SOIL SURVEY OF

Berrien and Lanier Counties, Georgia

United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of Georgia, College of Agriculture
Agricultural Experiment Stations

Issued May 1973

Major fieldwork for this soil survey was done in the period 1964 through 1966. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1967. This survey was made cooperatively by the Soil Conservation Service and the University of Georgia, College of Agriculture, Agricultural Experiment Stations. It is part of the technical assistance furnished to the Alapaha Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Berrien and Lanier Counties 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 suitability of tracts of land for agriculture, industry, or recreation.

Locating Soils

All the soils of Berrien and Lanier Counties are shown on the detailed soil 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 a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. 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 the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the woodland group.

Individual colored maps showing the relative suitability or degree of limitations of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay on the soil map and colored to show soils that have the same limitation 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 from the soil descriptions and from the discussions of woodland groups.

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

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

Engineers and builders can find, under "Engineering Uses of Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Community planners and others concerned with suburban development can read about soil properties that affect the choice of sites for light industrial buildings and for recreation areas in the section "Use of Soils for Town and Country Planning."

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

Newcomers in Berrien and Lanier Counties may be especially interested in the section "General Soil Map," where broad patterns of soil are described. They also may be interested in the information about the counties given in the section "Additional Facts About the Two Counties."

Cover picture: Tobacco on Leefield loamy sand, 0 to 3 percent slopes. Growing tobacco is one of the important soil uses in Berrien and Lanier Counties.

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

BERRIEN AND LANIER COUNTIES occupy approximately 412,648 acres, or 645 square miles, in the south-central part of Georgia (fig. 1). They are in the Southern Coastal Plain and the Atlantic Coast Flatwoods Major Land Resource Areas.

Nashville, the county seat of Berrien County, is in the south-central part of the county. Lakeland, the county seat of Lanier County, is located almost in the center of the county. The Willacoochee and Alapaha Rivers form the eastern boundary of Berrien County. The Alapaha River also forms a portion of the western boundary of Lanier County. New River and the Withlacoochee River form a large portion of the western boundary of Berrien County. All of these rivers flow in a southerly direction along and through Berrien and Lanier Counties.

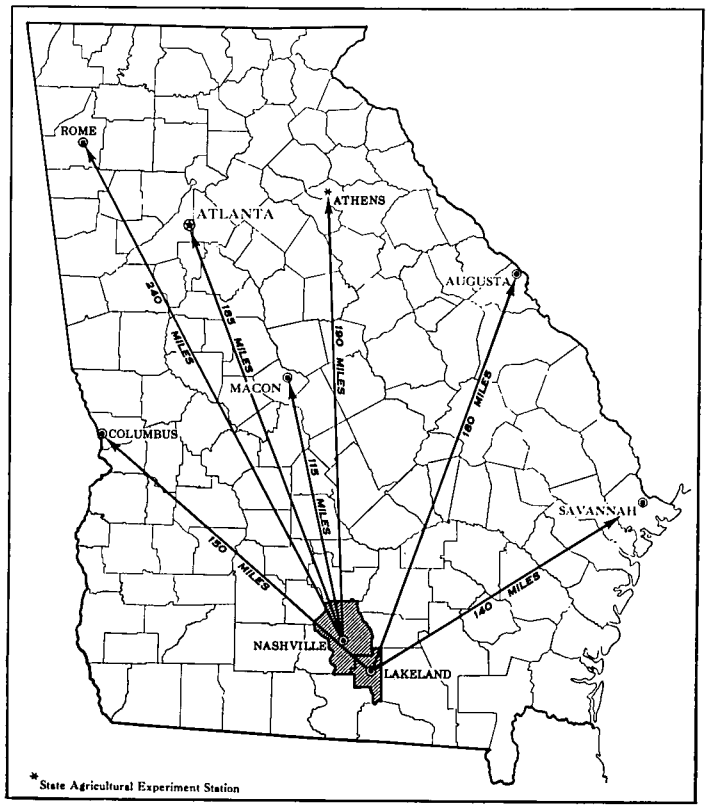

Figure 1.—Location of Berrien and Lanier Counties in Georgia.

The soils of the two counties are generally level to gently sloping and are on uplands dissected by numerous small shallow streams. These streams become more sluggish as the topography becomes more nearly level to the south and east. The topography is slightly hilly, and the soils are slightly more clayey and eroded in the northern part of Berrien County. In the Atlantic Coast Flatwoods section of these two counties are many shallow bays or cypress ponds, an acre to several thousand acres in size. These bays are covered with water several months of the year. Many of these bays have no visible outlets, and when they become full, they tend to spread out on soils adjacent to them.

About 35 percent of the two counties is open land, and the well-drained sandy and loamy soils are well suited to and are extensively used for the production of corn, peanuts, cotton, tobacco, and truck crops.

Most of the farms are of the general type, although there are many livestock and field-crop farms. A considerable acreage is in pasture, and almost one-third of the farm income of the two counties is derived from the sale of livestock and livestock products. Most of the land is privately owned, although pulp and paper companies are increasing their holdings in the two counties. Wood products, such as saw logs, pulpwood, naval stores, and poles that are produced mainly by the extensive pine forests of the two counties, are also an important source of income for the landowners.

How This Soil Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Berrien and Lanier Counties, where they are located, and how they can be used. The soil scientists went into the counties knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the 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 the action of plant roots.

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. The *soil series* and the *soil phase* (*7*)[1] are the categories of soil classification most used in a local survey.

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 Alapaha, 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 those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Tifton loamy sand, 0 to 2 percent slopes, is one of two phases within the Tifton series.

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 help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. 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 phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Berrien and Lanier Counties: soil complexes and soil associations.

For the most part, a soil complex is a unit of two or more soils that occur in an intricate pattern so that they cannot be mapped separately at a normal scale of mapping. A complex also may be composed of soils of one series and additional similar soils without naming the minor components if the included ones are small. The Istokpoga complex is an example.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map but are shown as one unit because the time and effort of delineating them separately cannot be justified. There is a considerable degree of uniformity in pattern and relative extent of the dominant soils, but the soils may differ greatly one from another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Johnston-Osier-Bibb association is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Swamp is a land type in Berrien and Lanier Counties.

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 soil 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 soil. 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 such a way as to be readily useful to different groups of users, among them farmers, managers of woodland, homeowners, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then 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.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Berrien and Lanier Counties. 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 an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

Soil associations and delineations on the general soil map in this soil survey do not fully agree with those of the general soil maps in adjacent counties published at a different date. Differences in the maps are the result of improvements in classification of soils, particularly in the modifications or refinements in soil series concepts. In ad-

[1] Italic numbers in parentheses refer to Literature Cited, p. 65.

dition, more precise and detailed maps are needed because the uses of the general soil maps have expanded in recent years. The more recent maps meet this need. Still another difference is caused by the range in slope that is permitted within associations in different surveys.

Of the 11 soil associations in Berrien and Lanier Counties, two consist of very poorly drained to moderately well drained nearly level soils of bottom lands and low stream terraces; two consist of very poorly drained and poorly drained nearly level soils on flats and intermittent ponded areas; one consists of excessively drained sandy soils of upland ridges and poorly drained soils of the depressions and drainageways; and six consist of well drained soils of upland ridges and moderately well drained, somewhat poorly drained, and poorly drained soils of broad flats and depressions.

The soil associations in Berrien and Lanier Counties are described in the following pages. More detailed information about the soils is given in the section "Descriptions of the Soils."

Very Poorly Drained to Moderately Well Drained, Nearly Level Soils of Bottom Lands and Low Stream Terraces

Two soil associations are in this group. One consists of soils on bottom lands, and the other of soils on terraces along major streams. Slopes range from 0 to 2 percent. The soils on bottom lands are dominantly gray, poorly drained, and sandy or loamy in the underlying layers. The soils on terraces are moderately well drained to poorly drained and have sandy and clayey underlying layers. The colors of the underlying layers chiefly range from yellowish brown to gray. These soils are subject to flooding.

1. Johnston-Osier-Bibb association

Very poorly drained and poorly drained, nearly level soils on flood plains

This association consists of nearly level soils on the flood plains of the Alapaha, Willacoochee, Withlacoochee, and New Rivers, and their tributaries. These soils formed in recent alluvium. Each year they are subject to frequent flooding, which leaves a thin deposit of fresh soil material each time.

This association occupies 12 percent of Berrien and Lanier Counties. Johnston soils make up about 44 percent of the association, Osier soils about 25 percent, and Bibb soils about 14 percent. Minor soils make up the remaining 17 percent.

The Johnston soils are on the lower positions in the association. They are nearly level and very poorly drained. In a typical profile, the surface layer is black loam about 20 inches thick. The underlying layer, about 16 inches thick, is dark-gray sandy loam that has pockets of gray sand. The next layer is gray loamy sand and sand to a depth of 65 inches.

The Osier soils are poorly drained to very poorly drained, and they are nearly level. In a typical profile, the surface layer is black and dark-gray fine sandy loam about 12 inches thick. Below the surface layer is light brownish-gray fine sand to a depth of about 26 inches. The lower layer, to a depth of 52 inches, is light-gray loamy coarse sand that has gray mottles. Stratified sand is in the lower layer in some places.

The Bibb soils are poorly drained and nearly level. In a typical profile, the surface layer is very dark gray fine sandy loam about 6 inches thick. Below the surface layer, to a depth of 30 inches, is dark grayish-brown fine sandy loam that has mottles of yellow and light yellowish brown. The next layer, about 12 inches thick, is light brownish-gray loamy fine sand that has gray mottles. The lower layer is gray sand to a depth of about 50 inches.

Minor soils in this association are the Angie, Barth, Chipley, and Rains soils. These soils are slightly higher in elevation than the major soils, but they are subject to flooding a few times each year.

A large acreage is privately owned woodland that consists dominantly of hardwoods, but includes some pines. The major soils of this association are not suited to cultivation, because of wetness and flooding. The Angie, Barth, and Chipley soils, however, are fairly well suited to cultivation if drained and protected from flooding, but only a few areas are used for this purpose. A small acreage is in pasture. This association is suited to woodland.

Limitations are severe for most nonfarm uses, such as for residential sites, sites for light industry and trafficways, and for such recreational uses as campsites and intensive play areas.

2. Angie-Chipley-Rains association

Moderately well drained and poorly drained, nearly level soils on low stream terraces

This association is on broad, level terraces, generally along the Alapaha River. It is mainly between the alluvial soils along the main river channel and the adjacent uplands. Numerous small drainageways dissect the association. Slopes range from 0 to 2 percent. During winter and spring the adjacent rivers and streams overflow most of the areas within the association.

This association occupies about 5 percent of the two counties. Angie soils make up about 50 percent of the association, Chipley soils about 10 percent, and Rains soils about 10 percent. Minor soils make up the remaining 30 percent.

The Angie soils are moderately well drained and are on the better drained part of the landscape. In a typical profile, the surface layer is grayish-brown fine sandy loam about 5 inches thick. The subsoil, to a depth of 66 inches, is mainly sandy clay. It is yellowish brown mottled with gray, red, and strong brown in the middle; and gray mottled with strong brown and red in the lower part.

The Chipley soils are moderately well drained and nearly level. In a typical profile, the surface layer is dark grayish-brown fine sand about 5 inches thick. Beneath this, to a depth of 78 inches or more, is sand mottled with light brownish gray, yellowish brown, light gray, and yellow.

Rains soils are poorly drained and are the wetter part of the association. In a typical profile, the surface layer is very dark gray fine sandy loam about 4 inches thick. The layer below is light brownish-gray and gray fine sandy loam, about 10 inches thick, mottled with light gray and yellowish brown and yellow. The subsoil, to a

depth of 60 inches or more, is gray sandy clay loam mottled with light yellowish brown, light gray, pale yellow, and yellowish brown.

Minor soils in this association are Johnston, Osier, Bibb, and Barth soils. The Johnston, Osier, and Bibb soils are wet. They occupy areas lower in elevation than the Angie and Chipley soils and slightly lower than the Rains soils.

A small acreage of this association is in cultivation or in pasture, but it is well suited to these uses only if it is protected from flooding. Nearly all the acreage is privately owned. Most of it is in woodland that consists dominantly of pines but partly of hardwoods.

Limitations are severe for nonfarm uses, such as residential sites and sites for industry and trafficways.

Very Poorly Drained and Poorly Drained, Nearly Level Soils on Flats and in Intermittently Ponded Areas

Two soil associations are in this group. One association consists of Swamp and of very poorly drained soils that are high in organic-matter content, and the other consists mainly of poorly drained and very poorly drained mineral soils. Slopes range from 0 to about 2 percent. The organic soils are mainly black to dark-brown mucky peat and peat. The mineral soils are chiefly in shades of gray and are mottled below the surface layer. They are sandy to loamy in the surface layer and the underlying layers.

3. Swamp-Istokpoga association

Swampy areas and very poorly drained, nearly level organic soils

This association consists of large areas of ponded soils (fig. 2) in the Banks Lake-Grand Bay area of Lanier County. The area is under water most of the time and has trees or aquatic plants for cover.

This association occupies about 2 percent of the two counties. Swamp makes up about 70 percent of this association, and Istokpoga soils about 20 percent. Minor soils make up the remaining 10 percent.

Swamp consists of mixed alluvial materials, which are variable from place to place. In some places, the material at the surface is very dark gray to black sandy loam to coarse sand, but in other places it is peaty muck. Partly decomposed leaves, twigs, and logs are common in the uppermost layer. The layers below the surface are variable in color and texture and are commonly stratified and interbedded.

Figure 2.—Natural vegetation on Banks Lake. This lake, which is within the Swamp-Istokpoga association, is one of the largest "cypress ponds" in the State.

Istokpoga soils are very poorly drained and high in organic-matter content. In a typical profile, the surface layer is black mucky peat about 8 inches thick. Below the surface layer, to a depth of about 72 inches, is dark-brown peat.

Minor soils in this association are the very poorly drained Rutlege and the poorly drained Alapaha and Mascotte soils. They occur on the outer fringes of the association, mainly on a few small islands, and at slightly higher elevations than Swamp and the Istokpoga soils.

None of the soils of this association is in cultivation or pasture, and none is suited to cultivation unless extensively drained. Drainage is needed for pine trees.

Because of internal wetness and flooding, this association has severe limitations for most nonfarm uses, such as trafficways, sites for industry, and campsites.

4. Mascotte-Rutlege-Pelham association

Poorly drained and very poorly drained, nearly level soils of smooth plains and depressions

This association consists of broad, wet areas. Numerous intermittent ponds ranging from a few acres to many acres in size are distributed throughout the association. Sluggish intermittent streams that have poorly defined channels form the drainage system.

This association occupies about 2 percent of the two counties. Mascotte soils make up about 40 percent of the association, Rutlege soils about 35 percent, and Pelham soils about 15 percent. Minor soils make up the remaining 10 percent.

The Mascotte soils are poorly drained. Slopes are mostly less than 1 percent. In a typical profile, the surface layer is very dark gray sand about 3 inches thick. Under this layer is gray sand about 6 inches thick. The next layer is very dark gray sand about 6 inches thick that in most places is firm or cemented with organic matter. Below this is light yellowish-brown, mottled sand to a depth of about 30 inches. The underlying layer, to a depth of 66 inches, is sandy clay loam and sandy loam. The upper part is light brownish gray mottled with shades of yellow, the middle is gray mottled with shades of brown and red, and the lower part is dark gray mottled with shades of brown and red.

The Rutlege soils are very poorly drained and are in depressions and on low flats. Slopes range from 0 to 2 percent, but in most areas they are 1 percent or less. In a typical profile, the surface layer is very dark grayish-brown and black loamy sand about 20 inches thick. A thin layer of leaf mold generally is on the surface. Beneath the surface layer, to a depth of about 26 inches, is very dark grayish-brown and gray loamy sand. The next layer is mainly gray sand to a depth of 70 inches.

The Pelham soils are poorly drained and nearly level. They occur as slightly depressed areas. In a typical profile, the surface layer is black and dark-gray loamy sand about 9 inches thick. Beneath the surface layer is light-

gray sand to a depth of 24 inches. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy clay loam mottled with strong brown. Below this, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

Minor soils in this association are the poorly drained Olustee soils, the somewhat poorly drained Leefield soils, and the poorly drained Alapaha soils. The Leefield and Olustee soils occupy the highest areas in this association. The Alapaha soils are generally on the rim of the Pelham and Rutlege depressions.

None of the acreage in this association is in cultivation or pasture. Most of the acreage is in woodland. This association is only fairly well suited to cultivation after drainage has been established, and in most years some drainage is needed for pasture. Bahiagrass and white clover are suitable pasture plants. If pines are planted, drainage is needed to improve survival rates of planted seedlings and to improve growth.

In its natural state, this association has severe limitations as residential and industrial sites and for most year-round recreational uses, such as campsites and play areas.

Excessively Drained Sandy Soils of Upland Ridges, and Poorly Drained Soils of Depressions and Drainageways

Only one soil association is in this group. It consists of nearly level to gently sloping soils. Slopes range from 0 to about 8 percent. The droughty, sandy soils of the ridges are mainly yellowish brown and very pale brown below the surface layer. The wet soils of the flats, depressions, and drainageways are mainly gray and light gray below the surface layer. They have a sandy surface layer and chiefly a loamy subsoil.

5. Lakeland-Pelham-Alapaha association

Excessively drained, nearly level to gently sloping sandy soils on broad upland ridges, and poorly drained soils in depressions and along drainageways

This association consists mainly of nearly level to gently sloping soils on broad ridges. Slopes range from 0 to 8 percent. There are numerous flats and depressions, and a number of streams originate within the association. This association is adjacent to and east of the flood plain of the Alapaha River in Berrien and Lainer Counties and along Big Creek in Lanier County.

This association occupies about 10 percent of the two counties. Lakeland soils make up about 45 percent of this association, the Pelham soils about 20 percent, and Alapaha soils about 20 percent. Minor soils make up the remaining 15 percent.

The Lakeland soils are excessively drained and are on ridgetops and side slopes. Slopes range from 2 to 8 percent. In a typical profile, the surface layer is very dark gray sand about 7 inches thick. Beneath the surface layer is yellowish-brown sand to a depth of 42 inches. The layer below, to a depth of 78 inches, is very pale brown sand mottled with yellowish brown.

The Pelham soils are poorly drained and nearly level. They are in slightly depressed areas and along drainageways. In a typical profile, the surface layer is black and dark-gray loamy sand about 9 inches thick. Beneath the surface layer is light-gray sand to a depth of 24 inches. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy clay loam mottled with strong brown. Below this layer, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

The Alapaha soils are poorly drained and nearly level to very gently sloping. They are in drainageways and low flat areas. In a typical profile, the surface layer is loamy sand to a depth of about 24 inches. This layer is mainly very dark gray in the upper part and dark gray in the lower part. The subsoil, to a depth of 72 inches, is sandy loam and sandy clay loam. It is gray mottled with shades of brown in the upper part and gray and light gray mottled with shades of brown and red in the middle and lower parts. Plinthite makes up about 10 to 20 percent of the layer between depths of 32 and 68 inches.

Minor soils in this association are the Barth, Fuquay, and Olustee soils. The Barth and Olustee soils generally are on flats between the Alapaha and Lakeland soils. The well-drained Fuquay soils generally are on the higher ridges of this association.

This association is generally poorly suited to cultivation and pasture. Droughtiness and wetness are hazards of the major soils. Most of the acreage that was formerly in cultivation has been planted in slash pine or has been reforested naturally. In the drier areas of this association, the vegetation consists of a fairly thick growth of scrub oaks, a few scattered pines, and a sparse understory of wiregrass and shrubs. In the wetter areas, the vegetation consists of water-tolerant hardwoods, such as cypress and water tupelo, and a dense stand of aquatic plants. Most of the acreage is privately owned woodland.

About half of this association has only slight limitations for use as sites for residences that have a public-sewage system, light industry, and similar purposes. Because of the seasonal high water table and flooding, areas of the Pelham and Alapaha soils have severe limitations for such uses.

Well Drained Soils of Upland Ridges and Moderately Well Drained, Somewhat Poorly Drained, and Poorly Drained Soils of Broad Flats and Depressions

Six soil associations are in this group. They consist of nearly level to gently sloping soils. Slopes range from 0 to about 8 percent. These soils have a sandy and loamy surface layer and a loamy subsoil. The well-drained and moderately well drained soils generally have a yellowish-brown, strong-brown, or yellowish-red, mottled subsoil, and the wet soils are mainly gray and light gray and mottled.

6. Tifton-Fuquay-Pelham association

Well-drained, nearly level and very gently sloping soils on broad interstream divides, and poorly drained soils of intermittently ponded flats and drainageways

This association is mainly on broad, level to very gently sloping divides, but a small part is on flats and

along drainageways. The divides are dissected by small shallow streams that originate within the boundaries of the association. Slopes range mainly from 0 to 5 percent.

This association occupies about 20 percent of the two counties. Tifton soils make up about 44 percent of the association, Fuquay soils about 20 percent, and Pelham soils about 15 percent. Minor soils make up the remaining 21 percent.

The Tifton soils are well drained and are on the smooth, higher parts of the landscape. Slopes range from 0 to about 5 percent. In a typical profile, the surface layer is very dark grayish-brown loamy sand about 6 inches thick. Below this layer is 5 inches of yellowish-brown loamy sand. The subsoil, to a depth of 66 inches, is sandy loam and sandy clay loam. It is yellowish brown in the upper part and yellowish brown and strong brown mottled with brownish yellow, red, yellowish brown, and light gray in the lower part. At depths between 30 and 66 inches, plinthite makes up about 10 to 30 percent of the soil material.

Fuquay soils are well drained. They occur as fairly large areas, mainly in smooth parts of the association. In a typical profile, the surface layer is very dark grayish-brown loamy sand about 7 inches thick. Below this, to a depth of 22 inches, is yellowish-brown loamy sand. The subsoil, to a depth of 70 inches, is sandy clay loam. It is yellowish brown in the upper part, yellowish brown mottled with red in the middle, and yellowish brown mottled with shades of gray, yellow, and brown in the lower part. Plinthite occurs at a depth of about 38 inches and slows the downward movement of water.

The Pelham soils are poorly drained and are in low areas along drainageways. In a typical profile, the surface layer is black and dark-gray loamy sand about 9 inches thick. Beneath the surface layer is light-gray sand to a depth of 24 inches. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy clay loam mottled with strong brown. Below this, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

Minor soils in this association are the Irvington, Stilson, Grady, Robertsdale, and Dothan soils. The Irvington, Robertsdale, and Stilson soils occupy areas slightly lower in elevation than the Tifton and Fuquay soils. The Grady soils are in ponded areas, and the Dothan soils are in the higher areas.

A significant acreage is in cultivation. This association is well suited to row crops and pasture plants, and it responds well to good management. Corn, cotton, peanuts, and tobacco are the chief crops. A considerable acreage is in pasture and is suited to bahiagrass and bermudagrass.

An average farm in this association is about 175 to 225 acres in size; all are of the general type. Nearly all are privately owned and are operated by the owner.

The major part of this association is well suited to most nonfarm uses, such as residential sites, light industry, and recreation, but because of wetness, the Pelham soils in low areas along drainageways are severely limited.

7. *Leefield-Pelham-Alapaha association*

Somewhat poorly drained and poorly drained, nearly level soils on broad flats

This association consists of nearly level soils in broad flat areas. Numerous intermittent ponds ranging from an acre to several acres in size are distributed over the landscape. Sluggish stream branches that have poorly defined channels make up the drainage system.

This association occupies about 27 percent of the two counties. Leefield soils make up about 35 percent of this association, Pelham soils about 30 percent, and Alapaha soils about 30 percent. Minor soils make up the remaining 5 percent.

The Leefield soils are somewhat poorly drained and are on the higher parts of the landscape. Slopes range from 0 to 3 percent. In a typical profile, the surface layer is very dark gray loamy sand about 4 inches thick. Below this, to a depth of about 24 inches, is chiefly light yellowish-brown loamy sand mottled with brownish yellow and gray. The subsoil, to a depth of 72 inches, is sandy clay loam. It is light yellowish brown mottled with light gray and yellowish brown in the upper part and mainly mottled with yellowish brown, red, light gray, and light yellowish brown in the lower part.

The Pelham soils are poorly drained and nearly level. They are in slightly depressed areas. In a typical profile, the surface layer is black and dark-gray loamy sand about 9 inches thick. Beneath the surface layer is light-gray sand to a depth of 24 inches. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy clay loam mottled with strong brown. Below this, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

The Alapaha soils are nearly level and poorly drained. They occur as narrow bands along drainageways and in low, flat or depressed areas. In a typical profile, the surface layer is loamy sand to a depth of about 24 inches. It is mainly very dark gray in the upper part and dark gray in the lower part. The subsoil, to a depth of 42 inches, is gray sandy loam mottled with pale brown, light brown, and red. Below this, to a depth of 72 inches, is mainly light-gray sandy clay loam mottled with shades of brown and red.

Minor soils in this association are the moderately well drained Irvington soils in the higher parts, the poorly drained Olustee and Mascotte soils on wet flats, and the very poorly drained Portsmouth soils in depressions.

A small to moderate acreage of this association is in cultivation and pasture. About one-third of the association, mainly the Leefield, Irvington, and Olustee soils, is suited to cultivation. If adequate drainage and good management are used, corn, tobacco, and peanuts are suitable row crops. These crops are commonly grown in some of the drier areas. Bahiagrass and bermudagrass are suitable pasture plants. The wet soils are used mostly for woodland, but some areas of Alapaha soils are in pasture.

The average farm in this association is about 175 to 225 acres in size, but several are much larger. General

farming predominates, and most of the farms are operated by the owner.

This association has moderate to severe limitations for most nonfarm uses because of the internal wetness and the flooding.

8. *Fuquay-Cowarts-Pelham association*

Chiefly well-drained, gently sloping soils on narrow upland ridges and knolls, and poorly drained, nearly level soils along drainageways

This association consists mainly of gently sloping soils on narrow ridges and knolls. Many areas are rough and choppy and contain eroded spots. Drainageways are small and originate within the association. Slopes range mainly from 0 to 8 percent.

This association occupies about 2 percent of the two counties. The Fuquay soils make up about 40 percent of this association, Cowarts soils about 25 percent, and Pelham soils about 15 percent. Minor soils make up the remaining 20 percent.

The Fuquay soils are well drained and are on the upland ridges. In a typical profile, the upper 22 inches of the soil is loamy sand. It is very dark grayish brown in the upper 7 inches and yellowish brown in the lower part. The subsoil, to a depth of 70 inches, is sandy clay loam. It is yellowish brown in the upper part, yellowish brown mottled with red in the middle, and yellowish brown mottled with shades of gray, yellow, and brown in the lower part. Plinthite occurs at a depth between about 38 and 70 inches; it impedes the movement of water in this layer.

Cowarts soils are also well drained, and they are on the ridgetops and slopes. Slopes range from 2 to about 8 percent. In a typical profile, the surface layer is brown sandy loam about 6 inches thick. The subsoil, to a depth of 65 inches, is sandy clay loam. It is light yellowish brown in the upper part; yellowish brown mottled with shades of red, brown, and gray in the middle; and dark red mottled with shades of gray and brown in the lower part. A few pebbles of iron and quartz are on the surface in most areas. Plinthite occurs at a depth between about 17 inches and 65 inches, and it impedes the movement of water in this layer.

Pelham soils are poorly drained and are mainly along drainageways. In a typical profile, the surface layer is loamy sand or sand to a depth of about 24 inches. It is black and dark gray in the upper 9 inches and light gray in the lower part. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy clay loam mottled with strong brown. Below this, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

Minor soils in this association are the well-drained Dothan, Tifton, and Carnegie soils on ridgetops and slopes.

This association is not well suited to cultivation, because of the slope and the erosion hazard. The smoother and more gently sloping areas, mainly Fuquay and Cowarts soils, are commonly in cultivation, but the acreage in cultivation is small. Corn, cotton, peanuts, and tobacco are the chief crops. A moderate acreage is in pasture. Bahiagrass and bermudagrass are suitable pasture plants. Many fields in this association that were formerly cultivated are now in slash pine.

Most of the land is privately owned and is used for general farming. The average farm is 175 to 225 acres in size. This association is important for wood products, and most of the acreage is used to produce pulpwood, lumber, and naval stores.

This association has mainly slight to moderate limitations for use as residential sites, play areas, trafficways, and similar nonfarm purposes.

9. *Fuquay-Leefield-Pelham association*

Well-drained to poorly drained, nearly level and very gently sloping soils on broad interstream divides and along drainageways

This association is on broad divides that are dissected by small, shallow streams that originate within the boundaries of the association. Slopes range from 0 to about 4 percent.

This association occupies about 3 percent of the two counties. Fuquay soils make up about 45 percent of the association, Leefield soils about 30 percent, and Pelham soils about 15 percent. Minor soils make up the remaining 10 percent.

The Fuquay soils are well drained and are on the higher parts of the landscape. In a typical profile, the surface layer is loamy sand to a depth of about 22 inches. It is very dark grayish brown in the upper 7 inches and yellowish brown in the lower part. The subsoil, to a depth of 70 inches, is mainly sandy clay loam. It is yellowish brown in the upper part, yellowish brown mottled with red in the middle, and yellowish brown mottled with shades of gray, yellow, and brown in the lower part. Plinthite is at a depth of about 38 inches, and it impedes the movement of water.

Leefield soils are somewhat poorly drained and occupy positions between the Fuquay and Pelham soils. In a typical profile, the surface layer is very dark gray loamy sand about 4 inches thick. Below this, to a depth of 24 inches, is chiefly light yellowish-brown loamy sand mottled with brownish yellow and gray. The subsoil, to a depth of 72 inches, is sandy clay loam. It is light yellowish brown mottled with light gray and yellowish brown in the upper part and mainly mottled with yellowish brown, red, light gray, and light yellowish brown in the lower part.

The Pelham soils are poorly drained and nearly level. They are in slightly depressed areas along drainageways. In a typical profile, the surface layer is black and dark-gray loamy sand about 9 inches thick. Beneath the surface layer is light-gray sand to a depth of 24 inches. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy clay loam mottled with strong brown. Below this, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

Minor soils in this association are the moderately well drained Stilson and Irvington soils and the poorly drained Alapaha soils.

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A fairly large acreage of this association is in cultivation and pasture, especially the better drained soils. Corn, cotton, peanuts, and tobacco are chief crops grown. A considerable acreage is in pasture. Bahiagrass and bermudagrass are suitable pasture plants.

The average farm in this association is about 175 to 225 acres in size, and all are of the general type. Nearly all the farms are privately owned and operated by the owner.

Most of this association has slight to moderate limitations for residential sites and recreational facilities, but areas of Pelham soils are severely limited because of wetness. The major soils should be studied for the anticipated use.

10. Tifton-Carnegie-Pelham association

Chiefly well-drained to poorly drained, nearly level to gently sloping soils on upland ridges

This association consists of moderately wide ridges dissected by small shallow streams. Some broken relief is included. It has somewhat stronger slopes than the Tifton-Fuquay-Pelham association. The slopes range from about 1 to 8 percent.

This association occupies about 1 percent of Berrien and Lanier Counties. Tifton soils make up about 50 percent of the association, Carnegie soils about 30 percent, and Pelham soils about 15 percent. Minor soils make up the remaining 5 percent.

The Tifton soils are well drained and are on smooth parts of the landscape. Slopes range from 0 to 5 percent. In a typical profile, the surface layer is very dark grayish brown loamy sand about 6 inches thick. Below this is 5 inches of yellowish-brown loamy sand. The subsoil, to a depth of 66 inches, is sandy loam and sandy clay loam. It is yellowish brown in the upper part and yellowish brown and strong brown mottled with brownish yellow, red, yellowish brown, and light gray in the lower part. At depths between 30 and 66 inches, plinthite makes up about 10 to 30 percent of the soil material. Small, rounded iron pebbles, ⅛ to ½ inch in diameter, on the surface and throughout most of the solum are characteristic of the Tifton soils.

The Carnegie soils are well drained and are on the steeper parts of the landscape. Slopes range from 2 to 8 percent. In a typical profile, the surface layer is dark-brown sandy loam about 6 inches thick. The subsoil, to a depth of about 66 inches, is sandy clay loam. It is strong brown and yellowish red in the upper part and strong brown and yellowish red mottled with shades of red, brown, and yellow in the middle and lower parts. Plinthite occurs at a depth of about 18 inches. Small, hard iron pebbles on the surface and in the upper part of the surface layer and subsoil are characteristic of these soils.

The Pelham soils are poorly drained and nearly level. They are in slightly depressed areas. Slopes are 0 to 2 percent. In a typical profile, the surface layer is black and dark-gray loamy sand about 9 inches thick. Beneath the surface layer is light-gray sand that extends to a depth of 24 inches. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy clay loam mottled with strong brown. Below this, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

Minor soils in this association are the Fuquay and Cowarts soils. These soils occupy upland areas along with the Tifton and Carnegie soils.

This association is suited to cultivated crops that respond fairly well to good management. Corn, cotton, and peanuts are the row crops that are most commonly grown. A small acreage is in pasture. Bahiagrass and bermudagrass are suitable pasture plants. A large acreage is in woodland.

The average farm in this association is about 150 to 200 acres in size, and it is of the general type. Nearly all are privately owned and operated by the owner.

Most of this association has slight to moderate limitations for residential sites, sites for industry, and campsites. Areas occupied by Pelham soils are severely limited because of the seasonal high water table and, in some places, ponding.

11. Irvington-Leefield-Pelham association

Moderately well drained to poorly drained, nearly level soils on broad flats, in low areas, and along drainageways

This association consists of broad flat areas. Slopes are mostly less than 2 percent. Numerous intermittent ponds are widely distributed over the association, and the heads of a few branch streams occur within the outer part.

