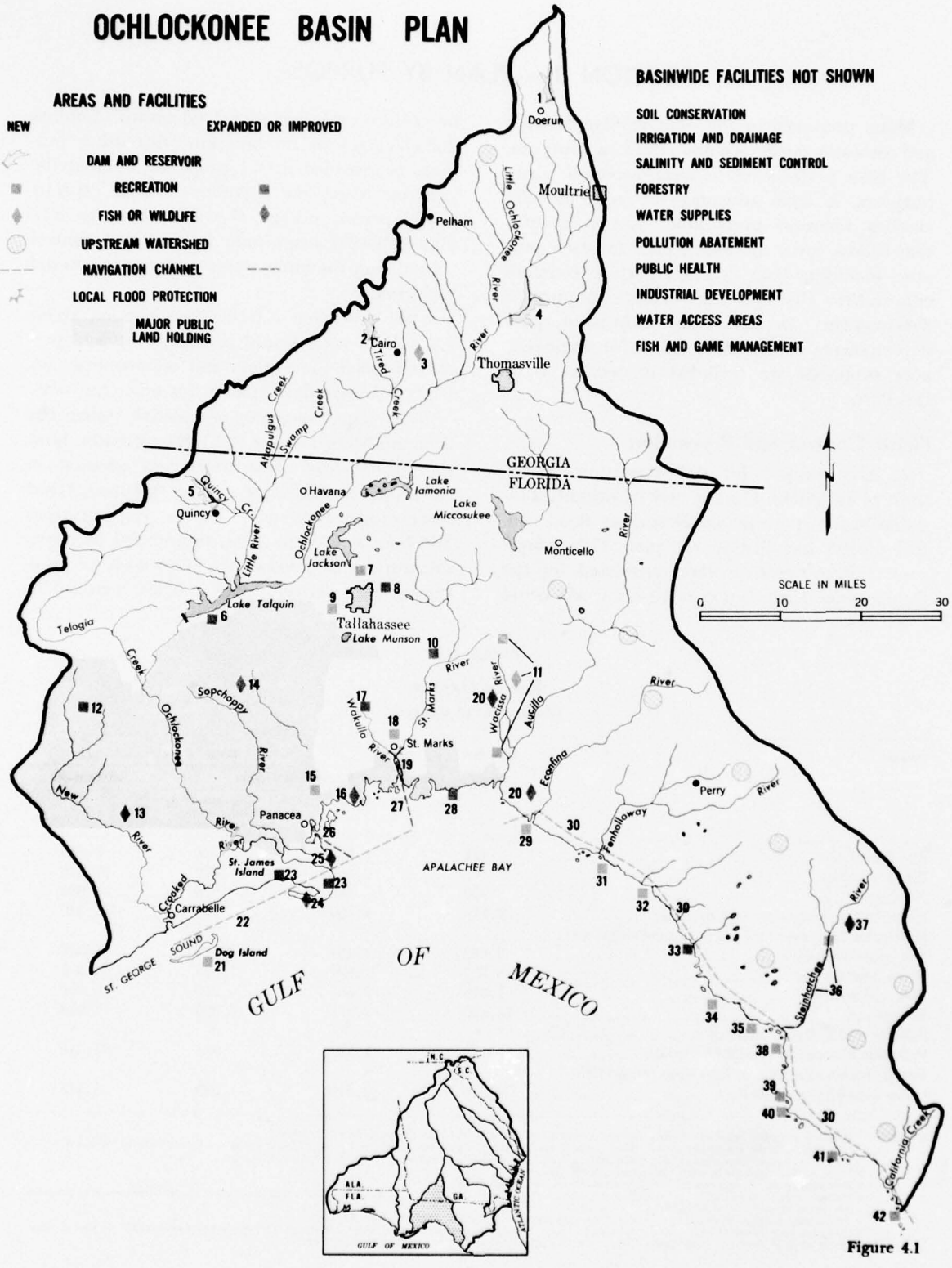

OCHLOCKONEE BASIN PLAN
AREAS AND FACILITIES
NEW
EXPANDED OR IMPROVED
DAM AND RESERVOIR
RECREATION
FISH OR WILDLIFE
UPSTREAM WATERSHED
NAVIGATION CHANNEL
LOCAL FLOOD PROTECTION
MAJOR PUBLIC LAND HOLDING
BASINWIDE FACILITIES NOT SHOWN
SOIL CONSERVATION
IRRIGATION AND DRAINAGE
SALINITY AND SEDIMENT CONTROL
FORESTRY
WATER SUPPLIES
POLLUTION ABATEMENT
PUBLIC HEALTH
INDUSTRIAL DEVELOPMENT
WATER ACCESS AREAS
FISH AND GAME MANAGEMENT
GEORGIA
FLORIDA
SCALE IN MILES
0 10 20 30
Doerun
Moultrie
Pelham
Little Ochlockonee River
Cairo
Tired Creek
Thomasville
Attapulgus Creek
Swamp Creek
Quincy
Quincy Creek
Havana
Lake Iamonia
Lake Miccosukee
Monticello
Ochlockonee River
Little River
Lake Jackson
Lake Talquin
Tallahassee
Lake Munson
Telogia Creek
Sopchoppy River
Wakulla River
St. Marks River
St. Marks
Wacissa River
Aucilla River
Econfina River
Perry
Panacea
New River
Ochlockonee River
St. James Island
Crooked River
Carrabelle
APALACHEE BAY
Tenmile Creek
Steinhatchee River
California Creek
ST. GEORGE SOUND
Dog Island
GULF OF MEXICO
N.C.
S.C.
ALA.
FLA.
GA.
ATLANTIC OCEAN
GULF OF MEXICO

Figure 4.1

SECTION II – PLAN BY PURPOSE

Many proposals in the plan involve benefits and costs associated with more than one purpose. The plan is designed to meet needs of many purposes; it takes advantage of joint use efficiencies wherever practicable. The summaries that follow cover the entire plan for each purpose, including both its single-purpose components and the allocated share of multiple-purpose developments. Details of the multiple-purpose developments and additional data for single-purpose proposals are included in Section V of this Part.

Flood Control and Prevention

A levee project for the protection of the town of St. Marks, Florida, and its industrial installations is the only single-purpose flood control project included in the plan. Other flood control improvements were considered for the Ochlockonee River but none of the works could be justified exclusively for flood control. Limited flood control in combination with other purposes is provided in the proposed Thomasville reservoir where the maximum storage capacity would permit storage of waters from an estimated 10-year magnitude flood. Flood control values from the other water control projects are incidental.

Small upstream watershed projects on about 1.6 million acres would provide watershed protection, flood prevention, and opportunities for water resources development for other purposes.

No stream forecasting or warning system has been established in the Ochlockonee basin, however, forecasting of streamflow is essential in the proper management of water resources. Flood forecasting is well known for reservoir operation and for warnings in areas unprotected by physical control of floodwaters. The costs of forecasting are relatively small and are included in

TABLE 4.3

Plan by Purpose
(thousands of dollars)

Purpose	Benefits[1]	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Flood control	471	360	78	7,819
Water supplies	[2]	2,480	1,810	27,640
Navigation	700	539	70	13,030
Reclamation, irrigation, and drainage	2,116	1,139	651	13,240
Hydroelectric power and industrial development[3]	--	--	--	--
Soil conservation	2,062	1,144	770	10,360
Forest conservation	3,839	2,922	1,315	64,940
Fish and wildlife	1,670	1,067	769	8,760
Recreation	12,690	4,973	2,329	77,920
Salinity and sediment control	[4]	[4]	[4]	[4]
Pollution abatement and public health	[5]	1,580	698	35,240
Beach erosion control and hurricane protection[6]	--	--	--	--
Other beneficial purposes[7]	2,304	2,210	220	55,345

NOTES:
[1] Primary tangible only; intangible and secondary benefits considered are presented in narrative.
[2] Benefits from the single-purpose portion of the plan for water supplies are assumed to be at least equal to the cost of the cheapest alternative, but monetary values have been assigned only for multiple-purpose projects which total $23,000.
[3] No specific proposals in plan—narrative discussion only.
[4] Included in soil conservation, forest conservation, and flood control.
[5] Justification based largely on intangible benefits, except for pollution abatement and public health aspects of multiple-purpose projects for which benefits total $520,000.
[6] Additional studies necessary, but no specific development program is included in the plan.
[7] Includes only benefits and allocated costs for land transportation as part of the Gulf Coast Improvement and landfill by use of spoil material as part of the Gulf Coast Improvement and Steinhatchee River Improvement projects.

TABLE 4.4

Flood Control Benefits and Costs
(dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Upstream watersheds*	456,900	350,400	76,900	7,580,000
Thomasville*	1,200	900	200	19,000
St. Marks Levee	12,600	9,000	1,100	220,000
Total	470,700	360,300	78,200	7,819,000

* Flood control benefits and allocated costs only.

the overall project and program costs. Benefits included are also based on the assumption that adequate forecasts will be available. These benefits are not achieved automatically. Effective use and regulation of streams require forecasts of flow, both high and low, as far in advance as is practicable. A program which recognizes the necessary lead time for development of reporting network and other facilities is required. Stream forecast points are needed for the towns of St. Marks and Newport, Florida, on the St. Marks River, and Perry, Florida, in the Fenholloway River drainage. A forecast point would also be needed at Thomasville, Georgia, if any extensive land development and land-use conversion from woodland to agricultural use occurs in the flood plains of the Georgia portion of the Ochlockonee River.

In addition to flood control, all river-related purposes such as recreational boating, fishing, navigation, hydropower operation, water supply, pollution abatement, public health, and irrigation would be benefited by advance information as to the expected flows.

Water Supplies

The water supply program includes additional and improved supplies for domestic, municipal, and industrial uses. Water supplies would continue to be obtained principally from the ground water resource, however, storage facilities for surface water supplies are included in the Quincy and Little Tired Creek dam and reservoir projects. The estimated demand for domestic, municipal, and industrial uses in the basin is about 219 million gallons per day by year 2000.

TABLE 4.5

Water Supplies Benefits and Costs
(dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Quincy[1]	9,900	10,000	1,900	210,000
Tired Creek[1]	13,200	10,000	1,700	230,000
Other water supplies				
Domestic	[2]	155,000	62,000	3,090,000
Municipal	[2]	1,231,000	816,000	18,060,000
Industrial	[2]	1,074,000	928,000	6,050,000
Total		2,480,000	1,809,600	27,640,000

NOTES: [1] Water supply benefits and allocated costs only.
[2] Benefits are assumed to be equal to the cheapest alternative cost but have not been assigned a dollar value.

The benefits from providing a suitable water supply is assumed to equal or exceed the cost of obtaining, from the cheapest and most likely alternative source, a supply that is adequate in quantity and quality. In the Ochlockonee basin ground water sources are generally the most likely alternative because of adequately yielding aquifers that are accessible at fairly shallow depths.

Adequate water supplies of good quality are essential to the health and well-being of all consumers. Water is a prime factor in governing human activity. Ample water of good quality is an important asset for future community and industrial development and can start or continue an expansion that would result in great economic benefits to any locality. Present availability does not, in reality, diminish the value of water or the benefits from its use. The value of water to an area as a natural resource to be preserved for the future may be much greater than the cost of obtaining it under existing conditions of supply and demand.

Navigation

Navigation projects included in the basin plan are: (1) The proposed multiple-purpose Gulf Coast Improvement project consisting of an inshore channel combined with a coastal highway and other developments to be located on the spoil area; (2) the deepening, widening, and extension of the navigation channel in the St. Marks River; (3) the improvement of a channel from Apalachee Bay to Panacea Harbor; (4) the extension of the improved channel in the Steinhatchee River to the small waterfalls about 1 mile downstream from the bridge on U. S. Highway No. 19 and 98; and (5) an extension of the protected route of the Gulf Intracoastal Waterway from Carrabelle, Florida, to Apalachee Bay through St. George Sound and across St. James Island. These developments and improvements would adequately accommodate the estimated water transportation requirements to year 2000.

Reclamation, Irrigation, and Drainage

In this Appendix reclamation and drainage are considered synonymous.

Irrigation

Irrigation would continue to be located principally in the Upper Coastal Plain portion of the basin. By year 2000, an estimated 24,000 additional acres of cropland are expected to be irrigated by individual systems on an individual farm basis. Irrigation included in the plan was established on the basis that incremental returns to the farmer, based on long-term projected prices, would at least equal the incremental operation, maintenance, and replacements costs without consideration of secondary effects or intangibles. This general guide was considered acceptable for reconnaissance studies although it was realized that followup individual irrigation

TABLE 4.6

Navigation Benefits and Costs
(dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
St. Marks Channel Improvement[1]	139,000	66,000	2,000	1,780,000
Panacea Channel Improvement	19,000	12,500	7,600	135,000
Gulf Coast Improvement[2]	270,000	262,000	23,500	6,611,000
Steinhatchee River Improvement[2]	29,000	29,000	3,300	719,000
Intracoastal Waterway Extension—Carrabelle to Apalachee Bay	243,000	170,000	34,000	3,785,000
Total	700,000	539,500	70,400	13,030,000

NOTES: [1] Benefits and costs are in addition to those associated with existing channel.
[2] Navigation benefits and allocated costs only.

TABLE 4.7

Irrigation Benefits and Costs
(dollars)

Feature	Benefits	Costs[2]		
	Annual equivalent[1]	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Individual projects	1,455,000	685,000	570,500	3,160,000

NOTES: [1] Value for irrigation is annual returns to farmers.
[2] Excludes technical assistance.

development would be subject to standard and more detailed evaluations. About 63 percent of the irrigation water is expected to be provided from farm ponds and 37 percent from individual wells and streams. Principal crops expected to be irrigated are tobacco, cotton, truck crops, corn, and orchards; and sprinkler systems would be the main method of applying irrigation water. It is assumed technical and financial assistance provided by State and Federal programs and private concerns will be continued. Irrigated acreages have been projected with the knowledge of current limitations imposed by ownership and land-use patterns, institutional factors such as crop allotments, and the expected time lapse before cropland uses are determined more nearly by competitive economic conditions.

Irrigation provides insurance against drought conditions, assists in prompt germination and continuous plant growth from seedlings to mature crops, assures a high survival percentage of transplanted crops, helps in establishing vegetative cover on eroded areas, and permits better use of land in accordance with capability.

Drainage

Use of land is restricted on a considerable acreage in the basin because of excess water. In addition to the adequately drained areas and within the Economic Framework used for this study, it appears feasible to provide drainage, during the 1960-2000 period, for an estimated 53,000 acres of cropland, pastureland, and rangeland. By year 2000, it is expected that about 3,200 acres of these lands subject to excess water will have adequate drainage facilities installed by individual landowners. This acreage may increase as additional flood protection is provided for low areas not now considered feasible for drainage because of frequent inundation. This is particularly applicable to the reach of the Ochlockonee River flood plain between Thomasville, Georgia, and Lake Talquin, Florida.

Upstream watershed projects proposed to be installed by year 2000 on nearly 1,600,000 acres of land include channel improvements which provide for drainage in combination with flood prevention.

TABLE 4.8

Drainage Benefits and Costs
(dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Individual projects	[1]52,000	[2]5,000	[2]3,300	[2]50,000
Upstream watersheds[3]	[1]518,600	362,900	78,400	7,890,000
Gulf Coast Improvement[3]	90,000	86,000	8,800	2,140,000
Total	660,600	453,900	80,500	10,080,000

NOTES: [1] Annual returns to farmers.
[2] Excludes technical assistance.
[3] Drainage benefits and allocated costs only.

The channel of the multiple-purpose Gulf Coast Improvement project would provide drainage for some of the adjacent flatwoods timberland and a drainage outlet for other systems.

Onfarm and small group facilities are expected to be used for most all agricultural land to be improved by installation of drainage facilities. Exclusive of drainage facilities provided by upstream watershed projects and the Gulf Coast Improvement, large group drainage is expected to be negligible. Surface facilities or open drains would be installed in most instances, but occasionally in the upper reaches of the basin, tile or closed drains may be installed. Individual landowners are expected to carry out nearly all the needed drainage improvements either with or without the detailed planning and technical assistance provided by Federal agencies through soil and water conservation districts.

Drainage provides for better use of land in accordance with its capability and also provides for improved land preparation, seeding, cultivation, management, and harvesting.

Woodland drainage is discussed under Forest Conservation and Utilization.

Hydroelectric Power And Industrial Development

Preliminary studies indicate no new economically justified hydroelectric powersites exist in the basin.

Industrial development is expected to play an important part in achieving the projected goals. Increased production and activities relating to proposals in the resource development plan would provide the basis for meeting the needs of increased employment and would add to the desirable environment for industrial development.

Inasmuch as there is active competition for attracting new industries, it is essential that the potentials of the basin be defined and evaluated. Factors which need consideration are the sources of raw materials, labor supply, education, financing, resource location in relation to cities, transportation, water supply, waste disposal, power requirements, and the impact of added population on public facilities.

For short-range planning, the local people should examine available resources and determine the possibilities for expansion under going programs. Many small industries, with the help of local organizations, may be able to increase sales. The possibilities for expanding manufacturing activities which utilize quantities of local resources and available labor are particularly significant.

Basinwide potentials must be assessed in long-range planning. As the extensive recreational potential along the Gulf coast is developed, industries associated with boat building and repair, camping equipment, fishing gear, and similar enterprises would be needed.

In addition to the large agricultural, forestry, and recreational resources, the basin has commercial deposits of limestone and clay for use by processing plants to produce products needed by the expanding construction industry. Chemical plants producing fertilizers, insecticides, and herbicides for use in expanding agricultural production are potential industries for the basin area. Industries manufacturing container and packaging materials have a good market potential, particularly for food processing. Industries using wood products and lumber also have a good potential for expansion.

No attempt has been made to identify or locate specific enterprises that are expected to come into the Ochlockonee basin, but a significant part of the plan is directed toward establishing a general setting that will be attractive to new or expanding industrial plants.

Soil Conservation and Utilization

Application of soil conservation measures and practices on the areas of cropland, pastureland, and rangeland needing conservation treatment throughout the basin is a basic principle in protecting the soil resources and in providing sustained agricultural production in the basin and region. In much of the basin, application of soil conservation measures and practices provides the most effective means of watershed protection. Applying these practices and measures would be accomplished by individual farmers on an individual farm basis. By year 2000 it is estimated

that of the 513,000 acres expected to be used for cropland, pastureland, and rangeland which would be benefited by conservation treatment, about 385,000 acres will be treated by the application of annual and permanent soil conservation measures and practices to protect the soil resource.

In addition to protecting the soil, application of these practices and measures would reduce the sediment load and thus extend the life of floodwater retarding structures and major reservoirs and enhance the value of the streams and reservoirs for fishing and recreation.

About 1,600 additional farm ponds are expected to be installed to provide for livestock water, irrigation water supplies, some small impoundment fishing, and some unclassified recreation use.

An estimated 72,000 acres of woodland, pastureland, and other lands are expected to be converted to cropland and 94,900 acres of cropland and other lands are expected to be converted to pastureland.

Land owners and operators would install conservation measures on an individual farm basis and in upstream watershed projects with technical and financial assistance from State and Federal programs and private concerns. Since 100 percent of the basin is in soil and water conservation districts, technical assistance would be furnished, in the main, through these districts.

Expanding nonagricultural land uses, such as urban and industrial areas and transportation facilities, would continue to decrease the amount of agricultural land. It is estimated that some

Figure 4.2 *Conservation Measures Are Needed to Protect Both Soil and Water Resources.*

55,000 acres now in cropland, pastureland, and woodland will be converted to nonagricultural uses by the year 2000. The erosion control and water management problems on these lands would require similar treatment measures as for cropland and pastureland and would be applied by private individuals, industries, and local and State entities. At the time these areas are converted to nonagricultural uses, the specific problems and solutions will need to be determined and means established to carry out the control measures.

Expected Land Use in Year 2000

Cropland and pastureland	821,000 acres
Woodland	2,842,000 acres
Other land	300,000 acres
Total	3,963,000 acres

TABLE 4.9

Soil Conservation and Utilization Benefits and Costs for Cropland and Pastureland (dollars)

Feature	Benefits	Costs[2]		
	Annual equivalent[1]	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Basinwide program	2,062,000	1,144,000	769,800	10,360,000

NOTES: [1] Value is annual returns to farmers.
[2] Excludes technical assistance.

Forest Conservation and Utilization

The forestry program would be instituted on all of the woodland in the basin. By the year 2000 woodlands are expected to occupy 2,842,000 acres as compared to 3,056,000 acres in 1959. The program for forest conservation and utilization includes fire protection, fencing for woodland grazing control, erosion control tree planting, woodland water control and forest roads, planting shelterbelts, timber-stand improvement, other tree planting, site preparation for natural reproduction, and improved woodland management.

The forestry program is expected to be largely developed, and administered by timber owners with technical assistance from public agencies.

TABLE 4.10

Forest Conservation and Utilization Benefits and Costs
(dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Basinwide program	3,839,000	2,922,000	1,315,000	64,940,000

Figure 4.3 *Woodland Water Control Project Under Construction.*

Fish and Wildlife

The fish and wildlife program is primarily one for local and State development but some Federal assistance would be provided under existing law. The overall program includes both single-purpose activities and fish and wildlife features in multiple-purpose projects.

The commercial fisheries program would consist of expansion and acceleration of existing operations and cultivation of shrimp, oysters, pompano, and other high-quality seafoods.

Accomplishment of the plan by the year 2000 would provide annually some 488,000 user-days of hunting, about 1.4 million user-days of sport fishing, and about 10.8 million pounds of commercial fish. Programs installed in the period 1960-2000 would provide for an annual increase of 168,000 user-days of hunting, 613,000 user-days of sport fishing, and about 5.7 million pounds of commercial fish.

Recreation

The public outdoor recreation program includes existing developments, the expansion and improvement of some existing facilities, and new facilities to provide an opportunity for a total of 10 million annual user-days by year 2000. This would accommodate about 3,600,000 user-days at beaches and 6,400,000 user-days at general outdoor, natural environment, and cultural areas. The new facilities include both developments for recreation alone and multiple-purpose projects containing recreation facilities. Recreation facilities included in the comprehensive plan to be developed during the period 1960-2000 would provide an opportunity for 8,950,000 user-days annually. Expansion of facilities in addition to those provided in 1960 at existing recreation areas would provide an opportunity for about 3,350,000 user-days annually and 5,600,000 user-days annually could be accommodated at new developments.

TABLE 4.11

Fish and Wildlife Benefits and Costs for Developments During 1960-2000 (dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Sport fisheries and wildlife				
Doerun*	5,000	3,000	700	63,000
Quincy*	5,500	4,200	900	94,000
Thomasville*	48,000	38,000	9,500	791,000
Tired Creek*	21,000	13,000	2,700	286,000
Gulf Coast Improvement*	198,000	191,000	42,000	4,141,000
Wacissa*	13,500	13,400	6,100	204,000
Steinhatchee River Improvement*	4,000	4,000	200	106,000
Water-access areas*	73,000	71,700	36,700	972,000
Single-purpose sport fisheries and wildlife	949,000	462,700	439,600	1,071,000
Subtotal	1,317,000	801,000	538,400	7,728,000
Commercial fisheries				
Gulf Coast Improvement*	35,000	34,000	3,500	838,000
Single-purpose commercial fisheries	318,000	232,000	227,000	194,000
Subtotal	353,000	266,000	230,500	1,032,000
Total	1,670,000	1,067,000	768,900	8,760,000

* Fish and wildlife benefits and allocated costs only.

TABLE 4.12

Recreation Benefits and Costs for Developments 1960-2000 (dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Doerun[1]	79,000	39,000	16,100	627,000
Quincy[1]	243,000	124,000	58,800	1,905,000
Thomasville[1]	624,000	285,000	135,000	4,291,000
Tired Creek[1]	384,000	151,000	73,100	2,153,000
Gulf Coast Improvement[1 2]	4,369,000	2,138,000	713,400	39,540,000
Steinhatchee River Improvement[1]	94,000	28,000	17,400	300,000
Wacissa[1]	252,000	161,000	86,700	2,188,000
Water-access areas[1]	2,776,000	686,000	432,000	7,026,000
Single-purpose recreation				
Improvement of existing areas	2,393,000	753,000	446,000	13,198,000
New developments	1,476,000	608,000	351,000	6,692,000
Total	12,690,000	4,973,000	2,329,500	77,920,000

NOTES: [1] Recreation benefits and allocated costs only.
[2] These data include costs and benefits associated with improvements that are to be made to the Suwannee Gulf Park in the Suwannee basin after the Gulf Coast Improvement project is constructed. However, the user-days of recreation related to the additional facilities are included as part of the total recreation use in the Suwannee basin.

Salinity and Sediment Control

Neither salinity nor sediment are major problems in the Ochlockonee basin and no programs or projects are proposed exclusively for their control. Saline soils in the Ochlockonee basin are located almost entirely in the coastal marshes. There is no foreseeable need for reclaiming saline soils for agricultural uses before year 2000. Incidental control values would probably result from other functional programs and multiple-purpose projects but the benefits have not been evaluated separately.

Pollution Abatement and Public Health

Pollution Abatement

Clean streams enhance the well-being of people and influence their choice of place of residence, employment, and recreation. Thus, pollution abatement is important in sustaining a healthy environment and in attracting others to the basin. Low-flow augmentation in connection with pollution abatement is a purpose at each of the proposed multiple-purpose dam and reservoir projects. The water stored for stream water quality control is the amount required to provide adequate flows for assimilating the organic pollution loads of the treated waste effluents, based on the estimated 7-day consecutive low flow occurring on an average of once every 10 years. The value of the water storage is based on the cost of providing the same stream water quality by constructing tertiary treatment plants. A constant annual equivalent value of $50 per acre-foot of water stored for augmentation of low flows was used in these preliminary studies, although equivalent costs of providing the alternative tertiary treatment generally ranged from $50 to over $100 per acre-foot. Justification for single-purpose pollution abatement programs is based largely on intangible benefits.

Public Health

The public health program is essentially annual operations for a single purpose. The Gulf Coast Improvement project, however, is an exception. This multiple-purpose project is expected to reduce the vector problems along the coast by providing drainage and landfill for large swampy areas and permitting ready access to areas along the coast that need additional vector control measures.

TABLE 4.13

Pollution Abatement Benefits and Costs
(dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Doerun[1]	321,700	30,000	5,300	678,000
Quincy[1]	18,500	14,000	2,900	310,000
Thomasville[1]	30,200	27,000	6,100	594,000
Tired Creek[1]	49,700	32,000	5,400	728,000
Single-purpose pollution abatement programs	[2]	932,000	219,100	30,550,000
Total	[3]	1,035,000	238,800	32,860,000

NOTES: [1] Benefits and allocated costs from multiple-purpose project.
[2] Justification is based largely on intangible benefits and a dollar value has not been assigned.
[3] Total not shown because benefits from single-purpose program have not been assigned a dollar value.

TABLE 4.14

Public Health Benefits and Costs for Developments 1960-2000
(dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Gulf Coast Improvement[1]	100,000	95,600	9,800	2,380,000
Single-purpose program	[2]	449,500	449,500	[3]
Total	[4]	545,100	459,300	2,380,000

NOTES: [1] Benefits and allocated costs from multiple-purpose project.
[2] Justification is based largely on intangible benefits and a dollar value has not been assigned.
[3] Investment costs are insignificant because this is principally an annual operation program.
[4] Total not shown because benefits from single-purpose program have not been assigned a dollar value.

Vector control would not only guard against the spread of vector-borne diseases but also, in the case of mosquitoes and other swarming and biting insects, would reduce the psychological and physiological discomforts caused by these pests. In the Ochlockonee basin, where recreation is so important, adequate control of vectors would be a very influencing factor in future economic development of the basin.

Other Beneficial Purposes

Beach Erosion Control and Hurricane Protection

Beach erosion problems occur principally along the western portion of the coast. Beach erosion along the shoreline in the eastern part of the basin is minor because the shallow offshore limestone bank reduces the natural wave action. Hurricane damage has been rather light in the past because development is lacking in the areas of prevailing hurricane paths. Both erosion and hurricane damages will increase as coastal areas continue to be developed. Proposals for alleviating these problems require detailed analyses considered to be beyond the scope of this study. However, a study should be made of the influences of tides, offshore currents, hazards from hurricanes, winds, and places of immediate danger. In this connection, use should be made of the results of Corps of Engineers studies which cover most of the hurricane protection problems in the study area.

