

A SUMMARIZATION OF THE PLAN FOR DEVELOPMENT OF
THE LAND AND WATER RESOURCES OF THE ALTAMAHA RIVER BASIN
(Based mainly on Appendix 3, Report of the United States
Study Commission, Southeast River Basins)

Prepared for
The Altamaha Area Planning and Development Commission

by
James R. Wyatt

Industrial Development Division
Engineering Experiment Station
GEORGIA INSTITUTE OF TECHNOLOGY
June 1964

INDEX TO ALTAMAHA BASIN PLAN FEATURES

- | | |
|--|---|
| 1 Curry Creek Reservoir | 32 Bibb County Recreation Area |
| 2 Fort Yargo State Park Recreation Area | 33 Ocmulgee National Monument Historic Area |
| 3 DeKalb County Recreation Area | 34 Browns Mountain Historic Area |
| 4 Stone Mountain Memorial Recreation Area | 35 Twigg County Recreation Area |
| 5 New Bethel Reservoir | 36 Buffalo Creek-Oconee River Fish and Wildlife Management Area |
| 6 Big Flat Creek Reservoir | 37 Washington County Recreation area |
| 7 Walton County Recreation Area | 38 Wilkinson County Recreation Area |
| 8 High Shoals Recreation Area | 39 Peach County Recreation Area |
| 9 Lake Spivey Recreation Area | 40 Houston County Recreation Area |
| 10 Peachstone Reservoir | 41 Big Indian Creek Wildlife Management Area |
| 11 Porterdales Recreation Area | 42 Dry Creek Wildlife Management Area |
| 12 Walton County State Fish Hatchery | 43 Laurens County Recreation Area |
| 13 Hard Labor Creek State Park Recreation Area | 44 Yam Grande State Park Recreation Area |
| 14 Barrett Recreation Area | 45 Cedar Creek Wildlife Management Area |
| 15 Oconee National Forest Recreation Areas | 46 Abbeville Reservoir |
| 16 Greene County Wildlife Management Area | 47 Little Ocmulgee State Park |
| 17 Henry County Recreation Area | 48 Coopers Ferry Reservoir |
| 18 Newton County Recreation Area | 49 Bells Ferry Wildlife Management Area |
| 19 High Falls Recreation Area | 50 Bowen Mill State Fish Hatchery |
| 20 Indian Springs State Park | 51 Reidsville State Park Recreation Area |
| 21 Jackson Lake Recreation Area | 52 Goose Creek Project |
| 22 Laurens Shoals Reservoir | 53 Fort Stewart Wildlife Area |
| 23 Shoulderbones Historic Area | 54 Navigation Project, Altamaha Sound to Doctortown |
| 24 Piedmont Wildlife Management Area | 55 Townsend Drainage and Flood Control Project |
| 25 Piedmont National Wildlife Refuge | 56 Fort King George Historic Area |
| 26 Piedmont National Wildlife Recreation Area | 57 Altamaha Wildlife Management Area |
| 27 Oconee National Forest Wildlife Area | 58 Wolf Island National Wildlife Refuge |
| 28 Lake Sinclair Recreation Area | 59 Wolf Island National Wildlife Refuge Recreation Area |
| 29 Hitchiti Experimental Forest Station | |
| 30 Shinholser Historic Area | |
| 31 Rum Creek Wildlife Management Area | |

ALTAMAHA BASIN PLAN

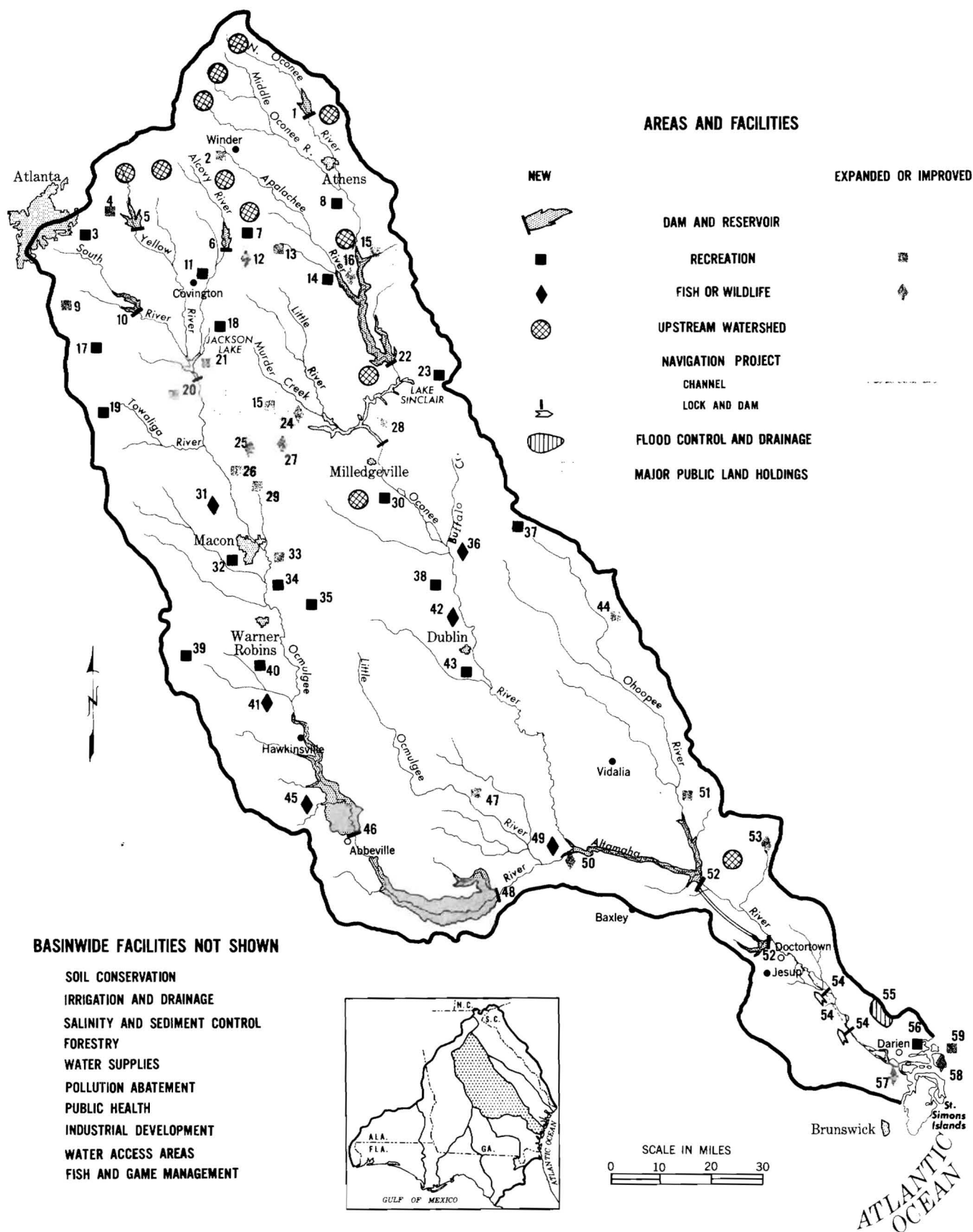


Table of Contents

	<u>Page</u>
Introduction, Summary, and Acknowledgments	i
BACKGROUND OF THE AREA	1
Basin Area	1
Basin Resources	1
People in the Basin	3
Basin Economy	4
NEEDS AND OPPORTUNITIES	7
Flood Control	7
Water Supplies	8
Navigation	9
Reclamation, Irrigation, and Drainage	9
Hydroelectric Power and Industrial Development	10
Soil Conservation and Utilization	10
Forest Conservation and Utilization	11
Fish and Wildlife	12
Recreation	13
Salinity and Sediment Control	14
Pollution Abatement and Public Health	14
COMPREHENSIVE BASIN PLAN	17
Flood Control and Prevention	17
Water Supplies	17
Navigation	18
Reclamation, Irrigation, and Drainage	18
Hydroelectric Power and Industrial Development	18
Soil Conservation and Utilization	18
Forest Conservation and Utilization	18
Fish and Wildlife	18
Recreation	19
Salinity and Sediment Control	19
Pollution Abatement and Public Health	19
Other Beneficial Purposes	19
PROJECTS AND PROGRAMS	21
Early Action Summary	21
Abbeville Project	22
Big Flat Creek Project	22
Curry Creek Project	22
Coopers Ferry Project	22
Goose Creek Project	23
Laurens Shoals Project	23
New Bethel Project	24
Peachstone Project	24
Townsend Project	24
Buffalo Creek-Oconee River Fish and Wildlife Project	25
Water Access Areas	25
Upstream Watershed Projects	25

	<u>Page</u>
PROJECTS AND PROGRAMS (continued)	
Water Supplies	25
Navigation Project	26
Hydroelectric Power and Industrial Development	26
Reclamation, Irrigation, and Drainage	26
Forest Conservation and Utilization	26
Fish and Wildlife	27
Recreation	27
Pollution Abatement and Public Health	28
IMPACTS OF THE PLAN	29
APPENDIX: EARLY ACTION PROJECTS	33
Goose Creek	34
Laurens Shoals	38
Peachstone	42
Buffalo Creek-Oconee River Fish and Wildlife	45

Introduction, Summary, and Acknowledgments

In response to the provisions of Public Law 85-850 (72 Stat. 1090) dated August 28, 1958, a comprehensive plan for development of the land and water resources of the Southeast River Basins was presented to the President of the United States in September 1963. Appendix 3 to the report, in six interrelated parts, summarized data relevant to the development of the Altamaha River basin.

Under contract to the Altamaha Area Planning and Development Commission, the Industrial Development Division of Georgia Tech has prepared this condensation of Appendix 3 in order to provide the Commission with a convenient reference piece for use in initiating particular projects recommended for the Altamaha basin. A supplement to this condensation which highlights the Altamaha Commission area has also been prepared for utilization in the development of projects located within that area.

This condensation presents general economic background data on the Altamaha basin, showing it to contain all or a part of the total land area of some 60 of the 159 Georgia counties and slightly more than 30% of the 1960 Georgia population. Corn and cotton represent the major agricultural land use in the basin, and 69% of the area is forested.

Mineral production in the basin was valued at \$48.7 million in 1959 and included a majority of the nation's kaolin production.

The 65 billion gallons of water annually withdrawn from basin wells and streams represent about 2% of the average sustained supply available. Basin industries use about 94 million gallons per day.

The economic pattern of the basin ranges from the heavily populated and industrialized Atlanta area to the sparsely populated mid-basin and coastal areas. In 1960, some 367,000 people were employed in the basin, about 23% in manufacturing. Slightly more than 40% of all manufacturing workers were engaged in textile and apparel operations, about 12% in metals, and about 12% in food processing.

Although total personal income increased by 50% from 1950 to 1960, per capita income in the basin was only about two-thirds the national average in 1960.

The realization of the comprehensive plan for the development of the land and water resources of the Altamaha River basin will bring about a rise in the area economy. Further industrialization will require the utilization of many of the recommended projects, and if the area is to attain a position of economic equality with the more fully developed regions of the United States, immediate action is needed to allow for meeting the year 2000 deadline for completion of the total plan.

