Issued May 1968

SOIL SURVEY
Bulloch County, Georgia

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATIONS

Major fieldwork for this soil survey was done in the period 1960–1962. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1963. This survey was made cooperatively by the Soil Conservation Service and the University of Georgia, College of Agriculture, Agricultural Experiment Stations, as part of the technical assistance furnished to the Ogeechee River Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Bulloch County, Ga. contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All the soils of Bulloch County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit, woodland suitability group, wildlife suitability group, or any other group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitations or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the discussions of the capability units, woodland suitability groups, and wildlife groups.

Foresters and others can refer to the section "Use of the Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Use of Soils for Wildlife and Fish."

Community planners and others concerned with suburban development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Use of Soils in Community Development."

Engineers and builders will find under "Use of Soils for Engineering" tables that give engineering properties of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation, Classification, and Morphology of Soils."

Students, teachers, and others will find information about soils and their management in various parts of the text, depending on their particular interest.

Newcomers in Bulloch County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "Additional Facts About the County," which gives information of a general nature.

Cover pictures: Peanuts, tobacco, and pines growing on Tifton loamy sand.

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NOTICE TO LIBRARIANS

Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued May 1968

EXPLANATION
Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vegas and Eldorado Valleys Area, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF BULLOCH COUNTY, GEORGIA

SURVEY BY HERSCHEL L. PAULK, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY HERSCHEL L. PAULK, JACK R. BROWN, AND DANIEL D. MONTS, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE, AGRICULTURAL EXPERIMENT STATIONS

BULLOCH COUNTY is in the southeastern part of Georgia (fig. 1) and has an area of 684 square miles. Statesboro, in the center of the county, is the county seat.

The county is within the lower and middle sections of the Coastal Plain and has a warm and humid climate. Rainfall is abundant and generally well distributed. The soils are gently rolling and well drained in most of the county. In the southeastern part, however, they are level or nearly level and moderately well drained to very poorly drained.

The soils of the county generally are well suited to cultivated crops or to trees. Most of the soils have a loose to friable sandy surface layer that is easily tilled. If adequate amounts of fertilizer and lime are added, these soils produce favorable yields of corn, tobacco, cotton, peanuts, small grains, soybeans, pecans, and truck crops. They also produce good yields of wood crops.

Since the county was settled, agriculture has been the main enterprise. In recent years, however, several industries have located in the county. Wood products, such as lumber, pulpwood, and turpentine, are also important sources of income in this county.

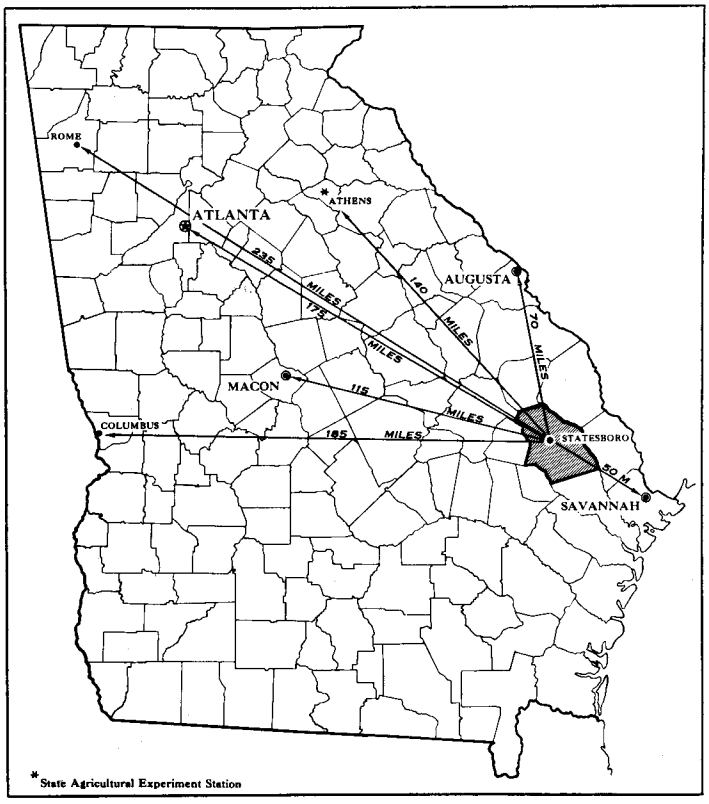

Figure 1.—Location of Bulloch County in Georgia.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Bulloch County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

Of the seven soil associations in Bulloch County, two consist of well-drained to poorly drained soils on low ridges and upland flats, two consist of sandy soils of the uplands, and one consists of poorly drained and very poorly drained soils on flood plains and in swamps. One soil association is on low stream terraces, on flats, and along drainageways, and another is on ridges and in drainageways. These soils associations are described on the following pages. More detailed information about the individual soils in each association can be obtained by studying the detailed soil map and by reading the section "Descriptions of the Soils."

1. Tifton-Fuquay-Pelham Association

Nearly level and gently sloping well-drained soils on ridges, and nearly level poorly drained soils in drainageways

This association consists of nearly level and gently sloping interstream ridges and numerous drainageways that dissect the ridges. The ridges are about ¼ mile to 1 mile wide, and the drainageways are about 50 to 100 feet wide. This association occupies about 53 percent of the county and occurs in the northern, central, and western parts.

The Tifton soils make up about 35 percent of this association; the Fuquay soils, about 25 percent; the Pelham soils, about 15 percent; and minor soils, the remaining 25 percent.

The Tifton and Fuquay soils are dominant on the interstream ridges. Tifton soils are well drained and pebbly. They have a loamy sand surface layer and a yellowish-brown sandy clay loam or sandy clay subsoil. The Fuquay soils resemble the Tifton soils but have a surface layer thicker than 20 inches and generally contain fewer pebbles throughout the profile. The Pelham soils are dominant in the drainageways and are poorly drained. They have a dark-gray loamy sand surface layer and a gray sandy clay subsoil.

The minor soils on the interstream ridges are the sandy, excessively drained Lakeland and the well-drained Dothan and Orangeburg soils. Other minor soils in the association are the Albany, the Ardilla, the Leefield, the Portsmouth, and alluvial land. These soils range from moderately well drained to very poorly drained.

About 70 percent of this association is cultivated. Almost all of the cultivated areas are on the ridges, and the farms in these areas are productive and well managed by the owners. Most of the farms are small and of the general type; they produce chiefly corn, cotton, peanuts, and tobacco.

About 60 percent of the association, which consists of the well-drained soils of the ridges, has only slight to moderate limitations for residential and industrial development, trafficways, campsites, and intensive play areas.

2. Leefield-Stilson-Pelham Association

Nearly level moderately well drained to poorly drained soils on low ridges and upland flats

This soil association is characterized by large, nearly level ridges that are cut by only a few major drainageways. On these ridges are flats and a few circular ponds that have no outlets. In periods of high rainfall, most of the cultivated land is wet a good part of the time.

Most of this association is in large areas in the southeastern part of the county. The largest area is along U.S. Highway No. 80 and extends from Brooklet to the Bryan County line. Another sizable area lies along State Route 46 and extends from near Denmark to the Bryan County line. This association makes up about 19 percent of the county.

The Leefield soils make up about 35 percent of the association; the Stilson soils, about 25 percent; the Pelham soils, about 19 percent; and minor soils, the remaining 21 percent.

The Leefield and Stilson soils are on the nearly level ridges. The Leefield soils are at a slightly lower elevation than the Stilson soils and are somewhat poorly drained. They have a very dark gray loamy sand surface layer and a light yellowish-brown sandy clay loam subsoil that is mottled throughout. The moderately well drained Stilson soils generally occur at the highest elevations on the ridges. They have a dark-gray loamy sand surface layer and a yellow to brownish-yellow sandy clay loam subsoil that is mottled in the lower part.

The Pelham soils are in flats, ponded areas, and drainage outlets. These poorly drained soils have a dark-gray loamy sand surface layer and a gray sandy clay loam subsoil.

Minor soils on the nearly level ridges are the well drained Fuquay soils, the moderately well drained Irvington soils, and the somewhat poorly drained Albany soils. These soils make up about 11 percent of this association. The remaining 10 percent of this association is on the flats and in the drainage outlets and consists of the poorly drained Plummer soils, the very poorly drained Rutlege and Portsmouth soils, and alluvial land.

About 70 percent of this association is wooded. Practically all of the cultivated land is on the low, nearly level ridges. The chief crops are corn, peanuts, tobacco, and some cotton. The farms in these areas are of the general type and are small to medium in size. The main income generally is from the sale of woodland products and row crops, but on some farms the sale of swine provides the main income. Pulpwood companies own a few large tracts.

The soils on the nearly level ridges are suitable for cultivation, but wetness is a slight limitation during prolonged rainy periods. Where drainage systems have been installed and good management is used, these soils produce favorable yields. The soils on flats, in ponded areas, and in drainage outlets are better suited as woodland than as land for crops and pasture because the high water table limits their suitability.

The low, nearly level ridges are good sites for road building material. In most of this association, limitations to residential and industrial development are moderate to severe because the water table is seasonally high in most places and long periods of flooding are likely.

On this association hunting for quail and doves is good because the supply of feed is abundant in the fields and good cover is available in the woods nearby.

3. Fuquay-Lakeland Association

Nearly level and gently sloping well-drained to excessively drained loamy sands and sands on uplands

This association occurs on uplands; it is on the broad, nearly level or very gently sloping ridgetops and on the gently sloping sides of the ridges. Breaking this landscape are creeks, a few small drainageways, and a few, small circular ponds. This association occupies a long area of variable width that parallels the Ogeechee River swamp and extends from the Bryan County line northward almost to Blitch. Parts of the association are in

sloping areas and on bluffs adjacent to the Ogeechee River. This association makes up about 8 percent of the county.

The Fuquay soils make up about 60 percent of this association; the Lakeland soils, about 28 percent; and minor soils the remaining 12 percent.

The well-drained Fuquay soils are at the lower elevations and on the side slopes. They have a surface layer of grayish-brown loamy sand and a subsoil of brownish-yellow to yellowish-brown sandy clay loam. The excessively drained Lakeland soils are at the higher elevations and, in places, extend down to the side slopes. These soils have a gray or grayish-brown sand surface layer and a yellowish-brown sand subsoil.

The minor soils in this association are the somewhat poorly drained Albany and Leefield soils, the poorly drained Pelham soils, the very poorly drained Rutlege and Portsmouth soils, and alluvial land. These minor soils are in the lowest areas of the association.

Nearly 60 percent of this association is cultivated; corn, cotton, peanuts, and tobacco are the main crops. The farms are small to medium in size and are managed by their owners. On most farms row crops are the main source of income, but on some, beef cattle or swine produce most of the farm income. Most farmers receive a sizable income from woodland. A large acreage that was once cultivated has reverted to pine.

Bird hunting is good within this association because the supply of food is abundant in cultivated fields and cover is available in nearby woods. Soils of this association have only slight to moderate limitations as sites for residential and industrial development.

4. Rutlege-Albany-Chipley Association

Nearly level very poorly drained to moderately well drained sandy soils on low ridges, on upland flats, in depressions, and along drainageways

This association is on low, nearly level ridges, on flats, in depressions, and along drainageways. The drainage patterns are weakly defined, and differences in elevations are slight. This association is in the southeastern part of the county and is adjacent to Upper Black Creek, Lower Black Creek, and Luke Swamp. This association makes up about 7 percent of the county.

Rutlege soils make up about 40 percent of this association; the Albany soils, about 25 percent; the Chipley soils, about 15 percent; and the minor soils, the remaining 20 percent.

The very poorly drained Rutlege soils are in the depressions and along drainageways. These soils have a black sandy surface layer over very dark gray to gray sand. The somewhat poorly drained Albany soils and the moderately well drained Chipley soils are on the flats and the low, nearly level ridges. These soils have a surface layer of dark-gray sand over pale-yellow sand that is splotched with light gray and yellowish brown. At a depth of 36 to 48 inches, however, the Albany soils are underlain by finer textured material than the Chipley soils.

Among the minor soils of the association are the somewhat poorly drained Ona soils and the somewhat poorly drained to poorly drained Leon soils. In the Ona soils a dark-brown layer just below the surface layer is stained with organic matter. A very dark brown hardpan is in the subsoil of the Leon soils. Other minor soils are the moderately well drained Stilson, the somewhat poorly drained Plummer, and the very poorly drained Portsmouth.

Nearly all of this association is woodland, which produces most of the farm income. Pulpwood companies own large tracts in this association. A small acreage on the low, nearly level ridges has been cleared and is used for corn, tobacco, and bahiagrass. The farms in this association range from 500 to several thousand acres in size. Most of the landowners do not live on the farms.

All of this association is suitable as woodland, but removing the water from waterlogged areas is necessary for encouraging the regeneration of trees. Except on the low, nearly level ridges, this association is not suited to cultivated crops. The bays, depressions, and drainageways are not suitable for cultivation, because water stands in them for long periods.

This association provides good hunting for deer, and sites on the Albany, Chipley, and Ona soils are fairly good for camps and lodges. The soils in this association have moderate to severe limitations for residential and industrial development because the water table is seasonally high and flooding is likely.

5. Kershaw-Lakeland Association

Very gently sloping and gently sloping excessively drained sands on ridges

This association consists of broad ridges of sand that are dissected by a few narrow drainageways. On these ridges small oaks are the dominant vegetation. This association is mainly adjacent to the swamps on the east side of Lotts Creek. It occupies about 3 percent of the county.

The Kershaw soils make up about 65 percent of this association; the Lakeland soils, about 25 percent; and minor soils, the remaining 10 percent.

The Kershaw soils are on the top of the ridges adjacent to the swamps along streams. They have a surface layer of grayish-brown coarse sand and a subsoil of light yellowish-brown to yellow coarse sand. The Lakeland soils are at a slightly lower elevation than the Kershaw soils. They have a surface soil of gray sand and a subsoil of light yellowish-brown to pale-yellow sand.

The minor soils are the moderately well drained to somewhat poorly drained Chipley soils, the poorly drained Plummer soils, and the very poorly drained Rutlege soils. The Chipley soils are on low ridges adjacent to the drainageways, and the Plummer and Rutlege soils are at the heads of drainageways.

Most of this association is woodland. Except in a few areas that have been cleared and planted to slash pine, the trees are turkey oak, blackjack oak, scrub oak, and a few scattered longleaf pines. Only a small acreage is cultivated. Most of the association is owned by farmers, but pulpwood companies own a few large tracts.

The major soils of this association are droughty sands that are not suitable for cultivation. Also, these soils

are only marginal for pines. The major soils are so droughty that establishing a stand of pine trees is difficult. The minor soils of this association, however, are well suited to pines. The major soils can be used as material in concrete and for building roads.

6. Rains-Izagora-Dunbar Association

Nearly level moderately well drained to poorly drained soils on low stream terraces, on upland flats, and along drainageways

This association is on low terraces, on flats, and along drainageways. It is adjacent to the Ogeechee River swamp. The total acreage amounts to about 2 percent of the county.

The Rains soils make up about 50 percent of this association; the Izagora soils, about 30 percent; the Dunbar soils, about 15 percent; and minor soils the remaining 5 percent.

The Rains soils are on flats and along drainageways and are poorly drained. They have a dark-gray sandy loam surface layer over a subsoil of dominantly gray or dark-gray sandy clay loam to sandy clay. The moderately well drained Izagora soils and the somewhat poorly drained Dunbar soils are on the low, nearly level terraces. The Izagora soils have a dark grayish-brown loamy sand surface layer over a brownish-yellow to yellow sandy clay loam subsoil. The Dunbar soils have a dark-gray fine sandy loam surface layer over a mottled pale-yellow and gray sandy clay subsoil.

Among the minor soils are the poorly drained Bladen soils, the very poorly drained Rutlege and Portsmouth soils, and alluvial land on flats and on drainageways. Other minor soils are the moderately well drained to somewhat poorly drained Chipley soils on low, nearly level ridges.

Most of this association is heavily forested with mixed stands of trees. A small part has been cleared and is used for corn or for bahiagrass pasture. Some of the land once cultivated has recently been planted to pine trees. The farms are large, and most of the owners do not live on them. Pulpwood companies own a large acreage in this association.

Much of this association is better suited as woodland than as cropland. The Izagora and Dunbar soils are suitable for cultivation, but their moderately high water table is a hazard. If they are properly drained and well managed, these soils are productive.

This association provides good hunting for deer. The higher areas can be used for hunting and fishing lodges. Because flooding is a hazard and the water table is seasonally high, the soils in this association have severe limitations if used for residential and industrial sites, trafficways, campsites, and intensive play areas.

7. Bladen-Rains-Swamp Association

Nearly level poorly drained and very poorly drained soils on flood plains and in swamps

This association is on nearly level flood plains along the Ogeechee River and along creeks and a few of their branches. These flood plains are covered by water for more than 1 month each year. This association makes up about 8 percent of the county.

The Bladen soils make up about 36 percent of this association; the Rains soils, about 32 percent; and Swamp, the remaining 32 percent.

The Bladen and Rains soils have a dark-gray to black sandy loam to clay loam surface layer and a gray to dark-gray sandy clay loam to sandy clay subsoil. Swamp has a dark-gray to black surface layer that ranges from clay to sand and is underlain by dark-gray to black, stratified and interbedded material that varies widely in texture.

This association is chiefly suited as woodland and wildlife habitat. The main trees of the woodland are blackgum, cypress, water oak, swamp chestnut oak, swamp maple, sweetgum, yellow-poplar, tupelo, and willow. These trees can be harvested only in exceptionally dry periods. Because flooding is periodic and drainage is poor, the soils of this association are unsuited to cultivated crops and pasture.

This association provides good hunting because it is a natural habitat for deer, squirrels, turkeys, wild hogs, ducks, and other kinds of wildlife. Fishing also is good. This association is well suited to programs for wildlife management, though not much of the association is so managed. Use of the soils of this association is severely limited for residential and industrial sites, trafficways, campsites, and intensive play areas.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Bulloch County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Tifton and Lakeland, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in these characteristics that go with their behavior in the natural, untouched landscape.

Soils of one series can differ somewhat in texture of the surface soil and in slopes, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Tifton sandy loam and Tifton loamy sand are two soil types in the Tifton series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Tifton loamy sand, 2 to 5 percent slopes, is one of several phases of Tifton loamy sand, a soil type that ranges from nearly level to gently sloping.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed, and so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Dunbar-Izagora complex. Another kind of mapping unit is the undifferentiated soil group, which consists of two or more soils not separated on the map, because differences among them are small, their practical value is limited, or they are too difficult to reach. An example is Bladen and Rains soils and swamp.

Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Swamp or Alluvial land, and are called land types rather than soils. In Bulloch County, swamp and alluvial land are not mapped as separate units but are parts of undifferentiated soil groups.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil surveys. On basis of yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

Descriptions of the Soils

This section describes the soil series (groups of soils) and single soils (mapping units) of Bulloch County. The procedure is first to describe the soil series and then the mapping units in the series. Thus to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. The estimated acreage and proportionate extent of each mapping unit are given in table 1.

Each mapping unit in the county has been placed in a capability unit, a woodland suitability group, and a wildlife suitability group so that its use and management for crops and pasture, for trees, and for wildlife can be readily discussed. To find the groups to which each of the soils has been assigned, and the page where each group is discussed, refer to the "Guide to Mapping Units" at the back of this survey. This Guide also gives the page of the description of each soil in the county.

Soil scientists, engineers, students, and others who want detailed descriptions of the soil series should turn to the section "Formation, Classification, and Morphology of Soils." Many terms used in the soil descriptions and other sections are defined in the Glossary.

Albany Series

The Albany series consists of somewhat poorly drained sandy soils on low flats in the uplands. Slopes range from 0 to 2 percent. Loose sand reaches to a depth of 40 inches or more. This sand ranges from dark gray to grayish brown in the upper part and from pale yellow to yellow in the lower part. Beneath the sand is mottled gray sandy loam or sandy clay loam. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

TABLE 1.—*Estimated acreage and proportionate extent of the soils*

Soil	Acres	Percent
Albany sand, 0 to 2 percent slopes	16,460	3.7
Ardilla loamy sand, 0 to 2 percent slopes	1,050	.2
Bladen fine sandy loam	710	.1
Bladen and Rains soils and swamp	34,710	7.9
Carnegie loamy sand, 2 to 5 percent slopes	1,430	.3
Carnegie loamy sand, 5 to 8 percent slopes	480	.1
Carnegie sandy loam, 2 to 5 percent slopes, eroded	1,360	.3
Carnegie sandy loam, 5 to 8 percent slopes, eroded	1,200	.3
Carnegie sandy loam, 8 to 12 percent slopes, eroded	100	(1)
Chipley sand, 0 to 2 percent slopes	6,830	1.6
Cowarts loamy sand, 2 to 5 percent slopes	10,380	2.4
Cowarts loamy sand, 2 to 5 percent slopes, eroded	1,420	.3
Cowarts loamy sand, 5 to 8 percent slopes	3,970	.9
Cowarts loamy sand, 5 to 8 percent slopes, eroded	1,860	.4
Dothan loamy sand, 0 to 2 percent slopes	1,820	.4
Dothan loamy sand, 2 to 5 percent slopes	7,970	1.8
Dothan loamy sand, 2 to 5 percent slopes, eroded	290	(1)
Dothan loamy sand, 5 to 8 percent slopes	180	(1)
Dunbar-Izagora complex	1,400	.3
Fuquay loamy sand, 0 to 2 percent slopes	20,420	4.6
Fuquay loamy sand, 2 to 5 percent slopes	36,380	8.3
Fuquay loamy sand, 5 to 8 percent slopes	2,260	.5
Fuquay pebbly loamy sand, 0 to 2 percent slopes	1,350	.3
Fuquay pebbly loamy sand, 2 to 5 percent slopes	2,170	.5
Grady sandy loam	110	(1)
Irvington loamy sand, 0 to 2 percent slopes	1,840	.4
Izagora loamy sand	2,480	.6
Kershaw coarse sand, 2 to 8 percent slopes	7,750	1.8
Lakeland sand, 0 to 5 percent slopes	24,040	5.5
Lakeland sand, 5 to 12 percent slopes	4,810	1.1
Leefield loamy sand, 0 to 2 percent slopes	27,900	6.3
Leon sand	1,370	.3
Ona sand	1,160	.3
Orangeburg loamy sand, 2 to 5 percent slopes	580	.1
Orangeburg loamy sand, 5 to 8 percent slopes	1,330	.3
Orangeburg loamy sand, 8 to 12 percent slopes	180	(1)
Pelham loamy sand	52,900	12.1
Plummer sand	6,990	1.6
Portsmouth loam	750	.2
Rains sandy loam	4,450	1.0
Rutlege sand	16,600	3.8
Rutlege and Portsmouth soils and alluvial land	37,800	8.6
Stilson loamy sand, 0 to 2 percent slopes	19,130	4.4
Susquehanna loamy sand, 2 to 8 percent slopes	120	(1)
Tifton loamy sand, 0 to 2 percent slopes	18,110	4.1
Tifton loamy sand, 2 to 5 percent slopes	44,700	10.2
Tifton sandy loam, 2 to 5 percent slopes, eroded	5,860	1.3
Tifton sandy loam, 5 to 8 percent slopes, eroded	600	.1
Total	437,760	100.0

[1] Less than 0.1 percent.

The Albany soils commonly are adjacent to or near the Chipley, Lakeland, Ona, and Plummer soils. The Albany soils are underlain by finer textured material than the Chipley soils and are lower and wetter than the Lakeland. They lack the dark-brown subsurface layer that commonly occurs in the Ona soils. The Albany soils are better drained than the Plummer soils and are less gray in the subsoil.

In this county the Albany soils have a fairly large acreage, much of which is in the southern half. The native vegetation is slash pine, water oak, waxmyrtle, gallberry, maple, and sweetgum, and there is an understory of wiregrass, briers, and shrubs. Most of the crops common in the county can be grown on these soils if they are adequately drained. Some of the formerly cultivated areas have been planted to slash pine in recent years.

Albany sand, 0 to 2 percent slopes (AdA).—This is a somewhat poorly drained sandy soil on low flats. A brief description of its profile follows:

0 to 16 inches, dark-gray to grayish-brown, loose sand.
16 to 40 inches, pale-yellow to yellow, loose sand mottled with yellowish brown at a depth of about 28 inches.
40 to 48 inches, gray sandy loam mottled with yellowish brown and strong brown; weak subangular blocky structure.
48 to 65 inches, gray, friable sandy clay loam mottled with yellow, light gray, and strong brown; weak subangular blocky structure.

The surface layer ranges from gray to dark gray. The depth to the mottled sandy loam or sandy clay loam ranges from 36 to 50 inches.

The available water capacity is low, and in the upper 4 feet, permeability is moderately rapid. Runoff is slow. The water table fluctuates and generally is within 15 to 30 inches of the surface for 2 to 6 months of each year, but it drops sharply to a depth of 36 inches or more during extended dry periods.

Tilth is generally good, and the root zone is thick. This soil is suited to a fairly wide range of crops and is well suited as woodland. In cultivated areas some drainage is needed to prevent crop damage during wet periods.

About 30 percent of the fairly large total acreage of this soil is cultivated. A small acreage is in pasture, and the rest is woodland.

Ardilla Series

The Ardilla series consists of somewhat poorly drained soils on low flats near drainageways. Slopes range from 0 to 2 percent. The surface layer of these soils is loamy sand 8 to 20 inches thick. It is dark gray in the upper part and light brownish gray in the lower part. The subsoil is mottled pale-yellow sandy clay loam that becomes grayish and more mottled as depth increases. These soils are low in content of organic matter and natural fertility, and they are strongly acid.

The Ardilla soils occur among the Leefield, Stilson, Pelham and Albany soils. The loamy sand surface layer of the Ardilla soils is thinner than that of the Leefield and Stilson soils. The Ardilla soils are more poorly drained than the Stilson soils. Texture is finer in the Ardilla soils than it is in the Albany soils. The Ardilla soils are better drained than the Pelham soils and lack a dominantly gray subsoil.

The total acreage of these soils is small. The native vegetation is slash, longleaf, and loblolly pines and water oaks. The understory consists of gallberry, waxmyrtle, and wiregrass. If management is good, these soils produce favorable yields of most crops commonly grown in the county.

Ardilla loamy sand, 0 to 2 percent slopes (AqA).—This somewhat poorly drained soil is on low flats near drain-

ageways in the uplands. A brief description of its profile follows:

0 to 4 inches, dark-gray, very friable loamy sand.
4 to 10 inches, light brownish-gray, very friable loamy sand.
10 to 21 inches, pale-yellow, friable sandy clay loam that has weak subangular blocky structure.
21 to 60 inches, mottled gray, pale-yellow, brownish-yellow, and red, friable sandy clay loam that has weak subangular blocky structure.

The surface layer ranges from dark gray to very dark gray. The thickness of loamy sand over finer textured materials ranges from 8 to 20 inches.

Runoff is slow on this nearly level soil. The available water capacity is medium. Permeability is moderate except in the lower part, where it is moderately slow. The water table fluctuates and generally, for about 2 to 6 months of most years, is between 15 and 30 inches of the surface. Before this soil can be cultivated, drainage is needed to remove excess surface water and to improve internal drainage. This soil generally has good tilth, and crops on it respond well to good management.

The total acreage of this soil is small. About half of it is in crops and pasture, and the rest is woodland.

Bladen Series

The Bladen series consists of poorly drained soils on low stream terraces that have slopes of less than 2 percent. The surface layer of these soils is dark-gray to gray fine sandy loam, and the subsoil is dark-gray clay mottled with light olive brown. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

The Bladen soils are slightly above the flood plain and are near the Rains, Dunbar, and Izagora soils. The Bladen soils have a finer textured subsoil than the Rains soils and are grayer, finer textured, and more poorly drained than the Dunbar and Izagora soils.

Most of the acreage is near the Ogeechee River. The native vegetation is water oak, red oak, sweetgum, and holly, and there are a few scattered loblolly and spruce pines. All of the acreage is woodland, but if this soil is cleared and adequately drained, it is suited to pasture and a narrow range of crops.

Bladen fine sandy loam (0 to 2 percent slopes) (BlA).—This poorly drained soil is on stream terraces near the Ogeechee River. A brief description of its profile follows:

0 to 8 inches, dark-gray to gray, friable fine sandy loam; many roots.
8 to 36 inches, dark-gray, firm clay mottled with light olive brown; moderate to strong subangular blocky structure.
36 to 60 inches +, gray, very firm clay mottled with olive brown and yellowish red; strong subangular blocky structure.

The surface layer ranges from dark gray to very dark gray. The subsoil ranges from dark gray to gray and from clay to sandy clay. Included in the mapping are areas that have a sandy loam surface layer.

Surface runoff is slow to very slow, and erosion is not a problem. Permeability is slow to very slow, and the available water capacity is high. Tilth is generally fair. This soil is flooded more than once a year for periods that last 7 days to 1 month. For more than 2 months of each year, the water table is less than 15 inches from the surface.

If this soil is drained, it is suited to a narrow range of crops and pasture. All of the small acreage of this soil is woodland.

Bladen and Rains soils and swamp (0 to 2 percent slopes) (Brs).—This mapping unit consists of densely wooded poorly drained soils and swamp along the larger streams of the county. For more than 6 months each year, these soils are covered with water, or the water table is less than 15 inches below the surface. The acreages of Bladen soil, Rains soil, and swamp are about equal.

In this mapping unit, the Bladen and Rains soils have a dark-gray to black clay loam to sandy loam surface layer that extends to a depth of 5 to 8 inches. The subsoil of the Bladen soils is gray to dark gray clay, but the Rains soils have a gray sandy clay subsoil that contains lenses of sandier material.

The surface layer of swamp is dark gray or black in color and ranges from clay to sand in texture. It contains partly decomposed leaves, twigs, roots, and logs. Beneath the surface layer is a mixture of mineral and organic materials that is commonly stratified or interbedded. These materials are extremely variable in color and in texture. The soil material in which swamp is formed is generally very strongly acid and low in natural fertility.

Generally this mapping unit is separated from the soils on uplands by a bluff 10 to 30 feet high. This mapping unit is similar to Rutlege and Portsmouth soils and alluvial land and adjoins them in places. It has water at or near the surface more of the time, for it receives water from the rivers and large creeks that it borders.

This mapping unit is more variable than other units in the county, but mapping is controlled well enough for the expected uses.

This mapping unit is extensive in Bulloch County. The largest area is along the Ogeechee River, and smaller areas are along Upper and Lower Black Creeks, Lotts Creek, and Mill Creek. These areas are woodland and are well suited to that use. The principal trees are cypress, swamp blackgum, red maple, ash, water oak, swamp chestnut, yellow-poplar, willow, and sweetgum. In places there is a thick understory of titi, alder, fetterbush, chokeberry, huckleberry, wild azalea, and bamboo vine.

Carnegie Series

The Carnegie series consists of well-drained pebbly soils on short breaks in the slopes of broad interstream ridges. The slopes of these soils range from 2 to 12 percent. The surface layer is dark grayish-brown loamy sand or sandy loam. The subsoil is yellowish-brown sandy clay that is prominently mottled with yellowish red and red at a depth of about 22 inches. Many small rounded iron concretions, or pebbles, 1/8 to 3/4 inch in diameter, are on and in these soils. These soils are low in natural fertility, contain little organic matter, and are strongly acid.

The Carnegie soils commonly are adjacent to or near the Tifton, Fuquay, Dothan, and Cowarts soils. Mottles are closer to the surface in the Carnegie soils than they are in the Tifton soils. The Carnegie soils contain more pebbles but have a finer textured subsoil than the Fuquay, Dothan, and Cowarts soils.

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The Carnegie soils are scattered throughout the northern three-fourths of the county. They are suitable for many uses, but most of the acreage is in cultivated crops. Mixed pines are the main trees in the native vegetation, but there are some widely scattered hardwoods. The understory consists of shrubs, briers, and wiregrass. Slash pine has been planted on some of the severely eroded slopes that were formerly cultivated.

Carnegie loamy sand, 2 to 5 percent slopes (CnB).—This is a well-drained pebbly soil on uplands. A brief description of its profile follows:

0 to 8 inches, dark grayish-brown, very friable loamy sand that contains many pebbles.
8 to 12 inches, yellow, very friable loamy sand that contains many pebbles.
12 to 22 inches, yellowish-brown, firm heavy sandy clay loam that has moderate subangular blocky structure.
22 to 60 inches +, mottled yellowish-brown, brownish-yellow, yellowish-red, and red, firm sandy clay loam that has moderate subangular blocky structure.

Typically, pebbles that vary in number and size make up about 15 to 20 percent of the upper 6 inches of this soil. The subsoil ranges from sandy loam to sandy clay. In the southwestern part of the county, the subsoil is red in a few included areas mapped as this soil.

The root zone of this soil is favorable to an average depth of about 22 inches. Below the favorable root zone, plant nutrients are insufficient and a firm layer containing concretions hinders the penetration of roots. The available water capacity is moderately low. Permeability is moderate except in the lower part, where it is moderately slow. The hazard of erosion is moderate. Tilth is generally good, but in some areas the pebbles are so numerous that they hinder cultivation and the harvesting of peanuts.

The total acreage of this soil is small, and most of it is in cultivated crops. Many kinds of crops are fairly well suited.

Carnegie sandy loam, 2 to 5 percent slopes, eroded (CoB2).—This well-drained pebbly soil has a dark grayish-brown sandy loam surface layer 4 to 8 inches thick. The surface layer has been thinned by erosion, and plowing has mixed the upper part of the subsoil with the surface layer. As a result, the surface layer appears spotty. The subsoil is yellowish-brown sandy clay loam to sandy clay that is highly mottled at a depth of about 18 to 20 inches. This soil has a few rills and shallow gullies and occasional deep gullies that are more than 100 feet apart. Included in areas mapped as this soil are a few places where the subsoil is red.

The hazard of erosion is moderate to severe. The available water capacity is moderately low. This soil is easy to work except where the pebbles are so numerous that they hinder cultivation and the harvesting of peanuts.

The total acreage of this soil is small; about 80 percent is in cultivated crops, a small acreage is in pasture, and the rest is woodland. All of the acreage has been cultivated in the past. If management is good, this soil is suited to a wide range of crops.

Carnegie loamy sand, 5 to 8 percent slopes (CnC).—This well-drained pebbly soil has a dark grayish-brown loamy sand surface layer 8 to 12 inches thick. The subsoil is yellowish-brown sandy clay to sandy clay loam that is highly mottled at a depth of about 22 inches. Included in places mapped as this soil are a few small areas that have a red subsoil.

The available water capacity of this soil is moderately low. Surface runoff is rapid, and the hazard of erosion is moderate to severe.

This soil is fairly well suited to most crops grown in the county, but practices that control erosion are needed in cultivated areas. About half of this soil is cultivated, but the total acreage in the county is small.

Carnegie sandy loam, 5 to 8 percent slopes, eroded (CoC2).—This well-drained pebbly soil has a dark grayish-brown to brown sandy loam surface layer 4 to 8 inches thick. The surface layer has a spotty appearance because it has been thinned by erosion and plowing has mixed material from the upper part of the subsoil with it. The subsoil is yellowish-brown sandy clay loam to sandy clay that is highly mottled with red and yellow, generally at a depth of about 18 to 22 inches. Gullies have formed. A few of them are shallow, but an occasional gully has cut deep enough to expose the lower layers.

The available water capacity is moderately low. Permeability is moderate except in the lower part, where it is moderately slow. The hazard of erosion is severe because runoff is rapid on the strong slopes. A requirement of good management is keeping cultivation to a minimum.

The acreage of this soil is small, and all of it has been in row crops at one time. In the past 10 years about one-half of the acreage has been planted to trees.

Carnegie sandy loam, 8 to 12 percent slopes, eroded (CoD2).—This well-drained pebbly soil is on short breaks. It has a dark grayish-brown to brown sandy loam surface layer and a yellowish-brown sandy clay subsoil that is mottled at a depth of about 16 to 20 inches. Gullies have formed. A few of them are shallow, but an occasional deep gully has cut deep enough to expose the lower layers. The pebbles on the surface of this soil are larger than those on Tifton soils. Included in places mapped as this soil are a few small areas that have a red subsoil.

The acreage of this soil is small, and all of it is in trees or permanent pasture. This soil is not suited to cultivated crops, for runoff is very rapid and the hazard of erosion is very severe. Also, the root zone is moderately shallow.

Chipley Series

The Chipley series consists of moderately well drained and somewhat poorly drained sandy soils on low flats in the uplands. Slopes range from 0 to 2 percent. The surface layer of these soils is dark-gray to gray sand over pale-yellow sand that extends to a depth of more than 50 inches. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

The Chipley soils commonly are adjacent to or near the Lakeland, Ona, Plummer, and Rutlege soils. They occur at lower elevations and are wetter than the Lakeland soils. The Chipley soils are similar to the Ona soils, but they lack the dark-brown subsurface layer that occurs in the Ona soils. The Chipley soils are better drained and have a less grayish subsoil than the Plummer and Rutlege soils.

The Chipley soils occupy a small acreage, most of which is in the southern half of the county. The native

trees are slash pine, water oak, waxmyrtle, gallberry, maple, and sweetgum, and the understory consists of wiregrass, briers, and shrubs. Most of the crops commonly grown in the county are suited to these soils if they are adequately drained. In recent years some of the acreage that was formerly cultivated has been planted to slash pine.

Chipley sand, 0 to 2 percent slopes (CmA).—This moderately well drained and somewhat poorly drained soil is on low, level ridges. A brief description of its profile follows:

0 to 9 inches, dark-gray, very friable sand.
9 to 42 inches, pale-yellow, loose sand that has a few light-gray mottles.
42 to 58 inches +, mottled pale-yellow, light-gray, and brownish-yellow, loose sand.

The surface layer is gray to dark gray loose sand. In some places this soil is underlain by mottled gray and yellow sandy loam or sandy clay loam at a depth of more than 50 inches. Included in areas mapped near the Ogeechee River and Lotts Creek are a few small areas that have a fine sand surface layer.

This soil has rapid permeability and slow runoff. The available water capacity is low, but moisture is available from the fluctuating water table, which is within 15 to 30 inches of the surface for more than 2 to 6 months each year. During extended dry periods, however, this soil is slightly droughty because the water table drops sharply to a depth of more than 36 inches.

The soil is easily worked and has a deep root zone. It is suited to cultivated crops, but planting in spring is often delayed 1 month or more because the soil is wet. Drainage is needed for most crops, but most of the acreage is woodland, which is a good use. This soil is not extensive in this county.

Cowarts Series

The Cowarts series consists of well-drained soils on side slopes of narrow and broad interstream ridges. Slopes range from 2 to 8 percent, but they are less than 5 percent in most of the acreage. The surface layer of these soils is dark grayish-brown loamy sand. The subsoil is friable, brownish-yellow to yellowish-brown sandy clay loam that is firm and prominently mottled with yellowish red, light gray, and red at a depth of about 20 inches. A highly mottled plinthitic layer occurs at a depth of less than 24 inches. These soils are low in natural fertility and in organic-matter content. They are strongly acid.

The Cowarts soils occur among the Dothan, Fuquay, Tifton, and Carnegie soils. The plinthitic layer in the Cowarts soils is less than 24 inches from the surface, but a similar layer in the Dothan and Fuquay soils is at a depth of more than 24 inches. The Cowarts soils contain a much smaller amount of pebbles than the Tifton and Carnegie soils and generally have a slightly coarser textured subsoil.

