SOIL SURVEY OF

Lake County Area, Florida

United States Department of Agriculture
Soil Conservation Service
in cooperation with
University of Florida
Agricultural Experiment Stations

Major fieldwork for this soil survey was completed in the period 1965–69. Soil names and descriptions were approved in 1969. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1969. This survey was made cooperatively by the Soil Conservation Service and the University of Florida Agricultural Experiment Stations. It is part of the technical assistance furnished to the Lake 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 contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of the Lake County Area are shown on the detailed map at the back of this publication. This map consists of many sheets 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. This guide lists all the soils of the area in alphabetic order by map symbol and gives the capability unit, range site, and woodland group of each. It also shows the page where each soil is described.

Individual colored maps showing the relative suitability or degree of limitation 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 over 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.

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

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife."

Ranchers and others can find, under "Range and Woodland Grazing," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Town and Country Planning."

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

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

Newcomers to the Lake County Area may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information in the section "General Nature of the Area."

Cover: Lake Minnehaha, a natural lake lined with cypress and typical of many lakes in the ridge section of the Lake County Area, provides excellent fishing and boating.

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SOIL SURVEY OF LAKE COUNTY AREA, FLORIDA

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

LAKE COUNTY, one of the largest counties in the State, is in the central part of Florida. It is bordered by Marion County on the north, Volusia County on the north and east, Orange and Seminole Counties on the east, Sumter County on the west, and Polk County on the south. Tavares, the county seat, is in the north-central part of the county at the south end of Lake Eustis and the extreme northwest end of Lake Dora. The distances from Tavares to other cities in Florida are shown in figure 1. The Ocala National Forest in the northeastern part of Lake County was not included in the area surveyed.

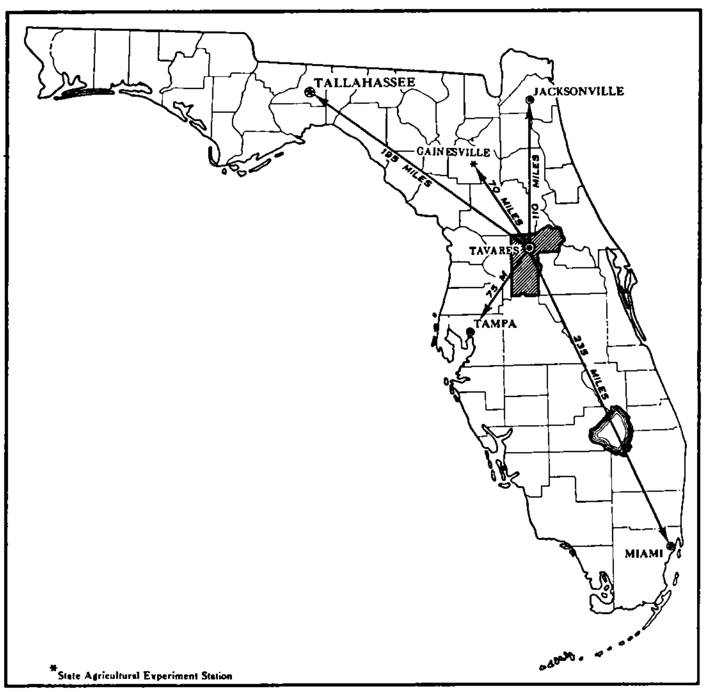

Figure 1.—**Location of the Lake County Area in Florida.**

The elevation above sea level is 63 to 75 feet at Tavares. The highest point in the county is locally known as Sugar Loaf Mountain. It is approximately 315 feet above sea level. Average rainfall in the Lake County Area is about 51 inches. The period of heaviest rainfall is June through September. The average temperature is approximately 50° F. in January and 91° in August. For more information on climate see the section "General Nature of the Area." Lake County has a total land area of 996 square miles, or 637,440 acres. The survey area, which includes all of Lake County south of Florida Highway 42, has a total land area of about 857.6 square miles, or 548,964 acres, and about 90,569 acres of lakes that are more than 40 acres in size. Citrus is the county's main source of income and principal farm industry. Allied industries, such as citrus processing plants, are also important sources of income.

Another important farm enterprise is truck cropping. Corn, cabbage, carrots, celery, and lettuce are produced in large quantities. Other farm industries are nurseries, landscaping, sod production, and cut flowers and bulb production. Cattle raising and dairying are also significant.

Lake County has many large lakes such as Lake Dorr, Lake Harris, Lake Yale, Lake Griffin, Lake Eustis, Lake Dora, Lake Minneola, Little Lake Harris, Lake Minnehaha, and Lake Louisa. The St. Johns River borders the county on the north and east.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the Lake County Area, where they are located, and how they can be used. The soil scientists went into the county 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, 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* 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. Astatula and Orlando, 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, Astatula sand, 0 to 5 percent slopes, is one of four phases within the Astatula 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 in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning 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 phases within one series. One such kind of mapping unit is shown on the soil map of the Lake County Area: an undifferentiated group.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Anclote and Myakka soils is an example.