Some 59 specific proposals are included in the Altamaha basin plan. These features include nine reservoirs, navigation to Doctortown, and a number of fish and wildlife developments. In addition, several upstream watershed improvements are proposed, mostly for the upper basin. A major flood control and drainage project is proposed for the Townsend area in the lower basin.

The plan is comprehensive and coordinated to serve a wide range of purposes for land and water resources development to meet the needs of the area to the year 2000. It is a guide for development to more efficiently satisfy human needs, both local and area-wide.

This plan, by purpose, includes a careful consideration of flood control, water supplies, irrigation and drainage, navigation, hydroelectric power, soil conservation, fish and wildlife, salinity and sediment control, recreation, pollution abatement and public health, and industrial development. The report emphasizes the considerable need for expansion in manufacturing activities to meet the need for increased employment opportunities which will result from a continued decline in agricultural employment and a continued rise in population.

A comparatively large portion of the multibillion-dollar plan is phased for early-action development, which is designated as the first 15 years of the 40-year implementation period. Aggressive local initiating action is necessary to the success of the plan, more particularly its early phases.

The author is appreciative of the capable and most willing assistance provided by the members of the Resources Advisory Board to the United States Study Commission, Southeast River Basins.

BACKGROUND OF THE AREA

Basin Area

The Altamaha basin in south central Georgia contains 14,464 square miles, with about 39% of the area being in the Piedmont physiographic province, 52% in the upper Coastal Plain, and 9% in the lower Coastal Plain. Approximately 10% of the basin is encompassed by the five-county Altamaha Area Planning and Development Commission, whose membership consists of Appling, Jeff Davis, Tattnall, Toombs, and Wayne counties.

The Altamaha River is formed by the confluence of the Ocmulgee and Oconee rivers 137 miles above its mouth on the Atlantic Ocean near Darien, Georgia. The Ocmulgee headwaters are found near Atlanta at about 1,000 feet above sea level. Its flow is southeasterly through Macon. The Oconee heads a few miles northwest of Athens and passes Milledgeville and Dublin in its southeasterly flow.

The Piedmont province is underlain by deeply weathered igneous and metamorphic bedrock. A transition zone, known as the Fall Line, is about 20 miles wide and contains thin soil layers of Coastal Plain material on steep valleys and slopes. The upper Coastal Plain is an area of gently rolling topography with friable soils that contribute to its being the most intensively cultivated area in Georgia. The lower Coastal Plain possesses both wet and dry soils, and large flat or depressed areas have poor runoff and internal drainage.

The Piedmont province and the upper Coastal Plain are adaptable to the development of water storage facilities.

The basin climate is mild. Average annual temperature is 66° F. Average yearly rainfall ranges from 44 inches in the central part to 52 inches in the north and along the coast. Livestock are able to graze nine to twelve months of the year and severe droughts are uncommon.

Basin Resources

About 69% of the 9,265,000 acres of land in the basin are forested. Of the 1,506,500 acres in the five-county Altamaha Commission area, about 76% are in forest. Croplands occupy 1,543,000 acres in the basin, with corn and cotton being the major agricultural land uses.

The Piedmont province, long important in poultry production, is well suited to the raising of livestock. Although general farming is declining, the upper and lower Coastal Plains are suited to truck crops, fruits, and nuts, and a potential exists for contract growing and for expanded freezing and canning operations.

About 617,000 acres of basin land are classed as special use or other land. Included is land for urban use, transportation, industry, and highway rights-of-way. There are four commercial airports in the basin.

Existing public recreation areas include two national forests, five state parks, Stone Mountain, a national monument, and two national wildlife refuges, all totaling some 143,000 acres.

The most important minerals found in the Altamaha basin are granite, ceramic and brick clays, fuller's earth, kaolin, sand and gravel, and bauxite. In 1959 value of minerals mined in the basin was \$48.7 million, with Twiggs County and Wilkinson County ranked first and fourth, respectively, in value of mineral production in the state.

Seventy-five per cent of the nation's kaolin production is in Georgia. With most of this production occurring in the Altamaha basin, a greater utilization of the mineral through research and product development could be of significance in the growth of the area economy. Other minerals are present in the basin.

A combination of climate and physical features usually provides an ample supply of surface and ground water throughout the basin. The Piedmont province, with its dense underlying rock, contributes about 50% more runoff than the Coastal Plain. Runoff averages 13 inches annually (about 10 million acre-feet), nearly twice the United States average and slightly less than that of the Southeast.

Total streamflow varies greatly from year to year. The highest measured flow of the Oconee River at Dublin, for example, occurred in 1929 with a 32-inch average depth and the lowest in 1954 with a 6-inch average depth.

There are three ground-water zones in the basin -- the crystalline rock of the Piedmont, the 40-mile-wide zone of Tuscaloosa and other Cretaceous formations immediately below the Fall Line, and the highly permeable beds of stratified rock under the rest of the basin. Typical Piedmont wells yield 5 to 25

gallons per minute. There are many artesian springs in the Cretaceous zone along the alluvial plains, and yields of 1,000 to 2,000 gallons per minute are frequent. Depths range to 1,500 feet and more.

The depth at which water is reached in the zone of the principal artesian aquifer varies from zero to rarely more than 700 feet, and water-bearing formations vary in thickness from a few feet to several hundred feet.

The surface water of the basin is generally of good chemical quality and is extremely soft. Sediment concentrations of 10 to 20 parts per million occur in Coastal Plain streams and up to 10 times these amounts occurs in the Piedmont. Ninety per cent of stream-carried sediment is moved by flows occurring 10% of the time. Tidal effects extend about 30 miles upstream.

The 65 billion gallons of water annually withdrawn from basin wells and streams represent about 2% of the average sustained supply available.

Rural users utilize some 17 million gallons of water per day (about 50 gallons per person). Reports show about 8% of rural shallow wells experience shortages from early July through September, and one-half of rural supplies do not meet acceptable sanitary standards. Withdrawal for irrigation amounts to 16,000 acre-feet, and livestock require 12 million gallons per day.

Municipal use, including 15 million gallons per day for industrial purposes, is 57 million gallons, or roughly 28% of the water used. Municipal use in the basin averages 107 gallons per day for each person, as compared with a Southeast figure of 116 gallons per day and 147 gallons for the nation. Basin industries use about 94 million gallons per day, including the 15 million furnished by municipalities.

People in the Basin

The earliest occupants of the basin were Folsom-age hunters of about 5000 B. C. Indian mound builders were in existence in about 1000 A. D. and were succeeded by the Creeks. Hernando de Soto explored the area between 1530 and 1542, and in 1735 General Oglethorpe settled New Inverness (Darien). One of the earliest inland settlements in the basin was Milledgeville in 1803, declared the seat of government in 1804. Macon, another early settlement, attained a population of 3,000 by 1834 and 72,765 in 1960.

Atlanta, a mere village in 1836, contained a population of 11,500 by 1859. In 1960, the population was 487,455.

Civil War devastation made the restoration of the old order of things economically impossible. A post-World War I boll weevil infestation next menaced the area, cutting cotton production in half and increasing the rate of migration of Negroes out of the area.

Old coastal plantations now raise cattle and have proven highly productive for truck crops; however, flooding limits this utilization at present. A further shift in agricultural emphasis has seen the lower Coastal Plain become an important pulpwood producing area. The upper Coastal Plain is sustained principally by cotton, tobacco, peanuts, and livestock, with many by-products of these resources being processed in the basin.

The rural farm population is expected to continue to decline, but substantial growth is expected in rural nonfarm areas, and the trend in out-migration from the Southeast River Basins is expected to reverse by 1980. Total Altamaha basin population is projected to increase from 1,040,000 in 1960 to 1,259,000 in 1975, and to 1,785,000 by 2000. The Atlanta population is expected to almost triple by 2000, and similar growth is expected in other metropolitan areas, particularly Macon, Warner Robins, Jesup, and Athens.

The basin population is about three-fourths white, and the percentage of nonwhite is more than twice the national average. Median age of the basin population is over 25, less than the national average of 30.

Population migration has left a large proportion of the rural population in the under-25 and over-65 age groups. Total basin population is 58% urban.

The present concentrated effort to prepare the young people for current and future needs by the establishment of technical schools and improvement of educational opportunities will serve to reduce out-migration as employment opportunities are provided.

Basin Economy

The economic pattern of the basin ranges from the heavily populated and industrialized Atlanta area to the sparsely populated mid-basin and coastal areas where there is little industry. In 1960, about 367,000 people were employed in the basin. Some 12% were employed in agriculture and about 23% in

manufacturing. Only 3% were employed in forest and forest products, although the basin was 69% in forest cover.

Four basin counties -- DeKalb, Fulton, Bibb, and Hall -- are among the top 10 Georgia counties as measured by manufacturing employment. At the same time, 26 counties lying wholly or partially in the basin each had less than 500 people employed in manufacturing.

Of the 84,000 people employed in the basin's manufacturing activities in 1960, about 20,000 were in textiles, 15,000 in apparel, 10,000 in metals, and 10,000 in foods and food processing. Textile activities were most heavily concentrated in Bibb, DeKalb, Fulton, Hall, Newton, Spalding, and Upson counties. Apparel manufacturing was most heavily concentrated in the Atlanta Metropolitan Area and in Barrow, Bibb, Bleckley, Clarke, Emanuel, Jackson, Jeff Davis, Spalding, Toombs, and Walton counties. Food processing centered in the areas of Athens, Atlanta, Brunswick, Gainesville, and Macon.

The three cities of Athens, Macon, and that portion of Atlanta in the basin account for about 36% of the total number of manufacturing plants. About 70% of pulp and paper products industries are located in Atlanta and Macon, and over half the metals and transportation groups are in the three largest cities. The textile, apparel, lumber and wood products, and stone, clay, and glass industries are, in general, located in smaller communities. Many small communities depend on one or two industrial types for job opportunities.

Almost two-thirds of all employment in the basin was in nonagricultural and nonmanufacturing activities as shown below.

<u>Employment Category</u>	<u>Approximate No. Employed</u>
Trade	70,000
Services	50,000
Government	46,000
Construction	15,000
Mining	3,000
Self-employed and other	50,000

Employment is expected to almost double by the year 2000, with manufacturing employment increasing by some 109,000 to account for 28% of total employment.

Total personal income from 1950 to 1960 increased in the basin by 50%, or almost three and one-half times the level of 1939. Per capita income was \$1,550 in 1960, or about two-thirds the national average. Personal income is projected to increase from \$1,613 million in 1960 to \$6,490 million in 2000. Per capita income is expected to increase from \$1,550 to over \$3,600 during the same period.

Estimated 1959 timber production from over six million acres of forest land had a stumpage value of about \$16.6 million.

Almost five million acres of the basin were in farmland, over half of which were farm woodland. More than a million acres of cropland were harvested in 1959.

Employment in agriculture is expected to continue to decline, although agricultural production will increase. Agricultural employment is expected to decline from the 1960 total of about 44,000 to about 33,000 in 1975 and to less than 25,000 by 2000. This continued agricultural employment decline, along with population growth, will rapidly increase the demand for nonagricultural employment opportunities. Expansion in manufacturing activities is required to meet this important need.