The existing hurricane warning systems should be modified as required to serve the area better. Evacuation routes should be established over bridges and causeways, and a plan for using ex-

isting ferries and other boats for emergencies should be prepared for use of Dog Island and for other out-of-the-way places as the need develops.

Provision should be made for installing and enforcing zoning and building codes, providing auxiliary power supplies, and determining the needs for protective seawalls or similar structures.

Beach erosion control plans should be coordinated with plans for channel improvement and maintenance, hurricane protection, recreation, fish and wildlife proposals, and other proposed improvements in the area.

Land Transportation and Landfill

Real benefits would accrue to land transportation by providing a highway as part of the Gulf Coast Improvement project, and to landfill by using the excess spoil material from both the Gulf Coast Improvement and Steinhatchee River Improvement projects. The purposes were therefore included in the analyses of these multiple-purpose projects, even though they are not normally included in the studies made to develop comprehensive plans in other basins. Landfill as a means of improving land by use of spoil material should not be confused with the sanitary landfill method of solid-waste disposal included in the public health program.

The highway proposed along or near the Gulf of Mexico would be a scenic route and it would provide needed transportation facilities to accommodate future traffic between the panhandle and the peninsula of Florida. Spoil material would be available for highway construction and to provide additional area to help satisfy the increasing demand for homesites along the Gulf of Mexico and the Steinhatchee River or to use for industrial purposes. The only spoil material used in the evaluation of the Gulf Coast Improvement project for landfill to improve adjacent lands was in excess of that needed for highway construction.

Other Beneficial Purposes

There are no development features in the plan specifically for purposes other than those listed above. It is assumed, however, that programs for obtaining topographic and geologic mapping, hydrologic data, data on water quality and water use, information concerning desirable land-use changes, and other basic data on the area resources will be continued or even accelerated.

TABLE 4.15

Land Transportation and Landfill Benefits and Costs*
(dollars)

Feature	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Land transportation	1,534,000	1,473,000	146,300	36,920,000
Landfill				
Gulf Coast Improvement	740,000	707,000	72,500	17,640,000
Steinhatchee River Improvement	30,000	30,000	1,500	795,000
Total	2,304,000	2,210,000	220,300	55,345,000

* Land transportation evaluated only as part of the Gulf Coast Improvement project and landfill evaluated only as part of the Gulf Coast Improvement and Steinhatchee River Improvement projects by estimating the value of the excess spoil material.

SECTION III – IMPACTS OF THE PLAN

Economic

A major objective of the plan is to improve the environment for people and industry of the basin. These improvements are not all measurable in tangible terms. Identifiable primary tangible benefits have been used for evaluation of the projects and programs in this plan. The greater use and greater value, however, might very well stem from benefits not identified or fully recognized in the monetary justification.

The nonevaluated benefits may be either or both primary and secondary in nature.

The impact of programs and projects which involve increased production of commodities would be felt in the general community by requiring additional production materials and processing equipment, and more services to provide the material, maintain the equipment, and sustain operations. These increased activities would stimulate a large exchange of money throughout the basin. Similarly, it is expected that there will be very sizable impacts from recreation and sport fishing and wildlife projects and programs. Fishing camps, motels, sporting goods stores, service stations, boat dealers, restaurants, and related new businesses would be required.

Development of the water and land resources in the Ochlockonee basin could also stimulate economic development that would reach beyond the basin limits. Inasmuch as most of the financing and cost sharing of the proposed developments, as well as the initiative for development, must be borne by local interests, it is important that impacts of the comprehensive plan be recognized and understood.

Flood Control

The flood problems of the Ochlockonee basin are minor. Most of the river flood plain areas are wooded and amount to only about 4 percent of the total basin area. Certain projects are included, however, which have flood control benefits and would help eliminate some of the flood problems. A levee at St. Marks is a single purpose flood control project which would result in land enhancement and enable more extensive use of the area for industrial purposes.

Greater safety from floods will permit more intensive utilization of some bottom lands for agricultural purposes. This is expected to increase land values in these areas now utilized for the production of hardwoods.

Water Supplies

In this study, the benefits from water supplies were assumed to at least equal the cost of obtaining water of similar quantity and quality from the cheapest and most likely alternative source. In the Ochlockonee basin the cheapest and most likely alternative source is usually an underground artesian aquifer. Since the ground water is presently adequate and accessible in most areas at relatively low cost, the values used in benefit analyses are low. One should not let this present availability, however, diminish the true value of water and its benefits. An ample supply of good quality water is a very important item in starting or continuing an expansion that would result in many economic benefits to any locality. Therefore, in reality, the value of water to an area as a natural resource to be preserved for the future should be considered as much greater than the cost of obtaining it under existing conditions.

Navigation

The economic impacts of navigation projects would stem from the primary benefits of savings in transportation costs and potential traffic expected to develop because of the waterway. These benefits may create increases in other economic developments.

Industries that supply or consume large amounts of bulk commodities suitable for water transport generally find it advantageous and profitable to locate on navigable waterways. These improved waterways become parts of mass-production lines for moving bulk materials and component parts or finished commodities at low cost. If other factors, such as raw materials, markets, land transportation, power, and suitable sites are favorable, industrial development could very well be an outgrowth of navigation improvements.

Industries that utilize or produce agricultural products, steel or iron, coal, petroleum, chemicals, pulp and paper, building materials, transportation equipment, and farm machinery are the big users of navigable waterways. These industries have been responsible for billions of dollars of industrial development on navigable waterways since World War II. An expansion of the petrochemical industry on the Gulf Intracoastal Waterway is evidence of the attractiveness of navigable waterways to industrial development. It is in this subsequent development that the major economic impacts are found.

Irrigation, Drainage, Flood Prevention, and Soil Conservation and Utilization

Agricultural employment is an important factor in the economy of the Georgia portion of the basin but of much less importance to the Florida portion. Agricultural employment is expected to decline by approximately 50 percent over the next 40 years but production will increase considerably. Thus it is expected that agriculture will continue to have an important impact on the basin economy although employing less people.

In 1959, the net income from agriculture, including farm forestry, was about $4 million. By 2000, it is projected to be over $32 million. Annual production expenditures are expected to exceed $58 million by 2000 which would also have an impact on the economy of the area.

By 2000, the basin farmers would probably spend about $6 million for feed, $3 million for livestock, $2 milion for seed, $9.7 million for fertilizer and lime, $10.5 million for repairs and maintenance, $7 million for labor, and $1 million for interest. Supporting retail, service, and financial activities are also expected to be greatly affected.

As a source of raw materials to sustain the food-processing industries, agriculture will continue to hold great importance, and is expected to continue to have real and lasting effects on the basin communities. In addition to increased agricultural production, benefits would accrue through improved efficiencies of farm operations; reduction of turbidity of many streams; prolongation of the useful life of surface reservoirs; some alleviation of flood and sediment damage to roads, bridges, roadfills, livestock, and real and personal property; improved wildlife habitat and recreation facilities; and abatement of stream pollution. Proper utilization of agricultural lands by providing protection from erosion would permit more intensive utilization, and contribute toward adequate agricultural and nonagricultural water supplies for the people of the basin.

Hydroelectric Power and Industrial Development

There are no hydroelectric power projects proposed for installation in the basin. Most of the power needs of the area will continue to be served by sources outside the basin. Non-Federal power companies will construct additional electrical facilities including steampowered electric plants as demands dictate. An adequate supply of cooling water may result in some of these plants being constructed in the basin.

Manufacturing employment projections for the basin show an increase in all industrial categories by 2000 except textiles. Industries that show promise of greatest increase are oriented to market, resources, or labor availability. Food processing is one of the fastest growing activities and the impact of this type industry is being felt in the basin particularly around Cairo and Thomasville, Georgia. The lumber and wood products industries are also of importance and their impact is basinwide.

Capital expenditures for industrial expansion anticipated in the basin will average about $2,750,000 annually. New jobs, averaging 230 annually, are expected to be created in manufacturing and approximately 1,400 new jobs annually are expected in service, trades, and professional categories.

New manufacturing employees and those in supporting industries and trades will buy new homes, cars, furniture, appliances, food, drugs, and services. They will also pay taxes and demand governmental services for their tax dollar. So with economic progress comes community demands for highways, water and sewerage facilities, education, police and fire protection, and other services. Communities that keep abreast or even ahead of these demands are the communities that are going to realize the fastest growth.

The economic impact of industry does not stop when it reaches the city limits or even the basin boundaries. Its effects are far reaching.

Forest Conservation and Utilization

More than 3 out of every 4 acres or a total of 3 million acres in the Ochlockonee basin are forested. Nearly half of the woodland is nonfarm, privately owned, much of which is under the management of pulp and paper companies. Timber production in the basin is expected to more than double by 2000 and this increased production would have an impact on the basin economy.

This increased production is of great importance to the basin because of the raw materials needed to advance the manufacturing potential. The pulp and paper industries as well as the lumber and wood products industries hold promise for employment growth. Increased employment will be forthcoming from reforestation, management, and fire protection. More employees are also expected to be needed for harvesting and transporting of the timber products and raw materials. All of these activities can be of great importance to the smaller rural communities. They mean increased expenditures for equipment, supplies, taxes, services, payrolls, and housing.

In addition, the forestry program would improve the condition of the soil and reduce erosion and storm runoff. Recreation possibilities would be enhanced, and better fish and wildlife habitat would be provided.

Fish and Wildlife

The expenditures of sportsmen in the project areas would add much to the economy of the basin. Additional employment opportunity would be afforded by many small businesses engaged in boat building and supplies, operation of fishing and hunting camps, and in services and sales of food, gasoline, arms and ammunition, fishing tackle, live bait, and other sporting goods and supplies.

Table 4.16 summarizes some of the expenditures which might be expected from hunting and fishing in the basin. These are compiled from national averages and are only illustrative.

TABLE 4.16

Average Annual Expenditure Per Person Hunting and Fishing—1960 (dollars)

Expenditure item	Hunting	Fishing
Food	5.35	8.24
Lodging	1.87	2.45
Transportation	11.50	14.85
Equipment	39.12	51.51
Licenses, tags, permits	4.28	2.08
Leases, fees, other	17.22	27.11
Total average expenditure per person	79.34	106.24
Average expenditure per user-day	6.00	5.75

Benefits that are less tangible are derived from general enhancement of the recreational opportunities afforded by a given locality. The growth of many towns and cities in this portion of the Southeast will depend to a great extent on their attractiveness and proximity to land and water affording good hunting and fishing.

The commercial fishing industry generally is plagued by the vagaries of weather, seasonal fluctuation of supply, precarious market conditions, lack of good conservation practices, and competitive products. As a result, this industry is not attracting energetic young men. The benefits which could be realized, however, are of such magnitude as to justify a vigorous effort toward attracting new men into the industry.

Secondary benefits include increased employment in the fishing and seafood industries and in boat building, boat maintenance, and boat supply enterprises. More services would be required; and sales of food, gasoline and oil, fishing supplies, and other equipment would increase.

Recreation

Outdoor recreation activities create economic stability in many areas of the Nation, including several areas in the Ochlockonee basin. Various trades and services and several segments of industry, such as boat building and recreation equipment, that are partially or wholly dependent upon outdoor recreation pursuits have evidenced phenomenal growth in the last decade. As leisure time and per capita income increase, outdoor recreation activities are also expected to increase; thus the growth of recreational related trades, services, and industries are expected to continue.

Outdoor recreation produces many primary benefits. Some of these benefits are intangible. Recreation provides the healthful exercise necessary for physical fitness, and it promotes mental health. It is also valuable for nature education.

Recreation produces secondary benefits that are reflected in the economy of the area, the community, and the Nation. Some of these secondary benefits are:

(1) An attractive environment stimulates inmigration of persons looking for a pleasant place to live.

(2) Stimulation of travel and travel expenditures.

(3) Development of business activity in areas within, adjacent to, or enroute to recreation areas, increasing retail trade and new construction.

(4) Stimulation of business activity relative to the manufacture of recreation equipment.

(5) Increased property valuations in and around recreation areas.

(6) Increased miscellaneous net tax revenue after deducting increased governmental expenditures for needed governmental services.

Surveys of these secondary benefits have been made in many areas but the effectiveness of these surveys is dependent upon how they were developed and for what purpose. Some of the surveys give estimates of individual expenditures running from $4 to $7 per day and breakdowns of expenditures for food, lodging, and transportation. A recent Georgia survey determined that about $4 are spent daily by the recreationist. These expenditures are reflected in the economic activities mentioned above. Even if this expenditure rate does not increase in the next 40 years, the 10 million user-days that recreationists are expected to spend in the Ochlockonee basin annually by 2000 would entail an outlay of over $40 million.

Water-based recreation is of special importance to outdoor recreation. Reservoirs, lakes, unpolluted streams, and gulf and ocean beaches generate more recreational activity than any other outdoor recreation factor. A recent 10-year study of selected counties in the Arkansas-White-Red River Basins with significant reservoir shorelines showed an increase in per capita income of 57 percent, an increase in bank deposits of 57 percent, and an increase in tax levies of 64 percent. Also significant was an increase in investment in overnight lodging facilities, annual expenditure on private home construction, and new school construction. Counties in the same areas without shorelines fell far short of this rate of growth.

While all the economic gains in those reservoir counties cannot be directly attributed to the presence of new lakes, it is evident that the new recreational activities had a pronounced effect. The reservoir counties are better off by nearly all economic yardsticks. These counties were comparatively depressed prior to the construction of the reservoirs so that the impact of the recreation dollar was somewhat more dramatic in this situation than it would be in an area of greater economic activity.

Pollution Abatement and Public Health

Clean streams enhance the well-being of people and good water quality influences people as to their choice of place of residence, employment, and recreation. These are important in sustaining a healthy environment and in attracting others to the basin.

There are varying degrees of pollution in the streams of the Ochlockonee basin resulting primarily from municipal wastes and industrial wastes. Pollution abatement is frequently needed to maintain suitable water quality necessary to realize fishing, hunting, and recreational opportunities. Clean streams improve land and property values which have a great impact on economic development. Industries are particularly interested in establishing new plants in areas where pollution problems can be handled effectively.

To properly handle the liquid wastes would require over $13 million in treatment systems and sewer lines by 1975. Other expenditures of nearly $17 million would be required between 1975 and 2000 to keep abreast of the population growth in the municipalities. Construction of these facilities is expected to provide employment in 19 or more communities in the basin.

It is difficult to assess the impact of a pollution abatement program. There are intangible economic benefits from improved waters as mentioned above. In this particular basin where recreation is so important to the future economic development, water quality assumes even greater importance. Pollution abatement would constitute insurance for future usefulness as well as for immediate purposes.

Public health programs for control of vectors, mainly mosquitoes and gnats, are also very important. The coastal areas of the Ochlockonee basin with its tidal marshlands as well as the entire length of the basin with its numerous ponds and wetlands afford breeding places for mosquitoes and other vectors. Various agricul-

tural practices such as raising livestock and poultry can create unsanitary conditions favorable to the breeding of flies and rodents. Much of this can be eliminated by better drainage and satisfactory disposal of solid wastes. Control of these undesirable vectors could mean the difference in some places between success or failure in the efforts to improve the area economy.

Other Economic Impacts

Other noteworthy economic impacts relate to several or all of the functional programs.

Land enhancement impacts—Land and water resources improvements have not been specifically planned for enhancement of land, except for lands actually improved by use of spoil material. However, enhancement of adjacent lands that would result from reservoir construction and coastal improvements could be an important factor. Waterfront property, particularly that suitable for homesites and recreational and industrial development, is generally marketable at a higher value than nonwaterfront property with other factors being equal. Land that was previously woodland or tidal marsh is subdivided into more expensive lots. Other areas become important for industrial property because of stable, ample, and unpolluted water supplies.

Studies show that within 10 years after the development of reservoirs, property values often have increased as much as 10 times on shoreline property. The increases have been even greater in areas where electricity and easy access are readily available. New tax parcels with taxable homes and improvements are added to the tax rolls annually, increasing the total net tax valuations.

This is not to claim that all land enhancement values of projects outlined in this plan will be of the same magnitude. Several factors which influence land enhancement are listed as follows:

(1) Proximity to urban population,
(2) shoreline topography,
(3) fluctuation in water level,
(4) water quality,
(5) accessibility and ownership, and
(6) size of reservoir.

Similar land enhancement, however, has occurred at Lake Talquin and where access has been provided along the Gulf of Mexico. Some land enhancement can be expected at all reservoirs and coastal improvement projects in the Ochlockonee basin plan. In the future, as waterfront property becomes scarce as a result of increases in population and leisure time, enhancement of land stemming from water project development would have even greater effects.

The losses of taxable land because of a reservoir or waterway acquisition are usually more than offset by the increased valuation of waterfront land improvements. Improvements, however, lead to increased problems and services at the governmental level. Careful planning for waterfront development should precede and follow reservoir construction and coastal improvements. Mixed land uses, poor subdivision zoning and design, haphazard road development, and inadequate sanitary facilities can make shorelines problem areas rather than community assets.

Impacts from construction activities—The construction of water storage works and other facilities will provide an economic stimulus during the construction period. This is brought about by the temporary influx of workers for the project who need housing, food, services, and entertainment. Much of this economic activity, stemming from wages and salaries, is felt locally.

It has been estimated that about 60 percent of the total construction or investment cost of a project or program is for labor. The proposed plan for the Ochlockonee basin involves an annual investment expenditure of about $8 million as compared with a 1960 expenditure in the basin of about $5 million for the same type of investment expenditures. This average increase of $3 million per year, particularly the portion of the costs needed for labor, would considerably affect the economy of communities in the vicinity of construction activities. The remaining 40 percent of the construction cost is for materials, equipment, maintenance, and service; the impact from these costs would generally affect a much larger area.

Impacts to redevelopment areas—There are five counties falling wholly or partially in the Ochlockonee basin that have been designated redevelopment areas as of April 1962, under Section 5 (b) of the Area Redevelopment Act of 1961. These counties have been designated for

various reasons such as low median family income, low farm family income, and persistent and substantial unemployment.

The Area Redevelopment Act is directed toward creating needed new employment opportunities through the development of facilities and resources. The program offers five broad types of assistance: Loans for industrial and commercial projects; loans and grants for public facilities; technical assistance; occupational training; and subsistence payments while retraining. Many Federal and State agencies cooperate under the provisions of the Act. Also, many universities and colleges lend technical assistance to eligible areas under this program.

A forerunner of the Area Redevelopment Act was the Rural Development Program established in 1955. Now renamed the Rural Areas Development Program, this program is an interagency effort to solve some of the economic problems of rural underdevolped areas. The U. S. Department of Agriculture and the land-grant colleges are very active in this work.

Many of the projects and programs in the basin plan could be facilitated by these and other available assistance programs. Bringing about speedier realization of the basin plan should help remedy many of the conditions that cause counties to be designated redevelopment areas.

The food and fiber programs would improve farm and forest efficiency and production throughout the basin and increase per capita income, especially for farm families. The commercial fisheries program would increase fish production and assist in increasing employment in the coastal counties. The projects to provide more and better recreational areas would increase per capita income as well as provide additional employment in the vicinity of the individual projects.

Physical

Projects and programs included in the plan would complement the natural attractions of the basin. Water storage projects would improve annual low-flow periods and eliminate periods of extremely low flow. The changes, however, are not of such magnitude as to change the basic stream regimens. The precise timing of flood peaks and their concentrations have not been studied in detail, however, some floodwater could be stored for later use and thus flood durations and peaks would be decreased in many areas.

Very little consumptive use of water is planned, so average annual discharges from streams would not change materially. Increased ground water pumping, in excess of consumptive use, would probably provide a small increase in flows. Evaporation losses from reservoir water surfaces are expected to about compensate for transpiration and evaporation losses that would otherwise occur from the areas proposed to be inundated.

The effects of drainage, land management, urbanization, road construction and other cultural improvements would affect runoff patterns in some localities. The aggregate of these effects, however, would tend to compensate and are expected to have little total effect on either the amount or quality of flows in the major streams.

Surface water quality should be improved in areas where low-flow augmentation is provided and should not be impaired in other areas if the proposed treatment facilities and rural zoning regulations are provided.

Saltwater has already caused minor problems by intruding into fresh-water supplies at coastal developments. This problem is not expected to become widespread but extensive and uncontrolled demands on ground water supplies as coastal communities continue to develop may cause serious problems in specific localities.

The productive capacity of the land in the basin will not be reached during the 1960-2000 period, so changes in land use should not create significant problems beyond the local area immediately affected.

SECTION IV – PLAN IMPLEMENTATION

Cost Sharing

Resource development costs should be shared so as best to serve the public interest by: (1) Encouraging sound resource development and economic and social stability and growth; (2) promoting maximum efficiency in use of private

and public funds; (3) obtaining an equitable relationship between the incidence of costs and benefits; (4) preventing avoidable wastes, unwarranted windfall gains, and undesirable competition; (5) serving as a check on project desirability and encouraging desirable types and sizes of enterprises; (6) securing consistency between the various purposes of resource development; and (7) promoting public understanding and cooperation in resource development.

Two types of costs are used for cost-sharing analyses: (1) Investment costs, which include all of the costs of project construction including lands and rights-of-way, estimated for the period of full development of the project; and (2) operation, maintenance, and replacements costs, shown as annual costs, and estimated on the basis of development at the year 2000. These costs are divided into those expected to be borne by the Federal Government and those to be borne by non-Federal interests. Before final cost-sharing arrangements are made, the non-Federal portion will often need to be further subdivided among State, local, and private participants. This subdivision is not important in project

TABLE 4.17

Cost Sharing—Comprehensive Plan

Purpose or project	Investment costs					Annual operation maintenance, and replacements costs at year 2000				
	Total ($1,000)	Federal ($1,000)	Federal (pct.)	Non-Federal ($1,000)	Non-Federal (pct.)	Total ($1,000)	Federal ($1,000)	Federal (pct.)	Non-Federal ($1,000)	Non-Federal (pct.)
Purpose[1]										
Flood control	7,949	4,361	55	3,588	45	78	--	--	78	100
Water supplies	27,640	--	--	27,640	100	3,208	--	--	3,208	100
Navigation	13,030	10,080	77	2,950	23	70	30	42	41	58
Irrigation	3,160	790	25	2,370	75	570	--	--	570	100
Drainage	10,140	2,536	25	7,604	75	91	--	--	91	100
Soil conservation	10,360	3,108	30	7,252	70	770	--	--	770	100
Forest conservation	64,940	22,730	35	42,210	65	1,632	490	30	1,142	70
Sport fisheries and wildlife	7,728	3,092	40	4,636	60	831	14	2	817	98
Commercial fisheries	1,032	619	60	413	40	403	242	60	161	40
Recreation	77,920	17,140	22	60,780	78	2,931	437	15	2,494	85
Pollution abatement	32,860	8,630	26	24,230	74	405	4	1	401	99
Public health	2,380	1,190	50	1,190	50	590	116	20	474	80
Other purposes[2]	55,345	18,460	33	36,885	67	219	--	--	219	100
Project[1]										
Doerun	1,368	271	20	1,097	80	22	1	4	21	96
Quincy	2,519	124	5	2,395	95	75	[3]	1	75	99
Thomasville	5,695	1,011	18	4,684	82	165	26	16	139	84
Tired Creek	3,397	291	9	3,106	91	85	1	1	84	99
Gulf Coast Improvement	110,200	37,930	34	72,270	66	1,036	121	12	915	88
Steinhatchee River Improvement	1,920	314	16	1,606	84	22	3	14	19	86
Wacissa	2,392	359	15	2,033	85	113	17	15	96	85
Water-access areas	7,998	3,199	40	4,799	60	469	70	15	399	85
Upstream watersheds	15,470	6,188	40	9,282	60	155	--	--	155	100
St. Marks Levee	220	110	50	110	50	1	--	--	1	100
Intracoastal Waterway—Carrabelle to Apalachee Bay	3,785	3,028	80	757	20	34	20	59	14	41
St. Marks Channel Improvement	1,780	1,424	80	356	20	2	1	50	1	50
Panacea Channel Improvement	135	127	94	8	6	8	5	62	3	38

NOTES: [1] Costs for purposes and projects are not additive. Costs of projects are included as part of the costs by purpose.
[2] Includes costs only for (1) land transportation as part of the Gulf Coast Improvement project of which the non-Federal share of the investment cost would be 50 percent and the operation, maintenance, and replacements costs would be 100 percent non-Federal; and (2) landfill by use of excess spoil material as part of the Gulf Coast Improvement and Steinhatchee River Improvement projects of which all costs would be non-Federal.
[3] Less than $500.

evaluation and is a detail beyond the scope of this study.

Of the total investment costs of the plan, about 30 percent is estimated to be borne by the Federal Government and about 70 percent by non-Federal interests. For operation, maintenance, and replacements costs, nearly 90 percent is expected to become the responsibility of the non-Federal groups involved in land and water developments.

Recreation investment costs, accounting for about 25 percent of the total, represent the largest expenditure for any single purpose. However, the combined total investment costs for programs relating to agriculture, including forest conservation and utilization, are greater; these expenditures account for slightly more than 27 percent of the total investment costs. Water supplies and pollution abatement investment costs, next in order of magnitude, account for nearly 20 percent.

Operation, maintenance, and replacements costs for use in cost-sharing determinations are based on full use of the facilities that are specifically proposed. Since the ultimate need during the period studied will not normally develop until the year 2000, the full operation, maintenance, and replacements costs for the facilities included in the plan are shown as operation, maintenance, and replacements at year 2000. The comprehensive plan is designed to meet needs to the year 2000, so additional needs, costs, and benefits that may develop after that year have not been evaluated. This does not ignore or preclude the possibility of adding facilities after the year 2000 to the then existing projects and programs to meet additional needs.

Cost-sharing data shown in Table 4.17 are only suggestive. Further study may result in different costs and cost-sharing arrangements.

Financing

In 1960, expenditures for resource development in the Ochlockonee basin by private interests and Federal, State, and local Governments totaled about $15 million. This was equivalent to about 5 percent of the basin total personal income. An estimated 15 percent of this expenditure was for training, technical aid, and other items not included in the comprehensive plan. Thus, the equivalent of slightly more than 4 percent of the personal income was expended for operation, maintenance, and replacements of existing facilities and for new and additional developments similar to those in the plan.

The projects and programs covered by this Appendix involve some private expenditures and some items of public expenditure which have been made since January 1, 1960, the starting date used for the valuation. During the period of analysis, the annual personal income in the basin is expected to be about $449 million by the year 1975, and about $1,169 million by the year 2000. An increasing annual expenditure will be required to accomplish the proposed basin plan; however, if the 1960 percentage of the personal income is continued to be invested in resource development to the year 2000, funds would be more than adequate to accomplish the plan.

The 1960 rate of expenditure for resource development in the Ochlockonee basin in relation to personal income is from 20 to 30 percent higher than other basins in the study area. This relatively high annual rate of expenditure, in relation to projected personal income, should be maintained to accomplish the early action phase of developments in the plan. The developments needed during the last 25 years of the study period could be accomplished by a slightly diminished annual rate of expenditure in relation to the greatly increased personal income projected for this same period. The higher rate needed prior to 1975 is due to: (1) An immediate demand for facilities not now developed, and (2) the omission of some developments which undoubtedly will be needed in the latter portion of the 1975-2000 period and immediately following year 2000. These latter developments are omitted because the long-range projection of economic conditions used in establishing resources needs was not carried beyond year 2000. It will be necessary, however, to start construction of some projects not included in the plan prior to the turn of the century in order not to cause a lag in resource development.

Studies indicate that the rate of expenditures for resource development in the Ochlockonee basin involves capital outlay and operation, maintenance, and replacements costs during the

period 1960-75 which would about equal the expected normal increase of these expenditures at all levels of private and governmental activity needed to accomplish the early action phase of the basin plan. While this is generally correct on an overall basis, each contemplated improvement will need to be studied in regard to its particular source of funds; and any delay in implementing the plan will necessitate additional financing at a rate higher than that prevailing in 1960.

The Federal expenditure rate in the Ochlockonee basin is expected to be increased slightly. The majority of funds, however, will have to come from non-Federal sources such as: State and local governments, individuals, and private enterprises. In the case of State and local government, needed funds usually come from bond issues, development funds, and authority financing in order to avoid overstressing the current tax base and to enable funds in the hands of individuals and private enterprises to be currently available for the non-Federal components of the plan.