The Cowarts soils are extensive in the northern two-thirds of the county. The native vegetation is slash pine, longleaf pine, mixed oaks, sweetgum, and many kinds of grasses. These soils are suited to most crops commonly grown in the county. In recent years a sizable acreage that was formerly cultivated has been planted to slash pine.

Cowarts loamy sand, 2 to 5 percent slopes (CqB).—This well-drained soil is on uplands. A brief description of its profile follows:

0 to 7 inches, dark grayish-brown, very friable loamy sand.
7 to 20 inches, yellowish-brown, friable sandy clay loam that has weak subangular blocky structure.
20 to 46 inches, mottled brownish-yellow, yellowish-brown, yellowish-red, light-gray, and red, firm sandy clay loam that has moderate subangular and angular blocky structure.
46 to 72 inches, reticulately mottled yellow, light-gray, brownish-yellow, and red, friable sandy clay loam that has weak subangular blocky structure.

The surface layer ranges from grayish brown to dark grayish brown in color and from 6 to 10 inches in thickness. The subsoil is brownish yellow or yellowish brown In places the loamy sand extends to a depth of 20 inches. Except in a few small areas, the plow layer is within the surface layer. Near the Jenkins County line, a few included areas have a surface layer coarser than loamy sand. Also included are a few small areas where the subsoil is sandy clay. In the northern edge of the county, the surface layer contains a few quartz pebbles, about ⅛ to ¼ inch in diameter.

This soil is low in natural fertility. Permeability is moderate except in the lower part, where it is moderately slow. The available water capacity is medium. Surface runoff is medium, and the hazard of erosion is moderate.

This soil is suited to many kinds of crops. Of its large total acreage, about 35 percent is in cultivated crops. The rest is woodland.

Cowarts loamy sand, 2 to 5 percent slopes, eroded (CqB2).—This well-drained soil has a grayish-brown loamy sand surface layer 4 to 7 inches thick. The subsoil is brownish-yellow to yellowish-brown sandy clay loam that is mottled with red and pale olive below a depth of about 18 to 20 inches. Generally, the plow layer consists of the original surface layer mixed with the upper part of the subsoil, but there are patches where the plow layer is wholly within the surface layer. In other small areas the plow layer consists entirely of subsoil material. Shallow gullies or galled spots have formed in some areas.

This soil is moderately permeable except in the lower part, where permeability is moderately slow. The available water capacity is medium. Runoff is medium, and the hazard of erosion is moderate. This soil is easy to work.

This soil is suited to a wide range of crops, but the total acreage in the county is small. About 75 percent is in cultivated crops, and the rest is woodland. All of this soil has been cultivated in the past.

Cowarts loamy sand, 5 to 8 percent slopes (CqC).—The surface layer of this soil is dark grayish-brown to grayish-brown loamy sand 6 to 10 inches thick. The subsoil is brownish-yellow to yellowish-brown sandy clay loam that is highly mottled at a depth of about 16 to 20 inches. The plow layer is within the surface layer except in a few small areas, and in places the loamy sand extends to a depth of 20 inches. In areas along the northern edge of the county, a few quartz pebbles, about ⅛ to ¼ inch in diameter, are on the surface and in the sur-

face layer. Included in places mapped as this soil are a few small areas where the subsoil is sandy clay.

Runoff on this soil is moderately rapid, and the hazard of erosion is moderate to severe. The available water capacity is medium. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. This soil generally has good tilth.

Total acreage of this soil is fairly small. If management is good, a wide range of crops is suited. About half of this soil is in cultivated crops, and the rest is woodland.

Cowarts loamy sand, 5 to 8 percent slopes, eroded (CqC2).—This soil has a grayish-brown to yellowish-brown loamy sand surface layer 4 to 7 inches thick. The subsoil is brownish-yellow or yellowish-brown sandy clay loam that is highly mottled at a depth of 16 to 20 inches. Generally, the plow layer consists of material from the upper part of the subsoil mixed with the surface layer, but in a few patches the plow layer does not extend into the subsoil material. In some patches the plow layer is entirely subsoil material. Included in areas mapped as this soil are a few places where the subsoil is sandy clay. Shallow gullies or galled spots have formed in some places.

This soil is low in natural fertility. Permeability is moderate except in the lower part, where it is moderately slow. The available water capacity is medium. Runoff is moderately rapid, and the hazard of erosion is severe. A requirement for good management is keeping cultivation to a minimum. Crops respond well to additions of fertilizer.

This soil is suited to a fairly wide range of crops. All of the small total acreage in the county has been cultivated at one time, and about half is now in cultivated crops. The rest is woodland.

Dothan Series

The Dothan series consists of well-drained soils on broad interstream ridges. Slopes range from 0 to 8 percent, but they are less than 5 percent in most places. The plow layer of these soils is dark grayish-brown loamy sand, and the subsoil is brownish-yellow to yellow sandy clay loam. At a depth of about 36 inches, the subsoil is commonly mottled with red and yellowish brown. These strongly acid soils are low to moderate in natural fertility and low in organic-matter content.

The Dothan soils commonly are adjacent to or near the Fuquay, Tifton, and Cowarts soils. The Dothan soils have a thinner loamy sand surface layer than the Fuquay soils and contain a smaller amount of pebbles throughout the profile than the Tifton soils. In contrast with Tifton soils, the Dothan soils have a less clayey subsoil. The subsoil of Dothan soils is thicker and more friable than that of the Cowarth soils, which is yellowish brown.

The Dothan soils are scattered throughout the county, but they make up only a small total acreage. The native vegetation is slash pine, longleaf pine, mixed oaks, sweetgum, and many kinds of grasses. These soils are among the most productive in the county. Yields of all locally grown crops are favorable if adequate fertilizer is added. Nearly all of the acreage is in cultivated crops.

Dothan loamy sand, 2 to 5 percent slopes (DaB).—This well-drained soil is on uplands. A brief description of its profile follows:

0 to 8 inches, dark grayish-brown, very friable loamy sand.
8 to 36 inches, yellowish-brown, friable sandy clay loam; moderate subangular blocky structure.
36 to 48 inches, brownish-yellow, firm sandy clay loam that is mottled with yellowish red, red, and light gray; moderate subangular and angular blocky structure.
48 to 68 inches +, mottled red, brownish-yellow, yellowish-brown, and light-gray, firm sandy clay loam; moderate subangular blocky and angular blocky structure.

The surface layer ranges from dark grayish brown to grayish brown. The thickness of the loamy sand over finer textured material ranges from 8 to 20 inches. In many places a few iron concretions are scattered on the soil surface and, to a lesser extent, are in the subsoil.

Runoff is medium, and the hazard of erosion is moderate. Permeability is moderate except in the lower part of this soil, where it is moderately slow. The available water capacity is medium. This soil has a favorable root zone and is easy to work.

This soil is suited to all crops grown locally and is one of the most productive soils in the county. It has a fairly large total acreage in this county and is more than 90 percent cultivated.

Dothan loamy sand, 0 to 2 percent slopes (DaA).—This well-drained soil has a grayish-brown to dark grayish-brown loamy sand surface layer that is 8 to 12 inches thick in most places. The subsoil is yellow to brownish-yellow sandy clay loam that is mottled at a depth of about 32 to 40 inches. In places the loamy sand is as much as 20 inches thick over the finer textured subsoil. In many places a few small concretions of iron are scattered on the surface and, to a lesser extent, are in the subsoil.

The natural fertility of this soil is low or moderate. The available water capacity is medium. Permeability is moderate in the upper part of the soil and moderately slow in the lower part. Runoff is slow, and the hazard of erosion is slight. This soil is well suited to all crops commonly grown in the county. Tilth is generally good, and the root zone is favorable for the growth of crops.

If this soil is well managed, it is one of the most productive soils in the county. The total acreage is fairly small, and nearly all of it is in cultivated crops.

Dothan loamy sand, 2 to 5 percent slopes, eroded (DaB2). This soil has a grayish-brown to light yellowish-brown loamy sand surface layer 4 to 8 inches thick. The original surface layer has been thinned by erosion, and plowing has mixed the upper part of the subsoil with the surface layer. Because subsoil material is mixed with it, the surface layer has a spotty appearance. The subsoil is yellow to brownish-yellow sandy clay loam that is mottled in the lower part. In many places a few small concretions of iron are scattered on the surface and, to a lesser extent, are in the subsoil. Shallow gullies or galled spots are in some areas.

Permeability is moderate in the upper part of this soil and is moderately slow in the lower part. The available water capacity is medium. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is low.

This soil is suited to all crops commonly grown in the county. More than 90 percent of the small total acreage is in cultivated crops.

Dothan loamy sand, 5 to 8 percent slopes (DaC).—This soil has a grayish-brown to dark grayish-brown loamy sand surface layer that is 8 to 12 inches thick in most places. The subsoil of yellow to brownish-yellow sandy clay loam is mottled with red, yellowish brown, and gray below a

depth of 30 inches. In some places loamy sand is as much as 20 inches thick over the finer textured subsoil. In many places a few small concretions of iron are scattered on the surface and, to a lesser extent, are in the subsoil. Included are a few mapped areas where the surface layer is only 4 to 8 inches thick, and in these places shallow gullies or galled spots have formed.

Runoff on this soil is medium to moderately rapid, and the hazard of erosion is moderate to severe. The available water capacity is medium, and permeability is moderate except in the lower part, where it is moderately slow. Tilth is generally good, and the root zone is favorable, but natural fertility is low.

This soil is suited to all crops commonly grown in the county. In cultivated areas intensive management is needed because erosion is a hazard. In this county about 70 percent of the small total acreage is in cultivated crops. A small part is in pasture, and the rest is woodland.

Dunbar Series

The Dunbar series consists of somewhat poorly drained soils on level to nearly level, low stream terraces. These soils have a surface layer of dark-gray fine sandy loam and a subsoil of pale-yellow sandy clay loam that grades to mottled sandy clay at a depth of about 18 inches. These soils are low to medium in natural fertility, contain little organic matter, and are very strongly acid.

The Dunbar soils occur with the Izagora, Bladen, and Rains soils. They are less well drained than the Izagora soils and have a finer textured subsoil. The Dunbar soils are better drained and are less grayish in their subsoil than the Bladen and Rains soils.

In this county Dunbar soils are mapped only in a complex with Izagora soils. They occur mainly near the Ogeechee River, but a few scattered areas are near Mill and Lotts Creeks. The native vegetation is loblolly, longleaf, and slash pines, water oaks, holly, and sweetgum, and there is an understory of gallberry, waxmyrtle, briers, and wiregrass. If these soils are properly drained, they are suited to a fairly wide range of crops and pasture. At present, most of the acreage is woodland, for which these soils are well suited.

Dunbar-Izagora complex (0 to 2 percent slopes) (Dic).—This complex consists of Dunbar soils and Izagora soils that are so closely intermingled in small, narrow areas that they were mapped together as a single unit. The Dunbar soils make up about 55 percent of the acreage; the Izagora soils, about 30 percent; and other soils, about 15 percent.

The somewhat poorly drained Dunbar soils are highly mottled near the surface and are finer textured throughout than the moderately well drained Izagora soils.

The following describes a profile of a Dunbar soil:

0 to 9 inches, dark-gray, very friable fine sandy loam.
9 to 18 inches, pale-yellow, friable sandy clay loam that has weak subangular blocky structure.
18 to 55 inches +, mottled gray, yellow, and red, firm sandy clay that has moderate subangular structure.

The surface layer is fine sandy loam in most places but ranges to sandy loam or loamy sand. This layer ranges from about 7 to 24 inches in thickness. In a few areas the subsoil is yellowish red in the upper part. Included in mapping were a few small areas where the soil is dominantly gray throughout the profile.

The water table is seasonally high and is at a depth between 15 and 30 inches for more than 2 months each year. Every 5 years Dunbar soils are subject to flooding that lasts for not more than 7 days.

The following describes a profile of an Izagora soil:

0 to 8 inches, dark grayish-brown, very friable loamy sand.
8 to 21 inches, pale-yellow, very friable loamy sand splotched with yellow and light gray.
21 to 31 inches, brownish-yellow or yellow, friable sandy clay loam that is mottled with light brownish gray, light yellowish brown, and red at a depth of about 26 inches.
31 to 62 inches +, mottled yellow, gray, and red, firm sandy clay that has moderate subangular blocky structure.

The depth to sandy clay loam ranges from about 8 to 24 inches.

The soils of the Dunbar-Izagora complex are very strongly acid, are low in natural fertility, and contain little organic matter. Their available water capacity is moderately high, and permeability is moderately slow.

These soils are not commonly used for cultivated crops, for they occur in remote places, and the lower areas are covered by water for short to long periods. Some areas are suited to bahiagrass, white clover, and similar crops. The total acreage of this mapping unit is small, and nearly all of it is woodland.

Fuquay Series

The Fuquay series consists of well-drained soils that occur on broad interstream ridges and have slopes of less than 8 percent. In these soils loamy sand extends from the surface to a depth of 20 to 40 inches. The loamy sand ranges from grayish brown in the upper part to light yellowish brown in the lower part. It is underlain by brownish-yellow to yellowish-brown sandy clay loam that is highly mottled at a depth of about 4 feet. These soils are low or moderate in natural fertility, low in content of organic matter, and very strongly acid.

The Fuquay soils commonly are adjacent to or near the Tifton, Orangeburg, Lakeland, and Stilson soils. In contrast to the Tifton soils, the Fuquay soils have a thicker surface layer, fewer iron concretions, and a less clayey subsoil. They have a thicker surface layer and more yellowish subsoil than the Orangeburg soils. The Fuquay soils have a finer textured subsoil than the Lakeland soils and are higher and better drained than the Stilson soils.

The Fuquay soils occupy a large acreage in this county and are scattered throughout. The native vegetation is slash pine, longleaf pine, mixed oaks, sweetgum, and many kinds of grasses. These soils are among the most productive in the county. They produce favorable yields of all crops commonly grown if they are well fertilized. Some of the acreage that was formerly cultivated has been planted to slash pine in recent years.

Fuquay loamy sand, 0 to 2 percent slopes (FsA).—This well-drained soil is on uplands. A brief description of its profile follows:

0 to 8 inches, grayish-brown, very friable loamy sand.
8 to 30 inches, light yellowish-brown loamy sand.
30 to 51 inches, yellowish-brown, friable sandy clay loam; moderate subangular blocky structure.
51 to 70 inches +, reticulately mottled brownish-yellow, yellowish-brown, red, and light-gray, friable to firm sandy clay loam; moderate subangular to angular blocky structure.

In most cultivated areas the surface layer ranges from grayish brown to gray. The subsurface layer ranges from light olive brown to pale yellow. The loamy sand is 20 to 40 inches thick over finer textured material. Included in the areas mapped as this soil are sizable areas where the surface and subsurface layers are sand.

This soil has low natural fertility, moderately low available water capacity, and slow runoff. Permeability is moderate to moderately rapid except in the lower part, where it is moderately slow. Tilth is generally good, and the root zone is favorable. Because the surface layer is thick and sandy, it is slightly droughty. Crops on this soil respond favorably to good management.

This soil is suited to most of the crops grown in the county. More than 85 percent of the fairly large total acreage is cultivated.

Fuquay loamy sand, 2 to 5 percent slopes (FsB).—The upper 6 to 8 inches of this well-drained soil is grayish-brown to gray loamy sand. It is underlain by light olive-brown to pale-yellow loamy sand that extends to a depth of about 30 inches in most places and is underlain, in turn, by brownish-yellow to yellowish-brown sandy clay loam. The thickness of loamy sand over finer textured material ranges from 20 to 40 inches.

In this soil permeability is moderate or moderately rapid except in the lower part, where it is moderately slow. Runoff is slow, and the available water capacity is moderately low. This soil has a favorable root zone and is easy to work. Because the surface layer is thick and sandy, this soil is slightly droughty.

This soil is suited to most of the crops grown in the county. Crops respond favorably to good management. Of the large total acreage, more than 80 percent is cultivated, about 10 percent is pasture, and about 10 percent is woodland.

Fuquay loamy sand, 5 to 8 percent slopes (FsC).—The loamy sand in this well-drained soil generally extends to a depth of about 24 inches. It ranges from grayish brown to gray in the uppermost few inches to light olive brown or pale yellow below. The loamy sand is underlain by brownish-yellow to yellowish-brown sandy clay loam. Depth to this finer textured material ranges from 20 to 40 inches.

Cultivation of this soil is limited chiefly by the moderate to severe hazard of erosion and by drought. Runoff is medium to rapid, and the available water capacity is moderately low. This soil has a favorable root zone and is easily worked. About half of the small total acreage is cultivated, and the rest is woodland.

Fuquay pebbly loamy sand, 2 to 5 percent slopes (FhB).—This well-drained pebbly soil is on uplands. A brief description of its profile follows:

0 to 8 inches, dark grayish-brown, loose loamy sand and many pebbles.
8 to 23 inches, light yellowish-brown, very friable loamy sand and many pebbles.
23 to 38 inches, yellowish-brown, friable sandy clay loam; weak subangular blocky structure.
38 to 54 inches +, mottled yellowish-brown, strong-brown, and yellowish-red, firm sandy clay; moderate subangular blocky structure.

In this soil the size and number of the pebbles vary considerably. In most places pebbles generally make up about 15 percent of the uppermost 12 inches, and many pebbles occur throughout the rest of the profile. The surface layer ranges from dark grayish brown to grayish brown. The loamy sand ranges from 18 to 30 inches in thickness over finer textured material.

Runoff is slow on this soil, and there is little or no hazard of erosion. Permeability is moderate or moderately rapid except in the lower part, where it is moderately slow. The available water capacity is moderately low. This soil is easy to work and has a thick root zone. During dry periods, however, it is slightly droughty because the surface layer is thick and sandy.

This soil is suited to many kinds of crops. About 80 percent of the small total acreage is cultivated, 10 percent is in pasture, and 10 percent is woodland.

Fuquay pebbly loamy sand, 0 to 2 percent slopes (FhA).—The upper 6 to 10 inches of this well-drained soil is dark grayish-brown to grayish-brown loamy sand. It is underlain by light yellowish-brown loamy sand that, in most places, is underlain by yellowish-brown sandy clay loam or sandy clay at a depth of about 23 inches. The thickness of loamy sand ranges from 20 to 40 inches over finer textured material.

Permeability in this soil is moderate to moderately rapid except in the lower part, where it is moderately slow. The available water capacity is moderately low. Runoff is slow, and there is little or no hazard of erosion. Tilth is generally good, and the root zone is thick. Because the surface layer is thick and sandy, this soil is slightly droughty during prolonged dry periods.

This soil is suited to many kinds of crops. More than 90 percent of the small total acreage is in cultivated crops.

Grady Series

The Grady series consists of poorly drained soils in small rounded depressions. Slopes range from 0 to 2 percent. The surface layer of these soils is very dark gray sandy loam, and the subsoil is gray clay to sandy clay that is mottled with yellowish red and reddish yellow. The content of organic matter is moderately high, but natural fertility is low. These soils are very strongly acid.

The Grady soils occur near the Tifton, Dothan, Leefield, and Pelham soils. The Grady soils are more poorly drained than the Tifton and Dothan soils and have a thinner surface layer and a finer textured subsoil than the Leefield and Pelham soils.

These soils occur in small areas that are scattered throughout the northern half of the county. The native vegetation is slash pine, sweetgum, cypress, water oaks, maple, swamp holly, and water-tolerant grasses. Because these soils have a high water table, they are better suited to trees than to cultivated crops. A few crops can be grown, however, in areas that have been properly drained.

Grady sandy loam (0 to 2 percent slopes) (Gra).—This is a poorly drained soil in small rounded depressions. A brief description of its profile follows:

0 to 6 inches, very dark gray to dark-gray, very friable sandy loam.
6 to 10 inches, gray, friable sandy clay loam that has a few reddish-yellow mottles; weak subangular blocky structure.
10 to 50 inches +, gray, very firm clay or fine sandy clay mottled with red, yellowish brown, and reddish yellow; moderate subangular blocky structure.

The surface layer ranges from dark gray to black. Its top 1 to 3 inches is slightly mucky or peaty in some areas.

The subsoil ranges from clay to sandy clay. The depth to red mottles ranges from 10 to 20 inches.

The permeability of this soil is slow, and the available water capacity is medium to high. This soil is flooded for 1 to 6 months each year, and the water table is at a depth of less than 15 inches for 6 months or more. Tilth however, is generally good, and cultivated crops can be grown successfully if ditches or tile are installed to remove excess surface water and to improve the internal soil drainage. Some drainage is also needed if pine trees are to reproduce satisfactorily.

This soil is better suited to pine trees than to cultivated crops, and more than 90 percent of the small total acreage is in trees. A few small areas are cultivated.

Irvington Series

The Irvington series consists of moderately well drained pebbly soils on low flats in the uplands. Slopes range from 0 to 2 percent. The surface layer of these soils is dark-gray loamy sand, and the subsoil is yellow sandy clay loam. At a depth of about 28 to 32 inches is a weakly to moderately cemented layer consisting of soft and hard concretions and sandy clay loam. Rounded iron concretions that average about one-half inch in diameter are on and in these soils. These soils are low in natural fertility, low in content of organic matter, and very strongly acid.

The Irvington soils occur among the Tifton, Stilson, and Leefield soils and are distinguished from them by the well-defined, weakly cemented layer. Irvington soils are not so well drained as the Tifton soils but are better drained than the Leefield. Also, the Irvington soils contain more iron concretions throughout the profile than the Stilson or Leefield soils.

The Irvington soils are scattered throughout the southeastern part of the county. The native vegetation is longleaf and slash pines, scattered oaks, waxmyrtle, gallberry, and a thick mat of wiregrass. These soils are well suited to crops, pasture, and trees. Most of the acreage is cultivated.

Irvington loamy sand, 0 to 2 percent slopes (IjA).—This moderately well drained pebbly soil is on low, level uplands. A brief description of its profile follows:

0 to 9 inches, dark-gray, very friable loamy sand and many iron concretions.
9 to 18 inches, pale-yellow, very friable loamy sand and many iron concretions.
18 to 36 inches, yellow, friable sandy clay loam and many iron concretions; weak subangular blocky structure.
36 to 48 inches, yellow sandy clay loam mottled with pale brown, yellowish brown, and light gray; weakly cemented with soft and hard iron concretions.
48 to 58 inches, mottled yellowish-brown, strong-brown, and red, friable sandy clay loam; weak subangular blocky structure.

The surface layer ranges from dark gray in most cultivated areas to very dark grayish brown in wooded areas. The subsoil is yellow to yellowish brown. In most places the loamy sand is 15 to 20 inches thick over finer textured material. In a few included areas the loamy sand is thicker than 20 inches. The thickness of the weakly cemented layer ranges from 6 to 16 inches.

The available water capacity is medium. Surface runoff is slow. Water moves through this soil at a moderate rate until it reaches the weakly cemented layer, where it moves slowly. Late in winter and early in spring, the water table is perched over this weakly cemented layer and is commonly within 24 to 36 inches of the surface. As a result, planting in spring is delayed 1 month or more, and some drainage is needed during wet seasons. Tilth is generally good, and the root zone is favorable.

This soil is well suited to cultivated crops or as woodland. It has a small total acreage, of which about 75 percent is in cultivated crops.

Izagora Series

The Izagora series consists of moderately well drained soils on nearly level stream terraces. These soils have a surface layer of dark grayish-brown loamy sand and a subsoil of brownish-yellow to yellow sandy clay loam. The sandy clay loam grades to a sandy clay at a depth of about 30 inches. These soils are low in natural fertility, low in content of organic matter, and very strongly acid.

The Izagora soils occur among the Dunbar, Bladen, and Rains soils. The Izagora soils are better drained than the Bladen and Rains soils and have a less grayish subsoil. They have a more friable subsoil and are better drained than the Dunbar soils.

Most of the acreage of Izagora soils is near the Ogeechee River in the northeastern and eastern parts of the county, but a few small areas are near Lotts Creek. The native trees are slash and loblolly pines and mixed hardwoods, and the understory consists of waxmyrtle, briers, and shrubs. About 70 percent of the acreage is woodland. Some of the acreage that formerly was cultivated has reverted to pines. If these soils are properly drained, they are suited to a wide range of crops and pasture plants.

Izagora loamy sand (0 to 2 percent slopes) (Izg).—This is a moderately well drained soil on stream terraces. A brief description of its profile follows:

0 to 8 inches, dark grayish-brown, very friable loamy sand.
8 to 18 inches, pale-yellow or yellow, very friable loamy sand.
18 to 31 inches, brownish-yellow to yellow, friable sandy clay loam mottled with pale brown, light yellowish brown, and red at a depth of about 26 inches.
31 to 62 inches, yellow, mottled with gray and red, firm sandy clay; moderate subangular blocky structure.

The surface layer ranges from dark grayish brown to grayish brown. The depth to the mottled sandy clay ranges from 26 to 32 inches. Included in mapped areas are a few areas where the fine-textured material is at a depth of more than 20 inches.

Permeability is moderately slow in the lower part of the subsoil. The available water capacity is medium, and runoff is slow. The water table fluctuates, and from 1 to 2 months each year it is between 15 and 30 inches of the surface. This soil is easy to work and has a thick root zone, but some drainage is needed to prevent crop losses during wet periods.

This soil is suited to a wide range of crops, and crops respond well to good management. Of the small total acreage, about 30 percent is in cultivated crops. A small acreage is in pasture, and the rest is woodland.

Kershaw Series

The Kershaw series consists of excessively drained soils in which loose coarse sand extends from the surface to a depth of more than 72 inches. Slopes range from 2 to 8 percent. The surface layer is grayish brown, and the subsoil is light yellowish brown. These soils are very low in natural fertility, contain little organic matter, and are very strongly acid.

The Kershaw soils occur among Lakeland, Albany, Chipley, and Plummer soils. The sand throughout the profile of Kershaw soils is coarser textured than that in Lakeland soils. Kershaw soils are higher and better drained than the Albany, Chipley, and Plummer soils.

In this county the Kershaw soils occupy a small acreage most of which is on ridges parallel to and east of Lotts Creek. The native trees are turkey oaks, scrub oaks, and scattered longleaf pines. Sparse spots of wiregrass and other grasses make up the understory.

Kershaw coarse sand, 2 to 8 percent slopes (KkC).—This excessively drained soil is on sand ridges near Lotts, Mill, and Ten Mile Creeks. A brief description of its profile follows:

0 to 3 inches, grayish-brown, loose coarse sand.
3 to 20 inches, light yellowish-brown, loose coarse sand.
20 to 43 inches, yellow, loose coarse sand.
43 to 80 inches +, very pale brown, loose coarse sand.

The subsoil ranges from light yellowish brown to pale yellow. The coarse sand ranges from 6 to 20 feet in depth.

This soil is extremely droughty; it has very low available water capacity and very rapid permeability.

Cultivated crops are not a suitable use, and yields from woodland and pasture are generally low. More than 95 percent of the small total acreage is woodland, and the rest is in Coastal bermudagrass.

Lakeland Series

The Lakeland series consists of excessively drained sandy soils. Slopes range from 0 to 12 percent, but they are less than 8 percent in most places. The surface layer is gray, loose sand. It is underlain by pale-yellow to light yellowish-brown, loose sand that extends to a depth of more than 40 inches. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

The Lakeland soils occur among the Fuquay, Chipley, and Plummer soils. Unlike the Fuquay soils, which have a friable loamy subsoil, the Lakeland soils are loose sand to a depth of more than 40 inches. They are at higher elevations and are better drained than the Chipley and Plummer soils.

The Lakeland soils are scattered throughout the county; they have a fairly large total acreage, and they occur mainly on the east side of Lotts Creek and the west side of the Ogeechee River. The native vegetation is longleaf pine, mixed oaks, scattered dogwoods, and many kinds of grasses. These soils generally are poorly suited to cultivated crops because they are sandy and droughty.

Lakeland sand, 0 to 5 percent slopes (LpB).—This excessively drained sandy soil is on the uplands. A brief description of its profile follows:

0 to 12 inches, gray, loose sand.
12 to 21 inches, light yellowish-brown, loose sand.
21 to 60 inches +, pale-yellow, loose sand that has a few, faint, yellow mottles.

In most places the surface layer is gray, but it is light gray in some cultivated areas. The subsoil ranges from light yellowish brown to yellow. In places this soil is underlain by sandy loam or sandy clay loam at a depth of 40 to 72 inches. Included in the areas mapped as this soil are a few areas that have a profile of fine sand.

This soil is rapidly permeable and has low available water capacity. Surface runoff is slow. The root zone is thick, and tilth is generally good.

Most of the fairly large total acreage is woodland, some of which was cultivated in the past but in recent years has been planted to slash pines. A small acreage is used for crops and pasture, though the soil is sandy and droughty and is not well suited to cultivated crops. The crops usually grown are corn, Coastal bermudagrass, and bahiagrass.

Lakeland sand, 5 to 12 percent slopes (LpD).—This excessively drained sandy soil is near streams and drainageways. It has a surface layer of gray sand that is underlain by light yellowish-brown to yellow loose sand. Sandy loam or sandy clay loam is at a depth of 40 to 72 inches. Included in the areas mapped as this soil are a few small areas that have slopes of more than 12 percent.

The permeability of this soil is rapid, and the available water capacity is low. Some of the needed water is lost in runoff from the strong slopes. As a result, this sandy soil is droughty.

This soil is poorly suited to cultivated crops; it is better suited to trees or pasture. About 95 percent of the acreage is woodland, and the rest is in cultivated crops and pasture.

Leefield Series

In the Leefield series are somewhat poorly drained soils on broad low flats in the uplands. Slopes range from 0 to 2 percent. In these soils loamy sand extends from the surface to a depth of more than 20 inches. The loamy sand ranges from very dark gray in the upper part to light brownish gray in the lower part. The subsoil is light yellowish-brown to pale-yellow sandy clay loam mottled with light gray and brownish yellow. Typically, the surface layer and subsoil combined are thicker than 50 inches. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

The Leefield soils commonly are adjacent to or near the Stilson, Irvington, Albany, Chipley, and Pelham soils. The Leefield soils are not so well drained as Stilson soils. In contrast with the Irvington soils, the Leefield soils are not so well drained, have a thicker surface layer, and lack a weakly cemented layer. The Leefield soils are better drained than the Pelham soils, which have a dominantly gray subsoil.

The largest acreage of Leefield soils is in the southeastern part of the county, but these soils occur throughout. The native trees are slash, longleaf, and loblolly pines and water oaks, and the understory consists of gallberry, waxmyrtle, and wiregrass. Under good management, these soils produce favorable yields of most crops commonly grown in the county, and many farmers prefer them for growing tobacco.

Leefield loamy sand, 0 to 2 percent slopes (LsA).—This is a somewhat poorly drained soil on broad low flats. A brief description of its profile follows:

0 to 10 inches, very dark gray, very friable loamy sand.
10 to 23 inches, light brownish-gray loamy sand that has a few pale-yellow mottles.
23 to 28 inches, light yellowish-brown, very friable sandy loam that has common light-gray mottles; weak subangular blocky structure.
28 to 57 inches, mottled light yellowish-brown, light-gray, yellowish-brown, olive-yellow, and yellowish-red sandy clay loam; very friable to friable; weak to moderate subangular blocky structure.
57 to 75 inches +, reticulately mottled yellowish-brown, brownish-yellow, light-gray, and red, firm sandy clay loam; massive, but breaks in place to moderate subangular blocky structure.

The surface layer ranges from dark gray to very dark gray. The thickness of loamy sand over finer textured material ranges from 20 to 40 inches.

Water moves in this soil at a moderate rate except in the lower part, where movement is moderately slow. The available water capacity is medium. Runoff is slow, and there is little or no hazard of erosion. Tilth is generally good. The water table is at a depth of about 15 to 30 inches for 2 to 6 months each year, and ditches or tile drains generally are needed to remove excess water and to improve internal soil drainage.

If this soil is properly drained, it produces favorable yields of most crops grown in the county. It is especially well suited to tobacco because it has a favorable supply of moisture.

About one-third of the large total acreage is in cultivated crops, a small acreage is in bahiagrass pasture, and the rest is woodland.

Leon Series

The Leon series consists of somewhat poorly drained and poorly drained soils that have an organic hardpan. Slopes range from 0 to 2 percent. The surface layer of these soils is very dark gray sand that is partly stained by organic matter. Because many of the sand particles are white and unstained, the surface layer has a salt and pepper appearance. Underlying the surface layer is a layer of leached light-gray sand that is 3 to 8 inches thick and is underlain, in turn, by a very dark brown organic pan. This pan is generally underlain by pale-brown sand. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

The Leon soils occur among the Plummer, Ona, Albany, and Chipley soils. The Leon soils have a highly leached layer underlain by a definite hardpan, and the Ona, Albany, Chipley, and Plummer soils do not.

In this county the Leon soils occur only in the southern part. The native trees are longleaf and slash pines, and the understory consists of a dense growth of saw-palmetto (fig. 2) and scattered gallberry, waxmyrtle, and runner oak. These soils are not suited to cultivated crops, because their root zone is shallow over the hardpan. Almost all of the acreage is woodland.

Leon sand (0 to 2 percent slopes) (LrA).—This somewhat poorly drained to poorly drained soil is in the lowlands. A brief description of its profile follows:

0 to 3 inches, very dark gray, very friable sand.
3 to 9 inches, light-gray, loose sand.
9 to 14 inches, very dark brown, firm, weakly cemented sand.
14 to 44 inches +, pale-brown to very pale brown, loose sand that is mottled with yellow and dark grayish brown.

In some areas near Upper Black Creek and Lower Black Creek, this soil is underlain by sandy clay loam at a depth of 40 inches. Included in some areas mapped as this soil are small areas of fine sand and of loamy sand. The included areas are near Upper and Lower Black Creeks. In some places more than one organic pan is present.

Little or no water runs off this soil. The water table is at a depth of less than 15 inches for about 2 to 6 months each year. The movement of water through the soil is restricted by the organic hardpan. Tilth is generally fair, but the root zone is thin over the organic hardpan.

This soil is not well suited to crops, and crops on it respond only slowly to normal management. The total acreage in this county is small, and all of it is woodland.

Figure 2.—**A dense understory of saw-palmetto growing on Leon sand.**

Ona Series

The Ona series consists of somewhat poorly drained soils that are on low ridges and have slopes of 0 to 2 percent. The surface layer of these soils is a very dark gray to dark gray loose sand. It is underlain by 4 to 7 inches of dark-brown sand that is stained by organic matter and is underlain, in turn, by dark-brown sand mottled with pale olive. At a depth of about 40 inches, in many places, is yellow sandy clay loam that is mottled with light gray and yellowish brown.

The Ona soils occur among the Leon, Albany, Chipley, and Plummer soils. Unlike the Leon soils, the Ona soils lack a light-gray, leached subsurface layer and a hardpan in the subsoil. They have a dark-brown organic layer in the subsoil, which is lacking in the Albany, Chipley, and

Plummer soils. Also, the Ona soils are better drained than the Plummer soils.

The Ona soils occur in the extreme southern part of the county. The native vegetation is mainly pines, but there are a few scattered oaks. The understory consists of saw-palmetto, runner oak, gallberry, and waxmyrtle. The Ona soils are moderately well suited to row crops and are well suited to pasture plants and trees.

Ona sand (0 to 2 percent slopes) (ObA).—This is a somewhat poorly drained soil on low level ridges. A brief description of its profile follows:

0 to 4 inches, very dark gray, loose sand.
4 to 10 inches, dark-brown, very friable sand; weak crumb structure.
10 to 40 inches, pale-yellow, loose sand.
40 to 60 inches, yellow, very friable sandy clay loam that is mottled with yellowish brown and light gray; weak subangular blocky structure.

The surface layer ranges from a dark gray to black. Included in the areas mapped as this soil are small areas of Chipley, Leon, and Plummer soils that are too small to be mapped separately.

This soil is rapidly permeable to a depth of 40 inches. The available water is low, but moisture, perhaps too much, is available for 2 to 6 months each year when the fluctuating water table is at a depth of 15 to 30 inches. During extended dry periods, however, this soil is slightly droughty because the water table drops sharply.

The choice of plants that can be grown successfully on this soil is limited by wetness, and planting in spring is usually delayed for 1 month or more. Among the best-suited crops are corn, tobacco, and bahiagrass. Pines are also well suited. Most of the small total acreage of this soil is woodland.

Orangeburg Series

The Orangeburg series consists of well-drained, reddish soils that are on uplands and have slopes of 2 to 12 percent. The surface layer of these soils is grayish-brown loamy sand 6 to 14 inches thick, and the subsoil is yellowish-red sandy clay loam. In most places the subsoil extends to a depth of more than 60 inches. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

The Orangeburg soils commonly are adjacent to or near Dothan, Fuquay, Tifton, and Lakeland soils. The subsoil of the Orangeburg soils is more reddish than that of the Dothan, Fuquay, and Tifton soils. It is also finer textured and more reddish than the subsoil of Lakeland soils.

The Orangeburg soils occur in the northeastern and eastern parts of the county. The native vegetation is mixed pines and scattered hardwoods, and there is an understory of shrubs, briers, and wiregrass. These soils are well suited to all crops grown in the county, but most of the acreage is wooded.

Orangeburg loamy sand, 5 to 8 percent slopes (OeC).—This is a well-drained, reddish soil on uplands. A brief description of its profile follows:

0 to 6 inches, grayish-brown, very friable loamy sand.
6 to 12 inches, light yellowish-brown, very friable loamy sand.
12 to 29 inches, yellowish-red, friable sandy clay loam; weak subangular blocky structure.
29 to 58 inches +, yellowish-red, firm sandy clay loam that is mottled with yellow; moderate subangular blocky structure.

The surface layer ranges from grayish brown to light yellowish brown, and the subsoil ranges from yellowish red to reddish yellow. The thickness of the loamy sand is 6 to 14 inches. Included in the areas mapped as this soil are a few eroded spots and a few small areas that have mottles at a depth of only about 22 inches.

This soil has medium available water capacity, medium runoff, and moderate permeability. The root zone is favorable, and tilth is generally good. The suitability for cultivated crops is somewhat limited because the hazard of erosion is severe. About 95 percent of the small total acreage is woodland.

Orangeburg loamy sand, 2 to 5 percent slopes (OeB).—This well-drained soil has a loamy sand surface layer that is 6 to 14 inches thick and that ranges from grayish brown in the upper part to light yellowish brown in the lower part. Yellowish-red sandy clay loam underlies the surface layer and is mottled with yellow at a depth of about 28 to 36 inches.

The permeability of this soil is moderate, and the available water capacity is medium. Runoff is medium, and the hazard of erosion is slight to moderate. This soil has a favorable root zone and is easily worked.

Of the small total acreage, about 75 percent is woodland. This soil is suited to all crops grown in the county.

Orangeburg loamy sand, 8 to 12 percent slopes (OeD).—This soil has a loamy sand surface layer that is 6 to 20 inches thick and is grayish brown in the upper part and light yellowish brown in the lower part. The subsoil is yellowish-red sandy clay loam. Yellow mottles occur at a depth of about 28 to 32 inches. Included in areas mapped as this soil are a few small areas where the mottles are at a depth of about 22 inches and the subsoil is sandy clay.

Runoff is rapid on this soil, and the hazard of erosion is severe. The available water capacity is moderately low, and permeability is moderate.

This soil can be used for cultivated crops if it is properly protected against erosion, but it is better suited to slash, longleaf, and loblolly pines. All of the small total acreage is woodland.