The metal industries employed 10,000 people in 1960, but this category is projected to increase to 42,000 by 2000. Stone, clay, and glass manufacturing should double employment by 1975, then double again by 2000 to more than 16,000 persons. Apparel manufacturing is estimated to rise from 15,000 employed in 1960 to 41,000 by 2000.

Employment in the chemical industries and in printing and publishing is projected to increase, but textiles employment is expected to decline by 2000.

NEEDS AND OPPORTUNITIES

The people of any area are the most important factors in resource use and development, and, in the final analysis, the nature of the economic and social environment is largely dependent upon the desires and actions of the people themselves.

Along with the many advantages of the basin are some obstacles which, if not adequately met, will impede economic development and progress. In the competitive race for economic development, the basin population must work hard to sustain its position and must exert increasing pressure to achieve the desired goals. The people must face the competitive economic battle with some social and institutional handicaps.

Increased and improved educational facilities are needed. A sufficient labor supply must be adequately educated and made adaptable to modern technological skills.

The nature and stability of the local governmental structures and the nature and equality of the tax structures are important factors in economic development. Continued progress toward more efficient and better coordinated local government appears to be essential to the future economic well-being of the people.

Needs and opportunities specifically concerned with water and related matters are discussed below.

Flood Control

Flood control and prevention measures can greatly reduce future economic losses resulting from flood damage to structural improvements, primarily in the Piedmont province, and from low agricultural production in and scant utilization of lands in flood plains. Annual losses in the Piedmont province, currently estimated at \$1,194,000, are increasing because of encroachment of tributary stream flood plains by business and residential construction.

To meet the needs of flood control, multiple-purpose flood prevention and drainage facilities could be installed on upstream watershed areas, which would also permit needed land-use adjustments. Although no reservoir-type construction appears justified on the main stem of the Oconee, Ocmulgee, and Altamaha

rivers, flood control features might be incorporated in some multiple-purpose projects.

Local interests and State agencies and officials should jointly ascertain problems and needs, especially in the Macon and Milledgeville areas. It is more practical to zone flood plains before improvements occur, and ideal conditions exist for flood plain zoning in much of the Altamaha basin.

Water Supplies

Fresh surface and ground waters are abundant in the Altamaha basin. Rural areas are served by some 76,000 domestic supplies; however, about 60% of the wells in use do not meet health standards. By 1975 there should be 5,000 new drilled wells, 18,000 existing wells should be equipped with pressure systems, and 30,000 wells should be provided with covers or seals.

There are 103 municipal systems, serving about 392,000 persons, that obtain their water supplies from within the basin. Five municipal systems that obtain water from sources outside the basin serve 308,000 persons who live within the basin.

Ground-water sources supply 73 municipal systems, surface water is used by 26 municipalities supplying over 65% of the total water requirement of the basin, and four systems use both surface and ground water. About 27% of the output of municipal systems is supplied to industry.

Some industries have developed private water sources, and consumption from such sources totaled approximately 78.3 million gallons a day in 1960. A survey showed 22 firms utilized well water, six obtained supplies from surface sources, and eight utilized both wells and surface sources. Nearly all of the withdrawal is later discharged into streams.

Future municipal water requirements are based on population projections and an estimated per capita demand of 200 gallons per day by 2000. It is estimated that 1,646,000 basin residents will be served by municipal systems in the year 2000. Surface water is expected to be the major source of supply in the Piedmont province, and municipalities must plan and provide for their own needs. There apparently are no unusual supply, development, or treatment problems.

Industrial water demand is expected to rise to 162.4 million gallons a day by 2000, exclusive of that supplied by municipalities. Expansion of present facilities to provide adequate water supplies for normal growth of existing industries and the development of supplies for new industries will include new wells, surface water intakes, and treatment facilities for conditioning process water. Available sources can meet all demands if properly developed, and no problems are expected from the viewpoint of either quantity or quality.

Navigation

Navigation of the Altamaha and Ocmulgee rivers to Macon and the Altamaha and Oconee rivers to Milledgeville was discontinued during the mid-1930's. Commercial river traffic was important to the early development of the area, but shoals and snags, low water, and the deterioration or disappearance of docking facilities now make these rivers hazardous to craft. An analysis of potential river traffic indicates a present potential of about 407,000 tons. The projected potential for the year 2000 is 1,701,000 tons.

Improvement of these rivers for navigation does not appear warranted at this time. However, consideration should be given to the inclusion of locks in any dams constructed below Macon and Dublin in the future.

A navigation project below Doctortown would open that area to additional industrial development and provide a first step in a more complete development of the river for navigation.

Reclamation, Irrigation, and Drainage

The United States Study Commission report uses the words "reclamation" and "drainage" synonymously. Some 40,000 acres of land subject to water problems are adequately drained, although a total of 2.4 million acres in the basin have a problem of excess water. Maximum production from all potential pastureland and cropland will not be needed by 2000, however. Alternate land uses should be carefully considered, however, since changes could occur to make the production of hardwoods and use of land as wildlife habitat, for example, more profitable. Various uses will require greater or less acreage of drained land. Drainage works required on farms are generally considered a non-Federal responsibility.

Development of the full irrigation potential of the basin will depend on future national, regional, and local needs, changing economic conditions, and the determination or desirability of potential beneficiaries. Continuing technical, loan, and cost-sharing assistance is available through the U. S. Department of Agriculture. Future use of irrigation is not expected to become an extensive production practice.

Hydroelectric Power and Industrial Development

To meet the electric energy requirements of expanding basin industry and the resultant total economic growth to the year 2000, additional generating capacity will be needed in an amount sufficient to satisfy an estimated increase in demand of 3,686,000 kilowatts. Several potential hydroelectric sites and several plans for diverting water from one watershed to another have been investigated. Many sites have been eliminated. Five sites, with power in conjunction with other potentials, warranted further study. These sites are at Laurens Shoals on the Oconee River, Peachstone Shoals on the South River, Abbeville and Coopers Ferry on the Ocmulgee River, and a project on the Altamaha River at the Ochopee River junction. These sites would have a potential for an installed capacity of 388,000 kilowatts.

The Georgia Power Company has commenced construction on the first unit of a steam-electric plant on Lake Sinclair which will have an ultimate capacity in excess of 1.5 million kilowatts.

Soil Conservation and Utilization

Considerable progress has been made in conservation of cropland and pastureland during the last two decades. Conversion of erodible cropland to grassland and woodland has been rapid. However, the use of land treatment practices has not been rapid enough to overcome past damages and to protect the present basic land resource. As of January 1958, some 1,241,000 acres of cropland and about 533,700 acres of pastureland had dominant erosion problems.

Several major State and Federal soil and water conservation and utilization programs are in operation in the basin, and 15 soil and water conservation districts coordinate State and Federal aid programs that are available to farmers. As of January 1, 1960, 21 applications for Federal assistance had been filed for organized watershed programs covering more than 669,000 acres.

To meet projected basin food and fiber needs by the year 2000, over-all agricultural production must double, and there will be need for resource development and more efficient land use.

Land treatment measures and stabilization of critical areas undergoing agricultural and conservation programs must be effected at an accelerated pace, and high-level management will be a necessity. The following measures are essential: (1) proper choice and rotation of crops; (2) control of excess water; (3) use of correct amounts of fertilizers and lime; (4) maintenance of organic matter at high levels; (5) improvement of soil nutrients and soil moisture; (6) selection of proper planting times; (7) improved tillage methods; (8) control of weeds, insects, and plant diseases; (9) proper combinations of soil and water conservation; and (10) use of farm ponds.

Additional studies are needed on costs and returns of conservation practices, systems, conversion of land, cost sharing estimates, erosion control and soil management, and selected plant management.

Forest Conservation and Utilization

Wood production and processing are important in the basin economy, and forests occupy 6,347,000 acres of the total 9,265,000 acres of land. A number of active programs for improving forestry practices and yields exist. The State of Georgia is accelerating its program for management assistance, and public and private organizations support research relating to forest problems and needs.

By the year 2000, 386 million cubic feet of growing stock will need to be cut annually to meet processing demands. Gum-naval stores will be the principal replacement for the wood-naval stores industry as economically suitable stumpwood is consumed. Production will have to double to maintain total present output, but enough slash and longleaf pine trees will be available.

Improved practices and coordinated individual and community efforts will be essential to assure adequate forest resources. Forest management and protection programs must be accelerated, including intensified forest fire protection, strengthened insect and disease control, construction of grazing control fences, erosion control work, site preparation for natural regeneration, improved naval stores practices, intensified research, establishment of shelterbelts and drainage features, and better forest credit and insurance programs.

Fish and Wildlife

The primary use for the fish and wildlife resources of the Altamaha basin is fishing and hunting for sport, although commercial fishing along the coast continues to provide a livelihood for many people. In 1960, hunting and fishing afforded approximately two million user-days of outdoor activity.

Some 5.3 million acres in the basin are suitable for big game, and white-tailed deer and wild turkeys can be found in 47% of the total habitat. The small game habitat totals about 9.2 million acres and accommodates mourning doves, bobwhite quail, rabbits, and squirrel. Principal game bird is the rail.

The more than 163,000 acres of publicly managed wildlife habitat in the basin include Oconee National Forest and the Piedmont National Wildlife Refuge. The waterfowl habitat consists of about 465,000 acres.

Principal streams supporting fresh-water fish life are the Altamaha, Ocmulgee, Oconee, and Ochopee rivers and their tributaries. Six dams on the Ocmulgee and Oconee rivers impound waters with a total surface area of about 21,000 acres. Coastal Plain sloughs, swamps, and bottom-land lakes; over 31,000 acres of small impoundments; a 17.5-mile-long coastline; and a system of tidal rivers, creeks, bayous, mud flats, scattered oyster reefs, and the open waters of Altamaha Sound combine to furnish a range of environments in which a wide variety of fresh- and salt-water fish life can be supported. The two State of Georgia fish hatcheries are located in the Altamaha basin, one each in Ben Hill and Walton counties.

The average annual commercial fish catch from 1955 to 1959 was 3.1 million pounds, worth about \$390,000 to the fishermen. In 1959, four firms in Darien handled or processed part of the commercial catch, and some 17 establishments in Brunswick processed about 30% of the catch.

To meet further demands for hunting and fishing opportunities, the following will be needed: (1) 90,000 deer and other big game, (2) improvements to wildlife habitat, (3) development of small game resources by small landowners, (4) increased waterfowl food, (5) establishment of regulated shooting preserves, (6) additional farm ponds, (7) 76,000 acres of large water impoundments, (8) pollution abatement, (9) bridges, walkways, jetties, and breakwaters at bays and inlets, (10) artificial fishing reefs, and (11) preservation and development of certain bottom lands.

Commercial fishing can be expanded through the re-establishment of old oyster bottoms, discovery of new sources of shrimp supply, greater utilization of crabs, expansion of finfish catch, and seafood culture in the shallow in-shore waters.

Primary administrative responsibility for fish and wildlife resources rests with the Georgia Game and Fish Commission. Federal agencies cooperate.