This association occupies about 16 percent of the two counties. Irvington soils make up about 35 percent of this association, Leefield soils about 25 percent, and Pelham soils about 10 percent. Minor soils make up the remaining 30 percent.

The Irvington soils are moderately well drained. They have a weakly expressed fragipan. These soils are generally on the highest parts of the landscape. In a typical profile, the surface layer is dark-gray loamy sand 5 inches thick. It is underlain by 3 inches of yellowish-brown loamy sand. The subsoil, to a depth of 66 inches, is mainly sandy clay loam. It is light olive brown in the upper part, light yellowish brown mottled with yellowish brown and strong brown in the middle, and light yellowish brown and light gray mottled with shades of brown, gray, and red in the lower part. A brittle, weakly cemented fragipan layer is at a depth between 24 and 66 inches. This layer slows the downward movement of water.

Leefield soils are somewhat poorly drained. They occur in areas somewhat intermediate between Irvington and Pelham soils. In a typical profile, the surface layer is very dark gray loamy sand about 4 inches thick. Below this, to a depth of about 24 inches, is chiefly light yellowish-brown loamy sand mottled with brownish yellow and gray. The subsoil, to a depth of 72 inches, is sandy clay loam. It is light yellowish brown mottled with light gray and yellowish brown in the upper part and mottled mainly with yellowish brown, red light gray, and light yellowish brown in the lower part.

The Pelham soils are poorly drained. They are in slightly depressed areas and along drainageways. In a typical profile, the surface layer is black and dark-gray loamy sand about 9 inches thick. Beneath the surface layer is light-gray sand to a depth of 24 inches. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy

clay loam mottled with strong brown. Below this, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

Minor soils in this association are the moderately well drained Stilson soils, the well drained Tifton and Fuquay soils, and the poorly drained Alapaha soils.

A moderate acreage of this association is in cultivation and pasture. The better drained parts of the association, mainly the Irvington and Leefield soils, are suitable for cultivation and pasture and with good management respond well. Commonly grown row crops suited to this soil are corn, tobacco, peanuts, and cotton. Bahiagrass, bermudagrass, and millet are suitable pasture plants. Because of wetness, the Pelham soils are mostly in woodland, but some areas are pastured with fairly good results. This association is suited to woodland.

The average farm in this association is about 175 to 225 acres in size, but several are much larger. General farming dominates, and most farms are operated by the owner.

This association has moderate to severe limitations for residential sites where septic tanks are to be used, because of the seasonal high water table. Most of the association has moderate limitations for trafficways, but Pelham soils are severely limited because of wetness.

Descriptions of the Soils

This section describes the soil series and mapping units in Berrien and Lanier Counties. The approximate acreage and proportionate extent of each mapping unit are given in table 1. Their location is shown on the soil map at the back of this survey.

The procedure in this section 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. The description of the soil series mentions features that apply to all the soils in a series. Differences among the soils of one series are pointed out in the description of the individual soils or are indicated in the soil name. The description of each mapping unit contains suggestions on how the soil can be managed.

A representative profile of each series is described in two ways. Many will prefer to read the short description in narrative form. It is the second paragraph in the series description. The technical description of the profile is mainly for soil scientists, engineers, and others

TABLE 1.—*Approximate acreage and proportionate extent of soils*

Soil	Berrien County		Lanier County		Total
	Acres	Percent	Acres	Percent	
Alapaha loamy sand	41, 745	14. 0	10, 571	9. 2	52, 316
Angie fine sandy loam, frequently flooded	4, 765	1. 6	7, 183	6. 3	11, 948
Ardilla loamy sand, 0 to 3 percent slopes	881	. 3	330	. 3	1, 211
Barth sand	1, 926	. 6	2, 644	2. 3	4, 570
Barth fine sand, frequently flooded	682	. 2	143	. 1	825
Carnegie sandy loam, 2 to 5 percent slopes	1, 195	. 4	80	. 1	1, 275
Carnegie sandy loam, 5 to 8 percent slopes, eroded	3, 102	1. 0	103	. 1	3, 205
Chipley fine sand, frequently flooded	1, 275	. 4	1, 261	1. 1	2, 536
Cowarts loamy sand, 2 to 5 percent slopes	772	. 3	146	. 1	918
Cowarts sandy loam, 5 to 8 percent slopes, eroded	1, 780	. 6	200	. 2	1, 980
Dothan loamy sand, 0 to 4 percent slopes	1, 671	. 6	258	. 2	1, 929
Fuquay loamy sand, 0 to 4 percent slopes	24, 742	8. 3	5, 227	4. 6	29, 969
Fuquay loamy coarse sand, 3 to 8 percent slopes	1, 610	. 5	45	(1)	1, 655
Grady soils	1, 366	. 5	464	. 4	1, 830
Irvington loamy sand, 0 to 3 percent slopes	19, 393	6. 5	3, 742	3. 3	23, 135
Istokpoga complex	0	0	1, 650	1. 5	1, 650
Johnston-Osier-Bibb association	28, 227	9. 5	7, 048	6. 2	35, 275
Lakeland sand, 2 to 8 percent slopes	10, 049	3. 4	8, 605	7. 5	18, 654
Leefield loamy sand, 0 to 3 percent slopes	42, 711	14. 3	16, 551	14. 5	59, 262
Mascotte sand	1, 127	. 4	4, 030	3. 5	5, 157
Olustee sand	4, 061	1. 4	6, 032	5. 3	10, 093
Osier-Johnston-Bibb association	8, 122	2. 7	763	. 7	8, 885
Pelham loamy sand	9, 354	3. 1	7, 417	6. 5	16, 771
Pelham loamy sand, low terrace	39, 347	13. 2	8, 729	7. 6	48, 076
Portsmouth loam	208	. 1	1, 086	. 9	1, 294
Rains fine sandy loam	1, 319	. 5	795	. 7	2, 114
Robertsdale loamy sand, 0 to 2 percent slopes	1, 609	. 5	364	. 3	1, 973
Rutlege loamy sand	3, 593	1. 2	2, 545	2. 2	6, 138
Stilson loamy sand, 0 to 4 percent slopes	9, 031	3. 0	3, 303	2. 9	12, 334
Sunsweet sandy loam, 5 to 12 percent slopes, eroded	442	. 1	0	0	442
Swamp	0	0	7, 004	6. 1	7, 004
Tifton loamy sand, 0 to 2 percent slopes	7, 661	2. 6	2, 995	2. 6	10, 656
Tifton loamy sand, 2 to 5 percent slopes	24, 474	8. 2	3, 094	2. 7	27, 568
Total	298, 240	100. 0	114, 408	100. 0	412, 648

[1] Less than 0.1 percent.

who need to make thorough and precise studies of soils. Unless otherwise stated, the profile described is that of a moist soil.

As mentioned in the section "How This Soil Survey was Made," not all mapping units are members of a soil series. Swamp, for example, is a land type that does not belong to a soil series. It is listed, nevertheless, in alphabetical order along with the soil series.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the soil map. Listed at the end of each description of a mapping unit is the capability unit and woodland suitability group in which the mapping unit has been placed. The "Guide to Mapping Units" at the back of this survey lists the pages where each of these groups is described.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with soil maps in adjacent counties published at a different date. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, and the extent of soils within the survey. In some places it is more feasible to combine small acreage of similar soils that respond to use and management in much the same way than it is to separate these soils and give them names.

Many terms used in the soil descriptions and other sections are defined in the Glossary at the back of this publication.

Alapaha Series

The Alapaha series consists of poorly drained, nearly level to very gently sloping soils in drainageways and low flat areas.

In a representative profile, the surface layer is loamy sand about 24 inches thick. It is very dark gray in the upper part and dark gray in the lower part. The subsoil, to a depth of 72 inches, is sandy loam and sandy clay loam. It is gray mottled with shades of brown in the upper part and is gray and light gray mottled with shades of brown and red in the middle and lower parts. Plinthite makes up about 10 to 20 percent of the layers at depths between 32 and 68 inches.

These soils are low in natural fertility and organic-matter content and are very strongly acid throughout. Permeability is rapid to moderate in the upper 2 to 3½ feet of sandy material but moderately slow in the parts of the subsoil that contain plinthite. The available water capacity is mainly medium.

The natural vegetation consisted of mixed hardwoods and pine and an understory of gallberry and waxmyrtle.

These soils are not used for cultivation. If drained they are fairly well suited to pasture. Drainage, fertilizer, and adequate lime are needed for good plant growth.

Representative profile of Alapaha loamy sand, 0.5 mile east of paved county road (Lakeland-Nashville), 0.75 mile southwest of Big Creek, Lanier County:

A1—0 to 6 inches, very dark gray (10YR 3/1) loamy sand; weak, fine, granular structure; very friable; many roots; very strongly acid; clear, wavy boundary.

A2g—6 to 24 inches, dark-gray (10YR 4/1) loamy sand; weak, fine, granular structure; very friable; common roots; very strongly acid; clear, wavy boundary.

B1tg—24 to 32 inches, gray (10YR 6/1) sandy loam; few, fine, distinct mottles of pale brown; weak, fine, granular structure; very friable; few roots; very strongly acid; clear, wavy boundary.

B21tg—32 to 42 inches, gray (10YR 6/1) sandy loam; common, medium, distinct mottles of light brown (7.5YR 6/4) and red (2.5YR 5/8); weak, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; 10 percent nonindurated plinthite; very strongly acid; clear, wavy boundary.

B22tg—42 to 60 inches, gray (10YR 6/1) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8) and red (2.5YR 4/8); moderate, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; 15 to 20 percent nonindurated plinthite; very strongly acid; clear, wavy boundary.

B23tg—60 to 68 inches, light-gray (10YR 7/1) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/6) and red (10YR 4/6); moderate, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; 15 to 20 percent nonindurated plinthite; very strongly acid; clear, wavy boundary.

B24tg—68 to 72 inches, light-gray (10YR 7/1) sandy loam; lumps of sandy clay loam; few, fine, faint mottles of light yellowish brown (2.5Y 6/4); weak, medium, subangular blocky structure; friable, very strongly acid.

The A1 or Ap horizon ranges from very dark gray to black. The A2 horizon is predominantly loamy sand but ranges to sand. The combined thickness of the sandy A1 and A2 horizons ranges from 20 to 24 inches. The B22tg and B23tg horizons range from sandy loam to sandy clay loam. The plinthite content of the B2t horizon ranges from about 10 to 25 percent.

The Alapaha soils occur with the Leefield, Mascotte, and Stilson soils. They occupy lower positions and are less well drained than Leefield and Stilson soils. They have about the same drainage as the Mascotte soils, but they lack the organic Bh layer of those soils.

Alapaha loamy sand (Al).—This is a poorly drained soil in low, flat areas and the upper parts of drainageways. Slopes range from 0 to 3 percent. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Leefield and Mascotte soils.

During wet seasons some areas are flooded more than once each year for periods of less than 2 days. The seasonal high water table is at a depth of less than 15 inches for periods of more than 6 months each year.

This soil is not suited to cultivated crops, because of wetness and the hazard of flooding. Pensacola bahiagrass and similar grasses can be grown if this soil is adequately drained and fertilized. Pine trees are well suited, and most of the acreage is wooded. (Capability unit Vw–1; woodland suitability group 2w2)

Angie Series

The Angie series consists of moderately well drained, nearly level soils that formed in thick beds of sandy clay loam and sandy clay on stream terraces. Slopes range from 0 to 2 percent but most are 1 percent or less.

In a representative profile, the surface layer is grayish-brown fine sandy loam about 5 inches thick. The subsoil, to a depth of 66 inches, is mainly sandy clay. It is yellowish brown mottled with red in the upper part; yellowish brown and light yellowish brown mottled with gray, red,

and strong brown in the middle; and gray mottled with strong brown and red in the lower part.

These soils are low in natural fertility and organic-matter content, and they are very strongly acid throughout. The available water capacity is medium. Permeability is slow. The tilth is generally good, and the effective root zone is moderately deep to deep.

The natural vegetation consisted of oaks, sweetgum, maple, and pines and and understory of palmetto, gallberry, and other shrubs.

These soils are not in cultivation, mainly because they are subject to flooding several times a year. Most of the acreage is in woodland, and it is well suited to blackgum, sweetgum, water oak, slash pine, cypress, and similar species. A few areas are in pasture, but drainage is needed for good results.

Representative profile of Angie fine sandy loam, frequently flooded, 150 yards north of U.S. Highway No. 129, 1 mile east of Lakeland, Lanier County:

A1—0 to 5 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, fine granular structure very friable; many fine and medium roots; very strongly acid; clear, wavy boundary.

B1t—5 to 8 inches, yellowish-brown (10YR 5/4) sandy clay loam; weak, medium, subangular blocky structure; friable; many fine and medium roots; very strongly acid; clear, wavy boundary.

B21t—8 to 11 inches, yellowish-brown (10YR 5/4) sandy clay; few, fine, distinct mottles of red; moderate, medium, subangular blocky structure; friable; clay films on ped surfaces; many fine and medium roots; very strongly acid; clear, wavy boundary.

B22tg—11 to 22 inches, yellowish-brown (10YR 5/4) sandy clay; many, medium, distinct mottles of gray (10YR 6/1), red (10YR 4/6), and strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; firm; clay films on ped surfaces; few fine roots; very strongly acid; gradual, wavy boundary.

B23tg—22 to 34 inches, light yellowish-brown (2.5Y 6/4) sandy clay; many, medium, distinct mottles of gray (10YR 6/1), red (2.5YR 4/8), and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; firm; distinct clay films on ped surfaces; few fine roots; very strongly acid; gradual, wavy boundary.

B3tg—34 to 66 inches +, gray (5Y 6/1) sandy clay; many, medium, distinct mottles of strong brown (7.5YR 5/8) and red (10R 5/6); moderate, medium, subangular blocky structure; firm; clay films on ped surfaces; very strongly acid.

The A1 horizon ranges from black to grayish brown. The B2t horizon ranges from yellowish brown to light olive-brown in matrix color. Gray mottles that have a chroma of 2 or less occur within the upper 11 to 22 inches of the profile.

The Angie soils occur with the Barth, Chipley, and Rains soils. They contain more clay than the Barth, Chipley, and Rains soils, and they are better drained than the Rains soils.

Angie fine sandy loam, frequently flooded (Au).—This is a nearly level soil that occurs as moderate to small areas along the stream terraces.

Included with this soil in mapping were small areas of Rains soils.

The depth to a seasonal high water table varies, but it is less than 30 inches for periods of 2 to 6 months. During wet seasons this soil is flooded several times each year for periods of 2 to 7 days.

Nearly all of the acreage in Berrien and Lanier Counties is in woodland, and a small acreage is in pasture.

This soil is limited in its suitability for crops, and only a small acreage is in cultivation in these two counties. In areas where drainage is provided corn is fairly well suited. Where adequate drainage and good management are provided, such pasture and hay plants as bahiagrass, dallisgrass, and white and ladino clover can be grown.

This soil has special management problems. It is generally in low areas surrounded by higher land. Because water moves slowly through the subsoil, drainage by the use of underground tile is not generally effective. In addition, this soil is subject to flooding from nearby streams.

This soil is not subject to soil losses from erosion. If the soil is cultivated, a suitable cropping system is corn grown continuously with the residue left on the soil. Adequate fertilization and liming are essential for good plant growth. (Capability unit IIIw-2; woodland suitability group 2w8)

Ardilla Series

The Ardilla series consists of somewhat poorly drained, level to very gently sloping soils on uplands. These soils occur at the foot of the slopes occupied by better drained upland soils and are slightly higher than the more poorly drained lowland soils. Slopes range from 0 to 3 percent.

In a representative profile, the surface layer is very dark grayish-brown loamy sand about 7 inches thick and is underlain by 5 inches of light olive-brown loamy sand. The subsoil, to a depth of 66 inches, is chiefly sandy clay loam. It is light yellowish brown mottled with shades of brown, red, and gray in the upper part, and light brownish gray and light yellowish brown mottled with shades of brown, gray, and red in the lower part. Layers below a depth of 24 inches contain 10 to 30 percent plinthite that impedes internal drainage.

These soils are low in natural fertility and organic-matter content and are very strongly acid throughout. The available water capacity is medium. Permeability is moderately rapid to moderate in the upper part of the profile and moderately slow in the lower part. Tilth is good, and the root zone is mainly deep.

The natural vegetation consisted of slash pine, scattered gum and oak trees, and an understory of briers, gallberry, waxmyrtle, and grass.

A few areas are in cultivation, and corn is the chief crop. These soils are well suited to woodland and pasture, and most of the acreage is used for woodland.

Representative profile of Ardilla loamy sand, 0 to 3 percent slopes, 0.3 mile east of Valdosta-Nashville Post Road, and 0.3 mile northeast of junction of State Route 122 and Nashville-Valdosta Post Road, Berrien County:

Ap—0 to 7 inches, very dark grayish-brown (2.5Y 3/2) loamy sand; weak, fine, granular structure; very friable; many fine and medium roots; very strongly acid; abrupt, smooth boundary.

A2—7 to 12 inches, light olive-brown (2.5Y 5/4) loamy sand; weak, fine, granular structure; very friable; common fine and medium roots; very strongly acid; clear, smooth boundary.

B1t—12 to 17 inches, light yellowish-brown (2.5Y 6/4) sandy loam; few, fine, faint mottles of yellowish brown and pale brown; weak, fine, granular structure; very friable; very strongly acid; clear, smooth boundary.

B21tg—17 to 24 inches, light yellowish-brown (2.5Y 6/4) sandy clay loam; many, medium, distinct mottles of strong brown (7.5YR 5/8), red (2.5YR 4/8), and light brownish gray (2.5Y 6/2); moderate, medium, subangular blocky structure; very friable; sand grains are coated and bridged with clay; less than 5 percent plinthite; very strongly acid; gradual, wavy boundary.

B22tg—24 to 44 inches, light brownish-gray (2.5Y 6/2) sandy clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/8), gray (N 6/0), and red (2.5YR 4/8); moderate, medium, subangular blocky structure; very friable; clay films on some ped surfaces; sand grains are coated and bridged with clay; 10 to 25 percent plinthite; very strongly acid; gradual, wavy boundary.

B23tg—44 to 66 inches, light yellowish-brown (2.5YR 6/4) sandy clay loam; many, medium, distinct mottles of light gray (N 7/0), yellowish brown (10YR 5/8), gray (N 6/0), red (2.5YR 4/8), and weak red (10R 5/4); moderate, medium, subangular blocky structure; friable; pockets of clay accumulation; about 30 percent plinthite; very strongly acid.

The Ap horizon ranges from very dark grayish brown to very dark gray. It is chiefly loamy sand, but some A2 horizons are loamy fine sand and sandy loam. The depth to a horizon that is more than 5 percent plinthite ranges from 24 to 35 inches, and the estimated content of plinthite ranges from 5 to 30 percent.

Ardilla soils occur with the Tifton, Alapaha, and Stilson soils. They differ from the Alapaha soils in being better drained and occupying higher positions. They are more gray in the subsoil and are less well drained than Stilson and Tifton soils.

Ardilla loamy sand, 0 to 3 percent slopes (AqA).—This soil has a seasonal high water table that ranges in depth from 15 to 30 inches for periods of 1 to 2 months each year.

Included with this soil in mapping were a few small areas of Ardilla loamy fine sand. Also included were small areas of Stilson and Alapaha soils.

Only a small acreage is in cultivation.

This soil is suited to many crops, but its use is somewhat limited by excess water. If adequately drained and fertilized, it is suited to corn, tobacco, sorghum, soybeans, and truck crops grown in summer. Among the suitable pasture and hay plants are bahiagrass, bermudagrass, white clover, and millet.

Because it is low lying and has a high water table, this soil generally needs drainage if cultivated crops are to be grown. Drainage can be obtained by arranging rows so that excess water is removed from fields or by the use of ditches. Another helpful practice is to plow fields in narrow beds that leave furrows or shallow ditches between the beds.

Returning crop residue to the soil and including soil-improving crops in the rotation help to maintain the organic-matter content and to maintain good tilth. A suitable cropping system is row crops, such as corn, grown continuously if the shredded residue is left on the surface. (Capability unit IIw–2; woodland suitability group 2w8)

Barth Series

The Barth series consists of somewhat poorly drained to moderately well drained soils that formed in thick beds of sand and loamy sand. These soils are mainly on upland flats. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is black sand about 8 inches thick. Below this layer, to a depth of 20 inches, is dark-gray and light brownish-gray sand that has mottles of brownish-yellow. The subsoil, to a depth of 60 inches, is loamy sand and sand. It is brownish yellow mottled with yellowish brown, light brownish gray, and light gray in the upper part and pale brown mottled with light brownish gray and light gray in the lower part.

These soils are low in natural fertility and organic-matter content and are very strongly acid throughout. Tilth is good, and the root zone is deep. Permeability is moderately rapid, and the available water capacity is low.

The natural vegetation consisted of mixed pines and hardwoods and an understory of gallberry, myrtle, and wiregrass.

Some small areas are cultivated, but these soils need some drainage in most years if row crops are grown. The water table falls sharply late in spring, and this soil is often droughty in summer. Most of the acreage is in woodland, dominantly slash and longleaf pines.

Representative profile of Barth sand, 0.75 mile east of the Alapaha River, 0.5 mile west of paved county road, 2 miles northeast of Alapaha, Berrien County:

Ap—0 to 8 inches, black (10YR 2/1) sand; single grain; loose; many fine roots; very strongly acid; abrupt, smooth boundary.

A21—8 to 13 inches, dark-gray (10YR 4/1) sand; single grain; loose; common fine roots; very strongly acid; clear, smooth boundary.

A22—13 to 20 inches, light brownish-gray (2.5Y 6/2) sand; few, fine, faint mottles of brownish yellow; single grain; loose; very strongly acid; gradual, wavy boundary.

B21tg—20 to 44 inches, brownish-yellow (10YR 6/8) loamy sand; common, medium, distinct mottles of yellowish brown (10YR 5/8), light brownish gray (10YR 6/2), and light gray (10YR 7/1); single grain; loose; sand grains coated with clay; very strongly acid; gradual, wavy boundary.

B22tg—44 to 60 inches, pale-brown (10YR 6/3) sand; few, fine, faint mottles of light brownish gray and light gray; single grain; loose; very strongly acid.

The Ap or A1 horizon ranges from sand to fine sand. Most cultivated areas have a grayish-brown to dark grayish-brown surface layer that ranges to black in some places. The abundance of yellowish-brown mottles in the A22 horizon is highly variable and ranges from few to common. The B2t horizon ranges through pale brown, brownish yellow, and pale yellow in matrix color.

These soils are slightly outside of the range defined for the series because the 44- to 60-inch layer is sand rather than loamy sand, but this does not alter their behavior.

Barth soils commonly occur with the Pelham, Leefield, Lakeland, and Alapaha soils on upland flat areas. They occupy higher positions and are better drained than the Pelham and Alapaha soils. The Barth soils occupy lower positions and are not nearly so well drained as the Lakeland series. They are coarser textured to a depth of 60 inches than the Leefield soils.

Barth sand (Ba).—This soil has the profile described as representative of the series.

Included with this soil in mapping were areas of Barth soils that have a loamy fine sand and fine sand surface

layer. Also included were small areas of Alapaha and Leefield soils.

The seasonal high water table is at a depth of 15 to 30 inches for periods of 2 to 6 months.

Most of the acreage is in woodland or pasture, but if adequately drained and fertilized, this soil is suited to many crops. It is also suited to pasture and hay plants, such as bahiagrass, bermudagrass, white clover and small grain. Row crops can be grown on these soils year after year, but it is desirable to grow them in short rotation to combat nematodes and plant diseases.

Planting is sometimes delayed because of excess water. Consequently, drainage is the special management needed. Excess water can be removed by plowing the fields into narrow beds with shallow ditches between them. Shallow ditches around the boundaries of the fields can provide drainage outlets. Soil leveling and shaping that eliminate depressions can improve the drainage in some fields.

A suitable cropping system is corn and tobacco if the tobacco is rotated in the field so that it is not planted in the same place more than once in 3 years. (Capability unit IIIw–1; woodland suitability group 3w2)

Barth fine sand, frequently flooded (Bb).—This soil is on stream terraces. It has a profile similar to the one described as representative of the series, except that the surface layer and subsoil are slightly finer textured.

During wet seasons this soil is flooded two or three times each year for 7 to 9 days. The seasonal high water table appears to be governed by the rise and fall of the river.

Nearly all of the acreage is in woodland, mainly because of the flooding hazard.

If adequately drained, fertilized, and protected from flooding, this soil can be cultivated. It is suited to corn, soybeans, truck crops, and grain sorghum. Row crops can be grown year after year, but short rotations are desirable because they help to control nematodes and plant diseases. A suitable cropping system is 1 year of corn followed by 1 year of small grain and a hay crop.

Because of the flooding hazard this soil is better suited to pasture and pine trees. Bahiagrass and bermudagrass are suitable pasture plants. (Capability unit IIIw–1; woodland suitability group 3w2)

Bibb Series

The Bibb series consists of poorly drained soils on bottom lands that are subject to frequent flooding. These soils formed in alluvium that resulted from flooding and the accumulation of sediment. The Bibb soils are not mapped separately in these two counties; they are mapped with the Johnston and Osier soils. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is very dark gray fine sandy loam about 6 inches thick. Below the surface layer, to a depth of 30 inches, is dark grayish-brown fine sandy loam mottled with yellow and light yellowish brown. The next layer is light brownish-gray loamy fine sand mottled with gray. It is about 12 inches thick. The lower layer, to a depth of about 50 inches, is gray sand.

These soils are low to moderate in natural fertility and organic-matter content, although in places the organic-matter content is higher. They are medium in available water capacity and very strongly acid throughout. Permeability is moderate. Tilth is fair to good. The depth to which the roots penetrate is influenced by the seasonal high water table.

The natural vegetation consisted chiefly of hardwoods, including water oak, cypress, yellow-poplar, sweetgum, blackgum, bay, and magnolia. A few slash and pond pines may also be present.

Because of its location and the flooding hazard, this soil is not suitable for cultivation. Nearly all of the acreage in the two counties is in woodland, for which it is well suited.

Representative profile of Bibb fine sandy loam, along the flood plain of the Alapaha River, 1.8 miles southeast of Union Church near Lakeland, 1 mile southwest of the Alapaha River, and 0.5 mile east of Activity building at Camp Patten, Boy Scouts of America, Lanier County:

A1—0 to 6 inches, very dark gray (10YR 3/1) fine sandy loam; weak, fine, granular structure; very friable; many roots; very strongly acid; gradual, smooth boundary.

C1g—6 to 30 inches, dark grayish-brown (10YR 4/2) fine sandy loam; common, medium, distinct mottles of yellow (2.5Y 7/6) and light yellowish brown (2.5Y 6/5); massive; friable; few large roots; some stratification; very strongly acid; gradual, smooth boundary.

C2g—30 to 42 inches, light brownish-gray (2.5Y 6/2) loamy fine sand; common, medium, distinct mottles of gray (10YR 6/1); pockets of sand; weak, medium, subangular blocky structure; friable; very strongly acid; gradual, smooth boundary.

C3g—42 to 50 inches +, light-gray (10 YR 7/1) sand; common, medium, faint mottles of gray (10YR 6/1); very friable; very strongly acid; single grain.

The A1 horizon ranges from sandy loam to loam and from very dark gray to black. The C1g horizon ranges from dark grayish brown to dark gray. The C2g horizon ranges from light brownish gray to grayish brown. Stratification occurs in some profiles but is variable in the extent and the texture of the layers. The estimated clay content in the upper 30 to 40 inches ranges from 10 to 18 percent.

Within the upper 30 inches of this soil, the colors are slightly browner than the allowable limits set for the Bibb series. This difference does not make these soils behave differently from soils of the Bibb series.

Bibb soils occur mainly with the Johnston and Osier soils. Their drainage is similar to that of the Johnston and Osier soils, but they do not have the thick black surface layer that is typical of the Johnston soils. Bibb soils contain more silt and clay than Osier soils.

Carnegie Series

The Carnegie series consists of well-drained soils that formed in thick beds of sandy clay loam and clay loam. These soils are on uplands. Slopes range from 2 to 8 percent.

In a representative profile, the surface layer is dark-brown sandy loam about 6 inches thick. The subsoil, to a depth of about 66 inches, is sandy clay loam. It is strong brown and yellowish red in the upper part and

strong brown and yellowish red mottled with shades of red, brown, and yellow in the middle and lower parts. Plinthite occurs at a depth of about 18 inches. The small, hard iron pebbles on the surface and in the upper part of the solum are characteristic of these soils.

These soils are low to moderate in natural fertility, low in organic-matter content, and very strongly acid throughout. The available water capacity is medium. Permeability is moderate in the upper part of the subsoil but slow in the lower part. Tilth is good, except in the severely eroded spots. The root zone is generally moderately deep.

The natural vegetation consisted of mixed hardwoods and pines and an understory of wiregrass.

Carnegie soils are suited to most crops grown in these counties, but erosion control measures are needed in most cultivated areas. These soils are well suited to pasture. They are also well suited to pine trees, and a large acreage is in woodland.

Representative profile of Carnegie sandy loam, 2 to 5 percent slopes, 0.25 mile west of the Withlacooche River, 1.8 miles southwest of Pine Ridge Church and about 1.5 miles southeast of Sapps Lake, Berrien County:

Apen—0 to 6 inches, dark-brown (10YR 3/3) sandy loam; weak, fine, granular structure; very friable; many, small, hard iron pebbles ⅛ to ¾ inches in diameter; many fine roots; very strongly acid; clear, wavy boundary.

B21tcn—6 to 10 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; firm; common iron pebbles; very strongly acid; clear, wavy boundary.

B22tcn—10 to 18 inches, yellowish-red (5YR 4/8) sandy clay loam; moderate, medium, subangular blocky structure; firm; common iron pebbles; clay films on ped surfaces; few pores; very strongly acid; clear, wavy boundary.

B23tcn—18 to 24 inches, strong-brown (7.5YR 5/6) sandy clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/8) and red (2.5YR 4/8); moderate, medium, subangular blocky structure; firm; few iron pebbles; 10 to 15 percent plinthite, by volume; clay films on some ped surfaces; very strongly acid; clear, wavy boundary.

B24t—24 to 48 inches, yellowish-red (5YR 4/8) sandy clay loam; coarse, distinct mottles of red (2.5YR 4/8) and yellowish brown (10YR 5/8); weak, fine, granular structure; firm; 15 to 25 percent plinthite, by volume; clay films on ped surfaces; very strongly acid; diffuse, wavy boundary.

B3t—48 to 66 inches +, yellowish-red (5YR 4/8) sandy clay loam; few, medium, distinct mottles of brownish yellow (10YR 6/6), weak red (10R 4/4), and yellowish red (5YR 5/8); weak, fine, granular structure; firm; plinthite exceeds 30 percent, by volume; clay films on ped surfaces; very strongly acid.

The A1 or Ap horizon ranges from brown to dark brown and very dark gray. Iron pebbles on the surface and throughout the upper 18 inches of the solum range from few to many. The matrix colors of B2t horizon range from yellowish brown or strong brown to yellowish red, and the texture ranges from sandy clay loam to clay loam. The depth to nonindurated plinthite ranges from 15 to 24 inches.

The Carnegie soils commonly occur with the Tifton and Sunsweet soils. They closely resemble the Sunsweet soils in color but have less clay in the subsoil and are deeper to plinthite. They have slightly redder surface layer and subsoil colors than the Tifton soils and are shallower to plinthite.

Carnegie sandy loam, 2 to 5 percent slopes (CoB).—This soil generally occurs as small areas, but it is in areas more than 10 acres in size in a few places. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Tifton and Sunsweet soils.

This soil is suited to many crops, including corn, cotton, peanuts, grain sorghum, and soybeans. Among the suitable pasture and hay plants are bahiagrass, bermudagrass, and millet. A sizable acreage is in cultivation and pasture, but most of the acreage is in woods.

Because of surface runoff, erosion is a moderate hazard if this soil is in cultivation. Some major practices that help to reduce erosion are plant-residue management, contour tillage, terraces, vegetative waterways, stripcropping, and inclusion of close-growing crops in the rotation. Both the degree and the length of the slope influence the cropping system needed to control erosion. An example of an adequate cropping system for a field with a 3 percent slope that is about 200 feet long, where straight-row farming is desired, is Coastal bermudagrass or bahiagrass for 4 years followed by peanuts for 2 years. Vegetated waterways are needed in the natural depressions to remove the runoff. Adequate fertilization and liming are essential for good plant growth and for success in controlling erosion. (Capability unit IIe–4; woodland suitability group 2o1)

Carnegie sandy loam, 5 to 8 percent slopes, eroded (CoC2).—This soil commonly forms an outer border or a narrow band between ridges and drainageways. This soil has a profile similar to the one described as representative for the series, but the surface layer is 2 to 4 inches thinner. In some places the original surface layer has been washed away and the plow layer consists of material from the subsoil. There are a few shallow gullies and rills in places.

Included with this soil in mapping were small areas of Sunsweet soils.

Tilth is good except in places where the subsoil is exposed at the surface.

This soil is not well suited to row crops because of the very severe erosion hazard in cultivated areas. It is better suited to permanent vegetation. If this soil is cultivated, cotton, corn, small grain, and peanuts can be grown. Among the suitable pasture and hay plants are bermudagrass, bahiagrass, and millet. Most of the acreage is in woodland, but some is in pasture.