Pelham Series

The Pelham series is made up of poorly drained soils in small drainageways, on large flats, and in depressions. Slopes range from 0 to 2 percent. The surface layer, to a depth of more than 20 inches, is loamy sand that ranges from dark gray in the upper part to gray in the lower part. Underlying the surface layer is mottled gray, yellowish-brown, and olive-gray sandy clay loam. These soils are very strongly acid, low in natural fertility, and low in content of organic matter.

The Pelham soils occur among the Plummer, Rutlege, Ardilla, Leefield, and Stilson soils. The subsoil of the Pelham soils is finer textured than that of the Plummer and Rutlege soils, and the surface layer is not thick and black, as it is in the Rutlege soils. The Pelham soils are more poorly drained than the Ardilla, Leefield, and Stilson soils and have a more grayish and less yellowish subsoil.

The Pelham soils are extensive throughout the county. The native vegetation is slash and loblolly pines, cypress, gum, maple, swamp holly, elderberry, poor man soapbush, and other water-tolerant vegetation. These soils are well suited as woodland if they are properly managed. Because they have a high water table, they are generally poorly suited to cultivation.

Pelham loamy sand (0 to 2 percent slopes) (PlA).—This poorly drained soil is in drainageways, on flats, and in depressions. A brief description of its profile follows:

0 to 5 inches, dark-gray, very friable loamy sand.
5 to 21 inches, gray, very friable loamy sand.
21 to 62 inches, mottled gray, yellowish-brown, and olive-gray, friable sandy clay loam; weak structure is subangular blocky to a depth of 30 inches and moderate subangular blocky below.

The surface layer ranges from dark gray to very dark gray. The thickness of the loamy sand over finer textured material ranges from 20 to 40 inches, but the average thickness is about 24 inches. The mottles range from few to many, and the most prominent mottles are gray. A few areas mapped as this soil have finer textured material at a depth of less than 20 inches.

The available water capacity is medium to high, and the permeability is moderate. Runoff is slow to ponded, and water covers this soil for 1 to 6 months each year. For about 2 to 6 months, the water table is at a depth less than 15 inches.

Only a few acres of this soil are in cultivated crops or pasture; most of the acreage is in mixed stands of trees. In the flats and depressions pine trees do not reproduce satisfactorily unless the surface water is removed.

Plummer Series

The Plummer series consists of poorly drained sandy soils on broad flats and in drainageways. Slopes range from 0 to 2 percent. The surface layer of these soils is very dark gray to dark gray sand. Underlying this layer is gray sand that extends to a depth of 40 to 50 inches. These soils are very strongly acid, are low in natural fertility, and contain little organic matter.

The Plummer soils occur among the Rutlege, Portsmouth, Leon, Pelham, Albany, and Chipley soils. Unlike the Rutlege and Portsmouth soils, Plummer soils lack a thick black surface layer. Also, they do not have the distinct organic pan that is typical of the Leon soils. The Plummer soils have a more sandy subsoil than the Portsmouth soils and a more grayish subsoil than Albany and Chipley soils. They are more poorly drained than the Albany and Chipley soils.

The Plummer soils are scattered throughout the county, but they occupy only a small total acreage. The native vegetation is slash, loblolly, and longleaf pines, blackgum, and cypress, and there is an understory of gallberry, waxmyrtle, swamp holly, and wiregrass. Because the water table is high, and water stands on the surface during wet seasons, the soils are not suited to cultivated crops. All of the acreage is woodland.

Plummer sand (0 to 2 percent slopes) (PeA).—This is a poorly drained sandy soil on flats and in slight depressions. A brief description of its profile follows:

0 to 6 inches, very dark gray, loose sand.
6 to 42 inches, gray, loose sand.
42 to 52 inches +, mottled gray, yellow, and yellowish-brown, slightly sticky sandy loam; weak subangular blocky structure.

The surface layer is very dark gray to dark gray, and the subsoil is gray to light gray. The depth to finer textured material ranges from 36 to 60 inches.

Runoff on this soil is slow or very slow, and water stands at or on the surface for 1 to 6 months each year. The rate at which water moves through this soil depends on the height of the water table, which generally is at a depth of less than 15 inches for about 2 to 6 months.

Poor drainage makes this soil unsuitable for cultivation, but it is well suited to slash pine. In some areas surface water must be removed if pines are to reproduce satisfactorily. All the small total acreage of this soil is woodland.

Portsmouth Series

The Portsmouth series consists of very poorly drained soils in bays and depressions. These soils have a black loam surface layer that contains a large amount of organic matter. It is 10 to 20 inches thick. The subsoil is mottled grayish sandy clay loam to sandy clay. These soils are very strongly acid and are low in natural fertility.

The Portsmouth soils occur among the Rutlege, Plummer, and Pelham soils. The subsoil of the Portsmouth soils is finer textured than that of the Rutlege and Plummer soils. Their surface layer contains more organic matter and is darker in color than that of Pelham and Plummer soils.

Most of the acreage of Portsmouth soils is in two large areas in the southeastern part of the county; one is near Stilson and the other is east of U.S. Highway No. 80 near the Bryan County line. A sizable acreage of densely wooded Portsmouth soils near small streams and creeks is mapped in an undifferentiated unit with Rutlege soils and alluvial land.

Portsmouth loam (0 to 2 percent slopes) (Por).—This is a very poorly drained soil in bays and depressions. A brief description of its profile follows:

0 to 15 inches, black, very friable loam.
15 to 24 inches, light brownish-gray, very friable fine sandy loam mottled with light gray; weak subangular blocky structure.
24 to 30 inches, gray, friable fine sandy clay loam.
30 to 55 inches +, dark-gray, massive fine sandy clay mottled with pale yellow and strong brown.

The surface layer ranges from 8 to 18 inches in thickness. The subsoil ranges from gray to black in color and from a sandy clay loam to sandy clay in texture.

Permeability is moderately slow in this soil, and the available water capacity is high. Runoff is very slow or ponded. Water stands on or near the surface for 2 months or more each year, and the water table is at a depth of less than 15 inches for more than 6 months.

This soil is of limited use for farming but can produce a few truck crops, corn, or pasture. It is better suited as woodland than as cropland, but surface water needs to be removed if pines are to reproduce satisfactorily.

Rains Series

The Rains series consists of poorly drained soils on low flats. The slopes range from 0 to 2 percent. The surface layer is black to dark-gray sandy loam 10 to 20 inches thick, and the subsoil is gray sandy clay loam. At a depth of about 25 inches is mottled gray, pale-yellow, and red sandy clay that contains lenses of sandy material. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

The Rains soils occur among the Bladen, Dunbar, and Izagora soils. The Rains soils are coarser textured than the Bladen soils and are more poorly drained and have a more grayish subsoil than the Dunbar and Izagora soils.

The Rains soils occur near the Ogeechee River and Mill and Lotts Creeks. In some densely wooded areas along the larger streams, a sizable acreage of Rains soils is mapped in an undifferentiated unit with Bladen soils and swamp. All of the acreage of Rains soils is wooded. The native vegetation is slash pine, loblolly pine, water oak, maple, cypress, and bay bushes. Because these soils are poorly drained, they are not suited to cultivated crops. They are better suited as woodland.

Rains sandy loam (0 to 2 percent slopes) (Ros).—This is a poorly drained soil on low flats. A brief description of its profile follows:

0 to 8 inches, black to dark-gray, very friable sandy loam.
8 to 12 inches, light-gray, nonsticky sandy loam.
12 to 25 inches, mottled gray, pale-yellow, and brownish-yellow, nonsticky sandy clay loam; few lenses of sandy material; weak subangular blocky structure.
25 to 56 inches +, mottled gray, pale-yellow, brownish-yellow, and red, nonsticky sandy clay; prominent lenses of sandy material; moderate subangular blocky structure.

Runoff is slow. This soil is flooded for about 1 to 6 months each year, and the water table is at a depth of less than 15 inches for about 2 to 6 months.

The available water capacity is moderately high, and the permeability is moderate to moderately slow.

This poorly drained soil is in remote areas and is not commonly used for cultivated crops. Bahiagrass, white clover, corn, and similar crops can be grown in areas that are adequately drained. All of the small total acreage is in stands of mixed trees.

Rutlege Series

The Rutlege series consists of very poorly drained sandy soils in bays and along drainageways that are covered with water during much of the year. Slopes range from 0 to 2 percent. These soils have a surface layer of black to very dark gray sand that is 20 to more than 40 inches thick and is underlain by dark-gray sandy clay loam. Light-gray mottles commonly occur at a depth of 40 to 50 inches. These soils are low in natural fertility, have a large amount of organic matter in the surface layer, and are very strongly acid.

The Rutlege soils occur among the Plummer, Portsmouth, and Pelham soils. They are more poorly drained than the Plummer and Pelham soils, and they have a thicker surface layer that is black instead of dark gray or very dark gray. The subsoil of the Rutlege soils is coarser textured than that of the Portsmouth soils.

The Rutlege soils occur in the southern part of the county in large scattered areas. The native vegetation is mostly cypress, blackgum, and bay, but there are a few scattered pines. The understory is a thick growth of titi, swamp holly, poor man soapbush, and other water-tolerant plants. All of the acreage is wooded. Flooding and the high water table make these soils unsuitable for cultivation and limit the production of desirable trees.

Rutlege sand (0 to 2 percent slopes) (RkA).—This very poorly drained soil is in bays and depressions. A brief description of its profile follows:

0 to 14 inches, black, very friable sand that feels loamy because the content of organic matter is high.
14 to 41 inches, very dark gray, very friable sand.
41 to 64 inches +, dark-gray mottled with light-gray, friable sandy clay loam that has weak subangular blocky structure.

The surface layer is sand in most places, but it is loamy sand in a few small areas. The surface layer ranges from 8 to 24 inches in thickness, and the depth to the finer textured material ranges from 36 to more than 48 inches.

This soil has very slow to ponded surface drainage and is covered by water from 2 to 6 months or more each year. Internal drainage is generally slow because the water table is at a depth of less than 15 inches for 6 months or more each year.

This soil is too wet for cultivated crops and is entirely wooded. Removal of excess surface water is necessary if pine trees are to reproduce well.

Rutlege and Portsmouth soils and alluvial land (0 to 2 percent slopes) (Rpa).—This unit consists of poorly drained and very poorly drained soils and alluvial land in densely wooded areas along creeks and larger streams. These soils are covered with water for more than 1 month each year, and their water table is at a depth of less than 15 inches for 6 months or more. The Rutlege soils, Portsmouth soils, and alluvial land are in about equal acreages.

The surface layer of the Rutlege soil is very dark gray to black sand 8 to 24 inches thick. In the Portsmouth soil this layer is very dark gray to black loam 8 to 15 inches thick. Alluvial land consists of mixed sand, clay, and other sediments that have been recently deposited by streams. Because these sediments are continually deposited on alluvial land, the color of its surface layer is extremely variable, but in most places is very dark gray or black. The surface layer of alluvial land ranges from sand to sandy loam. Also variable is the underlying material, which is generally dark gray or gray and ranges from sand to clay in texture.

This mapping unit commonly adjoins Bladen and Rains soils and swamp. It also adjoins areas of Pelham soils and of Plummer soils. The layers in the soils of this unit are less distinct than those in the Pelham and Plummer soils.

Most of this mapping unit is in the southeastern part of the county. The native vegetation is mostly blackgum, maple, bay, cypress, poplar, willow, and a few slash pines, and there is a thick understory of titi and fetterbush. All of the acreage is wooded.

Stilson Series

The Stilson series consists of moderately well drained soils on low, nearly level uplands. The topmost 20 to 30

inches of these soils is loamy sand that ranges from dark gray in the upper part to yellow in the lower part. The subsoil is brownish-yellow sandy clay loam that is mottled in the lower part. At a depth of about 43 inches, there is a highly mottled layer, of which more than 10 percent is soft and hard iron concretions. The surface layer and subsoil combined commonly are thicker than 60 inches. These soils are low in natural fertility, are low in content of organic matter, and are very strongly acid.

The Stilson soils occur among the Fuquay, Irvington, and Leefield soils. The Stilson soils are not so well drained as the Fuquay soils and contain fewer pebbles. Unlike the Irvington soils, Stilson soils do not have a weakly cemented layer in the subsoil. The upper part of the subsoil is free of mottles in the Stilson soils but is mottled with light gray in the Leefield soils.

Most of the acreage of Stilson soils is in the southeastern part of the county. The native vegetation is longleaf pine, slash pine, a few scattered oaks, gallberry, waxmyrtle, and wiregrass. About one-half of the acreage is cultivated. A large acreage that was formerly cultivated has been planted to pines. The Stilson soils are suited to a wide range of crops, but simple drainage practices are required to prevent crop losses. Many farmers prefer these soils for growing tobacco.

Stilson loamy sand, 0 to 2 percent slopes (SeA).—This moderately well drained soil is on low nearly level uplands. A brief description of its profile follows:

0 to 24 inches, very friable loamy sand that is dark gray in the upper few inches and pale yellow below.
24 to 29 inches, yellow, very friable sandy loam.
29 to 43 inches, brownish-yellow, very friable to friable sandy clay loam that has weak to moderate subangular blocky structure; below 38 inches are common, distinct, yellowish-brown and light-gray mottles.
43 to 72 inches, mottled brownish-yellow, yellowish-brown, light-gray, strong-brown, and yellowish-red, firm sandy clay loam that has moderate subangular blocky structure; more than 10 percent of the layer is soft and hard concretions of iron.

The surface layer ranges from 20 to 40 inches, and the subsoil ranges from light olive brown to brownish yellow. In places a few iron concretions are on the surface and throughout the profile. Included in places mapped as this soil are a few areas that have sandy clay loam at a depth of less than 20 inches.

This soil has medium available water capacity. Runoff is slow. Permeability is moderate except in the lower part, where it is moderately slow. Late in winter and early in spring, the water table is commonly within about 30 inches of the surface. In spring this high water table delays the planting of row crops for about 1 month. The root zone is favorable, and tilth is generally good.

This soil is suited to many kinds of crops, but some drainage is needed during wet periods. About half of the fairly large total acreage is in cultivated crops. A small acreage is in pasture, and the rest is woodland.

Susquehanna Series

The Susquehanna series consists of somewhat poorly drained soils on short broken slopes in the uplands. Slopes range from 2 to 8 percent. The surface layer is dark gray to very dark gray loamy sand. The subsoil is mottled light olive-gray, gray, and red, very plastic clay that extends to a depth of several feet in most places. These soils are low in natural fertility, contain little organic matter, and are very strongly acid.

The Susquehanna soils commonly adjoin the Cowarts soils but have a finer textured, more plastic, and more grayish subsoil.

The Susquehanna soils occupy small areas in the northern part of the county. The native vegetation is chiefly longleaf pine, but there are some mixed oak and sweetgum. The understory is wiregrass. Nearly all the acreage is wooded. The heavy plastic clay near the surface limits the suitability of these soils for cultivation.

Susquehanna loamy sand, 2 to 8 percent slopes (SpC).—This somewhat poorly drained soil is on uplands. A brief description of its profile follows:

0 to 4 inches, dark-gray, very friable loamy sand.
4 to 10 inches, brown, very friable loamy sand.
10 to 60 inches, mottled light olive-gray, red, and light olive-brown, very plastic clay; strong blocky structure.

The surface layer ranges from dark gray to very dark gray. The thickness of the loamy sand over finer textured material ranges from 6 to 12 inches. In some places medium blocky peds of red clay occur in the subsoil and are enclosed by pale-olive clay films 1 millimeter thick. In one small included area mapped as this soil, the subsoil is sandy clay loam. Also included are a few areas underlain by sandstone at a depth of 20 to 30 inches. A few rocks crop out on slopes of 5 to 8 percent, and a few areas are eroded.

The available water is moderately high. Runoff is rapid, and the hazard of erosion is severe. Tilth is generally good, but the slowly permeable, clayey subsoil restricts the growth of roots.

Use of this soil for farming is limited. Also, this soil is severely limited as sites for houses or highways because the subsoil consists of very plastic clay. Nearly all of the small total acreage is wooded.

Tifton Series

The Tifton series consists of well-drained pebbly soils on broad interstream ridges of the Coastal Plain uplands. Slopes range from 0 to 8 percent, but they are less than 5 percent in most places. These soils have a dark grayish-brown to brown loamy sand surface layer. The subsoil is yellowish-brown to strong-brown sandy clay loam or sandy clay that is mottled at a depth of about 32 inches. The surface layer and subsoil combined are at least 40 inches thick and commonly are thicker than 60 inches. Prominent on the surface and throughout the profile are small, rounded concretions of iron, or pebbles, 1/8 to 3/4 inch in diameter. These soils are low or moderate in natural fertility, contain little organic matter, and are strongly acid.

The Tifton soils commonly are adjacent to or near the Dothan, Carnegie, Irvington, and Leefield soils. They contain more iron concretions than the Dothan soils and have a slightly finer textured subsoil. The yellowish-brown subsoil of Tifton soils is thicker than that of the Carnegie soils. The Tifton soils are better drained than Irvington soils and lack a fragipan. They are higher and better drained than the Leefield soils and contain more pebbles.

Tifton soils are most extensive in the northern part of the county. They are among the most productive soils in the county and are suitable for many uses. Most of the acreage is in cultivated crops. All crops common in the county grow well on these soils if they are adequately fertilized. The native vegetation is mainly mixed pines, but there are also widely scattered hardwoods and an understory of shrubs, briers, and wiregrass. Some of the formerly cultivated areas have been planted to slash pine.

Tifton loamy sand, 0 to 2 percent slopes (TqA).—This is a well-drained pebbly soil of the uplands. A brief description of its profile follows:

0 to 10 inches, dark grayish-brown, very friable loamy sand that contains many iron concretions (pebbles).
10 to 14 inches, yellowish-brown, very friable sandy loam that has many iron concretions (pebbles).
14 to 32 inches, yellowish-brown, friable sandy clay loam that has moderate subangular blocky structure.
32 to 60 inches, mottled yellowish-brown, strong-brown, red, and light-gray, friable sandy clay to sandy clay loam that has moderate subangular blocky structure.

The surface layer ranges from dark grayish brown to brown. The subsoil ranges from yellowish brown to strong brown in color and from sandy clay loam to sandy clay in texture. The depth to finer textured material ranges from 8 to 20 inches but averages between 10 and 12 inches. The number and size of pebbles on the surface and throughout the profile vary from place to place. Generally, pebbles make up about 15 percent of the upper 6 inches and are numerous throughout the rest of the profile.

Permeability is moderate in the upper part of this soil and is moderately slow in the lower part. The available water capacity is medium. This soil has a deep root zone and is easily worked. It is suitable for many uses.

About 95 percent of the large total acreage of this soil is cultivated. This soil is suited to many kinds of crops and generally produces good yields.

Tifton loamy sand, 2 to 5 percent slopes (TqB).—The upper 10 to 12 inches of this well-drained soil is dark grayish-brown to brown loamy sand. Beneath this layer is yellowish-brown to strong-brown sandy clay loam that, as depth increases, grades toward yellowish-brown or strong-brown sandy clay. Except in a few thin spots, the plow layer is entirely within the surface layer.

Permeability is moderate except in the lower part of the soil, where it is moderately slow. The available water capacity is medium. Surface runoff is medium, and the erosion hazard is moderate. This soil has a thick root zone and generally is in good tilth.

This is the most extensive Tifton soil in the county. It is highly prized because it can be used intensively for most crops. Favorable yields of all crops grown in the county can be expected. About 95 percent of the acreage is cultivated or pastured, and the rest is wooded.

Tifton sandy loam, 2 to 5 percent slopes, eroded (TuB2).—This well-drained soil has a surface layer of dark grayish-brown to brown sandy loam 4 to 7 inches thick. The subsoil is yellowish-brown to strong-brown sandy clay loam to sandy clay. The surface layer has been thinned by erosion and has had some of the upper subsoil mixed into it by plowing. As a result, the rate of infiltration is slower and the amount of runoff is greater than on the less eroded Tifton soils. Rills and shallow gullies have formed. Included in areas mapped as this soil are some severely eroded areas that have a surface layer of yellowish-brown sandy clay loam.

The available water capacity is medium, and permeability is moderate except in the lower part of the subsoil, where it is moderately slow. Tilth is generally good, and the root zone is thick. Runoff is medium, and the hazard of further erosion is moderate.

This soil is suited to all the crops grown in the county. Most of the small total acreage is cultivated or pastured.

Tifton sandy loam, 5 to 8 percent slopes, eroded (TuC2).—This soil has a dark grayish-brown to yellowish-brown sandy loam surface layer 4 to 8 inches thick. The subsoil is yellowish-brown to strong-brown sandy clay loam to sandy clay. Included in areas mapped as this soil are places where the surface layer is 10 to 12 inches thick. Small rills and shallow gullies are common, and there are a few deep gullies. Also included are some severely eroded areas where yellowish-brown sandy clay loam is exposed and where the rate of infiltration is slower than that in the less eroded areas.

Permeability is moderate except in the lower part of the subsoil, where it is moderately slow. Surface runoff is medium or moderately rapid, and available water capacity is medium. The hazard of erosion is moderate or severe, but under good management many kinds of crops can be grown. Tilth is generally moderately good, and the root zone is favorable for cropping.

Most of the small acreage of this soil has been cultivated, and about 75 percent of it is still cultivated.

Use and Management of Soils

The soils of Bulloch County are used extensively for cultivated crops and pasture. This section explains how the soils may be managed for these main purposes and also as woodland, for wildlife, in the building of highways, farm ponds, and other engineering structures, and in community development. Also given are estimated yields of the principal crops grown under two levels of management.

The management of crops and pasture and of wildlife is discussed by groups of soils. Also by groups of soils, but in tables, are facts pertinent to the management of woodland and to the use of soils in community planning and development. To determine the soils in each of these groups, refer to the "Guide to Mapping Units" at the back of this survey.

This section is a general guide for managing the soils; it does not suggest specific management for individual soils. Detailed information about managing the soils of this county can be obtained from the local staff of the Soil Conservation Service or the Extension Service.

Factors Affecting the Use of Soils for Cultivated Crops [1]

Most of the soils in Bulloch County have a sandy loam, loamy sand, or sand surface layer that is friable and easy to till. They have a friable to firm, moderately permeable subsoil. If they are adequately fertilized and limed,

[1] J. N. NASH, conservation agronomist, Soil Conservation Service, assisted in the preparation of this subsection.

most of the soils produce favorable yields of all crops grown locally.

About 5 percent of the acreage in the county has only slight limitations for farming and needs only ordinary good management to maintain productivity and good tilth. On about 53 percent of the acreage, excess water is the main limitation. The drainage needed in these areas depends on the amount of water present and the kind of crops grown. In about 22 percent of the acreage, the soils are sandy and have low or very low available water capacity. If these sandy soils are cultivated, organic matter should be returned to the soils to increase the available water capacity. Also needed is good management of crop residue.

Erosion is the main limitation on about 20 percent of the acreage. Practices that help control erosion are contour tillage, terracing, stripcropping, and using vegetated waterways. Also beneficial is the use of close-growing crops that are adequately fertilized. Other protection can be provided by chopping or shredding crop residue and leaving it on the surface. Later the residue can be turned under to improve tilth and available water holding capacity. On soils susceptible to erosion, the degree of this limitation determines whether the farmer should use straight rows, contour cultivation with or without terraces, or stripcropping. Regardless of the practice used, a grassed waterway or outlet is essential.

Capability Groups of Soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I. Soils that have few limitations that restrict their use.

Class II. Soils that have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III. Soils that have severe limitations that reduce the choice of plants, or require special conservation practices, or both.

Class IV. Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V. Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Class VI. Soils that have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils that have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes (none in Bulloch County).

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained: *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States but not in Bulloch County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-2 or IIIe-4. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral, and for some capability units also a capital letter, specifically identifies the capability unit within each subclass. The capability units are not numbered consecutively, because all the units used in Georgia are not in this county.

Management by capability units[2]

In the following pages, the capability units in Bulloch County are described and suggestions for the use and management of the soils are given. To find the names of the soils in any given unit, refer to the "Guide to Mapping Units" at the back of this survey.

[2] J. N. Nash, conservation agronomist, Soil Conservation Service, helped prepare this subsection.

CAPABILITY UNIT I–2

This unit consists of well-drained soils on broad, nearly level interstream ridges in the uplands. The surface layer of these soils is very friable loamy sand, 8 to 20 inches thick. The subsoil is friable sandy clay loam or sandy clay. Many pebbles, as much as 1 inch in diameter, are on and in the Tifton soils.

The soils in this unit generally are in good tilth and can be tilled within a wide range of moisture content. Water moves into and through these soils at a moderate rate until it reaches the lower part, where its movement is moderately slow. The available water capacity is medium. These soils are low or moderate in natural fertility, low in content of organic matter, and strongly acid or very strongly acid.

These soils make up about 4.5 percent of the county, and nearly all of this acreage is cultivated. They are suited to all crops commonly grown in the county and are especially well suited to corn, tobacco, peanuts, and cotton (fig. 3). Among the plants well suited for hay and pasture are Coastal bermudagrass, bahiagrass, lupines, sericea lespedeza, millet, and crimson clover. Pecan trees and many truck and nursery crops also grow well.

Figure 3.—**Cotton on Tifton loamy sand, 0 to 2 percent slopes.**

Management of these soils is not difficult, but in a few areas of the Tifton soil, pebbles interfere with the harvesting of peanuts. Favorable yields of corn, grain sorghum, small grain, and soybeans can be produced year after year if fertilizer is added; if only the grain is harvested; and if the residue, or aftermath, is left on the surface or is mixed into the surface soil.

CAPABILITY UNIT IIe–1

This capability unit consists of well-drained soils on gently sloping uplands. The surface layer of these soils is very friable loamy sand, commonly more than 8 inches thick. The subsoil is friable to firm sandy clay loam.

The permeability of the soils in this group is moderate except in the lower part of the Dothan soils, where it is moderately slow. The available water capacity is medium. The root zone is thick and easy to till; it can be worked within a wide range of moisture content. These soils are low to moderate in natural fertility, have a low content of organic matter, and are strongly acid.

The soils in this unit occupy about 1.9 percent of the county. Nearly all of the acreage is cultivated, but a small part is in pasture or trees. The soils are suited to many kinds of crops, but they are used chiefly for tobacco, cotton, corn, peanuts, small grains, and soybeans. Bahiagrass, Coastal bermudagrass, and sericea lespedeza are among the plants that are well suited for hay or permanent pasture.

In cultivated areas, water erosion is a slight to moderate hazard. Stripcropping and parallel terracing are suitable practices because these soils are mostly in large areas on long, smooth, gentle slopes. Contour tillage, the sodding of waterways, and similar practices are effective in controlling erosion. An example of a suitable cropping system is 4 years of bahiagrass followed by 2 years of clean-tilled crops.

CAPABILITY UNIT IIe–2

This unit consists of well-drained pebbly soils on gently sloping, broad interstream ridges in the uplands. These soils have a surface layer of very friable loamy sand or sandy loam that is 4 to 7 inches thick in eroded areas and is 10 to 12 inches thick in uneroded areas. The subsoil is friable to firm sandy clay loam or sandy clay.

Water moves into and through these soils at a moderate rate until it reaches the lower part, where movement is moderately slow. The available water capacity is medium. These soils are generally in good tilth. They have a thick root zone and can be cultivated within a wide range of moisture content. These soils are low or moderate in natural fertility, contain little organic matter, and are strongly acid or very strongly acid. Crops on these soils respond well to management.

The soils in this unit occupy about 11.5 percent of the county, and more than 90 percent of this acreage is cultivated. These soils are well suited to row crops, to pasture and hay crops, and to legumes and small grains. Some of the better suited row crops are cotton, corn, tobacco, peanuts, soybeans, and truck crops. Small grains, such as oats, rye, and wheat, grow well. Among the plants that are suitable for hay and pasture are Coastal bermudagrass, bahiagrass, lupines, millet, sericea lespedeza, and crimson clover. Pecan trees and many nursery crops also are suited to these soils.

Erosion is a slight to moderate hazard. The pebbles on these soils tend to interfere with harvesting of the peanuts. If these soils are cultivated, one or more of the following practices are needed to help control erosion: terracing (fig. 4), stripcropping, contour tillage, using vegetated water disposal areas, or mulch planting. A way to help control erosion and improve tilth is that of using close-growing crops or crops that produce a large amount of residue in the cropping system.

CAPABILITY UNIT IIe–4

This capability unit consists of well-drained soils of the uplands. The surface layer of these soils is very friable loamy sand 8 to 20 inches thick. The subsoil is firm sandy clay loam or sandy clay that is highly mottled at a depth of about 20 to 22 inches.

Figure 4.—Construction of parallel terraces to control erosion on Tifton loamy sand, 2 to 5 percent slopes. A waterway is in the background.

Water moves into and through these soils at a moderate rate until it reaches the lower part where its movement is moderately slow. The available water capacity is medium. These soils are low in natural fertility, contain little organic matter, and are strongly acid. Tilth is generally good, and the root zone is about 22 inches thick. Crops on these soils respond well to good management, especially fertilization.

These soils make up about 2.7 percent of the county, and most of this acreage is cultivated. They are suited to most crops commonly grown in the county, including plants grown for pasture. Among the suitable plants are bahiagrass, Coastal bermudagrass, lupines, millet, small grains, corn, cotton, peanuts, and soybeans.

On most areas of these soils runoff is rapid enough to cause slight to moderate erosion. Further erosion can greatly reduce yields, since the root zone in these soils is only moderately thick. The numerous pebbles on the surface of the Carnegie soil tend to interfere with the harvesting of peanuts.

To protect the soils from erosion in cultivated areas, one or more of the following practices can be used: terracing, stripcropping, contour tillage, or mulch planting. If the residue from crops is well managed, available water capacity and crop yields are increased and these soils are protected from erosion. A cropping system that includes close-growing crops or crops that produce a large amount of residue also helps to protect these soils from erosion. If these soils are terraced and cultivated on the contour, a suitable cropping system is 3 years of row crops and 1 year of a small grain.

CAPABILITY UNIT IIw-2

This unit consists of level or nearly level, moderately well drained and somewhat poorly drained soils. These soils are mainly on low, broad ridges in the southeastern part of the county. In some small areas they are adjacent to natural drainageways, and in others they are on nearly level stream terraces. The surface layer of these soils is very friable loamy sand 10 to 40 inches thick. Below the surface layer is friable sandy clay loam or sandy clay. The Irvington soils of this unit have a weakly cemented fragipan that contains many soft and hard concretions of iron at a depth of about 28 to 40 inches.

These soils have medium or moderately high available water capacity. Water moves into and through these soils at a moderate rate until it reaches the lower part of the subsoil, where its movement is somewhat restricted. The water table is moderately high, and runoff is slow. Drainage, therefore, is impeded. These soils are low in content of organic matter, low in natural fertility, and very strongly acid.

These soils occupy about 12.1 percent of the county. About 40 percent of the acreage is cultivated, but excess water limits the suitability of these soils for some row crops. Among the most suitable crops are corn, tobacco, sorghum, soybeans, and truck crops. The best suited plants for hay and pasture are bahiagrass, millet, sericea lespedeza, Coastal bermudagrass, and white clover. Also suitable are pecan trees, many truck crops, and nursery crops.

These soils are productive if they are adequately drained. The excess water often delays planting, and in some years crops are damaged by heavy rains in spring and summer. Less drainage is required on the Stilson and Irvington soils than on the other soils in this unit. Excess water can be removed by bedding and by directing the crop rows to shallow, open ditches at the edges of fields. In some fields land leveling and shaping may help to improve drainage by eliminating low spots. Tile drainage is also effective in removing excess water. The yields of high-value crops can be increased by irrigation in prolonged dry periods.

Favorable yields of corn, grain sorghum, small grains, and soybeans can be produced year after year if fertilizer is added, if only the grain is harvested, and if the crop residue is left on the surface or is mixed into the surface soil. An example of a suitable cropping system for the soils of this group is 1 year of tobacco followed by 2 years of bahiagrass.

CAPABILITY UNIT IIs-1

This unit consists of well-drained, nearly level or very gently sloping soils on broad interstream ridges in the uplands. These soils have a very friable loamy sand surface layer that is 20 to 40 inches thick. Below this is friable sandy clay loam or sandy clay. Many pebbles, as much as 1 inch in diameter, are on the surface and in these soils.

Water moves into and through these soils at a moderate or moderately rapid rate until it reaches the lower part, where its movement is moderately slow. These sandy soils have moderately low available water capacity and are droughty. They lose plant nutrients and organic matter more rapidly than do other well-drained soils that contain more clay. They are low in content of organic matter, low in natural fertility, and very strongly acid.

These soils occupy about 14 percent of the county, and about 80 percent of this acreage is cultivated. The suitability of these soils for crops is somewhat limited by droughtiness, but under good management, many kinds of crops can be grown.

Droughtiness is the chief limitation on these soils, and wind erosion is a hazard in large open fields. The many pebbles on the surface tend to interfere with the harvesting of peanuts.

Turning under crop residue and using a suitable cropping system (fig. 5) that includes close-growing crops improve the available water capacity in these soils and help to control erosion. In large open fields wind erosion can be reduced by planting close-growing crops and clean-tilled crops in alternate strips at right angles to the prevailing wind. Bahiagrass and Coastal bermudagrass are among the close-growing crops that are most effective in supplying residue for controlling erosion. Other effective and useful close-growing crops are small grains, millet, and lupines. An example of a suitable cropping system is 3 years of bahiagrass followed by 2 years of peanuts.

Figure 5.—**Soybeans that have been planted in a mulch of oat stubble on Fuquay loamy sand, 2 to 5 percent slopes.**

CAPABILITY UNIT IIIe–1

This unit consists of well-drained, gently sloping soils on the uplands. These soils are slightly eroded to moderately eroded. They have a surface layer of very friable loamy sand 4 to 12 inches thick. The subsoil is friable sandy clay loam or firm sandy clay. In eroded areas the plow layer contains some material from the subsoil.

Runoff is medium or moderately rapid, and the hazard of erosion is moderate to severe. Water moves into and through these soils at a moderate rate, except in the lower part of the Dothan and Tifton soils of this unit, where its movement is moderately slow. The available water capacity is medium, and tilth is generally good except in small areas where the subsoil has been exposed by erosion. These soils can be cultivated within a fairly wide range of moisture content. They are strongly acid or very strongly acid, are low in natural fertility, and contain little organic matter. Crops grown on these soils respond well to good management, especially to additions of fertilizer and to practices that conserve moisture.

These soils occur in small scattered areas and make up about 0.9 percent of the county. About 70 percent of this acreage is cultivated. These soils are suited to a fairly wide range of crops. Well-suited crops are corn, cotton, soybeans, millet, and grain sorghum. Among the plants well suited for pasture and hay are Coastal bermudagrass, bahiagrass, lupines, and sericea lespedeza.

Control of erosion is essential if these soils are to be cultivated successfully. Helpful in controlling erosion are contour tillage, stripcropping, and terraces that have vegetated outlets. Also beneficial is including close-growing crops or crops that produce a large amount of residue in the cropping system, for this practice helps to control erosion and improves the structure and productivity of the soils as well.

Coastal bermudagrass and bahiagrass are effective for these purposes; they can be grown for pasture or hay in a rotation with row crops. Row crops can be irrigated by sprinklers. Where these soils are terraced and cultivated on the contour, mulch-planted corn can be grown continuously.

CAPABILITY UNIT IIIe–4

This unit consists of very gently sloping to gently sloping, well-drained soils of the uplands. These soils are slightly eroded or moderately eroded. They have a surface layer of very friable loamy sand or sandy loam 4 to 10 inches thick. The subsoil is friable to firm sandy clay loam to sandy clay that is highly mottled at a depth of about 20 inches. In eroded areas the plow layer contains some material from the subsoil. Small pebbles, as much as 1 inch in diameter, are on the surface of these soils.

Water moves into and through these soils at a moderate rate until it reaches the lower part, where its movement is moderately slow. The available water capacity is moderately low. Surface runoff is rapid, and the hazard of erosion is moderate to severe. These soils have a moderately thick root zone and generally good tilth, but tilth is poorer in eroded areas where the surface layer consists of material from the subsoil. These soils are low in natural fertility, contain little organic matter, and are strongly acid. Crops grown on them respond well to applications of lime and fertilizer.

These soils occupy about 1.6 percent of the county, and about 60 percent of this acreage is cultivated. Under a high level of management, favorable yields of all crops and pasture plants grown locally can be produced. These soils are well suited to bahiagrass and Coastal bermudagrass, are suited to small grains, and are fairly well suited to corn, cotton, and soybeans. An example of a suitable cropping system is 4 years bahiagrass followed by 2 years of corn.

CAPABILITY UNIT IIIe–5

Only one soil, Fuquay loamy sand, 5 to 8 percent slopes, is in this capability unit. This well-drained, gently sloping soil is on uplands. It consists of very friable or loose loamy sand that extends to a depth of 20 to 40 inches. Below this is friable to firm sandy clay loam.

Surface runoff is medium to rapid on this soil, and the hazard of erosion is moderate to severe. The movement of water into and through the soil is moderately rapid except in the lower part, where it is moderately slow. The available water capacity is moderately low. This soil has a thick root zone and generally good tilth. It can be tilled within a wide range in moisture content. It has low natural fertility, contains little organic matter, and is very strongly acid.

This soil occupies about 0.5 percent of the county, and about half of this acreage is cultivated. Because this soil

is sandy and susceptible to erosion, use for row crops is limited. It can be used occasionally for peanuts, corn, soybeans, watermelons, sweetpotatoes, and truck crops that mature early. Also suitable are small grains and lupines. Under good management, this soil is well suited to Coastal bermudagrass and bahiagrass. If contour stripcropping is used, a suitable cropping system is 2 years of bahiagrass followed by 2 years of truck crops.

CAPABILITY UNIT IIIw–1

This unit consists of moderately well drained to somewhat poorly drained soils of the lowlands. These soils are on broad, low ridges and are level to nearly level. Very friable, loose sand extends from the surface to a depth of 40 inches or more.

The available water capacity of these soils is low. Water moves into and through these soils rapidly, but its movement downward is retarded in wet seasons by a moderately high water table. The water table fluctuates between depths of 15 and 30 inches during rainy periods and falls below 3 feet in dry seasons. These soils are very strongly acid, are low in natural fertility, and contain little organic matter. They are generally in good tilth, and crops on them respond well to good management, especially to additions of fertilizer.

These soils occupy 5.6 percent of the county. About 20 percent of their acreage is in cultivated crops, but a periodically high content of moisture limits the suitability of these soils for crops. Because the water table is alternately high and low, both drainage and irrigation may be needed in a single growing season. Under good management, these soils produce favorable yields of corn, tobacco, soybeans, truck crops, small grains, grain sorghum, bahiagrass, and white clover.

Favorable yields of corn, grain sorghum, small grains, and soybeans can be produced year after year if fertilizer is added, if only the grain is harvested, and if crop residue is left on the surface or mixed into the surface layer.

CAPABILITY UNIT IIIw–2

This unit consists of poorly drained and very poorly drained soils in nearly level bays and depressions. These soils have a sandy loam to loam surface layer and a sandy clay loam to clay subsoil.

The movement of water through these soils is moderate to very slow. As a result, water stands on the surface for 7 days to 6 months each year, and the water table is within 15 inches of the surface for more than 2 months. The available water capacity is moderately high or high, and tilth is generally fair to good. The content of organic matter is low to moderately high or high, natural fertility is low, and the soils are very strongly acid.

The soils of this unit occupy about 0.3 percent of the county, and all of this acreage is woodland. Most areas are suitable for cultivation only if they are drained. Drained areas are suited to corn, soybeans, truck crops, clover, and bahiagrass. Corn can be grown year after year if the crop residue is left on the surface during winter.