Responsibility

The responsibility for initiating the plan basically must rest with the State and local interests. Even in those fields where a Federal agency is normally the organization which actually performs the detailed planning and construction, the impetus for the planning study must originate with those whom the programs and facilities will benefit.

The comprehensive plan for the Ochlockonee basin is a combination of projects and programs formulated to meet the needs of the people for land and water resource development. In most cases, the Commission studies have not been carried beyond the reconnaissance level and thus additional detailed planning is required prior to implementation of the plan. The authorizing Act specifically provides that the Commission plans shall not include final project designs and estimates.

The proposed assignment of responsibility for initiating the developments is made in the knowledge that timely and active interest on the part of the State and local leadership is required.

The designations included in Table 4.18 are made in accordance with the following criteria.

(1) If an existing project or program is to be expanded by the addition of facilities or acceleration of activity, then the assignment of major responsibility for planning, construction and/or development, and operation is to the agency already having jurisdiction over the existing project or program. For example, if additional facilities are to be provided at a project which is already a Federal project under the administrative supervision of the Corps of Engineers, then this agency would be given major responsibility for planning and construction even though the work might be actually done by other Federal or non-Federal entities.

(2) Where additional facilities are proposed at a project already under non-Federal jurisdiction, then the non-Federal interest is assigned the major responsibility.

(3) Non-Federal programs such as forestry, soil conservation, recreation, fish and wildlife, reclamation, drainage, irrigation, public health, and pollution abatement would continue under non-Federal sponsorship except where such programs apply to national forests, military reservations, and other Federal holdings. Where a clear-cut conclusion is not readily apparent, then selection is to be made on a case-by-case basis, giving due weight to the pertinent circumstances.

(4) New projects or programs are assigned to Federal agencies for planning, construction, and operation where there is a substantial involvement of navigation since this is the general historical pattern. Exception was made in the case of navigation improvements where the major portion of benefits are other than commerical navigation.

(5) Historical patterns are also observed in the case of flood control. If the project involved the provision of local protection works on the main stream, then the Federal interests would be responsible for construction and non-Federal interests would be responsible for operation and maintenance. In the case of flood plain management and small reservoir developments located in headwater areas to serve flood control purpose, planning, construction, and operation are designated as non-Federal, although local groups

may call upon Federal agencies for assistance in planning.

(6) In the application of the criteria, the incidence of benefits is considered in determining appropriate responsibility. Where benefits are of national significance, Federal responsibility is indicated; where they are local, non-Federal responsibility is indicated. Where these benefits are of regional significance, the matter is decided on a case-by-case basis, considering all of the related circumstances.

(7) In the designation of non-Federal and Federal interest for the major responsibility, there is no intention that such selection would ignore the other interests that may be concerned in planning the details of the proposed program or project. This applies also to construction and operation.

The designation of Federal agencies to have major responsibility for projects and programs generally was made on the basis of the agency usually associated with the purpose having the largest portion of the total allocated costs.

Where projects and facilities have been historically constructed by Federal agencies and turned over to local groups for operation and maintenance, it is intended that this practice be continued. An example of this is a local flood protection levee on a principal stream.

The non-Federal or Federal interests with the major responsibility for accomplishment, including coordinating the preauthorization planning, obtaining final approval or authorization of specific works or facilities, budgeting for appropriations or other funding, design of structures, administration of construction or installation, and other matters pertinent to planning and construction are indicated in Table 4.18. The designation of Federal and non-Federal is not intended to prejudice joint non-Federal and Federal development when and if a proposal is presented to Congress for final resolution.

Designation of a Federal agency as having the major responsibility for the Federal aspects of each project, regardless of the magnitude of these Federal aspects, is not intended to reflect

TABLE 4.18

Responsibility for Implementing Projects

Major responsibility for implementing designated projects	Project	Early action phase[1]	Purpose[1]	Federal agency with major responsibility for Federal aspects
Non-Federal --	Doerun	E	R, F&W, PA	Public Health Service
Non-Federal --	Quincy	E	R, F&W, PA, WS	Public Health Service
Non-Federal --	Thomasville	E	R, F&W, PA, FC	Public Health Service
Non-Federal --	Tired Creek	--	R, F&W, PA, WS	Public Health Service
Non-Federal and Federal	Gulf Coast Improvement	--	R, F&W, D, N, PH, T, L	Corps of Engineers
-- Federal	St. Marks Channel	E	N	Corps of Engineers
-- Federal	Panacea Channel Improvement	E	N	Corps of Engineers
-- Federal	Intracoastal Waterway (Carrabelle to Apalachee Bay)	--	N	Corps of Engineers
Non-Federal --	Steinhatchee River Improvement	--	R, F&W, N, L	Corps of Engineers
-- Federal	St. Marks Levee	--	FC	Corps of Engineers
Non-Federal --	Wacissa River Development	E	R, F&W	Bureau of Outdoor Recreation, National Park Service[2]

NOTES: [1] E —Early action phase development
FC —Flood control
WS —Water supplies
N —Navigation
I —Irrigation
D —Drainage
F&W—Fish and wildlife
R —Recreation
PA —Pollution abatement
T —Land transportation
L —Landfill

[2] Designated agency depends on the established division of responsibility between the Bureau of Outdoor Recreation and National Park Service.

any lack of interest by other Federal agencies in a project; in fact, most of the Federal land and water agencies have some interest in each of the projects.

In the general programs, not shown in Table 4.18, the division between non-Federal and Federal principal responsibility is made on the basis of ownership of the land or area involved. For example, wildlife or soil conservation programs on non-Federal lands are the principal responsibility of non-Federal entities; forestry programs on a military reservation or national forest are a principal Federal responsibility; and recreation programs on a Federal multiple-purpose reservoir project, which envisions Federal acquisition of the general reservoir area, are a principal Federal responsibility.

Early Action Phase

Action to achieve the comprehensive plan for the 1960-2000 period must be continued throughout the period to develop the basin resources in an orderly manner and to help stimulate growth in the basin economic structure. In order to meet immediate requirements, certain of the projects and programs contained in the comprehensive plan for the basin should be initiated as quickly as detailed plans can be prepared and other necessary arrangements including financing are made. These more urgent projects and programs have been included in the action phase of the program to be accomplished, or in the process of accomplishment, by 1975. The action phase in this study covers the period from 1960 to 1975, so part of the plan has been accomplished prior to the completion of this Report. Other parts of the plan that should be underway, however, involve physical and institutional problems that are causing delays. If the proposed 15-year program is actually completed by 1975, it would mean accomplishing the major part of the construction work in 10 years or less. If the program is delayed, there will be a related delay in the area economic activities; and the established goals will not be reached until some time after 1975. If a balanced development program is carried out, some delay would not seriously affect the benefits expected.

While most of the projects and programs included in the plan involve some degree of Federal and State participation, they are, almost without exception, the types of development that must be initiated at the local level. One of the first steps required to insure the success of a needed development is that the local public be informed about the type of development being considered, the need for that development, and the results that are expected in terms of benefits and costs. When the local consensus is that the development should be undertaken, active local support will make it possible for the agency or group carrying primary responsibility for the physical development to move expeditiously and with confidence. Local service organizations or other public membership groups seldom supervise the actual planning, construction, or operation of resource development works, but they generally provide the motivating force that gets them started. They can also contribute greatly in solving cost sharing, financing, and other problems that must be solved before construction can be undertaken.

In the Ochlockonee basin, many programs for conserving, developing, and utilizing land and water resources have been in operation for some time. Their continuation, expansion, and improvement form an important part of the comprehensive plan. Action for implementing new or expanded aspects of these programs will be needed throughout the life of the plan and will generally increase gradually in proportion to population and economic growth. However, there are certain components of these programs on which action should be started early. Included in this category are improvement works having a long timelag between initial action and full utilization, activities for conserving and protecting resources for future use, and items that require special emphasis or action to bring them in balance with general development.

Early action should be initiated and detailed studies completed on the Doerun, Quincy, and Thomasville water control projects. The land area should be acquired as early as practicable, the dams and reservoirs constructed, and minimum basic facilities for recreation and fishing installed to satisfy existing needs mainly for pollution abatement, recreation, and fish and wildlife use in the upper part of the basin and to meet expanding needs to 1975. The early

action phase of these projects would provide needed storage water for pollution abatement needs and would accommodate some 465,000 user-days annually for recreation and some 52,000 user-days annually for fishing. It is estimated that nearly 95 percent of the total investment costs for the projects would be required in the early action phase. Tired Creek project is not included in the early action portion of the plan, but acquisition of the land prior to 1975 should be considered.

Increments of the water supply program for domestic, municipal, and industrial uses should be installed to keep current with the needs of the population. Unless this is done, detrimental shortages and possible competition between users could occur, and economic growth would be hampered. It is estimated that about 50 percent of the total investment costs for the water supply program would be expended in the early action phase.

Immediate action should be taken to develop a long-range plan for the adequate handling of the liquid wastes. Such wastes must ultimately be discharged into the water courses, and volume will increase in direct proportion to growth and development. Unless long-range pollution abatement plans are followed, water resources will be damaged and beneficial uses impaired. It is estimated that about 45 percent of the total investment costs for treatment facilities would be required in the early action phase. In addition, streamflow regulation should be initiated as a complementary measure in the water quality control program.

The public health programs of vector control, solid-waste collection and disposal, and air pollution and radiation monitoring should also be initiated to protect and maintain the healthful environment of the basin for the benefit of its residents and attraction for the location of industry, as well as tourists and recreationists. It is expected that these programs would be initiated and carried out on an annual operation and maintenance basis.

Land should be acquired for 43 water-access areas and facilities installed to accommodate about 720,000 user-days annually for recreation and about 86,000 user-days annually for fishing to meet the needs of the population and tourists associated with the early action levels of development. It is estimated that nearly 50 percent of the investment cost of the total access areas should be included in the early action phase.

The early action phase of the recreation program, in addition to the multiple-purpose projects, should consist of acquiring, or otherwise making available for public use, necessary land along the Gulf of Mexico, at historic sites, and additional land at existing recreation areas and installing needed facilities to accommodate nearly 2.8 million user-days of outdoor recreation. Some features of the long-range recreation program will require action ahead of that required for gradual development to meet current needs. These are the designation and preservation of recreation areas for future use and the installation of basic facilities required for future expansion. It is estimated that about 55 percent of the investment cost for the single-purpose recreation program would be expended as part of the early action phase.

To assure preservation of the natural beauty of the Wacissa River and adjacent land and provide for 200,000 user-days of recreation and 4,500 user-days of sport fishing annually, all of the investment cost of the Wacissa project would be included in the early action phase.

Upstream watershed projects should be installed in the early action phase to alleviate existing problems and provide watershed protection, flood prevention, drainage, and water resources development for the improvement of agricultural lands and other areas. About 50 percent of the installation costs of the upstream watersheds would be incurred in the early action phase.

The installation of irrigation and drainage programs will depend to a great extent on the desires and needs of individuals and small groups to replace marginal units, improve farm efficiency, and improve land use as alternatives to other improved management practices. It is estimated that about 65 percent of the irrigation and drainage programs would be accomplished in the early action phase.

While the utilization of soil resources will be largely controlled by current requirements, all

reasonable effort should be expended to apply adequate soil conservation practices as quickly as possible on all land not now protected. Permanent conservation measures remaining to be applied should be installed in the early action phase to the maximum extent possible. About 40 percent of the total installation of this program would be expended in the early action phase.

To protect and conserve forests for future use, the major parts of tree planting and fire-, insect-, and disease-control facilities should be installed in the early action phase. To facilitate the present and future operation of the forestry program, forestry education and research should be given early emphasis, and drainage and road facilities should be installed. It is estimated that about 60 percent of the total investment costs for forest conservation and utilization will be required in the early action phase.

The improvement of existing wildlife facilities, extensive development, and supporting programs of additional studies, education, and enforcement activities should be initiated in the early action phase. Likewise for sport fishing, improvement of existing facilities on the rivers and fresh-water impoundments, new facilities on salt water, and supporting activities should be initiated in the early action phase. Most of the expenditures for wildlife and sport fisheries programs, would be for operation and maintenance that would be carried out on an annual basis. Most of the need for additional investment costs would occur in the latter part of the study period. Only about one-third of the total investment cost would be expended in the early action phase.

The commercial fisheries program should be initiated to expand this industry. A large percent of the investment costs, which represents only a very small part of the total costs, would be expended in the early action phase to help restore this basic local industry.

All of the investment costs for the St. Marks Channel Improvement project would be included in the early action phase to accommodate the rapidly increasing barge traffic into St. Marks, Florida.

The investment cost associated with the Panacea Channel Improvement would be incurred in the early action phase to permit fishing boats and recreation craft to come and go as needed or desired.

Although no expenditures are included in the early action phase for the Gulf Coast Improvement project and the Intracoastal Waterway Extension from Carrabelle, Florida, to Apalachee Bay, detailed studies may be warranted prior to 1975 so construction can be initiated shortly thereafter and land purchases for future rights-of-way should probably be considered to prevent excessive land speculation.

TABLE 4.19

Summary of Early Action Investment Costs
(thousands of dollars)

Project or program	Investment to 1975
Doerun	1,368
Quincy	2,260
Thomasville	5,275
Wacissa	2,392
Water-access areas	3,804
Upstream watersheds	8,000
Water supplies	*13,740
St. Marks Channel Improvement	1,780
Panacea Channel Improvement	135
Irrigation	2,065
Drainage	*18
Soil conservation	3,900
Forest conservation	39,780
Sport fisheries and wildlife	*332
Commercial fisheries	*138
Recreation	*10,510
Pollution abatement	*13,560

* Cost excludes expenditures associated with multiple-purpose projects.

The early action phase of the program is larger, on an annual basis, than the 1975-2000 part, for several reasons, the most significant of which are: (1) There was a backlog of developments needed in 1960, many of the needed projects have not yet been started, and some program items are still lagging; (2) basic facilities of the early developments are designed so that added features can be added to meet needs for the full period to the year 2000, therefore, some of the early action costs are related to benefits that will accrue after 1975; and (3) the 1975-2000 portion of the program does not include developments that should be started before year 2000 to meet needs after the turn of the century.

SECTION V – PROJECTS AND PROGRAMS

The comprehensive plan for the Ochlockonee basin includes both specific projects, usually multiple purpose in concept, and general programs, usually single purpose in concept but which often involve compatible multiple uses. The developments, both specific projects and general programs in combination, are necessary to meet the increasing resource development needs. Resource developments either existing or under construction as of 1960 are a necessary part of the plan. However, only the proposals for new developments and for expansion of existing developments to be made during the period 1960-2000 are presented in this Section.

In order to bring the data for multiple-purpose developments together and to provide analysis of costs and benefits by States, each project and single-purpose development is summarized in the pages that follow. Data for entire projects and single-purpose developments are provided and investment costs to be incurred in the early action phase are also shown.

Project design, quantity estimates, and areas required were based on observations made on reconnaissance field surveys, topographic maps that generally have contour intervals of 10 feet, and available hydrographic data. Instrumental surveys were limited to one cross section taken at the damsite for each of the proposed water storage projects. Other field work consisted of occasional borings along the coastal area of the Gulf of Mexico to indicate generally the depth to hard limestone rock.

In addition to the impacts discussion for each project and program in this Section, more general economic impacts stemming from the comprehensive plan are discussed in Section III, Part Four, Impacts of the Plan.

All elevations shown are related to mean sea level. Spillway discharges shown were estimated for a reservoir water surface at maximum pool elevation.

DOERUN PROJECT

Location

The Doerun project is in Worth County, Georgia, in the Upper Coastal Plain. The damsite is at a relatively narrow valley section in the headwaters of the Ochlockonee River about 3 miles northeast of Doerun, Georgia, and about 2.5 miles upstream from the bridge across Ochlockonee River on Georgia Highway No. 270.

Plan

The Doerun project consists of a dam and reservoir with facilities for recreation, fish and wildlife, and pollution abatement. From the standpoint of pollution abatement, this dam and reservoir is the most urgently needed water control project in the Ochlockonee basin. Storage water for augmenting low flows would be especially beneficial to the cities of Moultrie and Thomasville, Georgia. There is sufficient time of flow between the two points of waste discharge for the stream to regain its full assimilative capacity because a stream receiving waste discharges normally will recover from oxygen deficiency in the water by natural processes if the length of intervening stream is sufficient.

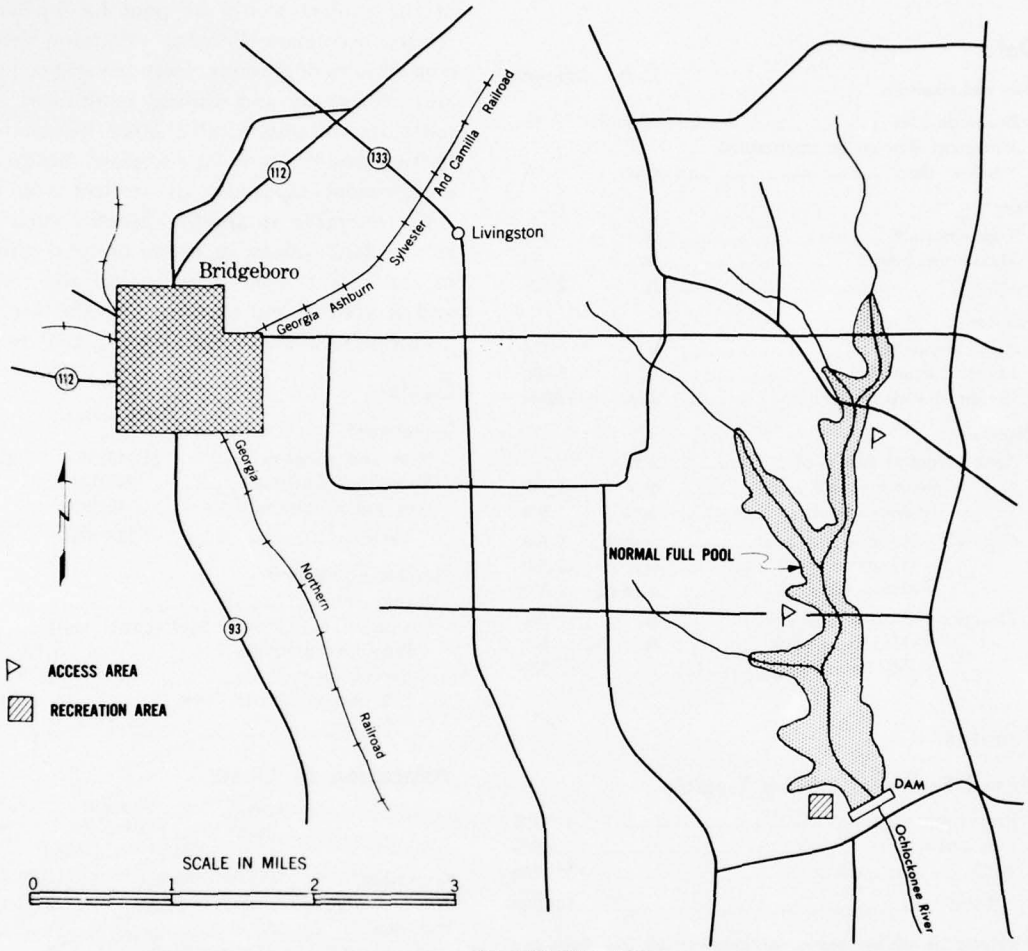
The dam would be an earthfill structure with an uncontrolled concrete spillway. General geologic information indicates that no critical foundation conditions exist for the type of dam considered.

The reservoir area would be cleared to normal full pool elevation of 334 feet. Land for the reservoir would be acquired to the spillway design-pool elevation of 340 feet and would total 1,200 acres. Relocation of developments in the reservoir area would be of minor importance.

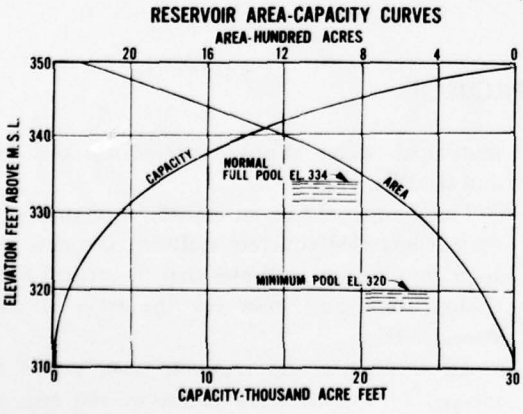
Facilities to be provided would be for boating, camping, fishing, picnicking, and sightseeing. These facilities would handle 40,000 recreation user-days annually and 4,100 user-days of reservoir fishing.

The reservoir would be operated as near as possible to 334 feet mean sea level and still satisfy the downstream flow requirements. Control of releases would be with gated sluices through the base of the dam.

DOERUN PROJECT



RESERVOIR MAP



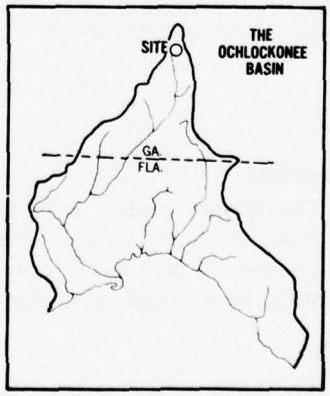


Figure 4.4

This reservoir was originally designed to store more water to include flood control as a purpose but cost and benefit analyses showed the additional storage was not justified.

Data

Dam and reservoir	Unit	Amount
Drainage area	sq. mile	31
Minimum flow to be maintained below dam	c.f.s.	14
Dam		
Top elevation	ft.	345
Maximum height	ft.	35
Length	ft.	2,320
Spillway		
Crest elevation	ft.	334
Effective length	ft.	3,000
Design discharge	c.f.s.	18,000
Reservoir		
Area — Normal full pool	acre	740
— Maximum pool	acre	1,200
— Minimum pool	acre	200
Capacity — Normal full pool	acre-ft.	6,900
— Maximum pool	acre-ft.	12,500
— Maximum pool	acre-ft.	1,000
Elevation — Normal full pool	ft.	334
— Maximum pool	ft.	340
— Minimum pool	ft.	320

Benefits

Annual Equivalent Primary Tangible

Recreation	$79,000
Fish and wildlife	5,000
Pollution abatement	*321,700
Total	405,700

* Release of storage water for augmenting low flows for purposes of pollution abatement would be beneficial to both Moultrie and Thomasville, Georgia.

Impacts

Economic impacts from this project would stem largely from recreation, fish and wildlife, and pollution abatement. Since a sizable portion of the project would be paid for by local interests, secondary benefits stemming from increased sales of gasoline, food, beverages, lodging, and recreation and fishing equipment are of particular interest locally. More leisure-time activities would result in increased business and employment especially in services and trades.

Considerable intangible benefits such as increased land values, increased home construction in the area immediately around the reservoir, and a general enhancement to the area from pollution abatement are also expected to result.

Costs

Investment	Early action	Total
Dam and reservoir	$1,145,000	$1,145,000
Recreation facilities	208,000	208,000
Fish and wildlife facilities	15,000	15,000
Total	1,368,000	1,368,000

Annual Equivalent		
Investment		49,900
Operation, maintenance, and replacements		22,100
Dam and reservoir	$10,000	
Recreation facilities	11,900	
Fish and wildlife facilities	200	
Total		72,000

Allocation of Costs

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	$627,000	$39,000	$16,100	$16,400
Fish and wildlife	63,000	3,000	700	700
Pollution abatement	678,000	30,000	5,300	5,300
Total	1,368,000	72,000	22,100	22,400

QUINCY PROJECT

Location

The Quincy project is in Gadsden County, Florida, in the Upper Coastal Plain. The damsite is about 1 mile north of the city of Quincy, Florida, on a branch of Quincy Creek.

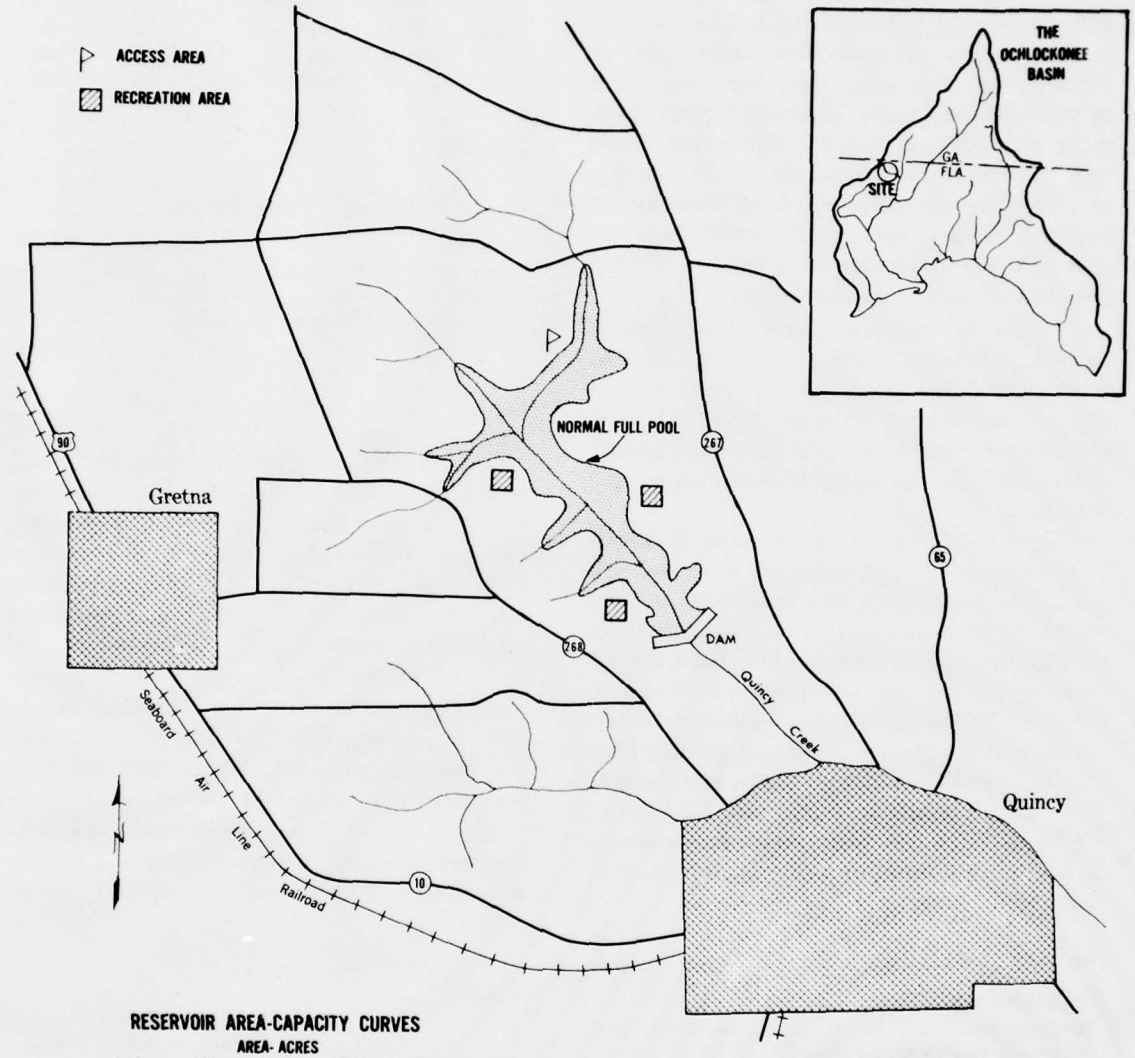
Plan

The Quincy project consists of a dam and reservoir with facilities for pollution abatement, municipal water supply, recreation, and fish and wildlife.

The dam would be an earthfill structure with an uncontrolled concrete spillway. General geologic information indicates that no critical foundation conditions exist for the type of dam considered.

All timber in the reservoir area would be cleared or topped from elevation 180 feet up

QUINCY PROJECT



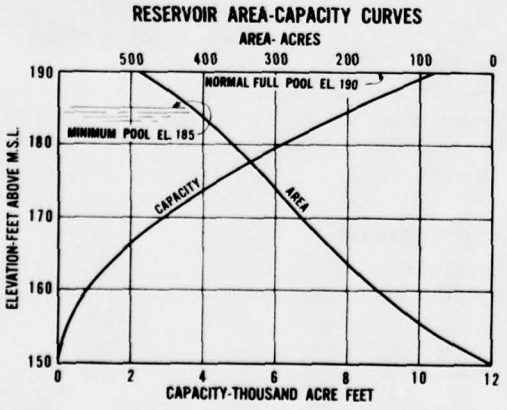


Figure 4.5

to the normal full pool elevation of 190 feet. Land for the reservoir would be acquired to the spillway design pool elevation of 195 feet and would total 560 acres. An additional 1,500 acres adjacent to the reservoir would be acquired for recreation and other uses. Facilities would be provided for boating, camping, hiking, swimming, picnicking, fishing, and sightseeing. These facilities would initially handle 75,000 user-days of recreation annually and 4,900 user-days of reservoir fishing. Additional development by year 2000 would provide for a total of 200,000 user-days of recreation annually.