Although better suited to trees or pasture, this soil can be cultivated if intensive conservation practices are used to reduce the runoff and hold soil losses within allowable limits. Soil-conserving practices, such as plant residue management, contour farming, terraces, and vegetative outlets, are needed. A suitable cropping system on a 6 percent slope that is 100 feet long and cultivated on the contour is cotton for 2 years, followed by bahiagrass for 4 years. All crop residue should be left on the soil. Adequate fertilization and liming are essential for good plant growth and for success in controlling erosion. (Capability unit IVe–4; woodland suitability group 2o1)

Chipley Series

The Chipley series consists of moderately well drained soils that formed in thick beds of sand and loamy sand. These soils are on stream terraces. Slopes range from 0 to 2 percent, but in most of the acreage they are less than 1 percent.

In a representative profile, the surface layer is dark grayish-brown and grayish-brown fine sand about 9 inches thick. Below this, to a depth of 78 inches or more, is mottled light brownish-gray, yellowish-brown, light-gray, and yellow sand.

These soils are low in natural fertility and organic-matter content and are very strongly acid throughout. They have good tilth and a deep root zone. Permeability is rapid, and the available water capacity is low.

The natural vegetation was forest, consisting mainly of pines and oaks, and an understory of myrtle, gallberry, and palmetto.

Most of the areas are in woodland, but a few are in pasture. Because these soils generally have a highly fluctuating water table, some drainage is needed in most years when they are in cultivation. The water table falls sharply late in spring; therefore, this soil is often droughty in summer. This soil is subject to flooding several times each year.

Representative profile of Chipley fine sand, frequently flooded, 0.5 mile southeast of Riverside Church on Guthrie Road, Berrien County:

A11—0 to 5 inches, dark grayish-brown (2.5Y 4/2) fine sand; single grain; loose; many fine roots; very strongly acid; abrupt, smooth boundary.

A12—5 to 9 inches, grayish-brown (10YR 5/2) fine sand; single grain; loose; common fine roots; very strongly acid; abrupt, smooth boundary.

C1—9 to 23 inches, light yellowish-brown (2.5Y 6/4) fine sand; single grain; loose; common fine roots; very strongly acid; gradual, smooth boundary.

C2—23 to 46 inches, light-gray (2.5Y 7/2) fine sand; few, fine, faint mottles of gray; single grain; loose; very strongly acid; gradual, smooth boundary.

C3—46 to 60 inches, light brownish-gray (2.5Y 6/2) fine sand; few, fine, faint mottles of yellowish brown; single grain; loose; very strongly acid; gradual, smooth boundary.

C4—60 to 78 inches, light-gray (2.5Y 7/2) sand; few, fine, faint mottles of yellow; single grain; loose; very strongly acid.

The A12 horizon ranges from sand to loamy fine sand. The abundance of mottles in the C horizon is highly variable and ranges from few to common. The depth to finer materials varies from place to place but is more than 70 inches.

Chipley soils occur with the Angie and Rains soils on stream terraces. They are more sandy to a greater depth than the Angie and Rains soils, and they occupy slightly higher positions and are better drained than the Rains soils.

Chipley fine sand, frequently flooded (Cm).—This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Chipley soils that have a loamy fine sand surface layer. Also included were small areas of Angie and Rains soils.

During wet seasons this soil is flooded two or three times each year for periods of 7 to 9 days. It has a seasonal high water table that appears to be governed by the rise and fall of the adjacent rivers. Nearly all of the acreage is in woodland, mainly because of the flooding hazard.

If this soil is adequately drained and fertilized and is protected from flooding, it can be cultivated. It is suited to corn, soybeans, truck crops, and grain sorghum. Row crops can be grown year after year, but it is desirable to grow them in short rotations. Short rotations help to control nematodes and plant diseases. A suitable cropping system is 1 year of corn followed by 1 year of small grain and a hay crop or pasture.

Because of the flood hazard, this soil is better suited to pasture and pine trees. Bahiagrass and bermudagrass are suitable pasture plants. (Capability unit IIIw-1; woodland suitability group 2w2)

Cowarts Series

The Cowarts series consists of well-drained soils that formed in thick beds of mottled sandy clay loam materials. These soils occur on undulating uplands. Slopes range from 2 to 8 percent.

In a representative profile, the surface layer is brown sandy loam about 6 inches thick. The subsoil, to a depth of about 65 inches, is sandy clay loam. It is light yellowish brown in the upper part; yellowish brown mottled with shades of red, gray, and brown in the middle; and dark red mottled with shades of gray and brown in the lower part. In most areas, a few pebbles of iron and quartz are on the surface. Plinthite occurs at a depth of about 17 inches and slows the downward movement of water.

These soils are low in natural fertility and in organic-matter content, and they are very strongly acid throughout. The available water capacity is medium. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. Tilth is good in uneroded areas. In most places the root zone is moderately deep.

The natural vegetation consisted chiefly of pines and a few hardwoods.

These soils are only fairly well suited to cultivation. In many small fields corn and cotton are the chief crops. A small acreage is in pasture. The acreage is dominantly in pines, to which it is well suited.

Representative profile of Cowarts sandy loam, 5 to 8 percent slopes, eroded, 0.25 mile west of the Alapaha River, 1 mile south of Berrien-Irwin County line, 6 miles northeast of Alapaha, Berrien County:

Ap—0 to 6 inches, brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable; a few, small, white pebbles of quartz and iron 1/16 to 3/8 inches in diameter; some fine roots; very strongly acid; clear, smooth boundary.

B21t—6 to 17 inches, light yellowish-brown (10YR 6/4) sandy clay loam; moderate, medium, subangular blocky structure; friable; some coarse sand grains; very strongly acid; gradual, smooth boundary.

B22t—17 to 23 inches, yellowish-brown (10YR 5/8) sandy clay loam; many, medium, prominent mottles of red (2.5 YR 4/8) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; friable; clay films on some ped surfaces; some coarse sand grains;

10 to 15 percent plinthite; very strongly acid; gradual, smooth boundary.

B23t—23 to 33 inches, yellowish-brown (10YR 5/8) sandy clay loam; many, coarse, prominent mottles of red (2.5YR 4/8), strong brown (7.5YR 5/8), and light gray (2.5Y 7/2); moderate, medium, subangular blocky structure; friable; clay films on some ped surfaces; some coarse sand grains; 25 percent soft plinthite; very strongly acid; gradual, smooth boundary.

B24t—33 to 65 inches +, dark-red (2.5YR 3/6) sandy clay loam; many, coarse, prominent mottles of light gray (2.5Y 7/2) and yellowish brown (10YR 5/8); moderate to weak, medium, subangular blocky structure; friable; 25 percent plinthite; clay films on some ped surfaces; very strongly acid.

The Ap horizon ranges from dark grayish brown to brown and light brownish gray. Some profiles have a loamy sand and sandy loam A horizon. The content of quartz, iron pebbles, and coarse sand grains in the profile is variable from place to place. The B22t horizon ranges from strong brown to yellowish brown and ranges from sandy loam to sandy clay loam. Lenses or pockets of coarser material are common in the B22t and B23t horizons. Gray colors result from inherent characteristics and not from wetness. The depth to a layer containing 5 percent or more plinthite ranges from 10 to 24 inches.

The Cowarts soils occur chiefly with the Tifton, Fuquay, Lakeland, and Dothan soils. Cowarts soils have the same drainage and occupy positions on the landscape similar to those of the Tifton and Fuquay soils, but they are shallower to plinthite then those soils. The Cowarts soils are much finer textured than the Lakeland soils. They are shallower to plinthite and have less coarse material in the upper horizons than the Dothan soils.

Cowarts loamy sand, 2 to 5 percent slopes (CqB).—This soil ordinarily occurs as areas 5 to 15 acres in size on ridgetops and side slopes. It has a profile similar to the one described as representative for the series, but the surface layer is sandier.

This soil has good tilth, except in eroded areas. It is suited to crops, including corn, cotton, peanuts, grain sorghum, and soybeans, and to pasture and hay plants, including bahiagrass, bermudagrass, and millet. Some of the acreage is in cultivation and pasture, but a greater acreage is in woods.

Because of surface runoff, erosion is a moderate hazard if this soil is in cultivation. Some major practices that help to reduce erosion are plant residue management, contour tillage, terraces, vegetative waterways, strip cropping, and inclusion of close-growing crops in the rotation. Both the degree and length of slope influence the cropping system needed to control erosion. An example of an adequate cropping system in a field with a 3 percent slope that is about 200 feet long, where straight row farming is desired, is Coastal bermudagrass or bahiagrass for 4 years followed by peanuts for 2 years. Vegetated waterways are needed in the natural depressions to remove the runoff.

Adequate fertilization and liming are essential for good plant growth and for success in controlling erosion. (Capability unit IIe–4; woodland suitability group 2o1)

Cowarts sandy loam, 5 to 8 percent slopes, eroded (CtC2).—This soil is on short slopes between the less sloping ridgetops and the drainageways. It has the profile described as representative for the series. The plow layer normally extends into the upper part of the subsoil. There are rills and shallow gullies in most areas.

Included with this soil in mapping were areas of Tifton, Carnegie, and Sunsweet soils. Also included were patches where the plow layer consists of the original surface layer and patches where yellowish-brown subsoil is exposed at the surface.

This soil has fair to good tilth except the patches where the subsoil is exposed at the surface. Erosion is a very severe hazard in cultivated fields.

This soil is better suited to permanent vegetation than to row crops. If this soil is cultivated, cotton, corn, small grain, and peanuts can be grown. Pasture and hay plants, such as bermudagrass, bahiagrass, and millet, are suited. Most of the acreage is in woods, and some is in pasture.

Although better suited to trees or pasture, this soil can be cultivated if intensive conservation practices are used to reduce runoff and hold soil losses within allowable limits. Soil-conserving practices, such as plant residue management, contour farming, terraces, and vegetative outlets, are needed. A suitable cropping system on a 6 percent slope that is 100 feet long and cultivated on the contour is cotton for 2 years followed by bahiagrass for 4 years. All crop residue should be left on the soil. Adequate fertilization and liming are essential for satisfactory plant growth and for success in controlling erosion. (Capability unit IVe–4; woodland suitability group 2o1)

Dothan Series

The Dothan series consists of well-drained soils that formed in beds of sandy clay loam and sandy loam materials on uplands. Slopes range from 0 to 4 percent.

In a representative profile, the surface layer is dark grayish-brown loamy sand about 7 inches thick, and it is underlain by light olive-brown loamy sand about 9 inches thick. The subsoil, to a depth of about 66 inches, is sandy clay loam that is yellowish brown in the upper part; yellowish brown mottled with strong brown in the middle; and brownish yellow mottled with strong brown and red in the lower part. Plinthite occurs at a depth of about 36 inches and slows the downward movement of water.

These soils are low to moderate in natural fertility and are strongly acid throughout. They are low in organic-matter content and medium in available water capacity. Permeability is moderately slow. Tilth is good, and the root zone is deep in most places.

The natural vegetation consisted chiefly of mixed pines and hardwoods and an understory of native grasses, mostly wiregrass.

These soils respond well to good management, and they are well suited to most locally grown crops. Most of the acreage is in cultivation or in pasture. A moderate acreage is well suited to pines and is used for pines.

Representative profile of Dothan loamy sand, 0 to 4 percent slopes, northeast of the junction of U.S. Highways No. 82 and No. 129, Berrien County:

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) loamy sand; weak, fine, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary.

A2—7 to 12 inches, light olive-brown (2.5Y 5/6) loamy sand; weak, fine, granular structure; very friable; many fine roots; strongly acid; clear, smooth boundary.

A3—12 to 16 inches, light olive-brown (2.5Y 5/4) loamy sand; weak, fine, granular structure; very friable; strongly acid; clear, smooth boundary.

B21t—16 to 36 inches, yellowish-brown (10YR 5/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; clay films on some ped surfaces; strongly acid; diffuse, smooth boundary.

B22t—36 to 50 inches, yellowish-brown (10YR 5/6) sandy clay loam; few, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; friable; 5 to 10 percent plinthite; clay films on some ped surfaces; few small pores; strongly acid; diffuse, wavy boundary.

B23t—50 to 66 inches +, brownish-yellow (10YR 6/6) sandy clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/6) and red (2.5YR 4/8); moderate, medium, subangular blocky structure; friable; common soft iron pebbles; 15 percent plinthite; clay films on some ped surfaces; a few fine pores; strongly acid.

The Ap horizon ranges from very dark grayish brown to light olive brown. Some profiles have a loamy fine sand or loamy coarse sand A2 horizon. In some places a few iron pebbles occur on the surface or throughout the solum. The matrix color of the B2t horizon ranges from brownish yellow to yellowish brown. The depth to a layer containing 5 percent or more plinthite ranges from 30 to 40 inches.

The Dothan soils occur mainly with the Tifton, Stilson, and Fuquay soils. They closely resemble the Tifton soils, but they have fewer iron pebbles throughout the solum. They are slightly better drained and occupy higher positions than the Stilson soils and lack the thick A horizon that is typical of those soils. The Dothan soils lack a thick A horizon, which is common in the Fuquay soils.

Dothan loamy sand, 0 to 4 percent slopes (DaB).—This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Tifton and Fuquay soils.

This soil is well suited to many crops, including corn, cotton, peanuts, tobacco, small grain, sorghum, pecans, and truck crops. Among the suitable pasture and hay plants are bahiagrass, bermudagrass, vetch, and crimson clover. This soil is also suited to pine trees. Most of the acreage is in cultivation or in pasture.

Because of surface runoff, erosion is the chief hazard if this soil is cultivated. Some major methods that help to reduce erosion are plant residue management, contour tillage, terraces, vegetative waterways, stripcropping, and inclusion of close-growing crops in the rotation. Both the degree and length of slope influence the cropping system needed to control erosion. An example of a suitable cropping system on a 3 percent slope that is 350 feet long, not terraced but cultivated on the contour, is mulch-planted corn grown continuously, and the residue mowed or chopped and left undisturbed during the winter.

Returning crop residue to the soil and including soil-improving crops in the rotation help to maintain the organic-matter content and to maintain good tilth. All crop residue should be left on the soil. Applications of fertilizer and lime are needed for good plant growth. (Capability unit IIe–1; woodland suitability group 2o1)

Fuquay Series

The Fuquay series consists of well-drained soils on uplands. These soils formed in beds of sandy clay loam and sandy loam materials. Slopes range from 0 to 8 percent.

In a representative profile, the surface layer is very dark grayish-brown loamy sand about 7 inches thick. Below this, to a depth of 22 inches, is yellowish-brown loamy sand. The subsoil, to a depth of 70 inches, is sandy clay loam. It is yellowish brown in the upper part; yellowish brown mottled with red in the middle; and yellowish brown mottled with shades of gray, yellow, and brown in the lower part. Plinthite occurs at a depth of about 38 inches and impedes the movement of water.

These soils are low in natural fertility and are very strongly acid throughout. They are low in organic-matter content and medium in available water capacity. Tilth is good, and the root zone is deep. Permeability is moderately rapid in the upper horizon but slow in the lower part of the subsoil.

The natural vegetation consisted of mixed hardwoods and pines and an understory of wiregrass or native grasses. These soils respond well to good management and are generally well suited to most locally grown crops. A large acreage of this soil is in cultivation and in pasture, to which it is well suited. It is also well suited to pines, and a considerable acreage is in this use.

A representative profile of Fuquay loamy sand, 0 to 4 percent slopes, between U.S. Highway No. 129 and State Route 122, 0.25 mile north of Banks Lake Dam, Lanier County:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) sand; weak, fine, granular structure; very friable; many fine roots; very strongly acid; clear, smooth boundary.

A2—7 to 22 inches, yellowish-brown (10YR 5/4) loamy sand; weak, fine, granular structure; very friable; very strongly acid; gradual, wavy boundary.

B21t—22 to 38 inches, yellowish-brown (10YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; friable; very strongly acid; gradual, wavy boundary.

B22tcn—38 to 42 inches, yellowish-brown (10YR 5/8) sandy clay loam; common, medium, distinct mottles of red (2.5YR 4/8); moderate, medium, subangular blocky structure; friable; clay films on some ped surfaces; a few small- and medium-sized iron pebbles; 10 percent plinthite; very strongly acid; gradual, wavy boundary.

B23t—42 to 48 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, medium, distinct mottles of brownish yellow (10YR 6/8) and red (2.5YR 5/8); moderate, medium, subangular blocky structure; friable; clay films on some ped surfaces; 10 to 15 percent plinthite; very strongly acid; gradual, wavy boundary.

B24t—48 to 70 inches +, yellowish-brown (10YR 5/8) sandy clay loam; many, medium, distinct mottles of gray (10YR 6/1), red (2.5YR 4/8), and yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; friable; 15 to 25 percent plinthite; clay films on some ped surfaces; very strongly acid.

The Ap or A1 horizon ranges from loamy sand to loamy coarse sand. In many places small rounded quartz and iron pebbles occur on the surface and in the plow layer. The Ap or A1 horizon ranges from very dark grayish brown to grayish brown. The A horizon ranges from 20 to 40 inches in thickness. The B2t horizon ranges from sandy loam to sandy clay loam. The depth to a plinthite layer ranges from about 36 to 46 inches.

Fuquay soils commonly occur with the Dothan, Lakeland, and Stilson soils. They have an A horizon that is thicker and slightly coarser textured than in the Dothan soils. The Fuquay soils contain more clay than Lakeland soils that lack plinthite, and they are slightly better drained and ordinarily occupy higher positions than the Stilson soils.

Fuquay loamy sand, 0 to 4 percent slopes (FsB).—This soil occurs as medium to large areas, some up to 50 acres

in size. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Dothan and Lakeland soils.

This soil responds well to good management, although it is slightly droughty. It is extensively cultivated and suited to most crops grown in the two counties. Crops suited to this soil are corn, cotton, tobacco, peanuts, and small grain, and pasture and hay plants, including bahiagrass and bermudagrass.

In large open fields these soils are subject to soil blowing. Soil blowing can be controlled by planting close-growing crops and clean-tilled crops in alternate strips at right angles to the prevailing winds. On long, very gently sloping fields, water erosion is a slight to moderate hazard. Some effective practices that help to reduce erosion are plant residue management, contour tillage, terraces, vegetated waterways, stripcropping, and the use of close-growing crops in the cropping system.

A suitable cropping system that will produce large amounts of organic matter and improve the available water capacity is row crops for 2 years followed by perennial sod crops for 2 years or more. All crop residue should be left on the soil. Vegetated waterways are needed in natural depressions to remove the concentration of runoff. Applications of fertilizer and lime are needed for good plant growth. (Capability unit IIs–1; woodland suitability group 3s2)

Fuquay loamy coarse sand, 3 to 8 percent slopes (FqC).—This is a well-drained soil on short slopes between ridgetops and drainageways. Relief is broken and irregular. The areas are mainly long and narrow and 10 to 20 acres in size. This soil has a profile similar to the one described as representative for the series, but the upper part has more coarse sand, and the subsoil has slightly more clay. In places a few quartz pebbles occur in the upper 24 inches of the profile.

Included with this soil in mapping were small areas of Stilson and Lakeland soils.

Erosion is a hazard because the thick sandy surface layer and subsurface layer make this soil somewhat droughty. Only a small acreage is in cultivation. Corn and peanuts are the chief crops. Among the suitable row crops are peanuts, corn, cotton, soybeans, small grain, sweetpotatoes, watermelons, and truck crops that mature early. Plants suitable for pasture and hay are Pensacola bahiagrass, Coastal bermudagrass, sorghum, sericea lespedeza, and millet. Pecan trees grow fairly well.

Because this soil is subject to erosion, rapidly leached, somewhat droughty, and rapidly depleted of organic-matter content, it should be managed so that soil losses from erosion are held within allowable limits and the organic-matter content is maintained. Some good erosion control methods are contour tillage, terraces, stripcropping, and planting close-growing crops that produce large amounts of residue. Where slopes are 6 percent and 300 feet long, and contour tillage but not terracing is used, an example of a suitable cropping system is 1 year of mulch-planted corn, 1 year of cotton or peanuts, and 4 years of bahiagrass or a similar close-growing crop. Fertilizer and lime are needed for good plant growth. (Capability unit IIIe–5; woodland suitability group 3s2)

Grady Series

The Grady series consists of poorly drained soils in depressions. These soils formed in beds of sandy clay and clay. Slopes are less than 1 percent.

In a representative profile, the surface layer is gray sandy loam about 7 inches thick. The subsoil, to a depth of 72 inches, is sandy clay. It is gray mottled with yellowish brown in the upper part, and gray and light gray mottled with brownish yellow, red, reddish gray, pink, and yellowish red in the lower part.

These soils are low in natural fertility and are very strongly acid throughout. They are low to moderate in organic-matter content and medium in available water capacity. Tilth is fair to good, and the root zone is influenced by the seasonal high water table. Permeability is slow.

The natural vegetation is cypress, blackgum, and tupelos and a gallberry, myrtle, and sedge undergrowth. Nearly all the acreage is in woodland, dominantly cypress. Water stands on this soil for several months each year. These soils need to be drained if they are in cultivation, in pasture, or are used for pines.

Representative profile of Grady sandy loam, adjacent to U.S. Highway No. 129, 1 mile north of Berrien High School, east of road, Berrien County:

A1—0 to 7 inches, dark-gray (10YR 4/1) sandy loam; weak, fine, granular structure; very friable; many medium and fine roots; very strongly acid; clear, wavy boundary.

B21tg—7 to 18 inches, gray (N 5/0) sandy clay; common, medium, distinct mottles of yellowish brown (10YR 5/8); strong, medium, subangular blocky structure; firm; clay films on some ped surfaces; streaks from the A horizon extend into this horizon; very strongly acid; gradual, wavy boundary.

B22tg—18 to 30 inches, gray (N 6/0) sandy clay; common, coarse, distinct mottles of yellowish brown (10YR 5/6); strong, medium, subangular blocky structure; firm; clay films on some ped surfaces; few fine pores; very strongly acid; gradual, wavy boundary.

B23tg—30 to 36 inches, gray (N 6/0) sandy clay; many, coarse, prominent mottles of brownish yellow (10YR 6/6) and red (10R 4/8); strong, medium, subangular blocky structure; firm; very strongly acid; clear, wavy boundary.

B24tg—36 to 54 inches, light-gray (10YR 7/1) sandy clay; common, medium, distinct mottles of brownish yellow (10YR 6/8), red (10R 4/8), and reddish gray (10R 5/1); strong, medium, subangular blocky structure; firm; very strongly acid; gradual, wavy boundary.

B25tg—54 to 72 inches +, light-gray (10YR 7/1) sandy clay; many, fine, distinct mottles of pink (5YR 7/4) and yellowish red (5YR 5/8); strong, medium, subangular blocky structure; firm; very strongly acid.

The A1 or Ap horizon ranges from very dark gray and gray to grayish brown in color and from 5 to 19 inches in thickness. The texture is variable within an area and from one mapped area to another. Dominant textures are sandy loam, loam, and silt loam. Near the center of an area, the A1 or Ap horizon is finer textured than near the outer boundary. The predominant textures of the B2tg horizon range from sandy clay to clay loam.

Grady soils occur chiefly with the Tifton, Robertsdale, Irvington, and Pelham soils but are more poorly drained and have a more clayey B horizon than the Tifton, Robertsdale, and Irvington soils. Grady soils have a more clayey Bt horizon than Pelham soils.

Grady soils (Grd).—These are poorly drained soils in depressions. They are mainly in small depressed areas

ranging from 1 to 10 acres in size. In addition to the sandy loam surface layer of the representative profile, these soils have a silt loam or loam surface layer in other places.

Included with these soils in mapping were small areas of Pelham and Irvington soils.

During wet seasons these soils are flooded more than once each year for periods of 1 to 6 months. Although not in cultivation in either county, they can be cultivated if adequate drainage and other good management are provided. These soils are better suited to pasture and trees. A few areas have been drained and used for pasture. When adequately limed and fertilized, suitable pasture grasses are bahiagrass and dallisgrass. Nearly all of the acreage is in woodland, to which it is well suited. Where drainage has removed the surface water, these soils are well suited to loblolly and slash pines. (Capability unit Vw–1; woodland suitability group 2w9)

Irvington Series

The Irvington series consists of moderately well drained soils that have a weakly expressed fragipan. These soils formed in thick beds of sandy clay loam on uplands. Slopes range from 0 to 3 percent.

In a representative profile, the surface layer is dark-gray loamy sand, about 5 inches thick, that is underlain by 3 inches of yellowish-brown loamy sand. The subsoil, to a depth of 66 inches, is mainly sandy clay loam. It is light olive brown in the upper part, light yellowish brown mottled with yellowish brown and strong brown in the middle, and light yellowish brown and light gray mottled with shades of brown, gray, and red in the lower part. A brittle, weakly cemented fragipan occurs at a depth between 24 and 66 inches. This layer slows the downward movement of water. Small, rounded iron pebbles on the surface and throughout the surface layer and subsoil are a characteristic of the Irvington soils.

Irvington soils are low in natural fertility and organic-matter content and are very strongly acid throughout. Tilth is good, and the root zone is mainly moderately deep. Permeability is moderately slow, and the available water capacity is medium.

The natural vegetation consisted of mixed pines and hardwoods and an understory of gallberry and wiregrass.

A significant acreage is in cultivation, to which this soil is well suited. Most of the acreage is in pines, and some is in pasture. Some drainage is needed for safe cultivation during most years.

Representative profile of Irvington loamy sand, 4 miles northwest of Lakeland, 2 miles southeast of Rays Pond, 100 yards south of unpaved county road, Lanier County:

Apcn—0 to 5 inches, dark-gray (10YR 4/1)) loamy sand; weak, fine, granular structure; very friable; many fine roots; few iron pebbles; very strongly acid; abrupt, smooth boundary.

A2cn—5 to 8 inches, yellowish-brown (10YR 5/4) loamy sand; weak, fine, granular structure; very friable; many fine roots; few iron pebbles; very strongly acid; abrupt, smooth boundary.

B1cn—8 to 18 inches, light olive-brown (2.5Y 5/4) sandy loam; weak, fine, granular structure; very friable; fine roots are common in upper part; few iron pebbles; very strongly acid; clear, smooth boundary.

B2cn—18 to 24 inches, light yellowish-brown (2.5Y 6/4) sandy clay loam; few, medium, distinct mottles of yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4); moderate, medium, subangular blocky structure; very friable; few iron pebbles; very strongly acid; clear, smooth boundary.

Bx1—24 to 36 inches, light yellowish-brown (2.5Y 6/4) sandy clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6); moderate, medium, subangular blocky structure; friable; brittle; few fine pores; small iron pebbles; about 7 percent plinthite; very strongly acid; gradual, wavy boundary.

Bx2—36 to 58 inches, light yellowish-brown (10YR 6/4) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8), red (2.5YR 4/8), and light gray (10YR 7/1); massive; friable; brittle; few fine pores; many small and medium iron pebbles; about 10 percent plinthite; very strongly acid; gradual, wavy boundary.

Bx3—58 to 66 inches +, light-gray (10YR 7/1) sandy clay loam; many, coarse, distinct mottles of yellowish brown (10YR 5/8), red (10R 4/8), and weak red (10R 4/4); moderate, medium, subangular blocky structure; friable; brittle; 15 to 20 percent plinthite; very strongly acid.

The A1 horizon is very dark gray in wooded areas. In cultivated areas the Ap horizon ranges to dark gray and grayish brown. The A horizon ranges from 8 to 19 inches in thickness, but generally ranges from 8 to 10 inches. The depth to the Bx1 horizon ranges from 23 to 36 inches.

The Irvington soils occur mainly with the Stilson, Leefield, Grady, and Pelham soils. They are better drained than the Grady, Pelham, and Leefield soils. They occupy higher positions than the Stilson soils, but they have a fragipan at a depth of about 24 inches.

Irvington loamy sand, 0 to 3 percent slopes (IjA).—This soil generally occurs as fairly large areas that are adjacent to but slightly higher than pond areas and drainageways, but several small areas are only 4 to 8 acres in size.

Included with this soil in mapping were small areas of Leefield and Stilson soils.

This soil has a seasonal high water table at a depth of 15 to 30 inches for periods of 1 to 2 months each year.

A significant acreage is in cultivation. Corn, tobacco, peanuts, and soybeans are the chief crops. A moderate acreage is in pasture, to which the soil is well suited. Bahiagrass, bermudagrass, white clover, and millet are suitable pasture plants. Most of the acreage is well suited to slash pine and longleaf pine.

Because of wetness, this soil generally needs drainage if crops are to be grown. Drainage can be provided by arranging rows so that they drain off excess water or by establishing ditches (fig. 3) that remove excess water from the fields. Another helpful practice is to plow fields in narrow beds that leave furrows or shallow ditches between the beds to remove water.

Adequate applications of fertilizer and lime are essential for good plant growth and for the success of the soil and crop management systems. Returning crop residue to the soil and including soil-improving crops in the rotation help to maintain organic-matter content and to maintain good tilth. A suitable cropping system is row crops, such as corn, grown continuously. In this system, the crop residue is shredded and left on the

Figure 3.—A drainage ditch cut in Irvington loamy sand, 0 to 3 percent slopes. Removal of excess water improves the use and productivity of this soil.

surface. (Capability unit IIw–2; woodland suitability group 2o7)

Istokpoga Series

The Istokpoga series consists of nearly level organic soils that formed in the remains of woody plants over acid sands and clays. These soils occur in Lanier County in bays and wet depressions adjacent to Swamp. They are underlain by limestone. They are covered by water much of the year.

In a representative profile, the surface layer is black mucky peat 8 inches thick. Below this is a dark-brown organic layer to a depth of 6 feet or more.

This soil is high in nitrogen but low in other plant nutrients. It is very strongly acid to strongly acid throughout. The organic-matter content is very high. Permeability is rapid, and the available water capacity is very high.

The natural vegetation consisted of cypress, tupelo, and sedge, as well as other aquatic plants.

Representative profile of Istokpoga mucky peat, at the Perryman Carter Pond, 4.5 miles south of Lakeland, 100 yards east side of State Route 135, Lanier County:

1—0 to 8 inches, black (10YR 2/1) mucky peat; fine, medium, granular structure; small pieces of hardwood; friable and dusty when dry, sticky when wet; very strongly acid; clear, smooth boundary.

2—8 to 72 inches +, dark-brown (10YR 3/3) peat; massive; fibrous; strongly acid.

The surface layer ranges from 3 to 8 inches in thickness. The organic layers range from 60 to more than 72 inches in thickness. Sampling in places where the organic layers are only about 5 feet thick revealed that the underlying mineral soil consists mainly of layers of dark-gray or gray sand and sandy clay loam.

The Istokpoga soils occur mainly with Swamp and with Portsmouth and Rutlege soils, but they contain more organic matter and less mineral soil material than the Portsmouth and Rutlege soils.

Istokpoga complex (Ist).—This is a complex of very poorly drained, organic soils that occur in wet depressions and bays. Slopes range from 0 to about 1 percent.

Istokpoga soils are dominant and make up about 75 percent of the complex. Similar unnamed soils that have an organic layer thinner than 60 inches make up about 20 percent of this complex, and the Pelham and Rutlege soils make up the remaining 5 percent.

Included with these soils in mapping were small areas of Swamp and of Portsmouth and Rutlege soils.

The soils of this complex are not in cultivation. They are mainly wooded, idle, or ponded. These soils have potential as a source of organic material, such as commercial peat. (Capability unit VIIw–1; not assigned to a woodland suitability group)

Johnston Series

The Johnston series consists of very poorly drained soils on bottom lands. These soils are subject to frequent flooding for periods of 7 days to 2 weeks and to accumulation of sediments. The Johnston soils are not mapped separately in these two counties; they are mapped in associations with the Bibb and Osier soils. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is black loam about 20 inches thick. Below this is a dark-gray sandy loam, about 16 inches thick, that has pockets of gray sand. The next layer is gray loamy sand and sand to a depth of 65 inches.

These soils are low in natural fertility and very strongly acid throughout. They have a high water table. They are moderate to high in organic-matter content. Permeability is moderately rapid to rapid. The available water capacity is medium. Tilth and depth of the root zone are dependent upon the degree of wetness.

The natural vegetation consisted of sweetgum, blackgum, water oak, red maple, bay, and a few slash and pond pines.

All the acreage in the two counties is in woodland, and it is well suited to this use.

Representative profile of Johnston loam, 150 yards west of U.S. Highway No. 129, 0.25 mile northwest of Ray City, Berrien County:

A11—0 to 7 inches, black (10YR 2/1) loam; massive; very friable; very high in organic matter; very strongly acid; abrupt, smooth boundary.

A12—7 to 20 inches, black (10YR 2/1) loam; few grains of gray sand; massive; very friable; moderately high in organic matter; very strongly acid; abrupt, smooth boundary.

IIACg—20 to 36 inches, dark-gray (10YR 4/1) sandy loam; pockets of gray (10YR 6/1) sand; massive; very friable; very strongly acid; abrupt, smooth boundary.

IIC1g—36 to 40 inches, gray (10YR 5/1) loamy sand; single grain; very friable; very strongly acid; abrupt, smooth boundary.

IIIC2g—40 to 65 inches +, gray (10YR 6/1) sand; small lumps of sandy clay; massive; loose; very strongly acid.

The A1 horizon is loam and mucky loam and is high in organic-matter content throughout. The IIACg horizon is lacking in many places. The upper part of the A1 horizon can be fresh alluvium, and if this is present, the A1 horizon is variable in color. In many places there is stratification, and in many places streaks of very light gray are common. The black A1 horizon is as thick as 25 inches in places. The C horizon is gray loamy sand or sand.

The Johnston soils occur with the Osier and Bibb soils. The Johnston soils have a thicker black surface layer and are slightly more poorly drained than the Osier or Bibb soils. The Johnston soils contain less fines than the Bibb soils and slightly more fines than the Osier soils.