CAPABILITY UNIT IVe–1

Only Orangeburg loamy sand, 8 to 12 percent slopes, is in this capability unit. This well-drained soil of the uplands has a surface layer of very friable loamy sand 6 to 20 inches thick. The subsoil is friable sandy clay loam.

Runoff is rapid on this soil, and the hazard of erosion is severe. Water moves into and through the soil at a moderate rate. The available water capacity is moderately low. This soil is very strongly acid, has low or moderate natural fertility, and contains little organic matter.

This soil occupies less than 0.1 percent of the county, and all of this acreage is woodland. The soil is fairly well suited to corn, cotton, small grains, and soybeans. Bahiagrass and Coastal bermudagrass are among the better suited forage plants. The strong slopes, rapid runoff, and severe hazard of erosion make this soil unsuitable for continuous cropping.

If this soil is cultivated, erosion can be lessened by cultivating on the contour, terracing, stripcropping, and grassing the waterways. In addition, good tilth and a fairly adequate amount of organic matter can be maintained by including in the cropping system close-growing crops, soil-improving crops, or crops that produce a large amount of residue. Crops grown on this soil respond well to additions of fertilizer, and some crops benefit from additions of lime. A suitable cropping system is 3 years of bahiagrass followed by 3 years of cotton grown on the contour in alternating strips. After each cotton crop is harvested, protection by a crop seeded for winter cover is needed.

CAPABILITY UNIT IVe–4

This unit consists of well-drained soils on uplands. These soils occupy strong slopes adjacent to small drainageways or flood plains. The surface layer is very friable sandy loam or loamy sand 4 to 8 inches thick. The subsoil is friable to firm sandy clay loam or sandy clay. Many pebbles, as much as 1 inch in diameter, are on the surface and in these soils.

Runoff is moderately rapid to rapid on these soils, and the hazard of erosion is severe. Water moves into and through these soils at a moderate rate except in the lower part, where its movement is moderately slow. The available water capacity is medium or moderately low. In most areas these soils have good tilth, but in small severely eroded areas where the subsoil is exposed, tilth is poor. These soils are low in natural fertility, contain little organic matter, and are strongly acid.

The soils of this capability unit occupy about 0.7 percent of the county, and about 40 percent of this acreage is cultivated. If intensive measures are used to control erosion, these soils are suited to many kinds of crops. Among the suitable crops are corn, cotton, small grains, vegetables, truck crops, sericea lespedeza, Coastal bermudagrass, and bahiagrass. A suitable cropping system is 3 years of bahiagrass followed by 3 years of cotton grown on the contour in alternating strips. After each cotton crop is harvested, protection by a crop seeded for winter cover is needed.

CAPABILITY UNIT IVw–4

This unit consists of poorly drained soils in flats, depressions, and drainageways. These soils have a surface layer of dark-gray to black loamy sand or sandy loam

that varies in thickness. The subsoil is dominately gray sandy clay loam or sandy clay.

The available water capacity of these soils is moderate to high. The surface layer and subsoil are saturated with water during parts of the year, and the soils are covered with water from 1 to 6 months or more each year. These soils are low in natural fertility, contain a small amount of organic matter, and are very strongly acid.

The soils in this unit occupy about 15.7 percent of the county, and nearly all of this acreage is woodland. Before the soils can be used for cultivated crops, they need to be bedded and intensively drained by open ditches or tile. Properly drained areas are fairly well suited to truck crops, corn, clover, and bahiagrass. Corn can be grown year after year if the residue is mowed, chopped, or disked and left on the surface.

CAPABILITY UNIT IVs–1

Only Lakeland sand, 0 to 5 percent slopes, is in this capability unit. This excessively drained soil is on uplands. It consists of loose sand that extends from the surface to a depth of more than 60 inches.

Water moves into and through this soil rapidly. The available water capacity is low. Although the root zone is thick, crops are likely to be damaged during dry seasons by a lack of moisture. This soil can be cultivated within a wide range of moisture content. It is low in natural fertility, contains little organic matter, and is very strongly acid.

This soil occupies about 5.5 percent of the county. Only about 10 percent of the acreage is cultivated. Droughtiness limits the suitability of this soil for crops. Suitable crops are Coastal bermudagrass (fig. 6), bahiagrass, and other deep-rooted plants, as well as early maturing vegetables. Also suitable are corn, peanuts, and watermelons. An example of a suitable cropping system is bahiagrass grown for 2 years and followed by peanuts grown for 1 year, on the contour.

***Figure 6.*—Coastal bermudagrass on Lakeland sand, 0 to 5 percent slopes.**

CAPABILITY UNIT Vw–2

This unit consists of nearly level, poorly drained and very poorly drained soils in bays, broad flats, and drainageways. The surface layer of these soils ranges from sand to clay loam. This is underlain by loose sand in Plummer and Rutlege soils, clay in Bladen soils, and variable material in alluvial land.

Internal drainage is slow in these soils. Water stands on the surface for 1 month or more each year, and the water table is at a depth of less than 15 inches for 2 months or more. These soils are low in natural fertility and range from low to high in content of organic matter. They are very strongly acid.

The soils in this unit occupy about 16.6 percent of the county. All this acreage is woodland. These soils are too wet for cultivated crops. They are suited to pine trees if the excess surface water is removed so that the trees reproduce favorably. Where the cost of drainage is not too high, the soils can be drained and used for pasture. Bahiagrass, dallisgrass, white clover, and other pasture plants that do not require a thick root zone generally grow better than deep-rooted plants.

CAPABILITY UNIT Vw–4

Only one soil, Leon sand, is in this capability unit. This somewhat poorly drained to poorly drained soil is on low, level ridges in the southeastern part of the county. Its sand surface layer is underlain by a thin layer of very dark brown, weakly cemented sand.

The water table of this soil is at a depth of less than 15 inches for 2 to 6 months each year and is responsible for the wetness, though available water capacity is low. The weakly cemented layer retards the movement of water through the soil. The root zone is normally thin. This soil is low in natural fertility, contains little organic matter, and is very strongly acid.

This soil occupies about 0.3 percent of the county. All of its acreage is woodland, but the stand of trees is sparse in many areas. Use for farming is limited because of the high water table. Also, the thin root zone limits the growth of pines. This soil can be used as woodland, but trees grow slowly.

CAPABILITY UNIT VIe–2

This unit consists of well-drained and somewhat poorly drained soils on very gently sloping to strongly sloping uplands. The surface layer of these soils is very friable sandy loam or loamy sand. The subsoil is sandy clay loam, sandy clay, or clay that, at a depth of about 10 to 20 inches, is highly mottled and compact or very plastic. The Carnegie soil of this unit has many pebbles, ½ to 1 inch in diameter, on the surface and in the subsoil.

Runoff on these soils is rapid or very rapid, and the hazard of erosion is very severe. The movement of water through these soils is moderate to slow. The available water capacity is moderately high in the Susquehanna soil and moderately low in the Carnegie soil. The soils in this unit have a moderately thin or thin root zone. They are strongly acid or very strongly acid, contain little organic matter, and are low in natural fertility.

These soils occupy less than 0.1 percent of the county. Nearly all this acreage is woodland, but a few acres are

in permanent pasture. These soils generally are not suited to cultivation.

These soils are fairly well suited as woodland, and under intensive management, they are suited to permanent pasture. Among the better suited pasture and hay plants are Coastal bermudagrass, bahiagrass, and sericea lespedeza. If these soils are heavily fertilized, a dense stand of grass that keeps erosion to a minimum can be grown in a short time. Overgrazing should be avoided to prevent further erosion.

CAPABILITY UNIT VIs–2

Only Lakeland sand, 5 to 12 percent slopes, is in this capability unit. This excessively drained soil is on sloping sand ridges near streams and drainageways. It has a surface layer of gray loose sand. Beneath this is light yellowish-brown to pale-yellow loose sand that extends to a depth of more than 40 inches.

This soil is rapidly permeable and has low available water capacity. It is very strongly acid. Natural fertility and content of organic matter are low.

This soil occupies about 1.1 percent of the county. Because it is sandy and sloping, it is droughty and poorly suited to cultivated crops. It is better suited to trees or pasture. Coastal bermudagrass, bahiagrass, and other drought-resistant grasses grow fairly well, but they require a large amount of fertilizer. Slash and longleaf pines grow fairly well if management is used that lessens the competition from hardwoods.

CAPABILITY UNIT VIIw–1

Only swamp in the mapping unit Bladen and Rains soils and swamp is in this capability unit. The swamp is in nearly level, very poorly drained areas on the flood plains of rivers and creeks. It is flooded for 1 to 12 months each year, and these floods deposit fresh sediments.

Swamp is low in natural fertility, generally very strongly acid, and medium to low in content of organic matter.

Swamp makes up 2.6 percent of the county, and all of its acreage is wooded. The principal trees are cypress, swamp blackgum, sweetgum, red maple, ash, water oak, swamp chestnut, yellow-poplar, and willow.

Management is needed that encourages the growth of the most valuable hardwoods. Swamp can also be managed for hunting and fishing. It is a natural habitat for deer, squirrel, turkey, wild hog, and duck, and many of its lakes contain several kinds of fish.

CAPABILITY UNIT VIIs–1

Kershaw coarse sand, 2 to 8 percent slopes, is the only soil in this capability unit. It is excessively drained and is on very gently sloping or gently sloping high sand ridges. Most of the acreage is on the northern and eastern sides of Lotts, Mill, and Ten Mile Creeks. The coarse sand in this soil extends from the surface to a depth of more than 72 inches.

The movement of water into and through this soil is rapid or very rapid, and available water capacity is very low. This soil is low or very low in natural fertility, low or very low in content of organic matter, and very strongly acid.

This soil occupies about 1.8 percent of the county. Nearly all its acreage is woodland, but a few acres are in permanent pasture. The soil is very droughty; it is unsuitable for cultivation and of little value for farming.

Estimated Yields

In table 2 are estimates of yields per acre that can be expected on each soil in the county under two levels of management. The yields in columns A are to be expected under the management commonly practiced in the county. In columns B are the yields obtained by farmers who used improved management or the yields obtained by research workers. The yields for tobacco, Coastal bermudagrass, and bahiagrass are those obtained under a high level of management.

The estimates in table 2 are based on records of yields on individual farms, on yields obtained in long-term experiments, and on information from agronomists who have had experience with the crops and with the soils. Yields have not been estimated for certain crops on some of the soils if the expected yields of the crops are so low, or the management needed is so exacting, that it is not practical to grow the crops. The estimates do not reflect losses caused by flooding, or increased yields resulting from irrigation.

To obtain yields in columns B, a higher level of management is needed than that required for the yields in columns A. The farmer can obtain the yields in columns B if he (1) chooses carefully the kind of crop to be grown and the cropping system to be used, (2) prepares a good seedbed, (3) uses proper methods of planting and seeding, (4) inoculates legumes, (5) plants high-yielding varieties and hybrids, (6) seeds at recommended rates and at proper times, (7) controls weeds, (8) controls excess water through drainage, (9) provides vegetated waterways, (10) tills on the contour or builds terraces where needed, and (11) adds liberal amounts of lime and fertilizer where required.

Given in the following paragraphs are the rates of fertilization and of planting that were assumed when the yields listed in columns B of table 2 were estimated.

Corn.—Soils that produce per acre 70 bushels or more of corn, as indicated in column B of table 2, require 25 to 36 pounds of nitrogen (N), 50 to 72 pounds of phosphoric acid (P_2O_5), and 60 to 90 pounds potash (K_2O) per acre at planting. Also needed is a side dressing of 90 to 100 pounds of nitrogen. Plant to insure a stand of 10,000 or 15,000 stalks per acre. Soils that produce 35 to 70 bushels of corn require 17 to 27 pounds of nitrogen, 35 to 54 pounds of phosphoric acid, and 42 to 68 pounds of potash per acre at planting, as well as a side dressing of 75 to 85 pounds of nitrogen. Enough seed should be used to insure 8,000 to 10,000 plants per acre. If the estimated yield is less than 35 bushels per acre, the soil should be used for some other crop.

All residue from the corn should be returned to the soil and a winter cover crop planted.

Tobacco (flue-cured).—Each soil for which a yield of tobacco is listed in table 2 requires 36 to 80 pounds nitrogen, 95 to 180 pounds phosphoric acid, and 108 to 240 pounds of potash per acre at planting, as well as a side

TABLE 2.—*Estimated acre yields of principal crops under two levels of management*

[Yields in columns A are expected under the management commonly practiced; yields in columns B are expected under improved management that does not include irrigation. Absence of yield indicates crop is not suited to the soil specified or is not commonly grown on it]

Soil	Corn		Tobacco (flue-cured)	Cotton (lint)		Peanuts (runner)		Soybeans		Oats		Coastal bermudagrass		Bahiagrass
												For pasture	For hay	For pasture
	A	B	B	A	B	A	B	A	B	A	B	B	B	B
	Bu.	*Bu.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Tons*	*Cow-acre-days* [1]
Albany sand, 0 to 2 percent slopes	30	60	2,300	125	350	800	1,500	12	25	20	55	325	4	360
Ardilla loamy sand, 0 to 2 percent slopes	35	75	2,200	200	500	800	1,400	20	35	30	70	275	4	390
Bladen fine sandy loam		40												165
Bladen and Rains soils and swamp:														
Bladen		40												
Rains		45												
Swamp														
Carnegie loamy sand, 2 to 5 percent slopes	30	65	1,800	300	650	650	1,700	15	25	30	65	380	6	320
Carnegie loamy sand, 5 to 8 percent slopes	25	50		210	500	500	1,500	12	20	25	50	355	5	310
Carnegie sandy loam, 2 to 5 percent slopes, eroded	25	50	1,500	225	550	500	1,500	12	20	25	50	355	5	310
Carnegie sandy loam, 5 to 8 percent slopes, eroded	15	40		150	400	500	1,400	10	18	20	40	320	4	275
Carnegie sandy loam, 8 to 12 percent slopes, eroded														225
Chipley sand, 0 to 2 percent slopes	25	50	2,200	125	325	700	1,200	12	25	20	45	310	4	360
Cowarts loamy sand, 2 to 5 percent slopes	25	60	2,200	400	650	800	1,900	15	25	30	60	380	6	320
Cowarts loamy sand, 2 to 5 percent slopes, eroded	25	50	1,900	350	550	700	1,700	12	22	25	50	360	5	310
Cowarts loamy sand, 5 to 8 percent slopes	20	45	1,900	350	500	700	1,700	12	22	25	50	360	5	310
Cowarts loamy sand, 5 to 8 percent slopes, eroded	15	35		300	500	600	1,400	10	18	20	40	320	4	300
Dothan loamy sand, 0 to 2 percent slopes	45	80	2,400	450	800	1,000	2,200	25	35	50	80	400	7	370
Dothan loamy sand, 2 to 5 percent slopes	40	75	2,400	450	775	1,000	2,000	22	32	50	75	400	7	370
Dothan loamy sand, 2 to 5 percent slopes, eroded	40	70	2,100	400	750	900	1,700	20	30	50	75	380	6	360
Dothan loamy sand, 5 to 8 percent slopes	35	70	1,600	350	700	800	1,500	15	25	45	70	360	5	350
Dunbar-Izagora complex:														
Dunbar	25	80	2,450		700		1,500	10	35	20	45			260
Izagora	35	80	2,200	300	600	800	1,800	20	35	30	70	380	6	380
Fuquay loamy sand, 0 to 2 percent slopes	35	70	2,000	400	650	800	1,900	18	28	40	75	380	6	360
Fuquay loamy sand, 2 to 5 percent slopes	30	65	2,000	400	625	800	1,900	18	28	40	70	380	6	360
Fuquay loamy sand, 5 to 8 percent slopes	20	50		250	500	600	1,300	12	22	30	60	360	5	340
Fuquay pebbly loamy sand, 0 to 2 percent	35	70	2,000	300	650	800	1,900	20	30	40	75	380	6	320
Fuquay pebbly loamy sand, 2 to 5 percent slopes	30	65	2,000	275	625	800	1,900	20	30	40	70	380	6	320
Grady sandy loam	25	50						15	25	25	60			350
Irvington loamy sand, 0 to 2 percent slopes	30	75	2,400	350	650	800	1,800	20	35	30	70	380	6	400
Izagora loamy sand	35	80	2,200	300	600	800	1,800	20	35	30	70	380	6	380
Kershaw coarse sand, 2 to 8 percent slopes												200	2	
Lakeland sand, 0 to 5 percent slopes	15	35	1,300	150	300	600	1,200	10	18	15	30	300	4	200
Lakeland sand, 5 to 12 percent slopes	15	30				500	1,000	10	15	15	25	275	4	180
Leefield loamy sand, 0 to 2 percent slopes	30	70	2,200	200	425	800	1,400	20	35	30	70	275	4	390
Leon sand														
Ona sand	25	45	2,000							25	45			360

See footnote at end of table.

TABLE 2.—*Estimated acre yields of principal crops under two levels of management*—Continued

Soil	Corn		Tobacco (flue-cured)	Cotton (lint)		Peanuts (runner)		Soybeans		Oats		Coastal bermudagrass		Bahiagrass
												For pasture	For hay	For pasture
	A	B	B	A	B	A	B	A	B	A	B	B	B	B
	Bu.	*Bu.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Tons*	*Cow-acre-days* [1]
Orangeburg loamy sand, 2 to 5 percent slopes	45	75	2,400	400	775	1,000	2,000	25	35	50	75	400	7	380
Orangeburg loamy sand, 5 to 8 percent slopes	40	65	1,600	300	675	800	1,500	12	22	40	65	360	5	350
Orangeburg loamy sand, 8 to 12 percent slopes		45										320	4	305
Pelham loamy sand	25	45												300
Plummer sand														160
Portsmouth loam														320
Rains sandy loam		45												225
Rutlege sand														
Rutlege and Portsmouth soils and alluvial land:														
Rutlege														
Portsmouth														320
Alluvial land														
Stilson loamy sand, 0 to 2 percent slopes	35	80	2,400	350	650	800	1,800	20	35	25	70	375	6	375
Susquehanna loamy sand, 2 to 8 percent slopes	15	35					900			15	35	225	2	250
Tifton loamy sand, 0 to 2 percent slopes	45	85	2,500	425	825	900	2,100	25	35	50	85	400	7	370
Tifton loamy sand, 2 to 5 percent slopes	40	80	2,300	400	800	800	2,000	22	32	45	80	400	7	370
Tifton sandy loam, 2 to 5 percent slopes, eroded	40	75	2,300	375	750	750	1,900	20	30	35	75	380	6	360
Tifton sandy loam, 5 to 8 percent slopes, eroded	35	65	1,900	325	700	700	1,800	15	25	30	65	370	6	320

[1] Cow-acre-days is the number of days 1 acre will support 1 animal unit (1 cow, steer, or horse; 5 hogs; or 7 sheep or goats) without injury to the pasture.

dressing of about 12 pounds nitrogen, 6 pounds phosphoric acid, and 48 pounds potash. The planting rate is 6,000 to 8,000 plants per acre.

Flue-cured tobacco generally is grown only on excellent soils, and only improved management is used. This management includes an effective program to control nematodes and insects.

Cotton.—Soils that produce per acre 500 pounds or more of cotton lint, as indicated in column B of table 2, require 30 to 48 pounds of nitrogen and 60 to 96 pounds each of phosphoric acid and potash per acre at planting. Also needed is a side dressing of 50 to 80 pounds of nitrogen. The planting rate is 25,000 to 40,000 plants per acre if the crop is to be harvested by hand. If a mechanical harvester is to be used, the planting rate is 40,000 to 60,000 plants per acre. Soils that produce 300 to 500 pounds of cotton lint per acre require 18 to 30 pounds nitrogen and 36 to 60 pounds each of phosphoric acid and potash per acre at planting, as well as 30 to 50 pounds of nitrogen as a side dressing. The planting rate is 20,000 to 35,000 plants per acre if the crop is to be harvested by hand. If a mechanical harvester is to be used, the planting rate is 35,000 to 50,000 plants per acre. Improved management should include an effective program for control of insects.

Peanuts (runner).—Soils that produce per acre 1,300 pounds or more of peanuts require 12 to 25 pounds of nitrogen, 36 to 60 pounds of phosphoric acid, and 36 to 75 pounds of potash per acre, as well as a side dressing of 400 to 500 pounds of gypsum. The seeding rate is 50 to 60 pounds of shelled seed per acre. Soils that produce 800 to 1,300 pounds of peanuts require 8 to 15 pounds of nitrogen, 20 to 36 pounds of phosphoric acid, and 24 to 45 pounds of potash per acre at planting and a side dressing of 300 to 400 pounds of gypsum. The seeding rate is 40 to 50 pounds of shelled seed per acre.

Peanuts respond less than most crops to direct applications of fertilizer. Apparently, they recover plant nutrients that are left in the soil by other crops.

Soybeans.—Soils that produce per acre 30 bushels or more of soybeans require 0 to 30 pounds of nitrogen, 40 to 60 pounds of phosphoric acid, and 60 to 120 pounds of potash per acre, and 60 to 80 pounds of seed. Soils that produce 15 to 25 bushels of soybeans require 0 to 20 pounds of nitrogen, 20 to 40 pounds of phosphoric acid, and 30 to 80 pounds of potash per acre, and 40 to 60 pounds of seed.

Soybeans should be planted only on well-drained or moderately well drained soils.

Oats.—Soils that produce per acre 70 bushels or more of oats require 18 to 30 pounds of nitrogen and 36 to 60 pounds each of phosphoric acid and potash per acre at planting and 50 to 80 pounds of nitrogen as a topdressing. The planting rate is 2 bushels per acre for drilled seed, and 3 bushels per acre for broadcast seed. Soils that produce per acre 35 to 70 bushels of oats require 12 to 24 pounds of nitrogen and 24 to 48 pounds each of phosphoric acid and potash per acre at planting, as well as 35 to 50 pounds of nitrogen as a topdressing. The planting rate is 2 bushels per acre for drilled seed and 3 bushels per acre for broadcast seed. If the oats are to be grazed, the planting rates on all soils should be doubled.

Coastal bermudagrass.—All soils for which yields of Coastal bermudagrass are listed in column B of table 2 require 20 to 25 pounds of nitrogen, 40 to 50 pounds of phosphoric acid, and 60 to 75 pounds of potash at planting. A topdressing of 90 to 100 pounds of nitrogen in split applications is also needed the first year. For maintenance an annual application of 25 pounds of nitrogen, 50 pounds of phosphoric acid, and 75 pounds of potash is required, as well as 100 to 200 pounds of nitrogen in split applications. The planting rate is 14,000 sprigs per acre. Mowing to a height of 6 inches or less is required for the best grazing.

Bahiagrass.—All soils for which yields of bahiagrass are listed in column B of table 2 require 24 to 30 pounds of nitrogen and 48 to 60 pounds of potash at planting, as well as a topdressing of 60 to 100 pounds of nitrogen in split applications. For maintenance an annual application of 25 pounds of nitrogen, 50 pounds of phosphoric acid, and 75 pounds of potash is required, in addition to 60 to 100 pounds of nitrogen in split applications. The planting rate is 15 pounds of broadcast seed per acre. Mowing is required to control excessive growth and weeds.

Climate and Crops [3]

Bulloch County has a warm climate, primarily because of its latitude and its nearness to the Atlantic Ocean, which is less than 50 miles from the county's southern border. This warm climate is suitable for growing many kinds of crops. The growing season lasts about 250 days. The last freeze in spring normally occurs around March 10, and the average date of the first freeze in fall is November 17. The blossoms of fruit trees, particularly peach, are occasionally damaged by a late frost. In table 3 are probabilities and dates for the last freezing temperatures in spring and the first in fall. From the data in this table, the farmer can estimate the chance that crops grown early in spring or late in fall will be damaged by freezing temperatures.

In this county the growing season, or frost-free period, is so long that some crops can be planted over a period of 2 or 3 months and still have plenty of time to mature. Among these crops are cotton, corn, tobacco, grain sorghum, millet, tomatoes, watermelons, peas, and potatoes.

The winters are generally short enough and mild enough to permit small grains sown in fall to survive and grow well. If the small grains are seeded early, grazing is provided for livestock during the winter. Fescue and clover make some growth during the winter when temperatures remain above 40°F. On the average, there are about 26 days per year that have freezing temperatures, and these occur mostly from December through February. More information about temperatures in this county is given in table 4.

TABLE 3.—*Probability of last freezing temperature in spring and first in fall, Bulloch County, Ga.*

Probability	Dates for given probability and temperature		
	24° F. or lower	28° F. or lower	32° F. or lower
Spring:			
1 year in 10 later than	March 6	March 14	March 29
2 years in 10 later than	February 22	March 6	March 22
5 years in 10 later than	January 31	February 12	March 10
Fall:			
1 year in 10 earlier than	November 21	November 13	November 4
2 years in 10 earlier than	November 26	November 22	November 8
5 years in 10 earlier than	December 12	November 30	November 17

Occasionally, in April or late in October, a cold spell occurs and the minimum temperature drops to 32° or just below. Slightly more than half of the winters have at least 1 day with a minimum temperature as low as 20°. The lowest temperature of record was 8° in December of 1962. Most of the cold weather occurs in spells that last for 2 or 3 days and are separated by longer periods of mild weather.

The summers are long, humid, and rather hot. As a rule, maximum and minimum temperatures vary only slightly from day to day through the summer months. The maximum temperature reaches 90° or higher on 3 out of 4 days from June through August and is generally above 80° from the end of April through the middle of October. Long periods of extreme heat are unusual. Days with a maximum temperature of 100° or higher average about six each summer, and they normally occur in two or three short hot spells. The highest temperature of record is 107°. Minimum temperatures in summer are generally in the low seventies but sometimes drop below 70°.

Spring and fall are both mild but differ in several other ways. Spring has more frequent and abrupt changes in weather than fall and has stronger winds and generally cooler temperature. Long periods of sunny and pleasantly mild weather are typical of the fall.

Data on precipitation are in several tables. Table 4 shows data on precipitation, including the average monthly and yearly totals. Tables 5 and 6 give the number of days each month that specified amounts of rainfall may be expected. Table 7 lists the number of dry periods lasting 2, 4, and 6 weeks that have occurred each in the year during a 10-year period.

[3] HORACE S. CARTER, State climatologist, U.S. Weather Bureau, Athens, Ga., assisted in writing this subsection.

TABLE 4.—*Temperature and precipitation, Bulloch County, Ga.*

Month	Temperature				Precipitation		
			2 years in 10 will have at least 4 days with—			1 year in 10 will have—	
	Average daily maximum	Average daily minimum	Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—	Average total	Less than—	More than—
	°F.	°F.	°F.	°F.	Inches	Inches	Inches
January	62. 9	40. 5	78	26	2. 55	0. 8	4. 3
February	65. 1	41. 8	79	27	3. 49	1. 3	6. 0
March	71. 3	46. 5	85	31	3. 81	1. 2	7. 4
April	79. 8	53. 9	90	40	3. 51	1. 7	6. 1
May	86. 3	61. 6	95	52	3. 38	1. 3	6. 2
June	91. 5	68. 2	100	62	4. 44	1. 7	8. 1
July	92. 2	70. 4	101	65	5. 57	3. 1	9. 4
August	91. 7	70. 1	98	65	5. 42	1. 9	10. 0
September	87. 2	66. 4	97	58	4. 56	1. 6	8. 2
October	79. 4	56. 0	89	42	2. 28	. 3	5. 2
November	70. 4	45. 8	84	30	2. 03	. 4	6. 7
December	62. 6	39. 9	77	25	2. 78	. 7	5. 6
Year	78. 4	55. 1	[1] 102	[2] 20	43. 82	30. 4	56. 0

[1] Average annual highest maximum. [2] Average annual lowest minimum.

TABLE 5.—*Average number of days by month and for the year that had rainfall equal to or greater than the stated amounts*

[Period of record, 1953 through 1962]

Rainfall equal to or greater than—	Average number of days in—												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Inches													
0.10	6	7	8	5	6	9	10	6	6	4	3	5	75
.25	4	4	6	4	4	6	7	5	5	2	2	3	52
.50	2	3	3	3	3	3	4	3	3	1	1	2	31

TABLE 6.—*Total number of days in 10 years (by months) that had rainfall equal to or greater than stated amounts*

Rainfall equal to or greater than—	Total number of days in—												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	10-year period
Inches													
1. 00	4	11	11	17	10	15	14	12	17	6	6	9	132
2. 00	0	1	1	4	3	2	2	1	7	0	1	0	22
3. 00	0	0	0	0	1	0	1	0	1	0	0	0	4
4. 00	0	0	0	0	0	0	0	0	1	0	0	0	1

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TABLE 7.—*Total number of 2-week, 4-week, and 6-week [1] periods in 10 years that had no days with 0.25 inch or more of precipitation*

Periods equal to or greater than—	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	10-year period
2 weeks	4	3	4	7	6	5	4	4	6	10	10	9	72
4 weeks	1	1	1	1	2	0	1	2	0	5	5	2	21
6 weeks	0	0	1	0	0	0	0	0	0	3	1	0	5

[1] Dry periods are counted in the months having the most days in the period. For example, if the dry period begins the last week in September and extends through October and into November, it is counted as occurring in October.

The average yearly rainfall in this county is about 44 inches, which affords an adequate supply of moisture during most years. Normally about half of the rain falls during the period from June through September, when it is most needed by crops. The driest part of the year is from October through January. A large part of the rainfall in warm season occurs in frequent showers and thundershowers.

Rainfall in winter comes primarily from low pressure storms or weather fronts that move over or near the area. Measurable snowfall occurs infrequently. Some of the heaviest rains have been associated with tropical storms or hurricanes that moved inland or northward near the coast. Extended dry periods, which are not uncommon in the area, are most frequent late in fall and in winter.

Only two tornadoes have been reported in this county. Damaging wind, however, accompanied some of the more severe local thunderstorms.

Average speed of winds in this county ranges from just over 7 miles per hour in midsummer to almost 10 miles per hour late in winter and early in spring. The direction of the prevailing winds is mostly northerly in fall and winter and southerly in spring and summer.

The average annual relative humidity is between 85 and 90 percent early in the morning and between 50 and 60 percent early in the afternoon. In spring relative humidity is slightly lower than the annual average, and in fall it is slightly higher. This county receives more than 50 percent of the possible sunshine throughout the year, and the total exceeds 60 percent in all seasons except winter.

ESTIMATED PROBABILITY OF DROUGHT DAMAGE

In predicting the likelihood that drought will damage a particular crop on a specified soil (*15*)[4], lists A and B are used with the information in table 8. List A groups crops according to the average depth of their root zone, and list B gives the total capacity of each soil to hold moisture to a depth of 12 inches, 24 inches, and 36 inches. Table 8 give the probabilities of drought days on soils having different moisture-storage capacities.

When you have learned the available moisture capacity of the soil to the depth to which the roots of the crop will penetrate, turn to table 8, where the probabilities of drought days, by months, are given for soils having moisture-storage capacities of 1 inch, 2 inches, 3 inches, 4 inches, and 5 inches. Suppose, for example, you wish to grow garden vegetables on Tifton loamy sand, and you want to know how likely it is that dry days will occur in July that will retard growth. List A shows that vegetables have most of their roots in the uppermost 12 inches of the soil, and list B shows, under the column headed "12 inches," that, to a depth of 12 inches, Tifton loamy sand holds approximately 1 inch of available moisture. The column headed "1 inch," gives the number of drought

TABLE 8.—*Probabilities of drought days on soils of different moisture-storage capacities*

Month [1]	Probability	Minimum drought days if soil has a moisture-storage capacity of [2]—				
		1 inch	2 inches	3 inches	4 inches	5 inches
April	1 in 10	19	12	0	0	0
	2 in 10	16	9	0	0	0
	3 in 10	15	6	0	0	0
	5 in 10	12	0	0	0	0
May	1 in 10	26	25	22	17	10
	2 in 10	23	22	18	12	6
	3 in 10	21	19	15	9	0
	5 in 10	18	15	10	0	0
June	1 in 10	23	23	22	21	18
	2 in 10	20	19	18	17	14
	3 in 10	18	16	15	13	10
	5 in 10	15	11	9	7	5
July	1 in 10	20	18	17	16	16
	2 in 10	17	14	13	12	11
	3 in 10	15	11	11	9	8
	5 in 10	11	7	6	0	0
August	1 in 10	19	15	12	11	10
	2 in 10	16	12	8	7	6
	3 in 10	14	10	5	0	0
	5 in 10	11	6	0	0	0
September	1 in 10	22	18	17	15	-------
	2 in 10	19	15	13	10	-------
	3 in 10	17	13	10	6	-------
	5 in 10	13	8	0	0	-------
October	1 in 10	31	29	20	16	-------
	2 in 10	22	18	15	10	-------
	3 in 10	20	14	10	5	-------
	5 in 10	15	7	0	0	-------

[1] Months of January, February, March, November, and December are not shown, because crops are rarely damaged by drought in these months.

[2] Moisture-storage capacity of soil is expressed as the inches of rainfall or irrigation water that a soil can hold and make available to plants.

[4] Italic numbers in parentheses refer to Literature Cited, p. 74.

days per month for four different probabilities. In July the chances are 1 in 10 that at least 20 drought days will occur, 2 in 10 that at least 17 drought days will occur, 3 in 10 that at least 15 drought days will occur, and 5 in 10 that at least 11 drought days will occur.

LIST A: Normal Root Zone for Common Crops on Permeable Soils

80 percent of roots at depth not exceeding—

12 inches	*24 inches*	*36 inches*
Most garden vegetables.	Beans (green and lima).	Bahiagrass.
	Clover (crimson and white).	Coastal bermudagrass.
	Cantaloupes.	Fescue.
	Corn.	Lespedeza (sericea and bicolor).
	Cotton.	Pecan trees.
	Cowpeas.	
	Peanuts.	
	Ryegrass.	
	Soybeans.	
	Sweetpotatoes.	
	Tobacco.	
	Tomatoes.	
	Watermelons.	

LIST B: Total Available Water

Soils:	Approximate available water, in inches of water, in soil from surface to a depth of—		
	12 inches	*24 inches*	*36 inches*
Albany sand	1	1	2
Ardilla loamy sand	1	3	4
Bladen fine sandy loam	2	4	5
Bladen and Rains soils and swamp:			
Bladen	2	4	5
Rains	1	3	5
Swamp	------	------	------
Carnegie loamy sand	1	3	4
Carnegie sandy loam	1	3	4
Chipley sand	1	1	2
Cowarts loamy sand	1	3	4
Dothan loamy sand	1	3	5
Dunbar-Izagora complex:			
Dunbar	2	3	5
Izagora	1	2	4
Fuquay loamy sand	1	2	3
Fuquay pebbly loamy sand	1	2	3
Grady sandy loam	1	3	5
Irvington loamy sand	1	2	4
Izagora loamy sand	1	2	4
Kershaw coarse sand	0	1	1
Lakeland sand	1	1	2
Leefield loamy sand	1	2	3
Leon sand	1	1	2
Ona sand	1	1	2
Orangeburg loamy sand	1	3	4
Pelham loamy sand	1	2	4
Plummer sand	1	1	2
Portsmouth loam	2	4	6
Rains sandy loam	1	3	5
Rutlege sand	1	2	3
Rutlege and Portsmouth soils and alluvial land:			
Rutlege	1	2	3
Portsmouth	2	4	6
Alluvial land	------	------	------
Stilson loamy sand	1	2	4
Susquehanna loamy sand	1	3	5
Tifton loamy sand	1	3	4
Tifton sandy loam	1	3	4

Use of the Soils as Woodland [5]

Slightly more than half of the acreage in Bulloch County is woodland, most of which is owned and operated by farmers. The principal commercial trees are longleaf pine on the dry ridges; slash pine (fig. 7) and loblolly pine on the moist, sandy flats; pine, gum, and yellow-poplar on the smaller, somewhat poorly drained bottoms; and gum and cypress on the larger, poorly drained bottoms.

***Figure 7.*—A well-managed stand of slash pine on Stilson loamy sand, 0 to 2 percent slopes.**

Both slash pine and longleaf pine are important as sources of turpentine, rosin, and other naval stores. Income from the sale of naval stores accounts for a significant part of the average farmer's income. Sold at local markets are pulpwood and sawtimber, including trees that no longer produce naval stores.

The soils of Bulloch County have been placed in six woodland suitability groups. Each group consists of soils that have about the same suitability for trees, that have about the same limitations and require about the same management, and that have about the same potential productivity.

In table 9 the woodland groups in the county are briefly described and for each group are given average productivity of important trees, hazards that affect management, trees to favor in existing stands, and trees suitable for planting.

[5] T. A. McFARLAND, woodland conservationist, Soil Conservation Service, assisted in writing this subsection.

TABLE 9.—*Productivity, hazards, and species priority for woodland suitability groups*

Woodland group	Average productivity			Plant competition	Seedling mortality	Equipment limitation	Species priority	
	Wood crop	Site index [1]	Yearly growth per acre [2]				Favor in stand	For planting
			Bd. ft.					
Group 1: Deep, well-drained soils that have a subsoil with moderate to moderately slow permeability; on uplands. (CnB, CnC, CoB2, CoC2, CoD2, CqB, CqB2, CqC, CqC2, DaA, DaB, DaB2, DaC, FsA, FsB, FsC, FhA, FhB, OeB, OeC, OeD, TqA, TqB, TuB2, TuC2).	Slash pine	90	570	Moderate	Slight	Slight	Slash pine, loblolly pine, and longleaf pine.	Slash pine and loblolly pine.
	Loblolly pine	87	570					
	Longleaf pine	75	330					
Group 2: Deep, moderately well drained to somewhat poorly drained soils in nearly level low areas. (AqA, Dic, IjA, Izg, LsA, SeA).	Slash pine	90	570	Moderate	Slight	Slight	Slash pine, loblolly pine, and longleaf pine.	Loblolly pine and slash pine.
	Loblolly pine	90	610					
	Longleaf pine	75	330					
	Yellow-poplar	95	450					
	Sweetgum	90	400					
	Oak	90	350					
Group 3: Poorly drained and very poorly drained soils in broad flats, depressions, and drainageways. (BlA, Brs[3], Gra, PlA, PeA, Por, RkA, Ros, Rpa).	Slash pine	90	570	Severe	Severe (slight in drained areas).	Severe (moderate in drained areas.)	Slash pine, longleaf pine, loblolly pine, and sweetgum.	Slash pine and yellow-poplar.
	Loblolly pine	85	540					
	Longleaf pine	75	330					
	Sweetgum	100	510					
	Yellow-poplar	95	450					
	Oak	90	350					
Group 4: Excessively drained, coarse-textured soils on high uplands. (KkC[4], LpB, LpD).	Longleaf pine	63	220	Moderate	Severe	Moderate	Slash pine, loblolly pine, and longleaf pine.	Slash pine and sand pine.
	Slash pine	78	410					
	Loblolly pine	75	410					
Group 5: Moderately well drained and somewhat poorly drained soils with thin root zone; on uplands. (SpC).	Loblolly pine	80	470	Moderate	Moderate	Slight	Loblolly pine, slash pine, and longleaf pine.	Loblolly pine.
	Slash pine	80	430					
	Longleaf pine.	72	300					
Group 6: Moderately well drained to poorly drained soils on low, level, broad ridges. (AdA, CmA, LrA, ObA).	Slash pine	90	570	Moderate	Moderate	Moderate	Slash pine, loblolly pine, and longleaf pine.	Slash pine.
	Longleaf pine.	69	270					
	Loblolly pine.	75	410					
	Sweetgum	90	400					

[1] Site index for pines is based on site curves in USDA Misc. Pub. 50 (*12*) and revised according to Coile and Schumacher, Jour. of Forestry, June 1953 (*4*).