Recreation

In 1959, visitation at public recreation areas within the basin totaled about 1-1/3 million user-days. A major segment of accountable outdoor recreation was credited to seven state parks, a national monument, a national forest, three lakes, two national wildlife refuge areas, and to Stone Mountain near Atlanta. There will be a need for facilities for 36 million user-days by 2000, with peak demand occurring in the summer months. Much of the demand will be for water-oriented recreational opportunities.

This projected recreation demand can be satisfied in part with expansions to existing facilities and with the development of resources not presently utilized. Stone Mountain, Lake Sinclair, and Jackson Lake can serve the greatest number of visitors. Facilities of existing recreation areas can be increased to accommodate 18 million user-days by 2000. New areas will have to be developed to meet the additional needs. High-density use areas can be established close to major population centers to satisfy the expected great need for outdoor recreation facilities to serve the residents of Atlanta and Macon, for example. Smaller population centers are expected to require centers for recreation use close to these cities.

General outdoor recreation areas, such as state parks and lake sites, could be located throughout the basin for the satisfaction of both urban and nonurban residents and tourists. Natural environment areas containing extensive water surface and woodlands would provide opportunities for recreationists who seek dispersed activities, such as hiking, camping, and boating.

The development of historic or archeological points of interest, such as Fort King George at Darien, Shinholser on Indian Island near Milledgeville, Shoulderbone near Sparta, and Browns Mountain near Macon, would satisfy still another recreational interest.

Salinity and Sediment Control

Problems of salinity and sedimentation are localized and are not significant in the Altamaha basin at present. There are 53,700 acres of saline soils in the basin, principally salt-water marsh.

Except for creeks in the Fall Line area that carry heavy sediment concentrations from clay processing operations, most of the basin streams have concentrations ranging up to only 80 parts per million, with an average of 40 parts per million. Altamaha River samples have indicated 16-part concentrations.

Conversion of croplands to forest and the application of conservation measures have caused a considerable decline in sediment damage in recent years. There are no existing programs specifically designed for sediment or salinity control.

The need for agricultural land will not require reclaiming any major portion of the saline soils in the Altamaha basin until well after the year 2000. Erosion-damage reduction for critical sediment-producing areas is a problem on about two million acres of land, mostly in the upland where erosion control will correct a large part of the problem. Roadside erosion is critical in localized areas.

Under existing, authorized, or proposed programs, most sediment control will occur as an incidental effect to programs initiated primarily for other purposes. Erosion and sediment control on roadside areas can be installed as parts of over-all watershed treatment programs and as integral parts of highway construction.

Pollution Abatement and Public Health

The abatement of air and water pollution, radiation monitoring, the collection and disposal of community and industrial waste, and insect (or vector) control are important factors in economic development.

The surface waters of the basin are used for final disposal of treated or untreated liquid waste from 60 municipalities, eight institutions, and more than 42 industries. Serious water quality degradation in the headwaters of South River have resulted from waste discharges of the Atlanta Metropolitan Area. Large industrial water users in Macon and Jesup have, in the past, adversely affected stream water quality in both the Ocmulgee and Altamaha rivers.

Periodic fish kills have been reported during periods of low water in the Ocmulgee below Macon, and Georgia Game and Fish Commission surveys have indicated that the water quality of several streams is adversely affected by municipal and industrial waste discharges. A policy of pollution abatement and prevention is needed. All industrial and municipal wastes should be treated, and some industrial wastes will require special handling.

Where streamflows are too small for satisfactory dilution of effluents, additional dilution water or additional treatment should be required.

In 1960, an estimated 537,500 persons were served by 68 municipal and industrial sewerage systems which discharged into the Altamaha basin. There is a need for 44 complete new sewerage systems prior to 1975 and seven additional new systems before the year 2000.

There is a need for a mosquito-control district to control vectors in the coastal area. Suitable control programs should be developed in 18 urban areas which had no vector control programs in 1960. County-wide water management systems and programs of permanent control works are needed, as are county-wide refuse collection and disposal systems. There is an additional need for state-aid programs of mosquito control and sanitation activities, as well as a need to provide sanitary landfills for waste disposal in all communities of over 500 population.

Measurement and identification of sources of air pollution by state-wide surveys are urged. State legislation would permit expansion of existing municipal and industrial air pollution abatement programs.

Waste treatment facilities needed prior to 1975 include eight primary treatment plants, 32 secondary treatment plants, and 24 stabilization ponds. Sixty-seven places should extend existing collection systems or construct new ones. In addition, after 1975 and prior to 2000, other necessary improvements are seven complete sewerage systems, the extension of 64 systems, a primary plant, 18 secondary plants, and eight stabilization ponds for treatment of municipal waste.

Industrial waste treatment should be provided for each of 32 industries having an estimated 1975 waste-discharge population equivalent before treatment of 840,000. In addition, treatment is needed for unknown volumes of organic liquid waste discharged to municipal sewers by 18 industries.

COMPREHENSIVE BASIN PLAN

The comprehensive plan for the Altamaha River basin includes land and water resource developments that contribute to meeting the needs projected to the year 2000. Projects and programs that are necessary to meet the area needs in the immediate future are included in the early action phase. The plan includes continuing programs, such as those for public health and soil conservation and utilization that are carried on from year to year, and individual projects which involve relatively large but short-term construction expenditures that will have benefits accruing over many years.

The plan should be reviewed and updated to maintain harmony with actual growth and to consider unanticipated needs and technological improvements that may develop.

Many of the 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.

Flood Control and Prevention

Upstream watershed projects on 1.1 million acres will include floodwater-retarding structures, channel improvements, land stabilization, and land treatment measures. The Townsend project will provide flood prevention in combination with drainage for 160,000 acres. Eight water storage projects are included in the plan.

Water Supplies

The domestic water supply program includes new drilled wells, sealing and covering of wells, and power pumps and pressure systems. The program will serve about 138,500 people and provide about 13.8 million gallons of water per day. The municipal supply program includes source improvement, treatment, elevated storage, and enlarged distribution systems. Some 1,646,000 people in 91 communities would be served with about 329.2 million gallons per day. The industrial supply program would provide about 162.4 million gallons of water per day to supply needs that can not be met through expansion of municipal distribution systems.

Navigation

Slack-water navigation would be provided by the year 2000 from Altamaha Sound to Doctortown by two low-lift locks and dams and channel improvements.

Reclamation, Irrigation, and Drainage

It is estimated that about 44,200 additional acres of cropland will be irrigated by individual sprinkler systems on individual farms, and 8,700 additional acres of cropland and pastureland will be drained by individual landowners by the year 2000.

Hydroelectric Power and Industrial Development

Hydroelectric power development was found to be feasible in connection with other purposes for five water storage projects. By the year 2000, the basin electric energy requirement is expected to be over 23 billion kilowatt hours, with a demand of some 4.3 million kilowatts. Presently developed hydroelectric power furnishes about 245 million kilowatt hours annually, mostly for peaking. The five proposed projects would have an installed capacity of 388,000 kilowatts and furnish about 670 million kilowatt hours annually.

No attempt has been made to identify or locate specific industrial enterprises that are expected to locate in the basin.

Soil Conservation and Utilization

It is estimated that by the year 2000 (1) 1,216,000 additional acres of cropland, pastureland, and range will be treated; (2) about 20,000 additional farm ponds will be installed; and (3) 202,000 acres of woodland, pasture, and other lands will be converted to cropland and some 272,000 acres of cropland, woodland, and other lands converted to pasture.

Forest Conservation and Utilization

This program will cover 5.7 million acres of woodland by 2000. Provided for would be an annual timber cut of some 386 million cubic feet and production of 470,000 barrels of gum-naval stores.

Fish and Wildlife

This program includes eight multiple-purpose reservoir projects, 66 water-access areas, and single-purpose features for fish and wildlife. It would

provide annually for some 1,365,000 user-days of hunting and about 3,561,000 user-days of sport fishing and would produce about 6.6 million pounds of commercial food fish.

Recreation

Included in this program are eight multiple-purpose reservoirs and 10 water-access areas. Expansion of 14 existing areas and the development of 40 new areas are also planned. New and existing facilities will provide annually about 36 million user-days of recreation.

Salinity and Sediment Control

Neither salinity nor sediment is a major problem in the basin.

Pollution Abatement and Public Health

The program for pollution abatement consists of new and expanded sewerage systems for 83 communities, primary treatment facilities at 10 places, secondary treatment facilities at 42 places, and stabilization ponds for 31 places. It will provide for service to 1,637,000 persons.

The public health program includes drainage and spraying for vector control, sanitary landfills at 100 places, eight incinerators for solid-waste disposal and fly and rodent control, and participation in state-wide programs for air pollution and radiological monitoring.

Other Beneficial Purposes

The plan provides for improvements to the hurricane warning system, studies of beach erosion and control, topographic and geologic mapping, collection of hydrologic data, and establishment of streamflow forecasting.

PROJECTS AND PROGRAMS

Early Action Summary

In order to meet immediate requirements for developing the basin resources and to help stimulate growth in the basin economic structure, certain projects and programs contained in the comprehensive plan should be initiated as quickly as detailed plans can be prepared and necessary financing and other arrangements can be made.

Early action should be initiated on the Goose Creek, Peachstone, and Laurens Shoals projects. Following feasibility studies, land should be acquired at an early date for the New Bethel and Big Flat Creek sites. Forty-two water-access areas should be developed in the early action phase for fish and wildlife and recreation.

Upstream watershed projects should be developed for flood prevention and drainage on some 898,000 acres of land in the early action phase. Water supply facilities should be installed early to catch up with present needs and to keep abreast of increasing future needs.

An estimated 38% of the total investment costs for irrigation and drainage and for soil conservation programs would be required in the early action phase. About 39% of the costs for forest conservation programs would be incurred in the early action phase.

Seventy-one per cent of the investment costs of the total fish and wildlife program would be expended during the early action phase, as would all investment costs for the commercial fisheries program and 58% of all recreation costs.

Immediate action is needed for the adequate handling of liquid wastes. Such a critical need will require 40% of the investment costs for pollution control for municipalities and 67% for industries during the early phase.

The public health programs of vector control, solid-waste collection and disposal, and air pollution and radiation monitoring programs should require about half of the total investment costs of the projects and programs recommended.

Abbeville Project

The project would provide for a dam and reservoir for hydroelectric power, recreation, and fish and wildlife. The dam site is on the Ocmulgee River, about one mile north of Abbeville, and 15 miles southwest of Eastman.

The structure would include a concrete gravity-type bulkhead section across the main channel with a rolled-earth embankment to the right and a concrete gravity spillway and rolled-earth embankment to the left.

The normal pool elevation of 225 feet would provide a 54,200-acre pool. The project would have a 50,000-kilowatt hydroelectric power plant and 3,000 acres for recreation, including three access areas for fishing.

Big Flat Creek Project

The dam site is on Big Flat Creek about 10 miles northeast of Covington in Walton County. The project consists of an earthfill structure with an ogee spillway, which would impound a 1,420-acre reservoir for fishing and recreation. Developments include 2,500 acres of recreation area, plus two access areas for launching boats.

Curry Creek Project

This project would consist of a dam and reservoir, 4,000 acres of recreation area, and two fishing access areas. The dam site is on the North Oconee River about 12 miles above Athens and about 23 miles upstream from the junction with the Middle Oconee River.