Johnston-Osier-Bibb association (Job).—This mapping unit consists of wooded areas of nearly level Bibb, Johnston, and Osier soils that are in large patterns on flood plains along the major rivers and streams of Berrien and Lanier Counties. The individual soils could be mapped separately if the potential for farming or other intensive use justified the additional costs. These soils are very poorly drained to poorly drained. The Johnston soils make up about 55 percent of the association, the Osier soils about 20 percent, and the Bibb soils about 15 percent. Other soils make up the rest.

The Johnston soils have a black loam surface layer about 20 inches thick. The next layer is dark-gray sandy loam about 16 inches thick. Below this is gray loamy sand and sand to a depth of 65 inches. Where the soil is depressed and inundated, the thickness of the black surface layer increases. Flooding occurs at frequent intervals and lasts several days to 2 weeks.

The Osier soils have a black and dark-gray surface layer about 12 inches thick. The next layer is light brownish-gray fine sand about 14 inches thick. Below this is a light-gray loamy coarse sand to a depth of 52 inches. Recent overwash may be present.

The Bibb soils have a very dark gray fine sandy loam surface layer about 6 inches thick. Below the surface layer, to a depth of 30 inches, is dark grayish-brown fine sandy loam that has mottles of yellow and light yellowish brown. The next layer is light brownish-gray loamy fine sand 12 inches thick that has mottles of light gray. The lower layer is gray sand to a depth of 50 inches.

Included in mapping were areas of Angie and Rains soils.

All of these soils are very strongly acid. They have a seasonal high water table that remains at or near the surface for several months each year.

These soils are not suited to cultivated crops, but if adequately drained, fertilized, and protected from flooding, they are suited to bahiagrass for hay and pasture. These soils are suited to pines and hardwoods.

Special management problems are caused by wetness and the flooding hazard. Drainage is necessary for the best growth of pines. (Capability unit Vw-2; woodland suitability group 2w9)

Lakeland Series

The Lakeland series consists of excessively drained soils formed in thick beds of sands on uplands. Slopes range from 2 to 8 percent.

In a representative profile the surface layer is very dark gray sand 7 inches thick. Beneath the surface layer, to a depth of 42 inches, is yellowish-brown sand. Below this, to a depth of 78 inches is very pale brown sand mottled with yellowish brown.

These soils are low in natural fertility and organic-matter content and are strongly acid throughout. Permeability is rapid. The available water capacity is low. Tilth is good, and the root zone is deep. These soils are droughty.

The natural vegetation consisted chiefly of turkey oak and blackjack oak. It also consisted of a few scattered longleaf pines and a scant undergrowth of wiregrass and common weeds.

A few areas are in cultivation but are only fairly well suited to crops. A small acreage is in pasture. Nearly all the acreage is in woodland, to which it is fairly well suited. A considerable acreage of this soil is in planted slash pines (fig. 4).

Representative profile of Lakeland sand, 2 to 8 percent slopes, 4 miles north of Stockton on U.S. Highway No. 129, 50 yards west of the highway, Lanier County:

Ap—0 to 7 inches, very dark gray (10YR 3/1) sand; weak, fine, granular structure; very friable; many common grass roots; strongly acid; clear, smooth boundary.

AC—7 to 11 inches, dark grayish-brown (10YR 4/2) sand mixed with pale-brown (10YR 6/3) clean sand grains; weak, fine, granular structure; very friable; strongly acid; gradual, smooth boundary.

C1—11 to 42 inches, yellowish-brown (10YR 5/4) sand; common, fine, faint mottles of very pale brown; weak, fine, single grain; loose; strongly acid; gradual, smooth boundary.

C2—42 to 78 inches +, very pale brown (10YR 7/3) sand; common, fine, distinct mottles of yellowish-brown (10YR 5/4); single grain; loose; strongly acid.

The Ap horizon ranges from very dark gray to dark yellowish brown. The AC horizon is chiefly sand but ranges from fine sand to coarse sand. The sand is more than 72 inches thick. Sand grains of the C horizon are chiefly coated, but some clean grains may be present. Mottles of pale brown and yellowish brown are common in the lower part of the C horizon.

The Lakeland soils occur mainly with the Fuquay, Barth, Cowarts, and Alapaha soils. They occupy higher positions and are better drained than the Barth and Alapaha soils. They have coarser materials in the lower horizons, and are more excessively drained than the Fuquay soils. Lakeland soils are sandier than the Cowarts soils.

Lakeland sand, 2 to 8 percent slopes (LwC).—This soil occurs as fairly large but narrow areas along the Alapaha River in Berrien and Lanier Counties. Finer textured materials are deeper than 72 inches.

Figure 4.—**Slash pine on Lakeland sand, 2 to 8 percent slopes. The stand, grown from planted stock, is 3 years old.**

Included with this soil in mapping were small areas where the underlying layers are mottled with shades of gray or light gray.

This soil is not well suited to many crops because it is droughty. Corn and peanuts are better suited to this soil than most commonly grown crops. Pasture and hay plants, such as bahiagrass and Coastal bermudagrass, do fairly well on these soils. Most of the acreage is in planted pines and in pasture.

Because of rapid infiltration and permeability, these soils require special management, but erosion is generally not a hazard. Crops respond to frequent applications of fertilizer, and most crops benefit from lime. Returning crop residue to the soil and including soil-improving crops in the rotation help to maintain the organic-matter content and to maintain good tilth. A suitable cropping system is mulch-planted corn grown year after year. All crop residue should be left on the soil. (Capability unit IVs–1; woodland suitability group 4s2)

Leefield Series

The Leefield series consists of somewhat poorly drained soils that formed in thick beds of sandy clay loam and sandy loam. Slopes range from 0 to 3 percent.

In a representative profile, the surface layer is very dark gray loamy sand about 4 inches thick. Below this, to a depth of about 24 inches, is chiefly light yellowish-brown loamy sand that has mottles of brownish yellow and gray. The subsoil, to a depth of 72 inches, is sandy clay loam. It is light yellowish brown mottled with light gray and yellowish brown in the upper part and mainly mottled yellowish brown, red, light gray, brownish yellow and light yellowish brown in the lower part.

Leefield soils are low in natural fertility and organic-matter content and are strongly acid to very strongly acid throughout. The available water capacity is mainly medium. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. Tilth is good, and the root zone is deep.

The natural vegetation consisted of mixed pines and hardwoods and an understory of gallberry, deerstongue, and wiregrass.

Several areas are in cultivation, to which these soils are well suited. Some drainage is needed in most years if these soils are in cultivation. These soils are well suited to pasture and pines.

Representative profile of Leefield loamy sand, 1.5 miles northwest of Withlacoochee River bridge along State Route 125; south of highway and 50 yards in the woods, Berrien County:

A1—0 to 4 inches, very dark gray (10YR 3/1) loamy sand; weak, fine, granular structure; very friable; many fine roots; strongly acid; clear, smooth boundary.

A21—4 to 10 inches, grayish-brown (2.5Y 5/2) loamy sand; few, medium, distinct mottles of light yellowish brown (2.5Y 6/4); weak, fine, granular structure; very friable; strongly acid; diffuse, smooth boundary.

A22—10 to 24 inches, light yellowish-brown (2.5Y 6/4) loamy sand; few, medium, distinct mottles of brownish yellow (10YR 6/6) and gray (10YR 5/1); weak, fine, granular structure; very friable; many fine pores, strongly acid; diffuse, smooth boundary.

B1t—24 to 30 inches, light yellowish-brown (2.5Y 6/4) sandy clay loam; few, medium, distinct mottles of light gray (N 7/0) and yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; friable; few fine pores; sand grains coated and bridged with clay; very strongly acid; diffuse, smooth boundary.

B21t—30 to 44 inches, yellowish-brown (10YR 5/8) sandy clay loam; common, medium, distinct mottles of light gray (N 7/0), red (2.5YR 4/8), and light yellowish brown (2.5Y 6/4); moderate, medium, subangular blocky structure; friable; few soft and slightly hard iron pebbles; about 15 percent plinthite; clay films on some ped surfaces; sand grains coated and bridged; very strongly acid; diffuse, smooth boundary.

B22t—44 to 72 inches, mottled brownish-yellow (10YR 6/6), light-gray (N 7/3), yellowish-brown (10YR 5/8), and red (2.5YR 4/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; 15 to 20 percent plinthite; clay films on some ped surfaces; sand grains coated and bridged with clay; very strongly acid.

The Ap or A1 horizon ranges from very dark to dark gray. The A2 horizon is dominantly loamy sand but ranges to sand in some profiles. The A horizon ranges from 20 to 34 inches in thickness. The B2t horizon is mainly sandy clay loam, but ranges through sandy loam. The depth to plinthite ranges from 30 to 36 inches, and the estimated content of plinthite ranges from 5 to 20 percent, by volume.

Leefield soils occur with the Irvington, Pelham, and Alapaha soils. They occupy lower positions, contain less fine material in the solum, and are not so well drained as the Irvington soils. They occupy higher positions and are better drained than the Pelham and Alapaha soils.

Leefield loamy sand, 0 to 3 percent slopes (LsA).—This soil commonly occurs as long narrow areas adjacent to but higher than natural ponds and drainageways. It is also on broad flats between drainageways and ponds.

Included with this soil in mapping were sizable areas of a soil that has many iron concretions within the surface layer and subsoil. Also included were small areas of Irvington and Alapaha soils.

The seasonal high water table varies, but is at a depth of 15 to 30 inches for periods of 2 to 6 months each year. A moderate acreage is in cultivation and pasture, and the rest is in woodland.

This soil is suited to corn, tobacco, sorghum, soybeans, and truck crops grown in summer. Among the suitable pasture and hay plants are bahiagrass, bermudagrass, and millet.

Because this soil is low lying and has a seasonal high water table, it generally needs drainage if cultivated crops are to be planted. Drainage can be obtained by arranging rows so that they drain off the excess water by tile drains or by using ditches to remove excess water from the fields. Another helpful practice is to plow fields in narrow beds that leave furrows or shallow ditches between the beds to remove water.

Applications of fertilizer and lime are essential for good plant growth. Returning crop residue to the soil and including soil-improving crops in the rotation help to maintain the organic-matter content and to maintain good tilth. If shredded residue is left on the surface, a suitable cropping system is row crops, such as corn, grown continuously. (Capability unit IIw–2; woodland suitability group 3w2)

Mascotte Series

The Mascotte series consists of poorly drained soils that formed in thick beds of sands and loamy sands. Slopes range from 0 to 2 percent, but in most areas they are less than 1 percent.

In a representative profile, the surface layer is very dark gray sand about 3 inches thick. Below this is light-gray sand about 6 inches thick. The next layer is very dark gray sand, about 3 inches thick, that in most places is firm or cemented with organic matter. Below this, to a depth of about 28 inches, is light yellowish-brown, mottled sand. The underlying layer, to a depth of 66 inches, is sandy clay loam and sandy loam. The upper part is light brownish gray mottled with shades of yellow; the middle is gray mottled with shades of brown and red; and the lower part is dark gray mottled with shades of brown and red.

These soils are very strongly acid throughout, low in natural fertility, and low in organic-matter content in the surface layer. Permeability is moderate. The available water capacity is low. The organic layer somewhat impedes water movement, and water is perched above this layer in many places. Tilth is fair to good.

The natural vegetation consisted of mixed pines and a few scattered hardwoods and an undergrowth of saw-palmetto, runner oak, gallberry, huckleberry, myrtle, and wiregrass.

Most of the acreage is in slash and longleaf pines. The Mascotte soils are not in cultivation in Berrien and Lanier Counties.

Representative profile of Mascotte sand, 1.5 miles northeast of Mud Creek Church, 75 yards east of State Route 64, Lanier County:

A1—0 to 3 inches, very dark gray (10YR 3/1) sand; single grain; loose; many fine roots; very strongly acid; clear, smooth boundary.

A2—3 to 9 inches, light-gray (10YR 6/1) sand; single grain; loose; very strongly acid; clear, smooth boundary.

B2h—9 to 12 inches, very dark gray (10 YR 3/1) sand; massive; firm; weakly cemented; very strongly acid; gradual, smooth boundary.

A'2—12 to 28 inches, light yellowish-brown (2.5Y 6/4) sand; few, fine, faint mottles of brownish yellow and light brownish gray; single grain; loose; very strongly acid; gradual, smooth boundary.

B'21tg—28 to 34 inches, light brownish-gray (2.5Y 6/2) sandy loam; common, medium, distinct mottles of olive yellow (2.5Y 6/6) and reddish yellow (7.5YR 6/8); weak, fine, granular structure; very friable; sand grains coated and bridged with clay; very strongly acid; clear, smooth boundary.

B'22tg—34 to 54 inches, gray (10YR 5/1) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/4) and red (2.5YR 4/8); weak, fine, granular structure; friable; sand grains coated and bridged with clay; many fine pores; very strongly acid; gradual, smooth boundary.

B'23tg—54 to 66 inches +, dark-gray (N 4/0) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/6), light olive brown (2.5Y 5/4), and red (10R 4/8); moderate, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; few fine pores; very strongly acid.

The A1 horizon ranges from gray or very dark gray to black. The A horizon ranges from 9 to 18 inches in thickness, although 8 to 10 inches thick is nearly typical. The depth to a B2h horizon ranges from 9 to 14 inches, and the thickness ranges from 3 to 7 inches. The depth to sandy clay loam material is typically about 34 inches but is as much as 54 inches in places.

The Mascotte soils occur with the Rutlege, Alapaha, Portsmouth, and Olustee soils. Mascotte soils differ from each of the first three soils in having a cemented layer high in organic-matter content beneath the surface layer. Mascotte soils have a thinner surface layer and a more leached subsurface layer than the Olustee soils. They have a grayer surface layer than the Rutlege soils. Mascotte soils have better surface drainage than the Rutlege and Alapaha soils.

Mascotte sand (Mn).—This soil is poorly drained, and it commonly occurs on broad level flats between the "cypress ponds".

Included with this soil in mapping was a sizable acreage of a similar soil that has a black sand layer. This layer is weakly cemented to strongly cemented, depending on the moisture content. In places there are two or more of these cemented layers at varying depths. Also included were small areas of Olustee and Alapaha soils.

The seasonal high water table in this soil is at a depth of 15 to 30 inches for 2 to 6 months each year. During periods of high rainfall the water table remains at the surface for weeks at a time.

None of the acreage is in cultivation in these two counties. This soil is not generally suited to crops. Bahiagrass and white clover grow fairly well under intensive management that includes drainage and fertilizer applied in amounts as determined by soil tests. Most of the acreage is in woodlands, mainly pines.

The organically cemented layer presents a special management problem, even in the use of this soil for pines, because roots do not readily penetrate. Planting in beds helps young pine seedlings to gain a better start. (Capability unit Vw–4; woodland suitability group 3w2)

Olustee Series

The Olustee series consists of poorly drained soils that formed in thick beds of marine sands and loamy sands. Slopes range from 0 to 2 percent, but in most areas they are less than 1 percent.

In a representative profile, the surface is dark-gray sand about 5 inches thick. Beneath the surface layer is very dark grayish-brown sand that is weakly cemented and stained by organic matter. This layer is about 6 inches thick. Below this, to a depth of about 38 inches, is light-gray sand mottled with shades of yellow and brown. At depths between 38 and 72 inches is light-gray sandy loam mottled with shades of yellow and brown.

These soils are very strongly acid throughout and are low in natural fertility and organic-matter content. Permeability is rapid in the upper part of the profile and moderate in the lower part. The available water capacity is low. Tilth is generally good, and the root zone is mainly deep.

The natural vegetation consisted of mixed pines and hardwoods and an understory of palmetto, gallberry, waxmyrtle, and wiregrass. Most of the acreage is in slash and longleaf pines, to which it is well suited. Some areas have been cleared and are used for corn and tobacco if drainage has been provided. A moderately small acreage is in pasture, but the dominant use is woodland.

Representative profile of Olustee sand, 0.25 mile east of U.S. Highway No. 129, and 1 mile northeast of Stockton, Lanier County:

A1—0 to 5 inches, dark-gray (10YR 4/1) sand; single grain; loose; many fine roots; very strongly acid; clear, smooth boundary.
B2h—5 to 11 inches, very dark grayish-brown (10YR 3/2) sand; single grain; friable; weakly cemented; stained by organic matter; very strongly acid; clear, smooth boundary.
B3g—11 to 14 inches, dark-brown (10YR 4/3) sand; common, medium, distinct mottles of grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2); single grain; loose; very strongly acid; clear, wavy boundary.
A'2—14 to 38 inches, light-gray (2.5Y 7/2) sand; common, medium, faint mottles of olive yellow (2.5Y 6/8) and light yellowish brown (2.5Y 6/4); single grain; loose; very strongly acid; gradual, wavy boundary.
B'2tg—38 to 72 inches +, light-gray (10YR 7/1) sandy loam; common, medium, distinct mottles of brownish yellow (10YR 6/6) and yellowish brown (10YR 5/8); weak, fine, granular structure; very friable; very strongly acid.

The A1 horizon ranges from very dark gray in wooded areas to gray in cultivated fields. The depth to loamy material ranges from 33 to 40 inches. The weakly cemented B2h horizon is within plow depth in many places.

The Olustee soils occur with the Mascotte, Alapaha, and Pelham soils. Olustee soils differ from Mascottee soils in lacking a leached A2 horizon beneath the surface layer. They occupy higher positions than Pelham and Alapaha soils, and they have an organically stained layer in the upper part of the profile.

Olustee sand (Oa).—This soil is commonly at the slightly higher elevations on broad flats.

Included with this soil in mapping were similar soils that have a layer of very dusky red sand that is weakly cemented to strongly cemented at a depth of about 8 to 10 inches. Also included were small areas of Pelham and Mascotte soils.

The depth to the seasonal high water table varies, but it is less than 15 inches for periods of 1 to 2 months each year.

A relatively small acreage is in cultivation, but if adequately drained and fertilized, this soil is suited to many crops, including tobacco, corn, grain sorghum, soybeans, and truck crops. Among the suitable pasture and hay plants are bahiagrass, bermudagrass, white clover, and small grain. Most of the acreage is in woodland or in pasture.

Drainage is the special management needed. Row crops may be grown year after year, but it is desirable to grow them in short rotations in order to maintain good tilth and to combat plant diseases.

Planting is sometimes delayed because of excess water. If this soil is cultivated, it can be bedded by plowing the fields into narrow beds with shallow ditches between them to remove the excess water. Shallow ditches around the boundaries of the fields will provide drainage outlets. Land leveling and shaping that eliminate the depressions will improve drainage in some areas. The soil is not subject to erosion.

A suitable cropping system is corn and tobacco grown in rotation, if tobacco is not planted in the same place within a field more often than once in 3 years. (Capability unit IIIw–1; woodland suitability group 3w2)

Osier Series

The Osier series consists of poorly drained and very poorly drained soils on bottom lands. These soils are subject to frequent flooding lasting from several days to 2 weeks and to an accumulation of sediments. The Osier soils are not mapped separately in these two counties; they are mapped with the Johnston and Bibb soils. Slopes range from 0 to about 2 percent.

In a representative profile, the surface layer is black and dark-gray fine sandy loam about 12 inches thick. Below this, to a depth of about 26 inches, is light brownish-gray fine sand. The next layer, to a depth of 52 inches, is light-gray loamy coarse sand mottled with gray. Stratified sand is in the lower layer in some profiles.

These soils are low in natural fertility and are very strongly acid throughout. They are low to moderate in organic-matter content. Permeability is rapid, although the seasonal high water table is near the surface for several months each year. The available water capacity is low. Tilth is good if these soils are drained.

The natural vegetation consisted mainly of sweetgum, blackgum, water oak, red maple, bay, and a few slash and pond pines. Scattered cypress may be present.

All the acreage in the two counties is in woodland, to which it is suited.

Representative profile of Osier fine sandy loam, along the Alapaha River, 1.8 miles southeast of Union Church, near Lakeland, 50 yards southeast of the Alapaha River, Lanier County:

A11—0 to 3 inches, black (10YR 2/1) fine sandy loam; single grain; very friable; roots matted; very strongly acid; abrupt, wavy boundary.
A12—3 to 12 inches, dark-gray (10YR 4/1) fine sandy loam; massive; friable; very strongly acid; abrupt, smooth boundary.
C1—12 to 26 inches, light brownish-gray (10YR 6/2) fine sand; weak, fine, granular structure to single grain; loose; very strongly acid; gradual, smooth boundary.
C2—26 to 52 inches +, light-gray (10YR 7/1) loamy coarse sand; common, medium, faint mottles of gray (10YR 6/1); weak, fine, granular structure; very friable; very strongly acid.

The A11 horizon ranges from 2 to 6 inches in thickness and is lacking in recent alluvium. It ranges from black to very dark grayish brown and from fine sandy loam to sand. Where the A1 horizon is black, it is generally less than 6 inches thick.

The Osier soils occur chiefly with the Bibb and Johnston soils. The Osier soils lack the thick black A horizon that is typical of the Johnston soils. They are coarser textured throughout the profile than either Johnston or Bibb soils.

Osier-Johnston-Bibb association (Ojb).—This mapping unit consists of wooded areas of nearly level Osier, Johnston, and Bibb soils that are in large patterns on flood plains along the major rivers and streams. The individual soils could be mapped separately if the potential for farming or other intensive use justified the cost. These soils are poorly drained to very poorly drained.

The Osier soils make up about 62 percent of this association, the Johnston soils about 18 percent, and the Bibb soils about 18 percent. Other soils make up the remaining 2 percent.

The Osier soils have a black and dark-gray fine sandy loam surface layer about 12 inches thick. The underlying layer, to a depth of 52 inches, is light brownish-gray or

light-gray fine sand and loamy coarse sand. Recent alluvium has been deposited in places.

The Johnston soils have a black loam to mucky loam surface layer about 20 inches thick. Below this is a layer of dark-gray sandy loam that has pockets of gray sand. This layer is about 16 inches thick. Beneath this, to a depth of 65 inches, is gray loamy sand and sand. The Johnston soils are generally more poorly drained than either the Osier or the Bibb soils.

The Bibb soils have a surface layer that is very dark gray fine sandy loam about 6 inches thick. Below this, to a depth of 30 inches, is dark grayish-brown fine sandy loam mottled with yellow and yellowish-brown. The next layer is light brownish-gray loamy fine sand about 12 inches thick and mottled with shades of gray. The lower layer, to a depth of 50 inches, is light-gray sand mottled with shades of gray.

Included in mapping were areas of Angie and Rains soils.

These soils are subject to flooding and are completely under water for long periods of time during wet seasons. They are not accessible during wet seasons.

These soils are not suited to cultivation, but if adequately drained and fertilized, they are suited to bahiagrass grown for hay and pasture. They are also suited to woodland. Drainage is needed for the best growth of pines. (Capability unit Vw–2; woodland suitability group 2w9)

Pelham Series

The Pelham series consists of poorly drained, nearly level soils in slightly depressed areas. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is black and dark-gray loamy sand about 9 inches thick. Below this, to a depth of 24 inches, is light-gray sand. The subsoil, to a depth of 56 inches, is mainly gray and light-gray sandy clay loam mottled with strong brown. Below this, to a depth of about 62 inches, is light-gray sandy clay mottled with olive yellow and yellowish brown.

These soils are low in natural fertility and organic-matter content and are very strongly acid throughout. Permeability is moderately rapid in the upper 2 feet of sandy material and moderate in the lower part of the subsoil. The available water capacity is mainly low, though water stands at or near the surface for long periods of time. Tilth and the depth of the root zone are dependent upon the intensity of wetness.

The natural vegetation consisted of cypress, tupelos, and wild pyracantha.

These soils are not well suited to cultivated crops or pasture because of the seasonal high water table that is at or near the surface several months of the year.

Representative profile for Pelham loamy sand, about 3 miles northeast of Grand Bay Creek Bridge on State Route 31, 0.25 mile southwest of crossroads, and 1 mile southeast of State Route 31, Lanier County:

A1—0 to 3 inches, black (N 2/0) loamy sand; weak, fine granular structure; very friable; very strongly acid; gradual, wavy boundary.

A12—3 to 9 inches, dark-gray (10YR 4/1) loamy sand; weak, fine, granular structure; very friable; very strongly acid; abrupt, smooth boundary.

A2—9 to 24 inches, light-gray (10YR 7/1) sand; single grain; loose; very friable; very strongly acid; gradual, wavy boundary.

B1tg—24 to 48 inches, gray (10YR 5/1) sandy clay loam; medium, fine, distinct mottles of strong brown (7.5YR 5/6); strong, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

B21tg—48 to 56 inches, light-gray (N 7/0) sandy clay loam; medium, fine, distinct mottles of strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; very strongly acid; gradual, wavy boundary.

B22tg—56 to 62 inches +, light-gray (N 7/0) sandy clay; many, medium, distinct mottles of olive yellow (2.5Y 6/8) and yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; very strongly acid.

The A1 horizon ranges from black to gray. The A2 horizon is sand in most places but loamy sand in some places. The matrix color of the B1tg horizon is light gray and gray. The mottles are dark gray, olive yellow, strong brown, and yellowish brown. The depth to the sandy clay loam B1tg horizon ranges from 24 to 40 inches. The Bt horizon is mainly sandy clay loam, but in many places it contains pockets or lenses of loamy sand as well as lumps of sandy clay.

The Pelham soils occur extensively with the Alapaha and Leefield soils. They differ from Alapaha and Leefield soils in lacking 5 percent, by volume, of plinthite in some parts of the subsoil that are within 60 inches of the surface.

Pelham loamy sand (Pl).—This soil is in depressions or bays. It has the profile described as representative of the series.

Included with this soil in mapping were areas where the surface layer is black muck 4 to 6 inches thick. Also included were a few small areas of Portsmouth soils.

This soil is easier to drain and to remove surface water from than Pelham loamy sand, low terrace.

This soil can be used for row crops and pasture if it is adequately drained (fig. 5).

Corn and truck crops are fairly well suited to this soil, as well as such hay and pasture plants as bahiagrass, dallisgrass, and white clover. Most of the acreage is in woodland. Pine trees, under good management that includes drainage, are also well suited.

Because of the seasonal high water table and runoff from the surrounding uplands, special management is needed. Flooding is common in spring and early in summer. If this soil is cultivated, returning crop residue helps maintain the organic-matter content and provides good tilth. A suitable cropping system is a row crop, such as corn, grown continuously, if drainage has been provided and all residue is left undisturbed through the winter. Adequate amounts of fertilizer and lime are essential for good plant growth. (Capability unit IVw–4; woodland suitability group 2w3)

Pelham loamy sand, low terrace (Pls).—This soil is along drainageways. The profile is similar to the one described as representative of the series, except that the surface layer is very dark gray loamy sand about 30 or 40 inches thick.

Included with this soil in mapping were areas of similar soils that have a mucky surface layer.

Flooding occurs after sizable rains, and water stands on the surface for periods of 1 to 3 weeks. The seasonal high water table is at or near the surface for long periods. The soil is mainly in woodland that consists of sweetgum, cypress, red maple, pine, and water-tolerant shrubs.

Figure 5.—**Drainage ditch cut in Pelham loamy sand. After excess water has been removed, pines replace the cypress and tupelos that are native to these areas.**

Because of the flooding and the wetness, this soil is not well suited to cultivated crops, but if the soil is adequately drained, fertilized, and limed, corn and truck crops can be grown continuously. Some areas require surface drainage for pasture. This soil is suitable for trees. (Capability unit IVw–4; woodland suitability group 2w3)

Portsmouth Series

The Portsmouth series consists of very poorly drained, depressional soils that formed in relatively thick beds of sediments. Slopes range from 0 to 2 percent, but in most areas they are 1 percent or less.

In a representative profile, the surface layer is black loam about 12 inches thick. It is underlain by very dark gray loam about 5 inches thick and mottled with dark gray. Below this, to a depth of about 30 inches, is a gray sandy loam mottled with dark gray. The subsoil, to a depth of 60 inches, is gray and yellowish-brown sandy clay loam mottled with shades of brown and gray. Sand lenses are in the lower part of the subsoil.

Portsmouth soils are moderate to low in natural fertility. They have a high organic-matter content in the upper part of the surface layer and low organic-matter content in the layers beneath. These soils are very strongly acid throughout. The available water capacity is medium, and permeability is moderate. Surface runoff is very slow, and in places water stands at or near the surface for long periods.

The natural vegetation consisted of a mixture of hardwoods, including sweetgum and cypress, and a few scattered pines.

If the surface water is removed, slash pines grow well. This soil is not in cultivation or in pasture in Berrien and Lanier Counties.

Representative profile of Portsmouth loam, 0.75 mile north of U.S. Highway No. 84, and about 0.25 mile north of Greenwood; 25 yards north of church on private road, Lanier County:

A11—0 to 12 inches, black (N 2/0) loam; weak, fine, granular structure; friable; many fine roots; very strongly acid; abrupt, smooth boundary.

A12—12 to 17 inches, very dark gray (10YR 3/1) loam; few, fine, faint mottles of dark gray; weak, fine, granular structure; friable; common fine roots; very strongly acid; clear, wavy boundary.

A2—17 to 30 inches, gray (10YR 5/1) sandy loam; few, fine, faint mottles of dark gray; weak, fine, granular structure; friable; many fine pores; few fine roots; very strongly acid; clear, wavy boundary.

B21tg—30 to 44 inches, gray (10YR 5/1) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; friable; sand lenses; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

B22tg—44 to 60 inches +, yellowish-brown (10YR 5/6) sandy clay loam; many, coarse, prominent mottles of gray

(10YR 5/1); moderate, medium, subangular blocky structure; friable; sand lenses; sand grains coated and bridged with clay; very strongly acid.

The substratum, at a depth below 60 inches, is either sandier or finer textured than the B2tg horizon in places. It is also stratified in places. The mottling in the B2tg horizon is red or strong brown in places.

Portsmouth soils occur with the Mascotte and Pelham soils. They are more poorly drained than the Mascotte and Pelham soils, and the surface layer is darker than that in either of those soils.

Portsmouth loam (Por).—This is a very poorly drained soil in depressions. The surface layer is dominantly loam.

Included in mapping were areas of sandy loam, fine sandy loam, and mucky loam.

This soil has a seasonal high water table at or near the surface for long periods of time. All the acreage is in woodland.

The use of this soil for crops and pasture is severely limited because of the wetness. Drained areas can be used for pasture, but most areas are difficult to drain because of the lack of suitable outlets. Bahiagrass and tall fescue are suitable pasture grasses. Pines can be grown. Trees reseed more readily and grow better in areas that are drained. Extremely wet areas that are impractical to drain can be managed in hardwoods. (Capability unit Vw–1; woodland suitability group 1w9)

Rains Series

The Rains series consists of poorly drained soils, mainly on stream terraces. These soils formed in old alluvium washed in from medium-textured soils. Slopes range from 0 to 2 percent, but in most areas they are less than 1 percent.

In a representative profile, the surface layer is very dark gray fine sandy loam about 4 inches thick. Below this is light brownish-gray and gray fine sandy loam about 10 inches thick and mottled with light gray, yellowish brown, and yellow. The subsoil, to a depth of 60 inches or more, is gray sandy clay loam mottled with light yellowish brown, light gray, pale yellow, and yellowish brown.

These soils are low in natural fertility and organic-matter content and are very strongly acid throughout. Permeability is moderate, and the available water capacity is medium, although these soils are wet for long periods. Tilth is generally good, and the effective depth of the root zone is dependent upon the wetness.

The natural vegetation consisted of mixed hardwoods and pines and an understory of gallberry, waxmyrtle, and palmetto.

These soils are not in cultivation because they are wet and subject to flooding several times a year. All the acreage in these two counties is in woodland, and it is well suited to slash and loblolly pines.

Representative profile of Rains fine sandy loam, 0.2 mile west of Alapaha River, 0.5 mile north of bridge over Alapaha River on U.S. Highway No. 129, Lanier County:

A1—0 to 4 inches, very dark gray, (10YR 3/1) fine sandy loam; weak, fine, granular structure; very friable; many fine and medium roots; very strongly acid; abrupt, smooth boundary.

A21g—4 to 8 inches, light brownish-gray (2.5Y 6/2) fine sandy loam; few, fine, faint mottles of light gray and yellowish brown; weak, fine granular structure; very friable; common fine and medium roots; very strongly acid; clear, smooth boundary.

A22g—8 to 14 inches, gray (10YR 6/1) fine sandy loam; common, medium, distinct mottles of light gray (10YR 7/1) and yellow (10YR 7/6); weak, fine, granular structure; very friable; common fine and medium roots; very strongly acid; clear, smooth boundary.

B1tg—14 to 28 inches, gray (10YR 6/1) sandy clay loam; common, medium, distinct mottles of light gray (10YR 7/1) and light yellowish brown (2.5YR 6/4); weak, medium, subangular blocky structure; friable; lenses of sand; very strongly acid; clear, smooth boundary.

B2tg—28 to 50 inches, gray (10YR 6/1) sandy clay loam; common, medium, distinct mottles of pale yellow (2.5Y 7/4), and yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; friable; very strongly acid; gradual, wavy boundary.

B3tg—50 to 60 inches +, gray (10YR 6/1) sandy clay loam; few, fine, faint mottles of light gray; weak, medium, subangular blocky structure; friable; lenses of sand; very strongly acid.

The A1 horizon ranges from very dark gray to gray. The A horizon ranges from 12 to 18 inches in thickness. The B horizon is gray or light gray. The B2tg horizon is chiefly sandy clay loam but in places ranges to sandy loam.

The Rains soils occur with the Chipley and Angie soils. They are wetter than either the Chipley or Angie soils and are finer textured below the A horizon than the Chipley soils. They are more poorly drained and not so clayey as the Angie soils.

Rains fine sandy loam (Ros).—This is a poorly drained, nearly level soil on stream terraces, and it occurs mainly as moderate to small areas.

Included with this soil in mapping were small areas of the Angie and Chipley soils.