[2] Average yearly growth (Scribner Rule) in board feet per acre for trees to age 60 in well-stocked, even-aged stands. Yields for southern pines are based on data in Misc. Pub. 50 (*12*) and data from soil-site evaluation by the Soil Conservation Service. Average yearly growth for hardwoods is based on data adapted from table 7 in USDA Handb. 181 (*13*) and the data on diameter growth from soil-site evaluation by the Soil Conservation Service and cooperating agencies. For hardwoods the data used was for trees having a diameter of 12 inches or more.

[3] Swamp in mapping unit Bladen and Rains soils and swamp is not assigned to a woodland suitability group.

[4] No data were available. Field observations indicate that trees on this soil have no commercial value.

The productivity of the soils for a given tree is expressed as the site index. The site index is the average height, in feet, that the best (dominant and codominant) trees of a given species, growing on the specified soil, will reach in 50 years. The average site indexes in table 9 were estimated on the basis of measurements of trees and on information in published and unpublished records. In addition to site index, table 9 gives the average annual growth in board feet (Scribner rule). The ratings shown for the limitations require explanation.

Plant competition refers to the rate of invasion by unwanted trees, shrubs, and vines when openings are made in the canopy. Competition is *slight* if it does not prevent adequate natural regeneration and early growth, or does not interfere with the normal development of planted seedlings. It is *moderate* if it delays natural or artificial regeneration and slows the growth of seedlings, but does not prevent the eventual development of a fully stocked, normal stand. Competition is *severe* if natural or artificial restocking is prevented unless the site is intensively prepared and maintenance practices (fig. 8) such as weeding are intensive.

Seedling mortality refers to the expected loss of seedlings as a result of unfavorable soil characteristics or topographic features, not as a result of plant competition. Even if healthy seedlings of suitable species are correctly planted or occur naturally in adequate numbers, some will not survive if conditions are unfavorable. Mortality is *slight* if less than 25 percent of the seedlings die; *moderate*, if between 25 and 50 percent die; and *severe*, if more than 50 percent die.

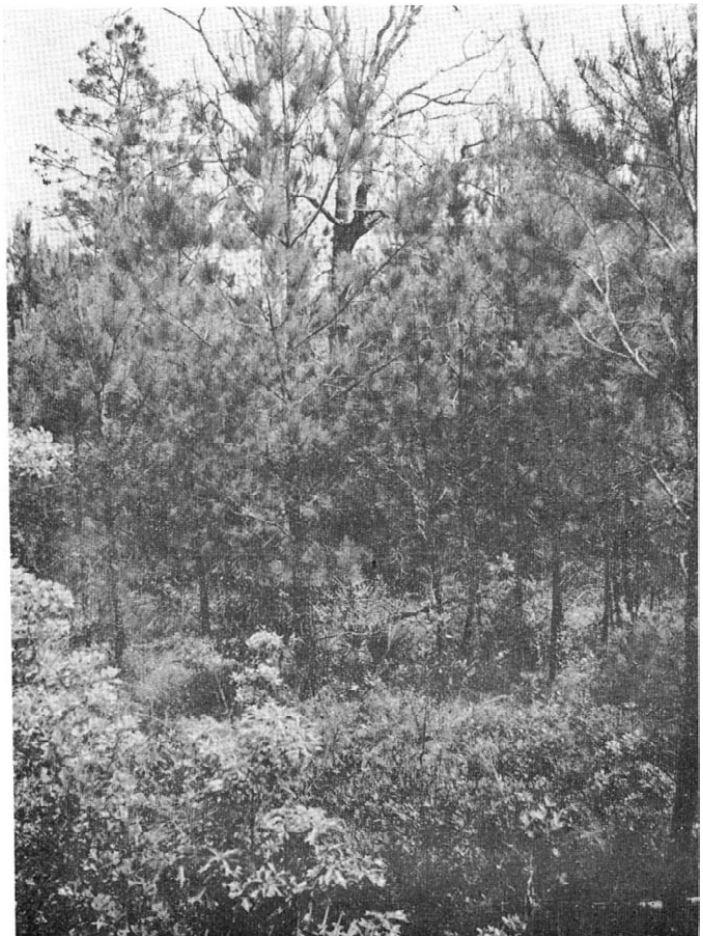

Figure 8.—**Chemical control of hardwoods on Albany sand, 0 to 2 percent slopes.**

Equipment limitations result from soil characteristics and topographic features that restrict or prohibit the use of conventional equipment for planting and harvesting wood crops, for constructing roads, for controlling unwanted vegetation, and for controlling fires. The limitation is *slight* if there is little or no restrictions on the type of equipment or on the time of the year that equipment can be used. It is *moderate* if the use of equipment is restricted by one or more unfavorable characteristics, such as slope, stones or other obstructions, seasonal wetness, instability, or risk of injury to roots of trees. The limitation is *severe* if special equipment is needed and the use of such equipment is severely restricted by one or more unfavorable soil characteristics.

Listed in table 9, in order of their priority, are the trees that ought to be favored in the management of existing stands and those that are suitable for planting.

Use of Soils for Wildlife and Fish

The soils of Bulloch County produce food and cover for many kinds of wildlife. Many bobwhite and doves live in the large cultivated areas of the county. Common throughout the county are rabbits, squirrels, foxes, opossum, raccoons, skunks, and many nongame birds. Deer and wild turkeys find suitable habitat in the large, moist areas of woodland in the southern one-third of the county and in the wide, swampy areas along the Ogeechee River and Black, Mill, and Lotts Creeks. Wild ducks, wild hogs, otters, and bobcats live along streams and, to some extent, in other parts of the county. The following list shows the principal kinds of wildlife on each soil association. These soil associations are shown on the General Soil Map at the back of this survey.

Soil association	*Wildlife*
Tifton-Fuquay-Pelham	Bobwhite, dove, squirrel, rabbit.
Leefield-Stilson-Pelham	Bobwhite, dove, deer, squirrel, rabbit.
Fuquay-Lakeland	Bobwhite, dove, deer, squirrel, rabbit.
Rutlege-Albany-Chipley	Deer, squirrel, duck, wild turkey.
Kershaw-Lakeland	Deer, rabbit.
Rains-Izagora-Dunbar	Deer, squirrel, duck, wild turkey.
Bladen-Rains-Swamp	Deer, squirrel, duck, wild turkey.

Food and cover needed by wildlife

The feeding habits of wildlife differ. Some eat only insects and other small animals, some eat only plants, and some eat a combination of the two. In the following paragraphs are summarized the needs of most of the important animals and fish in the county.

Bobwhite quail.—Choice foods for bobwhite quail are acorns, blackberries, bullgrass, wild black cherries, corn, cowpeas, dewberries, Florida beggarweed, flowering dogwood seeds, annual and bicolor lespedezas, browntop millet, oats, pecans, pine seeds, common ragweed, rye, soybeans, sweetgum seeds, and tickclover. Quail also eat many insects. The food must be close to vegetation that provides protection from predators, extreme heat, and adverse weather.

Deer.—Choice foods for deer are acorns, bahiagrass, clovers, chufa, corn, cowpeas, dogwood seeds, greenbrier, annual and bicolor lespedezas, oats, saw-palmetto, soybeans, tickclover, rye, and yaupon. A wooded area of 500 acres or more generally provides enough cover for deer.

Mourning dove.—Among the choice foods for dove are bullgrass, corn, browntop and Japanese millets, pine seeds, common ragweed, and sweetgum seeds. Doves do not eat insects, green leaves, or fruits. They drink water daily.

Duck.—Choice foods for ducks are acorns, chufa, corn, browntop and Japanese millets, and smartweed seeds. Although ducks occasionally eat acorns and corn on dry land, their food generally needs to be flooded.

Rabbit.—For cover, rabbits need a thicket of blackberry, plum, or other plants. They eat clover, winter grasses, and other succulent plants.

Squirrel.—Choice foods for squirrels are acorns, blackgum seeds, black cherries, chinkapin, chufa, corn, flowering dogwood seeds, magnolia, peanuts, pecans, pine seeds, cypress, and tupelo fruit.

Wild turkey.—Turkeys survive only in large wooded areas that generally occupy 2,000 acres or more. They need a daily supply of drinking water and often roost in large trees over or near water. Choice foods are insects, acorns, bahiagrass seeds, bullgrass, blackberries, dewberries, chinkapin, chufa, clover leaves, corn, cowpeas, browntop millet, peanuts, flowering dogwood seeds, galberry, wild grapes, oats, pecans, pine seeds, rye, saw-palmetto, and soybeans.

Nongame birds.—Nongame birds vary greatly in the foods they choose. Several kinds eat nothing but insects, others eat mostly seeds, and some eat insects, nuts, and fruits.

Fish.—The principal game fish in the county are bluegill, bass, and channel catfish. The choice foods of bluegills are mostly aquatic worms, insects, and larvae. Bass and channel catfish feed chiefly on small fish. The amount of food for fish produced in a pond is related directly to the fertility of the water. The fertility of the water is affected by the soils of the watershed and somewhat by the soils at the bottom of the pond. Because most of the soils in the county are acid and low in fertility, most ponds generally need to be fertilized and limed so that they produce enough green, microscopic algae to feed worms that are food for fish.

Establishing food and cover plants.—The local representative of the Soil Conservation Service maintains specific, up-to-date technical guides for each important kind of wildlife and fish, and for each significant plant that provides food or cover for wildlife. It also has specifications for establishing and maintaining each soil and water conservation practice that is adaptable to the soils and waters in the county. Thus, any landowner can obtain practical help in planning and establishing a habitat and food supply for the kinds of wildlife or fish he wishes to favor.

Wildlife suitability groups

The soils in Bulloch County have been placed in seven groups according to their suitability as habitats for specified kinds of wildlife. The seven groups are described in the following pages. Table 10 rates the suitability of specified plants to the soils of each group. Table 11 rates the suitability of the same plants as foods for selected kinds of wildlife that occur in the county. The plants listed in table 10 furnish some of the cover needed. Additional cover is generally abundant or excessive in this humid climate, or it can be readily grown where needed.

TABLE 10.—*Suitability of specified plants for soils in wildlife groups*

[In the numerical ratings, 1 stands for suited; 2 stands for marginally suited; and 3 stands for poorly suited or unsuited]

Kind of plant	Wildlife suitability groups						
	1	2	3	4	5	6	7
Bahiagrass	3	1	1	3	1	2	3
Beggarweed, Florida	3	2	1	3	1	3	3
Blackberry and dewberry	3	1	1	3	2	2	3
Blackgum	1	3	3	3	3	3	2
Cherry, black	3	1	1	3	2	1	3
Chinkapin	3	3	1	3	1	3	3
Chufa	3	1	1	3	1	2	3
Clover, crimson	3	1	1	3	2	2	3
Clover, white	3	3	1	3	1	3	3
Corn	3	1	1	3	1	2	3
Cowpeas	3	1	1	3	2	2	3
Cypress, bald	1	3	3	3	3	3	3
Dogwood, flowering	3	1	2	2	3	1	3
Gallberry	2	3	1	3	1	3	1
Grapes, wild	3	2	1	3	1	2	3
Greenbrier	1	2	1	3	1	2	3
Lespedeza, annual	3	2	1	3	1	2	3
Lespedeza, bicolor	3	2	2	3	3	2	3
Magnolia	1	1	1	2	1	1	2
Millet, browntop	3	1	1	3	1	3	3
Millet, Japanese	1	3	2	3	2	3	3
Oaks [1]	1	1	1	2	1	1	2
Oats	3	1	3	3	2	1	3
Paspalum, bull	3	3	1	3	1	3	3
Peanuts	3	1	1	3	2	2	3
Pecan	3	1	1	3	1	1	3
Pines	1	1	1	2	1	1	1
Ragweed, common	3	2	1	3	1	2	3
Rye	3	1	1	2	2	1	3
Saw-palmetto	1	2	2	2	1	3	3
Smartweed	1	2	2	2	1	3	3
Soybeans	3	1	1	3	1	2	3
Sweetgum	2	3	2	3	3	3	3
Tickclover (beggarlice)	3	2	1	3	3	1	3
Tupelo	1	3	3	3	3	3	3
Waxmyrtle	3	3	1	3	1	3	1

[1] These oaks are black, blackjack, bluejack, myrtle, post, sawtooth, Shumard, southern red, swamp chestnut, water, white, and willow.

WILDLIFE SUITABILITY GROUP 1

In this group are poorly drained and very poorly drained soils in drainageways and depressions and on broad, low flats. These soils are saturated with water for long periods. The surface layer ranges from clay loam to sand in texture and from gray to black in color. The subsoil ranges from sand to clay.

The soils of this group amount to about one-third of the county and are almost entirely wooded. Most of the acreage is covered by water for short periods, and Bladen and Rains soils and swamp, a unit in this group, is covered during the wet months. The excess water limits

TABLE 11.—*Suitability of plants as food for kinds of wildlife*

[In the numerical ratings, 1 stands for choice (attractive, nutritious); 2 stands for fair (useful when choice foods are gone); and 3 stands for unimportant (may be eaten in small amounts)]

Plant	Part of plant eaten	Suitability of plants as food for—									
		Bobwhite	Deer	Dove	Duck	Rabbit	Squirrel	Turkey	Nongame birds that feed on		
									Fruit [1]	Grain and seeds [2]	Nuts and acorns [3]
Bahiagrass	Seed	2	[4] 2	2	3	3	3	1	3	2	3
Beggarweed, Florida	Seed	1	[4] 3	3	3	3	3	3	3	3	3
Blackberry and dewberry	Fruit	1	[5] 3	3	3	3	2	1	1	3	3
Blackgum	Fruit	2	3	3	3	3	1	1	1	3	2
Cherry, black	Fruit	1	3	3	3	3	1	2	1	3	2
Chinkapin	Nut	3	2	3	3	3	1	1	3	3	1
Chufa	Nut	3	1	3	1	3	1	1	3	3	2
Clover, crimson	Forage	2	1	3	3	1	3	1	3	3	3
Clover, white	Forage	2	1	3	3	1	3	1	3	3	3
Corn	Seed	1	1	1	1	1	1	1	3	1	2
Cowpeas	Seed	1	1	2	3	1	3	1	3	3	3
Cypress, bald	Seed	3	3	3	3	3	1	2	3	3	3
Dogwood, flowering	Fruit	1	[4] 3	3	3	3	1	1	1	3	3
Gallberry	Fruit	2	3	3	3	3	3	1	2	3	3
Grapes, wild	Fruit	3	[5] 3	3	3	3	2	1	1	3	3
Lespedeza, annual	Seed	1	[4] 3	3	3	[5] 3	3	2	3	3	3
Lespedeza, bicolor	Seed	1	[4] 3	3	3	[5] 2	3	3	3	3	3
Magnolia	Fruit	3	[5] 3	3	3	3	1	2	1	3	3
Millet, brownton	Seed	1	3	1	1	3	3	1	3	1	3
Millet, Japanese	Seed	1	3	1	1	3	3	2	3	1	3
Oaks [6]	Acorns	1	1	3	1	3	1	1	3	3	1
Oats	All	[7] 3	1	[7] 3	3	1	3	1	3	[7] 3	3
Paspalum, bull	Seed	1	3	1	2	3	3	1	3	1	3
Peanuts	Nuts	2	3	2	3	3	1	1	3	3	1
Pecan	Nuts	1	2	3	3	3	1	1	3	3	1
Pines	Seed	1	3	1	3	3	1	1	3	1	1
Ragweed, common	Seed	1	[5] 3	1	3	3	3	3	3	1	3
Rye	All	1	1	3	3	1	3	1	3	3	3
Saw-palmetto	Forage	3	1	3	3	3	3	1	3	3	2
Smartweed	Seed	3	3	3	1	3	3	3	3	3	3
Soybeans	Seed	2	[4] 3	2	2	[4] 3	3	1	3	3	3
Sweetgum	Seed	1	[5] 3	1	3	3	2	2	3	1	3
Tickclover (beggarlice)	Seed	1	[4] 3	3	3	3	3	2	3	3	3
Tupelo	Fruit	3	3	3	3	3	1	3	1	3	3
Waxmyrtle	Fruit	2	[5] 3	3	3	3	3	3	3	3	2
Woolly croton	Seed	1	3	1	3	3	3	3	3	3	3

[1] Bluebird, catbird, mockingbird, and waxwing.
[2] Blackbird, cardinal, meadowlark, sparrow, and towhee.
[3] Chickadee, grackle, bluejay, titmouse, and woodpecker.
[4] Foliage is choice food.
[5] Foliage is fair food.
[6] These oaks are black, blackjack, bluejack, myrtle, post, sawtooth, Shumard, southern red, swamp chestnut, water, white, and willow.
[7] Seed is choice food.

the soils to plants that tolerate wetness. Among the plants that furnish choice food for wildlife are blackgum, baldcypress, Japanese millet, oak, smartweed, sweetbay magnolia, tupelo, and pine.

Some areas of these soils can be flooded for duck fields, and many sites are suitable for ponds. Some of the acreage is in large tracts suitable for deer and turkey. Cover for wildlife is plentiful.

WILDLIFE SUITABILITY GROUP 2

In this group are well-drained soils of the uplands that have slopes of 0 to 8 percent. These soils generally have a surface layer of loamy sand or sand, but in eroded areas of Tifton soils, the surface layer is sandy loam. The soils of this group have a subsoil of sandy clay loam or sandy clay that has moderate or moderately slow permeability. Tilth is good, and the available water capacity is moderately high to low.

The soils of this group are mostly cultivated. They are extensive in the northern and southwestern parts of the county. These soils are suited to many plants, such as bahiagrass, blackberry, chufa, corn, and cowpeas, that provide choice food for several kinds of wildlife. Species of wildlife that feed on these plants are deer, turkey, rabbits, squirrels, bobwhites, and doves. Many of the natural drainageways are good sites for ponds. Hunting is excellent on this group of soils.

WILDLIFE SUITABILITY GROUP 3

In this group are moderately well drained to somewhat poorly drained soils that have slopes of 0 to 2 percent. The surface layer of these soils is chiefly loamy sand 8

to 40 inches thick. In most places the subsoil is friable sandy clay loam or sandy clay that has moderate or moderately slow permeability. These soils are easily worked and have moderate to high available water capacity.

The soils of this group are scattered through the county, and a large part of their acreage is cultivated. They are suited to many plants, such as browntop millet, corn, cowpeas,, and beggarweed, that provide choice food for several kinds of wildlife. Among the wildlife that feed on these plants are turkeys, deer, rabbits, doves, and squirrels. The natural drainageways on these soils provide sites favorable for ponds, which are easy to construct and maintain.

WILDLIFE SUITABILITY GROUP 4

In this group are well-drained to excessively drained sandy soils on ridges and side slopes. Slopes range from 0 to 12 percent.

The soils in this group occupy about 37,000 acres and are mostly wooded. Cover for wildlife is adequate on these soils, but food plants are scarce because the available water capacity is moderately low or very low and natural fertility is low or very low. Supplemental food can be produced more economically on the adjacent soils in other wildlife groups. Drinking water also must be obtained in the areas nearby.

WILDLIFE SUITABILITY GROUP 5

This group consists of moderately well drained or somewhat poorly drained sands on low, broad ridges and flats. Slopes range from 0 to 2 percent. The sand in these soils extends from the surface to a depth of 40 inches to several feet. A water table that fluctuates considerably is near the surface during wet periods but drops to a depth of more than 3 feet during prolonged droughts.

The soils of this group occupy about 23,000 acres. More than two-thirds of the acreage is wooded, and the rest is cultivated or pastured. The soils are well suited to many plants that provide choice food for several kinds of wildlife. A few, large, wooded areas are suitable for deer and turkey, but waterholes are needed in some places for these animals and for squirrels. Protective cover for wildlife is plentiful. Because these soils are sandy, they generally cannot be flooded to make duck fields.

WILDLIFE SUITABILITY GROUP 6

This group consists of moderately well drained to excessively drained soils on uplands. Slopes range from 2 to 8 percent. The surface layer of these soils is loamy sand or sandy loam, 4 to 20 inches thick, and the subsoil is sandy clay loam to clay. These soils have medium to low available water capacity. Tilth is generally good.

The soils of this unit occupy about 22,000 acres and are scattered throughout the upper two-thirds of the county. Most of the acreage has been cultivated, but some of this has reverted to forest. These soils are suited to a number of plants, such as blackcherry, flowering dogwood, oak, pine, and tickclover, that supply choice food for several kinds of wildlife. Among the wildlife that feed on these plants are turkeys, deer, squirrels, doves, and bobwhites. These plants can be established and maintained if moderate practices are used to help control erosion.

WILDLIFE SUITABILITY GROUP 7

Only Leon sand is in this group. It is on low, nearly level ridges and is somewhat poorly drained or poorly drained. The surface layer is sand, 5 to 12 inches thick, and the subsoil is a hardpan of sand cemented with organic matter. This pan holds water at or near the surface during wet periods, but in dry periods this soil is droughty because the pan prevents moisture from rising into the surface layer.

This soil occupies about 1,400 acres, and all of it is wooded. Among the plants that produce choice food for squirrels and turkeys are pine, waxmyrtle, and gallberry. Because this soil is sandy and is in high areas, it cannot be flooded effectively for duck fields.

Use of Soils for Engineering [6]

Soils, to an engineer, are natural materials that occur in great variety over the earth and that have various engineering properties. These properties may vary widely from place to place, even within the small area covered by a single project. A large part of soil engineering consists of locating the various soils, determining their engineering properties, correlating those properties with the requirements of the job, and selecting the best soil material for each requirement.

The information in this survey can be used to—

(1) Make soil and land use studies that will aid in selecting and developing sites for industries, businesses, residences, and recreational areas.
(2) Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
(3) Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables, and in planning detailed investigations at the selected locations.
(4) Locate probable sources of gravel and other construction materials.
(5) Correlate performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining engineering practices and structures.
(6) Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
(7) Supplement the information obtained from other published maps and reports and aerial photographs for the purpose of preparing maps and surveys that can be used readily by engineers.
(8) Develop other preliminary estimates for construction purposes pertinent to the area.

With the use of the soil map for identification, the engineering interpretations in this subsection can be useful for many purposes. It should be emphasized that they may not eliminate the need for sampling and testing

[6] JOHN E. JACKSON, agricultural engineer, Soil Conservation Service, assisted in writing this subsection.

at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Much of the information in this section is given in tables 12, 13, and 14. Table 12 contains test data for soils of two series in the county. In table 13 the properties of the soils that are important to engineering are estimated. Table 14 indicates the suitability of the soils for various engineering uses.

In addition to this subsection, other sections of the survey, including "Descriptions of the Soils" and "Formation, Classification, and Morphology of Soils," are useful to engineers. Some of the terms used by the soil scientist may be unfamiliar to the engineer, and some terms have a special meaning in soil science. These terms, as well as other special terms used in the soil survey are defined in the Glossary at the back of this survey.

Engineering classification systems

Two systems of classifying soils are in general use among engineers. One is the system approved by the American Association of State Highway Officials (AASHO) (*2*), and the other is the Unified system adopted by the Corp of Engineers, U.S. Army (*16*). Both systems are used in this survey and are explained in the following paragraphs. The explanations are taken largely from the PCA Soil Primer (*8*).

AASHO classification system.—Most highway engineers classify soils according to the AASHO system. In this system soil material is classified on the basis of gradation, liquid limit, and plasticity index into seven principal groups. The groups range from A–1, consisting of gravelly soils that have high bearing strength and are the best soils for subgrades, to A–7, consisting of clayey soils that have low strength when wet and are the poorest soils for subgrades. Within each of the principal groups, the relative engineering value of the soil material is indicated by the group index number. Group index numbers range from 0 for the best material to 20 for the poorest material. For the soils tested, the group index numbers are shown in table 12 following the soil group symbol. The estimated AASHO classification of the soils in the county, without the group index numbers, is given in table 13.

The Unified system.—This system identifies the soils according to their texture, plasticity, and performance as construction material (*16*). Soil materials are identified as coarse grained (8 classes), fine grained (6 classes), and highly organic. The tested soils are classified according to the Unified system in table 12. The classification for the soils that were not tested is estimated in table 13.

Soil test data

To help evaluate the soils for structural purposes, soil samples were taken to a depth of 6 feet from the principal soil types in two important series and were tested in accordance with standard procedures. The results of these tests are given in table 12. Although samples of the soils in each of the two series were taken in three different locations, and the test data show that the soils vary in some characteristics, the data probably do not show the maximum variations in the B and C horizons. The samples were tested for moisture-density, volume change, liquid limit, and plasticity index. Also, they were analyzed mechanically for grain-size distribution.

In the moisture-density, or compaction, test a sample of soil material is compacted several times using the same compactive effort, but each time at a higher content of moisture. The dry density, or unit weight, of the compacted material increases until the optimum moisture content is reached. After that, the dry density decreases as the moisture content increases. The highest dry density obtained in the compaction test is termed maximum dry density. Soil in earthworks is most stable if it is compacted to about the maximum dry density when it is at the optimum moisture content.

The volume change listed in table 12 indicates the amount of shrinkage and swell obtained for samples prepared at optimum moisture content and then subjected to drying and wetting. The sum of these two values gives the total volume change that can occur in the particular soil material.

Grain-size distribution was obtained by a combination of the sieve and the hydrometer methods. The percentages of fine-grained particles obtained should not be used as a basis for naming soil textural classes.

The tests for liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the soil material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid and the plastic limit. It indicates the range of moisture content within which the soil material is in a plastic condition.

Engineering properties of soils

In table 13 the properties important to engineering are estimated for the soils in the county. Because these estimates are for the typical profile, considerable variation from the values recorded in table 13 may be expected. For the soil series that have been tested, the results of the tests were used as a basis for estimating soil properties. For the rest of the soils in the county the estimates are based on test data for similar soils in nearby counties, or on past experience in the use of these soils in structural work.

Table 13 also gives the depth to the water table. For those soils that have a high water table, the number of months that it remains high enough to affect construction is also given. The soils that are covered with water are designated by footnotes in table 13, but not designated in this table are the soils that are flooded from time to time. For more than once a year, Bladen soils are flooded for periods that last from 7 days to 1 month. For more than 6 months each year, Chipley soils are flooded or have a water table less than 15 inches from the surface. Dunbar soils generally are flooded only about once in 5 years, and the floods last for less than 7 days. Rutlege

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and Portsmouth soils and alluvial land are flooded for more than 1 month each year.

Permeability, measured in inches per hour, is the rate at which water moves through undisturbed soil material. This rate depends upon the texture and structure of the soil. Generally, those soils classified as coarse grained in the Unified system or A–1 in the AASHO system have the highest rate of permeability; those soils classified as fine grained in the Unified system or A–7 in the AASHO system have the lowest rate.

Available water capacity, given in inches per inch of soil depth, is the approximate amount of capillary water in the soil when it is wet to field capacity. The estimates in table 14 are based on the texture and structure of the soil material; the fine-grained soils have a greater available water capacity than coarse-grained soils. If the soil is air dry, or at the permanent wilting point of plants, the amount of water stated in table 14 will wet the soil material to a depth of 1 inch without deeper penetration.

In the column headed "Reaction" the degree of soil acidity or alkalinity is expressed in pH values. A pH of 7.0 is neutral; lower values indicate acidity, and higher values indicate alkalinity. A soil having a pH of 4.5 to 5.0 is very strongly acid, and one having a pH of 8.5 to 9.0 is strongly alkaline.

The shrink-swell potential indicates how much the volume of soil material changes as moisture content changes. The estimates in table 14 are based primarily on the amount and type of clay in the soil material. In general, soils classified as CH and A–7 have a high shrink-swell potential, and those classified as GW or SW (coarse grained) and A–1 have a low shrink-swell potential.

TABLE 12.—*Engineering*

[Test performed by State Highway Department of Georgia in cooperation with the Bureau of Public Roads in accordance

Soil name and location	Parent material	Georgia report No.	Depth	Horizon	Moisture-density [1]	
					Maximum dry density	Optimum moisture
			Inches		*Lb. per cu. ft.*	*Percent*
Ardilla loamy sand:						
5.5 miles northeast of Statesboro on U.S. Highway No. 301 (modal).	Hawthorn marine terrace.	S59Ga–16–3–1	0–10	Ap	120	10
		S59Ga–16–3–3	15–26	B2	125	11
		S59Ga–16–3–5	32–48	C	111	16
2 miles south of Arcola on county road (intergrade to Stilson).	Sunderland marine terrace.	S59Ga–16–2–1	0–6	A1	112	12
		S59Ga–16–2–4	24–42	B2	123	12
		S59Ga–16–2–5	42–72	C	115	15
0.5 mile southwest of Arcola on U.S. Highway No. 80 (intergrade to Irvington).	Sunderland marine terrace.	S59Ga–16–1–1	0–10	Ap	108	13
		S59Ga–16–1–4	23–44	B2	118	12
		S59Ga–16–1–6	50–65	C	112	14
Tifton loamy sand:						
2.5 miles south of Portal on county road (modal).	Hawthorn marine terrace.	S59Ga–16–4–1	0–10	Ap	121	10
		S59Ga–16–4–4	20–32	B2	118	15
		S59Ga–16–4–6	41–60	C	111	17
4.5 miles northeast of Statesboro on county road (intergrade to Dothan).	Hawthorn marine terrace.	S59Ga–16–6–1	0–14	Ap	118	11
		S59Ga–16–6–2	21–57	B2	114	15
		S59Ga–16–6–3	69–90	C	115	15
0.7 mile southwest of Portal on county road (intergrade to Carnegie).	Hawthorn marine terrace.	S59Ga–16–5–1	0–14	Ap	126	8
		S59Ga–16–5–2	24–33	B2	104	21
		S59Ga–16–5–3	33–54	C	104	18

[1] Based on AASHO Designation: T–99–57, Method A or C (*2*). (Method A was used when the sample contained less than 5 percent of the particles retained on the No. 4 sieve; Method C was used for other samples).

[2] Based on "A System of Soil Classification," by W. F. ABERCROMBIE, Proc., Highway Research Board, 1954 (*1*).

[3] Mechanical analysis according to AASHO Designation: T–88–57 (*2*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than

Engineering interpretations of soils

In table 14, suitability of the soils as sources of topsoil, sand, and road fill is rated and features that affect conservation engineering are listed. The rating for topsoil applies only to the surface layer. The rating for sand refers to suitability of sand if used as a filler or in bituminous mixtures used in building construction. Except for Kershaw coarse sand, the sand in Bulloch County is too fine textured for commercial use. Generally, the most desirable materials for road fill are fine-grained sands, loamy sands, and sandy clays. Albany sand is a good material for road fill.

Generally, only those features that adversely affect engineering practices and structures are listed in table 14. The features that affect the suitability of the soils for highway locations are topographic position; strength and stability; drainage, including a high water table; and desirability as foundation material.

The most important feature that affects reservoir areas is the permeability of the underlying material. Material that has slow or moderately slow permeability is desirable. Material used in embankments should have good strength and stability, good compactibility, and slow or moderate permeability. Where core walls are used in the development of side slopes, permeability is less important than the stability of the material. In the center section of an embankment, however, moderately permeable or slowly permeable material that has good compactability is desirable. Material that has a high shrink-swell potential is not suitable in any part of an embankment.

test data

with procedures of the American Association of State Highway Officials (AASHO) (*1*), except as stated in footnote 2]

Mechanical analysis [3]													Classification	
Volume change [2]			Percentage passing sieve—					Percentage smaller than—				Liquid limit	Plasticity index	AASHO	Unified
Shrinkage	Swell	Total change	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
Percent	*Percent*	*Percent*													
1.1	5.8	6.9	100	96	92	58	20	12	10	6	3	[4] NP	[4] NP	A-2-4(0)	SM.
2.0	2.7	4.7	100	98	94	73	34	24	21	18	15	20	7	A-2-4(0)	SM-SC.
5.2	1.0	6.2	100	99	96	86	46	37	35	31	28	34	11	A-6(2)	SM-SC.
5.3	5.6	9.9	------	100	99	77	17	11	8	2	1	NP	NP	A-2-4(0)	SM.
2.0	1.6	3.6	------	100	98	69	28	21	18	15	13	20	6	A-2-4(0)	SM-SC.
3.3	2.8	6.1	------	------	100	76	34	28	26	25	24	35	15	A-2-6(1)	SC.
1.3	5.6	6.9	------	100	99	97	15	10	8	4	3	NP	NP	A-2-4(0)	SM.
3.1	5.8	8.9	100	98	94	92	28	22	20	18	17	22	4	A-2-4(0)	SM-SC.
3.6	4.5	8.1	100	98	98	96	35	30	28	25	24	30	11	A-2-6(0)	SC.
1.0	3.5	4.5	100	90	88	66	16	8	5	2	1	NP	NP	A-2-4(0)	SM.
4.3	2.5	6.8	100	83	78	67	36	35	32	31	29	33	18	A-6(3)	SC.
5.7	1.5	7.2	100	97	93	78	42	38	34	32	30	35	13	A-6(2)	SM-SC.
.6	3.9	4.5	100	99	98	83	19	12	9	6	4	NP	NP	A-2-4(0)	SM.
3.9	2.0	5.9	[5] 99	88	84	76	39	34	31	29	27	31	14	A-6(2)	SC.
5.3	1.6	6.9	100	87	85	73	35	30	28	24	23	32	11	A-2-6(0)	SC.
1.5	3.0	4.5	100	92	88	60	16	10	8	5	5	NP	NP	A-2-4(0)	SM.
8.7	0.3	9.0	------	------	100	81	53	44	42	38	36	43	14	A-7-6(5)	ML.
7.5	2.6	10.1	------	100	99	82	52	49	41	37	35	42	15	A-7-6(6)	ML-CL.

2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

[4] NP = Nonplastic.

[5] 100 percent of this sample passed a 1-inch sieve.

TABLE 13.—*Estimated*

Soil name	Depth to water table	Depth from surface	Classification: USDA texture
		Inches	
Albany (AdA)	15 to 30 inches for 2 to 6 months each year	0 to 40	Sand
		40 to 48	Sandy loam
		48 to 65	Sandy clay loam
Ardilla (AqA)	15 to 30 inches for 2 to 6 months each year	0 to 10	Loamy sand
		10 to 21	Sandy clay loam
		21 to 60	Sandy clay loam
Bladen (B1A, Brs) (For properties of the Rains soils in mapping unit Brs, refer to the Rains series; the properties of swamp are too variable to estimate.)	Less than 15 inches for more than 2 months each year. [3]	0 to 8	Fine sandy loam
		8 to 60	Clay
Chipley (CmA)	15 to 30 inches for 2 to 6 months each year	0 to 58	Sand
Carnegie (CnB, CnC, CoB2, CoC2, CoD2)	Below 48 inches	0 to 12	Loamy sand
		12 to 22	Sandy clay loam
		22 to 60	Sandy clay loam
Cowarts (CqB, CqB2, CqC, CqC2)	Below 60 inches	0 to 7	Loamy sand
		7 to 20	Sandy clay loam
		20 to 46	Sandy clay loam
		46 to 72	Sandy clay loam
Dothan (DaA, DaB, DaB2, DaC)	Below 60 inches	0 to 8	Loamy sand
		8 to 36	Sandy clay loam
		36 to 68	Sandy clay loam
Dunbar (Dic) (For properties of the Izagora soil in this unit, refer to the Izagora series.)	15 to 30 inches for 1 to 2 months or more each year.	0 to 9	Fine sandy loam
		9 to 18	Sandy clay loam
		18 to 55	Sandy clay
Fuquay:			
Loamy sand (FsA, FsB, FsC)	Below 60 inches	0 to 30	Loamy sand
		30 to 51	Sandy clay loam
		51 to 70	Sandy clay loam
Pebbly loamy sand (FhA, FhB)	Below 60 inches	0 to 23	Loamy sand
		23 to 38	Sandy clay loam
		38 to 54	Sandy clay
Grady (Gra)	Less than 15 inches for more than 6 months each year. [4]	0 to 6	Sandy loam
		6 to 10	Sandy clay loam
		10 to 50	Clay
Irvington (Ija)	24 to 36 inches for short periods during prolonged wet spells (perched).	0 to 18	Loamy sand
		18 to 36	Sandy clay loam
		36 to 48	Sandy clay loam
		48 to 58	Sandy clay loam
Izagora (Izg)	15 to 30 inches for 1 to 2 months each year	0 to 18	Loamy sand
		18 to 31	Sandy clay loam
		31 to 62	Sandy clay
Kershaw (KkC)	More than 60 inches	0 to 80	Coarse sand
Lakeland (LpB, LpD)	Below 48 inches	0 to 60	Sand
Leefield (LsA)	15 to 30 inches for 2 to 6 months each year	0 to 28	Loamy sand
		28 to 57	Sandy clay loam
		57 to 75	Sandy clay loam
Leon (LrA)	Less than 15 inches for 2 to 6 months each year.	0 to 9	Sand
		9 to 14	Sand
		14 to 44	Sand

See footnotes at end of table.

properties of soils

Classification—Continued		Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.74 mm.)				
					Inches per hour	*Inches per inch of soil*	*pH value*	
SM, SP–SM	A–3 or A–2	100	100	5–15	6.3+	0.05	4.5 to 5.0	Low.
SM	A–2	100	100	25–35	2.0 to 6.3	.10	4.5 to 5.0	Low.
SM, SC	A–2, A–4	100	100	25–45	0.63 to 2.0	.15	4.5 to 5.0	Low.
SM	A–2	100	100	15–25	6.3+	.08	5.1 to 5.5	Low.
SM, SC	A–2 or A–6	100	100	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SM, SC	A–2 or A–6	[1]95–100	[2]95–100	25–45	0.2 to 1.0	.11	4.5 to 5.0	Low.
SC, CL	A–4, A–6	100	100	40–55	0.63 to 2.0	.15	4.5 to 5.0	Low to moderate.
CH	A–7	100	100	70–90	<0.2	.15	4.5 to 5.0	High.
SP–SM	A–3 or A–2	100	100	5–15	6.3+	.5	4.5 to 5.0	Low.
SM	A–2	[1]95–100	[2]90–95	15–25	6.3+	.08	5.1 to 5.5	Low.
SC, ML	A–6, A–7	[1]95–100	[2]90–95	36–55	0.63 to 2.0	.15	4.5 to 5.0	Moderate.
SC, ML, SM	A–6, A–7	[1]90–100	[2]90–100	36–55	0.2 to 1.0	.11	4.5 to 5.0	Moderate.
SM	A–2	100	100	10–20	6.3+	.08	5.1 to 5.5	Low.
SC, SM	A–2, A–6	100	100	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SC, SM	A–2, A–6	[1]95–100	[2]95–100	25–45	0.2 to 1.0	.11	4.5 to 5.0	Low.
SC, SM	A–2, A–6	100	100	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SM	A–2	100	100	10–20	6.3+	.08	5.1 to 5.5	Low.
SC, SM	A–2, A–6	100	100	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SC, SM	A–2, A–6	[1]95–100	[2]95–100	25–45	0.2 to 1.0	.11	4.5 to 5.0	Low.
SM, ML	A–4	100	100	40–55	0.63 to 2.0	.13	4.5 to 5.0	Low.
SC, CL	A–4, A–6	100	100	45–55	0.63 to 2.0	.14	4.5 to 5.0	Moderate.
CL	A–6 or A–7	100	100	50–60	0.20 to 0.63	.14	4.5 to 5.0	Moderate.
SM	A–2	100	100	10–20	6.3+	.08	4.5 to 5.0	Low.
SC, SM	A–2, A–4	100	100	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SC, SM	A–2, A–4	[1]95–100	[2]95–100	25–45	0.2 to 1.0	.11	4.5 to 5.0	Low.
SM	A–2	[1]95–100	[2]90–95	15–25	6.3+	.08	4.5 to 5.0	Low.
SM, SC	A–2, A–6	[1]95–100	[2]90–95	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SC, CL	A–6 or A–7	[1]90–100	[2]90–100	36–55	0.2 to 1.0	.12	4.5 to 5.0	Moderate.
SM	A–4	100	100	36–45	2.0 to 6.3	.10	4.5 to 5.0	Low.
SC, CL	A–6	100	100	45–60	0.63 to 2.0	.14	4.5 to 5.0	Moderate.
CH	A–7	100	100	65–85	<.2	.15	4.5 to 5.0	High.
SM	A–2	[1]95–100	[2]95–100	15–30	6.3+	.08	5.1 to 5.5	Low.
SC	A–6	[1]95–100	[2]95–100	35–45	0.63 to 2.0	.14	4.5 to 5.0	Moderate.
SM, SC	A–2, A–6	[1]95–100	[2]95–100	30–45	0.2 to 1.0	.11	4.5 to 5.0	Moderate.
SC	A–6	[1]95–100	[2]95–100	35–45	0.63 to 2.0	.14	4.5 to 5.0	Moderate.
SM	A–2	100	100	15–30	6.3+	.08	4.5 to 5.0	Low.
SC	A–4 or A–6	100	100	35–50	0.63 to 2.0	.15	4.5 to 5.0	Moderate.
SC, CL	A–6 or A–7	100	100	40–60	0.2 to 0.63	.15	4.5 to 5.0	Moderate.
SP	A–3	100	100	0–10	6.3+	.03	4.5 to 5.0	Low.
SP–SM, SM	A–3 or A–2	100	100	5–20	6.3+	.05	4.5 to 5.0	Low.
SM	A–2	100	100	15–25	6.3+	.08	4.5 to 5.0	Low.
SM, SC	A–2, A–4	100	100	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SM, SC	A–2, A–4	[1]95–100	[2]95–100	25–45	0.2 to 1.0	.11	4.5 to 5.0	Low.
SP–SM, SM	A–2, A–3	100	100	5–20	6.3+	.05	4.5 to 5.0	Low.
SM	A–3, A–2	100	100	10–25	0.63 to 2.0	.05	4.5 to 5.0	Low.
SM, SP–SM	A–2, A–3	100	100	5–20	6.3+	.05	4.5 to 5.0	Low.