A series of connected small water bodies formed by filling abandoned quarries would be inundated. These small lakes provide limited boating and fishing but this larger and more attractive reservoir would provide a much greater opportunity for use by both recreationists and fishermen.

The reservoir would be operated as nearly as possible to 190 feet mean sea level and still satisfy the downstream flow requirements. This would be accomplished with a gated sluice through the base of the dam. The 5-foot fluctuation between normal and minimum elevations, based on the lowest flows for 7 consecutive days during a 10-year period, would be gradual from May through November and most of the drawdown usually would be in the last 2 months of the period after the main recreation season is over. During normal or wet years, the fluctuation would be less.

Data

	Unit	Amount
Dam and reservoir		
Drainage area	sq. mile	9.4
Minimum flow to be maintained below dam	c.f.s.	6
Dam		
Top elevation	ft.	200
Maximum height	ft.	42
Length	ft.	1,950
Spillway		
Crest elevation	ft.	190
Effective length	ft.	140
Design discharge	c.f.s.	7,000
Reservoir		
Area — Normal full pool	acre	490
— Maximum pool	acre	630
— Minimum pool	acre	430
Capacity — Normal full pool	acre-ft.	10,400
— Maximum pool	acre-ft.	12,600
— Minimum pool	acre-ft.	8,200
Elevation — Normal full pool	ft.	190
— Maximum pool	ft.	195
— Minimum pool	ft.	185

Benefits

Annual Equivalent Primary Tangible

Recreation	$243,000
Fish and wildlife	5,500
Pollution abatement	18,500
Municipal water supply	9,900
Total	276,900

Impacts

Secondary benefits in the vicinity of Quincy would be reflected by increased sales of gasoline, recreation and fishing equipment, bait, food, beverage, and lodging. The future growth of Quincy would be enhanced by the provision of water for pollution abatement and municipal supply. The tax base of the county would tend to be broadened by the expected land enhancement and home construction following completion of the project. In addition, a large part of construction cost would be spent in the local area for wages, materials, and services.

The results of these local impacts would help increase repayment ability and create a willingness needed to meet local cost-sharing requirements.

Costs

	Early action	Total
Investment		
Dam and reservoir	$1,470,000	$1,470,000
Recreation facilities	775,000	1,034,000
Fish and wildlife facilities	15,000	15,000
Total	2,260,000	2,519,000

Annual Equivalent

Investment		87,700
Operation, maintenance, and replacements		64,500
Dam and reservoir	$13,600	
Recreation facilities	50,700	
Fish and wildlife facilities	200	
Total		152,200

Allocation of Costs

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	$1,905,000	$124,000	$58,800	$68,900
Fish and wildlife	94,000	4,200	900	1,000
Pollution abatement	310,000	14,000	2,900	2,900
Water supply	210,000	10,000	1,900	1,900
Total	2,519,000	152,200	64,500	74,700

THOMASVILLE PROJECT

Location

The Thomasville project is on the Ochlockonee River in Thomas County, Georgia, in the Upper Coastal Plain. The damsite is about 8 miles north of Thomasville, Georgia, at a relatively narrow valley section below the mouth of Coon Creek and about 500 yards upstream from the Ochlockonee River bridge on Georgia Highway No. 202. The reservoir would extend 8 miles up the Ochlockonee River, 2 miles up Coon Creek, and about 3 miles up Big Creek.

Plan

The Thomasville project would provide facilities for pollution abatement, fish and wildlife, recreation, and flood control.

The dam would be an earthfill structure with a gated concrete spillway section and an apron located in the middle of the dam. The dam would be riprapped on the upstream face and have a gravel filter and toe drain on the downstream side. General geologic information indicates that no critical foundation conditions exist at the damsite, however, the reservoir is located just north of an area that has scattered limestone sinks. Further geologic studies should be made to make sure the damsite is suitable for constructing a water storage project.

Land for the reservoir area would be acquired to the spillway design-pool elevation of 193 feet mean sea level and would total about 6,500 acres. In addition, about 4,500 acres adjacent to the reservoir would be acquired for parks, access areas, and other public use. The reservoir area would be either cleared or topped so that all timber would be eliminated from normal full pool elevation down to 5 feet below minimum elevation. The principal relocations would be about 2 miles of secondary road, 2 miles of powerline, and 6 miles of telephone line. Facilities would be provided for boating, swimming, camping, picnicking, fishing, and sightseeing. These facilities would handle 350,000 user-days of recreation annually by 1975 and 42,600 user-days of fishing annually. Development by the year 2000 would accommodate a total of 450,000 user-days of recreation annually. Access to this project would be via U. S. Highway No. 319 and State Highway No. 188 and 202.

The reservoir would normally be operated as near as possible to 185 feet mean sea level and still satisfy the downstream flow requirements. This would require under normal circumstances only minor water surface fluctuations, thus making this proposed reservoir especially favorable for recreation uses. Floods of the 10-year magnitude would be released through the gated spillway in 48 hours or less. Variations in normal operation procedures could permit storage of more floodwaters or storage of water for other uses if future needs occur. Normal fluctuations are expected to minimize mosquito and other public health problems.

Data

	Unit	Amount
Dam and reservoir		
Drainage area	sq. mile	316
Minimum flow to be maintained below dam	c.f.s.	24
Dam		
Top elevation	ft.	198
Maximum height	ft.	46
Length	ft.	3,000

THOMASVILLE PROJECT

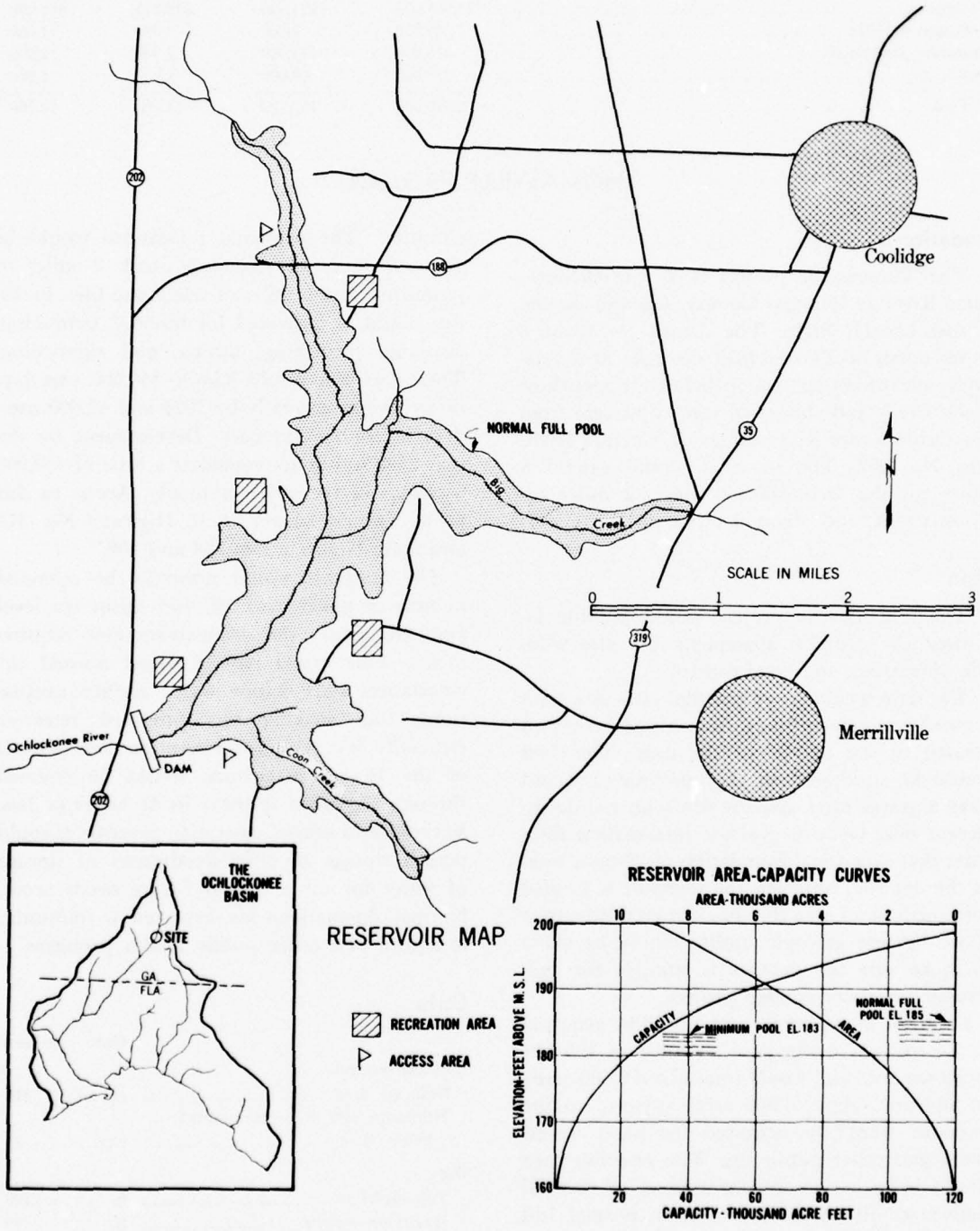


Figure 4.6

Spillway	Unit	Amount
Crest elevation	ft.	185
Effective length	ft.	770
Design discharge	c.f.s.	69,600
Reservoir		
Area — Normal full pool	acre	4,100
— Maximum pool	acre	6,500
— Minimum pool	acre	3,200
Capacity — Normal full pool	acre-ft.	36,000
— Maximum pool	acre-ft.	79,000
— Minimum pool	acre-ft.	28,000
Elevation — Normal full pool	ft.	185
— Maximum pool	ft.	193
— Minimum pool	ft.	183

Benefits

Annual Equivalent Primary Tangible

Recreation	$624,400
Fish and wildlife	48,000
Pollution abatement	30,200
Flood control	1,200
Total	703,800

Impacts

Anticipated land enhancement and home construction adjacent to and near the project would tend to broaden the tax base. It might be desirable to increase the project to provide building lots and recover costs through lease revenue. This can be done if the necessary legislation setting up the sponsoring local agency is provided. The reservoir is located centrally for convenient use by people from both Thomasville and Moultrie. All of these items would have a great and lasting impact on the local economy and assist in providing the repayment ability needed to carry the local share of the project cost.

Provisions to store the water from a 10-year magnitude flood would provide flood protection for about 1,000 acres and about half of these acres are suitable for general farmland or cropland use. Without this protection, these bottom land hardwoods are flooded more frequently than once a year. No tangible benefits were included in the benefit analysis for land-use conversion because most of these flood plain acres are part of large plantation holdings, and they are not likely to be developed for agriculture in the near future. Flood protection, however, would permit future benefits to be realized on the flood-fringe bottom lands if the present inefficient production of bottom land hardwoods is changed to production of farm crops.

Costs

	Early action	Total
Investment		
Dam and reservoir	$3,639,000	$3,639,000
Recreation facilities	1,621,000	2,026,000
Fish and wildlife facilities	15,000	30,000
Total	5,275,000	5,695,000

Annual Equivalent

Investment		200,100
Operation, maintenance, and replacements		150,800
Dam and reservoir	$37,600	
Recreation facilities	111,600	
Fish and wildlife facilities	1,600	
Total		350,900

Allocation of Costs

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	$4,291,000	$285,000	$135,000	$148,300
Fish and wildlife	791,000	38,000	9,500	10,000
Pollution abatement	594,000	27,000	6,100	6,100
Flood control	19,000	900	200	200
Total	5,695,000	350,900	150,800	164,600

TIRED CREEK PROJECT

Location

Tired Creek project is in Grady County, Georgia, in the Upper Coastal Plain. The damsite is located at a relatively narrow valley section about 3 miles west of Cairo, Georgia, and a short distance upstream from the Tired Creek bridge on U. S. Highway No. 84. The reservoir would extend about 2 miles up Tired Creek to the confluence of Black, Bass, and Sapp Creeks, which form Tired Creek and about another 2 miles up each of these creeks.

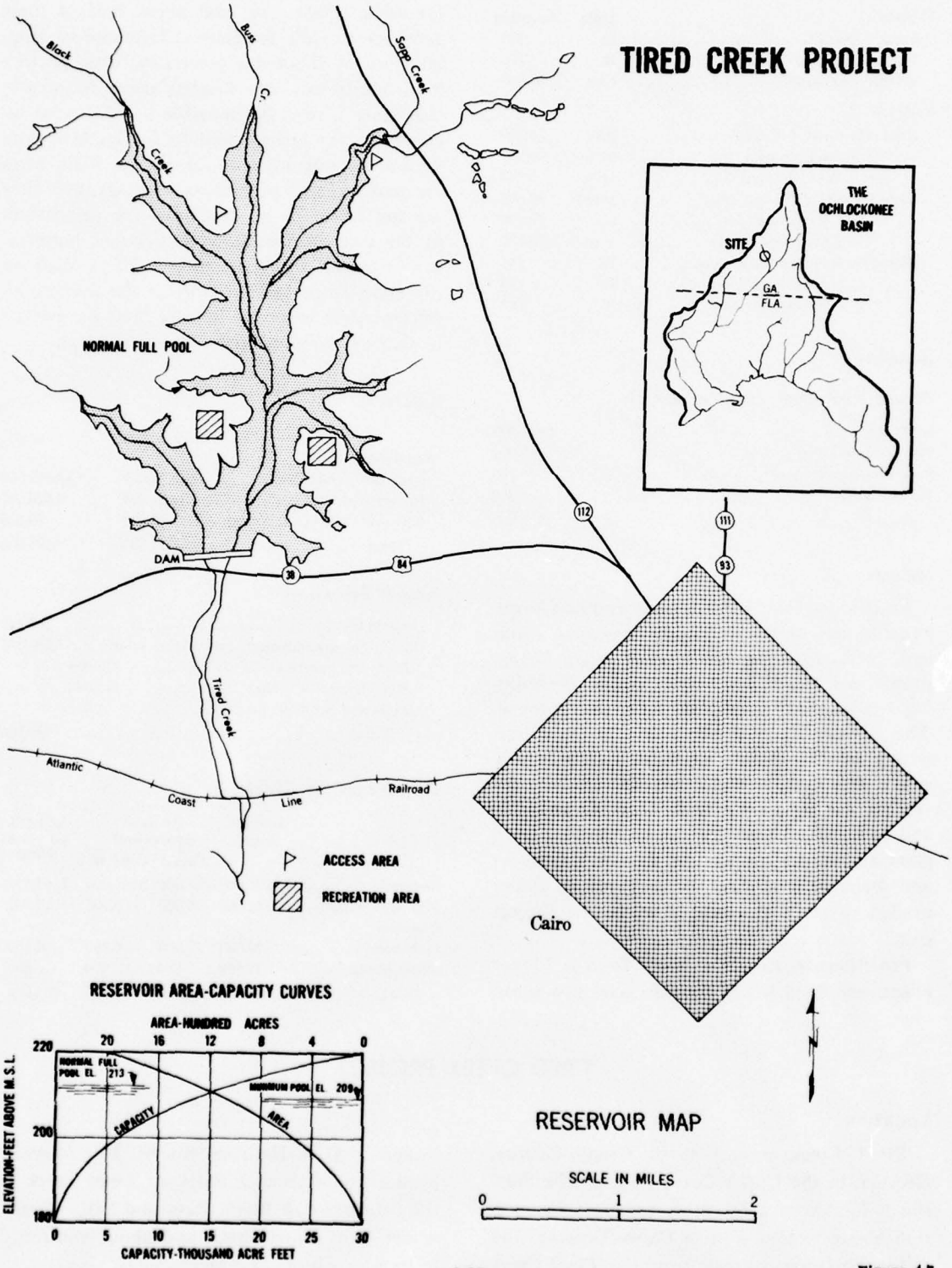

TIRED CREEK PROJECT
Block
Creek
Buss
C.
Sopp Creek
NORMAL FULL POOL
DAM
112
111
93
84
301
Tired Creek
Atlantic
Coast
Line
Railroad
ACCESS AREA
RECREATION AREA
Cairo
THE OCHLOCKONEE BASIN
SITE
GA
FLA
RESERVOIR AREA-CAPACITY CURVES
AREA-HUNDRED ACRES
220
20
16
12
8
4
0
NORMAL FULL POOL EL 213
MINIMUM POOL EL 209
CAPACITY
AREA
200
180
ELEVATION-FEET ABOVE M.S.L.
0
5
10
15
20
25
30
CAPACITY-THOUSAND ACRE FEET
RESERVOIR MAP
SCALE IN MILES
0
1
2

Figure 4.7

Plan

Storage in the reservoir would be provided for recreation, fish and wildlife, pollution abatement, and water supply.

The dam would be an earthfill structure with an uncontrolled concrete spillway. General geological information indicates no critical foundation problems for the type of dam considered.

All timber downstream from the confluence of Black, Bass, and Sapp Creeks would be cleared or topped from elevation 204 feet up to the normal elevation of 213 feet mean sea level. Timber upstream from this point would not be cut. Land would be acquired to the design pool elevation of 220 feet and would total 1,800 acres. Acquisition or preservation of an additional 1,500 acres adjacent to the reservoir area is proposed for use as parks, access areas, and other public uses. The principal relocations would be about 2 miles of hard-surfaced secondary road, two bridges, and about 6 miles of powerline.

Facilities would be provided for boating, camping, swimming, picnicking, fishing, hiking, and sightseeing. These facilities would handle 250,000 user-days of recreation and 14,000 user-days of reservoir fishing.

The reservoir would be operated as nearly as possible to 213 feet mean sea level and still satisfy downstream flow requirements. Regulation would be accomplished with a gated sluice through the base of the dam. The 4-foot fluctuation between normal and minimum elevations, based on the lowest flows for 7 consecutive days during a 10-year period would be gradual from May through November. Most of the surface level drawdown would occur in the last 2 months of the period after the main recreation season is over. During normal years the fluctuations would be less but are expected to be adequate to minimize mosquito and other public health problems.

Data

	Unit	Amount
Dam and reservoir		
Drainage area	sq. mile	33
Minimum flow to be maintained below dam	c.f.s.	8
Dam		
Top elevation	ft.	225
Maximum height	ft.	45
Length	ft.	2,550
Spillway		
Crest elevation	ft.	213
Effective length	ft.	210
Design discharge	c.f.s.	18,300
Reservoir		
Area — Normal full pool	acre	1,350
— Maximum pool	acre	1,800
— Minimum pool	acre	1,100
Capacity — Normal full pool	acre-ft.	19,000
— Maximum pool	acre-ft.	29,500
— Minimum pool	acre-ft.	14,000
Elevation — Normal full pool	ft.	213
— Maximum pool	ft.	220
— Minimum pool	ft.	209

Benefits

Annual Equivalent Primary Tangible

Recreation	$384,000
Pollution abatement	49,700
Fish and wildlife	21,000
Water supply	13,200
Total	467,900

Impacts

Creation of an attractive reservoir in this area would probably result in considerable homesite development along and near the shore. Land values should increase, thus increasing the tax base. Home construction would stimulate the local economy as would the construction of the dam and reservoir because a large part of the construction cost would be spent in the area for wages, services, and materials.

After completion of the project, new businesses could be attracted to the area because of increased outdoor recreational activity. New opportunities for employment would result due to increased sales of food, beverage, recreation and fishing equipment, lodging, and gasoline.

Pollution abatement and a more stable water supply would be of great benefit to the area, enabling a continuing growth of Grady County and the city of Cairo, Georgia.

All of these secondary and intangible benefits would have a great and lasting impact on the local economy and assist in providing repayment ability needed to carry the local share of the project cost.

Costs

	Early action	Total
Investment		
Dam and reservoir	0	$2,318,000
Recreation facilities	0	1,064,000
Fish and wildlife facilities	0	15,000
Total	0	3,397,000

Annual Equivalent		Total
Investment		$123,00
Operation, maintenance, and replacements		83,000
Dam and reservoir	$17,000	
Recreation facilities	65,300	
Fish and wildlife facilities	700	
Total		206,000

Allocation of Costs

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	$2,153,000	$151,000	$73,200	$74,900
Pollution abatement	728,000	32,000	2,700	2,700
Fish and wildlife	286,000	13,000	5,400	5,400
Water supply	230,000	10,000	1,700	1,700
Total	3,397,000	206,000	83,000	84,700

GULF COAST IMPROVEMENT PROJECT

Location

The Gulf Coast Improvement project would be a combined highway-waterway route extending from the mouth of the Aucilla River in Apalachee Bay to Cedar Key, Florida, with connecting highways to join U. S. Highway No. 98, and associated developments along the coast.

Basis for Planning

The portion of the Gulf of Mexico and its associated coastline southeast of Apalachee Bay is relatively inaccessible and undeveloped. This coastal area has an outstanding potential but to change it into an inviting and more intensively used area will require a systematic plan for future development. If wisely and attractively developed, this section of the Gulf of Mexico would be one of the primary attractions that would encourage the traveling public to plan a stopover in the basin.

Many significant facts and conditions must be considered in determining how this coastal section can best be developed and utilized. The major considerations were as follows:

(1) This area could very appropriately be referred to as the last frontier of the Florida coastline. Plans for development are needed in the near future because pressures for its use, already in evidence, will continue to increase.

(2) Even with the addition of Interstate Highway No. 10 and 75 and providing four-lane travel on U. S. Highway No. 27, the highway system between the peninsula and the panhandle of Florida will be inadequate to carry the traffic load in the near future. Travel through the basin is projected to continue to increase at a rapid rate, just as it has in the past few years, mainly because of its favorable location with respect to most parts of the Nation and south Florida.

(3) Both overland and water accesses are essential for optimum use of the coastline.

(4) The highway distance along the coast would be about 5 miles shorter than the present route of U. S. Highway No. 98.

(5) The demand for homesites along and near the Gulf of Mexico is increasing rapidly.

(6) Facilities for fishing, hunting, boating, and other types of outdoor recreation will need to be greatly expanded prior to year 2000.

(7) After the authorized Cross-Florida Barge Canal is constructed, navigation traffic across the Ochlockonee portion of the Gulf of Mexico will be increased.

(8) The area from Tampa Bay to Carrabelle, Florida, is by far the longest unprotected section of the Intracoastal Waterway system.

It was concluded from a study of all these conditions that a combined waterway-highway route and the associated developments would be the best means of utilizing this coastal area.

GULF COAST IMPROVEMENT PROJECT

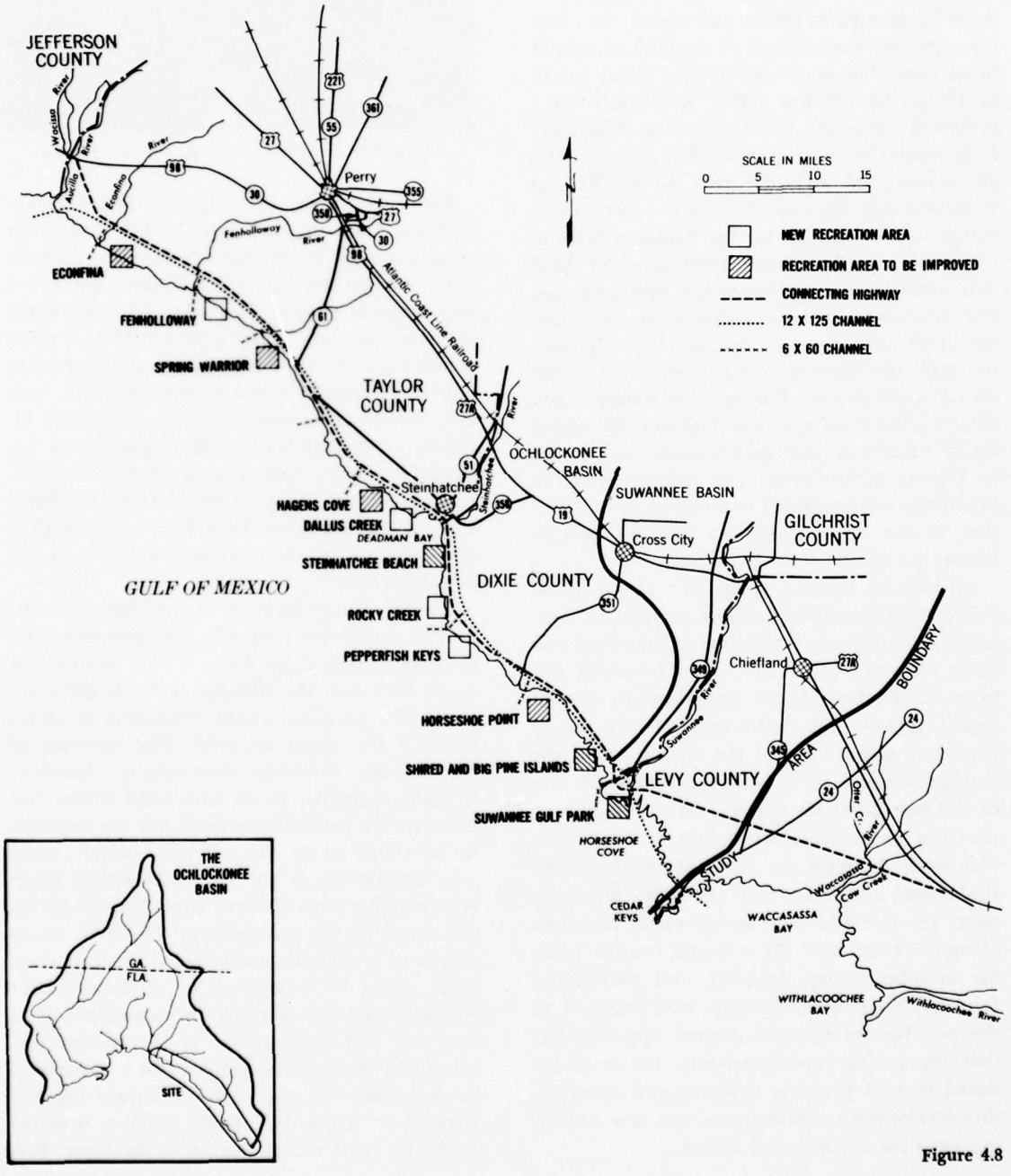


Figure 4.8

Plan

The multiple-purpose Gulf Coast Improvement project includes facilities for recreation, fish and wildlife, navigation, drainage, public health, land transportation, and land improvement by using the spoil material for fill.

The waterway-highway route would be inshore far enough to permit full use of the coastline area but near enough to the Gulf to permit canal operation at sea level. The canal would be 12 feet by 125 feet and it would serve as a protected route for the Intracoastal Waterway from Apalachee Bay to Cedar Key, Florida, and an unprotected channel from Cedar Key to Withlacoochee Bay. Spoil from the canal excavation would provide for the highway fill and additional fill for about 5,500 acres of land that could be used for homesites, industrial use, and development of recreation areas. Provision would be made for a future four-lane highway, but only two lanes would be completed in the initial construction. The strip of natural land between the Gulf and the highway fill would act as a buffer so that maintenance costs would be kept to a minimum. The highway and the top of the remaining fill area would be at elevation 10 feet above mean sea level to provide further protection from hurricanes.

In addition to the benefits that would be received from providing landfills, recreation, navigation, and highway facilities, and both land and water accesses to the coast, other favorable features of the Gulf Coast Improvement project would include the following: (1) It would provide a scenic view of the coastline and the Gulf of Mexico; (2) it would pass through one of the best dolomite deposits in the Southeast, near the Steinhatchee River; (3) it would provide both drainage for some of the flatwoods timberland and a drainage outlet for other systems; (4) it would decrease the vector problems along the coast; and (5) it would provide benefits to sport fishing, hunting, and commercial fisheries. No tangible benefits were assigned to the possible fishery management opportunities that the project would provide, but it is believed that, if properly designed and operated, this development would create vast new nurturing areas for shellfish and finfish.