The depth to the seasonal high water table varies, but it is less than 15 inches for a period of more than 6 months each year. During wet seasons, this soil floods more than once each year for periods of 2 to 7 days.

Nearly all of the acreage in Berrien and Lanier Counties is in woodland, to which it is well suited. The poor drainage and flood hazard are the chief reasons that none of the acreage is in cultivation. If adequately drained and fertilized, this soil can be cultivated and is fairly well suited to corn and truck crops. Among the fairly suitable hay and pasture plants are bahiagrass, dallisgrass, and white clover. If all residue is left on the surface through the winter, a suitable cropping system is a row crop, such as corn, grown continuously. (Capability unit IVw–4; woodland suitability group 2w3)

Robertsdale Series

The Robertsdale series consists of somewhat poorly drained soils that have a fragipan. They formed in thick beds of sandy clay loam. Slopes range from 0 to 2 percent.

In a representative profile the surface layer is dark-gray loamy sand about 5 inches thick. Beneath this is a layer of light yellowish-brown loamy sand about 7 inches thick. This layer has mottles of light brownish gray. The upper part of the subsoil is light yellowish-brown sandy loam and loamy sand mottled with brown and gray; the middle is light yellowish-brown and yellowish-brown sandy clay loam mottled with shades of brown, gray, and red; the lower part, to a depth of 72 inches, is light-gray

sandy clay loam mottled with yellowish brown. The depth to the fragipan layer is about 26 inches.

These soils are strongly acid throughout and are low in natural fertility and organic-matter content. Permeability is moderately slow, and the available water capacity is medium. The tilth is good, and the root zone is moderately deep in most places.

The natural vegetation consisted of slash and longleaf pines, oak, and other hardwoods and an understory of gallberry and wiregrass.

Small areas are in cultivation and pasture, but some drainage is needed for cultivated crops during most years. These soils are also well suited to pasture and pines. Pines make up a large acreage.

Representative profile of Robertsdale loamy sand, 0 to 2 percent slopes, 0.13 mile east on State Route 135, 0.75 mile southeast of Bethel Church, 50 yards in field, Berrien County:

Apcn—0 to 5 inches, dark-gray (10YR 4/1) loamy sand; weak, fine, granular structure; very friable; many fine roots; few iron pebbles; strongly acid; clear, wavy boundary.

A2cn—5 to 12 inches, light yellowish-brown (2.5Y 6/4) loamy sand; few, fine, faint mottles of brownish yellow and light brownish gray; weak, fine, granular structure; very friable; fine roots common in upper part; few iron pebbles; strongly acid; gradual, wavy boundary.

B1cn—12 to 18 inches, light yellowish-brown (2.5Y 6/4) loamy sand; common, medium, distinct mottles of yellowish brown (10YR 5/8); weak, fine, granular structure; very friable; few fine roots in upper part; few iron pebbles; strongly acid; gradual, wavy boundary.

B2cn—18 to 26 inches, light yellowish-brown (2.5Y 6/4) sandy loam; common, medium, distinct mottles of light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/8); weak, fine, granular structure; very friable; few iron pebbles; strongly acid; gradual, wavy boundary.

Bx1—26 to 36 inches, light yellowish-brown (2.5Y 6/4) sandy clay loam; many, medium, prominent mottles of yellowish brown (10YR 5/8), light gray (10YR 7/1), and red (2.5YR 4/8); moderate, medium, subangular blocky structure; friable; brittle; common to many small iron pebbles in the lower part; 15 to 20 percent plinthite; strongly acid; gradual, wavy boundary.

Bx2—36 to 60 inches, yellowish-brown (10YR 5/6) sandy clay loam; many, medium, prominent mottles of light gray (10YR 7/1), light yellowish brown (2.5Y 6/4), and red (2.5YR 4/8); moderate, medium, subangular blocky structure; friable; brittle; many small and medium iron pebbles; 25 percent plinthite; strongly acid; gradual, wavy boundary.

Bx3—60 to 72 inches +, light-gray (10R 7/1) sandy clay loam; many, coarse, distinct mottles of yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure to massive; friable; 10 percent plinthite; strongly acid.

The A1 or Ap horizon ranges from very dark gray to very dark grayish brown. The A horizon ranges from 11 to 14 inches in thickness. There are a few iron pebbles on the surface, but generally they increase in number with depth and reach a maximum near the fragipan. The plinthite content ranges from 5 to 25 percent, by volume. The depth to the fragipan ranges from 24 to 28 inches.

The Robertsdale soils occur chiefly with the Grady, Irvington, and Tifton soils. They are better drained than the Grady soils and occupy higher positions. They are not so well drained as the Tifton and Irvington soils.

Robertsdale loamy sand, 0 to 2 percent slopes (RlA).—This soil generally occurs as small areas that are long and narrow in most places. These areas are adjacent to but slightly higher than ponded areas or drainageways.

Included with this soil in mapping were small areas of the Irvington soil.

This soil has a seasonal high water table at a depth of about 15 to 30 inches below the surface for periods of 1 to 2 months each year.

This soil is limited in its suitability for crops because of wetness. It is generally in low areas surrounded by higher land; thus, in many places, drainage is difficult and expensive. In areas where drainage and fertilizer are provided, corn, tobacco, peanuts, and soybeans are fairly well suited. Bahiagrass, dallisgrass, and white and Ladino clover can be grown and are suitable pasture plants. Most of the acreage is in woods.

This soil is subject to slight soil losses or none from erosion. A suitable cropping system, if this soil is cultivated, is corn grown continuously with residue left on the soil. (Capability unit IIIw–2; woodland suitability group 2w8)

Rutlege Series

The Rutlege series consists of very poorly drained soils that formed in sands and loamy sands in depressions and on low flats. Slopes range from 0 to 2 percent, but in most areas they are 1 percent or less.

In a representative profile, the surface layer is black and very dark grayish-brown loamy sand to a depth of about 20 inches. In most places a thin layer of leaf mold is on the surface. Beneath this is very dark grayish-brown and gray loamy sand at a depth of about 20 to 26 inches. The next layer is mainly gray sand to a depth of 70 inches.

Rutlege soils are low in natural fertility. They are high in organic-matter content in the surface layer, but low in the layer beneath. They are very strongly acid throughout. Permeability is rapid, and surface runoff is slow to ponded. The available water capacity is low. The seasonal high water table is near the surface for long periods. The tilth and the depth to which plant roots penetrate are dependent on the wetness.

The natural vegetation consisted of a mixture of hardwoods and pond pines and an understory of grasses, bushes, and sedges.

These soils need drainage to improve growth of desirable species of pine. They are not used in cultivation or pasture in Berrien and Lanier Counties. All the acreage is in woodland that consists predominantly of cypress, tupelos, and a few scattered pines.

Representative profile of Rutlege loamy sand, 0.5 mile southeast of junction of State Route 168 and State Route 64, 50 yards from edge of large cypress pond, 1.5 miles east of the Alapaha River, Lanier County:

A11—0 to 20 inches, black (10YR 2/1) and very dark grayish-brown (10YR 3/2) loamy sand; weak, fine, granular structure; very friable; many clean sand grains; very strongly acid; gradual, wavy boundary.

A12—20 to 26 inches, mixed very dark grayish-brown (10YR 3/2) and gray (10YR 5/1) loamy sand; weak, fine, granular structure; very friable; very strongly acid; gradual, wavy boundary.

C1g—26 to 48 inches, gray (10YR 6/1) sand; single grain; loose; very strongly acid; diffuse, smooth boundary.

C2g—48 to 70 inches +, gray (10YR 5/1) sand; few medium mottles of gray (10YR 6/1); single grain; loose; very strongly acid.

The A11 horizon ranges from black to very dark grayish brown in color and from 8 to 20 inches in thickness. The A12

horizon ranges from gray to mixed gray and very dark grayish brown. The A11 and A12 horizons range from 24 to 35 inches in combined thickness. Gray colors are confined mainly to a depth below 40 inches.

Rutlege loamy sand (Ro).—This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas that have a sand and loamy fine sand surface layer. Also included were small areas of Portsmouth soils.

This soil has a seasonal high water table at or near the surface for long periods late in winter and in spring.

This soil is not suited to cultivated crops, and it must be drained before it can be used in pasture and pines. Suitable drainage outlets are not plentiful. If adequately drained and intensively managed, some areas can be used for pasture. Bahiagrass is a suitable pasture plant. Drainage ditches help to lower the water table. This soil is suited to woodland. (Capability unit Vw–2; woodland suitability group 2w3)

Stilson Series

The Stilson series consists of moderately well drained soils on uplands that formed in thick beds of sandy clay loam and sandy loam. These soils are widely distributed in both counties. Slopes range from 0 to 4 percent.

In a representative profile, the surface layer is dark grayish-brown loamy sand about 6 inches thick. Beneath the surface layer, to a depth of 22 inches, is olive-yellow to light olive-brown loamy sand. The subsoil, to a depth of about 70 inches, is sandy clay loam and sandy loam. It is brownish yellow and yellowish brown mottled with strong brown and pale brown in the upper part and brownish yellow mottled with shades of brown, gray, red, and yellow in the lower part. Plinthite occurs at a depth of about 42 inches.

These soils are strongly acid throughout and are low to moderate in natural fertility and organic-matter content. Permeability is moderate. The available water capacity is medium in most places. These soils have good tilth and a deep root zone.

The natural vegetation consisted of mixed pines and hardwoods and an understory of gallberry and wiregrass.

A moderate acreage is in cultivation, and a larger acreage is in pines and pasture. This soil is well suited to all of these uses.

Representative profile of Stilson loamy sand, 0 to 4 percent slopes, 1.5 miles north of Berrien High School on U.S. Highway No. 129, 0.3 mile west of highway, 50 feet in field, Berrien County:

Ap—0 to 6 inches, dark grayish-brown (2.5Y 4/2) loamy sand; weak, fine, granular structure; very friable; many grass roots; strongly acid; abrupt, smooth boundary.

A21—6 to 12 inches, olive-yellow (2.5Y 6/6) loamy sand; weak, fine, granular structure; very friable; strongly acid; gradual, wavy boundary.

A22—12 to 22 inches, light olive-brown (2.5Y 5/6) loamy sand; weak, fine, granular structure; very friable; strongly acid; gradual, wavy boundary.

B1t—22 to 32 inches, brownish-yellow (10YR 6/6) sandy loam; few, fine, faint mottles of strong brown; weak, medium, and fine, granular structure; friable; strongly acid; diffuse, wavy, boundary.

B21t—32 to 42 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, fine, faint mottles of strong brown and pale brown; moderate, medium, subangular blocky structure; friable; strongly acid; gradual, wavy boundary.

B22tg—42 to 52 inches, brownish-yellow (10YR 6/6) sandy clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/8) and light gray (10YR 7/2); moderate, medium, subangular blocky structure; friable; clay films on some ped surfaces; few soft and hard iron concretions; about 7 percent plinthite; strongly acid; gradual, wavy boundary.

B23tg—52 to 70 inches +, mottled light-gray (10YR 7/1), yellowish-brown (10YR 5/8), dark-red (10R 3/6), and brownish-yellow (10YR 6/8) sandy clay loam; mottles are common, medium, and prominent; moderate, medium, subangular blocky structure; clay films on some ped surfaces; friable; few, soft and hard iron concretions; about 25 percent plinthite; strongly acid.

The A1 or Ap horizon ranges from dark grayish brown to very dark grayish brown. The thickness of the A horizon ranges from 20 to 26 inches. The depth to the sandy clay loam B21t horizon ranges from 22 to 34 inches. The matrix color of the B1t horizon ranges from brownish yellow to yellowish brown. In places it has pale-yellow, pale-olive, or pale-brown mottles that have a chroma of 3 or 4 and that are within 30 inches of the surface. Gray mottles that have a chroma of 2 or less are at a depth below 30 inches and are mainly in the B22t horizon. The depth to a horizon that contains more than 5 percent plinthite ranges from 38 to 44 inches, and the content ranges from 5 to 25 percent.

The Stilson soils occur chiefly with the Fuquay, Leefield, and Alapaha soils. They occupy higher positions than the Alapaha and Leefield soils. They are better drained than the Leefield soils and much better drained than the Alapaha soils. The upper part of the subsoil has the characteristic yellow color of the Fuquay soils, but the lower part is mottled with gray.

Stilson loamy sand, 0 to 4 percent slopes (SeB).—This soil commonly occurs as moderately small areas that are adjacent to but higher than drainageways.

Included with this soil in mapping were small areas of Leefield and Fuquay soils.

The seasonal high water table fluctuates, but during wet seasons it is within 30 to 60 inches of the surface for periods of 1 to 2 months. A considerable acreage is in cultivation.

This soil is well suited to many crops, including corn, cotton, peanuts, tobacco, small grain, sorghum, pecans, and truck crops. Suitable pasture and hay plants are bahiagrass, bermudagrass, vetch, and crimson clover. Pine trees are well suited.

Erosion is the chief hazard if this soil is in cultivation, but in places, nearly level areas need minor drainage measures for selected crops. Some major measures that help to control erosion are plant residue management, contour tillage, terraces, vegetative waterways, strip cropping, and close-growing crops in the rotation. Both the degree and the length of slope influence the cropping system needed to control erosion. An example of a suitable cropping system on a 3 percent slope that is 350 feet long, and not terraced but cultivated on the contour, is mulch-planted corn grown continuously, and the residue mowed or chopped and left undisturbed during winter.

Returning crop residue to the soil and including soil-improving crops in the rotation help to maintain the organic-matter content and to maintain good tilth. All crop residue should be left on the soil. Adequate fertilizer and lime are essential for good plant growth and for success in controlling erosion. (Capability unit IIe–3; woodland suitability group 3s2)

Sunsweet Series

The Sunsweet series consists of well-drained pebbly soils on uplands that formed in sandy clay marine sediments. Slopes range from 5 to 12 percent, but in most of the acreage, they are more than 8 percent.

In a representative profile, the surface layer is very dark grayish-brown sandy loam about 6 inches thick. The subsoil, to a depth of 60 inches, is sandy clay and sandy clay loam. It is strong brown in the upper part, strong brown mottled with shades of red, gray, and brown in the middle, and brownish yellow mottled with light gray and yellowish brown in the lower part. The content of iron pebbles ranges from common to many on the surface and in the upper 10 to 15 inches of the profile.

The Sunsweet soils are low in natural fertility and in organic-matter content and are very strongly acid throughout. They are medium in available water capacity. They have fair tilth, except in eroded areas. The effective root zone is shallow to moderately deep. Permeability is moderately slow.

The natural vegetation consisted of mixed pines and hardwoods, and an understory of wiregrass.

These soils are not cultivated in Berrien and Lanier Counties. A small acreage is in pasture, to which these soils are fairly well suited. Most of the acreage is in pines, to which the soils are suited.

Representative profile of Sunsweet sandy loam, 5 to 12 percent slopes, eroded, 0.75 mile south of Tift-Berrien County line; 3 miles north of Enigma, west side of paved road, Berrien County:

Apcn—0 to 6 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, fine, granular structure; very friable; many hard iron pebbles ⅛ to 1 inch in diameter; coarse sandy fragments; very strongly acid; clear, smooth boundary.

B21tcn—6 to 12 inches, strong-brown (7.5YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; firm; many iron pebbles; some coarse sandy fragments; very strongly acid; clear, smooth boundary.

B22t—12 to 22 inches, strong-brown (7.5YR 5/6) sandy clay; many, medium, distinct mottles of dark red (2.5YR 3/6) and light gray (2.5Y 7/2); strong, medium, subangular blocky structure; firm; 5 to 7 percent plinthite; clay films on some ped surfaces; very strongly acid; gradual, smooth boundary.

B23t—22 to 34 inches, strong-brown (7.5YR 5/8) sandy clay; many, coarse, distinct mottles of dusky red (2.5YR 3/2), yellowish brown (10YR 5/8), and light gray (2.5Y 7/2); strong, medium, subangular blocky structure; firm; 15 to 20 percent plinthite; clay films on some ped surfaces; very strongly acid; gradual, smooth boundary.

B24t—34 to 60 inches +, brownish-yellow (10YR 6/8) sandy clay loam; many, coarse, distinct mottles of light gray (2.5Y 7/2) and yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; firm; clay films on most ped surfaces; very strongly acid.

The A1 or Ap horizon ranges from dark brown to very dark grayish brown. The depth to a layer containing 5 percent or more plinthite ranges from 5 to 12 inches. The content of plinthite ranges from 5 to 20 percent. Iron pebbles are common to many on the surface and throughout the B21tcn horizon. Light-gray or gray mottles are at a depth of about 12 inches. Field observations indicate that these mottles are the result of inherent characteristics of the parent material and are not wetness characteristics.

The Sunsweet soils commonly occur with the Tifton and Carnegie soils. They are similar to the Carnegie soils in color, but they are shallower to plinthite and are more clayey in the subsoil. Sunsweet soils are much shallower to plinthite and contain more clay than Tifton soils.

Sunsweet sandy loam, 5 to 12 percent slopes, eroded (ShD2).—This pebbly soil is on abrupt slope breaks. It occurs as small, somewhat irregular areas. There are patches where erosion has removed the original surface layer and exposed the strong-brown subsoil. Shallow gullies and rills are common.

Included with this soil in mapping were small areas of Carnegie and Tifton soils.

For the most part, this soil is not in cultivation and is not suited to row crops. A few areas are in pasture, to which the soil is well suited. Grasses, such as bahiagrass and bermudagrass, grow fairly well if good management practices are used. The major use of this soil is woodland, to which it is suited. It is also suited to pine trees.

Because of slope and the clayey nature of this soil, surface runoff is rapid. If the surface is not protected, this soil is susceptible to erosion. Special care must be taken in planting pasture or hay crops if rapid growth that provides cover with the least delay is to be insured. Careful attention should be given to planting rates, seedbed preparation, moisture conditions, and liming and fertility requirements. (Capability unit VIe–2; woodland suitability group 3c2)

Swamp

Swamp (Swa) consists of undifferentiated, very poorly drained, alluvial material of mixed origins. Water stands on or near the surface more than 10 months of the year.

The surface layer ranges from very dark gray to black. It ranges from sandy loam to coarse sand, but it is loamy sand and fine sandy loam in a few areas. Peaty muck is in some areas. Partly decomposed leaves, twigs, logs, and numerous roots are common in the surface layer. The underlying layers are variable in color and texture and are commonly stratified and interbedded. Roots and logs are common to a depth of 2 feet or more in places. The texture of these layers is silty clay loam, coarse sandy loam, coarse sand, and sand.

This land type is very strongly acid and low in natural fertility. The organic-matter content is medium to high throughout the upper part of the profile.

Swamp adjoins the Istokpoga soils.

All the acreage is in woodland, mostly hardwoods. Cypress, blackgum, bay, sweetgum, juniper, and a few scattered pines are the dominant woodland species. The understory consists of vines, ferns, bamboo, and other water-tolerant plants. Swamp is suitable for woodland and as a habitat for wildlife. (Capability unit VIIw–1; not assigned to a woodland suitability group)

Tifton Series

The Tifton series consists of well-drained soils on uplands that formed in thick beds of reticulately mottled sandy clay loam and sandy clay materials. Slopes range from 0 to 5 percent.

In a representative profile, the surface layer is very dark grayish-brown loamy sand about 6 inches thick. Below this is 5 inches of yellowish-brown loamy sand. The subsoil, to a depth of 66 inches, is sandy loam and sandy clay loam. It is yellowish brown in the upper part and yellowish brown and strong brown mottled with brownish yellow, red, yellowish brown, and light gray in the lower part. Plinthite, at depths between 30 and 66 inches, makes up about 10 to 30 percent of the soil material. Small, rounded iron pebbles, ⅛ to ½ inch in diameter, on the surface and throughout most of the surface layer and subsoil are characteristic of the Tifton soils.

These soils are low to moderate in natural fertility and are strongly acid throughout. They are low in organic-matter content and medium in available water capacity. Permeability is moderate. Tilth is good, and the root zone is deep.

The natural vegetation consisted chiefly of mixed pines and hardwoods and an understory of native grasses, mainly wiregrass.

These soils respond to good management. They are well suited to most locally grown crops. Most of the acreage is in cultivation and pasture.

Representative profile of Tifton loamy sand, 0 to 2 percent slopes, 0.75 mile north of Lowndes-Berrien County line on State Route 125, 25 yards west of highway in pecan orchard, Berrien County:

Apcn—0 to 6 inches, very dark grayish-brown (10YR 3/2) loamy sand; weak, fine, granular structure; very friable; many, small, hard iron pebbles ⅛ to ¾ inch in diameter; many fine roots; strongly acid; abrupt, smooth boundary.

A2cn—6 to 11 inches, yellowish-brown (10YR 5/4) loamy sand; weak, fine, granular structure; very friable; many, small, hard iron pebbles; some fine roots; strongly acid; clear, smooth boundary.

B1tcn—11 to 14 inches, yellowish-brown (10YR 5/4) sandy loam; weak, medium, subangular blocky structure; very friable; few, small, hard iron pebbles; some fine roots; strongly acid; clear, smooth boundary.

B21tcn—14 to 30 inches, yellowish-brown (10YR 5/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; clay films on ped surfaces; many pebbles; strongly acid; clear, smooth boundary.

B22tcn—30 to 42 inches, yellowish-brown (10YR 5/6), pebbly sandy clay loam; few, fine, distinct mottles of brownish yellow and red; moderate, medium, subangular blocky structure; friable; 10 percent plinthite, by volume; clay films on ped surfaces; few fine pores; strongly acid; clear, smooth boundary.

B23t—42 to 66 inches +, strong-brown (7.5YR 5/6) sandy clay loam; common, medium, distinct mottles of light gray (10YR 7/2) and red (2.5YR 4/8) and few, fine, faint mottles of yellowish brown; moderate, medium, subangular blocky structure; clay film on ped surfaces; few fine pores; 25 to 30 percent plinthite, by volume; friable; strongly acid.

The A horizon ranges from 6 to 18 inches in thickness. The Ap or A1 horizon ranges from grayish brown to very dark grayish brown. Small areas have an A2 horizon that ranges to loamy coarse sand or sand. The B2t horizon ranges from yellowish brown to strong brown and is sandy clay loam and clay loam. Few to many iron pebbles are on the surface and in the profile to a depth of about 30 inches. The depth to plinthite ranges from 24 to 32 inches.

The Tifton soils commonly occur with the Dothan, Carnegie, Sunsweet, and Irvington soils. They closely resemble the Dothan soils, but they have more iron pebbles throughout the profile, and generally the subsoil contains more clay. They have a thicker A horizon and are deeper to plinthite than the Carnegie soils. They are better drained than the Irvington soils, which have a fragipan. They are more friable, contain less clay, and are deeper to plinthite than Sunsweet soils.

446-142—73——3

Tifton loamy sand, 0 to 2 percent slopes (TqA).—This is a well drained soil of the uplands. It generally is in large areas, some up to 40 acres in size, on smooth ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were a few small areas of Dothan soils.

This soil responds well to management. It is well suited to most locally grown crops and is used extensively for cotton, corn, peanuts, tobacco, truck crops, and rye. It is also well suited to pasture and pines.

Most of the acreage is in cultivation or in pasture.

There are no special management problems. Cultivated fields may require row direction to take care of excess water in spring. Crops respond well to applications of fertilizer, and most crops benefit from lime. Soil testing is the best way to determine fertility needs. Returning crop residue to the soil and including soil-improving crops in the rotation help to maintain the organic-matter content and to maintain good tilth. A suitable cropping system is cotton grown for 2 years, a reseeding winter legume allowed to mature the third year, followed by grain sorghum or soybeans. Also, corn can be grown continuously. All crops residue should be left on the soil. (Capability unit I–2; woodland suitability group 2o1)

Tifton loamy sand, 2 to 5 percent slopes (TqB).—This soil occurs as large areas, some up to 60 or 80 acres in size. A profile of this soil is similar to the one described as representative of the series, but the surface layer is about 3 inches thinner.

Included with this soil in mapping were small areas of Dothan and Carnegie soils. Also included were a few eroded areas that have a yellowish-brown surface layer.

This soil can be cultivated under a wide range of moisture content, and it is extensively used for and is well suited to most locally grown crops. These crops include corn, cotton, tobacco, peanuts, small grain, pecans, and soybeans. Among the suitable pasture and hay plants are bahiagrass, bermudagrass, lupines, vetch, and crimson clover. Most of the acreage is in cultivation or in pasture.

This soil contains more iron concretions, has a slightly finer textured subsoil, and is slightly more susceptible to erosion than the Dothan soils that are in capability unit IIe–1.

Because of surface runoff and slope, this soil should be used in such a manner as to hold soil losses from erosion within allowable limits. Some major practices that help to control erosion are plant residue management, contour tillage, terraces, vegetated waterways, stripcropping, and close-growing crops in the rotation. Both the degree and length of slope influences the cropping system needed to control erosion.

Adequate fertilizer and lime are essential for good plant growth and for crop management systems in controlling erosion.

An example of a suitable cropping system for a terraced field that has a 3 percent slope and is cultivated on the contour is cotton or some other row crop the first year, mulch-planted corn the second year, and small grain followed by mulch-planted soybeans the third year. All crop residue should be left on the soil. (Capability unit IIe–2; woodland suitability group 2o1)

Use and Management of Soils

This section contains information about the use and management of the soils of Berrien and Lanier Counties for cropland and pasture, woodland, wildlife habitat, and in engineering work.

Use of Soils for Cultivated Crops and Pasture

This section discusses the use and management of soils for crops and pasture, and it has three main parts. In the first part, the capability grouping is explained, and all the capability units in the two counties are listed and briefly described. The next part gives a general statement on management by capability units. In the third part the estimated average acre yields of the principal crops in the two counties under a high level of management are given. Also, the suggested management, including fertilization, that helps to produce these yields is described.

The suitability of each soil for use as cropland and pasture, and the management needs of each soil when so used, are discussed in the individual soil descriptions.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive land forming that would change slope, depth, or other characteristics of the soils. It does not take into consideration possible but unlikely major reclamation projects; and it does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

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

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

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, shows that the chief limitation is climate that is too cold or too dry. The *c* subclass is not used in Berrien and Lanier Counties.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, 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–1 or IIIe-5. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass. The Arabic numerals are assigned at State levels. Since not all of the capability units in the statewide system are represented in Berrien and Lanier Counties, the numbering of the units is not consecutive.

The eight classes in the capability system and the subclasses and units in Berrien and Lanier Counties are described in the list that follows:

Class I. Soils that have few limitations that restrict their use.
- Unit I–2. Nearly level, well-drained soil that has a sandy surface layer and loamy subsoil.

Class II. Soils that have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe. Soils subject to moderate erosion if they are not protected.
  - Unit IIe–1. Level to very gently sloping, well-drained soil that has a sandy surface layer and loamy subsoil.
  - Unit IIe–2. Very gently sloping, well-drained, pebbly soil that has a sandy surface layer and loamy subsoil.

Unit IIe–3. Level to very gently sloping, moderately well drained soil that has a sandy surface layer and loamy subsoil.

Unit IIe–4. Very gently sloping, well-drained soils that have a loamy or sandy surface layer and a loamy subsoil; depth of the root zone is somewhat limited because of plinthite.

Subclass IIw. Soils that have moderate limitations because of excess water.

Unit IIw–2. Nearly level, moderately well-drained and somewhat poorly drained soils that have a sandy surface layer and loamy subsoil.

Subclass IIs. Soils that have moderate limitations because of limited available water capacity.

Unit IIs–1. Level to very gently sloping, well-drained soil that is somewhat droughty.

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

Subclass IIIe. Soils subject to severe erosion if they are cultivated and not protected.

Unit IIIe–5. Very gently sloping to gently sloping, well-drained soil that has a sandy surface layer and loamy subsoil.

Subclass IIIw. Soils that have severe limitations because of excess water.

Unit IIIw–1. Moderately well drained to poorly drained, nearly level soils that have a sandy surface layer and sandy to loamy underlying layers.

Unit IIIw–2. Moderately well drained and somewhat poorly drained, nearly level soils that have a sandy or loamy surface layer and a loamy to clayey subsoil.

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

Subclass IVe. Soils subject to very severe erosion if they are cultivated and not protected.

Unit IVe–4.Well-drained, gently sloping, eroded soils that have a loamy surface layer and subsoil.

Subclass IVw. Soils that have very severe limitations because of excess water.

Unit IVw–4. Poorly drained, nearly level soils that have a sandy or loamy surface layer and loamy subsoil.

Subclass IVs. Soils that have very severe limitations because of limited available water capacity.

Unit IVs–1. Excessively drained, very gently sloping to gently sloping sandy soil.

Class V. Soils that are not likely to erode, but that have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife food and cover.

Subclass Vw. Soils too wet for cultivation; drainage or protection not feasible.

Unit Vw–1. Nearly level, poorly drained and very poorly drained soils that have a sandy or loamy surface layer and loamy to clayey subsoil, in depressions and along drainageways.

Unit Vw–2. Nearly level, very poorly drained and poorly drained soils that have a sandy or loamy surface layer and underlying layer, mainly along streams.

Unit Vw–4. Nearly level, poorly drained soil that has a sandy surface layer and an organically cemented layer in the underlying layers, mainly on level flats.

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

Subclass VIe. Soils subject to very severe erosion if they are not protected by perennial cover.

Unit VIe–2. Gently sloping and sloping, well-drained, eroded soil that has a loamy surface layer and mainly clayey subsoil.

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

Subclass VIIw. Soils that have very severe limitations because of excess water.

Unit VIIw–1. Nearly level, very poorly drained organic soils and swamp.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife habitat, or water supply, or to esthetic purposes. (There are no class VIII soils in Berrien and Lanier Counties.)

Management by capability units [2]

The soils in Berrien and Lanier Counties have been grouped in 18 capability units. The soils in each unit have about the same management and respond to management in about the same way. Those who wish to know the capability classification of a given soil can refer to the "Guide to Mapping Units" at the back of this publication. Detailed information about management of the soil is given in the section "Descriptions of the Soils," at the mapping unit level.

Several management practices are helpful in maintaining soil productivity and good tilth. Among these are (1) regular application of fertilizer and lime according to the results of soil tests; (2) frequent use of cover and green-manure crops if low-residue crops are grown; (3) good management of crop residue; and (4) use of suitable cropping systems. The success of these management practices often depends upon the establishment of terraces, waterways, and drainage structures for control of water.

A suitable cropping system is a sequence of suitable crops grown under needed cultural and management measures. These measures help to control erosion, maintain

[2] JOHN B. HUNGERFORD, agronomist, SCS, assisted in writing this section.

organic-matter content, improve the physical condition of the soil, and aid in the control of insects and plant diseases. Including a green-manure or cover crop in the rotation will add organic-matter content to the soil, and including a legume will add nitrogen.

Residue from crops, if chopped or shredded and left on or near the soil surface, helps to provide a protective cover. If turned under, it improves the tilth and the available water capacity.

Soils in capability unit I–2 need only ordinary management practices to maintain productivity and good tilth. Such practices may include regular applications of fertilizer and lime, use of cover and green-manure crops, good management of plant residue, or planting of special sequence of suitable crops.

Soils in IIw, IIIw, and IVw subclasses are not subject to erosion. Excess water is the main hazard. The water management needed depends on the extent of the problem and the crops to be grown. To insure maximum efficiency of many soils, some degree of drainage will be needed. If drainage is needed, a system of main and lateral ditches may be installed, and either open drains or covered tile drains may be used. After the water problem has been solved, the same management practices used for soils in capability unit I–2 apply.

If the soils in capability subclasses IIs, IVs, and IIe, IIIe, and IVe are used for row crops, special conservation practices are required. The intensity of use and treatment of these soils are governed by: (1) the erodibility of the soil; (2) the frequency and intensity of rainfall; (3) the degree of slope; (4) the length of slope; (5) the cropping system and the management; and (6) erosion control practices.

Generally, among the choices are four erosion control practices. These practices are (1) straight-row farming, (2) contour farming without terraces, (3) terraces and contour rows, or (4) stripcropping and contour rows or straight rows. A grassed waterway or outlet is essential, and the rows should be drained from the ridges into the outlets.

The more gently sloping soils may need only contour cultivation and cropping systems that include crops producing medium to heavy residue. Steep soils or soils that have long slopes may need terraces or stripcropping and a cropping system that includes annual, close-growing crops, crops that produce much residue, or perennial crops.

A field border of perennial grass is attractive and provides convenience and efficiency in operating farm equipment. Its primary purpose is to prevent erosion at the edge of fields.

Farm roads and fences should be located on the crest of slopes where the watershed divides, or on the contour. This allows an arrangement of fields and rows that facilitates farming operations. Fences may be located in or adjacent to natural waterways.

For specific assistance in land management, the services of the local Soil and Water Conservation District can be requested. Services are provided that help in evaluating problems, in designing and laying out drainage or other water-disposal systems, and that help in planning the cropping management needed to keep soil and water losses within allowable limits.

Estimated yields

Table 2 gives estimated average acre yields of the principal crops grown in Berrien and Lanier Counties. The yields listed are those that can be expected under an improved, high level of management for nonirrigated soils. These estimates are based chiefly on observations made by the soil scientists while they were making the survey; on interviews with farmers; on information obtained from other agricultural workers who have had experience with the soils and crops of the counties; and, when available, on record of crops yields for specific soils.

The farmer can obtain the yields listed if he (1) chooses carefully the kind of crop to be grown on suitable soil and the cropping system to be used, (2) prepares a good seedbed, (3) uses proper methods of planting and seeding, (4) innoculates 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, tills on the contour, or builds terraces where needed, (10) adds liberal amounts of lime and fertilizer where required, and (11) controls disease and insects effectively.

The estimates given take into consideration the known deficiencies of the soils and the increase in yields that can be expected when these deficiencies are corrected within practical limits. Irrigation is not included.