The dam would be an earthfill structure with an ogee spillway section in the center. Normal pool elevation of 710 feet would provide a 5,800-acre pool. Gates would be provided for releasing water when needed by the city of Athens and to maintain a minimum streamflow.

Coopers Ferry Project

The plan provides for a dam consisting of a concrete gravity-type bulkhead section across the main channel, with rolled-earth abutments and a concrete gravity spillway section. The normal pool elevation at 160 feet would provide a 54,000-acre pool.

Project site is in Telfair and Jeff Davis counties. The dam site is located on the Ocmulgee River about 17 miles south of McRae and 12 miles west of Hazlehurst.

The project includes facilities for hydroelectric power development, about 3,000 acres for recreation and limited fishing, and three access areas for fishermen.

Goose Creek Project

An early action project, Goose Creek includes two reservoirs and a connecting canal. The site for the dam creating the upper reservoir in Tattnall and Appling counties is across the Altamaha River at the mouth of the Ohoopee River. The site for the dam creating the lower reservoir is across Goose Creek in Wayne County near its confluence with the Altamaha River. The site for the canal connecting the two proposed reservoirs is along the right bank of the Altamaha River.

This project would have facilities for power, recreation, and fishing. The reservoir would be operated primarily to produce peaking power and would have an installed capacity of 180,000 kilowatts at the Goose Creek dam site. The Ohoopee River reservoir would provide most of the water for hydroelectric power generation.

Laurens Shoals Project

The project, recommended for early action, would include a concrete and earthfill dam with a gated spillway at the right side of the dam and would provide for hydroelectric power for peaking purposes, recreation, and fish and wildlife.

The dam site is in Putnam and Hancock counties on the Oconee River, about 12 miles northwest of Sparta and about 16 miles east of Eatonton. The normal pool elevation would be at 455 feet and would provide a 38,700-acre pool. About 12,000 acres of land adjacent to the reservoir would be available for recreation, and four separate access areas would be provided for fishing. Installed capacity at the power plant would be 95,000 kilowatts.

New Bethel Project

A project designed primarily for recreation, New Bethel would be an earth-fill dam with a gated concrete spillway, providing a surface area of 1,540 acres at normal operating pool level.

The dam site is on Yellow River in Rockdale County about one mile east of the DeKalb County line. The reservoir site is in Rockdale, Gwinnett, and DeKalb counties, and it extends upstream on Stone Mountain Creek almost to a new lake in Stone Mountain Park.

Development would include about 3,500 acres of land for recreation and limited fishing use and three access areas for fishermen.

Peachstone Project

An early action project, Peachstone would be an earthfill-type dam with a gate controlled side-channel spillway, and a 13,000-kilowatt-capacity power plant on the right bank of the river, at the toe of the dam.

The dam site is on South River about eight miles northeast of McDonough, the county seat of Henry County, and 19 miles above the mouth of the river. The reservoir site is in Henry and Newton counties.

The project would include about 8,000 acres of land for recreation and limited fishing and two access areas for fishermen. Normal pool elevation of 670 feet would provide a 6,500-acre pool.

Townsend Project

The project would provide drainage and flood control for 161,000 acres of land in Long, Liberty, and McIntosh counties and is located near Townsend and about 25 miles north and slightly west of Brunswick.

The plan includes levees for flood prevention connecting the sand ridges parallel to the river on the southwest side of the area and a series of canals draining generally southeast to remove excess water from the area to be improved. Much of the land is well adaptable to high-value truck crops, general farming, or pasture.

Buffalo Creek-Oconee River Fish and Wildlife Project

The plan proposes creation of a big game restoration area, intensively stocked with deer and wild turkeys. Waterfowl developments are also proposed.

The project consists of two units which would be in Hancock, Washington, Baldwin, and Wilkinson counties. The Oconee River unit, located about 10 miles southeast of Milledgeville, would inundate bottom-land hardwood flats to provide sufficient water for waterfowl during migration periods. The unit would include 17,500 acres of land.

The Buffalo Creek unit, located about 13 miles east of Milledgeville, would inundate hardwood flats by construction of a dam and cross levees. A 100-acre reservoir would be built on Tiger Creek for fishing and for supplying some of the water required to flood bottom lands. The project would provide 10,800 user-days of fishing on the 100-acre lake and 18,500 user-days of hunting within the project.

Water Access Areas

The plan would acquire and develop 66 access areas spaced about five to 10 miles apart along the Altamaha River and tributaries, at small reservoirs in upstream watersheds, and along the coastal waters of the basin. Six coastal access areas and 10 stream accesses would be used for both recreation and fish and wildlife. The other areas would be for fishing.

Development would include roads, water supply and sanitary facilities, and sightseeing, picknicking, swimming, camping, and boating facilities. The plan would provide low-cost facilities to people all over the basin.

Upstream Watershed Projects

It is estimated that multiple-purpose flood prevention and drainage projects, draining some 1.1 million acres, would be developed basin-wide between 1960 and 2000.

Water Supplies

The basin-wide program would provide water storage projects for domestic supplies and development and improvement projects for domestic, municipal, and industrial supplies, treatment facilities, and distribution systems. These programs would serve needs for about 331 million gallons per day by 2000.

Navigation Project

The project would provide a slackwater channel from Altamaha Sound upstream to mile 59 near Doctortown. The plan consists of a two low-head navigation dams and locks located at mile 28.7 (No. 1) and mile 39.6 (No. 2). Minimum channel depth would be nine feet and minimum channel width 90 feet.

Hydroelectric Power and Industrial Development

The projects proposed would add about 388,000 kilowatts capacity, which could be readily absorbed in the projected electrical load. The availability of electric energy, a navigable waterway to Doctortown, increased agricultural raw materials production, adequate waste handling, and other beneficial improvements would stimulate basin-wide industrial expansion.

Reclamation, Irrigation, and Drainage

A feature of the irrigation program is the provision of sprinkler systems for some 44,200 acres of cropland. The drainage program would include open ditch drainage systems on an estimated 8,700 additional acres of cropland and pastureland. Individual farmers would install the irrigation and drainage systems with the technical and financial assistance of private concerns and State and Federal programs.

Forest Conservation and Utilization

Major items in the forestry plan are as follows:

1. Technical assistance for managing and harvesting timber.
2. Commercial and noncommercial thinnings.
3. Tree planting and site preparation.
4. Detecting and controlling insects and diseases.
5. Woodland drainage.
6. Forest-fire protection.
7. Fencing.
8. Road building.
9. Education and information programs.
10. Accelerated forest research.

Fish and Wildlife

The features of the wildlife program would satisfy 629,000 user-days annually by 2000 and include the following:

1. Habitat improvement and development on State and Federal lands.
2. Establishment and development of five additional wildlife areas by the Georgia Game and Fish Commission, in cooperation with private landowners, for public hunting.
3. Development of about 2,000 acres of dove fields.
4. Establishment of a national wildlife refuge in the lower Buffalo Creek-Oconee River bottom.
5. Extensive landowner management of wildlife habitat.
6. Expansion of research, planning, education, information, and management and enforcement.

Features of the sport fisheries program would satisfy 1,525,000 user-days annually by 2000 and include the following:

1. Improvements to and development of rivers and streams for fishing.
2. Provision of access areas.
3. Development of about 20,000 acres of new impoundments.
4. Expansion of services and facilities for coastal fishermen -- piers, artificial reefs, hatcheries, research, etc.

Features of the commercial fisheries program include the following:

1. Abatement of pollution.
2. Cultivation of shrimp, pompano, and other high-quality food fish under controlled conditions.
3. Rehabilitation of oyster beds.

Recreation

There are 14 areas in the basin which are already developed as public recreation areas, ranging from small high-density-use urban parks to large areas and lakes of many uses. Expansions and improvements to these would increase their utilization in the face of increasing demands.

Forty new recreation areas would be established. Six new areas for high-density use would encompass about 5,000 acres. Twenty-nine areas for general outdoor use would require some 14,500 acres. Five large areas would involve water acreages at the following existing projects: (1) Lake Sinclair, (2) Jackson Lake, (3) Oconee National Forest, (4) Piedmont National Wildlife Refuge, and (5) Wolf Island National Wildlife Refuge.

Pollution Abatement and Public Health

The basin-wide program consists of new and extended sewerage systems and waste treatment facilities. Included is a proposal for a system of sewers to intercept the Atlanta Metropolitan Area's treated effluent, now entering the South River, and carry it to a point below Georgia Highway 155 for additional treatment before releasing into the stream.

The public health program includes drainage, spraying, and other measures for vector control, the collection and disposal of solid wastes, and air pollution and radiological pollution monitoring.

IMPACTS OF THE PLAN

Successful flood control programs may set in motion a chain of land-use shifts which could have far-reaching consequences. Land in the flood plains, now idle, could be made valuable for cropland and pasture. Marginal cropland and pastureland could then be utilized as woodlands or recreation areas. Some of the land to be protected might be well suited as industrial sites, especially those adjacent to navigable waterways.

The navigation project proposed for the basin will provide access to industries that could locate on high-bank sites in order to utilize water transportation in obtaining large amounts of bulk commodities. The immediate area could compete for petrochemical plants, building materials manufacturers, heavy equipment makers, and pulp and paper mills, among others. For example, the 52-mile-long Houston, Texas, ship channel has helped to develop a multimillion-dollar industrial complex and create thousands of new jobs in a community that was landlocked by nature.

The availability of good-quality water in ample supply determines to a considerable extent the character and degree of community and industrial development. The value of water to an area should be considered as much greater than the low cost of obtaining it today.

Erosion control measures, irrigation systems, and drainage installations should help to increase the net income from agriculture to more than \$100 million by the year 2000. Net income was about \$40 million in 1959.

Estimated annual expenditures for agricultural production will exceed \$306 million. Agriculture will continue to hold a place of importance as a source of raw materials for food processing industries.

Timber production in the basin should more than double by the year 2000, and increased employment will be necessary for reforestation, management, fire protection, harvesting, and transportation. Pulp and paper industrial employment should more than double.

Total capital expenditures for industrial expansion in the basin are expected to average about \$27 million annually, resulting in an annual average of 2,700 new manufacturing jobs and about 5,600 new jobs in service, trades, and professional categories.

The expenditures of sportsmen in recreation areas and in the towns and cities should add much. Benefits to be derived from commercial fishing are of such magnitude as to warrant a vigorous effort to attract new operators.

Recreation activities may contribute to economic stability for some areas, including the coastal areas of the Altamaha basin and the offshore islands. Persons expected to seek outdoor recreation in the basin by 2000 would be spending over \$144 million annually.

Pollution abatement enhances the well-being of people and influences their choice of place of residence, employment, and recreation. The construction of treatment systems to handle industrial and municipal wastes would provide employment in 75 basin communities and require the expenditure of over \$535 million by 1975. Other expenditures of more than \$72 million will be required between 1975 and 2000.

Other noteworthy economic impacts of the Altamaha basin program of development will include enhancement of land values, an increase in tax revenues, and a reversal of the present out-migration trend during the period from 1975 to 2000.