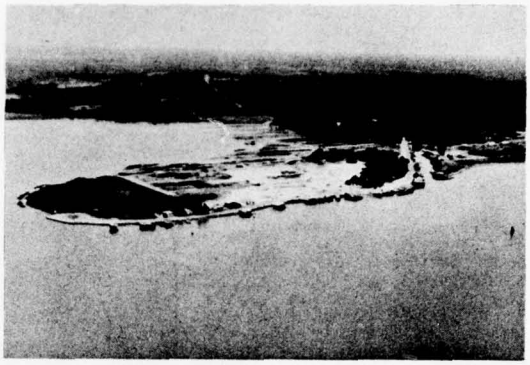


Figure 4.9 *Horseshoe Point on Gulf of Mexico.*

Four new coastal recreation developments and improvements of seven other recreation areas, proposed for partial development prior to 1975, are included as part of the Gulf Coast Improvement project. Representative sites along the coast are shown on Figure 4.8. One of these recreation areas to be improved is the Suwannee Gulf Park located in the Suwannee basin; costs and benefits associated with the additional facilities at this recreation development are included in the economic analyses of this multiple-purpose project. However, the increase of 800,000 user-days at Suwannee Gulf Park between 1975 and 2000 are shown as recreational use in the Suwannee basin.

Preliminary geologic studies indicate the overburden material is primarily sand and clay. The thickness ranges from about 1 foot to as much as 20 feet, but the average bedrock elevation along the proposed canal alignment is about minus 5 feet mean sea level. The hardness of the bedrock, dolomitic limestone or dolomite, is highly variable. Zones with hard ledges and boulders are probably common but are expected to be restricted to the bedrock surface. Areas near Keaton Beach and the Steinhatchee River represent the more difficult conditions to be encountered in the construction. However, channels have already been dredged in each of these areas, either for navigation or to provide boat channels and fill material for homesites. It is expected that a great deal of the bedrock encountered could be excavated with a cutterhead dredge, such as was used in excavating the channel at Horseshoe Beach, and a dragline could be used to remove large boulders. Pre-

liminary geologic studies indicate that conditions for constructing the Gulf Coast Improvement project are generally favorable and that no serious problems of a geologic nature are likely to be encountered.

Data

	Unit	Amount
Waterway (sea level)		
Length	mile	83
Minimum width	ft.	125
Minimum depth	ft.	12
Highway		
Length	mile	122
Lanes of travel		
Initial construction	lane	2
Ultimate	lane	4
Height above mean sea level	ft.	10
Landfill area in excess of highway	acre	5,500
Recreation areas		
New developments	area	4
Estimated use	user-day	1,200,000
Improvement to areas partially developed	area	[1]7
Estimated use[2]	user-day	[1]1,100,000
Sport fisheries and wildlife[2]	user-day	66,000

NOTES: [1] One of these developments is the Suwannee Gulf Park located in the Suwannee basin. The economic analyses of the Gulf Coast Improvement project include all costs and benefits associated with proposed improvements to this park after the Gulf Coast Improvement project is constructed, however, the 800,000 user-days of recreation related to these additional facilities are included as part of the total recreation use in the Suwannee basin.
[2] Increased annual use by year 2000.

Benefits

Annual Equivalent Primary Tangible

Recreation[1]	$4,369,000
Navigation[2]	270,000
Sport fisheries and wildlife	198,000
Commercial fisheries	35,000
Drainage	90,000
Public health	100,000
Land transportation	1,534,000
Landfill[3]	740,000
Total	7,336,000

NOTES: [1] Includes benefits from 800,000 user-days at Suwannee Gulf Park in the Suwannee basin.
[2] Only the benefits from elimination of lost time, reduction in damage, and increased local traffic were evaluated in monetary terms. No tangible credit was given to the possibility of increased through traffic in the Intracoastal Waterway system that may result from providing a protected channel.
[3] This is the estimated annual equivalent value of the improvements to land by use of spoil material not needed for highway construction.

Impacts

Major economic impacts from this project would stem principally from the primary and secondary benefits of recreation, landfill by using the excess spoil material, and increased access and transportation by both land and water. Adequate facilities and attractive developments along this section of the coast would encourage industrial development and extensive use for other purposes. This, in turn, would require greatly expanded accommodations and services associated with recreation, navigation, and fishing. Also, land values for a large area in addition to the land actually improved by spoil material would undoubtedly be enhanced. No tangible benefits were assigned to the possible fishery management opportunities that the project would provide, but it is believed that, if properly designed and managed, this development would create vast new nurturing areas for shellfish and finfish.

Costs

	Early action	Total
Investment		
Canal and highway, Apalachee Bay to Cedar Keys (Canal only—$60,000,000)	0	$84,200,000
Waterway extension, Cedar Keys to Withlacoochee Bay	0	2,100,000
Highway extension to join U. S. Highway No. 98	0	11,600,000
Docking facilities and side channel excavation	0	2,100,000
Recreation facilities		
New developments at four locations	0	5,235,000
Additional facilities at seven partially developed areas	0	*4,999,000
Total	0	*110,200,000

Annual Equivalent

Investment		*3,966,000
Operation, maintenance, and replacements		1,020,000
Canal and highway	$402,000	
Recreation facilities	618,000	
Total		4,986,000

* Includes $3,324,000 investment cost and all associated annual costs for recreation facilities at Suwannee Gulf Park in the Suwannee basin.

Allocation of Costs

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation*	$39,540,000	$2,138,000	$714,000	$729,000
Navigation	6,611,000	262,000	24,000	24,000
Sport fisheries and wildlife	4,141,000	191,000	42,000	43,000
Commercial fisheries	838,000	34,000	3,000	3,000
Drainage	2,140,000	86,000	9,000	9,000
Public health	2,380,000	95,000	10,000	10,000
Land transportation	36,920,000	1,473,000	146,000	146,000
Landfill	17,630,000	707,000	72,000	72,000
Total	110,200,000	4,986,000	1,020,000	1,036,000

* Includes $3,324,000 investment cost and all associated annual costs for recreation facilities at Suwannee Gulf Park in the Suwannee basin.

Special Considerations

No expenditures were included in the economic analyses prior to 1975 but further studies in the near future should be given consideration, and if warranted, land should be purchased or otherwise reserved for future rights-of-way and other developments for public use to prevent the possibility of excessive land speculation.

Conversion of the relatively inaccessible section of the Gulf coast from St. Marks, Florida, to the mouth of the Suwannee River into an attractive and valuable asset to the basin presents local and State leaders with an immediate and continuing opportunity for initiating and coordinating this joint non-Federal and Federal multiple-purpose development. It is expected this project would permit optimum use of a potentially great resource that is little used in its present underdeveloped state.

STEINHATCHEE RIVER IMPROVEMENT PROJECT

Location

An improved channel generally following the thread of the stream would be provided from the end of the existing channel improvement near the mouth of the Steinhatchee River upstream to the small waterfalls about 1 mile downstream from the river bridge for U. S. Highway No. 19 and 98. The improved channel would be about 8 miles long.

Plan

An improved channel for small-boat navigation and improved recreation and fishing use would be constructed by excavating through the rock shoals and intervening areas, as needed, to provide a minimum depth of 6 feet and a width of 60 feet. Channel side slopes would be 1 vertical on 2 horizontal. No bridge alterations would be required and there are no known submarine cables, pipelines, or other utilities that would require alteration or relocation. Spoil from dredging would be used to partially fill lowlands bordering or near the stream. Land values through deposit of spoil would increase an amount equal to the cost of equivalent fill.

Facilities, principally near the upper end of the project, would be provided for swimming, boating, fishing, picnicking, camping, and sightseeing. These facilities would handle 60,000 user-days annually of recreation. The principal benefits to sport fishing would accrue from providing a ready access to the Gulf of Mexico from all points along the improved section of the river channel rather than increasing the user-days of stream fishing.

Data

	Unit	Amount
Channel improvement		
Length	mile	8
Minimum depth	ft.	6
Width	ft.	60
Recreation development	area	1
Spoil material	cu. yd.	500,000

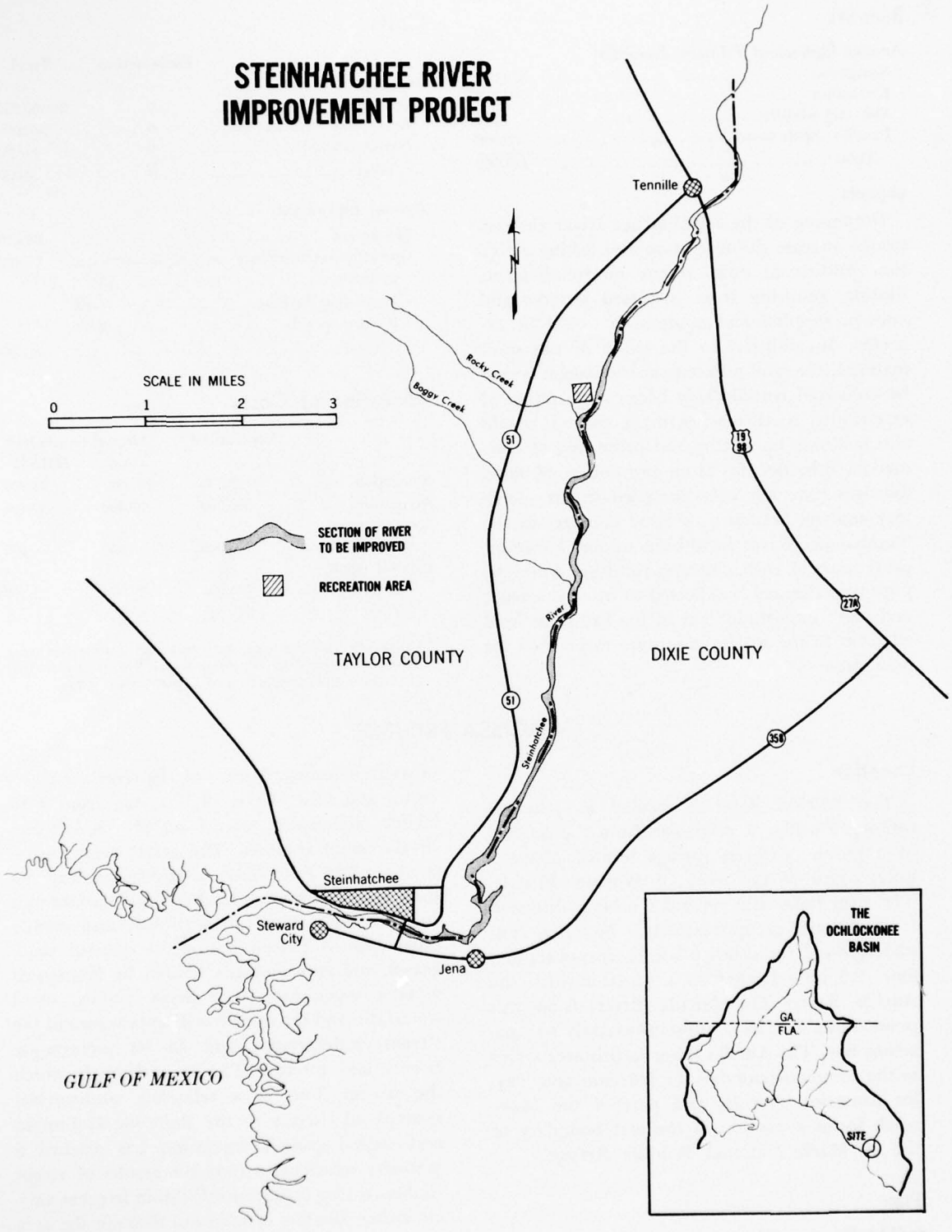

STEINHATCHEE RIVER
IMPROVEMENT PROJECT
Tennille
N
Rocky Creek
Boggy Creek
SCALE IN MILES
0 1 2 3
51
19
98
SECTION OF RIVER
TO BE IMPROVED
RECREATION AREA
River
27A
TAYLOR COUNTY
DIXIE COUNTY
51
Steinhatchee
350
Steinhatchee
Steward
City
Jena
GULF OF MEXICO
THE
OCHLOCKONEE
BASIN
GA.
FLA.
SITE

Figure 4.10

Benefits

Annual Equivalent Primary Tangible

Navigation	$29,000
Recreation	94,000
Fish and wildlife	4,000
Landfill (spoil material)	30,000
Total	157,000

Impacts

Deepening of the Steinhatchee River channel would increase the recreation and fishing activities. Additional employment in Steinhatchee, Florida, resulting from increased services and sales of supplies and equipment would be expected. In addition to the value of the spoil material, the land adjacent to the stream would be enhanced considerably because of improved accessibility to all reaches of the river. It would also facilitate harvesting and processing of commercial fish. Benefits from prevention of flood damages have not been included in the monetary analyses because past flood damages in the Steinhatchee River have been minor. However, prevention of such damages resulting from the improved channel is expected to become a more and more important item in the future as land adjacent to the stream continues to be used for homesites.

Costs

	Early action	Total
Investment		
Channel	0	$1,590,000
Recreation facilities	0	300,000
Navigation aids	0	30,000
Total	0	1,920,000

Annual Equivalent

Investment		68,900
Operation, maintenance, and replacements		22,400
Channel	$3,000	
Recreation facilities	17,400	
Navigation aids	2,000	
Total		91,300

Allocation of Costs

	Investment	Annual equivalent	
		Total	OM&R*
Navigation	$719,000	$29,000	$3,300
Recreation	300,000	28,000	17,400
Sport fisheries and wildlife	106,000	4,000	200
Landfill (spoil material)	795,000	30,000	1,500
Total	1,920,000	91,300	22,400

* Operation, maintenance, and replacements costs at year 2000 are assumed to be equal to the annual equivalent operation, maintenance, and replacements costs.

WACISSA PROJECT

Location

The Wacissa River is located in Jefferson County, Florida. It originates from the outflow of a group of seven springs located about 2 miles south of the town of Wacissa, Florida. The river flows in a general southerly direction for a distance of approximately 12 miles, runs underground for about 0.7 mile, reappears and flows 0.3 mile farther to a junction with the Aucilla River. The Aucilla River, from this point, flows 7 miles south-southwesterly to Apalachee Bay. The Aucilla River in this area serves as the common boundary of Jefferson and Taylor Counties, Florida, and part of the lower reach forms a portion of the east boundary of the St. Marks National Wildlife Refuge.

Plan

The Wacissa River area is a primeval setting of natural beauty. Waters of the river are clear, clean, and pure. River depths vary from 1 to 25 feet and widths vary from 250 to 400 feet in the main channel. The water temperature is about 70° Fahrenheit at the source and approaches air temperature about half the distance to the mouth. Fish life is profuse and readily observable. A stream bottom of colorful sand, gravel, and rock partially hidden by submerged aquatic vegetation, deep pools, rapids, small waterfalls, and the complete disappearance of the stream underground add to its picturesque beauty and interest. The area through which the stream flows is a relatively undisturbed swampland. Access to the shoreline is limited and second growth vegetation has reached a maturity sufficient to hide the results of virgin timber-cutting operations. Wildlife in great variety either inhabits or migrates through the area and adds much to its esthetic splendor.

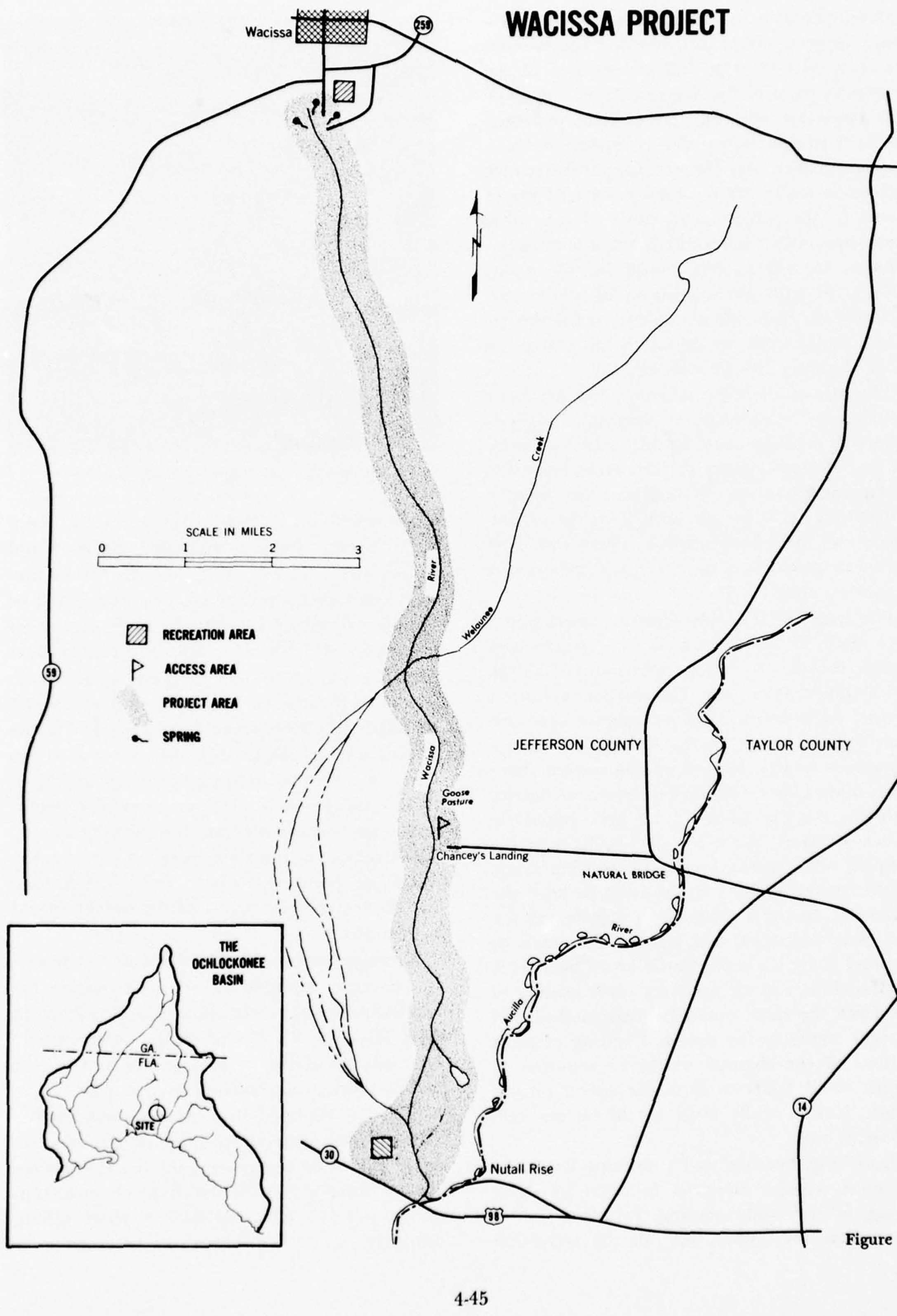

WACISSA PROJECT
Wacissa
259
N
SCALE IN MILES
0
1
2
3
RECREATION AREA
ACCESS AREA
PROJECT AREA
SPRING
59
Welaunee
Creek
Wacissa
River
Goose
Pasture
Chancey's Landing
JEFFERSON COUNTY
TAYLOR COUNTY
NATURAL BRIDGE
River
Aucilla
14
30
Nutall Rise
98
THE
OCHLOCKONEE
BASIN
GA.
FLA.
SITE

Figure 4.11

Development and management of the proposed project would provide for recreational use at designated areas and preservation of the remaining parts of the Wacissa River and adjacent lands for wildlife and esthetic purposes. Facilities would consist of two recreation areas, a camping area, and the necessary maintenance and access roads. Many tangible benefits would accrue to the project, but much of the value would naturally fall into the intangible category.

Lands for the project would include about 9,000 acres with an acquisition of about one-half mile on each side of the stream for the 14-mile distance from the source to just above the U. S. Highway No. 98 crossing.

The loss of timber production has not been included in the economic evaluation, since it is believed a program could be formulated whereby the loss of timber from the relatively low-value swampland would be nominal, and the adjacent landowners could benefit from joint use of firebreaks and maintenance roads. There would be no loss of production from agricultural land in the project area.

The larger of the two recreation areas would be located in the vicinity of the springs and would include a beach, interpretive center, and administrative area. The smaller recreation area would be located a short distance upstream from U. S. Highway No. 98. A designated camping area would be located on the eastern shore about midway from the springs to the confluence with the Aucilla River in an area popularly known as "goose pasture." The facilities at the camping area, except the boat-launching ramp, would be out of sight of the river to keep the project as nearly as possible in a primeval setting. Any additional rest stations that may be required along the route would be set back from the shoreline, and all necessary trails leading to and from the river would be well marked and at right angles to the stream. Clearing of short sections of the channel would be required to permit small boats to float the entire project length. Nature study trails would be on well-defined routes.

Picnicking, boating, and swimming would be the most popular activities followed by sightseeing, fishing, and camping. Principal use of the project area other than in the recreation areas would be for float trips down the river. Sport fishing from nonmotored boats would be permitted, but hunting and the use of outboard motorboats would not. Facilities would be provided to take float crafts from the river near the center of this unique area and return them with the passengers over a maintenance road. Travel on the maintenance road, however, would be restricted. Boats taken from the river at the downstream terminus could be returned to the point of origin by existing improved highways. Bank fishing would not be permitted except within short distances from the recreation areas. Limited tree cutting away from the stream edges could be permitted under strict regulations, but the picturesque beauty of the stream should be retained.

Figure 4.12 *Canoeing on the Wacissa River.*

A major portion of the demand for recreational use is expected to originate outside the Ochlockonee basin. Strategically located between U. S. Highway No. 27 and 98, the project would be easily accessible to a large segment of the public visiting or traveling in this part of the basin. It is expected that once the availability, attractiveness, and accessibility of the area become known to the general public, the project would provide 200,000 user-days of recreation annually and 4,500 user-days of sport fishing annually.

Data

	Unit	Amount
Land area	acre	9,000
Length of stream	mile	14
Recreation developments	area	2
Facilities for rustic camping	area	1

Benefits

Annual Equivalent Primary Tangible

Recreation	$252,000
Fish and wildlife	13,500
Total	265,500

Impacts

The greatest benefits to be derived from the project would be the preservation of the free-flowing stream and associated flora and fauna in a primeval setting. This area would have a special attraction for camera fans and float trip enthusiasts. This would provide a special secondary benefit in the fields of photography and float craft, and the usual benefits for operators of restaurants, motels, and other service facilities. Intangible benefits from preserving the seven springs, the clear stream, and the associated flora and fauna would include a continued opportunity for the recreationist, the nature lover, and the conservationist to see and enjoy a primeval setting of natural beauty. Generally speaking, the intangibles are the factors that principally induce the nonbasin people to visit an area of this type.

No alternative sites were found which had the natural qualities of the Wacissa River. Accordingly, there is an opportunity to preserve and develop an area that is relatively unknown by the present generation for the enjoyment of future generations.

Costs

Investment

Early action	$2,392,000
Total	2,392,000

Annual Equivalent

Investment	81,600
Operation, maintenance, and replacements	92,800
Total	174,400

Allocation of Costs

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	$2,188,000	$161,000	$86,700	$106,500
Fish and wildlife	204,000	13,400	6,100	6,100
Total	2,392,000	174,400	92,800	112,600

Special Considerations

Except for using numerous signs to mark the boundary of this unique area, no provision has been made to keep poachers or livestock out of the area. If either of these situations create serious problems in the future, it may be necessary to fence the area or provide some other means of protection.

WATER ACCESS AREAS

Location

Water access areas would be located along the Ochlockonee, Crooked, Wakulla, St. Marks, Aucilla, and Steinhatchee Rivers, along the coastal waters, at small reservoirs available for public use, and at lakes principally in the general vicinity of Tallahassee. These areas are in addition to the access areas adjacent to the proposed dam and reservoir sites, the access points in connection with the Wacissa area, and the recreation developments along the Gulf coast.

Plan

Four different kinds of access areas would be developed. Type A, Type B, and Type C access areas with average sizes of 75 acres, 40 acres, and 10 acres, respectively, would be used for both fish and wildlife and recreation. Type D with an average size of 2 acres would be for fish and wildlife only. Types A, B, and C access areas would have facilities for boating, camping, swimming, fishing, limited hunting, picnicking, sightseeing, parking, water supply, sanitation, and access to these facilities. Type D access areas

would have facilities for parking and access to the water for fishing and hunting.

A total of 43 access areas would be developed by 1975 and a total of 73 by the year 2000. Twenty-four of the sites, Types A, B, and C, would be for both recreation and fish and wildlife, and 49 Type D areas would be for fish and wildlife without facilities for recreation. In addition to these access sites, high density and general recreation areas would provide numerous access points to the Gulf coast. No attempt has been made to locate the proposed access areas precisely. They may be located at or near highway crossings or other suitable sites where they best suit the desires of the local landowners and sportsmen, and where construction work and land acquisition could be held to a minimum. The anticipated use of the sites to be developed by 2000 would be as follows.

Data

State	Type of area	No. of areas	Annual user-days	
			Recreation	Fish and wildlife*
Georgia portion	A	2	200,000	4,000
	B	2	120,000	4,000
	C	1	40,000	2,000
	D	3	....	6,000
Subtotal		8	360,000	16,000
Florida portion	A	6	600,000	12,000
	B	6	360,000	12,000
	C	7	280,000	14,000
	D	46	....	92,000
Subtotal		65	1,240,000	130,000
Total		73	1,600,000	146,000

* These user-days for fish and wildlife are assigned to the multiple-purpose access areas for allocation purposes only and are not additive to the user-days shown in the single-purpose wildlife and sport fisheries programs.

Benefits

Annual Equivalent Primary Tangible

	Georgia	Florida	Total
Recreation	$615,000	$2,161,000	$2,776,000
Fish and wildlife	8,000	65,000	73,000
Total	623,000	2,226,000	2,849,000

Impacts

The access areas provide a wide distribution of facilities at low cost to make the streams, lakes, small reservoirs, and coastal areas available to people all over the basin. The use of private land along water bodies is becoming more and more restricted. While the restrictions are usually justifiable, they limit the use of the water bodies of the basin and are making fishing and other water-based activities more and more difficult for the public. A main objective of the access areas is to make areas available to the public and at the same time protect the rights of private property holders.

It is recognized that the Ochlockonee River would be improved for fishing and other recreational uses when the upstream storages are provided to permit low-flow augmentation; but, inasmuch as the water-storage requirements were based on the needs for pollution abatement and do not meet the full needs for downstream fishing, none of the benefits from the access points have been assigned to the water-storage projects.

The access sites would provide convenient points to reach the streams, small reservoirs, lakes, and Gulf coast for fish and wildlife management, stream gaging and sampling, and other purposes outside the fields of recreation and fishing.

Costs

	Georgia	Florida	Total
Investment			
Early action	$730,000	$3,074,000	$3,804,000
Total	1,654,000	6,344,000	7,998,000
Annual Equivalent			
Investment	60,000	229,000	289,000
Operation, maintenance, and replacements	100,900	367,800	468,700
Total	160,900	596,800	757,700

Allocation of Costs

	Georgia	Florida	Total
Investment			
Recreation	$1,559,000	$5,467,000	$7,026,000
Fish and wildlife	95,000	877,000	972,000
Total	1,654,000	6,344,000	7,998,000

Total Annual Equivalent

	Georgia	Florida	Total
Recreation	$153,000	$533,000	$686,000
Fish and wildlife	7,900	63,800	71,700
Total	160,900	596,800	757,700

Annual Equivalent Operation, Maintenance, and Replacements*

	Georgia	Florida	Total
Recreation	$96,400	$335,600	$432,000
Fish and wildlife	4,500	32,200	36,700
Total	100,900	367,800	468,700

* Operation, maintenance, and replacements costs at year 2000 are assumed to be equal to the annual equivalent operation, maintenance, and replacements costs.

UPSTREAM WATERSHEDS

Location

Upstream watershed projects would be located throughout the basin.

Plan

In the upstream watersheds of the Ochlockonee basin, multiple-purpose flood prevention works and drainage channels would be developed between 1960 and 2000 on about 1.6 million acres. An estimated 1.5 million of these acres are in the Florida portion of the basin and the remaining 100,000 acres in Georgia. Improvement and protection would be provided to both agricultural and other lands.

Unpredictable changes in (1) the criteria for project selection, evaluation, and installation; (2) cost sharing due to legislative changes; (3) local interest; and (4) the amount of technical assistance provided could substantially change the estimate and result in a different rate of upstream watershed project installation. The possibility of changes is recognized, but appropriate recognition of actual watershed developments and resulting modifications can be accomplished as part of keeping the plan up to date.