The yields given in table 2 are estimated average yields for both counties, not for any particular farm or tract. They indicate, however, the response to be expected when reasonably intensive management is practiced.

The following are the management practices assumed to have been used to obtain the estimated yields given in table 2. The rates given for plant nutrients are on a per acre basis.

Corn.—The soils used for corn receive 80 to 120 pounds each of nitrogen, phosphoric acid, and potash. The stand contains 12,000 to 14,000 plants per acre. All crop residue and a winter cover crop are returned to the soil.

Tobacco.—The soils used for tobacco receive 50 to 70 pounds of nitrogen, 150 to 200 pounds of phosphoric acid, and 260 to 300 pounds of potash. The crop is grown on a suitable soil, and fertilizer is added in split applications. The farm operator has an effective program for controlling insects and plant diseases. The stand contains 7,000 to 8,000 plants per acre. A suitable crop rotation is used.

Peanuts.—The soils used for peanuts receive 12 to 25 pounds of nitrogen, and 36 to 60 pounds each of phosphoric acid and potash. The planting rate is 80 to 100 pounds of treated shelled seeds per acre. As a sidedressing, 400 to 500 pounds of gypsum is applied.

Cotton.—At planting time the soils used for cotton receive 30 to 40 pounds of nitrogen, 50 to 60 pounds of phosphoric acid, and 90 to 100 pounds of potash. The stand contains 20,000 to 30,000 plants per acre. As a sidedressing, 60 to 80 pounds of nitrogen is applied. The farm operator has an effective program for controlling insects and plant diseases.

Oats.—At planting time the soils used for oats receive 15 to 25 pounds of nitrogen and 50 to 75 pounds each of phosphoric acid and potash. An additional 30 to 65 pounds of nitrogen is applied late in winter. For drilled seed, the planting rate is 2 bushels per acre, and for broadcast seed it is 3 bushels per acre.

TABLE 2.—*Estimated average yields per acre of the principal crops grown under a high level of management*

[Yield figures represent average yields obtained under improved management practices that do not include irrigation. Absence of a figure indicates the crop is not commonly grown or the soil is not well suited to it]

Soil	Corn	Tobacco (flue-cured)	Peanuts (runner)	Cotton (lint)	Oats	Coastal bermudagrass		Bahiagrass for pasture
						For hay	For pasture	
	Bu.	*Lb.*	*Lb.*	*Lb.*	*Bu.*	*Tons*	*A.U.M.*[1]	*A.U.M.*[1]
Alapaha loamy sand								6. 0
Angie fine sandy loam, frequently flooded						2. 5	4. 1	4. 1
Ardilla loamy sand, 0 to 3 percent slopes	65	1, 800	1, 400	500	60	5. 0	8. 2	7. 5
Barth sand	45	1, 540	1, 400	250	45	4. 0	6. 7	4. 5
Barth fine sand, frequently flooded								4. 5
Carnegie sandy loam, 2 to 5 percent slopes	65	1, 700	2, 300	750	65	5. 0	8. 0	6. 6
Carnegie sandy loam, 5 to 8 percent slopes, eroded	55	1, 200	1, 900	450	50	4. 0	6. 5	6. 0
Chipley fine sand, frequently flooded								5. 6
Cowarts loamy sand, 2 to 5 percent slopes	70	1, 700	2, 000	600	60	4. 2	8. 0	5. 3
Cowarts sandy loam, 5 to 8 percent slopes, eroded	45	1, 000	1, 500	500	45	4. 0	5. 8	3. 8
Dothan loamy sand, 0 to 4 percent slopes	80	2, 300	2, 200	675	75	5. 3	8. 8	8. 3
Fuquay loamy sand, 0 to 4 percent slopes	80	2, 200	2, 400	600	60	5. 0	8. 8	7. 0
Fuquay loamy coarse sand, 3 to 8 percent slopes	60	1, 900	2, 200	500	50	4. 5	7. 5	6. 5
Grady soils								5. 0
Irvington loamy sand, 0 to 3 percent slopes	75	2, 200	2, 000	650	75	6. 0	9. 6	9. 5
Istokpoga complex								
Johnston-Osier-Bibb association								5. 0
Lakeland sand, 2 to 8 percent slopes						3. 6	6. 5	5. 5
Leefield loamy sand, 0 to 3 percent slopes	70	2, 200	1, 200	450	60	5. 2	8. 8	7. 6
Mascotte sand								7. 0
Olustee sand	65	2, 000	1, 200		60	4. 2	7. 0	7. 3
Osier-Johnston-Bibb association								5. 0
Pelham loamy sand								6. 6
Pelham loamy sand, low terrace								
Portsmouth loam								
Rains fine sandy loam								7. 0
Robertsdale loamy sand, 0 to 2 percent slopes	70	1, 800	1, 800	350	60	5. 0	8. 3	7. 5
Rutlege loamy sand								
Stilson loamy sand, 0 to 4 percent slopes	75	2, 200	2, 200	550	60	5. 7	9. 8	8. 5
Sunsweet sandy loam, 5 to 12 percent slopes, eroded						2. 0	3. 3	4. 0
Swamp								
Tifton loamy sand, 0 to 2 percent slopes	90	2, 400	2, 800	880	75	6. 0	9. 8	9. 0
Tifton loamy sand, 2 to 5 percent slopes	85	2, 300	2, 600	800	70	6. 0	9. 8	9. 0

[1] A.U.M. stands for animal-unit-month. This is a term used to express the carrying capacity of a pasture. It is the number of months 1 acre will support 1 animal unit, such as 1 cow, 1 steer, 1 horse, 5 hogs, or 7 sheep or goats without injury to the pasture.

Coastal bermudagrass.—The soils used for Coastal bermudagrass grown for hay or pasture (fig. 6) receive 25 to 50 pounds of nitrogen, and 60 to 100 pounds each of phosphoric acid and potash that are applied early in spring. An additional 30 pounds of nitrogen is applied after each cutting, or 60 to 90 pounds is applied in split applications, as needed, for grazing. Every 3 to 5 years, 1 ton of lime is added, or lime is applied according to the needs indicated by soil tests. The planting rate is 14,000 sprigs per acre. The grass is grazed or mowed for hay at regular intervals to control excessive growth.

Bahiagrass.—The soils used for bahiagrass grown for hay or pasture receive 25 to 50 pounds of nitrogen and 60 pounds to 100 pounds each of phosphoric acid and potash that are applied late in winter or early in spring. An additional 50 to 75 pounds of nitrogen is applied early in summer. Every 3 to 5 years, 1 ton of lime is added or lime is applied according to the needs indicated by soil tests. The planting rate is 15 pounds of broadcast seed per acre. The grass is mowed for hay at regular intervals to control excessive growth. With higher fertilization, some good farmers make higher yields than those indicated during good years.

Use of Soils for Woodland [3]

This section contains information concerning the relationship between soils and trees. It gives woodland interpretations for Berrien and Lanier Counties that make this survey more useful to woodland owners and operators. The interpretations are useful in developing and carrying

[3] W. P. THOMPSON, forester, Soil Conservation Service, assisted in the preparation of this section. Field information was gathered by teams of foresters and soil scientists. Representatives of Federal and State agencies, the wood-using industry, and others cooperated in gathering field data.

Figure 6.—**Well-managed Coastal bermudagrass pasture. The soil is Tifton loamy sand, 2 to 5 percent slopes.**

out plans for establishing and harvesting forest resources. Table 3 shows the woodland suitability groups in Berrien and Lanier Counties.

Virgin forest covered about 99 percent of the total land area in Berrien and Lanier Counties, but presently, about 65 percent is in forest.

The principal commercial tree species are slash pine (fig. 7), longleaf pine, loblolly pine, red oak, and water oak on the better drained ridges and slight ridges and cypress, blackgum, sweetgum, water oak, willow oak, sycamore, red maple, elm, and tupelo gum in the depressions, drainageways, bays, and swamps.

Both slash and longleaf pines are important to the naval stores industry as sources of turpentine and resin. After the extraction of crude gum, the trees are still marketable for other forest products.

Rating soils for woodland use

The soils of Berrien and Lanier Counties have been rated on the basis of their performance when used to produce wood crops. Ratings are based on pertinent research, measurements by foresters and soil scientsts, and the experience of forest managers. They are a means of expressing information useful in managing wood crops according to kinds of soil. Items rated in this soil survey and important to woodland use and management in Berrien and Lanier Counties are discussed in the following paragraphs.

TABLE 3.—*Suitability of the soils for woodland*

Woodland groups	Potential productivity		Species suitable for planting
	Tree species	Site index class	
Group 1w9. Excessively wet soils that have a loamy surface layer and subsoil; very high potential productivity; severe equipment limitations and seedling mortality in areas without adequate surface drainage; suited to needleleaf or broadleaf trees (Por).	Slash pine [1]	100	Loblolly pine.[2]
	Loblolly pine [1]	100	Slash pine.[2]
	Water oaks [1]	90–100	Sweetgum.[2]
	Tupelo		Sycamore.[2]
			Cherrybark oak.[2]
Group 2o1. Soils that have a sandy or loamy surface layer and a loamy subsoil; high potential productivity; no serious management problems; suited to needleleaf trees (CoB, CoC2, CqB, CtC2, DaB, TqA, TqB).	Loblolly pine	90	Slash pine.
	Slash pine	90	Loblolly pine.
	Longleaf pine	70	
Group 2o7. Soils that have a sandy surface layer and loamy subsoil; high potential productivity; no serious management problems; suited to needleleaf or broadleaf trees (IjA).	Loblolly pine	90	Slash pine.
	Slash pine	90	Loblolly pine.
	Yellow-poplar	100	Yellow-poplar.
	Red oaks		Black walnut.
	White oaks		Cherrybark oak.
			Sycamore.
Group 2w2. Chiefly seasonally wet soils that have a sandy surface layer and sandy underlying layer or loamy subsoil; high productivity; moderate equipment limitations and slight to moderate seedling mortality; suited to needleleaf trees (At, Cm).	Loblolly pine	90	Loblolly pine.
	Slash pine	90	Slash pine.
	Longleaf pine	70	
Group 2w8. Seasonally wet soils that have a sandy or loamy surface layer and loamy subsoil; high potential productivity; moderate equipment limitations and slight to moderate seedling mortality; suited to needleleaf or broadleaf trees (AqA, Au, RlA).	Loblolly pine	90	Loblolly pine.
	Slash pine	90	Slash pine.
	Sweetgum	90	Yellow-poplar.
	Yellow-poplar	100	Sycamore.
	Water oak	90	Sweetgum.
	Blackgum		Cherrybark oak.
	Red oaks		
	White oaks		
Group 2w3. Excessively wet soils that have a sandy or loamy surface layer and loamy subsoil; high potential productivity; severe equipment limitations and seedling mortality in areas without adequate surface drainage; suited to needleleaf trees (Pl, Pls, Ro, Ros).	Loblolly pine	90	Slash pine.
	Slash pine	90	Loblolly pine.
	Longleaf pine	70	

See footnotes at end of table.

TABLE 3.—*Suitability of the soils for woodland*—Continued

Woodland groups	Potential productivity		Species suitable for planting
	Tree species	Site index class	
Group 2w9. Excessively wet soils that have a sandy or loamy surface layer and sandy to loamy underlying layer or clayey subsoil; high potential productivity; severe equipment limitations and seedling mortality in areas without adequate surface drainage; suited to broadleaf or needleleaf trees (Grd, Ojb, Job).	Loblolly pine [1]	90	Loblolly pine.[2]
	Slash pine [1]	90	Slash pine.[2]
	Tupelo		Sweetgum.[2]
	Cypress		Sycamore.[2]
	Sweetgum [1]	90	Water tupelo.
	Green ash		Water oak.[2]
	Red oaks		Cherrybark oak.[2]
	White oaks		
Group 3s2. Soils that have a sandy surface and subsurface layer 20 to 40 inches thick over a loamy subsoil; moderately high potential productivity; moderate equipment limitations and seedling mortality; suited to needleleaf trees (FqC, FsB, SeB).	Slash pine	80	Slash pine.
	Loblolly pine	80	Longleaf pine.
	Longleaf pine	60–70	
Group 3c2. Soils that have a loamy surface layer and a subsoil that is mainly clayey; moderately high productivity; moderate equipment limitations and seedling mortality; suited to needleleaf trees (ShD2).	Loblolly pine	80	Loblolly pine.
	Slash pine	80	Slash pine.
	Longleaf pine	60–70	
Group 3w2. Seasonally wet soils that have a sandy surface and subsurface layer and sandy or loamy subsoil; moderately high potential productivity; moderate equipment limitations and slight to moderate seedling mortality; suited to needleleaf trees (Ba, Bb, LsA, Mn, Oa).	Loblolly pine	80	Slash pine.
	Slash pine	80	Loblolly pine.
	Longleaf pine	70	
Group 4s2. Droughty soils that are sandy to a depth of about 6 feet; moderate potential productivity; moderate equipment limitations and seedling mortality; suited to needleleaf trees (LwC).	Slash pine	70	Longleaf pine.
	Loblolly pine	70	Sand pine.
	Longleaf pine	60	Slash pine.

[1] Potential productivity attainable only in areas that have adequate surface drainage.
[2] Tree planting is feasible only in areas that have adequate surface drainage.

***Figure 7.*—Slash pine cupped for production of naval stores. Trees that are suitable for cupping are at least 10 inches in diameter. The soil is Leefield loamy sand, 0 to 3 percent slopes.**

Potential productivity is expressed as site index class for a given tree species. The site index is the average height in feet of dominant or codominant trees, at age 30 for cottonwood, at age 35 for sycamore, and at age 50 for all other species.

Species suitability is shown by listing the tree species that are suitable for planting. The selection of preferred species is influenced by their growth rates, and by the quality, value, and general marketability of the products obtained from each species.

Important soil-related hazards or limitations in woodland use and management are a part of the definition of each woodland suitability group. The limitations or hazards are (1) potential erosion hazard, (2) equipment limitation, and (3) seedling mortality. The evaluation of these management items for the soils of each woodland suitability group are rated according to the severity of the problems they impose on management. The ratings are slight, moderate, and severe.

Erosion hazard is the potential erodibility of the soil and the hazard it causes when the area is managed according to currently recognized acceptable standards. The rating classes are—

Slight. No special techniques in management are required.

Moderate. Some provision in management must be made to control accelerated erosion. Roads, skid trails, fire lanes, and landing construction require some special techniques.

Severe. Special techniques in management and special attention to roads, skid trails, fire lanes, and land-

ing construction and maintenance are necessary to minimize accelerated erosion.

Equipment limitation ratings are for the mechanical equipment that is normally used for woodland operation. The dominant factors that limit the use of equipment are wetness of the soil, rough terrain, and unfavorable soil texture. A soil rating of *slight* indicates that there are no particular problems in the use of equipment. A rating of *moderate* indicates that not all types of equipment can be used, that there are periods not in excess of 3 months when equipment cannot be used because of soil wetness, or that the soils are unstable. A rating of *severe* indicates that the use of some kinds of equipment may be limited, that special equipment may be needed, that the soil is wet more than 3 months, or that the soil texture is unfavorable.

Seedling mortality ratings refer to the expected degree of mortality of naturally occurring or planted tree seedlings as influenced by the kinds of soils, but plant competition is not a factor. The rating is *slight* if, ordinarily, seedling survival will exceed 75 percent, if natural regeneration is suitable, or if one planting may be expected to produce a satisfactory stand. The rating is *moderate* if seedling survival will be between 50 to 75 percent, if natural regeneration cannot always be relied upon for adequate and immediate restocking, and if planting may be a desirable alternative. The rating is *severe*, if seedling survival is less than 50 percent and if adequate restocking is not expected without additional management attention. For example, superior planting techniques and planting stock and replanting may be required to assure adequate stands.

Woodland suitability groups

The ratings for individual soils provide a basis for grouping soils according to their suitability for woodland use and management. A woodland suitability group is made up of soils that are capable of producing similar kinds of wood crops, that need similar management to produce these crops, and that have about the same potential productivity. The system of numbering and the use of group symbols are explained in the following paragraphs.

Each group symbol consists of three elements. The first element in the symbol is a numeral that indicates the relative productive potential of the soils for the growing of wood crops. It expresses the site quality based on the site index of one or more important forest types or species. The numeral 1 indicates very high productive potential. The numeral 2 indicates high potential productivity, the numeral 3 moderately high, the numeral 4 moderate, and the numeral 5 low potential.

The second element in the symbol is a small letter that indicates the soil characteristics or physiographic feature that is the primary cause of hazard, limitation, or restriction to the use or management of the soils for woodland, as follows:

w—Excessive wetness.
c—Clay in upper subsoil.
s—Excessive sandy material in soil profile.
o—No significant soil-related problem.

Some soils have more than one limiting characteristic, and for these soils, priority was assigned in the order of *w*, *c*, and *s*.

The third element in the symbol is a numeral that indicates the degree of hazard or limitation, and the general suitability of the soils for certain kinds of trees.

The numeral 1 indicates that the soils have no significant management limitations and they are suited to needleleaf trees. The numeral 2 indicates that the soils have one or more moderate limitations and that they are suited to needleleaf trees. The numeral 3 indicates that the soils have one or more severe limitations and that they are suited to needleleaf trees. The numeral 4 indicates that the soils have no significant limitations and are suited to broadleaf trees. The numeral 5 indicates that the soils have one or more moderate limitations, and that they are suited to broadleaf trees. The numeral 6 indicates that the soils have one or more severe limitations and that they are suited to broadleaf trees. The numeral 7 indicates that the soils have no significant limitations and that they are well suited to either needleleaf or broadleaf trees. The numeral 8 indicates that the soils have one or more moderate limitations and that the soils are well suited to either needleleaf or broadleaf trees. The numeral 9 indicates that the soils have one or more severe limitations and that the soils are suitable for needleleaf or broadleaf trees. In Berrien and Lanier Counties, numerals 4, 5, and 6 were not used.

The woodland suitability group to which each mapping unit is assigned can be determined by referring to the "Guide to Mapping Units" at the back of this survey, or to the description of the particular mapping unit.

Table 3 includes a brief description of each woodland suitability group of soils in Berrien and Lanier Counties. The table also summarizes information concerning potential wood productivity, major hazards and limitations, and preferred tree species.

Use of Soils for Wildlife[4]

The soils of Berrien and Lanier Counties produce food and cover for many kinds of wildlife. Bobwhites and doves are numerous in the large cultivated areas of both counties. Among the animals common throughout the two counties are rabbits, squirrels, foxes, opossums, raccons, skunks, and many kinds of nongame birds. Deer and wild turkeys find suitable habitat in wooded areas along the Alapaha, New, and Withlacoochee Rivers and in other large wooded tracts. Wild ducks, minks, and otters live throughout the counties

[4] PAUL D. SCHUMACHER, biologist, Soil Conservation Service, assisted in writing this section.

but are most plentiful along the major rivers and near Rays Pond and Banks Lake.

Fish are plentiful in the numerous farm ponds, in the major rivers, and in Rays Pond and Banks Lake. Banks Lake, near Lakeland, is a pond that covers several thousand acres and provides excellent fishing.

Table 4 shows suitability of the soils of Berrien and Lanier Counties for wildlife habitat and kinds of wildlife.

Interpretations for wildlife habitat

Successful management of wildlife on any tract of land requires, among other things, that food, cover, and water be available in a suitable combination. Lack of any one of these requirements, an unfavorable balance between them, or inadequate distribution of them may severely limit the numbers or may account for the lack of desired wildlife species. Information about the soil provides a valuable tool in creating, improving, or maintaining suitable habitats for wildlife.

Most wildlife habitats are managed by (1) planting suitable vegetation, (2) manipulating existing vegetation to bring about a favorable habitat or increase or improvement of desired plants, or (3) a combination of these measures. In addition, water areas can be created and natural ones can be improved for wildlife habitats. The influence of a soil on the growth of many plants is known and for other plants can be inferred from a knowledge about the characteristics and behavior of the soil.

Soil interpretations for wildlife habitat serve a variety of purposes. They are an aid in selecting the more suitable sites for various kinds of habitat management. They serve as indicators of the level of management intensity needed to achieve satisfactory results. They also serve as a means of showing why it may not be feasible generally to manage a particular area for a given kind of wildlife.

These interpretations also may serve in broad-scale planning of wildlife management areas, parks, and nature areas, or for acquiring wildlife lands. Map overlays can be made to show suitability of soils for habitat elements.

The soil areas shown on the soil survey maps are rated without regard to position in relationship to adjoining areas. The size, shape, or location of the outlined areas does not affect the rating. Certain influences on habitats, such as elevation and aspect, must be appraised onsite.

In table 4, the soils of Berrien and Lanier Counties are rated according to their suitability for the creation, improvement, or maintenance of seven elements of wildlife habitat and three kinds of wildlife. These ratings are based upon limitations imposed by the characteristics or the behavior of the soil. The four levels of suitability recognized are *well-suited*, *suited*, *poorly suited*, and *unsuited*. These ratings indicate the relative suitability of the soil and the degree of limitation. For example, a soil that is limited by slope may have a rating of "suited" for one habitat element but a rating of "poorly suited" or "unsuited" for another habitat element. The rating of "suited" indicates that the degree of slope is only a moderate limitation, and the rating of "poorly suited" or "unsuited" indicates that the same degree of slope is a severe limitation.

Special attention is directed to the rating of a coniferous woody plant habitat. A considerable body of evidence indicates that, under conditions of slow growth and delayed canopy closure, a coniferous habitat supports larger numbers and kinds of wildlife than under fast growth and quick closure. For this kind of habitat, the soil properties that tend to promote rapid growth and canopy closure are classed as limitations. In general, soil conditions that are favorable to the quick establishment of conifers and to their rapid growth, are also favorable to hardwoods. Because they generally represent a higher stage in the succession of plants, hardwoods are seriously competitive with conifers. Thus, high-level management is required to achieve satisfactory results in the creation, improvement, or maintenance of a conifer habitat.

For short-term use, soils rated as "poorly suited" may provide a temporary habitat that is easily established.

The following definitions are given for habitat suitability ratings:

Well suited: Soil limitations are negligible in the management of the designated habitat element. Generally, the intensity of management required for the creation, improvement, or maintenance of the habitat element is low, and satisfactory results are well-assured.

Suited: Soil limitations moderately affect the management of the designated habitat element. Fairly frequent attention and a moderate intensity of effort are required to achieve satisfactory results.

Poorly suited: Soil limitations are severe. The creation, improvement, or maintenance of the designated habitat element is difficult, may be expensive, and requires intensive effort to attain satisfactory results.

Unsuited: Soil limitations are so extreme that it is highly impractical, if not impossible, to manage the designated habitat element.

The seven wildlife habitat elements and the three kinds of wildlife rated in table 4 are discussed in the following paragraphs. Practical help in planning and establishing a habitat for wildlife or fish may be obtained from the nearest office of the Soil Conservation Service in either Berrien or Lanier County.

Grain and seed crops are agricultural grains or seed-producing annuals planted to produce food for wildlife. Examples are corn, sorghum, wheat, oats, millet, soybeans, and proso.

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TABLE 4.—*Suitability of soils for*

Soil series and map symbols	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Alapaha: At	Unsuited	Poorly suited	Poorly suited	Well suited
Angie: Au	Poorly suited	Suited	Suited	Well suited
Ardilla: AqA	Suited	Suited	Well suited	Well suited
Barth: Ba, Bb	Suited	Suited	Poorly suited	Suited
Carnegie: CoB, CoC2	Well suited	Well suited	Well suited	Suited
Chipley: Cm	Suited	Suited	Suited	Suited
Cowarts: CqB, CtC2	Well suited	Well suited	Well suited	Suited
Dothan: DaB	Well suited	Well suited	Well suited	Well suited
Fuquay: FqC, FsB	Suited	Well suited	Well suited	Suited
Grady: Grd	Poorly suited	Poorly suited	Suited	Suited
Irvington: IjA	Suited	Well suited	Well suited	Well suited
Istokpoga: Ist	Unsuited	Unsuited	Poorly suited	Poorly suited
Johnston-Osier-Bibb: Job	Unsuited	Poorly suited	Poorly suited	Suited
Lakeland: LwC	Poorly suited	Suited	Poorly suited	Suited
Leefield: LsA	Suited	Suited	Suited	Suited
Mascotte: Mn	Poorly suited	Poorly suited	Suited	Poorly suited
Olustee: Oa	Suited	Suited	Suited	Poorly suited
Osier-Johnston-Bibb: Ojb	Unsuited	Poorly suited	Suited	Suited
Pelham: Pl, Pls	Poorly suited	Suited	Poorly suited	Suited
Portsmouth: Por	Unsuited	Poorly suited	Poorly suited	Suited
Rains: Ros	Poorly suited	Suited	Poorly suited	Suited
Robertsdale: RlA	Suited	Well suited	Well suited	Suited
Rutlege: Ro	Unsuited	Poorly suited	Poorly suited	Poorly suited
Stilson: SeB	Suited	Well suited	Well suited	Suited
Sunsweet: ShD2	Poorly suited	Suited	Poorly suited	Suited
Swamp: Swa	Unsuited	Unsuited	Unsuited	Suited
Tifton: TqA, TqB	Well suited	Well suited	Well suited	Suited

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are established by planting and that furnish wildlife food and cover. Examples are fescue, bromegrass, lovegrass, reed canarygrass, bahiagrass, white clover, trefoil, alfalfa, annual lespedeza, perennial lespedeza, and shrub lespedeza.

Wild herbaceous upland plants are native or introduced perennial grasses and weeds that provide food and cover principally to upland wildlife. These plants are established mainly through natural processes. Examples are bluestem, wild ryegrass, catgrass, pokeweed, strawberries, lespedeza, beggarweed, wildbeans, goldenrod, dandelion, cheat and ragweed.

Hardwood woody plants are nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, or foilage used extensively as food by wildlife. These plants are commonly established through natural processes but also may be planted. Examples are oak, beech, cherry, hawthorn, dogwood, viburnum, maple, birch, poplar, grapes, honeysuckle, blueberry, briers, greenbriers, autumn olive, and multiflora rose.

Coniferous woody plants are cone-bearing trees and shrubs that are important to wildlife mainly as cover, but that also may furnish food in the form of browse, seeds, or fruitlike cones. These plants are commonly established through natural processes but also may be planted. Examples are pine and redcedar.

Wetland food and cover plants are annual and perennial, wild herbaceous plants in moist to wet sites. They do not include submerged or floating aquatics. Wetland plants produce food and cover that are extensively and dominantly used by wetland wildlife. Examples are smartweed, wild millet, bulrush, spike sedge, rushes, sedges, burreeds, wild rice, rice cutgrass, mannagrass, and cattails.

Shallow water developments control water that generally is not more than 6 feet deep. Examples are low dikes and levees, shallow dugouts, level ditches, and devices for controlling the water level in marshy drainageways or channels.

Open wildlife are quail, doves, cottontail rabbits, fox, meadowlarks, field sparrows, and other birds and mammals that normally live on cropland, pastures, meadows, lawns, and in other openland areas where grasses, herbs, and shrubby plants grow.

Woodland wildlife are woodcocks, thrushes, vireos, squirrels, deer, raccoons, wild turkeys, and other birds and mammals that normally live in the wooded areas where hardwood trees, shrubs, and coniferous trees grow.

Wetland wildlife are ducks, geese, rails, herons, shore birds, mink, and other animals that normally live in wet areas, marshes, and swamps.

Engineering Uses of Soils [5]

This section is useful to those who need information about soils used as structural material or as founda-

[5] By SHELBY R. LASTINGER, civil engineer, Soil Conservation Service.

wildlife habitat and kinds of wildlife

Coniferous woody plants	Wetland food and cover plants	Shallow water develpoments	Kinds of wildlife		
			Openland	Woodland	Wetland
Suited	Well suited	Suited	Unsuited	Well suited	Well suited.
Poorly suited	Poorly suited	Well suited	Suited	Suited	Poorly suited.
Suited	Poorly suited	Poorly suited	Suited	Well suited	Poorly suited.
Suited	Poorly suited	Poorly suited	Suited	Suited	Poorly suited.
Suited	Unsuited	Poorly suited	Well suited	Suited	Unsuited.
Suited	Unsuited	Poorly suited	Suited	Suited	Unsuited.
Well suited	Unsuited	Poorly suited	Well suited	Well suited	Unsuited.
Suited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Suited	Suited	Well suited	Poorly suited	Suited	Suited.
Suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Poorly suited	Suited	Suited	Unsuited	Poorly suited	Suited.
Poorly suited	Poorly suited	Poorly suited	Unsuited	Suited	Poorly suited.
Suited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Poorly suited	Poorly suited	Suited	Suited	Unsuited.
Suited	Poorly suited	Poorly suited	Poorly suited	Suited	Poorly suited.
Suited	Poorly suited	Poorly suited	Suited	Suited	Unsuited.
Poorly suited	Poorly suited	Poorly suited	Unsuited	Suited	Poorly suited.
Poorly suited	Well suited	Suited	Poorly suited	Suited	Well suited.
Poorly suited	Suited	Well suited	Unsuited	Suited	Well suited.
Poorly suited	Suited	Suited	Poorly suited	Suited	Suited.
Suited	Poorly suited	Poorly suited	Suited	Well suited	Poorly suited.
Poorly suited	Suited	Suited	Unsuited	Suited	Suited.
Suited	Unsuited	Poorly suited	Well suited	Suited	Unsuited.
Well suited	Unsuited	Suited	Poorly suited	Well suited	Unsuited.
Unsuited	Well suited	Well suited	Unsuited	Poorly suited	Suited.
Suited	Unsuited	Poorly suited	Well suited	Suited	Poorly suited.

tion upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, contractors, farmers, and highway, agricultural, and sanitary engineers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information concerning these and related soil properties is given in tables 5, 6, and 7. The estimates and interpretations in these tables can be used to—

1. Make studies of soil and land use that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the soil properties that are important in planning agricultural drainage systems, farm ponds, irrigation systems, terraces, and diversions.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, pipelines, and cables and in planning detailed investigations at the selected locations.
4. Locate probable sources of topsoil, roadfill, and other construction materials.
5. Supplement the information from other published maps and reports and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
6. Evaluate the limitations of soils as sites for residential, industrial, and recreational areas.

With the soil map for identification, the engineering interpretations in this section can be useful for many purposes. It should be emphasized, however, that the interpretations do not eliminate the need for sampling and testing at the site of specific engineering works where loads are heavy and where the excavations are deeper than about 5 to 7 feet or as reported here. Even in these situations, however, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Some of the terms used by soil scientists may not be familiar to the engineer, and some terms may have a special meaning in soil science. Several of these terms are defined in the Glossary at the back of this survey.

Much of the information in this section is given in tables 5, 6, and 7, but additional information useful to engineers can be found in other sections of the soil survey, particularly the sections "Descriptions of the Soils," "Use of Soils for Town and Country Planning," and "Formation and Classification of Soils."

TABLE 5.—*Engineering*

[Tests performed by Georgia State Highway Department, in cooperation with Bureau of Public Roads, U.S. Department

Soil name and location of sample	Parent material	SCS report No. S–61–Ga	Depth from surface	Moisture-density data [1]		Volume change [2]		
				Maximum dry density	Optimum moisture	Shrinkage	Swell	Total volume change
			Inches	*Pounds per cubic foot*	*Percent*	*Percent*	*Percent*	*Percent*
Angie fine sandy loam:								
1 mile E. of Lakeland and 150 yards N. of U.S. Highway 129, Lanier County. (Modal)	Alluvium (stream terrace).	86–3–1	0–5	111	11	7. 2	3. 5	10. 7
		86–3–2	8–11	122	11	6. 9	2. 4	9. 3
		86–3–5	22–34	104	18			
1.5 miles E. of Lakeland, along road parallel to powerline; 1 mile W. of junction of U.S. Highway 221 and Georgia Highway 37, Lanier County. (Coarser textured at a depth below 19 inches than modal profile)	Alluvium (stream terrace).	86–2–2	3–7	116	12	5. 0	2. 5	7. 5
		86–2–3	7–12	115	14	5. 4	0. 3	5. 7
		86–2–5	19–60+	114	15	6. 1	1. 7	7. 8
Ardilla loamy sand:								
0.3 mile E. of Valdosta-Nashville Post Road, and 0.3 mile NE. of junction of Georgia Highway 122 and Valdosta-Nashville Post Road, Berrien County. (Modal)	Coastal Plain sediments.	10–4–1	0–7	116	11	2. 7	2. 0	4. 7
		10–4–4	17–24	119	11	3. 9	0. 5	4. 4
		10–4–5	24–44	110	15	3. 9	0. 7	4. 6
4 miles SE. of Enigma on Nashville-Enigma Road, Berrien County. (Coarser textured at a depth below 13 inches than modal profile)	Coastal Plain sediments.	10–6–1	0–7	119	8	0. 0	1. 3	1. 3
		10–6–4	13–22	123	11	4. 4	0. 5	4. 9
		10–6–5	22–29	114	14	5. 4	3. 6	9. 0
Chipley fine sand:								
4.5 miles SE. of Riverside Church on Guthrie Road, Berrien County. (Coarser textured than modal profile)	Coastal Plain sediments mixed with old alluvium.	10–3–1	0–3	106	12	0. 0	0. 0	0. 0
		10–3–2	3–60	114	11	1. 2	4. 2	5. 4

[1] Based on AASHO Designation: T 99–57, Method A (*2*).
[2] Based on "A System of Soil Classification," by W. F. Abercrombie, (*1*).
[3] Mechanical analysis according to AASHO Designation: T 88 (*2*). Results by this procedure frequently differ somewhat from results that would have been 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 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the

test data

of Commerce, in accordance with standard procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis [3]							Liquid limit	Plasticity index	Classification	
Percentage passing sieve—			Percentage smaller than—						AASHO [4]	Unified [5]
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			
100	98	57	42	19	16	12	(6)	(6)	A-4(4)	ML.
100	99	66	56	38	26	21	18	(6)	A-4(6)	ML.
	100	78	70	56	48	44	38	20	A-6(12)	CL.
100	94	53	46	33	22	19	20	5	A-4(4)	ML-CL.
100	97	67	60	44	34	30	24	10	A-4(6)	CL.
100	98	55	47	39	34	31	27	13	A-6(5)	CL.
100	95	30	17	15	10	10	(6)	(6)	A-2-4(0)	SM.
100	94	34	32	28	23	22	18	4	A-2-4(0)	SM-SC.
95	89	44	38	35	31	30	24	8	A-4(2)	SC.
96	84	28	19	15	11	10	(6)	(6)	A-2-4(0)	SM.
95	83	31	26	22	19	18	20	4	A-2-4(0)	SM-SC.
93	80	36	32	30	24	23	24	10	A-4(0)	SC.
100	89	14	10	8	7	6	(6)	(6)	A-2-4(0)	SM.
100	85	15	14	9	7	6	(6)	(6)	A-2-4(0)	SM.