Of the total investment costs for the full program to the year 2000, about 19% will be borne by the Federal Government and about 81% by non-Federal interests. For operation, maintenance, and replacement costs, approximately 5% will become the responsibility of the Federal Government and 95% the responsibility of the non-Federal groups involved in land and water development.

Hydroelectric power costs totaling \$200,600,000 represent the largest investment. Although the Federal Government may make the total initial investment for hydroelectric power at Federal projects, the sale of energy repays the investment and, therefore, the cost is considered non-Federal.

The cost of the forestry program, totaling \$90 million, will be about 35% Federal and 65% non-Federal.

The responsibility for initiating the plan basically rests with 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.

If an existing project or program is to be expanded by the addition of facilities, such as a Federal project under the administrative supervision of the Corps of Engineers, the agency having jurisdiction, in this example the Corps of Engineers, would be given the major responsibility for planning and construction.

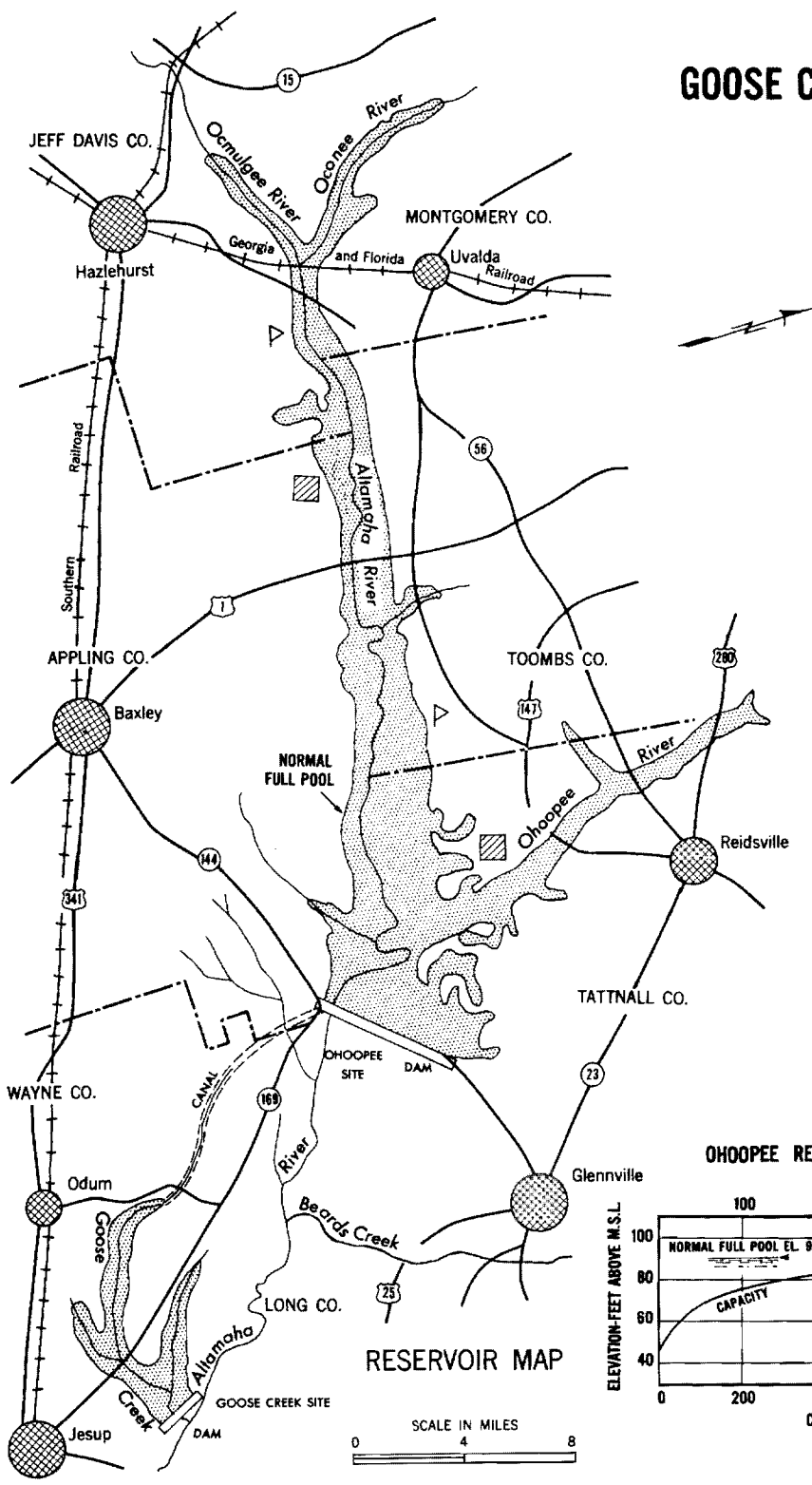
Where additional facilities are proposed for a project not now under Federal jurisdiction, the non-Federal interest is assigned the responsibility for planning and construction.

Appendix
EARLY ACTION PROJECTS

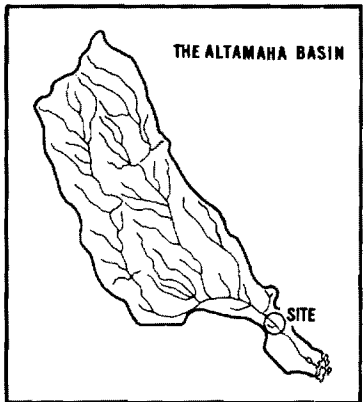
The following early action projects are reproduced
from Appendix 3, Report of the United States Study
Commission, Southeast River Basins:

Goose Creek
Laurens Shoals
Peachstone
Buffalo Creek-Oconee River Fish and Wildlife

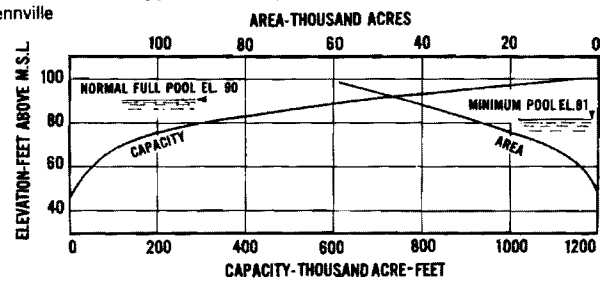
GOOSE CREEK PROJECT



- △ ACCESS AREA
- ▨ RECREATION AREA



OHOOPTEE RESERVOIR AREA-CAPACITY CURVES



GOOSE CREEK PROJECT

LOCATION

This project includes two reservoirs and a connecting canal. The site for the dam creating the upper reservoir is in Tattnall and Appling Counties is across the Altamaha River at the mouth of the Ohoopsee River. The site for the dam creating the lower reservoir is across Goose Creek in Wayne County near its confluence with the Altamaha River. The site for the canal connecting the two proposed reservoirs is along the right bank of the Altamaha River.

PLAN

The Goose Creek project would have facilities for power, recreation, and fishing. The reservoir would be operated primarily to produce peaking power and would generate 275 million kilowatt-hours of electric energy annually.

The Ohoopsee River reservoir would be farther upstream than the smaller Goose Creek reservoir and it would provide most of the water for hydroelectric power generation. The two reservoirs would be interconnected by a canal through which water from the Ohoopsee River reservoir would pass on its way to the powerhouse at the Goose Creek damsite.

DATA

	Unit	Reservoir	
		Ohoopsee	Goose Creek
Drainage area above dam-----	sq. mile	13,220	--
Dam			
Top elevation, mean sea level-----	ft.	100	100
Maximum height-----	ft.	65	73
Length-----	ft.	24,030	2,950
Spillway			
Crest elevation, mean sea level-----	ft.	70	70
Design flood pool elevation, mean sea level-----	ft.	95	95
Effective length-----	ft.	1,432	--
Design discharge-----	c.f.s.	680,000	95,000
Reservoir			
Normal full pool elevation, mean sea level-----	ft.	90	90
Normal full pool area-----	acre	44,800	--
Minimum design pool area-----	acre	28,600	2
Maximum design pool elevation, mean sea level-----	ft.	--	95
Normal full pool capacity-----	acre-ft.	665,000	--
Minimum design pool capacity--	acre-ft.	335,000	--

(Continued)

	Unit	Reservoir	
		Ohoopsee	Goose Creek
Recreation and fishery development, four areas-----	acre	3,000	--
Canal, minimum size-----	ft.	110 x 20	--
Hydroelectric powerplant			
Installed capacity-----	kw.	--	180,000
Annual energy output-----	million	--	275
	kw.-hr.		
Recreation-----	user-day	350,000	
Fishing-----	user-day	205,200	

BENEFITS

Annual Equivalent Primary Tangible (\$1,000)

Power-----	4,900
Recreation-----	630
Fish and wildlife-----	220
Total-----	5,750

Impacts

The Goose Creek project would have economic impacts stemming from power, recreation, fish and wildlife, and land enhancement. These are discussed in more detail in Section III of Part Four.

The project would create impacts which would have a pronounced effect on several of the area redevelopment counties in the basin. There would be economic stimulus from the construction activity itself, with much of the construction costs being spent in the local area for wages, services, and materials.

The impacts would extend beyond the basin boundaries and favorably affect many counties in adjoining basins. Recreation would provide impacts to the local economy resulting in new business, new construction, and new economic activity. The availability of cooling water could induce manufacturing and industrial development. The projects would increase the land values and the local tax bases. All of these factors would have an effect on the repayment ability of the local area to meet its cost-sharing responsibilities.

COSTS (\$1,000)

	Early action	Total
Investment		
Dams and reservoirs-----	43,150	43,150
Power-----	53,100	53,100
Recreation-----	1,400	1,700
Fish and wildlife-----	130	170
Total-----	97,780	98,120

Annual Equivalent

Investment-----	3,528
Operation, maintenance, and replacements-----	581
Taxes foregone-----	1,386
Total-----	5,495

ALLOCATION OF COSTS (\$1,000)