Benefits

Annual Equivalent Primary Tangible

The structural improvements of the upstream watershed projects would (1) make possible many desirable land-use changes by permitting more effective utilization; (2) allow increased development of land and water resources; and (3) reduce the average annual floodwater and sediment damages occurring under existing conditions on a substantial area of flood plains in the small-stream watersheds. The estimated annual equivalent benefits by States are as follows:

	Georgia	Florida	Total
Flood prevention	$12,400	$444,500	$456,900
Drainage	65,600	453,000	518,600
Total	78,000	897,500	975,500

Impacts

The upstream projects, together with corrective measures to minimize soil erosion, would reduce sediment storage requirements in downstream reservoirs. Although plans have been designed for meeting needs of the basin for recreation, fish and wildlife, water supply, and pollution abatement through other projects, upstream watershed projects provide many opportunities for developing recreation facilities and for storing water for other beneficial uses. To the extent any reservoirs in the upstream watershed projects are made available to and managed for public use or are developed to meet pollution abatement or water supply needs, they would contribute to meeting projected needs. At the time detailed plans are being made to develop an upstream watershed, consideration should be given to meeting needs for all purposes. Whenever it is feasible to meet such needs through upstream watershed projects, the quantities of needs assigned to other undeveloped projects and programs should be adjusted.

Costs

	Georgia	Florida	Total
Investment			
Early action	$600,000	$7,400,000	$8,000,000
Total	600,000	14,870,000	15,470,000

Annual Equivalent	Georgia	Florida	Total
Investment	$21,500	$536,500	$558,000
Operation, maintenance, and replacements	4,700	150,600	155,300
Total	26,200	687,100	713,300

Allocation of Costs

Investment

Flood prevention	210,000	7,370,000	7,580,000
Drainage	390,000	7,500,000	7,890,000
Total	600,000	14,870,000	15,470,000

Total Annual Equivalent

Flood prevention	9,100	341,300	350,400
Drainage	17,100	345,800	362,900
Total	26,200	687,100	713,300

Annual Equivalent Operation, Maintenance, and Replacements*

	Georgia	Florida	Total
Flood prevention	$1,600	$75,300	$76,900
Drainage	3,000	75,400	78,400
Total	4,600	150,700	155,300

* Operation, maintenance, and replacements costs at year 2000 are assumed to be equal to the annual equivalent operation, maintenance, and replacements costs.

All costs would be allocated to flood control and drainage initially. Subsequent allocations would be made to reflect all purposes served as detailed studies are made and developments analyzed.

ST. MARKS LEVEE PROJECT

Location

This levee project would nearly encircle the town of St. Marks, Florida.

Plan

This levee project is phased for construction during the latter part of the study period. It would protect St. Marks against hurricane tides which would be the cause of damage rather than from river floods due to storms in the upper basin. The levee would protect the entire residential and business area leaving out only the boat works and loading facilities located on the river bank. A freeboard of 3 feet above a tidal elevation expected once in 100 years would be provided.

Data

	Unit	Amount
Levee		
Length	ft.	13,000
Average height	ft.	8
Elevation – top of levee	ft.	14
Freeboard – 100-year tidal flood	ft.	3
Area protected	acre	140

Benefits

Annual Equivalent Primary Tangible

Flood prevention	$12,600

Impacts

Adequate protection from flooding would encourage industrial development. This would increase the use of the St. Marks navigation channel, and other associated services would be increased proportionately.

Costs

Investment

Early action	0
Total	$220,000

Annual Equivalent

Investment	7,900
Operation, maintenance, and replacements	*1,100
Total	9,000

* Operation, maintenance, and replacements costs for year 2000 are assumed to be equal to the annual equivalent operation, maintenance, and replacements costs.

Allocation of Costs

All costs are allocated to flood control.

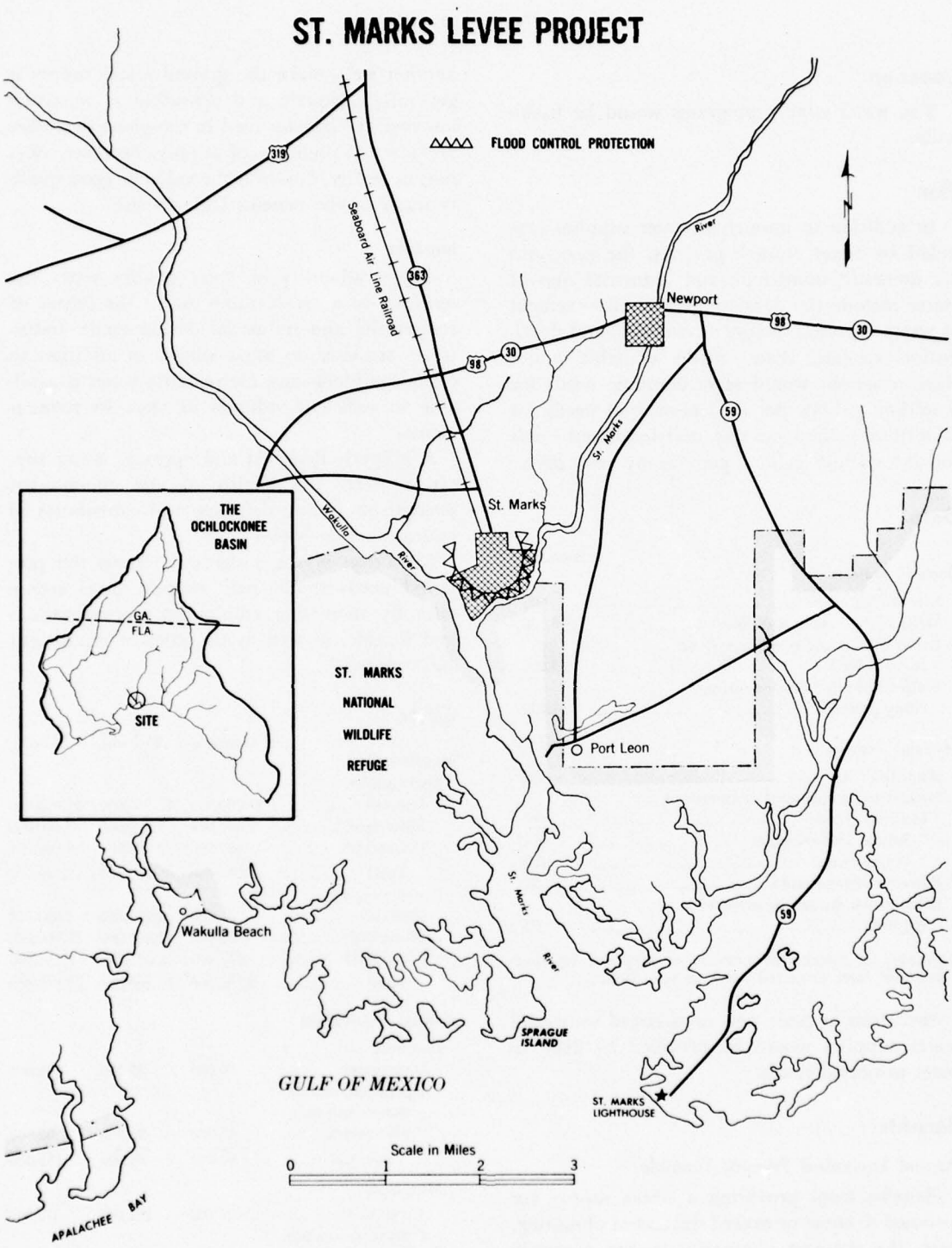

ST. MARKS LEVEE PROJECT
FLOOD CONTROL PROTECTION
319
363
Seaboard Air Line Railroad
Newport
98
30
59
St. Marks
River
Wakulla
River
St. Marks
THE OCHLOCKONEE BASIN
GA.
FLA.
SITE
ST. MARKS NATIONAL WILDLIFE REFUGE
Port Leon
Wakulla Beach
SPRAGUE ISLAND
GULF OF MEXICO
ST. MARKS LIGHTHOUSE
Scale in Miles
0
1
2
3
APALACHEE BAY

Figure 4.18

WATER SUPPLIES

Location

The water supply programs would be basin-wide.

Plan

In addition to municipal water supplies provided by water storage projects, the programs for domestic, municipal, and industrial uses of water include the development or improvement of water supplies, treatment facilities, and distribution systems. Water made available under these programs would serve domestic needs for 5 million gallons per day, municipal needs for 60 million gallons per day, and industrial needs for 154 million gallons per day by year 2000.

Data

	Number*
Domestic supplies	
New drilled wells	600
Wells to be sealed and covered	9,000
Power pumps and pressure systems to be added	3,000
Wells to be rehabilitated during study period	11,000
Municipal supplies	
Municipalities	30
Systems to be improved or treatment facilities added	22
Source improvement	(14)
Water treatment	(19)
Elevated storage tanks	21
Distribution systems or extensions required	27

* Number of systems or number of proposed improvements to meet projected needs to year 2000.

Seventeen or more new or enlarged industrial water supplies would be provided by 2000 to meet projected needs.

Benefits

Annual Equivalent Primary Tangible

Benefits from providing a water supply are assumed to equal or exceed the cost of obtaining, from the cheapest alternative source, a supply that is adequate in quantity and quality. In the Ochlockonee basin the alternative is usually another well. Since the ground water supply is generally adequate and accessible at relatively low cost, the benefits used in comparative studies are low. Availability of supply, however, does not, in reality, diminish the value of good quality water or the benefits from its use.

Impacts

The availability of good quality water determines to a considerable extent the degree of community and industrial development. Industry is attracted to areas where, in addition to other considerations, high-quality water is available in sufficient volumes to meet its requirements.

A properly designed and operated water supply protects the health of the community, strengthens its fire defenses, and contributes to recreational activities.

Execution of the program to meet the projected needs would help support local economies by increasing employment opportunities and income, as well as the sales of equipment and supplies.

Costs

	Georgia	Florida	Total
Investment			
Early action			
Domestic	$1,790,000	$1,300,000	$3,090,000
Municipal	2,690,000	4,800,000	7,490,000
Industrial*	260,000	2,900,000	3,160,000
Total	4,740,000	9,000,000	13,740,000
Total program			
Domestic	1,793,000	1,297,000	3,090,000
Municipal	5,080,000	12,980,000	18,060,000
Industrial*	427,000	5,623,000	6,050,000
Total	7,300,000	19,900,000	27,200,000
Annual Equivalent			
Domestic			
Investment	54,000	39,000	93,000
Operation, maintenance, and replacements	36,000	26,000	62,000
Subtotal	90,000	65,000	155,000
Municipal			
Investment	124,000	291,000	415,000
Operation, maintenance, and replacements	204,000	612,000	816,000
Subtotal	328,000	903,000	1,231,000

	Georgia	Florida	Total
Industrial*			
Investment	$10,000	$136,000	$146,000
Operation, maintenance, and replacements	547,000	381,000	928,000
Subtotal	557,000	517,000	1,074,000
All water supplies			
Investment	188,000	466,000	654,000
Operation, maintenance, and replacements	787,000	1,019,000	1,806,000
Total	975,000	1,485,000	2,460,000

Operation, Maintenance, and Replacements at Year 2000

	Georgia	Florida	Total
Domestic	$80,000	$58,000	$138,000
Municipal	359,000	1,081,000	1,440,000
Industrial*	1,004,000	622,000	1,626,000
Total	1,443,000	1,761,000	3,204,000

* Does not include industrial supplies furnished by municipal systems.

Allocation of Costs

All costs are allocated to water supplies as shown.

INTRACOASTAL WATERWAY EXTENSION
Carrabelle to Apalachee Bay

Location

This waterway project would extend from the existing protected channel of the Gulf Intracoastal Waterway system at Carrabelle, Florida, through St. George Sound, Alligator Harbor, a land cut across St. James Island, and the outer reach of Ochlockonee Bay to Apalachee Bay, as shown on Figure 4.14.

Plan

A channel with a minimum depth of 12 feet and a width of 125 feet would extend eastward a total of 22 miles from mile 376 on the existing Gulf Intracoastal Waterway system. The channel alignment would run along the side of St. James Island to Alligator Harbor then cut across St. James Island to the outer reaches of Ochlockonee Bay. Most of the required excavation of sand and silt would be in the 2 ½ mile land cut. This route would require alteration of only one State highway bridge, it would be 15 miles shorter than the previously authorized Crooked River route, and 5 miles shorter than the open-water route through the Gulf of Mexico now followed by present waterway traffic. Although this route would not provide complete protection from storms, at least 75 percent of the total tow-hours lost due to adverse weather would be eliminated.

Data

	Unit	Amount
Channel		
Length	mile	22
Minimum depth	ft.	12
Minimum width	ft.	125
Length of land cut	mile	2.5
Highway bridge alterations	bridge	1
Dredging	cu. yd.	3,828,000
Land for right-of-way	acre	500

Benefits

Annual Equivalent Primary Tangible

Navigation	$243,000

Impacts

Increased barge traffic expected to result from the proposed extension of the Gulf Intracoastal Waterway would provide opportunities for new businesses and additional employment at both St. Marks and Carrabelle, Florida.

Costs

Investment

Early action		0
Total		$3,785,000

Annual Equivalent

Investment		136,000
Operation, maintenance, and replacements		*34,000
Channel	$29,000	
Navigation aids	5,000	
Total		170,000

* Operation, maintenance, and replacements costs by year 2000 are assumed to equal the annual equivalent operation, maintenance, and replacements costs.

INTRACOASTAL WATERWAY EXTENSION

CARRABELLE TO APALACHEE BAY

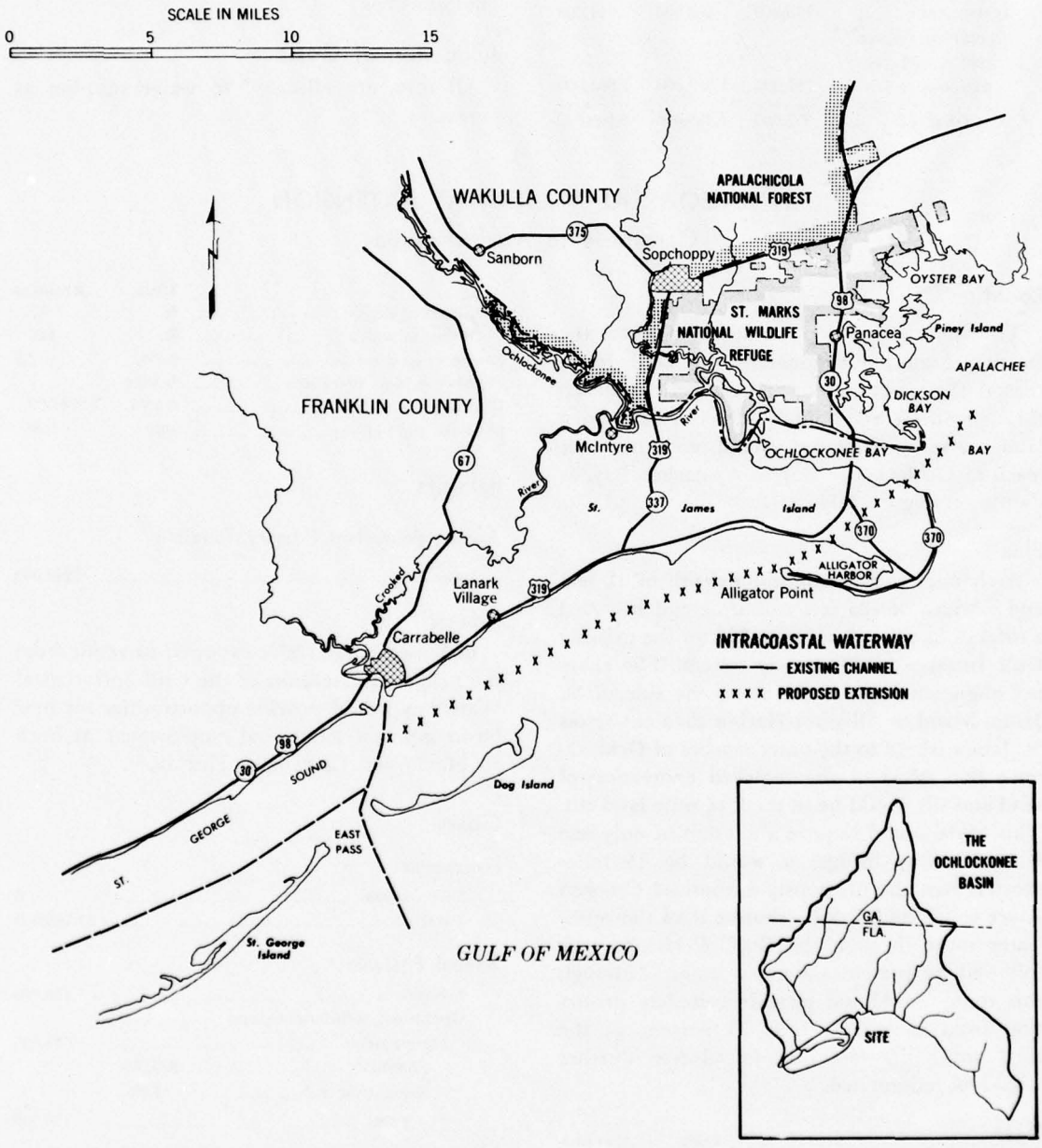


Figure 4.14

Allocation of Costs

All costs are allocated to navigation.

Special Considerations

No expenditures were included in the economic analyses of the early action phase for future rights-of-way, but land purchases should be given consideration to prevent the possibility of excessive land speculation.

ST. MARKS CHANNEL IMPROVEMENT PROJECT

Location

This channel improvement project is on the St. Marks River from Apalachee Bay in the Gulf of Mexico to the town of St. Marks, Florida, as shown on Figure 4.15.

Plan

The proposed navigation improvement at St. Marks, Florida, is to enlarge and modify the existing project. The present channel is narrow and winding, and it is not deep enough to pass fully loaded barges except at high tides. Improvement of the St. Marks channel would: (1) Eliminate delay caused by waiting for high tides; (2) permit barges to be fully loaded; (3) allow tugs to pull more than one tug at a time through the channel; (4) reduce damages to both tugs and barges; and (5) permit faster trips. This project is needed to accommodate the rapidly increasing barge traffic into St. Marks.

Data

The existing navigation project completed in 1947 provides a 7-mile channel, 10 feet deep and 100 feet wide, from Apalachee Bay to the town of St. Marks; a turning basin 200 feet square and 10 feet deep at St. Marks; and removal of snags and similar obstructions in 3 miles of the present channel between St. Marks and Newport. Enlargement and modification of the existing project plans for a channel 12 feet deep and 125 feet wide in Apalachee Bay to the turning basin at the town of St. Marks generally along the alignment of the existing channel; a turning basin at St. Marks 12 feet deep and 300 feet square; and a channel 12 feet deep and 100 feet wide extending approximately 3,400 feet upstream from the turning basin.

Benefits

Annual Equivalent Primary Tangible

Elimination of delays	$9,000
Elimination of double tripping	2,000
Increased loading of barges	113,000
Reduction of damages	15,000
Total	139,000

Impacts

The improvement to navigation and elimination of delays occasioned by maneuvering of barges due to inadequacy of facilities would have a tendency to increase economic activities and increase employment opportunities at St. Marks. Expansion of the existing petroleum commerce would be possible and other types of industry would also be encouraged to locate in this centrally located distribution area. The proposed channel dimensions are consistent with those of the Intracoastal Waterway. Reduction of oil pollution resulting from damaged barges would be a benefit to fish and wildlife, but no primary tangible benefits for this were assigned to the project. Economic impacts of navigation are discussed further in Section III, Part Four.

Costs

Investment

Early action	$1,780,000
Total	1,780,000

Annual Equivalent

Investment	64,000
Operation, maintenance, and replacements (in addition to that now required)	*2,000
Total	66,000

* Operation, maintenance, and replacements costs at year 2000 are assumed to equal the annual equivalent operation, maintenance, and replacements costs.

Allocation of Costs

All project costs are allocated to navigation.

ST. MARKS CHANNEL IMPROVEMENT PROJECT

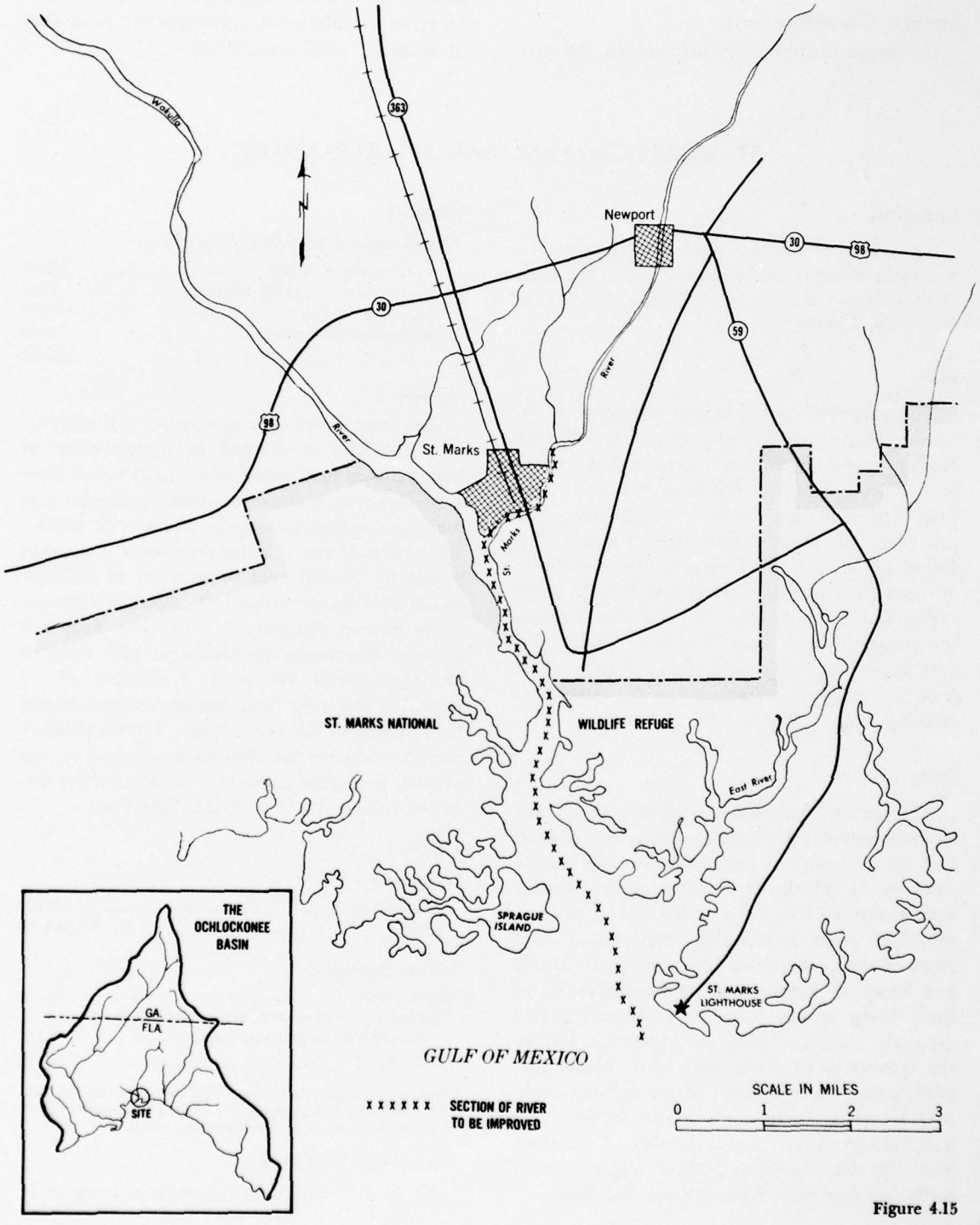


Figure 4.15

PANACEA CHANNEL IMPROVEMENT PROJECT

Location

This harbor improvement would consist of a small-boat navigation channel from the public pier at Panacea, Florida, to deep water in Apalachee Bay. The approximate location of the proposed channel is shown on Figure 4.16.

Plan

The proposed channel improvement would be 8 feet deep, 100 feet wide, and about 19,300 feet long. Depths 8 feet or more exist along about 11,000 feet of this route requiring channel markers only to provide for safe navigation. Dredging would be required on the remaining 8,300 feet, involving removal of about 200,000 cubic yards.

The deeper channel into Panacea would permit both commercial fishing boats and recreation craft to come and go as needed or desired without the necessity of waiting for high tide. The Panacea area is reported to be the center of the Florida blue crab industry and most of the commercial activity there is based on gathering, processing, and marketing of that commodity. The improved channel would reduce shipping costs to and from the seafood processing industries at Panacea, and damages to vessels either stationed or traveling in this area would be considerably reduced. The channel alignment would follow generally along the natural channel and extend from the public pier at Panacea in a southerly direction to deep water in Apalachee Bay.

Benefits

Annual Equivalent Primary Tangible

Reduction in damages to vessels	$6,900
Value of vessel time lost during repairs	2,500
Reduction of spoilage (in commercial crabbing and fishing)	1,000
Reduction of trucking costs (in periods of inadequate depth)	7,800
Increased boating	800
Total	19,000

Impacts

The proposed channel improvement, which would provide a dependable water access, is expected to enhance property values in the Panacea area. Also, significant increases in employment and business may be expected as a result of increased recreation and fishing activities. Another secondary benefit is the shelter that would be provided boats in Dickerson Bay opposite Panacea.

Costs

Investment

Early action	$135,000
Total	135,000

Annual Equivalent

Investment	4,900
Operation, maintenance, and replacements	*7,600
Total	12,500

* Operation, maintenance, and replacements costs at year 2000 are assumed to equal the annual equivalent operation, maintenance, and replacements costs.

Allocation of Costs

All project costs are allocated to navigation.

IRRIGATION

Location

Irrigation would be carried out on an individual farm basis on irrigable lands of the basin used principally for crops.

Plan

The plan for irrigation is discussed in Section II, Part Four.

Benefits

Annual Equivalent Primary Tangible

	Georgia	Florida	Total
Returns to farmers	$976,000	$479,000	$1,455,000

Impacts

Improved efficiencies of farm operations and increased production resulting from irrigation

PANACEA CHANNEL IMPROVEMENT PROJECT

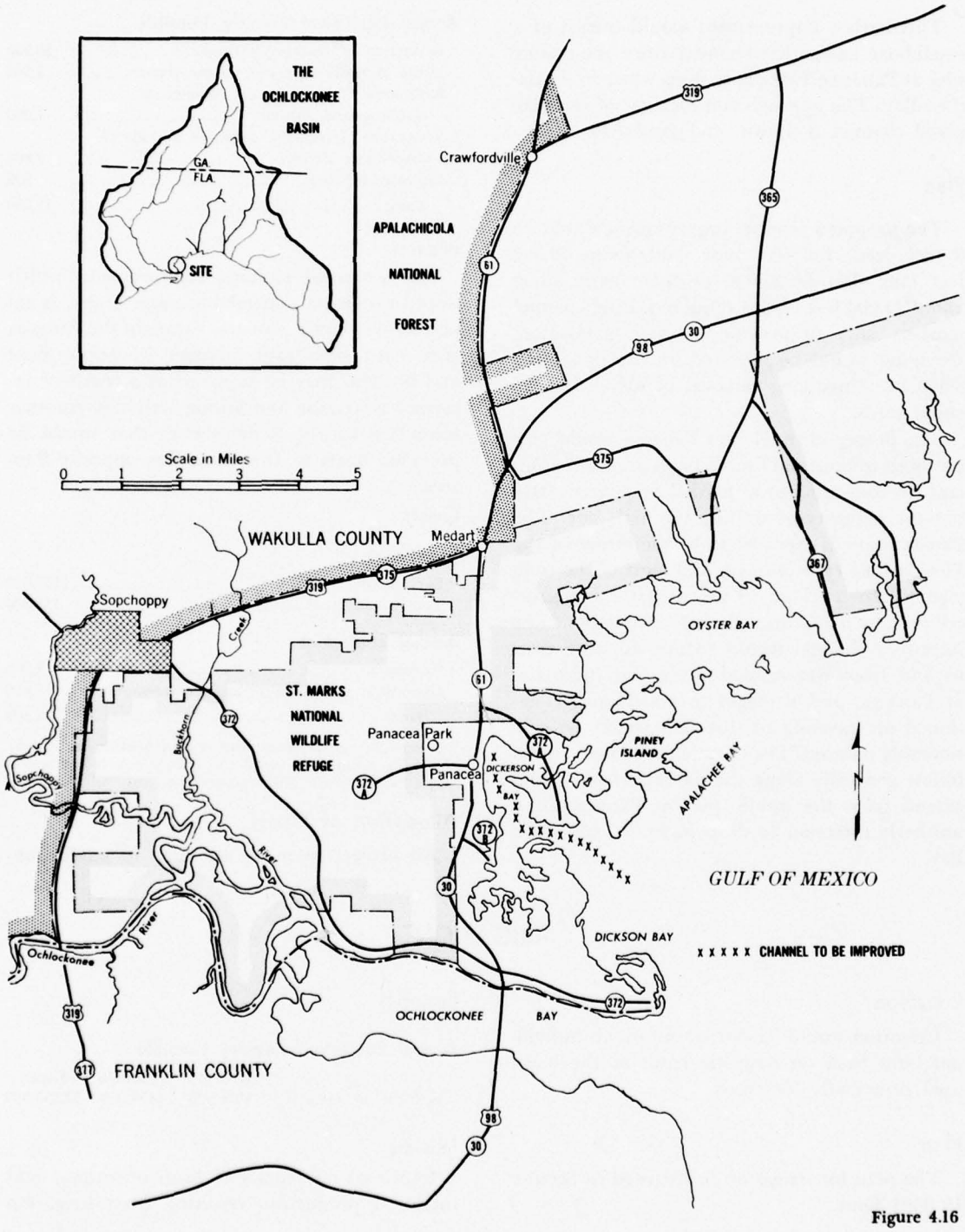


Figure 4.16

would have real and lasting effects on the basin communities.