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 use in naming textural classes for soils.

[4] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145–49.

[5] Based on the Unified Soil Classification System (*9*).

[6] Nonplastic.

TABLE 6.—*Estimated*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear in the first column of this table.

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification: USDA texture
		Inches	
Alapaha: At	Less than 15 inches for more than 6 months each year.	0–24	Loamy sand
		24–42	Sandy loam
		42–68	Sandy clay loam
		68–72	Sandy loam
Angie: Au	Less than 30 inches for 2 to 6 months each year.	0–5	Fine sandy loam
		5–8	Sandy clay loam
		8–66	Sandy clay
Ardilla: AqA	15 to 30 inches for 1 to 2 months each year.	0–12	Loamy sand
		12–17	Sandy loam
		17–66	Sandy clay loam
Barth: Ba, Bb	15 to 30 inches for 2 to 6 months each year.	0–20	Sand
		20–44	Loamy sand
		44–60	Sand
Bibb Mapped only in associations with Johnston and Osier soils.	Less than 8 inches for 6 to 11 months each year.	0–30	Fine sandy loam
		30–42	Loamy fine sand
		42–50	Sand
Carnegie: CoB, CoC2	More than 60 inches.	0–6	Sandy loam
		6–18	Sandy clay loam
		18–66	Sandy clay loam
Chipley: Cm	30 to 60 inches for 2 to 6 months each year.	0–78	Fine sand and sand
Cowarts: CqB, CtC2	More than 60 inches.	0–6	Sandy loam
		6–17	Sandy clay loam
		17–65	Sandy clay loam
Dothan: DaB	More than 48 inches.	0–16	Loamy sand
		16–36	Sandy clay loam
		36–66	Sandy clay loam
Fuquay: FqC, FsB	More than 60 inches.	0–22	Loamy sand
		22–38	Sandy clay loam
		38–70	Sandy clay loam
Grady: Grd	At or near the surface for 6 to 8 months each year.	0–7	Sandy loam
		7–72	Sandy clay
Irvington: IjA	15 to 30 inches for 1 to 2 months each year.	0–8	Loamy sand
		8–18	Sandy loam
		18–66	Sandy clay loam
Istokpoga: Ist	At or near the surface for 8 to 12 months each year.	0–8	Mucky peat
		8–72	Peat
*Johnston: Job For the Bibb and Osier parts of the unit, see the Bibb and Osier series.	At or near the surface for 6 to 11 months each year.	0–20	Loam
		20–36	Sandy loam
		36–65	Loamy sand or sand
Lakeland: LwC	More than 120 inches.	0–78	Sand
Leefield: LsA	15 to 30 inches for 2 to 6 months each year.	0–24	Loamy sand
		24–30	Sandy clay loam
		30–72	Sandy clay loam

See footnotes at end of table.

engineering properties

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions The symbol < means less than; the symbol > means more than]

Classification—Continued		Percentage passing sieve [1]—				Permeability	Available water capacity	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
SM	A-2	100	100	70-95	10-25	>6. 3	0. 08	Low.
SM, SC	A-2, A-4	100	100	70-95	25-40	0. 63-2. 0	. 12	Low.
SC	A-4, A-6	100	100	80-90	36-50	0. 20-0. 63	. 14	Low.
SM	A-2, A-4	100	100	70-95	25-40	0. 63-2. 0	. 12	Low.
SM, ML, ML-CL	A-4	100	100	70-100	36-60	0. 63-2. 0	. 12	Low.
ML, CL	A-4, A-6	100	100	80-100	50-70	0. 20-0. 63	. 14	Moderate.
MH, CL	A-7, A-6	100	100	85-100	55-80	<0. 20	. 14	Moderate to high.
SM	A-2	95-100	95-100	75-100	15-30	2. 0-6. 3	. 08	Low.
SM, SM-SC	A-2, A-4	90-100	80-95	80-95	30-45	0. 63-2. 0	. 12	Low.
SC, SM-SC	A-4	95-100	80-95	80-95	36-50	0. 20-0. 63	. 14	Low.
SP-SM	A-3	100	100	51-75	5-10	>6. 3	. 05	Low.
SM, SP-SM	A-2	100	100	60-75	10-20	2. 0-6. 3	. 08	Low.
SM, SP-SM	A-2, A-3	100	100	50-70	5-15	2. 0-6. 3	. 08	Low.
SM, ML	A-2, A-4	100	100	70-85	20-55	0. 63-2. 0	. 15	Low to moderate.
SM	A-2	100	100	85-95	15-25	2. 0-6. 3	. 08	Low.
SM, SP-SM	A-2	100	100	50-70	10-20	2. 0-6. 3	. 05	Low.
SM	A-2	70-100	60-80	55-75	20-35	2. 0-6. 3	. 12	Low.
SC, CL	A-6, A-4	70-100	60-80	70-90	36-60	0. 63-2. 0	. 14	Moderate.
SC, CL	A-6, A-7	100	100	75-95	40-60	<0. 20	. 14	Moderate.
SM, SP-SM	A-3, A-2	100	100	70-90	5-15	>6. 3	. 05	Low.
SM	A-2	[3] 95-100	90-100	60-75	20-30	2. 0-6. 3	. 10	Low.
SC	A-2, A-6	95-100	90-100	70-80	30-40	0. 63-2. 0	. 12	Low to moderate.
SC, SM-SC	A-4, A-6 A-2	95-100	90-100	70-85	30-45	0. 20-0. 63	. 15	Moderate.
SM	A-2	85-95	85-95	70-85	15-25	2. 0-6. 3	. 10	Low.
SM, SC	A-2, A-4	90-95	80-95	70-85	25-45	0. 63-2. 0	. 12	Low.
SC, CL	A-4, A-6	90-100	90-100	70-85	36-55	0. 2-0. 63	. 15	Low.
SM	A-2	95-100	95-100	70-85	15-25	2. 0-6. 3	. 08	Low.
SM, SC	A-2, A-4	95-100	90-100	70-85	25-45	2. 0-6. 3	. 12	Low.
SC, CL	A-4, A-6	75-95	70-95	70-85	36-55	<0. 20	. 14	Low.
SM, ML	A-2, A-4	100	100	85-95	25-55	0. 63-2. 0	. 10	Low.
SC, CL, CH	A-6, A-7	100	90-100	85-100	45-80	<0. 20	. 12	Moderate to high.
SM	A-2	[3] 85-95	85-95	70-85	15-25	2. 0-6. 3	. 10	Low.
SM, SC	A-2	85-95	80-90	75-85	25-35	2. 0-6. 3	. 14	Low.
SC, CL, SM	A-4, A-6	80-90	80-90	75-90	36-55	0. 20-0. 63	. 14	Moderate.
Pt	[4]	0-10	0-10	0-10	0-5	>6. 3	. 20	Low.
Pt	[4]	5-35	5-35	5-35	5-10	>6. 3	. 16	Low.
OL, ML	A-4	100	100	85-95	50-65	2. 0-6. 3	. 16	Low.
SM, SC	A-4	100	100	75-85	36-45	2. 0-6. 3	. 12	Low.
SM	A-2	100	100	50-75	10-25	>6. 3	. 08	Low.
SM, SP-SM	A-3, A-2	100	100	50-75	5-15	>6. 3	. 05	Low.
SM	A-2	100	100	70-90	10-25	>6. 3	. 08	Low.
CL, SC	A-4, A-6	100	100	80-90	36-55	0. 63-2. 0	. 12	Low.
CL, SC	A-2, A-6	100	90-100	70-90	30-55	0. 20-0. 63	. 12	Low.

TABLE 6.—*Estimated*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification: USDA texture
		Inches	
Mascotte: Mn	15 to 30 inches for 2 to 6 months each year.	0–9	Sand
		9–12	Sand
		12–28	Sand
		28–34	Sandy loam
		34–66	Sandy clay loam
Olustee: Oa	Less than 15 inches for 1 to 2 months each year.	0–38	Sand
		38–72	Sandy loam
*Osier: Ojb For the Johnston and Bibb parts of this unit, see the Johnston and the Bibb series.	Less than 15 inches for 3 to 6 months each year.	0–12	Fine sandy loam
		12–52	Fine sand and loamy coarse sand.
Pelham: Pl, Pls	Less than 15 inches for more than 6 months each year.	0–24	Loamy sand and sand
		24–56	Sandy clay loam
		56–62	Sandy clay
Portsmouth: Por	At or near the surface for 5 to 10 months each year.	0–17	Loam
		17–30	Sandy loam
		30–60	Sandy clay loam
Rains: Ros	Less than 15 inches for more than 6 months each year.	0–14	Fine sandy loam
		14–60	Sandy clay loam
Robertsdale: RlA	15 to 30 inches for 1 to 2 months each year.	0–18	Loamy sand
		18–26	Sandy loam
		26–72	Sandy clay loam
Rutlege: Ro	At or near the surface for long periods.	0–70	Loamy sand and sand
Stilson: SeB	30 to 60 inches for 1 to 2 months each year.	0–22	Loamy sand
		22–32	Sandy loam
		32–70	Sandy clay loam
Sunsweet: ShD2	More than 48 inches.	0–6	Sandy loam
		6–12	Sandy clay loam
		12–34	Sandy clay
		34–60	Sandy clay loam
Swamp: Swa Most properties are so variable that they were not estimated.	At or near the surface for long periods.		
Tifton: TqA, TqB	More than 48 inches.	0–11	Loamy sand
		11–14	Sandy loam
		14–30	Sandy clay loam
		30–66	Sandy clay loam

[1] None of the soils contain material coarser than 3 inches in diameter.

[2] The values in this column are the approximate midpoint of a 3-figure range. For example, the available water capacity for the Alapaha soil is given as 0.8 inches per inch of soil. The value represents a range of 0.07 to 0.09 inch per inch of soil.

engineering properties—Continued

Classification—Continued		Percentage passing sieve [1]—				Permeability	Available water capacity [2]	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
SP-SM	A-3	100	100	70-85	5-10	>6. 3	. 05	Low.
SM	A-2	100	100	70-85	5-10	0. 63-2. 0	. 07	Low.
SM	A-2	100	100	70-85	5-10	>6. 3	. 09	Low.
SM	A-2	100	100	70-90	20-30	0. 63-2. 0	. 07	Low.
SC, CL	A-4, A-6	100	100	80-95	36-55	0. 63-2. 0	. 12	Low.
SM	A-3, A-2	100	100	70-85	5-10	>6. 3	. 05	Low.
SM	A-2	100	100	70-85	20-35	0. 63-2. 0	. 10	Low.
SM	A-2	100	100	50-80	20-35	>6. 3	. 12	Low.
SM, SP-SM	A-2	100	100	50-70	10-25	>6. 3	. 05	Low.
SM, SP-SM	A-3, A-2	100	100	80-90	5-20	2. 0-6. 3	. 06	Low.
SM, SC	A-6, A-4	100	100	75-90	36-45	0. 63-2. 0	. 13	Low.
SC, CL	A-7, A-6	100	100	75-95	40-60	0. 63-2. 0	. 14	Moderate.
SM, ML	A-2, A-4	100	100	75-90	25-55	0. 63-2. 0	. 15	Low.
SM	A-2	100	100	70-85	15-25	2. 0-6. 3	. 10	Low.
SC, CL	A-4, A-6	100	100	70-95	36-55	0. 63-2. 0	. 14	Moderate.
SM	A-2	100	100	70-85	20-35	0. 63-2. 0	. 12	Low.
SC, CL	A-6, A-7	100	100	75-90	40-60	0. 63-2. 0	. 15	Low to moderate.
SM	A-2	95-100	90-100	70-85	15-25	2. 0-6. 3	. 08	Low.
SM	A-4	95-100	90-100	75-85	36-45	0. 63-2. 0	. 12	Low.
SC	A-4, A-6	95-100	90-100	75-90	36-50	0. 20-0. 63	. 14	Moderate.
SM, SP-SM	A-3, A-2	100	100	50-75	5-25	>6. 3	. 06	Low.
SM	A-2	100	75-95	70-85	15-30	2. 0-6. 3	. 08	Low.
SM, SC	A-2, A-4	100	75-95	70-85	25-45	2. 0-6. 3	. 12	Low.
SC	A-4, A-6	100	70-95	70-90	36-50	0. 63-2. 0	. 13	Low.
SM	A-2	[3] 85-95	55-75	55-70	25-35	2. 0-6. 3	. 10	Low.
SM, SC	A-2, A-4	90-100	70-85	55-65	25-45	2. 0-6. 3	. 12	Low.
SC, CL	A-6, A-7	95-100	75-95	75-95	40-65	0. 20-0. 63	. 14	Moderate to high.
SC, CL	A-6	95-100	75-90	75-90	36-55	0. 63-2. 0	. 14	Moderate.
SM, SP-SM	A-2	[3] 60-95	50-90	45-75	10-25	>6. 3	. 08	Low.
SM	A-2	70-100	65-90	50-80	20-35	2. 0-6. 3	. 12	Low.
SM, SC, SM-SC	A-2, A-6	70-100	60-80	50-80	30-45	2. 0-6. 3	. 14	Low.
SC, SM-SC	A-6, A-7	95-100	70-90	70-85	40-50	0. 63-2. 0	. 14	Moderate.

[3] Iron pebbles larger than No. 4 Sieve.
[4] The AASHO system is not applicable to highly organic soils.

TABLE 7.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Alapaha: At	Poor: seasonal high water table; flooding.	Poor: seasonal high water table; flooding.	Seasonal high water table; flooding.
Angie: Au	Fair: seasonal high water table; flooding.	Poor: moderate to high shrink-swell potential.	Seasonal high water table; flooding.
Ardilla: AqA	Fair: seasonal high water table.	Fair: seasonal high water table.	Seasonal high water table.
Barth: Ba, Bb	Poor: low productivity.	Fair: seasonal high water table.	Seasonal high water table; flooding.
Bibb. Mapped only in associations with Johnston and Osier soils.	Fair: seasonal high water table; flooding.	Poor: seasonal high water table; flooding.	Seasonal high water table; flooding.
Carnegie: CoB, CoC2	Fair: thickness of material at source.	Fair: moderate shrink-swell potential.	Moderate shrink-swell potential.
Chipley: Cm	Poor: low productivity.	Good	Flooding; seasonal high water table.
Cowarts: CqB, CtC2	Fair: thickness of material at source.	Good	Features generally favorable.
Dothan: DaB	Fair: thickness of material at source.	Good	Features generally favorable.
Fuquay: FsB, FqC	Fair to poor: sandy material in upper part of profile.	Good	Features generally favorable.
Grady: Grd	Poor: flooding; seasonal high water table.	Poor: flooding; seasonal high water table.	Flooding; seasonal high water table.
Irvington: IjA	Fair: seasonal high water table.	Fair: seasonal high water table.	Seasonal high water table.

See footnote at end of table.

interpretations

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions appear in the first column of this table]

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Sprinkler irrigation	Pits excavated for irrigation	Terraces and diversions
Reservoir areas	Embankment				
Features generally favorable.	Low strength and stability.	Seasonal high water table; adequate outlets scarce.	Seasonal high water table; flooding.	Features generally favorable.	Nearly level soil.
Features generally favorable.	Slow permeability; moderate to high shrink-swell potential.	Seasonal high water table; flooding.	Seasonal high water table; flooding.	Poor recharge features; flooding.	Nearly level soil.
Moderately slow permeability.	Features generally favorable.	Moderately slow permeability; seasonal high water table.	Features generally favorable.	Fluctuating water table.	0 to 3 percent slopes.
Moderately rapid permeability and seepage.	Low strength and stability.	Seasonal high water table; flooding.	Rapid intake rate; low available water capacity.	Flooding; fluctuating water table.	Nearly level soil.
Moderate permeability.	Moderate seepage	Seasonal high water table; flooding.	Seasonal high water table; flooding.	Fluctuating water table; flooding.	Nearly level soil.
Features generally favorable.	Moderate shrink-swell potential.	Well drained	Features generally favorable on 2 to 5 percent slopes; hazard of water erosion on steeper slopes.	Well drained; poor recharge features.	Features generally favorable.
Rapid permeability and seepage.	Low strength and stability; rapid permeability.	Flooding	Rapid intake rate; low available water capacity.	Flooding; fluctuating water table.	Nearly level soil.
Probability of moderate seepage.	Susceptible to piping.	Well drained	Features generally favorable on 2 to 5 percent slopes; hazard of water erosion on steeper slopes.	Well drained; poor recharge features.	Features generally favorable.
Moderately slow permeability.	Features generally favorable.	Well drained	Features generally favorable.	Well drained; recharge features.	Features generally favorable.
Probability of moderate seepage.	Features generally favorable.	Well drained	Features generally favorable on 0 to 4 percent slopes; hazard of water erosion on steeper slopes.	Well drained; poor recharge features.	Features generally favorable.
Features generally favorable.	Moderate strength and stability; moderate to high shrink-swell potential.	Slow permeability; adequate outlets scarce.	Slow permeability; seasonal high water table; flooding.	Good water impoundment features; variable recharge features.[1]	Nearly level soil.
Probability of moderate seepage.	Susceptible to piping	Seasonal high water table; fragipan at a depth of 24 inches.	Features generally favorable.	Poor recharge features.	0 to 3 percent slopes.

TABLE 7.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Istokpoga: Ist	Poor: flooded for long periods.	Poor: high in organic-matter content.	Flooded for long periods; high in organic-matter content.
*Johnston: Job For the Bibb and Osier parts of this unit, see the Bibb and Osier series.	Fair: flooding; seasonal high water table.	Poor: flooding; seasonal high water table.	Flooding; seasonal high water table.
Lakeland: LwC	Poor: low productivity	Fair: needs additional fines.	Sand hinders hauling operation; subject to gullying.
Leefield: LsA	Poor: low productivity in upper part of profile.	Fair: seasonal high water table.	Seasonal high water table
Mascotte: Mn	Poor: low productivity	Fair: seasonal high water table.	Seasonal high water table
Olustee: Oa	Poor: seasonal high water table.	Fair: seasonal high water table.	Seasonal high water table
*Osier: Ojb For the Bibb and Johnston parts of this unit, see the Bibb and Johnston series.	Poor: seasonal high water table; low productivity.	Poor: seasonal high water table; flooding.	Flooding; seasonal high water table.
Pelham: Pl, Pls	Poor: seasonal high water table; flooding.	Poor: seasonal high water table; flooding.	Seasonal high water table; flooding.
Portsmouth: Por	Poor: seasonal high water table; flooding.	Poor: seasonal high water table; flooding.	Seasonal high water table; flooding.
Rains: Ros	Fair: seasonal high water table.	Fair: seasonal high water table.	Seasonal high water table; flooding.
Robertsdale: RlA	Fair: seasonal high water table.	Fair: seasonal high water table.	Seasonal high water table
Rutlege: Ro	Poor: seasonal high water table; ponded.	Poor: seasonal high water table; ponded.	Seasonal high water table; ponded.
Stilson: SeB	Fair: loamy sand texture in upper 22 inches of profile.	Good	Seasonal high water table

See footnote at end of table.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Sprinkler irrigation	Pits excavated for irrigation	Terraces and diversions
Reservoir areas	Embankment				
High in organic-matter content; probable seepage.	High in unstable organic-matter content; probable seepage.	Flooding; adequate outlets scarce.	Flooding for long periods.	Flooding for long periods; moderate to rapid lateral movement of water.	Nearly level soil.
Moderately rapid to rapid permeability.	Low strength and stability.	Flooding; seasonal high water table.	Flooding; seasonal high water table.	Flooding; fair recharge features.	Nearly level soil.
Rapid permeability--	Low to moderate strength and stability; probable seepage.	Excessively drained--	Low available water capacity; high intake rate.	Rapid permeability; depth to seasonal high water is greater than 6 feet.	Slow runoff; rapid permeability.
Lateral seepage probable in upper 30 inches of profile.	Probable seepage----	Seasonal high water table.	Moderate intake rate.	Fair recharge features; probable lateral seepage in upper part of profile.	0 to 3 percent slopes.
Moderate seepage probable; moderate permeability.	Moderate strength and low stability.	Seasonal high water table.	Low available water capacity; rapid intake rate.	Fluctuating water table; lateral seepage probable in the upper 34 inches of the profile.	Nearly level soil.
Rapid seepage probable in upper part of profile; moderate permeability.	Low to moderate strength; low stability.	Seasonal high water table.	Low available water capacity; rapid intake rate.	Fair to poor recharge features.	Nearly level soil.
Rapid permeability--	Low strength and stability.	Flooding; seasonal high water table.	Flooding; seasonal high water table.	Flooding; fluctuating water table.	Nearly level soil.
Moderate permeability.	Moderate strength and stability.	Seasonal high water table; adequate outlets scarce.	Seasonal high water table; rapid intake rate.	Moderate permeability; fair to poor recharge features.	Nearly level soil.
Moderate permeability; some seepage probable.	Surface layer high in organic matter; moderate strength and stability.	Seasonal high water table; adequate outlets scarce.	Moderate intake rate; seasonal high water table.	Moderate permeability; fair to good recharge features.	Nearly level soil.
Moderate permeability.	Features generally favorable.	Seasonal high water table; flooding.	Medium available water capacity; moderate intake rate.	Features generally favorable.	Nearly level soil.
Moderately slow permeability.	Susceptible to piping.	Seasonal high water table; moderately slow permeability.	Moderately rapid intake rate; fragipan at a depth of about 26 inches.	Features generally favorable.	Nearly level soil.
Rapid permeability and excessive seepage.	Probable seepage; low strength and stability.	Seasonal high water table; ponded; adequate outlets scarce.	Seasonal high water table; ponded.	Rapid permeability; slopes formed by excavation generally unstable.	Nearly level soil.
Moderate permeability.	Features generally favorable.	Seasonal high water table.	Features generally favorable.	Features generally favorable.	0 to 4 percent slopes.

TABLE 7.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Sunsweet: ShD2	Poor: clayey material at a depth of 12 inches.	Fair: moderate to high shrink-swell potential.	Slopes slightly unstable; some seepage areas; moderate to high shrink-swell potential.
Swamp: Swa	Poor: flooding; seasonal high water table.	Poor: flooding; seasonal high water table.	Flooding; seasonal high water table.
Tifton: TqA, TqB	Good	Good	Features generally favorable.

[1] Excavated open pits to intercept and store ground water.

Engineering classification systems

In this soil survey, the soils are classified according to the systems used by the American Association of State Highway Officials (AASHO) (*2*), the U.S. Department of Defense (Unified) (*9*), and the U.S. Department of Agriculture (USDA) (*8*).

Most highway engineers classify material according to the AASHO system. In this system the soil material is classified in seven principal groups. Groups range from A–1, consisting of gravelly soils of high bearing capacity, to A–7, consisting of clay soils having low strength when wet. Within each group, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest. The group index number is shown in parentheses following the soil subgroup symbol, for example, A–6(7).

Some engineers prefer the Unified system. In this system soil materials are classified according to their texture and plasticity and are grouped according to their performance as engineering construction material. Soil material is identified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class).

The USDA system of classifying soil texture is used mainly by agricultural scientists, but it is also useful to engineers. In this system, the textural class of a soil is estimated on the basis of proportions of sand, silt, and clay. 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 "very fine," "fine," "coarse," or "very coarse."

Engineering test data

Soil samples from the principal soil types of three soil series that were recognized in Berrien and Lanier Counties were tested in accordance with standard procedures so that the soil material could be evaluated for engineering purposes. The results of these tests are reported in table 5. Each soil series was sampled so that an approximation of the range of characteristics for the series could be obtained. The modal profiles are typical. The coarser textured and finer textured profiles show significant variations, but these variations are probably not the maximum variations for the series. Because the samples were obtained at a depth of 6 feet or less, the test data may not be adequate for estimating the characteristics of soil material in deep cuts.

In the moisture-density test, soil material was compacted in a mold several times with a constant compaction effort, each time at a successively higher moisture content. The density, or unit weight, of the soil material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest density obtained in the compaction test is termed "maximum dry density." Data showing moisture density are important in earthwork because, as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum content.

The data on volume change indicate the amount of shrinking and swelling that is obtained from samples prepared at optimum moisture content and then subjected to drying and wetting. The total change that can occur in a specified soil is the sum of the values given for shrinking and for swelling.

The test for liquid limit and plastic limit measure the effect of water on the consistency of the soil ma-

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Sprinkler irrigation	Pits excavated for irrigation	Terraces and diversions
Reservoir areas	Embankment				
Features generally favorable.	Low to moderate strength and stability; moderate to high shrink-swell potential.	Well drained	Slope; moderately slow permeability; hazard of water erosion.	Poor recharge features.	Slopes; clayey material at a depth of about 12 inches.
Variable textures; variable in permeability.	Variable textures	Flooding; seasonal high water table.	Flooding; seasonal high water table.	Flooding; soil features variable.	Nearly level soil.
Features generally favorable.	Features generally favorable.	Well drained	Features generally favorable.	Well-drained; recharge features variable.	Features generally favorable.

terial. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid state 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 material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Engineering properties of soils

Table 6 gives soil characteristics that are significant to engineering. These estimates are for a typical profile, which is divided into layers significant to engineering. Estimates were based on test data for those soils tested in two counties. For the soils not tested in these counties, estimates were based on test data obtained from similar soils in other counties and on past experience in engineering construction.

The depth to a seasonal high water table is based on field observations. Soils that have a high water table are limited in their use for highways and other construction. The depth to bedrock is not given in table 6, because it is not considered significant in these counties.

Permeability of the soil layers, in inches of water percolation per hour, was estimated for the soil in place. These estimates were based on the texture, structure, and porosity of the soils, and on field observations.

Available water capacity, in inches per inch of soil soil depth, is the approximate amount of water in a soil that is wet to field capacity minus the amount at the permanent wilting point of plants.

Shrink-well potential is rated according to the expected volume change of the soil material when its moisture content changes. It is estimated primarily on the basis of the amount and type of clay in the soil layers and is rated as low, moderate, and high in table 6. In general, soils classified CH and A–7 have a high shrink-swell potential. Clean sand and gravel (single grain) and soils containing a small amount of nonplastic to slightly plastic soil material have a low shrink-swell potential.

All the soils are described as strongly acid to very strongly acid; therefore, the column showing reaction for individual soils was omitted.

Engineering interpretations of soils

Engineering interpretations of the soils in Berrien and Lanier Counties are given in table 7. This table rates the suitability of soils as a source for topsoil and highway construction materials. It also lists features that adversely affect the location of highways, the construction of farm ponds, drainage systems, sprinkler irrigation systems, excavated irrigation pits, and terraces and diversions. These interpretations are made on the basis of estimates given in table 6, on test data shown in table 5, and on observations of soils in the field.

A rating of good, fair, or poor is given to show suitability of soil material as a source of topsoil and road fill. Topsoil is soil material that is suitable for topdressing slopes, road shoulders, and other earth structures that require a plant cover for protection. The suitability of a soil for road fill depends largely on its texture, moisture content, and location. Normally wet, plastic clay is rated poor for road fill, and sand is rated poor or fair, depending on its location. Sand is difficult to compact and needs close control of moisture during compaction.

The suitability of the soils in these two counties as a source of sand is not given in table 5, though several of the soils are classified as sand. These soils have poor gradation and contain material that is not suitable for

use in concrete structures or as filter material. Some of these soils, however, are suitable as a source of material that can be used in subbase of pavements. The suitability of the soils as a source of sand for subbase material can be determined by referring to tables 5 and 6.

The selection of highway locations is affected by susceptibility to seepage and flooding, a seasonal high water table, and other factors that affect construction.

The reservoir areas of farm ponds are adversely affected by rapid permeability, seepage, and flooding. Material that has low strength and stability and high shrink-swell potential is not well suited for use in embankment.

Soil features affecting agricultural drainage are a seasonal high water table, permeability, susceptibility to flooding, and availability of outlets.

Some of the features considered in evaluating a soil for irrigation purposes are rate of water intake, available water capacity, and productivity.

Slope, susceptibility to flooding, and permeability are some of the features that affect the suitability of a soil for exacavation for open pits used to intercept and store ground water.

Slope and rate of water intake are considered when determining the suitability of a soil for terraces and diversions.

Use of Soils for Town and Country Planning

This section interprets the soils of Berrien and Lanier Counties for town and country planning. Table 8 lists the degree and kind of limitations when the soils are used as sites for residences that are served by a community sewage system and by septic tank filter fields. Also listed are the limitations for campsites, intensive play areas, picnic grounds, structures for light industry, trafficways, and gardens. In these counties, soils that have slight limitations can be used essentially as they are; soils that have moderate limitations are of questionable suitability and require some modification or change in design to compensate for unfavorable soil properties; soils that have severe limitations generally are not suitable and, if used, require intensive modifications or adjustments in design to compensate for unfavorable soil properties.

These ratings used in combination with the soil maps in the back of this report can be helpful in selecting sites and in general planning for community facilities. Reference to the other engineering tables may also be helpful, but this table does not eliminate the need for onsite investigations to determine the extent of the engineering problems and the specifications to correct them.

Residences refer to dwellings of three stories or less. They may be single houses or in a large subdivision. The limitations are rated for dwellings served by public or community sewage systems and for dwellings that are served by septic tank filter fields. The significant soil properties are bearing strength, shrink-swell potential, depth to seasonal high water table, flood hazard, and slope. Flooding (fig. 8) is a major limiting factor. If a septic tank filter field is required, a high water table and a slow percolation rate are major limitations.

Figure 8.—**A flooded area in the Angie-Chipley-Rains association. This association is on broad, level river terraces that are subject to flooding. The limitations for community development are severe.**

Recreational facilities include campsites, intensive play areas, and picnic grounds. Campsites are suitable for tents and camping trailers and provide accommodations for outdoor living for a period of about 5 to 7 days. It is assumed that little site preparation is needed. Suitability for septic tanks is not a requirement. Soil properties that affect this use are depth to seasonal high water table, flood hazard, permeability, surface soil texture, and slope.

Intensive play areas are areas developed for playgrounds and organized games, such as baseball and tennis. They are subject to much foot traffic and generally require a nearly level surface, good drainage, and texture and consistence that give a firm surface. The properties important in evaluating soils for these uses are depth to seasonal high water table, flood hazard, permeability, slope, and surface soil texture.

For picnic grounds, the same properties as for intensive play areas are significant, although wider variations within some properties can be permitted.

Structures for light industry include buildings that are used for stores, offices, and small industries, none of which are more than three stories high nor require more than moderate bearing strength. It is assumed that sewage disposal facilities are available. The properties important in evaluating soils for this use are slope, depth to seasonal high water table, flood hazard, bearing strength, shrink-swell potential, and corrosion potential.

Trafficways refer to low-cost roads and residential streets. It is assumed that construction involves limited cut and fill and limited preparation of subgrade. The properties important in evaluating soils for such trafficways are slope, depth to seasonal high water table, flood hazard, shrink-swell potential, and traffic-supporting capacity.

Gardens include the production of both vegetables and flowers for the home. Properties important in evaluating soils for this use are productivity, depth to seasonal high water table, flood hazard, droughtiness, tilth, slope, erodibility, and permeability.

Formation and Classification of Soils

This section presents the outstanding characteristics of the soils of Berrien and Lanier Counties and relates them to the factors of soil formation. The first part of the section discusses the factors of soil formation, and the second discusses their classification.

Factors of Soil Formation

Soil is formed by the action of soil-forming processes on material deposited or accumulated by geologic forces. The characteristics of the soil at any given point are determined by (1) the physical and mineralogical composition of the parent material; (2) the climate under which the soil material has accumulated and has existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief or lay of the land, which influences drainage; and (5) the length of time the forces of soil development have acted on the soil material.

Climate and vegetation are active factors of soil genesis. They act on the parent material that has accumulated through the weathering of rocks and slowly change it to a natural body that has genetically related horizons. The effect of climate and vegetation is conditioned by relief. The parent material also affects the kind of profile that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the changing of the parent material into a mature soil. The amount of time may be short or long but some time is always required for soil horizons to form. Usually a long time is required for the development of a distinct horizon. Thus, for every soil, the past combinations of the five major factors are of first importance in determining its present character. All of these five factors have influenced the formation and development of the soils of Berrien and Lanier Counties.

The factors of soil genesis are so closely interrelated in their effects on the soil that some generalizations cannot be made regarding the effect of any one unless conditions are specified for the other four.

Parent material

Parent material is the unconsolidated mass from which soil develops. The kind of parent material, especially the size of the particles and the content of minerals, greatly influences the development of soils. In Berrien and Lanier Counties, the parent materials of most of the soils are sedimentary and consist of unconsolidated, fragmentary rock materials that have been deposited by water. The material ranges in texture from coarse sand, which is chiefly quartz mineral, to fine clay, which is a secondary silicate mineral.