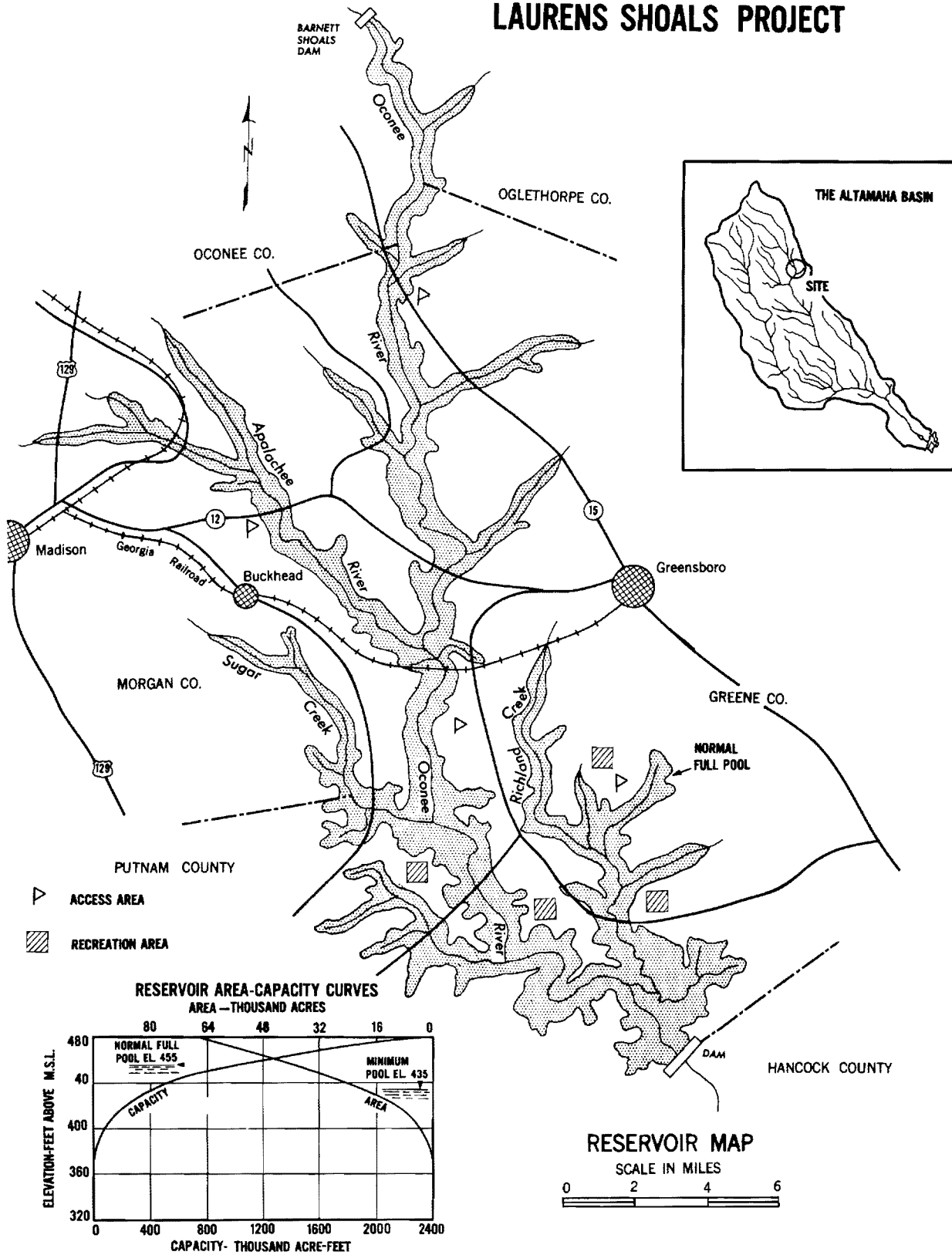
	Invest- ment	Annual equivalent Total	OM&R	OM&R at year 2000
Power-----	84,750	*4,900	463	463
Recreation-----	8,000	380	97	117
Fish and wildlife-----	5,370	215	21	23
Total-----	98,120	*5,495	581	603

* Includes \$1,386,000 for taxes foregone.

SPECIAL CONSIDERATIONS

The Goose Creek project has been scheduled for construction in the early action phase primarily because of the urgent need for peaking power. Total benefits for the project exceed the project costs and the costs allocated to power equal the justified expenditure. Benefits that would accrue from power due to streamflow regulation provided by the upstream projects of Abbeville and Coopers Ferry have not been evaluated. It is probable that the additional benefits to be derived from coordinated operation of the Abbeville, Coopers Ferry, and Goose Creek projects would result in benefits in power exceeding the power costs.

LAURENS SHOALS PROJECT



LAURENS SHOALS PROJECT

LOCATION

The damsite is in Putnam and Hancock Counties on the Oconee River. It is about 12 miles northwest of Sparta, Georgia, and about 16 miles east of Eatonton, Georgia.

PLAN

The project would include a concrete and earthfill dam with a gated spillway at the right side of the dam. The normal pool elevation would be at elevation 455 feet and would provide a 38,700-acre pool. Land would be acquired for the reservoir to an elevation of 460 feet.

The project would provide for hydroelectric power for peaking purposes, recreation, and fish and wildlife use. The hydroelectric powerplant would have an installed capacity of 95,000 kilowatts and would generate 120 million kilowatt-hours of electricity annually. The project would have about 12,000 acres of land adjacent to the reservoir for recreation and some fishing use and four access areas at other locations for fishermen.

DATA

	Unit	Amount
Dam and reservoir		
Drainage area-----	sq.mile	1,840
Dam		
Top elevation, mean sea level-----	ft.	465
Maximum height-----	ft.	165
Length-----	ft.	6,090
Spillway		
Crest elevation, mean sea level-----	ft.	425
Effective length-----	ft.	727
Design discharge-----	c.f.s.	478,000
Reservoir		
Normal full pool elevation, mean sea level-----	ft.	455
Maximum design pool elevation, mean sea level-----	ft.	460
Normal full pool area-----	acre	38,700
Minimum design pool area-----	acre	20,400
Normal full pool capacity-----	acre-ft.	1,070,000
Minimum design pool capacity-----	acre-ft.	462,000
Recreation and fishery development, three areas-----	acre	12,000
Hydroelectric powerplant		
Installed capacity-----	kw.	95,000
Annual energy output-----	million kw.-hr.	120
Recreation-----	user-day	3,000,000
Fishing-----	user-day	72,700

BENEFITS

Annual Equivalent Primary Tangible (\$1,000)

Power-----	2,520
Recreation-----	4,460
Fish and wildlife-----	60
Total-----	<u>7,040</u>

Impacts

The project will provide economic impacts to the area stemming from power, recreation, and fish and wildlife. In addition, there would be impacts from the construction activity and from land enhancement.

The construction activity would provide a temporary impetus to the local economy with a large portion of the construction costs being spent locally for wages, materials, and services. This and the other economic impacts would be of great benefit to the area, especially since one of the counties involved is an area redevelopment county.

This recreational activity would stimulate local business, creating new economies, and boosting the sale of gasoline, recreation equipment, food, beverages, and lodging. The value of the land in the vicinity of the reservoir should increase and provide a larger tax base for the counties involved. All of these impacts would increase the ability of the area to meet its local cost sharing responsibilities.

COSTS (\$1,000)

	Early action	Total
Investment		
Dam and reservoir-----	41,300	41,300
Recreation-----	6,850	13,130
Fish and wildlife-----	50	60
Power-----	<u>17,770</u>	<u>17,770</u>
Total-----	65,970	72,260
Annual Equivalent		
Investment-----		2,516
Operation, maintenance, and replacements-----		924
Taxes foregone-----		<u>730</u>
Total-----		4,170

ALLOCATION OF COSTS (\$1,000)

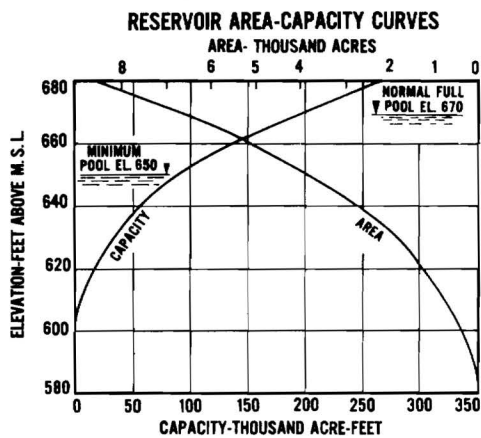
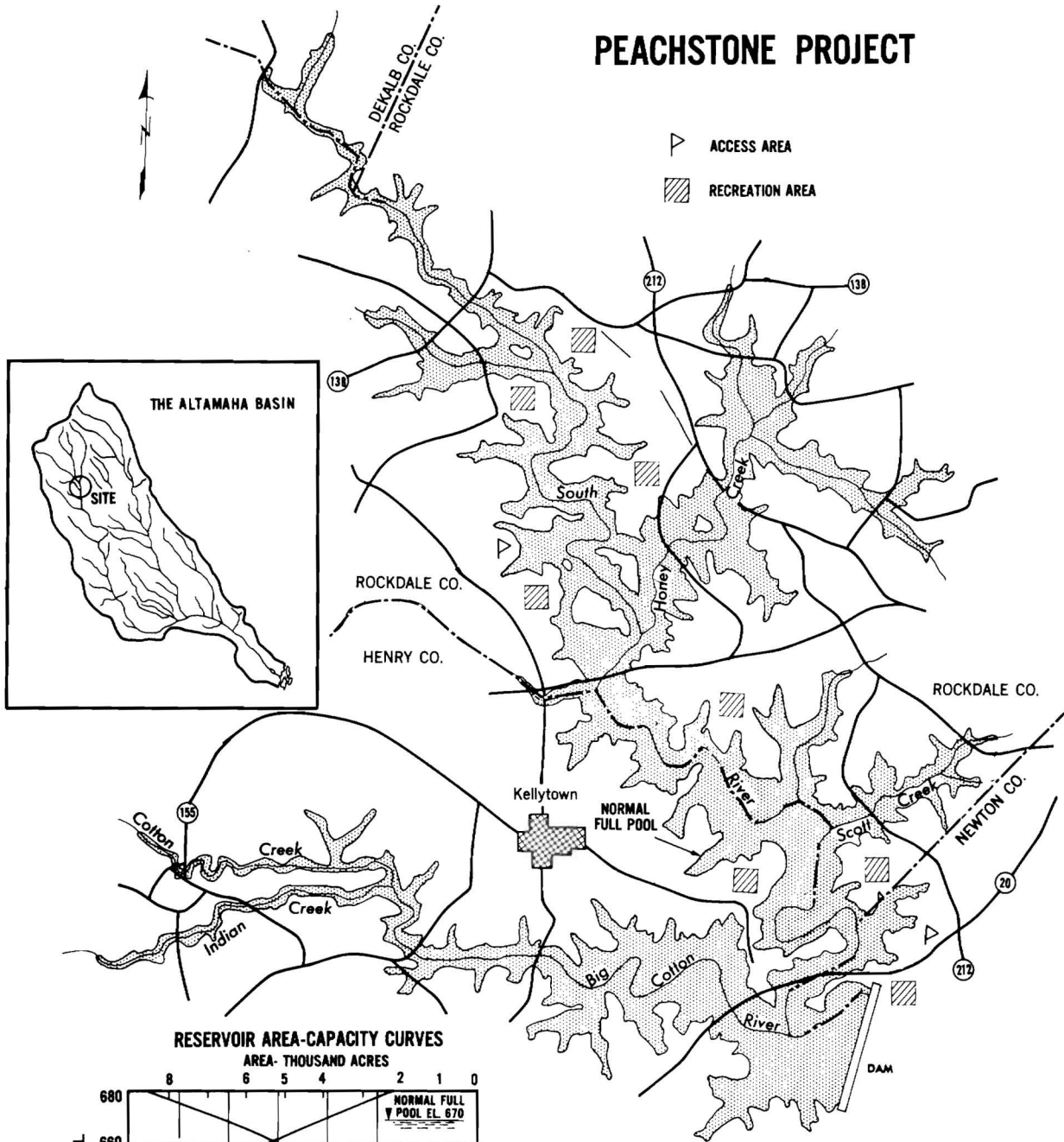
	Invest- ment	<u>Annual equivalent</u> Total	<u>OM&R</u>	OM&R at year 2000
Power-----	51,200	*2,860	284	284
Recreation-----	19,500	1,250	633	833
Fish and wildlife-----	<u>1,560</u>	<u>60</u>	<u>.7</u>	<u>7</u>
Total-----	72,260	*4,170	924	1,124

* Includes \$730,000 for taxes foregone.