TABLE 13.—*Estimated*

Soil name	Depth to water table	Depth from surface	USDA texture
		Inches	
Ona (ObA)	15 to 30 inches for about 2 to 6 months each year.	0 to 40	Sand
		40 to 60	Sandy clay loam
Orangeburg (OeB, OeC, OeD)	Below 60 inches	0 to 12	Loamy sand
		12 to 58	Sandy clay loam
Pelham (PlA)	Less than 15 inches for more than 2 months each year. [4]	0 to 21	Loamy sand
		21 to 62	Sandy clay loam
Plummer (PeA)	Less than 15 inches for more than 2 months each year. [4]	0 to 42	Sand
		42 to 52	Sandy loam
Portsmouth (Por)	Less than 15 inches for more than 6 months each year. [5]	0 to 15	Loam
		15 to 24	Fine sandy loam
		24 to 55	Fine sandy loam
Rains (Ros, Brs)	Less than 15 inches below surface more than 2 months each year.[6]	0 to 12	Sandy loam
		12 to 25	Sandy clay loam
		25 to 56	Sandy clay
Rutlege (RkA, Rpa) (For properties of Portsmouth soil in mapping unit Rpa, refer to the Portsmouth series; properties of alluvial land are too variable to estimate.)	Less than 15 inches for more than 6 months each year.[7]	0 to 41	Sand
		41 to 64	Sandy clay loam
Stilson (SeA)	Within 30 inches of the surface during prolonged wet periods.	0 to 24	Loamy sand
		24 to 43	Sandy clay loam
		43 to 72	Sandy clay loam
Susquehanna (SpC)	Between 30 and 60 inches for 1 or 2 months each year.	0 to 10	Loamy sand
		10 to 60	Clay
Tifton (TqA, TqB, TuB2, TuC2)	Below 48 inches	0 to 14	Loamy sand
		14 to 41	Sandy clay loam
		41 to 60	Sandy clay loam

[1] Iron pebbles retained on No. 4 sieve.
[2] Iron pebbles retained on No. 10 sieve.
[3] The water table in mapping unit Brs is at a depth of less than 15 inches for more than 6 months each year.
[4] Water stands on the surface for 1 to 6 months.

TABLE 14.—*Interpretation of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—		
					Farm ponds and reservoirs	
	Topsoil	Sand	Road fill	Highway location	Reservoir area	Embankment side slopes
Albany (AdA)	Poor	Poor	Good	Water table within a depth of 15 to 30 inches for 2 to 6 months each year; slopes erode easily.	Moderately rapid permeability and excessive seepage.	Moderately rapid permeability; low strength and stability; fair compactability.

properties of soils—Continued

Classification		Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.74 mm.)				
					Inches per hour	*Inches per inch of soil*	*pH value*	
SM, SP–SM	A–2, A–3	100	100	5–20	6.3+	.05	4.5 to 5.0	Low.
SC	A–4 or A–6	100	100	35–45	0.63 to 2.0	.13	4.5 to 5.0	Low.
SM	A–2	100	100	10–20	6.3+	.08	4.5 to 5.0	Low.
SM, SC	A–2, A–4	100	100	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SM	A–2	100	100	15–25	6.3+	.08	4.5 to 5.0	Low.
SC, CL	A–4, A–6	100	100	36–55	0.63 to 2.0	.14	4.5 to 5.0	Low.
SP, SM	A–2, A–3	100	100	5–20	6.3+	.05	4.5 to 5.0	Low.
SM, SC	A–4	100	100	36–45	0.63 to 2.0	.10	4.5 to 5.0	Low.
OL, ML	A–4	100	100	50–60	0.63 to 2.0	.16	4.5 to 5.0	Low.
ML, SM	A–4	100	100	45–55	0.63 to 2.0	.16	4.5 to 5.0	Low.
CL	A–6	100	100	50–60	0.2 to 0.63	.16	4.5 to 5.0	Moderate.
SM	A–2	100	100	15–25	2.0 to 6.3	.10	4.5 to 5.0	Low.
SC	A–2, A–6	100	100	25–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SC, CL	A–4, A–6	100	100	36–55	0.2 to 0.63	.14	4.5 to 5.0	Moderate.
SM, SP–SM	A–3 or A–2	100	100	5–20	6.3+	.07	4.5 to 5.0	Low.
SM, SC	A–2, A–6	100	100	30–45	0.63 to 2.0	.14	4.5 to 5.0	Low.
SM	A–2	100	100	15–30	6.3+	.08	4.5 to 5.0	Low.
SM, SC	A–2, A–4	100	100	25–40	0.63 to 2.0	.14	4.5 to 5.0	Low.
SM, SC	A–2, A–6	[1] 95–100	[2] 95–100	25–40	0.2 to 1.0	.11	4.5 to 5.0	Low.
SM	A–2	100	100	20–30	2.0 to 6.3	.08	4.5 to 5.0	Low.
CH	A–7	100	100	70–90	<0.2	.15	4.5 to 5.0	High or very high.
SM	A–2	[1] 95–100	[2] 90–95	15–25	2.0 to 6.3	.08	5.1 to 5.5	Low.
SC	A–6 or A–7	[1] 95–100	[2] 90–95	36–55	0.63 to 2.0	.15	5.1 to 5.5	Moderate.
SM, SC	A–6 or A–7	[1] 90–100	[2] 90–100	36–55	0.2 to 1.0	.12	4.5 to 5.0	Moderate.

[5] Water stands on the surface for 2 months or more.
[6] Water covers the surface for more than 1 month each year.
[7] Water stands on the surface for 2 to 6 months or more each year.

engineering properties of soils

Soil features affecting—Continued						
Farm ponds and reservoirs—Continued	Agricultural irrigation		Agricultural drainage		Water disposal system	
Embankment core and keyway	Sprinkler irrigation	Pits excavated for obtaining irrigation water	Open drains	Tile drains	Terraces	Waterways and construction outlets
Moderately rapid permeability; sand surface layer extends to a depth of 2½ to 3½ feet.	Rapid intake rate; low water-holding capacity.	Low stability; water-bearing strata within a desirable depth.	Moderately rapid permeability; responds to open drains and bedding; low stability.	Moderately rapid permeability; sand hard to manage; tile drainage very effective; approximate spacing of tile lines 90 feet or more.	Not generally needed but properties are favorable.	Soil properties favorable.

TABLE 14.—*Interpretation of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—		
	Topsoil	Sand	Road fill	Highway location	Farm ponds and reservoirs	
					Reservoir area	Embankment side slopes
Alluvial land (in mapping unit Rpa).	Poor	Unsuitable.	Poor	Flooding for more than 1 month each year; water table at a depth within 15 inches of the surface for more than 6 months each year.	Stratified soil material; use cutoff to reduce seepage.	Rapid permeability; low strength and stability.
Ardilla (AqA)	Fair	Poor	Good	Water table within a depth of 15 to 30 inches for 2 to 6 months each year; somewhat poor drainage; permeability is moderate in upper part and moderately slow below depth of about 2 or 2½ feet.	Permeability is moderate in upper part and moderately slow below a depth of about 2 or 2½ feet; slow seepage.	Permeability is moderate in upper part and moderately slow below a depth of about 2 or 2½ feet; low shrink-swell potential; good compactability; high strength and stability.
Bladen (BlA, Brs) (For properties of the Rains soils and swamp in mapping unit Brs, refer to the Rains series and swamp.)	Fair to poor in upper part; poor below 8 inches.	Unsuitable	Poor	Floods more than once a year for periods of 7 days to 1 month; water table at a depth of less than 15 inches for more than 2 months each year; slow to very slow permeability.	Slow to very slow permeability; slow seepage.	High shrink-swell potential; slow permeability.
Carnegie (CnB, CnC, CoB2, CoC2, CoD2).	Good	Poor to fair.	Fair to good.	Well-drained soil on uplands; very gently sloping to strongly sloping; high strength and stability.	Permeability is moderate in upper part of subsoil and moderately slow below a depth of about 2 feet; slow seepage.	Permeability is moderate in upper part of subsoil and moderately slow below a depth of about 2 feet; high strength and stability; good compactability.
Chipley (CmA)	Poor	Poor	Good	Water table at a depth of 15 to 30 inches for 2 to 6 months each year; slopes erode easily.	Rapid permeability; excessive seepage.	Rapid permeability; low strength and stability; fair compactability.

engineering properties of soils—Continued

Soil features affecting—Continued						
Farm ponds and reservoirs—Continued	Agricultural irrigation		Agricultural drainage		Water disposal system	
Embankment core and keyway	Sprinkler irrigation	Pits excavated for obtaining irrigation water	Open drains	Tile drains	Terraces	Waterways and construction outlets
Stratified soil material; rapid permeability.	Poorly drained lowland not generally cultivated.	Flooding; low strength and stability.	Low strength and stability; sand strata increase hazard of silting.	Flooding; soil not generally cultivated.	Not needed; level soil.	Wet, level soil; not generally cultivated.
Permeability is moderate in upper part and moderately slow below a depth of about 2 or 2½ feet; sandy clay loam at a depth of 1 to 1½ feet; good workability.	Moderate intake rate; medium water-holding capacity.	Moderately high strength and stability; water-bearing strata within a desirable depth.	Permeability is moderate in upper part and moderately slow below a depth of 2 or 2½ feet; responds to open drains or bedding; high stability.	Permeability is moderate in upper part and moderately slow below a depth of about 2 or 2½ feet; tile drainage very effective; stable material below about 1 to 1½ feet; approximate spacing of tile lines 90 feet or more.	Soil properties favorable.	Soil properties favorable.
Slow to very slow permeability; poor workability; clay is at a depth of ½ to 1 foot.	Slow to very slow intake rate; not generally cultivated.	Plastic material is below a depth of 8 inches and is difficult to excavate.	Occasional flooding; high strength and stability.	Slow permeability; occasional flooding; not generally cultivated.	Wet, level soil.	Wet, level soil.
Permeability is moderate in upper part of subsoil and moderately slow below a depth of about 2 feet; good workability; sandy clay loam at a depth of about ½ to 1½ feet.	Moderately high intake rate; moderately high water-holding capacity.	Well-drained soil on uplands.	Not needed; well-drained soil.	Not needed; well-drained soil.	Soil properties favorable.	Soil properties favorable.
Rapid permeability; sand surface layer extends to a depth of about 4 feet or more.	Rapid intake rate; low water-holding capacity.	Low stability; water-bearing strata within a desirable depth.	Rapid permeability; will respond to open drains and bedding; low stability.	Rapid permeability; sand hard to manage; tile drainage very effective; approximate spacing of tile lines 90 feet or more.	Not generally needed but soil properties are favorable.	Soil properties favorable.

TABLE 14.—*Interpretation of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—		
					Farm ponds and reservoirs	
	Topsoil	Sand	Road fill	Highway location	Reservoir area	Embankment side slopes
Cowarts (CqB, CqB2, CqC, CqC2).	Fair	Poor	Good	Well-drained; moderately high strength and stability; level to gently sloping.	Permeability is moderate in the upper part and moderately slow below a depth of about 2½ feet; moderately slow seepage in subsoil.	Permeability is moderate in the upper part and moderately slow below a depth of about 2½ feet; low shrink-swell potential; good compactability.
Dothan (DaA, DaB, DaB2, DaC).	Fair	Poor	Good	Well-drained; moderately high strength and stability; level to gently sloping.	Permeability is moderate in the upper part and moderately slow below a depth of about 3½ to 4 feet; moderately slow seepage in subsoil.	Permeability is moderate in the upper part and moderately slow below a depth of about of 3½ to 4 feet; low shrink-swell potential; good compactability.
Dunbar (Dic) (For properties of the Izagora soil in this mapping unit, refer to the Izagora series.)	Fair	Fair to poor.	Fair	Somewhat poor drainage; subject to flooding once in 5 years for 7 days to 1 month; water table at a depth of 15 to 30 inches for more than 2 months each year; moderately slow permeability.	Moderately slow permeability; slow seepage; occasional flooding.	Moderately slow permeability; moderate to high strength and stability; fair to good compactability.
Fuquay (FsA, FsB, FsC, FhA, FhB).	Fair	Poor	Good	Good drainage; moderately high strength and stability; level to gently sloping.	Permeability is moderate in upper part and moderately slow below a depth of about 4 feet; moderately slow seepage in subsoil.	Permeability is moderate in the upper part and moderately slow below a depth of about 4 feet; low to moderate shrink-swell potential; good compactability.
Grady (Gra)	Poor	Unsuitable	Poor	Water table at a depth of less than 15 inches for 6 months or more each year; water covers the surface 1 to 6 months each year; plastic material is below a depth of 1 foot.	Slow permeability; slow seepage.	Plastic material below a depth of 1 foot; high shrink-swell potential; poor workability.

engineering properties of soils—Continued

Soil features affecting—Continued						
Farm ponds and reservoirs—Continued	Agricultural irrigation		Agricultural drainage		Water disposal system	
Embankment core and keyway	Sprinkler irrigation	Pits excavated for obtaining irrigation water	Open drains	Tile drains	Terraces	Waterways and construction outlets
Permeability is moderate in the upper part and moderately slow below a depth of about 2½ feet; sandy clay loam at a depth of 1 to 1½ feet; good workability.	Moderately high intake rate; medium water-holding capacity.	Upland location; excessive depth to water-bearing strata.	Not needed	Not needed	Soil properties favorable.	Soil properties favorable.
Permeability is moderate in the upper part and moderately slow below a depth of about 3½ to 4 feet; sandy clay loam is at a depth of about 1 to 2 feet; good workability.	Moderately high intake rate; medium water-holding capacity.	Upland location; excessive depth to water-bearing strata.	Not needed	Not needed	Soil properties favorable.	Soil properties favorable.
Moderately slow permeability; sandy clay loam to sandy clay is at a depth of about 1 foot; fair workability.	Moderate intake rate; moderately high water-holding capacity.	Moderate strength and stability; water-bearing strata within a desirable depth.	Moderately slow permeability; will respond to open drains; moderate strength and stability.	Moderately slow permeability; stable material at a depth of about 1 foot; approximate spacing of tile lines 70 feet or more.	Nearly level topography; not needed.	Nearly level topography; not needed.
Permeability is moderate in the upper part and moderately slow below a depth of about 4 feet; sandy clay loam is at a depth of about 2 to 3 feet; good workability.	Moderately high intake rate; moderately low water-holding capacity.	Upland location; excessive depth to water-bearing strata.	Not needed	Not needed	Soil properties favorable.	Soil properties favorable.
Slow permeability; poor workability; clay is at a depth of about 1 foot.	Not needed, wet soil.	Material below a depth of 1 foot is difficult to excavate; water-bearing strata below desirable limits.	Slow permeability; will respond to open drains for surface water removal; high stability.	Slow permeability; plastic material below a depth of 1 foot; surface layer seals under compaction.	Not needed, level soil.	Not needed, level soil.

TABLE 14.—*Interpretation of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—		
	Topsoil	Sand	Road fill	Highway location	Farm ponds and reservoirs	
					Reservoir area	Embankment side slopes
Irvington (IjA)	Fair	Poor	Fair	Seasonally high water (perched) within a depth of 24 to 36 inches for short periods during long wet spells; moderately well drained.	Permeability is moderate in the upper part and moderately slow below a depth of about 3 feet; slow seepage.	Strong stability; moderate shrink-swell potential; good compactability.
Izagora (Izg, Dic)	Fair	Poor	Fair	Water table at a depth of 15 to 30 inches for 1 to 2 months each year; moderately well drained.	Moderate permeability; slow seepage.	Strong stability; moderate shrink-swell potential; good compactability.
Kershaw (KkC)	Poor	Fair	Fair	Unstable slopes; very rapid permeability.	Upland location; very rapid permeability; excessive seepage.	Low stability; poor compactability; very rapid permeability.
Lakeland (LpB, LpD)	Poor	Fair	Good	Unstable slopes; rapid permeability.	Upland location; rapid permeability; excessive seepage.	Low stability; poor compactability; rapid permeability.
Leefield (LsA)	Fair	Poor	Good	Water table within a depth of 15 to 30 inches for more than 2 months each year; somewhat poorly drained.	Permeability is moderate in the upper part and moderately slow below a depth of about 4 to 5 feet; moderately slow seepage.	Strong stability; low shrink-swell potential; good compactability.
Leon (LrA)	Poor	Poor	Fair	Unstable slopes; water table is at a depth of less than 15 inches for more than 2 months each year.	Permeability is rapid in the upper part and moderate in the hardpan; excessive seepage.	Low strength and stability; permeability is rapid in the upper part and moderate in the hardpan; poor compactability.

engineering properties of soils—Continued

Soil features affecting—Continued						
Farm ponds and reservoirs—Continued	Agricultural irrigation		Agricultural drainage		Water disposal system	
Embankment core and keyway	Sprinkler irrigation	Pits excavated for obtaining irrigation water	Open drains	Tile drains	Terraces	Waterways and construction outlets
Permeability is moderate in the upper part and moderately slow below a depth of about 3 feet; good workability; sandy clay loam is at a depth of 1 to 2 feet.	Moderate intake rate; medium water-holding capacity.	Strong stability; water-bearing strata within a desirable depth.	Permeability is moderate in the upper part and moderately slow below a depth of about 3 feet; will respond to open drains or bedding; strong stability.	Permeability is moderate in the upper part and moderately slow below a depth of about 3 feet; weakly cemented layer is at a depth of about 3 feet; depth to stable material is 1 to 2 feet; approximate spacing of tile lines 90 feet or more.	Soil properties favorable.	Soil properties favorable.
Moderate permeability; good workability; sandy clay loam at a depth of 1 to 2 feet.	Moderate intake rate; medium water-holding capacity.	Strong stability; water-bearing strata within a desirable depth.	Moderate permeability; will respond to open drains or bedding; strong stability.	Moderate permeability; stable material at a depth of 1 to 2 feet; approximate spacing of tile lines 90 feet or more.	Soil properties favorable.	Soil properties favorable.
Very rapid permeability; coarse sand surface layer extends to a depth of more than 6 feet.	Rapid intake rate; very low water-holding capacity.	Too deep to water-bearing strata; very low water-holding capacity.	Not needed	Not needed	Not needed	Not needed.
Rapid permeability; sand surface layer extends to a depth of 3½ to 6 feet.	Rapid intake rate; low water-holding capacity.	Too deep to water-bearing strata; low water-holding capacity.	Not needed	Not needed	Rapid intake rate; little or no runoff.	Low water-holding capacity.
Permeability is moderate in the upper part and moderately slow below a depth of about 4 or 5 feet; sandy clay loam is at a depth of about 2 or 3 feet.	Moderately rapid intake rate; medium water-holding capacity.	Strong stability; water-bearing strata within a desirable depth.	Strong stability; will respond to open drains or bedding.	Permeability is moderate in the upper part and moderately slow below a depth of about 4 or 5 feet; stable material is at a depth of 2 or 3 feet; approximate spacing of tile lines 90 feet or more.	Soil properties favorable.	Soil properties favorable.
Permeability is rapid in the upper part and moderate in the hardpan; sand surface layer extends to a depth of 2½ feet or more; low strength and stability.	Low water-holding capacity; rapid intake rate.	Low strength and stability; water-bearing strata within a desirable depth.	High water table; will respond to open drains and bedding; low strength and stability.	Hardpan about 12 inches below surface; tile drainage not suitable.	Not generally cultivated.	Not generally cultivated.

TABLE 14.—*Interpretation of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—		
	Topsoil	Sand	Road fill	Highway location	Farm ponds and reservoirs	
					Reservoir area	Embankment side slopes
Ona (ObA)	Poor	Fair; poorly graded.	Good	Somewhat poor drainage; water table within a depth of 15 to 30 inches for more than 2 months each year; slopes erode easily; low strength and stability.	Rapid permeability; excessive seepage.	Rapid permeability; low shrink-swell potential; low strength and stability; fair or poor compactability.
Orangeburg (OeB, OeC, OeD)	Fair	Fair	Good	Good drainage; moderately high strength and stability; very gently sloping to strongly sloping.	Moderate permeability; moderately slow seepage.	Moderate permeability; low shrink-swell potential; good compactability; good workability.
Pelham (PlA)	Fair	Unsuitable	Fair	Poor drainage; flooded 1 to 6 months each year; water table at a depth of less than 15 inches for more than 2 months; moderate strength and stability in subsoil.	Moderate permeability; moderately slow seepage.	Moderate permeability; low shrink-swell potential; fair compactability; moderate strength and stability.
Plummer (PeA)	Poor	Fair; poorly graded.	Good	Poor drainage; flooded 1 to 6 months each year; water table at a depth of less than 15 inches for more than 2 months each year; low strength and stability.	Rapid permeability; excessive seepage.	Rapid permeability; low strength and stability; poor compactability; low shrink-swell potential.
Portsmouth (Por)	Good	Unsuitable	Fair	Very poor drainage; flooded 2 months or more each year; water table at a depth of less than 15 inches for 6 months or more; slightly plastic at a depth of about 30 inches.	Moderately slow permeability; slow seepage.	Moderately slow permeability; moderate shrink-swell potential; fair compactability.

engineering properties of soils—Continued

Soil features affecting—Continued						
Farm ponds and reservoirs—Continued	Agricultural irrigation		Agricultural drainage		Water disposal system	
Embankment core and keyway	Sprinkler irrigation	Pits excavated for obtaining irrigation water	Open drains	Tile drains	Terraces	Waterways and construction outlets
Rapid permeability; sand surface layer extends to a depth of about 3½ feet or more.	Rapid intake rate; low water-holding capacity.	Low strength and stability water-bearing strata within a desirable depth.	Rapid permeability; will respond to open drains or bedding; low stability.	Tile drainage very effective; flowing sand at a depth of 2 to 2½ feet under wet conditions; spacing of tile lines approximately 90 feet or more.	Not needed	Not needed.
Moderate permeability; good workability; sandy clay loam is at a depth of about 8 inches to 1½ feet.	Moderately high intake rate; medium water-holding capacity.	Upland location; too deep to water-bearing strata.	Not needed	Not needed	Soil properties favorable.	Soil properties favorable.
Moderate permeability; fair workability; sandy clay loam is at a depth of 2 to 3 feet.	Not needed, wet soil.	Moderate strength and stability; water-bearing strata within a desirable depth.	Moderate stability; will respond to open drains or bedding.	Moderate permeability; stable material is at a depth of 2 to 3 feet; approximate spacing of tile lines 80 feet or more.	Not needed, level soil.	Not needed.
Rapid permeability; poor workability; sand surface layer extends to a depth of about 3½ feet or more.	Wet soils, not generally cultivated.	Low strength and stability; flowing sand; water-bearing strata within a desirable depth.	Flowing sand; not generally cultivated; will respond to open drains or bedding; low stability.	Flowing sand; not generally cultivated; approximate spacing of tile lines 100 feet or more.	Not needed, level or nearly level soil.	Not needed.
Moderately slow permeability; poor workability; fine sandy clay is at a depth of about 2 feet.	Not needed, wet soil.	High strength and stability; soil material difficult to excavate.	High stability; will respond to open drains.	Moderately slow permeability; surface soil subject to sealing.	Not needed, level soil.	Not needed.

TABLE 14.—*Interpretation of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—		
	Topsoil	Sand	Road fill	Highway location	Farm ponds and reservoirs: Reservoir area	Farm ponds and reservoirs: Embankment side slopes
Rains (Ros, Brs)	Fair	Poor	Fair	Poor drainage; flooded 1 to 6 months each year; water table at a depth of less than 15 inches for 2 to 6 months each year.	Moderate or moderately slow permeability; slow to moderate seepage; lenses of sandy material in subsoil.	Moderate or moderately slow permeability; moderate strength and stability; fair to poor compactability.
Rutlege (RkA, Rpa) (For properties of Portsmouth soil and Alluvial land in the mapping unit Rpa, refer to the Portsmouth series and Alluvial land.)	Fair	Fair to poor.	Poor; good if confined.	Very poor drainage; flooded 2 months or more each year; water table at a depth of less than 15 inches for 6 months or more; low strength and stability.	Rapid permeability; excessive seepage.	Rapid permeability; low strength and stability; poor compactability.
Stilson (SeA)	Fair	Poor	Good	Seasonally high water table, commonly within a depth of 30 inches during prolonged wet periods; moderately well-drained.	Permeability is moderate in the upper part and moderately slow below a depth of about 3½ to 4 feet; slow seepage.	Strong stability; low shrink-swell potential; good compactability.
Susquehanna (SpC)	Poor	Unsuitable	Poor	Very plastic material below 8 to 10 inches; low strength and stability; sandstone may be at a depth of 20 to 30 inches.	Upland location; soil material difficult to excavate; slow permeability; slow seepage.	Slow permeability; low strength and stability; poor compactability.
Swamp (Brs)	Unsuitable	Unsuitable	Unsuitable	Occurs along the larger streams; flooded 1 to 6 months or more each year; water table at a depth of less than 15 inches for more than 6 months each year.	Flooded 1 to 12 months each year.	Soil material variable.

engineering properties of soils—Continued

Soil features affecting—Continued						
Farm ponds and reservoirs—Continued	Agricultural irrigation		Agricultural drainage		Water disposal system	
Embankment core and keyway	Sprinkler irrigation	Pits excavated for obtaining irrigation water	Open drains	Tile drains	Terraces	Waterways and construction outlets
Moderate or moderately slow permeability; sandy clay loam is at a depth of about 1 to 1½ feet; lenses of sandy material in subsoil.	Wet soil, not needed.	Moderate strength and stability; water-bearing strata within a desirable depth.	Moderate strength and stability; will respond to open drains.	Moderate or moderately slow permeability; depth to stable material about 1 to 1½ feet.	Wet soil, not needed.	Wet soil, not needed.
Rapid permeability; sandy surface layer extends to a depth of about 40 inches or more.	Wet soil, not generally cultivated.	Low strength and stability; flowing sand.	Low strength and stability; flowing sand.	Rapid permeability; flowing sand.	Not needed---	Not needed.
Permeability is moderate in the upper part and moderately slow below a depth of about 3½ to 4 feet; good workability; sandy clay loam is at a depth of about 2 to 3 feet.	Moderately rapid intake rate; medium water-holding capacity.	Strong stability; water-bearing strata within a desirable depth.	Strong stability; will respond to open drains or bedding.	Permeability is moderate in the upper part and moderately slow below a depth of about 3½ to 4 feet; stable material is at a depth of 2 to 3 feet; approximate spacing of tile lines 90 feet or more.	Soil properties favorable.	Soil properties favorable.
Slow permeability; poor workability; clay at a depth of 8 to 10 inches.	Poor agricultural soil; irrigation may not be practical.	Not suitable; soil material too difficult to excavate.	Low stability; slow permeability; very plastic material below 8 to 10 inches.	Upland location; slow permeability.	Not suitable; poor agricultural soil.	Soil properties unfavorable below 8 to 10 inches.
Soil material variable.	Wet soil, not needed.	Flooded 1 to 12 months each year.	Soil material variable; flooded 1 to 12 months each year.	Soil material variable; flooded 1 to 12 months each year.	Wet soil, not needed.	Wet soil, not needed.

TABLE 14.—*Interpretation of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—		
	Topsoil	Sand	Road fill	Highway location	Farm ponds and reservoirs	
					Reservoir area	Embankment side slopes
Tifton (TqA, TqB, TuB2, TuC2).	Good	Poor to fair.	Fair to good.	Well-drained; upland location; level to gently sloping; high strength and stability.	Permeability is moderate in the upper part and moderately slow below a depth of about 3 to 3½ feet; slow seepage.	Permeability is moderate in the upper part and moderately slow below a depth of about 3 to 3½ feet; high strength and stability; good compactability.

Irrigation is rather widespread in Bulloch County and is used mainly on tobacco fields. The soils most suitable for irrigation are those that have a moderate intake rate, have medium to high water-holding capacity, and are not susceptible to erosion. To supply water, irrigation pits (fig. 9), or shallow surface wells, are excavated. These pits are large enough to hold the amount of water needed. They are generally dug in places where they can be recharged from the water-bearing strata. In favorable sites these strata are between 10 and 18 feet of the surface. Before the pit is dug, the recharge capacity of the proposed site is determined.

Agricultural drainage is not a serious problem in Bulloch County, though drainage is needed in some parts. In table 14, features that affect open drains and tile drains are listed.

***Figure 9.*—An excavated pit used for irrigation on Leefield loamy sand, 0 to 2 percent slopes.**

The soils of Bulloch County range from level to sloping, and most of the cultivated areas in the uplands are moderately susceptible to erosion. Those areas that have slopes of between 1.5 and 5 percent require a complete system for water disposal, including parallel terraces, land leveling, grassed outlets, and field roads.

Use of Soils in Community Development

The selection of areas for community development depends on the suitability of soils as sites for the structures and other facilities that are to be built. In table 15 the soils are grouped according to the degree of their limitations as sites for dwellings, recreational facilities, structures for light industries, trafficways, and gardens. The limitations of each group of soils are rated *slight*, *moderate*, and *severe*. A rating of slight means that the soil has few or no limitations for the use specified or that the limitations can be easily overcome. A rating of moderate indicates that some planning and engineering practices are needed to overcome the limitation. A rating of severe indicates that the soil is poorly suited to the use specified and that intensive engineering practices, as well as a large investment, are needed to overcome the problems.

DWELLINGS.—In this survey dwellings refer to houses of three stories or less. The limitations are rated for soils used as sites for dwellings served by community sewerage systems and for dwellings that require septic tank filter fields. The properties important in evaluating soils for these uses are bearing capacity, shrink-swell potential, depth to seasonally high water table, hazard of flooding (fig. 10), slope, and depth to hard rock. Where fields for disposing of effluent from septic tanks are required, the hazard of flooding, high water table, and slow rate of percolation are the major limiting factors.

engineering properties of soils—Continued

Soil features affecting—Continued						
Farm ponds and reservoirs—Continued	Agricultural irrigation		Agricultural drainage		Water disposal system	
Embankment core and keyway	Sprinkler irrigation	Pits excavated for obtaining irrigation water	Open drains	Tile drains	Terraces	Waterways and construction outlets
Permeability is moderate in the upper part and moderately slow below a depth of about 3 to 3½ feet; good workability; sandy clay loam at a depth of about ½ to 1½ feet.	Moderately high intake rate; medium to moderately high water-holding capacity.	Well-drained upland soil.	Not needed, well-drained soil.	Not needed, well-drained soil.	Nearly level soil, not needed.	Nearly level soil, not needed.

***Figure 10.*—A housing development on Pelham loamy sand that has been flooded.**

RECREATION.—In one column under recreational facilities, limitations are rated for soils used as campsites, picnic areas, and intensive play areas, and in the other column the ratings are for golf fairways. Campsites are areas suitable for pitching tents and for outdoor living for at least 1 week. Not much preparation of the site should be necessary. Intensive play areas are sites developed for playgrounds, baseball diamonds, tennis courts, and other grounds for organized games. These areas are subject to much foot traffic and generally require good drainage and a nearly level, firm surface. They should be free of coarse fragments and outcrops of hard rock. Picnic areas are sites suitable for pleasure outings at which a meal is eaten outdoors.

Properties important in evaluating soils for campsites, intensive play areas, and picnic areas are slope, trafficability, and erodibility. In intensive play areas, the depth to hard rock is also important. The suitability of soils for golf fairways depends mainly on the ease of foot travel, the ability of the soil to withstand foot and cart traffic, especially soon after a rain, and the freedom from obstacles to a moving golf ball. Properties important in evaluating soils for fairways are trafficability, amount of coarse fragments, fertility, and slope. The soils are not rated for greens because most greens are manmade. The water table and the hazard of flooding are important to recreational uses, but they are considered in determining trafficability and are not rated separately.

STRUCTURES FOR LIGHT INDUSTRIES.—These structures include buildings not more than three stories high that are used for stores, offices, and small industries. It is assumed that public or community sewage disposal facilities are available. Properties important in evaluating the soils for this use are slope, water table, hazard of flooding, bearing capacity, shrink-swell potential, and corrosion potential.

TRAFFICWAYS.—Areas are suitable as trafficways if roads and residential streets can be built at a low cost and without much cutting, filling, and preparation of subgrade. Properties important in evaluating the soils for trafficways are slope, depth to hard rock, water table, hazard of flooding, erodibility, and traffic-supporting capacity.

GARDENS.—This term refers to areas used to grow vegetables for home consumption. The properties important in evaluating soils for gardens are productivity, wetness, droughtiness, tilth, permeability, slope, and hazard of flooding.

TABLE 15.—*Limitations of soils used in community development*

Groups of soils and map symbols	Dwellings		Recreational facilities		Structures for light industries	Trafficways	Gardens
	With community sewerage system	With septic tank filter fields	Campsites, picnic areas, and intensive play areas	Golf fairways			
Group 1 (OeB)	Slight	Slight	Slight	Slight	Slight	Slight	Slight.
Group 2 (OeC, OeD)	Slight	Slight	Moderate for campsites and intensive play areas, slight for picnic grounds; 5 to 12 percent slopes.	Moderate; 5 to 12 percent slopes.	Moderate; 5 to 12 percent slopes.	Slight	Moderate; erosion hazard.
Group 3 (DaA, DaB, DaB2, FsA, FsB).	Slight	Moderate; percolation rate 45 to 75 minutes per inch in the lower part of the profile.	Slight	Slight	Slight	Slight	Slight.
Group 4 (DaC, FsC, TuC2).	Slight	Moderate; percolation rate 45 to 75 minutes per inch in the lower part of the profile.	Moderate; 5 to 8 percent slopes.	Moderate; 5 to 8 percent slopes.	Moderate; 5 to 8 percent slopes.	Slight	Moderate; erosion hazard.
Group 5 (FhA, FhB, TqA, TqB, TuB2).	Slight	Moderate; percolation rate 45 to 75 minutes per inch in the lower part of the profile.	Slight; numerous pebbles on surface.	Slight to moderate; numerous pebbles on surface.	Moderate; moderate shrink-swell potential in lower part of subsoil.	Moderate; fair traffic-supporting capacity.[1]	Slight.
Group 6 (CnB, CoB2, CqB, CqB2).	Slight	Severe; percolation rate is slower than 90 minutes per inch.	Slight; numerous pebbles on the surface.	Moderate; numerous pebbles on the surface.	Slight to moderate; moderate shrink-swell potential in lower part of subsoil.	Slight	Moderate; erosion hazard.
Group 7 (CnC, CoC2, CoD2, CqC, CqC2).	Slight	Severe; percolation rate is slower than 90 minutes per inch.	Moderate; 5 to 8 percent slopes.	Moderate; 5 to 8 percent slopes.	Moderate; 5 to 8 percent slopes.	Slight	Severe; erosion hazard.
Group 8 (SeA)	Slight	Moderate; water table is below a depth of 60 inches for less than 11 months a year; percolation rate 45 to 75 minutes per inch.	Slight	Slight	Slight	Slight	Slight; soil is wet during prolonged wet periods.

See footnotes at end of table.

TABLE 15.—*Limitations of soils used in community development*—Continued

Groups of soils and map symbols	Dwellings		Recreational facilities		Structures for light industries	Trafficways	Gardens
	With community sewerage system	With septic tank filter fields	Campsites, picnic areas, and intensive play areas	Golf fairways			
Group 9 (IjA, Izg)	Slight	Severe; percolation rate is slower than 75 minutes per inch; water table is within 30 inches of the surface during prolonged wet periods.	Moderate; fair trafficability.[2]	Moderate; fair trafficability.	Moderate; moderate shrink-swell potential in subsoil; moderate corrosion potential.	Moderate; fair traffic-supporting capacity.	Slight; soil is wet during prolonged wet periods.
Group 10 (AdA, AqA, CmA, LsA, ObA).	Moderate; water table between a depth of 15 and 30 inches for more than 2 months a year.	Severe; water table within a depth of 15 to 30 inches for 2 to 6 months a year.	Moderate; fair trafficability.	Moderate; fair trafficability.	Moderate; moderate corrosion potential; water table at a depth of 15 to 30 inches for 2 to 6 months a year.	Moderate; water table at a depth of less than 30 inches for more than 3 months a year.	Moderate; soil is wet during prolonged wet periods; some areas are sandy and droughty during prolonged dry periods.
Group 11 (LpB, LpD)	Slight	Moderate; low filtering action may cause contamination of nearby water.	Moderate; fair trafficability.	Severe; low productivity; fair trafficability.	Moderate; some areas have 5 to 12 percent slopes.	Slight	Severe; droughty; very sandy; low productivity.
Group 12 (KkC)	Severe; thick beds of loose coarse sand.	Severe; thick beds of loose coarse sand.	Severe; thick beds of loose coarse sand.	Severe; very low productivity; thick beds of loose coarse sand.	Severe; thick beds of loose coarse sand.	Severe; thick beds of loose coarse sand.	Severe; very low productivity; very droughty.
Group 13 (SpC)	Severe; high shrink-swell potential.	Severe; percolation rate is slower than 90 minutes per inch.	Moderate; 2 to 8 percent slopes; very severe erodibility.	Moderate; 2 to 8 percent slopes; very severe erodibility.	Severe; high shrink-swell potential.	Severe; very severe erodibility; poor traffic-supporting capacity.	Severe; erosion hazard; plastic clayey subsoil.
Group 14 (BlA, Brs, Dic, Gra, LrA, PlA, PeA, Por, Ros, RkA, Rpa.)	Severe; flooded annually, or water table at a depth less than 15 inches for more than 2 months; Dunbar-Izagora complex is not flooded annually; Leon soil is seldom flooded.	Severe; very frequent flooding; seasonally high water table at a depth of less than 15 inches.	Severe; poor to very poor trafficability.	Severe; poor to very poor trafficability.	Severe; flooded annually; water table at a depth of less than 15 inches for more than 2 months; high corrosion potential.	Severe; annual flooding; water table below a depth of 15 inches for less than 8 months.	Severe; subject to flooding; high water table.