Costs (exclusive of technical assistance)

	Georgia	Florida	Total
Investment			
Early action	$1,385,000	$680,000	$2,065,000
Total	2,120,000	1,040,000	3,160,000
Annual Equivalent			
Investment	77,200	37,300	114,500
Operation, maintenance, and replacements*	$382,800	$187,700	$570,500
Total	460,000	225,000	685,000

* Operation, maintenance, and replacements costs at year 2000 are assumed to be equal to the annual equivalent operation, maintenance, and replacements costs.

Allocation of Costs

All costs are allocated to irrigation.

DRAINAGE

Location

Reclamation and drainage are considered synonymous in Commission studies. The single-purpose drainage program would be carried out on an individual basis on wetlands to be used for crops and pasture. Drainage of woodlands is discussed under Forest Conservation and Utilization and project drainage is discussed under Upstream Watersheds and the Gulf Coast Improvement project.

Plan

Single-purpose drainage on an individual farm basis is discussed under Section II, Part Four.

Benefits

Annual Equivalent Primary Tangible

	Georgia	Florida	Total
Returns to farmers	$33,000	$19,000	$52,000

Impacts

Individual projects for drainage alone would facilitate proper utilization of agricultural land and contribute toward an adequate agricultural program.

Costs (exclusive of technical assistance)

	Georgia	Florida	Total
Investment			
Early action	$10,000	$8,000	$18,000
Total	29,000	21,000	50,000
Annual Equivalent			
Investment	1,100	600	1,700
Operation, maintenance, and replacements*	1,900	1,400	3,300
Total	3,000	2,000	5,000

* Operation, maintenance, and replacements costs at year 2000 are assumed to be equal to the annual equivalent operation, maintenance, and replacements costs.

Allocation of Costs

All costs are allocated to drainage.

SOIL CONSERVATION AND UTILIZATION

Location

The soil conservation and utilization program would be carried out on the cropland, pastureland, and rangeland throughout the basin.

Plan

Soil conservation measures on cropland, pastureland, and rangeland are discussed in Section II, Part Four, Plan by Purpose. Conservation of woodland is discussed under Forest Conservation and Utilization.

Benefits

Annual Equivalent Primary Tangible

	Georgia	Florida	Total
Returns to farmers	$1,260,000	$802,000	$2,062,000

Impacts

Soil conservation measures would be an im-

portant factor in assuring that adequate soil and water resources are available for future use.

Costs (exclusive of technical assistance)

	Georgia	Florida	Total
Investment			
Early action	$1,610,000	$2,290,000	$3,900,000
Total	6,098,000	4,262,000	10,360,000
Annual Equivalent			
Investment	220,200	154,000	374,200
Operation, maintenance, and replacements*	$467,800	$302,000	$769,800
Total	688,000	456,000	1,144,000

* Operation, maintenance, and replacements costs by year 2000 are assumed to be equal to the annual equivalent operation, maintenance, and replacements costs.

Allocation of Costs

All costs are allocated to soil conservation and utilization.

FOREST CONSERVATION AND UTILIZATION

Location

The forestry program would be instituted generally on all of the woodland in the basin, including the 444,000 acres in the Apalachicola National Forest.

Plan

The accelerated and improved forestry plan proposed to meet future needs includes expanded operations and improved methods in the following major items: (1) Technical assistance for managing and harvesting timber and for applying other recommended measures based on periodic examinations; (2) timber-stand improvement including commercial and noncommercial thinnings to help bring forest stands to more operable conditions; (3) tree planting and site preparation for natural regeneration; (4) detecting and controlling insect and disease infestations; (5) woodland drainage to help eliminate standing surface water in the forests with drainage ditches gated to maintain desired water levels; (6) forest-fire protection by increasing air observation, by providing needed additional facilities, such as tractors and fire towers, and by increasing the number of personnel assigned to detection and suppression activities; (7) fencing overgrazed woodland areas to control grazing and prevent damage to tree seedlings by livestock; (8) road building for management and protection purposes, using drainage ditch fill where feasible; (9) intensified education and information programs; and (10) accelerated and intensified studies on all phases of the forestry program.

About 60 percent of the proposed program would be installed by the year 1975. The $40 million spent during the early action phase of the program would complete installation needs for all practices except tree planting, timber-stand improvement, and site preparation for natural regeneration. The annual operation, maintenance, and replacements costs for new and accelerated programs at year 1975 are about the same as needed for full development of the forestry program in the year 2000.

Data

Item	Unit	Georgia	Florida	Total
Fire protection—new	acre	0	91,000	91,000
Fencing for woodland grazing control	mile	80	1,720	1,800
Erosion control tree planting	acre	7,900	1,800	9,700
Woodland drainage and water control	acre	80,000	355,000	435,000
Shelterbelts	acre	1,000	800	1,800
Timber-stand improvement (commercial and noncommercial)	acre	437,000	2,133,000	2,570,000
Other tree planting and site preparation for natural reproduction	acre	306,000	1,494,000	1,800,000
Annual Production—2000				
Timber cut (million)	cu. ft.	31	150	181
Gum-naval stores (thousand)	bbl.	14	17	31

Benefits

Annual Equivalent Primary Tangible

Georgia	$649,000
Florida	3,190,000
Total	3,839,000

Impacts

The increased timber and naval-stores production would have a stabilizing effect on the local economy. The local citizens can gain additional income, if they harvest the timber and gum crops and haul them to local distribution points. Further processing of the material locally would mean increased manufacturing employment and additional services and would create a need for satellite industries. The multiplier effect of production on the local economy would include increased tax returns, town development, and social improvements.

In addition, the forestry program would improve the condition of the forest soil and thereby reduce erosion and storm runoff. It would enhance the recreation possibilities in the basin and provide better fish and wildlife habitat.

Costs

	Georgia	Florida	Total
Investment			
Early action			
Forest-fire protection		$70,000	$70,000
Fencing for woodland grazing control	$20,000	530,000	550,000
Erosion control tree planting	200,000	40,000	240,000
Roads and/or drainage	960,000	23,170,000	24,130,000
Shelterbelts	20,000	10,000	30,000
Timber-stand improvement (commercial and noncommercial)	$330,000	$1,590,000	$1,920,000
Other tree planting and site preparation for natural regeneration	4,530,000	8,310,000	12,840,000
Total	6,060,000	33,720,000	39,780,000
Total program			
Forest-fire protection		70,000	70,000
Fencing for woodland grazing control	20,000	530,000	550,000
Erosion control tree planting	200,000	40,000	240,000
Roads and/or drainage	960,000	23,170,000	24,130,000
Shelterbelts	20,000	10,000	30,000
Timber-stand improvement (commercial and noncommercial)	1,520,000	7,440,000	8,960,000
Other tree planting and site preparation for natural regeneration	5,260,000	25,700,000	30,960,000
Total	7,980,000	56,960,000	64,940,000
Annual Equivalent			
Investment	193,000	1,414,000	1,607,000
Operation, maintenance, and replacements	222,000	1,093,000	1,315,000
Total	415,000	2,507,000	2,922,000
Operation, Maintenance, and Replacements at Year 2000	276,000	1,356,000	1,632,000

Allocation of Costs

All costs are allocated to forestry.

FISH AND WILDLIFE

For purposes of planning and discussion the wildlife and sport fisheries segment and the commercial fisheries segment of the total fish and wildlife program are treated separately.

SPORT FISHERIES AND WILDLIFE

Location

The single-purpose wildlife and sport fisheries programs would be basinwide. Sport fisheries and wildlife facilities included in multiple-purpose projects are described as part of specific projects.

Plan

Sport fisheries programs and projects, as proposed, are designed to meet the need for 1.4 million user-days of sport fishing by 2000. Selection of developments to meet these needs have been guided by recognition of the desirability of a balanced distribution of fishing pressure by types of fishing water—streams, large impoundments, small impoundments, and salt waters; geographical location; resource potentials; and costs of developments.

Wildlife programs and projects are designed

to meet a total demand of 488,000 user-days of hunting by 2000. Selection of developments to meet these needs has been guided by trends in type of hunting, resource potentials, and feasibility of developments.

The wildlife program would consist of the following: (1) Habitat improvement in the existing State administered wildlife management areas; (2) development of habitat within the St. Marks National Wildlife Refuge and the Apalachicola National Forest whereby the wildlife potentials of these areas may be more fully realized; (3) development of one new upland game management area in Georgia; (4) preservation and improvement of designated areas along Wacissa and Wakulla Rivers; (5) extensive development of wildlife habitat throughout the basin by interested landowners in cooperation with State and Federal conservation agencies; and (6) the expansion of current activities in planning, education, studies and distribution of available information, management, and enforcement.

Items in the sport fisheries program would include the following: (1) Improvement of the existing lakes and streams; (2) renovation and more intensive management of the existing impoundments; (3) improvement of existing services and facilities for coastal fishermen, including installation of artificial reefs; and (4) the expansion of current activities in planning, education, studies and distribution of information, management, and enforcement.

Four multiple-purpose water storage projects would provide about 6,600 acres of fishing water. Storage would also be provided in these reservoirs for the purpose of low-flow regulation, which would result in improved fishing conditions in the Ochlockonee River and its tributaries.

Data

	Unit	Georgia	Florida	Total
Wildlife				
Improvement of existing facilities				
State administered areas	acre	0	223,000	223,000
St. Marks National Wildlife Refuge	acre	0	165,000[1]	165,000
Apalachicola National Forest	acre	0	444,000	444,000
Development of new facilities				
Grady County Wildlife Management Area	acre	20,000	0	20,000
Dove fields	acre	1,000	0	1,000
Extensive habitat improvement		Basinwide		
Supporting programs		Basinwide		
Sport Fisheries				
Improvement of existing waters				
Streams	acre	500	6,000	6,500
Large impoundments	acre	0	10,000	10,000
Small impoundments	acre	600	500	1,100
Preservation of unusual areas				
Wacissa River	See multiple-purpose project			
Wakulla River	See recreation development			
Projects creating new waters				
Thomasville	See multiple-purpose project			
Doerun	See multiple-purpose project			
Quincy	See multiple-purpose project			
Tired Creek	See multiple-purpose project			
New separate facilities				
Stream and lake access	See water-access areas			
Salt-water access	See multiple-purpose water-access areas, Gulf Coast Improvement, and recreation coastal developments			
Fishing reefs[2]	site	---	12	12
Fishing piers	site	---	6	6
Supporting programs	Basinwide			

NOTES: [1] Excludes 30,000 surface acres of water bodies.
[2] These are submerged reefs 3 to 4 feet high in water with depths varying from 20 to 60 feet.

By year 2000, the total estimated increase over 1960 in annual user-days of hunting and sport fishing associated with the above program features are as follows:

	Increase in user-days annually 1960 to 2000		
Item	Georgia	Florida	Total
Hunting	26,000	142,000	168,000
Sport fishing, fresh water	38,000	125,000	*163,000
Sport fishing, salt water	0	313,000	*313,000
Total	64,000	580,000	644,000

* Includes user-days of fishing which were assigned to water-access areas for allocation purposes but excludes 71,000 user-days of fresh-water sport fishing and 66,000 user-days of salt-water sport fishing associated with other multiple-purpose projects.

Benefits

Annual Equivalent Primary Tangible

	Georgia	Florida	Total
Wildlife	$39,000	$216,000	$255,000
Sport fisheries	45,000	649,000	694,000
Total	84,000	865,000	949,000

Impacts

Many of the benefits from fish and wildlife programs would fall into an intangible category. Preservation of areas in their natural state and increased esthetic values are difficult to assess in monetary terms. The Ochlockonee basin has many areas that support a variety and abundance of fish and wildlife. Several areas, less than 30 miles from Tallahassee, have been retained in their natural state, despite the pressure of increased populations and speculative development in other parts of the State.

The development of the inshore location of the Gulf Coast Improvement project as proposed in the long-range plan would create many opportunities. With adequate provision for conservation and development of fish and wildlife resources in the design and maintenance of this project, it would be possible to develop hunting and fishing areas of regional and national significance.

Costs

	Georgia*	Florida	Total
Investment			
Early action			
Wildlife	---	$92,000	$92,000
Sport fisheries	---	240,000	240,000
Total	---	332,000	332,000
Total			
Wildlife	---	341,000	341,000
Sport fisheries	---	730,000	730,000
Total	---	1,071,000	1,071,000
Annual Equivalent			
Investment			
Wildlife	---	7,200	7,200
Sport fisheries	---	15,900	15,900
Subtotal	---	23,100	23,100
Operation, maintenance, and replacements			
Wildlife	$36,600	178,800	215,400
Sport fisheries	35,200	189,000	224,200
Subtotal	71,800	367,800	439,600
Total			
Wildlife	$36,600	$186,000	$222,600
Sport fisheries	35,200	204,900	240,100
Total	71,800	390,900	462,700
Operation, Maintenance, and Replacements at Year 2000			
Wildlife	60,000	293,700	353,700
Sport fisheries	49,000	317,700	366,700
Total	109,000	611,400	720,400

* All investment costs shown are for Florida; investment costs in Georgia are associated with and included in data for multiple-purpose projects.

Allocation of Costs

All costs are allocated to sport fisheries and wildlife.

Special Considerations

Many areas are controlled by owners of large tracts who have manifested much interest in preserving the land in its natural state. To provide the most beneficial use of the resources would require that provisions be made to assure public use and ultimate development by local, State, and Federal conservation agencies with a view to maintaining their natural attributes.

COMMERCIAL FISHERIES

Location

Improvements for commercial fisheries operations would extend throughout the coastal waters of the basin. This program is exclusive of improved conditions for commercial fisheries that would result from the Gulf Coast Improvement project.

Plan

The commercial fisheries program would consist of: (1) Expansion of existing operations with a view toward more efficient harvests, better methods of handling and processing the catch, new sources of supply, sound regulations and enforcement, and increasing demand for domestic products; and (2) cultivation of shrimp, oysters, pompano, and other high-quality sea-

Figure 4.17 *Underwater Studies of Fishes Must Be Undertaken to Obtain More Information About the Coastal Fishery Potential.*

foods under controlled conditions. With improvements and expansions in effect, it is anticipated that the total production of seafoods will be increased to about 10.8 million pounds annually by 2000, an increase of nearly 5.7 million pounds over the 1960 harvest.

Data

Supporting commercial fisheries activities would consist of: (1) Expansion of fishing operations; (2) exploratory fishing and gear development; (3) market development; (4) technological services; (5) biological studies; (6) protection of habitat; and (7) enforcement of regulations. By the year 2000, the increased production associated with these improved activities are as follows:

Item	Pounds
Food fishes	5,225,000
Seafood culture	
Oysters (800 acres)	320,000
Shrimp (100 acres)	85,000
Fishes for other than human consumption	30,000
Total	5,660,000

Benefits

Annual Equivalent Primary Tangible

Expansion of operations	$249,000
Seafood culture	69,000
Total	318,000

Impacts

The benefits which could be realized by improving seafood culture and harvests are of such magnitude as to justify expansion of the industry. Improved seafood culture would eliminate to a great extent the seasonal fluctuations of supply and would encourage new fish processing plants to locate in the basin. Stabilization of supply and market conditions would attract energetic young men into the field of commercial fishing.

Secondary benefits include increased employment in the fish and other seafood processing industries and in boat building, boat maintenance, and boat-supply enterprises. More services would be required and sales of food, gasoline and oil, fishing supplies, and other equipment would increase.

Costs

Investment*

Early action	$138,000
Total	*194,000*

Annual Equivalent

Investment		5,000
Operation, maintenance, and replacements		227,000
Expansion of operations	$186,000	
Seafood culture	41,000	
Total		232,000

Operation, Maintenance, and Replacements at Year 2000 — 400,000

Expansion of operation	328,000
Seafood culture	72,000

* Investment costs are mainly for seafood culture. Most of the commercial fisheries costs are annual expenditures.

Allocation of Costs

All costs are allocated to commercial fisheries.

SUMMARY

Fish and Wildlife Benefits and Costs

	Wildlife	Sport fisheries	Commercial fisheries	Total
Benefits				
Annual equivalent	$255,000	$694,000	$318,000	$1,267,000
Costs				
Investment	341,000	730,000	194,000	1,265,000
Annual equivalent	222,600	240,100	232,000	694,700
Operation, maintenance, and replacements at year 2000	353,700	366,700	400,000	1,120,400

RECREATION

Location

The single-purpose recreation program would consist of expanding and improving existing recreation areas and developing new recreation areas, principally along the coast of the Gulf of Mexico.

Many improvements to existing recreation areas and developments of new recreation areas in addition to facilities included as part of multiple-purpose projects are proposed to meet projected recreation use in the Ochlockonee basin. Hunting and sport fishing are discussed under Wildlife and Sport Fisheries.

Plan

Many locations in the basin along the 200 miles of the coastal reaches of the Gulf of Mexico have the potential for being developed into attractive beaches. Most of the developed beaches are located between Apalachicola Bay just west of the basin and the St. Marks River. These range from highly developed areas with intense use to large, little-used, undeveloped areas. The beaches and other areas discussed are illustrative of what is considered to be reasonable for such development.

Beaches from Carrabelle to Alligator Point already support recreation amounting to an estimated 500,000 user-days in 1959. Several of the beaches would permit intensive use, whereas others would allow more dispersed use. Swimming and picnicking would be major activities.

Keaton Beach is an artificially developed area on the Gulf coast in Taylor County, Florida. This is an example of what can be done to provide recreation opportunities where existing resources are relatively meager. The coastal waters are shallow along this part of the coast. This condition requires carefully planned improvements to provide attractive beaches.

Dog Island, about 8 miles off the mainland south of Carrabelle, is privately owned and is being developed for recreation homesites. A small area is reserved for public use. Access is provided by ferry. Provision of additional facilities would provide an opportunity to more fully utilize the island beaches. Larger areas than are now reserved for public recreation would be desirable.

General outdoor recreation areas are proposed

Figure 4.18 *Dog Island—Gulf of Mexico.*

for development along the Gulf of Mexico extending from Apalachee Bay southeastward to the Suwannee River estuary. For illustrative purposes the approximate location and size of six areas to be partially developed by 1975 are listed below:

Recreation area	Approximate size (acres)
Econfina River	300
Spring Warrior	5,000
Hagens Cove	2,200
Steinhatchee	300
Horseshoe Point	200
Shired and Big Pine Islands	1,000

Additional development of these areas between 1975 and 2000 and the remainder of developments along the Gulf of Mexico would be integral parts of the Gulf Coast Improvement project. Land would be acquired and access roads, water supplies, sanitary provisions, and parking would be provided. These facilities would enhance swimming, picnicking, sightseeing, camping, and boating opportunities. The design and location of added facilities would be determined by the alignment of the proposed waterway and highway.

The basin contains three large areas which offer a variety of recreation opportunities. These are St. Marks National Wildlife Refuge, Lake Talquin, and Apalachicola National Forest. Each area is partially developed for recreation.

Lake Talquin, formed by a power dam at Jackson Bluff, Florida, has a surface area of 9,750 acres. The lake offers good opportunities for pleasure boating and several areas already have picnicking facilities. Stumps should be removed and access areas should be provided around the reservoir so that full use can be made of this resource. Providing for boating, camping, picnicking, swimming, and sightseeing activities and furnishing facilities for parking, water supplies, and sanitation at this lake would aid in satisfying the growing recreation needs in the vicinity of Tallahassee.

Apalachicola National Forest lies southwest of Tallahassee and encompasses over 444,000 acres. A few of the many areas in the forest that are adaptable to outdoor recreation have been partially developed for recreation use. In 1959, these facilities were used by about 100,000 recreationists. Additional facilities would be provided for camping, hiking, picnicking, swimming, and cultural activities to more fully utilize the vast recreational potential of this forest.

The St. Marks National Wildlife Refuge is located on the Gulf coast at the St. Marks River. This 95,000-acre area is open to the public under certain restrictions for protecting the wildlife. The refuge offers exceptional opportunities for observing waterfowl in a natural habitat. To enhance opportunities at this refuge, additional development is needed. Proposed development would be designed so that it would not interfere with the primary purposes of the refuge. An interpretive center would be a part of the improvement.

There are three partially developed historical or cultural areas in the Ochlockonee basin and numerous other undeveloped historic sites. Additional facilities are proposed for the partially developed areas and four selected undeveloped historic sites warrant some degree of development to preserve and permit adequate use of these areas. All of the sites included in the plan are in Florida, but subsequent studies may reveal similar areas could be developed in Georgia.

Natural Bridge Battlefield Historic Memorial is a 6-acre historic site, southeast of Tallahassee, commemorating a Confederate victory in the Civil War. The area also contains unusual geologic forms. Facilities would be provided on about 50 additional acres for sightseeing and picnicking to adequately use the recreational potential of this interesting area.

Killearn Gardens is a 307-acre State park just north of Tallahassee used principally for sightseeing, swimming, boating, and fishing. The principal features are the beautiful formal gardens and a 10-acre lake. Additional facilities should not be required before 1975, but expansion of facilities would be provided prior to year 2000.

Wakulla Spring, 15 miles south of Tallahassee, forms Wakulla River. The normal flow of crystal clear water is about 183 million gallons per day. Facilities include a small beach on one side of the spring, glass-bottom boats for observing fish and underwater plants, and a lodge with dining room and curio shop. Additional facilities would be provided to permit increased use of this outstanding recreation area.

Bird Hammock is 1¼ miles southeast of Hyde Park in Wakulla County, Florida, on the Wakulla River. The remains of two Indian mounds are visible.

Fort San Luis, on the western outskirts of Tallahassee, Florida, was once the center of Spanish missionary efforts in northern Florida and is now privately owned. Spanish and Indian artifacts have been recovered at this site.

Lake Jackson, located just north of Tallahassee, is the site of five Indian mounds. Excavation of the mounds could provide data and artifacts of pre-Spanish settlement.

Fort St. Marks—San Markos de Apalachee—is south of Tallahassee on an island formed by the confluence of the St. Marks and Wakulla Rivers. Confederate earthworks overlie the site of a Spanish fort which was erected around 1680. Andrew Jackson captured the fort in 1818.

Sufficient facilities would be provided at these undeveloped historic sites to adequately protect the historic features and provide interpretive services. Activities would center around sightseeing, cultural pursuits, and picnicking. Museums would be provided where sufficient historic data and artifacts are available. Land acquisition would be required as would service facilities for parking, sanitation, water supplies, and access roads. Detailed designs would be worked out as the needs increase for development of such areas.

Data

The proposed level of development at single-purpose recreation areas included in the plan would provide an opportunity for the following estimated use of facilities:

	User-days annually (1,000)		
	1960 Base	By 1975	By 2000
Existing Developments			
Beaches—Carrabelle to Alligator Point	500	800	2,000
Keaton Beach	50	50	200
Apalachicola National Forest	200	350	1,000
St. Marks National Wildlife Refuge	—	70	100
Lake Talquin	40	140	500
Natural Bridge Battlefield Historic Memorial	10	20	50
Killearn Gardens State Park	150	150	300
Wakulla Spring	100	120	250
New Developments			
Dog Island	—	200	400
Econfina	—	25	•25
Spring Warrior	—	100	•100
Hagens Cove	—	200	•200
Steinhatchee	—	100	•100
Horseshoe Point	—	50	•50
Shired and Big Pine Islands	—	225	•225
Historic sites—Fort St. Marks, Lake Jackson, Bird Hammock, and Fort San Luis	—	115	200

* Added facilities and the associated increases in user-days at these developments are included as parts of the proposed Gulf Coast Improvement project.

Benefits

Annual Equivalent Primary Tangible

Expansion of existing facilities*	$2,393,000
New developments	1,476,000
Total	3,869,000

* Benefits associated only with expansion of existing facilities.

Impacts

Impacts of the single-purpose recreation program are discussed in Sections II and III, Part Four.

Costs[1]

	Existing[2]	New	Total
Investment			
Early action	$4,686,000	$5,824,000	$10,510,000
Total	13,198,000	6,692,000	19,890,000
Annual Equivalent			
Investment	307,000	257,000	564,000
Operation, maintenance, and replacements	446,000	351,000	797,000
Total	753,000	608,000	1,361,000
Operation, Maintenance, and Replacements at Year 2000	846,000	392,000	1,238,000

NOTES: [1] All costs shown are in Florida; recreation costs in Georgia are associated with multiple-purpose projects.
[2] Costs associated only with expansion of existing facilities.

Allocation of Costs

All costs are allocated to recreation.

Location

The pollution abatement program would be basinwide. This program is in addition to low-flow augmentation provided by the water-storage projects.

Plan

Programs for pollution abatement consist of new and extended sewerage systems and new or enlarged municipal and industrial waste-treatment facilities.

Data

Projected pollution abatement needs from 1960 to year 2000 are as follows:

Feature	Number[1]
Total municipal sewerage systems	[2]24
New systems	15
Primary treatment plants to be converted to secondary plants	2
Secondary plants to be enlarged	5

NOTES: [1] Number of improvements included in plan to meet projected needs to year 2000.
[2] Four nonmunicipal systems are excluded.

Capacity of existing treatment facilities on other systems is adequate.

Benefits

Annual Equivalent Primary Tangible

The pollution abatement program, excluding the dilution water provided at the multiple-purpose water-storage projects, is based primarily on intangibles. Benefits were not evaluated in monetary terms; however, in each situation the most economical proposal that would satisfactorily meet the needs was selected.

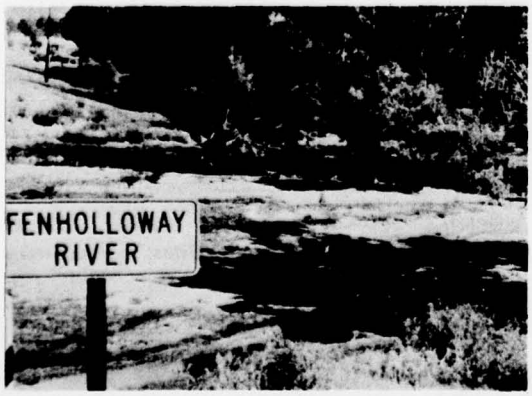


Figure 4.19 *Fenholloway River Is Heavily Polluted.*

Impacts

Construction and operation and maintenance of enlarged pollution abatement facilities would increase employment and sales and service activities in the basin. Although not readily expressed in monetary terms, pollution abatement would also be valuable in protecting health and esthetic values in the basin. This would be especially true for the Fenholloway River and the upper reaches of the Ochlockonee River. Perhaps its prime value would be in providing water-quality levels which would permit a full range of uses and help maintain property values.