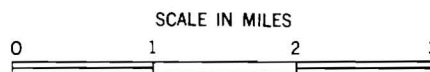
SPECIAL CONSIDERATIONS

The Laurens Shoals project has been scheduled for construction by the year 1975 primarily due to the urgent need for peaking power and because it is adjacent to depressed areas which would receive economic stimulation by its construction. Total benefits for the project exceed project costs, however, the costs allocated to power exceed the justifiable investment. Benefits which would accrue from power generation at the downstream Sinclair Dam due to stream regulation by the Laurens Shoals project have not been evaluated. It is probable that the additional benefits to be derived from coordinated operation of the Laurens Shoals and Sinclair project would result in benefits from power exceeding the costs. Additional benefits may, also, accrue from the Laurens Shoals project by furnishing cooling water into Lake Sinclair. Water for cooling purposes will be used from this lake in connection with the operation of the steam-electric plant now under construction adjacent to Lake Sinclair.

PEACHSTONE PROJECT



RESERVOIR MAP



PEACHSTONE PROJECT

LOCATION

The Peachstone damsite is on South River about 8 miles northeast of McDonough, the county seat of Henry County, and 19 miles above the mouth of the river. The reservoir site is in Henry and Newton Counties.

PLAN

The project would include about 8,000 acres of land for recreation and limited fishing use and 2 access areas for fishermen. Facilities would be provided for recreation, fish and wildlife, and hydroelectric power development primarily for peaking purposes.

The dam would be an earthfilled type with a gate-controlled side-channel spillway. The powerplant will be on the right bank of the river at the toe of the dam. The normal pool elevation will be at 670 feet and will provide a 5,000-acre pool. Land should be acquired for the reservoir to elevation 670 feet mean sea level, and flood easements to elevation 675.

DATA

	Unit	Amount
Dam and reservoir		
Drainage area-----	sq. mile	372
Dam		
Top elevation*-----	ft.	685
Maximum height-----	ft.	123
Length-----	ft.	7,625
Spillway		
Crest elevation*-----	ft.	640
Effective length-----	ft.	200
Design discharge-----	c.f.s.	167,000
Reservoir		
Maximum design pool elevation*---	ft.	675
Normal full pool elevation*-----	ft.	670
Minimum design pool elevation*---	ft.	650
Maximum design pool area-----	acre	7,500
Normal full pool area-----	acre	6,500
Minimum design pool area-----	acre	3,900
Maximum design pool capacity-----	acre-ft.	230,000
Normal full pool capacity-----	acre-ft.	197,000
Minimum design pool capacity-----	acre-ft.	90,000
Hydroelectric powerplant		
Installed capacity-----	kw.	13,000
Annual energy output-----	million kw.-hr.	21
Recreation-----	user-day	2,000,000
Fishing-----	user-day	13,000

* All elevations given are mean sea level.

BENEFITS

Annual Equivalent Primary Tangible (\$1,000)

Power-----	360
Recreation-----	1,974
Fish and wildlife-----	<u>16</u>
Total-----	2,350

Impacts

This project, located near the Atlanta metropolitan area, would have impacts attributable to recreation fish and wildlife, and the power generation. The land enhancement and construction impacts should be comparable to those of Lake Lanier but on a less scale because of the much smaller reservoir, or to some other bodies of water near a large metropolitan center.

These benefits should have an effect on the local economy. The result would be an increased tax base and increase in business, particularly in services and trades. These increased economic activities would aid the locality in paying its share of the project costs.

COSTS (\$1,000)

	Early action	Total
Investment		
Dam and reservoir-----	11,790	11,790
Recreation-----	4,575	7,625
Fish and wildlife-----	15	15
Power-----	<u>2,770</u>	<u>2,770</u>
Total-----	19,150	22,200

Annual Equivalent

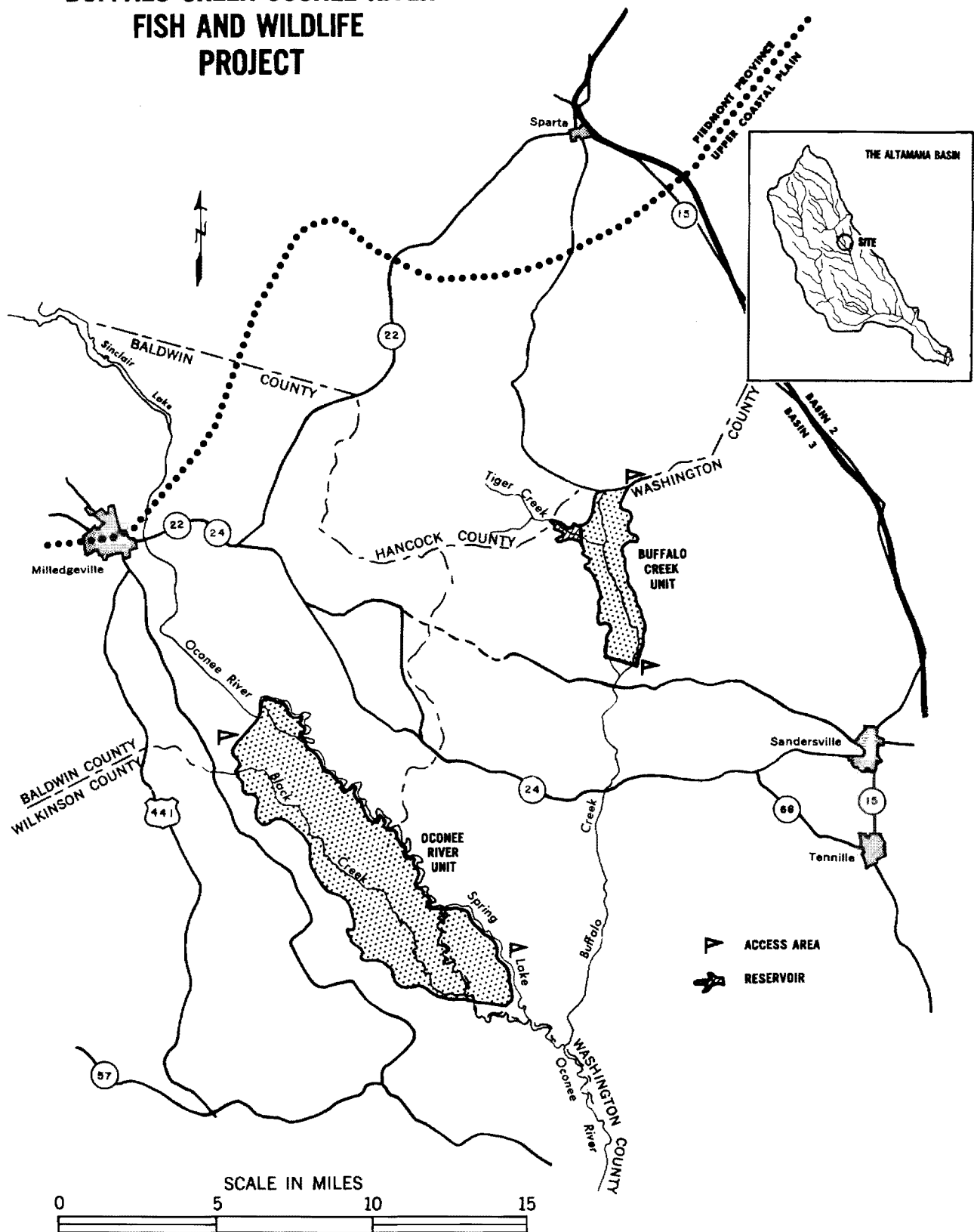
Investment-----	760
Operation, maintenance, and replacements-----	485
Taxes foregone-----	<u>100</u>
Total-----	1,345

ALLOCATION OF COSTS (\$1,000)

	Investment	<u>Annual equivalent</u>		OM&R at
		Total	OM&R	year 2000
Power-----	4,850	*346	73	73
Recreation-----	17,000	985	411	619
Fish and wildlife-----	<u>350</u>	<u>14</u>	<u>1</u>	<u>1</u>
Total-----	22,200	*1,345	485	693

* Includes \$100,000 for taxes foregone.

BUFFALO CREEK-OCONEE RIVER FISH AND WILDLIFE PROJECT



BUFFALO CREEK-OCONEE RIVER FISH AND WILDLIFE PROJECT

LOCATION

This project consist of two units which are located in Hancock, Washington, Baldwin, and Wilkinson Counties. The Oconee River unit is about 10 miles south of Milledgeville and the Buffalo Creek unit is about 13 miles east of that city.

PLAN

The plan proposes creation of a big game restoration area that would be intensively stocked with deer and wild turkeys to provide a source of replenishment and an adjacent equally desirable habitat open to public hunting. Hunting benefits attributable to the project would be realized within the two units as well as on a minimum 100,000-acre peripheral area.

Waterfowl developments are also proposed. Very desirable waterfowl habitats are located in both units with the primary limitatins being a lack of waterfowl and sufficient water during migration periods. With the plan in effect, a waterfowl project would be carried out to inundate bottomland hardwood flats to determine if waterfowl would congregate in sufficient numbers to utilize the natural food supplies and provide public hunting opportunity.

Desirable hardwood flats on Buffalo Creek would be inundated by construction of a dam across the stream near the downstream terminus of the unit and construction of cross levees that would tie into natural stream levees. A 100-acre reservoir would be built on a tributary stream for fishing and supplying some of the water for flooding the bottomlands and to augment seasonal runoff.

The two tracts of land in the project would include areas of 5,000 acres and 17,500 acres.

The project will provide annually 10,800 user-days of fishing on the 100-acre lake and 18,500 user-days of hunting within the project, plus 10,000 additional user-days in contiguous areas outside the project.

DATA

	Unit	Amount
Buffalo Creek unit-----	acre	4,300
Reservoir-----	acre	100
Agricultural land-----	acre	600
Oconee River unit-----	acre	17,500
Oconee River stream improvement-----	mile	16
Black Creek stream improvement-----	mile	12
Buffalo Creek stream improvement-----	mile	6
Spring Lake stream improvement-----	mile	5
Access area development-----	each	4
Access road development-----	mile	10

BENEFITS

Annual Equivalent Primary Tangible (\$1,000)

Hunting -----	97
Fishing -----	15
Total -----	<u>112</u>

Impacts

The project will, in addition to providing hunting and fishing for local residents, also act as an inducement for the hunters from outside the area to visit the area. This adds to the motel, service station, and other trades and service business. The regular payroll of personnel engaged in operating and maintaining the area will contribute materially to the economy of the Milledgeville area. These benefits would result in an increased tax base and the increased economic activities would aid the locality in paying its share of the project costs. Impacts are further discussed in Section III, Part Four.

COSTS (\$1,000)

	Early action	Total
Investment		
Fish and wildlife -----	2,500	2,500
Annual Equivalent		
Investment -----		80
Operation, maintenance, and replacements -----		*24
Total -----		<u>104</u>

* Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

ALLOCATION OF COSTS

All costs are allocated to fish and wildlife.