[1] Traffic-supporting capacity refers to the ability of an undisturbed soil to support moving loads.
[2] Trafficability refers to the ease or difficulty with which people can move about over the soil on foot, on horseback, or in a small vehicle, such as a golf cart.

Formation, Classification, and Morphology of Soils

This section consists of three main parts. The first part tells how the factors of soil formation affected the development of soils in Bulloch County. In the second part the system of soil classification currently used is explained, and each soil series in the county is placed in classes of this system and in its great soil group in the system adopted in 1938. In the third part the morphology of each soil series is discussed, and a profile representative of each series is described.

Formation of Soils

Soil is produced when the factors of soil formation—parent material, plants and animals, climate, and relief—interact over a period of time. The nature of the soil at any point on the earth depends on the combination of these factors, including time, at that point. All five of these factors come into play in the formation of every soil, but the relative importance of each differs from place to place.

In a few places one of the factors may dominate in the formation of a soil and determine most of its properties, as is comon where the parent material consists of pure quartz sand. Quartz sand is highly resistant to weathering, and soils formed in it commonly have faint horizons. The Lakeland soils are examples of soils that formed in this kind of parent material and that have faint horizons. Even in quartz sand, however, a distinct profile can be formed under certain kinds of vegetation if the topography is low and flat and the water table is high. This is illustrated by the Leon soils. Thus, for every soil, the past combination of the five major factors is of first importance in determining its present characteristics.

Parent material

Parent material, the unconsolidated mass from which soil develops, is largely responsible for the chemical and mineralogical composition of soils. In Bulloch County the parent material of most of the soils is sedimentary and consists of unconsolidated rock fragments that have been deposited by water. The texture of the material ranges from coarse sand to fine clay.

Parts of five major geologic formations, all sedimentary, occur in the county (*5*). From oldest to youngest these formations are the Hawthorn, Okefenokee (Sunderland), Wicomico, Penholoway, and Talbot. The Hawthorn formation is of Miocene age and occurs at the highest elevation. The Okefenokee, Wicomico, Penholoway, and Talbot formations are of Pleistocene age and are at lower elevations. The most recent deposits consist of alluvium on the valley floor of the Ogeechee River.

The shorelines of the Pleistocene formations are shown on figure 11 (*7*). The shoreline of the Talbot formation, at 25 to 42 feet above mean sea level, is east of Olney in the valley of the Ogeechee River and is at Burnsed Bridge on Black Creek along the Bryan County line. The main soils developed in this formation are the Bladen and Rains.

The shoreline of the Penholoway formation is 70 feet above mean sea level and occurs as a reentrant in the Black Creek area west of Ivanhoe. The Chipley, Ona, and Leon soils formed in material from the Penholoway formation.

The Wicomico shoreline, at an elevation of 100 feet, has three small discontinuous areas south of Arcola. The major soils formed in material from this formation are the Leefield, Stilson, and Irvington.

The oldest and most extensive of the Pleistocene formations is the Okefenokee, which is at an elevation of 170 feet. This formation is well defined in a scarp near Brooklet (*9*). The Leefield, Stilson, and Fuquay soils formed in material from this formation.

About 65 percent of the county is underlain by the Hawthorn formation. The areas are north and west of Nevils, Denmark, Brooklet, and Leefield. In these areas the Tifton and Fuquay soils formed on the Miocene surfaces, and Lakeland soils formed on the unconformable Pleistocene sediments. Remnants of two additional Pleistocene shorelines, the Coharie at 215 feet and the Brandywine at 270 feet (*7, 9*), are evident on the Hawthorn formation. No sediments, however, have been identified with these two stages. The unconformable Pleistocene blanket of sand is patchy especially along the eastward bluffs of the main streams, and ranges from a few inches to 30 feet in thickness.

Plants and animals

The kinds and numbers of plants and animals that live on and in the soil are determined largely by the climate and, to varying degrees, by parent material, topography, and the age of the soil.

Micro-organisms, insects, small plants, and small animals exert a continued effect on the physical and chemical properties of the soils. Bacteria, fungi, and other micro-organisms speed the weathering of rock and the decomposition of organic matter. Earthworms and other small invertebrates slowly but continuously mix the soil and, by ingesting it, alter the chemical properties.

The larger plants furnish organic matter. They also transfer elements from the subsoil to the surface soil by assimilating these elements into their tissue and then depositing this tissue on the surface in the form of fallen fruit, leaves, or stems. When trees are uprooted, soil material is brought to the surface.

In this county mixed forests of pines and hardwoods once covered the uplands. Gum and cypress trees grew on the flood plains. The undergrowth was chiefly bay, maple, swamp holly, titi, waxmyrtle, saw-palmetto, and gallberry. Many of the trees that were important in the development of the soils had roots that penetrated deep into the soil and shed their leaves annually. Fallen leaves transfer essential nutrients from the lower part of the soil to the upper part and partly replace the nutrients that are washed out by percolating waters. This transfer of nutrients is probably greater in the better drained soils. Also, the decaying leaves, twigs, roots, and whole plants add much organic matter to the upper part of the soil, where they are acted on by micro-organisms, earthworms, and other forms of life.

The complex of living organisms affecting soil formation in Bulloch County has been drastically changed as a result of man's activity. The clearing of the forests, the cultivation of the soils, and the introduction of new kinds of plants will be reflected in the direction and rate of soil formation in the future. Except for a decrease in organic-matter content and the loss of soil through erosion in

cultivated areas, few effects of these changes are evident as yet.

Climate

The climate of this county is warm and humid. The summers are long and hot, and the winters are mild. This warm weather induces the oxidation of iron in soils that have good internal drainage, and it encourages rapid decay of organic matter. Water from the abundant rainfall highly leaches the rapidly permeable soils as it moves through them. This water also keeps some of the soils moist or saturated during much of the year. In the warm, humid climate of Bulloch County the decay of minerals, the dissolution of bases, and the translocation of clay are accelerated.

Relief

Relief modifies the effects of climate and vegetation and influences the formation of soils through its effect on drainage, erosion, temperature, and plant cover. This county, a part of the Coastal Plain, is mostly nearly level to gently sloping. The landscapes in the county are of four general kinds—narrow to broad ridges; low, nearly level ridges and flats; sand ridges; and low areas on valley floors, in stream swamps, and on terraces.

The narrow to broad ridges are broken by many small streams and a few, small, rounded ponds. The small streams have cut below the general level of the plain and have formed very gentle and gentle side slopes. In this area most of the soils are well drained, and the water table is several feet below the surface.

The low, nearly level ridges and flats are broken by sluggish drainageways and swampy or ponded areas. Most of the soils in these areas are moderately well drained or somewhat poorly drained, but some are poorly drained. The water table is about 1 to 3 feet below the surface.

The sand ridges are in rolling areas that are dissected by streams. The soils of these ridges are deep and sandy, and the water table is at a depth of more than 6 feet.

On valley floors, in stream swamp, and on low terraces the soils are young. They are predominantly gray, or gleyed, and have poorly defined horizons. In these areas the water table is at or near the surface most of the time.

Time

The length of time required for a mature soil to develop depends largely on the other factors of soil formation. In a mature soil, the profile has easily recognized zones of eluviation (A horizon) and of illuviation (B horizon).

Less time is generally required for a soil to develop in a humid, warm area where vegetation is rank than in a dry or cold area where the vegetation is scant. Also, if factors other than time are equal, less time is required for a soil to develop from coarse-textured parent material than from fine-textured parent material.

The age of the soils in this county varies considerably. Generally, the older soils show a greater degree of horizon differentiation than younger soils. For example, the soils on the smoother uplands in the northern and western parts of the county have more profile development than the soils on the stronger slopes, where erosion removes the soil material almost as fast as it forms. On the large, broad flats in the southeastern part of the county, the soils formed primarily in alluvial material from the Okefenokee and Penholoway formations, but this material has not been in place long enough for well-defined horizons to have developed.

Classification of Soils

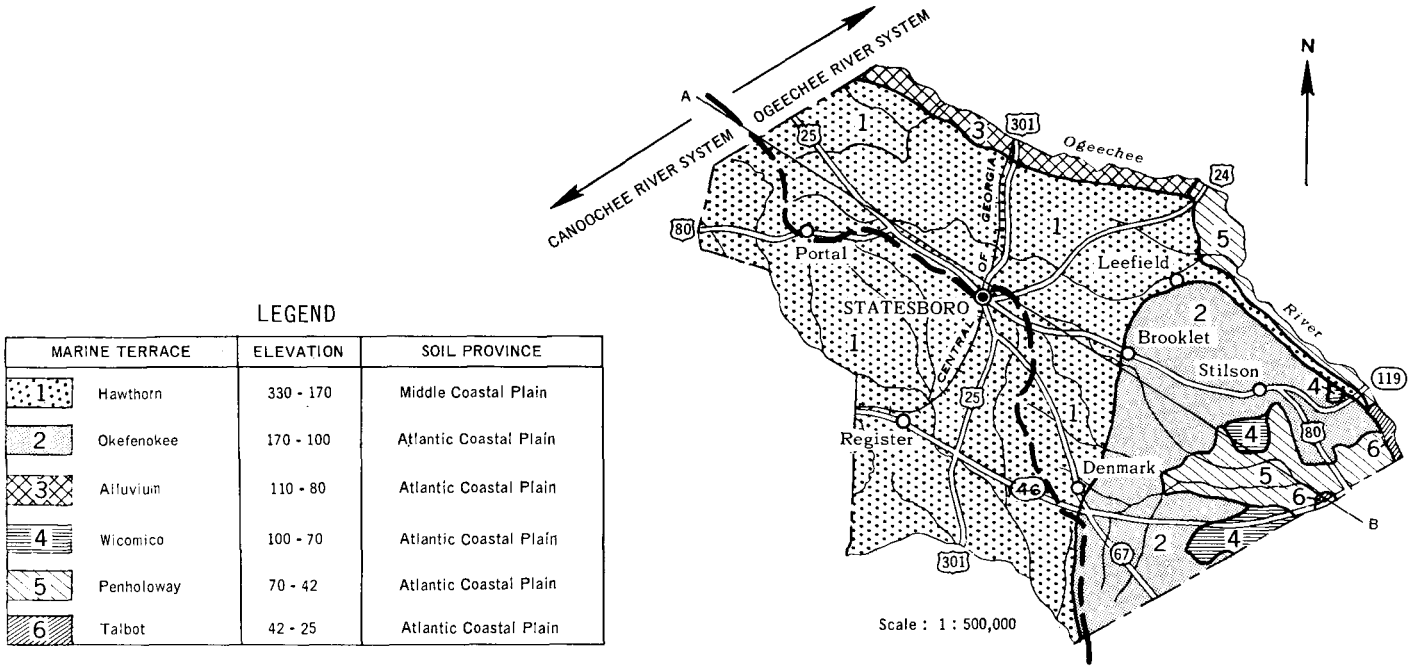
Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationships to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First, through classification and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus, in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and woodlands; in developing community areas; in engineering work; and in many other ways. They are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils are now in general use in the United States. One of these is the 1938 system (*3*), with later revisions (*11*). The other, the system currently used, was placed in general use by the Soil Conservation Service in 1965. The reader who is interested in the current system should search the latest literature (*10*, *14*) for new information. In this survey some of the classes in the current system and the great soil groups of the older system are given in table 16. The classes in the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic grouping of soils. Two exceptions are Entisols and Histosols, which occur in many different climates.

Table 16 shows the five soil orders in Bulloch County—Entisols, Inceptisols, Spodosols, Alfisols, and Ultisols. Entisols are recent mineral soils that do not have genetic horizons or have only the beginnings of such horizons. Inceptisols generally form on young but not recent land surfaces, and their name is derived from the Latin *inceptum*, for beginning. Spodosols are mineral soils that have a spodic horizon, or that have a thin horizon cemented by iron that overlies a fragipan and that meets all the requirements of a spodic horizon except thickness. A spodic horizon is an illuvial horizon that has (1) accumulations of free sesquioxides and appreciable organic matter; (2) accumulations of free iron oxides and little silicate clay or organic matter; or (3) accumulations of organic matter alone or with aluminum. Alfisols have a clay enriched B horizon that has more than 35 percent base saturation in some parts. Ultisols have a clay-enriched B horizon that has less than 35 percent base saturation, which decreases with depth.



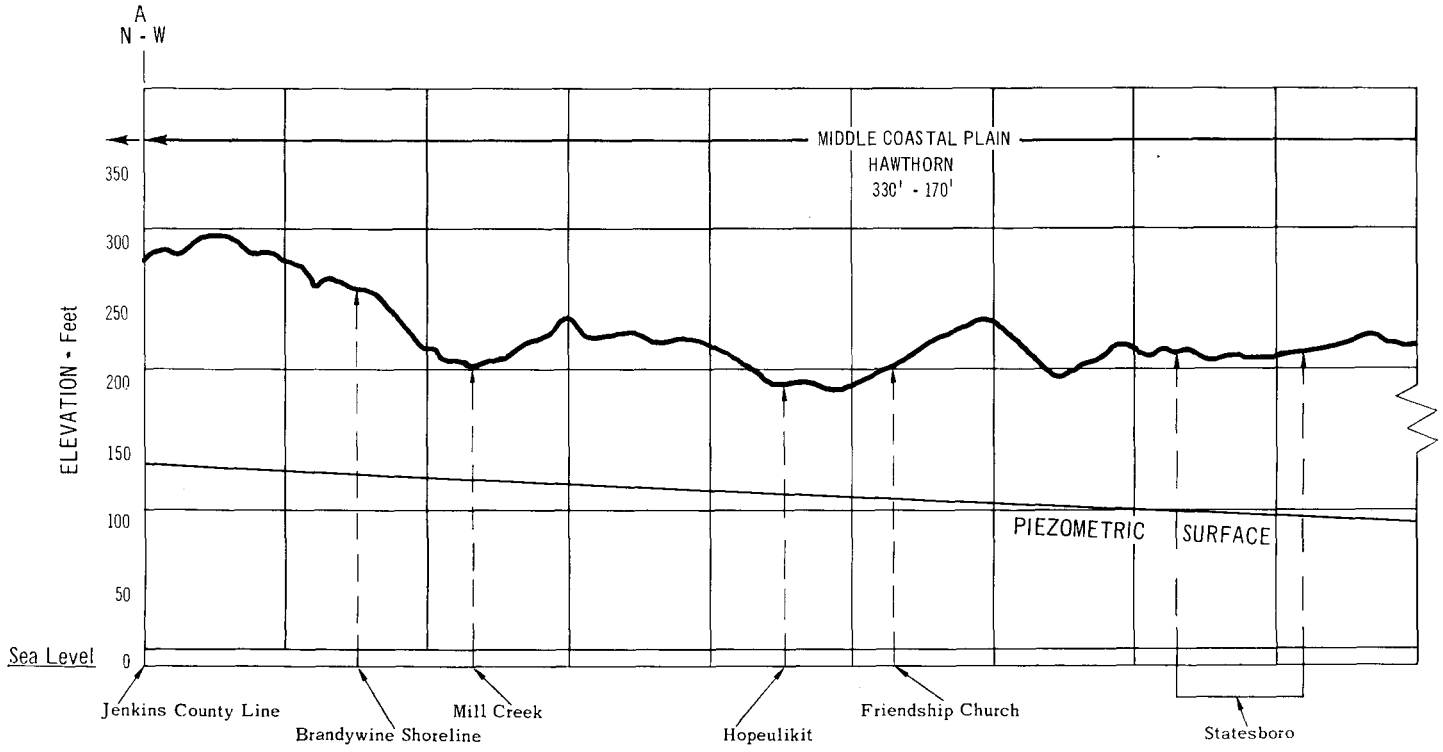


***Figure 11.*—Geologic map of Bulloch County, Ga. (upper left) and**

SUBORDER: Each order is subdivided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation.

GREAT GROUP: Soil suborders are separated into great groups on basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated or those that have pans interfering with growth of roots or movement of water. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 16, because it is the last word in the name of the subgroup.

SUBGROUP: Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Quartzipsamments (a typical Quartzipsamment).

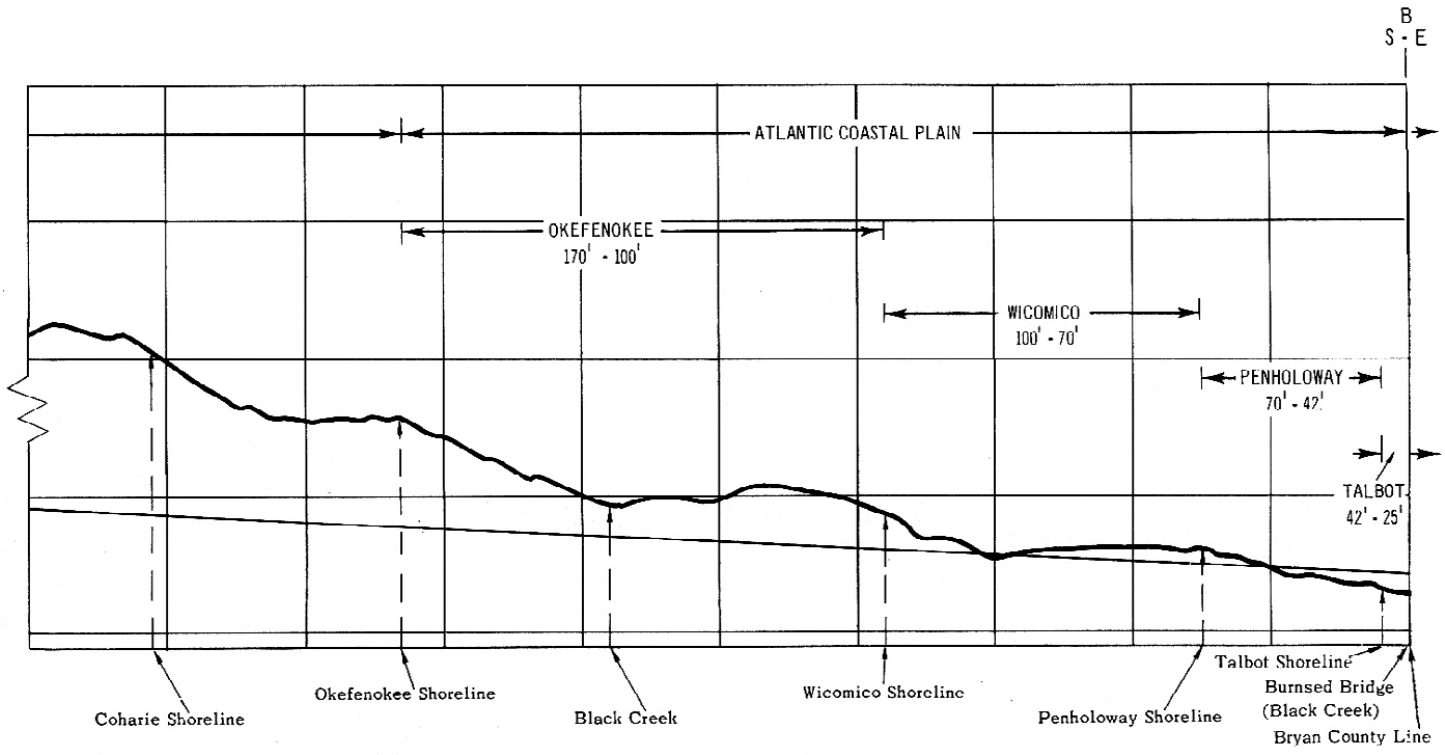
FAMILY: Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or behavior of soils where used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. An example of a family is the fine loamy, siliceous, thermic family of Typic Paleudults.

SERIES: The series is a group of soils having major horizons that, except for texture of surface layer, are similar in important characteristics and in arrangement in the profile. The soil series generally is given the name of a geographic location near the place where that series was first observed and mapped. An example is the Tifton series.

New soil series must be established and concepts of some established series, especially older ones that have been used little in recent years, must be revised in the course of the soil survey program across the country. A proposed new series has tentative status until review of the series concept at state, regional, and national levels of responsibility for soil classification results in a judgment that the new series should be established. Most of the soil series described in this publication have been established earlier. Seven of the soil series used in this survey had tentative status when the survey was sent to the printer. They are the Albany, Ardilla, Chipley, Cowarts, Dothan, Leefield, and Stilson series.

Morphology of Soils

In this subsection each soil series is briefly discussed, and a profile of a soil at a specified location is described in detail. The 26 soil series in the county are arranged



cross section along line A and B. See map for path of line A and B.

TABLE 16.—*Soil series classified according to current and old systems* [1] *of classification*

Series	Current classification			1938 classification
	Family	Subgroup	Order	Great soil group
Albany	Loamy, siliceous, thermic	Aquic Grossarenic Paleudults.	Ultisols	Regosols intergrading toward Red-Yellow Podzolic soils.
Ardilla	Fine loamy, siliceous, thermic	Plinthaquic Paleudults	Ultisols	Red-Yellow Podzolic soils intergrading toward Low-Humic Gley soils.
Bladen	Clayey, mixed, thermic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Carnegie	Fine loamy, siliceous, thermic	Plinthic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Chipley	Siliceous, acid, thermic, coated	Aquic Quartzipsamments	Entisols	Regosols.
Cowarts	Fine loamy, siliceous, thermic	Plinthic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Dothan	Fine loamy, siliceous, thermic	Plinthic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Dunbar	Clayey, kaolinitic, thermic	Aquic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Fuquay	Loamy, siliceous, thermic	Arenic Plinthic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Grady	Clayey, kaolinitic, thermic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Irvington	Fine loamy, siliceous, thermic	Plinthic Ochreptic Fragiudults.	Ultisols	Red-Yellow Podzolic soils.
Izagora	Fine loamy over clayey, mixed, thermic.	Aquic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Kershaw	Siliceous, acid, thermic, uncoated	Typic Quartzipsamments	Entisols	Regosols.
Lakeland	Siliceous, acid, thermic, coated	Typic Quartzipsamments	Entisols	Regosols.
Leon	Sandy, siliceous, thermic	Aeric Haplaquods	Spodosols	Ground-Water Podzols.
Leefield	Loamy, siliceous, thermic	Arenic Plinthic Paleudults	Ultisols	Red-Yellow Podzolic soils intergrading toward Low-Humic Gley soils.
Ona	Sandy, siliceous, thermic	Aeric Haplaquods	Spodosols	Ground-Water Podzols.
Orangeburg	Fine loamy, siliceous, thermic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Pelham	Loamy, siliceous, thermic	Arenic Ochraquults	Ultisols	Low-Humic Gley soils.
Plummer	Loamy, siliceous, thermic	Grossarenic Ochraquults	Ultisols	Low-Humic Gley soils.
Portsmouth	Fine loamy, siliceous, thermic	Typic Umbraquults	Ultisols	Humic Gley soils.
Rains	Fine loamy, siliceous, thermic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Rutlege	Sandy, siliceous, acid, thermic	Typic Humaquepts	Inceptisols	Humic Gley soils.
Stilson	Loamy, siliceous, thermic	Arenic Plinthic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Susquehanna	Fine, montmorillinitic, thermic	Vertic Paleudalfs	Alfisols	Red-Yellow Podzolic soils intergrading toward Regosols.
Tifton	Fine loamy, siliceous, thermic	Plinthic Paleudults	Ultisols	Red-Yellow Podzolic soils.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

alphabetically. First given for each series are pertinent facts about the soils, and then the description of the soil profile. Following the profile is the range in the characteristics of the series as it was mapped in Bulloch County.

The detailed description of a profile is an important part of each series description because the marks that the factors of soil formation leave on the soil are recorded in the profile. The profile is a succession of layers, or horizons, that extend from the surface downward. The horizons vary in thickness and differ in one or more properties, such as color, texture, structure, consistence, porosity, or reaction. Most soil profiles contain three major horizons, called A, B, and C. In some young soils a B horizon generally has not developed.

ALBANY SERIES

Soils of the Albany series are somewhat poorly drained. They formed in marine deposits that are sandy in the upper part and loamy below. These soils occur on low flats in the uplands and have slopes of 0 to 2 percent. Typically, they have a thick sandy A horizon underlain by a loamy B horizon that is gleyed. The water table fluctuates and, for 2 to 6 months each year, is only 15 to 30 inches below the surface.

Representative profile of Albany sand (in a moist wooded area three-fourths mile south of Red Hill Church along county road):

A11—0 to 4 inches, dark-gray (10YR 4/1) sand; structureless; loose; very strongly acid; clear, smooth boundary.

A21—4 to 16 inches, grayish-brown (2.5Y 5/2) sand; structureless; loose; very strongly acid; gradual, wavy boundary.

A22—16 to 28 inches, pale-yellow (2.5Y 8/4) sand that has few, fine, distinct, yellow (10YR 7/8) mottles; structureless; loose; very strongly acid; gradual, wavy boundary.

A23—28 to 40 inches, pale-brown (10YR 6/3) sand that has common, medium, distinct, yellowish-brown (10YR 5/8) and light brownish-gray (10YR 6/2) mottles; structureless; loose; very strongly acid; gradual, wavy boundary.

B1tg—40 to 48 inches, gray (N 6/0) sandy loam that has many, coarse, prominent, yellowish-brown (10YR 5/8) and strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure; nonsticky; very strongly acid.

B2tg—48 to 65 inches +, mottled gray (N 6/10), yellow (10YR 7/6), light-gray (N 7/0), and strong-brown (7.5YR 5/6) sandy clay loam; mottles are many, coarse, and prominent; weak, medium, subangular blocky structure; friable; very strongly acid.

The A11 horizon of the Albany soils ranges from dark gray to gray in color and from 2 to 6 inches in thickness. The A horizon ranges from 36 to 48 inches in thickness. Sandy loam to sandy clay loam is the textural range of the B horizon.

ARDILLA SERIES

The Ardilla series consists of somewhat poorly drained soils on low flats near drainageways. Slope ranges from 0 to 2 percent. These soils formed chiefly in loamy marine sediments. Their water table fluctuates and, for 2 to 6 months each year, is only 15 to 30 inches below the surface.

Representative profile of Ardilla loamy sand (in a moist wooded area 1 mile south of Emit Crossroads on State Route 67):

A1—0 to 4 inches, dark-gray (N 4/0) loamy sand; weak, medium, granular structure; very friable; numerous roots; strongly acid; clear, smooth boundary.

A2—4 to 10 inches, light brownish-gray (2.5Y 6/2) loamy sand that has few, fine, faint, gray (N 5/0) mottles; weak, medium, granular structure; very friable; many roots; strongly acid; clear, smooth boundary.

B1tg—10 to 14 inches, pale-yellow (2.5Y 7/4) sandy loam that has few, fine, distinct mottles of brownish yellow (10YR 6/6); weak, medium, subangular blocky structure; very friable; streaks of gray (N 5/0) along old root channels; strongly acid; gradual, wavy boundary.

B21tg—14 to 21 inches, pale-yellow (2.5Y 7/4) sandy clay loam that has few, fine distinct mottles of brownish yellow (10YR 6/6) and light brownish gray (2.5Y 6/2); weak, medium, subangular blocky structure; very strongly acid; gradual, wavy boundary.

B22tg—21 to 60 inches +, gray (N 6/0) sandy clay loam that has many, medium, prominent mottles of pale yellow (2.5Y 7/4), brownish yellow (10YR 6/6), and yellowish red (5YR 5/8); weak, medium, subangular blocky structure; friable; very strongly acid; gradual, wavy boundary.

The A1 horizon of the Ardilla soils ranges from gray to very dark gray. The A horizons range from 8 to 20 inches in thickness. Depth to the B22tg horizon ranges from 20 to 30 inches.

BLADEN SERIES

The Bladen series consists of poorly drained soils that formed in old alluvium on stream terraces having slopes of less than 2 percent. The water table fluctuates and is within 15 inches of the surface for more than 2 months each year. More than once a year, these soils are flooded for a period lasting 7 days to 1 month.

Representative profile of Bladen fine sandy loam (in a moist wooded area near the Ogeechee River, about three-fourths mile south of Oliver Road):

O1—1 inch to 0, loose, partly decomposed forest litter.

A1—0 to 3 inches, dark-gray (5Y 4/1) fine sandy loam; weak, fine, crumb structure; friable; numerous roots; very strongly acid; clear, smooth boundary.

A2g—3 to 8 inches, gray (N 5/0) fine sandy loam that has few, fine, distinct mottles of olive yellow (2.5Y 6/6); weak, fine subangular blocky structure; friable; many roots; very strongly acid; clear, wavy boundary.

B21tg—8 to 36 inches, dark-gray (N 4/0) clay that has few, distinct, light olive-brown (2.5Y 5/6) mottles; strong, medium, subangular blocky structure; very firm when moist, slightly plastic when wet; very strongly acid; diffuse, wavy boundary.

B22tg—36 to 60 inches +, gray (N 5/0) clay that has common medium, prominent mottles of light olive brown (2.5Y 5/6) and yellowish red (5YR 5/8); strong, medium, subangular blocky structure; very firm when moist, slightly sticky when wet; very strongly acid.

The A1 horizon of the Bladen soils ranges from clay loam to sandy loam in texture and from dark gray to very dark gray in color. The B21tg horizon ranges from clay to sandy clay in texture and from dark gray to gray in color.

CARNEGIE SERIES

The Carnegie series consists of well-drained pebbly soils on short breaks on the slopes of broad interstream ridges. The slopes range from 2 to 12 percent. These soils formed in sandy clay loam and sandy clay marine deposits that are reticulately mottled. They contain many iron concretions less than 1 inch in diameter.

The Carnegie soils are similar to the Tifton, Cowarts, and Dothan soils. The upper part of the B horizon, which is above the layer containing a large amount of soft plinthite, is free of mottles and is thinner in the Carnegie soils than in the Tifton and Dothan soils. The Carnegie soils contain more hard iron concretions throughout the profile than the Dothan and Cowarts soils. They also have a more clayey B2 horizon than Cowarts and Dothan soils.

Representative profile of Carnegie loamy sand (in a cultivated field 3 miles north of Hopeulikit along U.S. Highway No. 25 and 1¼ miles west of the highway along county road):

Apcn—0 to 8 inches, dark grayish-brown (10YR 4/2) loamy sand; weak, fine, granular structure; very friable; common iron concretions ¼ to ¾ inch in diameter; strongly acid; clear, smooth boundary.

A2cn—8 to 12 inches, yellow (2.5Y 8/6) loamy sand; weak, fine, granular structure; very friable; common iron concretions; strongly acid; clear, wavy boundary.

B1tcn—12 to 15 inches, brownish-yellow (10YR 6/6) sandy loam; weak, medium, crumb structure; very friable; common iron concretions; very strongly acid; clear, wavy boundary.

B21tcn—15 to 22 inches, yellowish-brown (10YR 5/8) heavy sandy clay loam; moderate, medium, subangular blocky structure; firm; common iron concretions; very strongly acid; gradual, wavy boundary.

B22t—22 to 60 inches +, mottled yellowish-brown (10YR 5/8), brownish-yellow (10YR 6/8), yellowish-red (5YR 5/8), and red (2.5YR 4/8) sandy clay loam; moderate, medium, subangular blocky structure; firm; soft plinthite; common soft and hard iron concretions; very strongly acid.

The Ap horizon of the Carnegie soils ranges from dark grayish brown to grayish brown in color and from 6 to 10 inches in thickness. The B21 and B22 horizons range from sandy clay loam to sandy clay. The depth to common or prominent mottles in the B horizon ranges from about 16 to 24 inches.

CHIPLEY SERIES

The Chipley series consists of moderately well drained to somewhat poorly drained sandy soils that formed in sandy marine deposits. These soils are on low flats in the uplands and have slopes of 0 to 2 percent. The water table fluctuates and, for more than 2 months each year, is within 15 to 30 inches of the surface.

Representative profile of Chipley sand (in a moist

wooded area 100 feet west of U.S. Highway No. 80, 4½ miles south of Stilson):

Ap—0 to 9 inches, dark-gray (10YR 4/1) sand; weak, fine, granular structure; very friable; very strongly acid; clear, smooth boundary.

C1—9 to 23 inches, pale-yellow (2.5Y 7/4) sand that has few, medium, faint mottles of light gray (2.5Y 7/2); structureless; loose; very strongly acid; gradual, wavy boundary.

C2—23 to 42 inches, pale-yellow (2.5Y 7/4) sand that has few, medium, faint mottles of light gray (2.5Y 7/2); structureless; loose; gradual, wavy boundary.

C3—42 to 58 inches +, pale-yellow (2.5Y 7/4) sand that has many, medium, prominent mottles of light gray (2.5Y 7/2) and brownish yellow (10YR 6/8); structureless; loose; very strongly acid.

The Ap horizon of the Chipley soils ranges from dark gray to gray in color and from 6 to 12 inches in thickness. The matrix of the C1 and C2 horizons ranges from light yellowish brown or pale yellow to pale brown. The depth to gray mottles in the C horizon ranges from about 15 to 35 inches.

COWARTS SERIES

The Cowarts series consists of well-drained soils on short breaks of slopes in the uplands. Slopes range from 2 to 8 percent. These soils formed in marine deposits of reticulately mottled loamy sand and clayey material.

Representative profile of Cowarts loamy sand (in a moist wooded area 1¼ miles southwest of Middle Ground Church along old Burkhalter Road):

A1—0 to 7 inches, dark grayish-brown (10YR 4/2) loamy sand; weak, fine, granular structure; very friable; many fine roots; strongly acid; clear, smooth boundary.

B1t—7 to 10 inches, brownish-yellow (10YR 6/6) sandy loam; weak, fine, subangular blocky structure; very friable; common fine roots; very strongly acid; clear, wavy boundary.

B21t—10 to 20 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; few, medium iron concretions that have yellowish-red (5YR 5/8) centers; very strongly acid; gradual, wavy boundary.

B22t—20 to 25 inches, brownish-yellow (10YR 6/8) sandy clay loam that has common, medium, prominent mottles of yellowish brown (10YR 5/6), yellowish red (5YR 5/8), light gray (10YR 7/1), and red (2.5YR 5/8); moderate, medium, subangular blocky structure; firm; slightly plinthitic; few clay films on surfaces of peds; very strongly acid; clear, wavy boundary.

B23t—25 to 46 inches, yellowish-brown (10YR 5/8) sandy clay loam that has many, medium, prominent mottles of brownish yellow (10YR 6/8), yellowish red (5YR 5/8), light gray (10YR 7/1), and red (2.5YR 5/8); moderate, medium, subangular and angular blocky structure; firm, soft plinthite; few clay films on surfaces of peds; very strongly acid; gradual, wavy boundary.

B24t—46 to 72 inches +, reticulately mottled yellow (10YR 7/8), light-gray (10YR 7/1), brownish-yellow (10YR 6/8), and red (2.5YR 4/8) sandy clay loam; mottles are many, coarse, and prominent; weak, medium, subangular blocky structure; friable; very strongly acid.

The A1 horizon of the Cowarts soils ranges from dark grayish brown to grayish brown in color and from 6 to 20 inches in thickness. The matrix of the upper part of the B horizon ranges from yellowish brown to brownish yellow. The depth to distinct or prominent mottles (soft plinthite) in the B horizon ranges from about 16 to 24 inches.

DOTHAN SERIES

The Dothan series consists of well-drained soils on broad interstream ridges that have slopes of 0 to 8 percent. These soils formed in marine deposits of reticulately mottled loamy and clayey material.

Representative profile of Dothan loamy sand (in a cultivated field 1 mile north of Pleasant Hill Church):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loamy sand; weak, medium, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary.

B1t—8 to 11 inches, brownish-yellow (10YR 6/6) sandy loam marked with few fine splotches of pale brown (10YR 6/3); weak, medium, subangular blocky structure; very friable; very strongly acid; clear, wavy boundary.

B21t—11 to 36 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; few clay films on surfaces of peds; very strongly acid; gradual, wavy boundary.

B22t—36 to 46 inches, brownish-yellow (10YR 6/8) sandy clay loam that has common, medium, prominent mottles of yellowish brown (10YR 5/8), yellowish red (5YR 5/8), and red (2.5YR 5/8); moderate, medium, subangular blocky structure; firm; slightly plinthitic; few clay films on surfaces of peds; very strongly acid; gradual, wavy boundary.

B23t—46 to 68 inches +, reticulately mottled red (2.5YR 5/8), brownish-yellow (10YR 6/6), yellowish-brown (10YR 5/8), and light-gray (10YR 7/1) sandy clay loam; moderate, medium, subangular and angular blocky structure; firm soft plinthite; few clay films on surfaces of peds; very strongly acid.

The Ap horizon of the Dothan soils ranges from dark grayish brown to grayish brown in color and from 6 to 12 inches in thickness. The upper part of the B horizon ranges from yellowish brown to brownish yellow.

DUNBAR SERIES

The Dunbar series consists of somewhat poorly drained soils that developed in old alluvium on low stream terraces near the Ogeechee River and Mill and Lotts Creeks. Slopes range from 0 to 2 percent. The water table fluctuates and, for more than 2 months each year, is within 15 to 30 inches of the surface. The soils are subject to flooding once every 1 to 5 years for periods that last less than 7 days.

Representative profile of Dunbar fine sandy loam (in a moist wooded area 1½ miles west of the Ogeechee River along Loop Road):

Ap—0 to 9 inches, dark-gray (5Y 4/1) fine sandy loam; weak, fine, crumb structure; very friable; numerous roots; very strongly acid; abrupt, wavy boundary.

B1t—9 to 18 inches, pale-yellow (2.4Y 7/4) sandy clay loam; weak, medium, subangular blocky structure; friable; many roots; very strongly acid; clear, wavy boundary.

B2tg—18 to 23 inches, pale-yellow (2.5Y 7/4) sandy clay that has common, medium, distinct mottles of gray (5Y 6/1) and red (2.5YR 5/6); moderate, medium, subangular blocky structure; firm; few roots; very strongly acid; gradual, wavy boundary.

B3tg—23 to 55 inches +, gray (5YR 6/1) sandy clay that has many, coarse, prominent mottles of light gray (5Y 7/1), yellow (2.5Y 7/6), and red (2.5YR 5/6); moderate, medium, subangular blocky structure; firm; few clay films on surfaces of peds; very strongly acid.

The Ap horizon of the Dunbar soils is fine sandy loam in most places, but it ranges to sandy loam or loamy sand. The Ap horizon ranges from dark gray to very dark gray. The B horizons range from sandy clay to clay.

FUQUAY SERIES

The Fuquay series consists of well-drained soils that formed in reticulately mottled sandy, loamy, and clayey marine deposits on broad interstream ridges. Slopes are 0 to 8 percent. These soils have a thick sandy A horizon and a loamy B horizon; the lower part of the B horizon is more than 10 percent soft plinthite, by volume.