Costs

	Georgia	Florida	Total
Investment (new systems or expansion of sewerage and treatment facilities)			
Early action			
Municipal	$3,410,000	$7,680,000	$11,090,000
Industrial	1,120,000	1,350,000	2,470,000
Total	4,530,000	9,030,000	13,560,000
Total			
Municipal	6,710,000	18,980,000	25,690,000
Industrial	2,700,000	*2,160,000	*4,860,000
Total	9,410,000	*21,140,000	*30,550,000
Annual Equivalent			
Investment			
Municipal	161,700	433,800	595,500
Industrial	62,500	55,000	117,500
Subtotal	124,200	488,800	713,000
Operation, maintenance, and replacements			
Municipal	53,300	130,200	183,500
Industrial	24,500	11,000	35,500
Subtotal	77,800	141,200	219,000
Total			
Municipal	215,000	564,000	779,000
Industrial	87,000	66,000	153,000
Total	302,000	630,000	932,000

* Sufficient funds are included to accomplish proposed pollution abatement of the Fenholloway River.

Operation, Maintenance, and Replacements at Year 2000

	Georgia	Florida	Total
Municipal	$95,600	$231,100	$326,700
Industrial	40,000	18,500	58,500
Total	135,600	249,600	385,200

Allocation of Costs

All costs are allocated to pollution abatement. The distribution of costs is about 84 percent municipal and 16 percent industrial.

PUBLIC HEALTH

Location

Public health programs are basinwide. These programs are exclusive of vector control features in the proposed Gulf Coast Improvement project.

Plan

Programs include measures for vector control, solid-waste collection and disposal, and air pollution and radiation monitoring. For vector control and radiation monitoring, the plan assumes a continuation and expansion of existing programs. In maintaining satisfactory air qualities, full industrial cooperation is assumed. Any investment costs involved are reflected in the annual equivalent costs. Costs for sanitary landfill are treated in the same manner, with investment in the land and equipment required for disposal and landfill operations accounted for only in annual equivalent costs.

Data

Solid-Waste Disposal

Number of sanitary landfill operations	25

Annual Operations

Vector control	Basinwide
Air pollution and radiation monitoring	Basinwide

Benefits

Annual Equivalent Primary Tangible

Annual benefits from the public health programs are not expressed in monetary terms; however, these items need to be effectively carried on to improve community appearance and citizen morale.

Impacts

Vector control would not only guard against the spread of vector-borne diseases but, as in the case of mosquitoes and other swarming and biting insects, it would reduce the psychological and physiological discomforts caused by these pests. Insect pest control deserves high priority in recreation planning. The measures for solid-waste disposal will also have effects far beyond these important public health aspects. By helping to prevent haphazard or uncontrolled waste dumping and burning, which lead to despoilment of the countryside, these measures would add to well-being and help retain the desirability of the basin. In addition, the land created by the fill generally has a value well in excess of the original land involved.

Costs

Investment

Investment costs for public health features are assumed to be part of the annual costs. Amounts shown for annual costs are those considered necessary to carry out effective basinwide programs.

	Georgia	Florida	Total
Annual Equivalent			
Operation, maintenance, and replacements			
Vector control	$35,500	$194,500	$230,000
Solid-waste disposal	78,400	131,100	209,500
Air pollution and radiation monitoring	4,000	6,000	10,000
Total	117,900	331,600	449,500
Operation, Maintenance, and Replacements at Year 2000			
Vector control	35,500	194,500	230,000
Solid-waste disposal	129,500	210,000	339,500
Air pollution and radiation monitoring	4,000	6,000	10,000
Total	169,000	410,500	579,500

Allocation of Costs

All costs are allocated to public health.

SECTION VI – OTHER PROJECTS CONSIDERED

The studies leading to the comprehensive plan for the Ochlockonee basin involved consideration of numerous projects not included in the plan and various alternative locations and sizes for the projects included in the plan. Some of the more significant projects that were eliminated during plan formulation and brief reasons for their rejection are shown in the summary that follows. More discussion on alternatives is contained in Appendix 12, Planning.

Name of project not included in plan	Key number on Fig. 4.20	Approximate location	Description	Purpose*	Major reason for not including in plan
Lower Doerun	2	5 miles SE. of Doerun, Ga., on Ochlockonee River	Dam and reservoir	PA, R, F&W	Doerun project better alternative
Little Ochlockonee	3	2 miles E. of Ochlockonee, Ga., on Little Ochlockonee River	Dam and reservoir	FC, R, F&W, PA	Thomasville project better alternative
Little Tired	6	1 mile N. of Cairo, Ga., on Little Tired Creek	Dam and reservoir	PA, R, F&W, WS	Tired Creek project better alternative
Barnetts	7	6 miles NW. of Thomasville, Ga., on Barnetts Creek	Dam and reservoir	R, F&W, FC, PA	Not economically justified
Lower Tired	8	3 miles SW. of Cairo, Ga., on Tired Creek	Dam and reservoir	R, PA, F&W	Tired Creek project better alternative
Attapulgus	9	4 miles SW. of Attapulgus, Ga., on Attapulgus Creek	Dam and reservoir	R, PA, F&W, I	Quincy project better alternative
Wards Creek	10	10 miles SW. of Thomasville, Ga., on Wards Creek	Dam and reservoir	R, F&W, I, FC	Not economically justified and site not suitable
Aucilla	11	4 miles N. of Ga.-Fla. line on Aucilla River	Dam and reservoir	R, FC, F&W	Not economically justified
Willacoochee (upper and lower)	12 and 13	2 sites in vicinity of Quincy, Fla., on Willacoochee Creek	Dam and reservoir	R, F&W	Not economically justified
Swamp Creek (upper and lower)	14 and 15	2 sites considered in vicinity of Havana, Fla.	Dam and reservoir	R, F&W	Not economically justified
Quincy Creek	17	1 mile E. of Quincy, Fla., on Quincy Creek	Dam and reservoir	R, F&W	Quincy project better alternative
Hubert Branch	18	2 miles E. of Quincy, Fla., on Hubert Branch	Dam and reservoir	R, F&W	Quincy project better alternative
Little River	19	8 miles E. of Quincy, Fla., on Little River	Dam and reservoir	R, F&W, PA, I	Not economically justified
Stabilization of Lakes Iamonia and Jackson	20	5 to 15 miles N. of Tallahassee, Fla.	Stabilize and raise water levels by control structures and a diversion channel from Ochlockonee River	R, F&W	Stabilizing water level at a higher elevation very doubtful because of underlying limestone
Richlander	21	5 miles S. of Quincy, Fla., on Richlander Creek	Dam and reservoir	R, F&W	Not economically justified
Vote Creek	22	4 miles SW. of Quincy, Fla., on Vote Creek	Dam and reservoir	R, F&W	Not economically justified
Big Creek	23	2 miles N. of Hosford, Fla., on Big Creek	Dam and reservoir	R, F&W, I	Not economically justified
Telogia	24	3 miles SW. of Hosford, Fla., on Telogia Creek	Dam and reservoir	R, F&W, PA	Not economically justified
Intracoastal Waterway Extension via Crooked River	25	Crooked River from Carrabelle to Ochlockonee Bay, Fla.	Gulf Intracoastal Waterway	N, F&W, R	Not economically justified
Channel Improvement Ochlockonee Bay and Lower Ochlockonee River	26	Ochlockonee Bay and Ochlockonee River to McIntyre, Fla.	Channel improvement for small boat navigation	N, F&W, R	Not economically justified
Newport Levee	31	Newport, Fla.	Levee around the town of Newport	FC	Not economically justified
Fenholloway River Barge Channel	33	Gulf of Mexico to Perry, Fla.	Channel for barge navigation	N	Not economically justified
Spring Creek	34	5 miles SW. of Perry, Fla.	Dam and reservoir	R, PA, FC	Not economically justified
Steinhatchee River Barge Channel	36	Steinhatchee River from Gulf of Mexico to bridge crossing for U. S. Highway No. 19 and 98	Channel for barge navigation	N, R, F&W	Not economically justified

* FC —Flood control; WS—Water supplies; N—Navigation; I—Irrigation; F&W—Fish and wildlife; R—Recreation; PA—Pollution abatement.

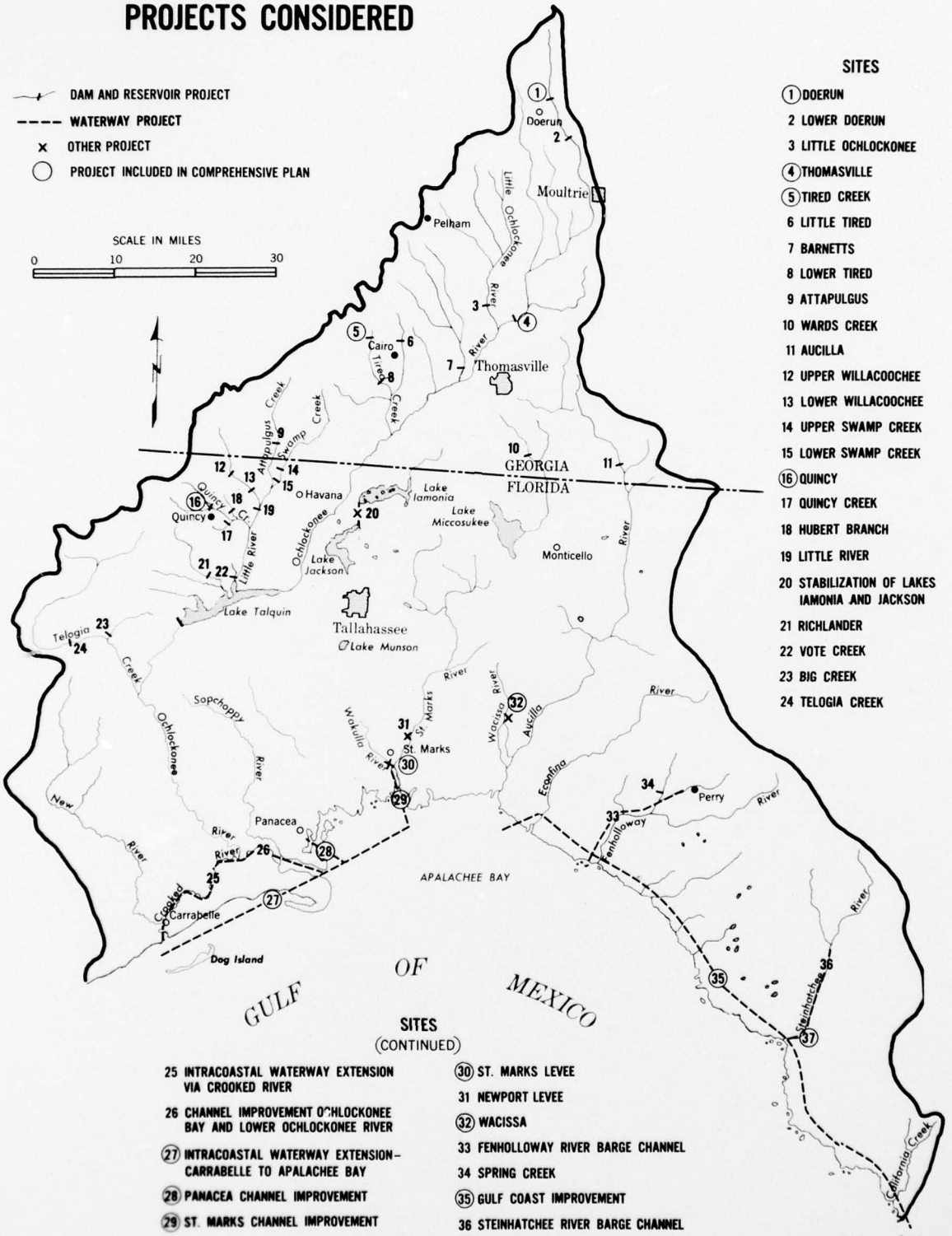

PROJECTS CONSIDERED
DAM AND RESERVOIR PROJECT
WATERWAY PROJECT
OTHER PROJECT
PROJECT INCLUDED IN COMPREHENSIVE PLAN
SCALE IN MILES
0 10 20 30
SITES
(1) DOERUN
2 LOWER DOERUN
3 LITTLE OCHLOCKONEE
(4) THOMASVILLE
(5) TIRED CREEK
6 LITTLE TIRED
7 BARNETTS
8 LOWER TIRED
9 ATTAPULGUS
10 WARDS CREEK
11 AUCILLA
12 UPPER WILLACOOCHEE
13 LOWER WILLACOOCHEE
14 UPPER SWAMP CREEK
15 LOWER SWAMP CREEK
(16) QUINCY
17 QUINCY CREEK
18 HUBERT BRANCH
19 LITTLE RIVER
20 STABILIZATION OF LAKES IAMONIA AND JACKSON
21 RICHLANDER
22 VOTE CREEK
23 BIG CREEK
24 TELOGIA CREEK
Doerun
Moultrie
Pelham
Little Ochlockonee River
Cairo
Tired Creek
Thomasville
Attapulgus Creek
Swamp Creek
GEORGIA
FLORIDA
Havana
Lake Iamonia
Lake Miccosukee
Quincy
Quincy Cr.
Little River
Ochlockonee River
Lake Jackson
Monticello
Lake Talquin
Tallahassee
Lake Munson
Telogia Creek
Sopchoppy River
Wakulla River
St. Marks River
St. Marks
Wacissa River
Aucilla River
Econfina River
Perry
Fenholloway River
Panacea
New River
Crooked River
APALACHEE BAY
Carrabelle
Dog Island
GULF OF MEXICO
Steinhatchee River
California Creek
SITES
(CONTINUED)
25 INTRACOASTAL WATERWAY EXTENSION VIA CROOKED RIVER
26 CHANNEL IMPROVEMENT OCHLOCKONEE BAY AND LOWER OCHLOCKONEE RIVER
(27) INTRACOASTAL WATERWAY EXTENSION – CARRABELLE TO APALACHEE BAY
(28) PANACEA CHANNEL IMPROVEMENT
(29) ST. MARKS CHANNEL IMPROVEMENT
(30) ST. MARKS LEVEE
31 NEWPORT LEVEE
(32) WACISSA
33 FENHOLLOWAY RIVER BARGE CHANNEL
34 SPRING CREEK
(35) GULF COAST IMPROVEMENT
36 STEINHATCHEE RIVER BARGE CHANNEL
(37) STEINHATCHEE RIVER IMPROVEMENT

Figure 4.20

PART FIVE – CONCLUSIONS

DISCUSSION

The Ochlockonee basin has the potential for continued population and personal income growth through the year 2000. The population density ranges from heavy in and near the basin cities to sparse in the coastal area. The population in the basin is expected to increase from slightly more than 200,000 in 1960 to nearly 350,000 by 2000. Gains in per capita income are expected to be greater than the average for the Southeast River Basins. Based on the 1960 dollar value, per capita income by year 2000 is expected to be about two and one-half times that of 1960. Realization of the projected levels of income depends upon a continuing rise in the productivity of the area workers as well as an increase in the numbers employed.

Urban expansion, a trend well established, will be a major influence on future use of land and water resources. With the shift toward an urban economy will come readjustments in urban-rural relations and influences. There will be increased emphasis on industrial development and problems connected with urbanization and for the rural economy increased emphasis on efficiency of rural enterprises. Thus, it is important to recognize that raising educational levels of the labor force and other social advancements are needed to promote increased productivity and to permit desirable shifts to envisioned employment opportunities.

The ultimate goal in planning is to satisfy the needs and desires of the people; permit efficient development and utilization of the basin land and water resources; provide means of achieving favorable levels of per capita income; provide opportunities for adequate employment; maintain pleasant living conditions in the basin; and create an environment that will attract new enterprises to help broaden the economic activities. This goal can best be accomplished by balancing population, investment capital, labor, management, education, and basin resources. The comprehensive plan is designed to provide a framework for meeting projected needs to year 2000. Although the basin plan is primarily land and water oriented and many categories of need require much more than land and water development, this plan can contribute greatly to increasing the income and the general well-being of the people in the Ochlockonee basin. It would also contribute to national, southeastern, and state economies and would provide an attractive vacation and leisure-time area for thousands of people. To be effective, the plan must be implemented as a joint local, State, and Federal effort. In most instances, more detailed analyses and evaluations will be necessary before programs and projects are started. Because the plan is based on long-range assumptions and projections, it will need frequent reviews and periodic revisions to insure that it is properly responsive to changing times and conditions.

With presently known management and technical knowledge factors, food and fiber can be produced on Ochlockonee basin lands at several times the present rate. This will be more than adequate to meet the projected share of local, national, and world requirements to be produced in the basin until year 2000. However, the use of gainful soil and water conservation techniques should be encouraged to avoid costly losses by erosion and soil deterioration and conserve for future generations the basic soil and water resources. The nonagricultural requirements for land will cause no serious restriction on agricultural production, and there is adequate land for the projected growth of urban areas with the accompanying industrial and service activities. Water, generally, is distributed favorably in relation to development possibilities and seasonal demands. If properly developed, sufficient water of good quality is available to meet all foreseeable requirements for human comfort and health, needed expansion of industry, recreation, agriculture including forestry, and fish and wildlife.

CONCLUSIONS

Nearly all of the projected needs and desires of the Ochlockonee basin people can be satisfied by development of the comprehensive plan presented in Part Four.

The Commission concludes:

(1) Flood damages are locally significant in the Ochlockonee basin but are low with relation to the area flooded because there is comparatively little flood plain development. Some encroachment has been initiated, however, and flooding could become a major problem unless zoning or other control measures are adopted for flood-prone areas. Projects and programs in the comprehensive plan would alleviate the major flood problems in the more critical areas but would not eliminate them.

(2) Water supply systems, both domestic and municipal, will need major improvements or expansion during the 1960-2000 period.

(3) Navigation traffic on the Gulf Intracoastal Waterway is important to the basin eeconomy. Development of the coastal area for both commercial navigation and recreation boating and facilities to permit use of streams for recreation boating are provided for in the comprehensive plan.

(4) Individual operators are expected to install drainage and irrigation facilities for efficiency, increased yields, and improved uniformity in agricultural products. Marginal lands now in crop production would then be put in pastureland, woodland, or other uses. Truck farming and cattle raising are expected to become more significant parts of the agricultural program.

(5) Development of new potential hydroelectric power sites in the basin does not appear to be warranted to the year 2000. Increased requirements for electric energy generally will be met from sources outside the basin. If, however, actual demand greatly exceeds the projection, a steam electric generating plant in the basin may be warranted during the 1975-2000 period.

(6) Industrial expansion is a key factor in supporting the projected income growth in the area. The levels of industrial growth reflected by projections are practicable of attainment with a concerted effort by community leaders to establish a suitable legal, institutional, social, and political environment with conditions favorable for financing, education, and training.

(7) Conservation treatment has been applied to most of the cropland, pastureland, and rangeland of the area. However, the application of erosion control and other conservation treatment measures included in the comprehensive plan must be continued and expanded to conserve soil and water resources and contribute to increased efficiency in production.

(8) Annual merchantable wood growth now exceeds the annual harvest and mortality. Projected levels of production can be met by the year 2000 if accelerated protective management programs are carried out.

(9) The proposed wildlife and sport fisheries developments can meet the needs for hunting and fishing opportunity. More intensive management of existing habitat and development of new management areas at strategic locations are key items in the plan.

(10) Despite the natural productivity of the Gulf of Mexico, it will become increasingly difficult to harvest wild fish crops at costs permitting commercial fishing industries to compete with imports and the mass production and marketing methods of other food industries. The plan includes new programs and improved facilities for producing and harvesting fishes for food and industrial purposes.

(11) Demands for outdoor recreation are rapidly exceeding the capacity of developed facilities in the area, particularly along the Gulf of Mexico and in the vicinity of major transportation routes. Many out-of-basin residents are expected to seek recreation in the Ochlockonee basin. Extensive recreation development is an integral part of the development plan.

(12) Soil salinity is generally not a problem in the basin. Salt-water intrusion of fresh-water aquifers is not now a major problem and potential future problems can be obviated by judicious withdrawals, by shifts to alternative sources, or by a combination of these measures. Sedimentation problems are generally not serious, but wind and water erosion are critical in some local areas. Satisfactory sediment control

can be achieved largely through conservation practices.

(13) Waste water from some sources is adequately treated, but much raw or inadequately treated sewage and industrial waste is still discharged directly into streams and lakes. As the population grows and industry expands, the pollution problems will intensify unless adequate waste treatment is provided and waste loadings reduced to assure stream water quality suitable for reuse. The flow in some streams, particularly in the upper part of the basin, gets very low during part of the year and low-flow augmentation is a primary need that would be met by planned facilities.

(14) Beach erosion problems occur principally along the western portion of the coast; beach erosion along the shoreline in the eastern part of the basin is minor because the shallow offshore limestone bank reduces the wave action. Hurricane damage is a problem that will continue to increase as coastal areas are developed. Additional studies are recommended to evaluate adequately the problem and to find a suitable solution.

(15) In the course of implementing the comprehensive plan and keeping it responsive to changing conditions, recognition should be given to the existing water laws in relation to the development contemplated in the plan. As water uses increase, there will be more competition for the available supplies. Optimum water development will sometimes require the storage of surplus flows for use at points considerable distances from the site in which the flows are stored. Some agreement among the interested groups—local, State, and Federal—will be needed to insure that the distribution of stored water will conform to the planned uses.

(16) Land and water resource developments needed to support the area growth can be financed within the limits of available income. The rate of expenditure devoted to such developments in 1960 amounted to about 5 percent of the total personal income. This rate as compared to increased personal income will need to be continued to accomplish the developments prior to 1975. The developments needed during the 1975-2000 period can be accomplished by a slightly diminished annual rate of expenditure in relation to the greatly increased personal income projected for this same period. Some outside assistance in financing may be required, however, due to large initial investments for a few of the projects.

(17) Much of the plan is based on reconnaissance-type information. However, based on available data all the projects and programs included in the Ochlockonee basin comprehensive plan appear to be economically feasible. Unless steps are taken in the near future to provide additional data on the land and water resources in the basin, lack of topographic, geologic, economic, and other basic information will be a handicap to more detailed resource-use planning.

(18) A few needs, principally local flood control problems and abatement of short isolated stretches of polluted streams in sparsely populated areas, cannot be completely satisfied unless economic concepts are ignored.

(19) Resource developments needed to support the basin economy at satisfactory levels are well within the limits of the physical, economic, and institutional abilities of the basin and its people. The projects and programs described in Part Four provide a basic, comprehensive, and integrated plan of development of the land and water resources of the basin. Their development, with adjustments and revisions growing out of more detailed studies, should create an environment that will attract new enterprises to help broaden the economic activities, help maintain this area as a pleasant place to live, and assist greatly in obtaining optimum public benefits from use of the basin resources.

PART SIX – LOCAL, STATE, AND FEDERAL PARTICIPATION AND ASSISTANCE

Acknowledgments

The U. S. Study Commission, Southeast River Basins, gratefully acknowledges the assistance and cooperation of the following:

Alabama

Department of Agriculture; Auburn University; Department of Conservation; State Docks Department; Extension Service; Division of Forestry; Geological Survey; Department of Public Health; Highway Department; State Planning and Industrial Development Board; Department of Labor; Pilotage Commission; Public Service Commission; River Development Board; Soil Conservation Committee; Soil Conservation Districts; and Water Improvement Commission.

Florida

Department of Agriculture; Board of Conservation; Development Commission; Extension Service; Florida State University; University of Florida; Forest Service; Game and Fresh Water Fish Commission; State Board of Health; Industrial Commission; Inland Navigation District; Board of State Parks and Historical Monuments; Railroad and Public Utilities Commission; Road Department; Soil Conservation Board; Soil Conservation Districts; and Suwannee River Water Conservation Authority.

Georgia

Department of Agriculture; Bainbridge Port Authority; Brunswick Port Authority; Extension Service; Forestry Commission; Game and Fish Commission; University of Georgia; Georgia Institute of Technology; Georgia State College; Georgia Southern College; Department of Public Health; Highway Department; Department of Industry and Trade; Jekyll Island State Park Authority; Department of Labor; Department of Mines, Mining, and Geology; Department of State Parks; Georgia Ports Authority; Public Service Commission; Savannah District Authority; Soil and Water Conservation Committee; Soil and Water Conservation Districts; Tidewater Commission; Waterways Commission; Water Quality Council; and Water Resources Commission.

North Carolina

Extension Service; State Board of Conservation and Development; Highway Department; North Carolina State College; Western North Carolina Regional Planning Commission; Soil Conservation Committee; Department of Water Resources; Soil Conservation Districts; and Wildlife Resources Commission.

South Carolina

Department of Agriculture; Clemson College; Development Board; Extension Service; Forestry Commission; State Board of Health; Department of Labor; Congaree Navigational Study Committee; Parks Commission; Ports Authority; Public Service Authority; Public Service Commission; Soil Conservation Committee; Committee for Water Development; Soil Conservation Districts; Water Pollution Control Authority; and Wildlife Resources Department.

General

Altamaha Development Association; Middle Chattahoochee Development Association; Upper Chattahoochee Development Association; Choctawhatchee-Pea Development Association; Council of State Governments; Southern Regional Education Board; Southeastern Power Committee of Electric Membership Cooperatives of Nine Southeastern States; and Three Rivers Development Association.

Federal

U. S. Department of Agriculture—Agricultural Marketing Service, Agricultural Research Service, Agricultural Stabilization and Conservation Service, Economic Research Service, Farmers Home Administration, Forest Service, and Soil Conservation Service; U. S. Department of the Army—Beach Erosion Board, Board of Engineers for Rivers and Harbors, Corps of Engineers, and Military Posts; Atomic Energy Commission;

Atlanta Federal Reserve Bank; U. S. Civil Service Commission; U. S. Department of Commerce – Area Redevelopment Administration, Business and Defense Services Administration, Bureau of the Census, Office of Busines Economics, Bureau of Public Roads, Small Business Administration, and Weather Bureau; Federal Power Commission; General Services Administration; U. S. Department of Health, Education, and Welfare—Public Health Service; Housing and Home Finance Agency; U. S. Department of the Interior—Bureau of Commercial Fisheries, Geological Survey, Bureau of Mines, National Park Service, Bureau of Reclamation, Bureau of Outdoor Recreation, Southeastern Power Administration, and Bureau of Sport Fisheries and Wildlife; U. S. Department of Labor—Bureau of Labor Statistics; U. S. Department of the Navy—Sixth Marine Corps Reserve and Recruitment District; Executive Office of the President—Bureau of the Budget, and Public Works Planning; Outdoor Recreation Resources Review Commission; Advisory Commission on Intergovernmental Relations; Select Committee on National Water Resources, U. S. Senate, 86th Congress; Smithsonian Institution; U. S. Study Commission—Texas; and Tennessee Valley Authority.

In addition, the Commission gratefully acknowledges assistance received from numerous county and municipal governments, planning commissions, development commissions, chambers of commerce, corporations, trade associations, interested individuals, press, radio, television, and professional societies.

Public Hearings and Presentations

A series of public hearings were held early in the investigation to secure the views and desires of various interests, organizations, and individuals. These hearings were held at Tallahassee, Florida, on November 16, 1959; at Dothan, Alabama, on November 17, 1959; at Macon, Georgia, on November 18, 1959; and at Anderson, South Carolina, on November 19, 1959.

During the latter stage of the studies, a series of public presentations were held to acquaint the public with the proposed plan of the Commission for development of the land and water resources of the Southeast River Basins; to inform Federal, State, local, and private interests of their responsibility in implementing the developments proposed; and to solicit views and opinions on proposals under active consideration. These presentations were held as follows:

Place	Date
Statesboro, Georgia	March 20, 1962
Waycross, Georgia	March 23, 1962
Tallahassee, Florida	May 15, 1962
White Springs, Florida	May 17, 1962
Valdosta, Georgia	May 18, 1962
Geneva, Alabama	June 19, 1962
Pensacola, Florida	June 20, 1962
Savannah, Georgia	July 16, 1962
Clemson, South Carolina	July 17, 1962
Atlanta, Georgia	August 13, 1962
Columbus, Georgia	August 14, 1962
Albany, Georgia	August 14, 1962
Baxley, Georgia	August 15, 1962
Macon, Georgia	August 16, 1962
Athens, Georgia	August 17, 1962

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1.29	Florida State News Bureau
1.32	Florida Forest Service
1.33	Florida State News Bureau
1.35	Florida State News Bureau
2.7	U. S. Soil Conservation Service
2.9	U. S. Soil Conservation Service
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2.30	U. S. Bureau of Sport Fisheries and Wildlife
4.2	U. S. Soil Conservation Service
4.3	U. S. Soil Conservation Service
4.9	National Park Service
4.18	U. S. Bureau of Commercial Fisheries
All others	U. S. Study Commission Staff