Although the texture of the parent materials is significantly variable within each, parts of the three major geologic formations (*4*) are the sources of parent material for the soils that have formed in these two counties. Most of the soils formed in materials of the Hawthorn Formation. This formation is of the Miocene Epoch. The materials that are near the surface consist of irregular beds of loamy, sandy, and, to some extent, clayey deposits. Some of the well-drained soils, particularly in the western and northern parts of Berrien County, formed in materials of this formation. Among these are soils of the Tifton, Fuquay, and Cowarts series.

The Brandywine Formation of the Pleistocene Epoch covers a fairly large area, stretching from south of Alapaha in Berrien County to a point northwest of Lakeland in Lanier County. This formation is approximately 270 feet above sea level. Although the texture in the uppermost 5 to 7 feet is similar to that in the Hawthorn Formation, the soils that have formed are less well drained. Among these are commonly soils of the Irvington, Leefield, and Stilson series.

The Coharie Formation occurs only in the western and eastern parts of Lanier County and is separated by a narrow ridge of Hawthorn Formation along either side of the Alapaha River. The Coharie Formation is at an elevation of about 215 feet. Generally, wet soils formed in materials of this formation. Among these are soils of the Alapaha, Pelham, and Mascotte series.

Within the bounds of each geologic formation, soils that have a different textured solum because they formed in different textured parent materials are common. The differences in parent material may be attributed to one or more factors. Among these are stream deposition and sorting and accumulation of materials because of relief. Two examples of contrasting soils within close proximity are the loamy Tifton soils and the clayey Sunsweet soils, and the clayey Angie soils and sandy Chipley soils. Thus, perhaps the most significant factor in the formation of these soils is the parent material.

Climate

The amount of precipitation, the temperature, humidity, and wind are the climatic forces that act on the parent material of soils. These forces also cause some variation in the plant and animal life on and in the soils. In this way they influence changes in the parent material and soil development.

Berrien and Lanier Counties have a warm, humid climate. The climate of these two counties has probably not changed much from that in earlier times. The average annual temperature is 65° F., and the average annual rainfall is 48 inches. The winters are mild, and, as a result, freezing and thawing of the soil material occurs only occasionally and then only in the upper 2 or 3 inches of the surface layer.

Because of the warm climate and the abundance of rainfall, chemical and biological actions are rapid. The abundance of rainfall causes the soils of the ridges and slopes to be highly leached and low in organic-matter content. The removal of basic elements, such as calcium, magnesium, and sodium, and their replacement by hydrogen causes the soils to be acid. Hydrogen is the dominant cation in the soils of the counties. The translocation of such soluble material as bases and such less soluble material as colloidal matter has made the soils less fertile than they formerly were and has caused their surface layer to be more sandy. More information about the climate of Berrien and Lanier Counties is given under "Climate" in the section "Additional Facts About the Two Counties."

TABLE 8.—*Limitations of soils*

Soil series and map symbols	Residences with—		Recreational facilities
	Public or community sewage systems	Septic tank filter fields	Campsites
Alapaha: At	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Angie: Au	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Ardilla: AqA	Moderate: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.
Barth: Ba	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Bb	Severe: flooding	Severe: flooding	Severe: flooding
Bibb (mapped only in associations with Johnston and Osier soils).	Severe: flooding	Severe: flooding	Severe: flooding
Carnegie: CoB, CoC2	Slight to moderate: moderate shrink-swell potential.	Severe: percolation rate is slower than 75 minutes per inch.	Slight on slopes of 2 to 5 percent; moderate on slopes of 5 to 8 percent.
Chipley: Cm	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Moderate: seasonal high water table; flooding.
Cowarts: CqB, CtC2	Slight	Severe: percolation rate is slower than 75 minutes per inch.	Slight
Dothan: DaB	Slight	Severe: percolation rate is slower than 75 minutes per inch.	Slight
Fuquay: FsB, FqC	Slight	Severe: percolation rate is slower than 75 minutes per inch at a depth below 36 to 48 inches.	Slight
Grady: Grd	Severe: seasonal high water table; flooding.	Severe: flooding; seasonal high water table.	Severe: seasonal high water water table; flooding.
Irvington: IjA	Slight to moderate: seasonal high water table.	Severe: seasonal high water table.	Slight
Istokpoga: Ist	Severe: flooding	Severe: flooding	Severe: flooding
Johnston: Job. For the Bibb and Osier parts of this unit, see the Bibb and Osier series.	Severe: flooding	Severe: flooding	Severe: flooding
Lakeland: LwC	Slight	Slight to severe: contamination hazard to nearby water supply, where water is shallow.	Moderate: sand surface texture.

See footnote at end of table.

for town and country planning

Recreational facilities—Continued		Other uses		
Intensive play areas	Picnic grounds	Structures for light industry	Trafficways[1]	Gardens
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: flooding; seasonal high water table.	Severe: flooding; seasonal high water table.	Severe: seasonal high water table; flooding.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: droughty in summer.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Moderate on slopes of 2 to 5 percent; severe on slopes greater than 5 percent.	Slight	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential; fair traffic-supporting capacity.	Moderate on slopes of 2 to 5 percent; severe on slopes of 5 to 8 percent; moderate to very severe erosion hazard.
Moderate: seasonal high water table; flooding.	Moderate: seasonal high water table; flooding.	Moderate: flooding	Moderate: fair traffic-supporting capacity.	Severe: flooding.
Moderate on slopes of 2 to 5 percent slopes; severe on slopes of 5 to 8 percent slopes.	Slight	Slight on slopes of 2 to 5 percent; moderate on slopes of 5 to 8 percent.	Slight	Moderate on slopes of 2 to 5 percent; severe on slopes of 5 to 8 percent; moderate to very severe erosion hazard.
Slight to moderate: slope	Slight	Slight	Slight	Slight.
Moderate on slopes of 2 to 5 percent; severe on slopes of 5 to 8 percent.	Slight	Slight on slopes of 0 to 4 percent; moderate on slopes of 4 to 8 percent.	Slight to moderate: slope.	Slight to moderate on slopes of 0 to 4 percent; severe on slopes of 4 to 8 percent; droughtiness and slope.
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: flooding; seasonal high water table.	Severe: seasonal high water table; flooding.
Slight to moderate: slope.	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table; fair traffic-supporting capacity.	Slight.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Severe: sand surface texture.	Moderate: sand surface texture.	Slight on slopes of 2 to 5 percent; moderate on slopes of 5 to 8 percent.	Slight to moderate: slope.	Severe: droughtiness.

TABLE 8.—*Limitations of soils for*

Soil series and map symbols	Residences with—		Recreational facilities
	Public or community sewage systems	Septic tank filter fields	Campsites
Leefield: LsA	Moderate: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.
Mascotte: Mn	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Olustee: Oa	Moderate to severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Osier: Ojb For the Bibb and Johnston parts of this unit, see the Bibb and Johnston series.	Severe: flooding	Severe: flooding	Severe: flooding
Pelham: Pl, Pls	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Portsmouth: Por	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Rains: Ros	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Robertsdale: RlA	Moderate to severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.
Rutlege: Ro	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Stilson: SeB	Slight	Moderate: seasonal high water table.	Slight to moderate: seasonal high water table.
Sunsweet: ShD2	Moderate: slope	Severe: percolation rate slower than 75 minutes per inch.	Moderate: slope
Swamp: Swa	Severe: flooding	Severe: flooding	Severe: flooding
Tifton: TqA, TqB	Slight	Moderate: percolation rate is 45–75 minutes per inch in the lower part of the profile.	Slight

[1] Traffic-supporting capacity refers to the ability of the undisturbed soil to support moving loads.

town and country planning—Continued

Recreational facilities—Continued		Other uses		
Intensive play areas	Picnic grounds	Structures for light industry	Trafficways[1]	Gardens
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; droughty in dry periods.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe to moderate: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: flooding; poor traffic-supporting capacity.	Severe: seasonal high water table; flooding.
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: flooding; seasonal high water table.	Severe: flooding; poor traffic-supporting capacity.	Severe: flooding.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: flooding; poor traffic-supporting capacity.	Severe: flooding; seasonal high water table.
Moderate: seasonal high water table.	Slight to moderate: seasonal high water table.	Moderate to slight: seasonal high water table.	Moderate: seasonal high water table; fair traffic-supporting capacity.	Slight to moderate: slight to moderate erosion hazard.
Severe: slope	Moderate: slope	Moderate to severe: slope.	Moderate: fair traffic-supporting capacity; slope.	Severe: very severe erosion hazard.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Slight on slopes of 0 to 2 percent; moderate on slopes of 2 to 5 percent.	Slight	Slight	Slight	Slight on slopes of 0 to 2 percent; moderate on slopes of 2 to 5 percent; moderate erosion hazard.

Plant and animal life

Plants, micro-organisms, earthworms, insects, and other forms of life that live on or in the soil are active in the soil-forming process. They help decompose plant residue, and they affect the chemistry of the soil. In this way they hasten the development of a soil profile. Living organisms also help to convert plant nutrients to a form in which they are readily available to higher forms of life.

Plants provide shade and cover and thus reduce losses of water from runoff and evaporation. They add organic matter to the soils, thereby influencing the soil structure and physical condition. Plant roots help keep the soil supplied with minerals by bringing elements from the parent material to the surface layer in a form more usable to plants.

Generally the kind of soils in an area varies according to the kinds of plants. In these counties most of the soils in the upland areas contain little organic matter, but such ponded wet soils as the Portsmouth and Istokpoga soils are much higher in organic-matter content. The long summers and the kinds of trees on the uplands have kept organic matter from accumulating in sizable amounts. In wooded areas, however, there is a thin covering of leaf mold and a small amount of organic matter in the uppermost 1 to 3 inches of mineral soil material.

In the poorly drained areas of Berrien and Lanier Counties are mineral soils, such as Pelham and Portsmouth soils, that have a dark-gray or black surface layer. The organic-matter content, by volume, ranges from 3 to 6 percent. On the other extreme is the Lakeland series that is excessively drained and that supports a relatively poor stand of native vegetation. These soils contain little or no organic matter.

The soils in these counties formed under three broad types of vegetation. These are (1) longleaf pine and scattered hardwoods that have an understory of wiregrass; (2) a cypress-swamp-hardwood type of forest that has scattered pines and an understory of gallberry bushes and other water-tolerant shrubs and grasses; and (3) scrub oaks and scattered longleaf pines.

Man has changed the direction and rate of development of some soils by clearing the forests, cultivating the soils, and introducing new kinds of plants. The results from these activities cannot be seen yet, but studies show that the organic-matter content of soils is sharply reduced for a few months after fields have been cultivated. Also, the somewhat coarse textured, eluviated layer is lost through mixing or erosion in most sloping areas under cultivation. Although some results will probably not be evident for many centuries, the complex of living organisms affecting the soil formation in Berrien and Lanier Counties has been drastically changed as a result of man's activity.

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. Relief results from the entrenchment of the drainage pattern into the land surface and, in places, reduces the percolation of water through the soil. In these counties, which are a part of the Coastal Plain, relief is mostly nearly level to strongly sloping. The four general kinds of landscapes in these counties are narrow to broad ridges; low, nearly level ridges and flats or depressions; sand ridges; and low areas on valley floors in stream flood plains and 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 have a water table that 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 during part of the year. In the soils of these naturally wet areas, reduction of materials generally results in gray (gleyed) colors. Among these are soils of the Pelham, Grady, Rains, and Alapaha series.

The sand ridges are in rolling areas or on narrow ridgetops near or along the major streams. The soils of these ridges are deep and sandy, and the water table is at a depth of more than 10 feet. Among these are soils of the Lakeland series.

On valley floors, in stream swamps, and on low terraces, the soils are young. The are predominantly gray or gleyed, and they have poorly defined horizons. In these areas the water table is at or near the surface much of the time. Among these are soils of the Johnston, Osier, Bibb, Angie, Chipley, and Rains series.

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). In a warm, humid climate, such as that in Berrien and Lanier Counties, less time is required for a profile to develop than in a cold, dry climate. This is because moisture and warm temperature accelerate the chemical and biological activity in the soil material. Also, less time is required for a soil to develop a distinct profile in moderately permeable soil material than in slowly permeable material.

In Berrien and Lanier Counties the soils that formed in alluvium along the first bottoms of streams lack well-defined and genetically related horizons. In contrast, the Tifton and Dothan soils, which are on uplands, have a well developed profile. Geologically, all of the soils of these counties are young.

Classification of Soils

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and later revised (*6*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 and supplemented in March 1967 and September 1968 (*8*). This system is under continual study, and readers interested in the development of the system should refer to the latest literature available.

The current system of classification defines classes in terms of observable or measurable properties of soils (*5*).

It has six categories. Beginning with the most inclusive, the categories are the order, the suborder, the great group, the subgroup, the family, and the series. The placement of some soil series, particularly in families, may change as more precise information becomes available.

In table 9, the soil series of Berrien and Lanier Counties are placed in the categories of the current system. Following are brief descriptions of the first five categories in the system.

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 groupings of soils. Two exceptions are Entisols and Histosols, that occur in many different climates. Table 9 shows that five soil orders are represented in Berrien and Lanier counties. They are Entisols, Inceptisols, Spodosols, Ultisols, and Histosols.

Entisols are young mineral soils that do not have genetic horizons or have only the beginning of such horizons.

Inceptisols are mineral soils in which horizons have definitely started to develop. They generally are on young, but not recent land surfaces.

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 requirements of a spodic horizon except thickness.

Ultisols are mineral soils that commonly occur on relatively old land surfaces and have distinct horizons. These soils contain a clay-enriched B horizon that has low base saturation. The base saturation decreases with depth.

Histosols consist of organic soil materials and are commonly in areas that are saturated by water for prolonged periods but not in artificially drained areas. The organic-matter content generally is 20 percent or more.

SUBORDER.—Each order is divided into suborders, primarily on the basis of soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders have a narrower climatic range than the orders. The criteria for suborders chiefly reflect the presence or absence of waterlogging or soil differences resulting from the climate or vegetation.

GREAT GROUP.—Each suborder is divided into great groups according to the presence or absence of genetic horizons and the arrangement of these horizons.

SUBGROUP.—Each great group is divided into subgroups. One of these subgroups represents the central (typic) concept of the great group. The other subgroups, called intergrades, are made up of soils that have mostly the 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.

FAMILY.—Each subgroup is divided into families, primarily on the basis of properties important to the growth of plants or behavior of soils that are used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, consistence, and the thickness of the horizon.

TABLE 9.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Alapaha	Loamy, siliceous, thermic	Arenic Plinthic Paleaquults	Ultisols.
Angie	Clayey, mixed, thermic	Aquic Paleudults	Ultisols.
Ardilla	Fine-loamy, siliceous, thermic	Plinthaquic Paleudults	Ultisols.
Barth [1]	Sandy, siliceous, thermic	Aquic Psammentic Paleudults	Ultisols.
Bibb [2]	Coarse-loamy, siliceous, acid, thermic	Typic Haplaquents	Entisols.
Carnegie	Fine-loamy, siliceous, thermic	Plinthic Paleudults	Ultisols.
Chipley	Siliceous, thermic, coated	Aquic Quartzipsamments	Entisols.
Cowarts	Fine-loamy, siliceous, thermic	Plinthic Paleudults	Ultisols.
Dothan	Fine-loamy, siliceous, thermic	Plinthic Paleudults	Ultisols.
Fuquay	Loamy, siliceous, thermic	Arenic Plinthic Paleudults	Ultisols.
Grady	Clayey, kaolinitic, thermic	Typic Paleaquults	Ultisols.
Irvington	Fine-loamy, siliceous, thermic	Plinthic Fragiudults	Ultisols.
Istokpoga	Dysic, hyperthermic	Typic Medohemists	Histosols.
Johnston	Coarse-loamy, siliceous, acid, thermic	Cumulic Humaquepts	Inceptisols.
Lakeland	Siliceous, thermic, coated	Typic Quartzipsamments	Entisols.
Leefield	Loamy, siliceous, thermic	Arenic Plinthaquic Paleudults	Ultisols.
Mascotte	Sandy over loamy, siliceous, thermic	Ultic Haplaquods	Spodosols.
Olustee	Sandy over loamy, siliceous, thermic	Ultic Haplaquods	Spodosols.
Osier	Siliceous, thermic	Typic Psammaquents	Entisols.
Pelham	Loamy, siliceous, thermic	Arenic Paleaquults	Ultisols.
Portsmouth	Fine-loamy, mixed, thermic	Typic Umbraquults	Ultisols.
Rains	Fine-loamy, siliceous, thermic	Typic Paleaquults	Ultisols.
Robertsdale	Fine-loamy, siliceous, thermic	Plinthaquic Fragiudults	Ultisols.
Rutlege	Sandy, siliceous, thermic	Typic Humaquepts	Inceptisols.
Stilson	Loamy, siliceous, thermic	Arenic Plinthic Paleudults	Ultisols.
Sunsweet	Clayey, kaolinitic, thermic	Plinthic Paleudults	Ultisols.
Tifton	Fine-loamy, siliceous, thermic	Plinthic Paleudults	Ultisols.

[1] These soils are taxadjuncts to the Barth series. The B horizon, at a depth of 44 to 60 inches, is sand and is less clayey than the defined range for the Barth series, but they are enough alike in morphology, composition, and behavior that a new series is not warranted.

[2] These soils are taxadjuncts to the Bibb series. They have a value of 4 and a chroma of 2 at a depth between 6 and 30 inches, which is outside the range of the Bibb series, but they are enough alike in morphology, composition, and behavior that a new series is not warranted.

SERIES.—The series is a group of soils that have major horizons that, except for texture of surface layer, are similar in important characteristics and in arrangement in the profile.

All of the soil series described in this survey have been established earlier.

Additional Facts About the Two Counties

Early settlers coming to the area that is now Berrien and Lanier Counties traveled the Old Coffee Road, which was a main thoroughfare that ran southwestward from Jacksonville, Georgia, to St. Marks, Florida. They raised livestock and allowed their cattle and hogs to run free and to subsist on the coarse grass and other forage in the Pine Barrens, a vast woodland of yellow pine.

The town of Milltown, now Lakeland, was the industrial center during the Reconstruction period. In this town were several watermills that ground corn, cleaned rice, or ginned cotton. At an early date there were also a sawmill and a cotton-cording machine for making pillows and mattresses. The finished products were sold at market in Savannah.

Berrien County was created out of three counties in 1856, and Lanier County, one of the last counties to be formed in Georgia, was also created out of three counties in 1919 and 1920. Nashville is the county seat of Berrien County, and Lakeland is the county seat of Lanier County.

Between 1940 and 1970, the population of both counties decreased, but that of Nashville increased from 2,449 to 4,302. In 1970, the population of Berrien County was 11,401 and that of Lanier County was 4,831.[6]

At present, one large lumber mill, several portable sawmills, and several other industries operate within these two counties. Crude gum and pulpwood from the extensive pine forests are collected at receiving stations and shipped to Valdosta for conversion to finished products, such as turpentine and paper. Industries at Valdosta and Tifton as well as the nearby Moody Air Force Base in Lowndes County provide part-time work for many people living on farms in Berrien and Lanier Counties. There also are 200 to 300 beeyards (fig. 9) in the two counties.

Transportation is provided by three Federal highways, several State highways, and many hard-surface county roads. There are also two railroads operating in the counties.

Recreational facilities, including fishing and boating, are provided at several lakes and ponds. Fishing and boating are also provided on many farm ponds (fig. 10)

[6] Preliminary census figures for 1970 issued by the U.S. Dept. of Commerce.

Figure 9.—**Beeyard on Olustee sand. This is one of many beeyards in Berrien and Lanier Counties.**

Figure 10.—**Multipurpose pond on Alapaha loamy sand. The pond is used for recreational purposes, as a source of irrigation water, and for watering cattle. A pipe is run through the dam, and the cattle drink from a float-type trough below the dam.**

and on the Alapaha, Withlacoochee, and New Rivers. Camp Patten, the Boy Scout County Camp for the Alapaha area, near Lakeland, provides camping and recreational facilities for several thousand Boy Scouts.

Farming

Most of the soils of Berrien and Lanier Counties are well suited to farming. According to the 1964 U.S. Census of Agriculture, farmland made up 71.5 percent, or 213,031 acres, of Berrien County and 48.6 percent, or 51,889 acres, of Lanier county. The Banks Lake or Grand Bay area, which occupies approximately 10 percent of the acreage in Lanier County, does not have any arable soils. Most of the land in both counties is used for woodland.

The farms of the two counties are of different kinds. Field-crop farms, other than vegetable, nut, and fruit farms, are more numerous than general farms in Berrien County. Field-crop farms are much more numerous in Lanier County. Livestock farms, other than poultry and dairy farms, and tobacco farms are common in the two counties.

The number of farms in the counties is decreasing, but the size of farms is increasing, mainly because the use of farm machinery has increased and the efficiency of farm operators has improved. During the period 1959 to 1964, the number of farms decreased from 1,134 to 968 in Berrien County and from 322 to 298 in Lanier County. In 1964 the average farm was 220.1 acres in Berrien County and 174.2 acres in Lanier County.

According to the 1964 Census of Agriculture, the acreage of cropland decreased in both counties in the period 1959 to 1964. The largest acreage was in corn, an important crop grown on nearly every farm, mainly for livestock feed. The acreage of tobacco and that of vegetables harvested for sale decreased in both counties. The acreage of cotton increased in Berrien County but remained about the same in Lanier County. The acreage of peanuts increased in Berrien County, but none were grown in Lanier County in 1964. The acreage of oats increased in both counties. The oats were grown for winter grazing and for feed on many farms.

The number of improved pecan trees remained about the same in Berrien County and decreased slightly in Lanier County. The number of peach trees, grown mostly for sale, increased sharply in both counties.

Both the cropland and the woodland used for pasture have continued to decrease in both counties. Most farms now have improved pasture of Coastal bermudagrass and bahiagrass, and the acreage of improved pasture is increasing in both counties. Many soils in the two counties are well suited to sprinkler irrigation, and the acreage under irrigation has greatly increased in recent years. Tobacco is the main irrigated crop.

The livestock in both counties consists mainly of cattle, hogs, and poultry, but a few sheep are raised on some farms in Berrien County. According to the Census of Agriculture, the number of cattle and calves in both counties increased during the period 1959 to 1964. The number of hogs decreased in both counties. The number of chickens increased in Berrien County but decreased in Lanier County. The number of horses and mules decreased because the use of farm machinery increased.

Corn and tobacco are marketed in both counties, as well as in surrounding counties. Livestock is sold in Nashville at a market that has a weekly auction. Tobacco is the main cash crop, but peanuts is also a cash crop.

Climate [7]

This section discusses the climate of Berrien and Lanier Counties and gives information that will help farmers plan their time for planting and for other activities. Some of the information is in tables. Table 10 shows the temperature and precipitation data for Berrien and Lanier Counties. Table 11 shows the probabilities of the last freezing temperature in spring and the first freezing temperature in fall.

The climate of Berrien and Lanier Counties is strongly influenced by its location in south-central Georgia, approximately 100 miles from the Gulf of Mexico and Atlantic Ocean. Summers are warm and humid, and winters are normally mild. Rainfall is usually plentiful, although it is sometimes poorly distributed.

Summer days are quite hot. Midafternoon temperatures reach or exceed 90° F. on about 90 days during an average year. Most of these occur from June to August, but nearly one-third of the days in May and about one-half of those in September have maximum temperatures of 90° F. or higher. More than one-half the summers have one or more days with a temperature of 100° F. or above. The highest temperature officially recorded in the area was 107° F.

Nights are usually comfortable. A steady drop in temperature after sunset brings readings to the low seventies or slightly lower by early morning. The average minimum temperature for the three summer months is just under 70° F.

Winters are generally mild. The outbreaks of cold weather that move south in winter have usually moderated considerably by the time they reach Berrien and Lanier

[7] By Horace S. Carter, climatologist for Georgia, National Weather Service, U.S. Department of Commerce.

TABLE 10.—*Temperature and precipitation data for Berrien and Lanier Counties, 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	38. 3	77	23	3. 46	1. 0	6. 3
February	65. 5	40. 6	80	25	4. 20	1. 4	8. 1
March	70. 8	45. 2	84	29	4. 95	2. 1	8. 5
April	78. 3	52. 6	87	40	4. 52	1. 3	8. 4
May	86. 0	60. 6	94	50	3. 54	1. 2	6. 6
June	90. 4	67. 1	97	59	4. 69	2. 1	7. 0
July	91. 7	69. 1	98	64	5. 66	2. 0	9. 5
August	91. 8	68. 7	97	63	4. 88	1. 7	7. 1
September	87. 6	64. 7	94	57	4. 22	1. 5	7. 3
October	80. 5	53. 4	89	38	2. 34	. 5	6. 5
November	71. 2	43. 6	82	28	1. 86	. 5	3. 8
December	63. 4	37. 6	77	24	3. 86	. 9	7. 5
Year	78. 3	53. 5	[1] 99	19	48. 18	35. 9	59. 8

[1] The extreme temperature that will be equaled or exceeded (minimum equal to or lower than) on at least 4 days in 2 years out of 10 years.

TABLE 11.—*Probabilities of freezing temperatures in spring and fall*

Probability	Dates of given probability and temperature of—		
	24° F.	28° F.	32° F.
Spring:			
1 year in 10 later than	March 5	March 21	March 31
2 years in 10 later than	February 24	March 12	March 23
5 years in 10 later than	January 27	March 1	March 15
Fall:			
1 year in 10 earlier than	November 19	November 7	October 26
2 years in 10 earlier than	November 29	November 15	November 1
5 years in 10 earlier than	December 15	November 28	November 12

Counties. The temperature drops to freezing or below on about 30 days during an average winter. Most of the spells of cold weather are short and alternate with longer periods of mild, open weather throughout the winter. Daytime temperatures usually rise to comfortable levels, and there are few, if any, days when normal outside activities are prevented by the cold weather. The average maximum temperature for the three winter months is more than 63° F. The temperature dropped to 0° at Alapaha during the historic cold wave of February 1899. The lowest temperature recorded in the area since that time was 8° F. in December 1962.

Spring and fall are usually short. Spring is slightly cooler, windier, and much wetter than fall. The weather usually changes frequently during spring, while fall is characterized by long periods of settled weather with warm sunny days and mild nights.

The freeze-free growing season normally extends from mid-March to mid-November and averages about 245 days in length. The probability of specified freezing temperatures occurring after certain dates in spring and before certain dates in fall is given in table 11.

Average annual rainfall is about 48 inches. The annual rainfall ranged from a high of 79.76 inches in 1964 to a low of 26.48 inches in 1954. In 2 years out of 3, it has been between 40 and 55 inches. July, with an average of 5.66 inches, and November, with an average of 1.86 inches, are normally the wettest and driest months, respectively. Most of the warm-season rainfall is of the convective shower type. The showers occur more frequently in the afternoon and are usually of short duration. The heavier showers may cause considerable erosion, especially early in summer when cultivated soils have little vegetative cover. During most of the winter and early in spring, rainfall is associated with weather fronts and related low-pressure storm centers. Long periods of rainy weather usually result when storms of this type become stagnant over the area.

Thunderstorms occur in the area about 60 days per year. They may occur in any month, but the most come

late in spring and in summer. Local damaging winds are associated with some of the more severe thunderstorms. Small tornadoes have been reported in the area on several occasions. The worst was in April 1932 when five people were killed in a rural area southeast of Nashville.

The nearness of the counties to the Gulf of Mexico and the Atlantic Ocean results in fairly high relative humidities. The monthly averages are mostly between 80 and 90 percent in early morning and between 50 and 60 percent in early afternoon. The average humidity is lower in spring and higher late in summer and in autumn.

The average wind velocities are between 5 and 10 miles per hour. The higher velocities occur early in spring, and the lower velocities occur late in summer.

Water Supplies

The water needs for Berrien and Lanier Counties are supplied by streams, by shallow wells drilled into water-bearing sand, and by deep artesian wells that are drilled into underlying limestone. There are many streams and drainageways in both counties, but most of them have flowing water only in wet seasons. The Alapaha River flows through both counties. This stream is large and dependable, and has stopped flowing only once in recent years. Because this river is quite crooked, it rises rapidly and floods large areas. There are no sizable natural lakes in the two counties, but there are hundreds of cypress ponds that hold water for several months in the year. Banks Lake in Lanier County and Lake Lewis (Averys Mill Pond), both dammed reservoirs, hold water the year around as do many manmade ponds in the two counties. Banks Lake is large and cypress studded. It covers several thousand acres and is one of the largest cypress lakes in Georgia.

The shallow wells in the two counties are generally 30 to 60 feet in depth, and the moderate yield is normally sufficient for home use, except in extreme droughts. The deep wells give a uniform and abundant supply of good water. The depth of these wells ranges from 300 to 400 feet, and the water rises to 100 to 150 feet from the surface. Lakeland has two city wells. One is 350 feet deep and pumps 412 gallons per minute, and the other is 320 feet deeps and pumps 150 gallons per minute. A well at Camp Patten, which is the Boy Scout Reservation for the Alapaha Council, yields more than a million gallons per day.

The city of Nashville obtains its water from three wells. The average depth of these wells is 550 feet, and the pumping capacity is 1,296,000 gallons per day.

There are more than 300 farm ponds in Berrien County, but there are considerably fewer ponds in Lanier County, which has less favorable topography for the construction of ponds. Many other sites in Berrien County and a few sites in Lanier County are also suitable for ponds.

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

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 when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, 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, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage (natural).—Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deep-

ening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Effective root zone. The depth to which roots can readily penetrate a soil in search of plant food and water.

Field moisture capacity. The moisture condition of the soil when downward movement of capillary water into dry soil has virtually ceased.

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, it is hard or very hard 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.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

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.

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.

Organic matter. A general term for plant and animal material, in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Percolation. The downward movement of water through the soil.

Permeability. The quality of a soil horizon that enables water or air to move through it. In words the degrees of permeability are expressed thus:

	Inches per hour
Slow	Less than 0.20
Moderately slow	0.20 to 0.63
Moderate	0.63 to 2.0
Moderately rapid	2.0 to 6.3
Rapid	More than 6.3

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly show 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 relicts of the soft, red mottles. It is a form of laterite.

Reaction, soil. 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 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		

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

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 on earthy 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 characteristic of the soil are largely confined to the solum.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

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).

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 "course," "fine," or "very fine."

Upland (geology). 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.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which it belongs. For information about capability classification, see the section beginning on page 32. For information on the suitability of a given soil for crops and pasture and on the management needed, see the description of the mapping unit. Other information is given in tables as follows:

Acreage and extent, table 1, page 9.
Estimated yields, table 2, page 35.
Suitability of the soils for woodland, table 3, page 36.
Suitability of soils for wildlife habitat and kinds of wildlife, table 4, page 40.
Engineering uses of the soils, tables 5, 6, and 7, pages 42 through 53.
Limitations of soils for town and country planning, table 8, page 56.

Map symbol	Mapping unit	Described on page	Capability unit	Woodland group
			Symbol	Number
AqA	Ardilla loamy sand, 0 to 3 percent slopes	12	IIw-2	2w8
At	Alapaha loamy sand	10	Vw-1	2w2
Au	Angie fine sandy loam, frequently flooded	11	IIIw-2	2w8
Ba	Barth sand	12	IIIw-1	3w2
Bb	Barth fine sand, frequently flooded	13	IIIw-1	3w2
Cm	Chipley fine sand, frequently flooded	15	IIIw-1	2w2
CoB	Carnegie sandy loam, 2 to 5 percent slopes	14	IIe-4	2o1
CoC2	Carnegie sandy loam, 5 to 8 percent slopes, eroded	14	IVe-4	2o1
CqB	Cowarts loamy sand, 2 to 5 percent slopes	16	IIe-4	2o1
CtC2	Cowarts sandy loam, 5 to 8 percent slopes, eroded	16	IVe-4	2o1
DaB	Dothan loamy sand, 0 to 4 percent slopes	17	IIe-1	2o1
FqC	Fuquay loamy coarse sand, 3 to 8 percent slopes	18	IIIe-5	3s2
FsB	Fuquay loamy sand, 0 to 4 percent slopes	17	IIs-1	3s2
Grd	Grady soils	18	Vw-1	2w9
IjA	Irvington loamy sand, 0 to 3 percent slopes	19	IIw-2	2o7
Ist	Istokpoga complex	20	VIIw-1	---
Job	Johnston-Osier-Bibb association	21	Vw-2	2w9
LsA	Leefield loamy sand, 0 to 3 percent slopes	22	IIw-2	3w2
LwC	Lakeland sand, 2 to 8 percent slopes	21	IVs-1	4s2
Mn	Mascotte sand	23	Vw-4	3w2
Oa	Olustee sand	24	IIIw-1	3w2
Ojb	Osier-Johnston-Bibb association	24	Vw-2	2w9
Pl	Pelham loamy sand	25	IVw-4	2w3
Pls	Pelham loamy sand, low terrace	25	IVw-4	2w3
Por	Portsmouth loam	27	Vw-1	1w9
RlA	Robertsdale loamy sand, 0 to 2 percent slopes	28	IIIw-2	2w8
Ro	Rutlege loamy sand	29	Vw-2	2w3
Ros	Rains fine sandy loam	27	IVw-4	2w3
SeB	Stilson loamy sand, 0 to 4 percent slopes	29	IIe-3	3s2
ShD2	Sunsweet sandy loam, 5 to 12 percent slopes, eroded	30	VIe-2	3c2
Swa	Swamp	30	VIIw-1	---
TqA	Tifton loamy sand, 0 to 2 percent slopes	31	I-2	2o1
TqB	Tifton loamy sand, 2 to 5 percent slopes	31	IIe-2	2o1

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