Representative profile of Fuquay loamy sand (in a field 1 mile north of State Route 46, along Arcola-Pembroke Highway):

Ap—0 to 8 inches, grayish-brown (2.5Y 5/2) loamy sand; weak, medium, granular structure; very friable; very strongly acid; abrupt, smooth boundary.

A2—8 to 26 inches, light yellowish-brown (2.5Y 6/4) loamy sand that has few, fine, faint mottles of white (2.5Y 8/2); weak, medium, granular structure; very friable; very strongly acid; clear, wavy boundary.

B1t—26 to 30 inches, brownish-yellow (10YR 6/6) sandy loam that has few, fine, faint mottles of white (10YR 8/2); weak, medium, subangular blocky structure; very friable; very strongly acid; gradual, wavy boundary.

B21t—30 to 51 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; very strongly acid; gradual, wavy boundary.

B22t—51 to 56 inches, brownish-yellow (10YR 6/6) sandy clay loam that has common, medium, prominent mottles of yellowish brown (10YR 5/8), red (2.5YR 5/6), and light gray (10YR 7/1); moderate, medium, subangular blocky structure; friable; few clay films on surfaces of peds; slightly plinthitic; very strongly acid; gradual, smooth boundary.

B23t—56 to 70 inches +, reticulately mottled brownish-yellow (10YR 6/6), red (2.5YR 4/8), light-gray (10YR 7/1), and strong-brown (7.5YR 5/6) sandy clay loam; moderate, medium, subangular and angular blocky structure; firm; soft plinthite; very strongly acid.

The Ap horizon of the Fuquay soils ranges from grayish brown to gray in color and from 6 to 12 inches in thickness. The thickness of the Ap and A2 horizons combined ranges from 20 to 40 inches. The depth to soft plinthite in the B horizon ranges from 50 to 65 inches. In some places the surface layer is pebbly.

GRADY SERIES

The Grady series consists of poorly drained soils that formed chiefly in clayey marine deposits in small round depressions. Slopes range from 0 to 2 percent. The water table fluctuates and, for more than 6 months each year, is within 15 inches of the surface. Most areas are covered with water for 1 to 6 months each year.

Representative profile of Grady sandy loam (in a moist wooded area one-fourth mile southeast of Clito Station along county road):

A1—0 to 3 inches, very dark gray (N 3/0) sandy loam; weak, medium, crumb structure; very friable; very strongly acid; clear, wavy boundary.

A2—3 to 6 inches, dark-gray (N 4/0) sandy loam that has few, fine, faint mottles of gray (N 5/0); weak, medium, crumb structure; very friable; very strongly acid; clear, wavy boundary.

B1tg—6 to 10 inches, gray (N 6/0) sandy clay loam that has few, fine, distinct mottles of reddish yellow (7.5YR 6/6); weak, medium, subangular blocky structure; friable; very strongly acid; clear, wavy boundary.

B2tg—10 to 26 inches, gray (5Y 5/1) clay that has common, medium, prominent mottles of reddish yellow (7.5YR 6/6) and light red (10R 6/8); moderate, medium, subangular blocky structure; very firm; a few clay films on surfaces of peds; very strongly acid; gradual, wavy boundary.

B3tg—26 to 50 inches +, gray (N 6/0) fine sandy clay that has many, medium, prominent mottles of red (10YR 5/6), light red (10R 6/6), and yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; very firm; few clay films on surfaces of peds; few pockets of sandy clay loam; very strongly acid.

The A1 horizon of the Grady soils ranges from very dark gray to black. The B2 and B3 horizons range from clay to sandy clay in texture and from gray to dark gray in color.

IRVINGTON SERIES

The Irvington series consists of moderately well drained pebbly soils that formed chiefly in marine deposits of sandy clay loam on low flats in the uplands. Slopes range from 0 to 2 percent. On these soils and throughout the profile are rounded concretions of iron that average about one-half of an inch in diameter. A layer of weakly to moderately cemented, soft and hard iron concretions is at a depth of 24 to 36 inches and supports a perched water table during wet seasons.

Representative profile of Irvington loamy sand (in a moist cultivated field 1¼ miles north of Brooklet along Leefield Road, 50 yards east of road):

Apcn—0 to 9 inches, dark-gray (10YR 4/1) loamy sand; weak, fine, granular structure; very friable; common iron concretions ¼ to 1 inch in diameter; strongly acid; clear, smooth boundary.

A2cn—9 to 18 inches, pale-yellow (2.5Y 7/4) loamy sand; weak, medium, granular structure; very friable; common iron concretions ¼ to 1 inch in diameter; very strongly acid; gradual, wavy boundary.

B1cn—18 to 24 inches, yellow (10YR 7/6) sandy loam; weak, fine, subangular blocky structure; very friable; common iron concretions ¼ to 1 inch in diameter; very strongly acid; clear, wavy boundary.

B2tcn—24 to 36 inches, yellow (10YR 7/6) sandy clay loam; weak, medium, subangular blocky structure; friable; common iron concretions ¼ to 1 inch in diameter; very strongly acid; gradual, wavy boundary.

B31txcn—36 to 48 inches, yellow (10YR 7/6) sandy clay loam that has common, medium, prominent mottles of very pale brown (10YR 7/4), yellowish brown (10YR 5/8), and light gray (2.5Y 7/2); weak, medium, subangular blocky structure; weakly cemented; common, fine to medium, hard iron concretions; many soft, strong-brown concretions of iron; concretions make up more than 15 percent of material; very strongly acid; gradual, wavy boundary.

B32t—48 to 58 inches +, mottled yellowish-brown (10YR 5/8), strong-brown (7.5YR 5/8), yellow (10YR 7/6), and red (2.5YR 4/8) sandy clay loam; mottles are many, coarse, and prominent; weak, medium, subangular blocky structure; friable; few iron concretions; soft plinthite; very strongly acid.

The Ap horizon of Irvington soils ranges from dark gray to dark grayish brown. The A horizon is 15 to 20 inches thick. The B2 horizon ranges from yellow to brownish yellow or yellowish brown. The weakly cemented B31 horizon is 26 to 40 inches from the surface and ranges from 6 to 16 inches in thickness.

IZAGORA SERIES

The Izagora series consists of moderately well drained soils formed in alluvium that is sandy in the upper part and is clayey below. These soils are on stream terraces and have slopes of 0 to 2 percent. The water table fluctuates and, for 1 to 2 months each year, is within 15 to 30 inches of the surface.

Representative profile of Izagora loamy sand (in a

moist cultivated field 100 yards east of Old Dover Road near the Ogeechee River):

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) loamy sand; weak, fine, granular structure; very friable; very strongly acid; clear, wavy boundary.

A21—8 to 15 inches, pale-yellow (2.5Y 7/4) loamy sand that has few, fine, distinct mottles of light gray (5Y 7/2); weak, fine, granular structure; very friable; very strongly acid; clear, wavy boundary.

A22—15 to 18 inches, yellow (2.5Y 7/6) loamy sand that has few, fine, distinct mottles of pale yellow (2.5Y 8/4) and light olive gray (5Y 6/2); weak, fine, granular structure; very friable; very strongly acid; clear, wavy boundary.

B21t—18 to 26 inches, brownish-yellow (10YR 6/6) sandy clay loam that has few, medium, faint mottles of yellow (10YR 7/6); weak, medium, subangular blocky structure; very friable; very strongly acid; gradual, wavy boundary.

B22t—26 to 31 inches, yellow (10YR 7/6) sandy clay loam that has common, medium, prominent mottles of pale brown (10YR 6/3), light yellowish brown (10YR 6/4), and red (10YR 4/6); weak, medium, subangular blocky structure; friable; gradual, wavy boundary.

IIB23tg—31 to 62 inches +, yellow (10YR 7/6) sandy clay that has many, coarse, prominent mottles of gray (5Y 5/1) and red (10R 4/8); moderate, medium, subangular blocky structure; firm; very strongly acid.

The Ap horizon of Izagora soils ranges from dark grayish brown to grayish brown. The matrix of the B2 horizons ranges from brownish yellow or yellow to yellowish brown. The depth to the IIB horizon ranges from 26 to 32 inches.

KERSHAW SERIES

The Kershaw series consists of excessively drained soils that formed in thick beds of coarse sand on ridges. Slopes range from 2 to 8 percent. Typically, the clay and silt in these soils amount to less than 5 percent of the soil mass, and available water capacity is very low.

Representative profile of Kershaw coarse sand (in a moist wooded area 100 yards east of Lotts Creek along U.S. Highway No. 80):

A1—0 to 3 inches, grayish-brown (10YR 5/2) coarse sand; loose; single grain (structureless); many roots; very strongly acid; clear, wavy boundary.

AC—3 to 20 inches, light yellowish-brown (10YR 6/4) coarse sand streaked with light brownish gray (10YR 6/2) along old root channels; loose; single grain (structureless); few roots; very strongly acid; gradual, wavy boundary.

C1—20 to 43 inches, yellow (10YR 7/6) coarse sand; structureless; loose; very strongly acid; gradual, wavy boundary.

C2—43 to 80 inches +, very pale brown (10YR 8/3) coarse sand; structureless; loose; very strongly acid.

The A1 horizon of Kershaw soils ranges from 2 to 6 inches in thickness. Coarse sand extends from the surface to a depth of 6 to 20 feet or more.

LAKELAND SERIES

The Lakeland series consists of excessively drained soils that formed in thick beds of sand on broad uplands. Slopes range from 0 to 12 percent.

Representative profile of Lakeland sand (in a moist field 1½ miles northwest of Robbins Pond along U.S. Highway No. 80, 400 yards west of highway):

Ap—0 to 12 inches, gray (10YR 5/1) sand; structureless; loose; very strongly acid; clear, smooth boundary.

AC—12 to 21 inches, light yellowish-brown (2.5Y 6/4) sand; structureless: loose; very strongly acid; gradual, wavy boundary.

C—21 to 60 inches +, pale-yellow (2.5Y 8/4) sand that has few, fine, faint mottles of yellow (2.5Y 7/6); structureless; loose; very strongly acid.

The Ap horizon of Lakeland soils ranges from gray to light gray in color and from 6 to 14 inches in thickness. The matrix of the AC and C horizons ranges from light yellowish brown to yellow.

LEEFIELD SERIES

The Leefield series consists of somewhat poorly drained soils on broad, low flats in the uplands. Slopes range from 0 to 2 percent. These soils formed in marine deposits that are sandy in the upper part and loamy below. They have a thick, sandy A horizon and a gleyed, loamy B horizon that, in the lower part, is more than 10 percent soft plinthite, by volume. The water table fluctuates and, for more than 2 months each year, is within 15 to 30 inches of the surface.

Representative profile of Leefield loamy sand (in a cultivated field approximately 5 miles southeast of Denmark, along State Route 46, 300 yards north of highway):

Ap—0 to 10 inches, very dark gray (10YR 3/1) loamy sand; weak, medium, granular structure; very friable; very strongly acid; abrupt, smooth boundary.

A2g—10 to 23 inches, light brownish-gray, (2.5Y 6/2) loamy sand that has few, fine, faint mottles of pale yellow (2.5Y 7/4); weak, medium, granular structure; very friable; very strongly acid; gradual, wavy boundary.

B1tg—23 to 28 inches, light yellowish-brown (2.5Y 6/4) sandy loam that has common, fine, faint mottles of light gray (2.5Y 7.2); massive in places, but breaks to weak, medium, subangular blocky structure; very friable; very strongly acid; gradual, wavy boundary.

B21tg—28 to 33 inches, light yellowish-brown (2.5Y 6/4) sandy clay loam that has common, medium, prominent mottles of light gray (10YR 7/1) and brownish yellow (10YR 6/8); weak, medium, subangular blocky structure; very friable; very strongly acid; clear, smooth boundary.

B22tg—33 to 57 inches, olive-yellow (2.5Y 6/6) sandy clay loam that has many, coarse, prominent mottles of light gray (10YR 7/1), yellowish brown (10YR 5/6), and yellowish red (5YR 4/8); moderate, medium, subangular blocky structure; friable; few peds that have firm yellowish-red centers; few soft and slightly hard concretions of iron; very strongly acid; gradual, smooth boundary.

B23tg—57 to 75 inches +, sandy clay loam reticulately mottled with yellowish-brown (10YR 5/6), brownish-yellow (10YR 6/6), light-gray (N 7/0), and red (2.5YR 4/8); massive in place but breaks to moderate, medium, subangular blocky structure; firm; soft plinthite; very strongly acid.

The Ap horizon of Leefield soils ranges from very dark gray to dark gray. The A2 horizon ranges from light brownish gray to pale yellow. The Ap and A2 horizons combined are 20 to 40 inches thick. The matrix of the B21 and B22 horizons ranges from light yellowish brown or brownish yellow to olive yellow. These horizons are distinctly or prominently mottled with light gray or gray. The depth to the soft plinthite in the B horizon ranges from 38 to 60 inches.

LEON SERIES

The Leon series consists of somewhat poorly drained or poorly drained soils that formed in sandy marine deposits. These soils occur on broad flats in the low uplands and

have slopes of 0 to 2 percent. They have a well-developed, sandy A2 horizon from which clay and free iron have been removed to the extent that the hue and chroma of the horizon are determined by the color of the sand and silt particles. This horizon is underlain by a B horizon, 3 to 7 inches thick, that is weakly cemented with organic matter. For more than 2 months each year, the water table of this soil is less than 15 inches below the surface.

Representative profile of Leon sand (in a moist woodland area 1½ miles south of Denmark and 1¼ miles east of State Route 67 on county road):

A1—0 to 3 inches, very dark gray (N 3/0) sand; weak, medium, crumb structure; very friable; very strongly acid; clear, smooth boundary.
A2—3 to 9 inches, light-gray (5Y 7/1) sand; structureless; loose; very strongly acid; abrupt, smooth boundary.
B2h—9 to 14 inches, very dark brown (10YR 2/2) sand, dark yellowish-brown (10YR 3/4) in lower part; weakly cemented with organic matter; strong, medium, subangular blocky structure; firm; very strongly acid; gradual, smooth boundary.
C1—14 to 24 inches, pale-brown (10YR 6/3) sand; single grain (structureless); loose; very strongly acid; gradual, irregular boundary.
C2—24 to 44 inches +, very pale brown (10YR 8/4) sand that has common, medium, prominent mottles of yellow (10YR 7/6) and dark grayish brown (10YR 4/2); single grain (structureless); loose; very strongly acid.

The A1 horizon of the Leon soils ranges from very dark gray to black in color and from 2 to 5 inches in thickness. The A2 horizon ranges from light gray to white. The B2h horizon is 6 to 12 inches below the surface.

ONA SERIES

The Ona series consists of somewhat poorly drained soils that formed in sandy marine deposits on broad flats. These soils are on low uplands and have slopes of 0 to 2 percent. The thin A horizon of Ona soils consists of sand and is underlain by a B horizon of sand stained by organic matter. The B horizon is 4 to 7 inches thick. The water table fluctuates and, for more than 2 months each year, is only 15 to 30 inches below the surface.

These soils have many characteristics in common with the Leon soils, but unlike them, they lack the eluvial A horizon and show no indication of cementation in the B horizon. Also, they occupy slightly higher positions than Leon soils.

Representative profile of Ona sand (in a moist woodland area 1 mile south of Upper Black Creek on a county road three-fourths mile west of the Arcola-Pembroke Road):

A1—0 to 4 inches, very dark gray (N 3/0) sand; structureless; loose; very strongly acid; clear, smooth boundary.
B2h—4 to 10 inches, dark-brown (10YR 4/3) sand; weak, medium, crumb structure; very friable; very strongly acid; gradual, irregular boundary.
C—10 to 40 inches, pale-yellow (2.5Y 8/4) sand that has few, fine, faint mottles of pale olive (5Y 6/3); structureless; loose; very strongly acid; gradual, wavy boundary.
IIBb—40 to 60 inches +, yellow (10YR 7/8) sandy clay loam that has many, coarse, distinct mottles of yellowish brown (10YR 5/8) and light gray (10YR 7/2); weak, medium, subangular blocky structure; very friable; very strongly acid.

The A1 horizon of the Ona soils ranges from very dark gray to black in color and from 3 to 7 inches in thickness. The B2h horizon is 3 to 8 inches thick. Depth to the IIBb horizon ranges from 38 to 60 inches or more.

ORANGEBURG SERIES

The Orangeburg series consists of well-drained soils that formed chiefly in loamy marine deposits on broad uplands. Slopes range from 2 to 12 percent.

A representative profile of Orangeburg loamy sand (in a moist wooded area 200 yards south of a manufacturing plant 1 mile east of U.S. Highway No. 301 or Old River Road):

O—1 inch to 0, dark-brown (10YR 4/3), loose, partly decomposed forest litter.
A1—0 to 6 inches, grayish-brown (10YR 5/2) loamy sand; weak, fine, granular structure; very friable; many small roots; very strongly acid; clear, smooth boundary.
A2—6 to 12 inches, light yellowish-brown (10YR 6/4) loamy sand; weak, fine, granular structure; very friable; many small roots; very strongly acid; clear, smooth boundary.
B1—12 to 15 inches, reddish-yellow (7.5YR 6/8) sandy loam; weak, medium, crumb structure; very friable; few roots; very strongly acid; clear, wavy boundary.
B21t—15 to 29 inches, yellowish-red (5YR 5/8) sandy clay loam; weak, fine, subangular blocky structure; friable; very strongly acid; gradual, wavy boundary.
B22t—29 to 58 inches +, yellowish-red (5YR 5/8) sandy clay loam that has common, medium, prominent mottles of yellow (10YR 7/6); moderate, medium, subangular blocky structure; firm; very strongly acid.

The A1 horizon of the Orangeburg soils ranges from grayish brown to light yellowish brown. The A1 and A2 horizons combined range from 6 to 14 inches in thickness.

PELHAM SERIES

The Pelham series consists of poorly drained soils in depressions, in small drainageways, and on large flats. Slopes range from 0 to 2 percent. These soils formed in deposits that are sandy in the upper part and loamy below. They have a thick sandy A horizon and a loamy B horizon that is strongly gleyed. The water table fluctuates and, for more than 2 months each year, is less than 15 inches below the surface. Water covers these soils for 1 to 6 months each year.

Representative profile of Pelham loamy sand (in a moist area along a powerline right-of-way about 1½ miles east of Lotts Creek along State Route Highway 46):

A1—0 to 5 inches, dark-gray (10YR 4/1) loamy sand; weak, fine, granular structure; very friable; very strongly acid; clear, smooth boundary.
A2—5 to 21 inches, gray (10YR 5/1) loamy sand that has common, fine, faint mottles of light yellowish brown (10YR 6/4) and very pale brown (10YR 8/3); weak, fine, granular structure; very friable; very strongly acid; gradual, irregular boundary.
B21tg—21 to 30 inches, gray (N 5/0) sandy clay loam that has common, fine, prominent mottles of yellowish brown (10YR 5/8) and brownish yellow (10YR 6/6); weak, medium, subangular blocky structure; friable; very strongly acid; gradual, wavy boundary.
B22tg—30 to 62 inches +, mottled gray (10YR 6/1), olive-gray (5Y 5/2), and yellowish-brown (10YR 5/8) sandy clay loam; mottles are many, coarse, and prominent; moderate, medium, subangular blocky structure; slightly sticky; very strongly acid.

The A1 horizon of the Pelham soils ranges from dark gray to very dark gray; the A2 horizon ranges from gray to dark gray. The thickness of the A horizon ranges from 20 to 40 inches, but in most places the range is 22 to 30 inches.

PLUMMER SERIES

The Plummer series consists of poorly drained soils that formed in sandy marine deposits, on broad flats and in drainageways. Slopes range from 0 to 2 percent. The water table fluctuates and, for more than 2 months each year, is less than 15 inches below the surface. Water covers these soils for 1 to 6 months each year.

Representative profile of Plummer sand (in a moist wooded area 200 yards west of Ash Branch Church):

A1—0 to 6 inches, very dark gray (N 3/0) sand; structureless; loose; numerous roots; very strongly acid; clear, smooth boundary.

A2g—6 to 42 inches, gray (N 6/0) sand that has common, fine, distinct mottles of white (N 8/0); structureless; loose; few roots; very strongly acid; clear, wavy boundary.

Btg—42 to 52 inches +, gray (N 6/0) sandy loam that has common, medium, prominent mottles of yellow (10YR 7/6) and yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; slightly sticky; very strongly acid.

The A1 horizon of the Plummer soils ranges from very dark gray to dark gray in color and from 5 to 10 inches in thickness. The A2g horizon ranges from gray to light gray. Depth to the Btg horizon ranges from 40 to 52 inches.

PORTSMOUTH SERIES

The Portsmouth series consists of very poorly drained soils in bays and depressions that have slopes of less than 2 percent. These soils formed in loamy and clayey marine deposits. They have an A horizon that commonly is about 12 inches thick and is rich in organic matter. The B horizon is strongly gleyed. The water table is at a depth of less than 15 inches for more than 6 months each year, and water covers the surface for more than 2 months each year.

Representative profile of Portsmouth loam (in a large bay 1 mile south of Stilson):

A1—0 to 15 inches, black (10YR 2/1) loam; weak, fine, granular structure; very friable; very strongly acid; gradual, smooth boundary.

A2—15 to 24 inches, light brownish-gray (10YR 6/2) fine sandy loam that has few, fine, faint mottles of light gray (10YR 7/1); weak, medium, subangular blocky structure; very friable; very strongly acid; gradual, wavy boundary.

B1tg—24 to 30 inches, gray (10YR 5/1) fine sandy clay loam that has common, fine, faint mottles of light gray (10YR 7/1); weak, medium, subangular blocky structure; friable; few small lenses of sand; very strongly acid; gradual, wavy boundary.

B2tg—30 to 55 inches +, dark-gray (10YR 4/1) fine sandy clay that has common, medium, prominent mottles of light gray (10YR 7/1), pale yellow (2.5Y 7/4), and strong brown (7.5YR 5/6); massive; slightly sticky and slightly plastic when wet; few small lenses of sand; very strongly acid.

The A1 horizon of Portsmouth soils ranges from 8 to 18 inches in thickness. The matrix of the B1 horizon ranges from gray to black. Sandy clay loam to sandy clay is the textural range of the B horizon.

RAINS SERIES

The Rains series consists of poorly drained soils that formed chiefly in loamy marine deposits. These soils occupy low flats near the Ogeechee River and Lotts and Mill Creeks. Slopes range from 0 to 2 percent. The water table is less than 15 inches below the surface for 2 to 6 months each year. Water covers these soils for periods of 1 to 6 months.

Representative profile of Rains sandy loam (in a moist wooded area one-half mile west of the Ogeechee River and 100 yards northeast of Loop Road):

A1—0 to 3 inches, black (N 2/0) sandy loam; weak, medium, granular structure; very friable; numerous roots; very strongly acid; clear, wavy boundary.

A21g—3 to 8 inches, dark-gray (10YR 4/1) sandy loam that has few, fine, faint mottles of very dark gray (10YR 3/1); weak, fine, granular structure; very friable; many roots; very strongly acid; clear, wavy boundary.

A22g—8 to 12 inches, light-gray (2.5Y 7/2) sandy loam that has many, medium, prominent mottles of pale yellow (2.5Y 7/4) and brownish yellow (10YR 6/8); weak, medium, crumb structure; nonsticky; very strongly acid; gradual, wavy boundary.

B1tg—12 to 25 inches, gray (N 5/0) sandy clay loam that has lenses of sandy material and many, medium, prominent mottles of pale yellow (2.5Y 7/4) and brownish yellow (10YR 6/8); weak, medium, subangular blocky structure; nonsticky; very strongly acid; gradual, wavy boundary.

B2tg—25 to 56 inches, mottled gray (N 5/0), pale-yellow (2.5Y 7/4), brownish-yellow (10YR 6/8), and red (2.5YR 4/8) sandy clay that has lenses of sandy material; mottles are many, medium, and prominent; moderate, medium, subangular blocky structure; slightly sticky; very strongly acid.

The A1 horizon of the Rains soils ranges from black to dark gray. The thickness of the A horizon ranges from 10 to 20 inches. The B2tg horizon ranges from sandy clay loam to sandy clay.

RUTLEGE SERIES

The Rutlege series consists of very poorly drained sandy soils in bays and along drainageways. These soils have a thick (more than 20 inches) A1 horizon that is rich in organic matter. Slopes range from 0 to 2 percent. Water covers these soils for more than 2 months each year, and the water table is at a depth of less than 15 inches for 6 months or more.

Representative profile of Rutlege sand (in a moist wooded area 1¼ miles south of Upper Black Creek Church near a paved county road):

0—2 inches to 0, partly decomposed forest litter containing numerous small roots.

A11—0 to 14 inches, black (N 2/0) sand; weak, fine, granular structure; very friable; numerous roots; very strongly acid; clear, wavy boundary.

A12—14 to 30 inches, very dark gray (N 3/0) sand that has few, fine, distinct mottles of light gray (N 7/0); weak, fine, granular structure; very friable; few roots; very strongly acid; clear, wavy boundary.

A2g—30 to 41 inches, gray (5Y 5/1) sand that has common, medium, distinct mottles of light gray (N 7/0); weak, fine, granular structure; very friable; very strongly acid.

Btg—41 to 64 inches, dark-gray (N 4/0) sandy clay loam that has common, medium, distinct mottles of light gray (N 7/0); weak, medium, subangular blocky structure; friable; few sand lenses; very strongly acid.

The A1 horizon of the Rutlege soils ranges from 8 to 24 inches in thickness, and the A12 horizon from 12 to 22 inches. Depth to finer textured material ranges from 36 to more than 48 inches, but it is more than 40 inches in most places. The finer textured material ranges from sandy clay loam to sandy loam.

STILSON SERIES

The Stilson series consists of moderately well drained soils formed in marine deposits that are sandy in the upper part and loamy below. These soils are on low uplands and have slopes of less than 2 percent. They have a thick, sandy A horizon and a loamy B horizon that, in the lower part, is more than 10 percent soft plinthite, by volume. The water table is seasonally high and is at a depth of 30 to 60 inches for more than 2 months each year.

Representative profile of Stilson loamy sand (in a moist wooded area near the county road from Stilson to Leefield, about 2½ miles north of Stilson and 700 yards south of Lanes Church):

A1—0 to 5 inches, dark-gray (5Y 4/1) loamy sand; weak, fine, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary.

A2—5 to 24 inches, pale-yellow (2.5Y 7/4) loamy sand; weak, medium, granular structure; very friable; common fine roots; few, fine, black charcoal nodules; very strongly acid; clear, wavy boundary.

B1t—24 to 29 inches, yellow (2.5Y 7/6) sandy loam that has few, fine, faint mottles of brownish yellow (10YR 6/8); weak, medium, subangular blocky structure; very friable; few roots; very strongly acid; gradual, wavy boundary.

B21t—29 to 38 inches, brownish-yellow (10YR 6/6) sandy clay that has common, medium, faint mottles of yellowish brown (10YR 5/8) and few, fine, faint mottles of light brownish gray (10YR 6/2); weak, medium, subangular blocky structure; very friable; few, medium, soft and hard concretions of iron; very strongly acid; gradual, wavy boundary.

B22tg—38 to 43 inches, yellow (10YR 7/6) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8) and light gray (10YR 7/1); moderate, medium, subangular blocky structure; friable; few, medium, strong-brown (7.5YR 5/6), soft and hard concretions of iron; very strongly acid; gradual, wavy boundary.

B23tg—43 to 60 inches, brownish-yellow (10YR 6/6) sandy clay loam that has many, coarse, prominent mottles of yellowish brown (10YR 5/8), light gray (10YR 7/1), strong brown (7.5YR 5/6), and yellowish red (5YR 5/8); moderate, medium, subangular blocky structure; firm; common, medium, soft and hard concretions of iron; soft plinthite; very strongly acid; gradual, wavy boundary.

B24tg—60 to 72 inches, mottled light-gray (5Y 7/1), red (10R 5/8), brownish-yellow (10YR 6/8), and yellowish-brown (10YR 5/8) sandy clay loam; mottles are many, coarse, and prominent; moderate, medium, subangular blocky structure; friable; few soft and hard concretions of iron; slightly plinthitic; very strongly acid.

The A1 horizon of the Stilson soils ranges from dark gray to very dark gray. The A horizon ranges from 20 to 40 inches in thickness. The matrix of upper part of the B horizon ranges from light olive brown to yellow or brownish yellow. The grayish mottles at a depth of about 1 foot below the top of the B horizon ranges from faint to distinct. The mottles were caused by gleying. Depth to soft plinthite in the B horizon ranges from about 32 to 60 inches.

SUSQUEHANNA SERIES

The Susquehanna series consists of somewhat poorly drained soils that formed chiefly in clayey marine deposits. These soils occur on short broken slopes that range from 2 to 8 percent.

Representative profile of Susquehanna loamy sand (in a moist wooded area one-half mile south of Parrish's store on U.S. Highway No. 25):

A1—0 to 4 inches, dark-gray (10YR 4/1) loamy sand; weak, fine, granular structure; very friable; very strongly acid; gradual, wavy boundary.

A2—4 to 10 inches, brown (10YR 5/3) loamy sand; weak, fine, granular structure; very friable; very strongly acid; clear, smooth boundary.

B21t—10 to 12 inches, red (2.5YR 5/6) sandy clay that has few, fine, distinct mottles of light brown (7.5YR 6/4); weak, medium, subangular blocky structure; friable; very strongly acid; abrupt, wavy boundary.

B22tg—12 to 60 inches +, light olive-gray (5Y 6/2) clay that has many, medium, prominent mottles of red (10R 4/6); strong, medium, blocky structure; very firm, very plastic, and sticky when wet, hard when dry; many clay films on surface of peds; very strongly acid.

The A1 horizon of the Susquehanna soils ranges from dark gray to very dark gray. The thickness of the A horizon ranges from 6 to 12 inches.

TIFTON SERIES

The Tifton series consists of well-drained pebbly soils formed in marine deposits that are loamy in the upper part and clayey below. These soils are on broad interstream ridges in the uplands and have slopes of 0 to 8 percent. Many iron concretions, less than 1 inch in diameter, are on the surface and throughout the profile.

Representative profile of Tifton loamy sand (in a moist cultivated field 2½ miles south of Portal on county road):

Apcn—0 to 10 inches, dark grayish-brown (2.5Y 4/2) loamy sand; weak, fine, granular structure; very friable; many hard iron concretions, or pebbles; strongly acid; abrupt, smooth boundary.

B1tcn—10 to 14 inches, yellowish-brown (10YR 5/6) sandy loam; weak, fine, crumb structure; very friable; many hard iron concretions, or pebbles; strongly acid; clear, smooth boundary.

B21tcn—14 to 20 inches, yellowish-brown (10YR 5/8) sandy clay loam; weak, fine, subangular blocky structure; friable; many hard iron concretions or pebbles; strongly acid; clear, smooth boundary.

B22tcn—20 to 32 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; many hard iron concretions; strongly acid; gradual, smooth boundary.

B23t—32 to 41 inches, yellowish-brown (10YR 5/8) sandy clay that has common, medium, distinct mottles of strong brown (7.5YR 5/8) and light olive brown (2.5Y 5/4); moderate, medium, subangular blocky structure; friable; few hard and soft iron concretions; very strongly acid; gradual, smooth boundary.

B24t—41 to 60 inches +, strong-brown (7.5YR 5/8) sandy clay loam that has many, coarse, prominent mottles of dark red (10R 3/6) and light gray (2.5Y 7/2); soft plinthite; moderate, medium, subangular blocky structure; friable; very strongly acid.

The Ap horizon of the Tifton soils ranges from dark grayish brown to brown. The A horizon ranges from 4 to 20 inches in thickness, but it has an average thickness of 10 to 12 inches. The matrix of the B horizon ranges from yellowish brown to strong brown. The depth to

distinct or prominent mottles in the B horizon ranges from 25 to 41 inches.

Additional Facts About the County

This section contains information for those who are not familiar with Bulloch County. Described are the physiography, drainage, and water supply of the county, as well as the industries, transportation, and market facilities. The last part of the section contains some facts about agriculture in this county. The figures for population and the statistics on agriculture are mainly from reports of the U.S. Bureau of the Census.

Bulloch County was established in 1796 and named for Archibald Bulloch, the first elected governor of Georgia. The county was created from part of the territory obtained from the Creek Indians in 1773. In 1803, the county seat was organized at Statesboro.

The population of the county grew slowly until 1850. It was 4,300 in 1850, 13,709 in 1890, and 24,263 in 1960. The population of Statesboro, the county seat, was 8,356 in 1960.

Physiography and Drainage

Bulloch County ranges from about 40 feet above sea level along the Ogeechee River and Black Creek near the Bryan County line to more than 300 feet at several points near the Jenkins County line. The elevations of the following towns in the county are typical: Portal, 295 feet; Statesboro, 225 feet; Brooklet, 155 feet; and Stilson, 110 feet. The valley floor of the Ogeechee River ranges from 120 feet to 40 feet above mean sea level.

The county is highly dissected by Mill, Lotts, and Nevils Creeks and their tributaries. These streams have cut into the once broad and nearly level plain and have developed young dendritic drainage patterns in the Pleistocene sediments. The drainage patterns are poorly defined, and numerous shallow depressions, lagoons, and bays occur throughout. Some trellislike drainageways have formed in the upper reaches of Black Creek, Luke Swamp, and Ash Branch. Most of the eastern half of the county drains into the Ogeechee River, and the western half drains mainly into the Canoochee River. The divide between these two drainage areas is, in general, State Route 67 and that part of U.S. Highway No. 80 north of Statesboro.

Water Supply

All of Bulloch County is underlain by a limestone aquifer (*6*), which yields artesian water. Water for domestic, industrial, and farm uses is obtained from deep wells drilled into this formation. These wells extend below a depth of 200 feet, and they abundantly yield water of good quality. Free-flowing artesian wells occur only in the valley of the Ogeechee River.

Many streams occur throughout the county, but in most of the smaller ones, water flows only in wet weather. The larger streams flow through wide areas of bottom lands and overflow their banks during heavy rains. More than 900 farm ponds have been constructed on the smaller streams and furnish water for livestock, fishing, and irrigation.

Industries, Transportation, and Markets

Among the industries in the county are plants that manufacture wool yarn, meters, and children's dresses and plants that process meat, fruit, lumber, frozen foods, and peanuts. In addition, five lumber plants and several portable sawmills process forest products (fig. 12). Raw gum, or turpentine, and pulpwood are collected at a receiving station and shipped out of the county so that they can be converted into finished products.

***Figure 12.*—A portable sawmill processing selective timber from pines harvested on Leefield loamy sand, 0 to 2 percent slopes.**

Major highways serving the county are U.S. Highways Nos. 301, 80, and 25 and State Routes 24, 46, 67, 119, and 321. Proposed Interstate Highway No. 16 will cross the county just south of and parallel to State Route 46. A network of hard-surfaced roads connects farms with markets in the county.

Markets are available in Statesboro for corn, tobacco, cotton, peanuts, livestock, and pecans. Statesboro is one of the largest tobacco markets in the State. Corn can also be marketed at Brooklet, Portal, and Denmark, and cotton gins are located in Statesboro, Portal, Brooklet, and Denmark. The nearest market for produce is the State Farmers Market in Savannah. Markets or receiving stations for forest products are located in Statesboro and Brooklet, and near Portal.

Georgia Southern College, a State supported school, is located near Statesboro. It has an enrollment of about 3,000.

Agriculture

Bulloch County is one of the largest agricultural counties in Georgia, and much of it is well suited to farming. In 1959, about 75 percent of the county, or 328,124

acres, was in farms. Of this acreage, 151,747 acres was cropland and 158,299 acres was woodland. Of the cropland, 12,957 acres was pastured and 8,665 acres was idle. Of the woodland, 30,657 acres was pasture. Pasture that was not cropland and not woodland amounted to 11,273 acres. House lots, roads, and other land amounted to 6,805 acres.

Cotton was the main cash crop grown on farms in the county during the 1800's and early in the 1900's. From 1900 to well into the 1920's, Statesboro was the largest market in the world for Sea Island cotton, a variety that has a long staple. In the 1920's the boll weevil nearly destroyed the crop of Sea Island cotton, and little of this variety has been grown since then. After the boll weevil invaded, farmers began growing other varieties of cotton and other crops, such as tobacco and peanuts.

The farms are now mostly of the general type. Farming is diversified, and row crops, pasture, livestock, and wood products all contribute to farm income. The main cash crops are tobacco, corn, cotton, and peanuts. Table 17 shows the acreage of the principal crops in 1954 and 1959.

TABLE 17.—*Acreage of the principal crops in 1954 and 1959*

Crops	1954	1959
	Acres	*Acres*
Corn for all purposes	82, 547	82, 756
Oats harvested	2, 895	3, 992
Peanuts grown for all purposes	16, 956	15, 026
Harvested	[1] 4, 200	12, 916
Cotton harvested	17, 764	13, 438
Tobacco harvested	4, 784	3, 581
Soybeans:		
Grown alone	1, 300	5, 498
Grown with other crops	10, 259	7, 262
Harvested:		
Grown alone	[1] 377	3, 893
Grown with other crops	[1] 33	513
Sweetpotatoes	247	406
Vegetables harvested for sale	1, 314	426
Watermelons	1, 034	252
Coastal bermudagrass cut for hay	([2])	729
	Number	*Number*
Improved pecans (trees of all ages)	17, 070	17, 248
Wild and seedling pecans (trees of all ages)	3, 042	5, 083

[1] A severe drought reduced the number of acres harvested in 1954.
[2] Not reported by the census in 1954.

During the past 15 years, the yields of many crops have increased substantially. About 5 million pounds of high-quality tobacco (fig. 13), 20 million pounds of peanuts, and 3 million bushels of corn (fig. 14) are produced annually in Bulloch County.

The number of livestock on farms in the county has also increased; 15,000 head of cattle and 100,000 hogs are raised annually. Beef cattle and hogs are the principal kinds of livestock raised in the county.

***Figure 13.*—Tobacco growing on Stilson loamy sand, 0 to 2 percent slopes.**

***Figure 14.*—Corn growing on Irvington loamy sand, 0 to 2 percent slopes.**

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Glossary

Acidity, soil. See Reaction.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Aquifer (geologic). A water-bearing bed or stratum of earth, gravel, or porous stones.

Available water capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Concretions. Grains, pellets, or nodules of various sizes, shapes and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; soil does not hold together in a mass.

Friable.—When moist, soil crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, soil crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, soil readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, soil adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, soil moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, soil breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Dendritic. Branched like a tree or shrub; used to describe a river or natural drainage system.

Drainage, soil. Runoff, or surface flow, of water from an area.

Flood plain. Nearly level land, consisting of stream sediments that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented when dry, has a hard or very hard consistence, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes and that differs in one or more ways from adjacent horizons in the same profile.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Morphology, soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, mineralogical, and biological properties of the various horizons of the soil profile.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Parent material, soil. The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents, that commonly shows as red mottles, usually in platy polygonal or reticulate patterns. Plinthite changes irreversibly to hardpan or to irregular aggregates on repeated wetting and drying, or it is the hardened relict of the soft, red mottles. It is a form of the material that has been called laterite.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Sedimentary rock. A rock composed of particles deposited from suspension in water. The chief sedimentary rocks are conglomerate, from gravel; sandstone, from sand; shale, from clay; and limestone, from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sands have been consolidated into sandstone.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or R horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

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