In most areas surveyed there are places where the soil material is so shallow, so severely eroded, or so disturbed 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. Fill land, loamy materials, is a land type in the Lake County Area.

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 and rangeland, 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 the Lake County Area. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a survey area, who want to compare different parts of a survey area, or who want to 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.

The eight soil associations in the Lake County Area are described in the following pages. Table 1 shows the degree of limitations and the chief limiting properties of the soils, by soil association, for building construction, landscaping, sanitation, transportation, and recreation. For additional information, see the section "Town and Country Planning."

1. Pomello-Paola Association

Nearly level to sloping, moderately well drained and excessively drained, sandy soils on low ridges interspersed with lakes and shallow depressions

Nearly level to sloping, droughty, low sandy ridges interspersed with many lakes and small grassy ponds characterize this association. There are a few streams, but most surface drainage is through the very porous soil.

This association makes up about 4 percent of the Lake County Area. About 40 percent is Pomello soils and 28 percent is Paola soils. The rest consists of minor soils, small lakes, and shallow ponds.

Pomello soils are moderately well drained. They have a surface layer of gray sand about 3 inches thick. Leached white sand about 36 inches thick underlies the surface layer. Below this and extending to a depth of 55 inches is dark reddish-brown sand that is weakly cemented and coated with organic matter. Below the cemented layer is loose sand that extends to a depth of 80 inches. The water table is normally at a depth of about 40 to 60 inches, but it fluctuates between depths of 30 and 40 inches for about 4 months during the year.

TABLE 1.—*Summary of limitations by soil associations for selected nonfarm uses*

Soil association	Degree and kind of limitation for—				
	Building construction	Landscaping	Sanitation	Transportation	Recreation
Pomello-Paola association.	Moderate: seasonal high water table.	Moderate: very low available water capacity; very low natural fertility.	Moderate: seasonal high water table.	Slight	Severe: loose sand.
Myakka-Paola-Tavares association.	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; loose sand.
Astatula-Apopka association.	Slight	Moderate: very low available water capacity; low natural fertility.	Slight	Slight	Severe: loose sand.
Tavares-Myakka association.	Slight	Moderate: very low available water capacity; low natural fertility.	Severe: hazard of contamination of water supplies.	Slight	Moderate: sand texture.
Myakka-Placid-Swamp association.	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Anclote-Iberia-Emeralda association.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding; low traffic-supporting capacity.	Severe: high water table; flooding.
Montverde-Ocoee-Brighton association.	Very severe: high water table; flooding; high potential subsidence.	Very severe: high water table; flooding.	Very severe: high water table; flooding.	Very severe: high water table; flooding; high potential subsidence; very low traffic-supporting capacity.	Very severe: high water table; flooding.
Swamp association	Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: high water table; flooding.

Paola soils are excessively drained. They have a surface layer of gray sand about 4 inches thick. The subsurface layer is white sand about 20 inches thick. Below this are layers of brownish-yellow and light yellowish-brown sand that extend to a depth of 90 inches. The water table is at a depth of more than 90 inches.

Among the minor soils in this association are the poorly drained to very poorly drained Myakka and Placid soils in depressions and low-lying areas and the excessively drained St. Lucie soils on knolls and ridges.

Only a small part of this association is used for farming. In most areas the vegetation is sand pine, scrub oak, turkey oak, palmetto rosemary, sparse shrubs, and native grasses. Bay trees, other water-tolerant hardwoods, and cypress grow in the depressions and around the lakes. Mainly water-tolerant grasses grow in the shallow ponds and marshes. Areas near small communities are being cleared and developed for housing and commercial uses.

The Pomello and Paola soils are poorly suited to cultivated crops and have only limited use for pasture, range, and woodland. Also, under present conditions, the wet, less extensive soils in this association are of little value for farming.

2. Myakka-Paola-Tavares Association

Nearly level, poorly drained sandy soils interspersed with excessively drained to moderately well drained sandy soils on low knolls

Broad, nearly level, periodically wet areas and nearly level to undulating, low sandy ridges and knolls characterize this association. There are a few, narrow swamps.

This association makes up about 1 percent of the survey area. Myakka soils are dominant and make up about 40 percent of the association. About 30 percent is Paola soils, 15 percent is Tavares soils, and the rest is minor soils.

Myakka soils are poorly drained. They have a black sand surface layer about 6 inches thick. The next layer is leached white sand about 14 inches thick. Below this is a layer of sand about 16 inches thick that is black to dark reddish brown and weakly cemented with organic matter. It is underlain by dark-brown to dark grayish-brown sand. The water table is at a depth of 10 to 40 inches for about 6 months during the year. It sometimes rises to the surface during wet seasons and drops to a depth below 40 inches during dry periods.

Paola soils are excessively drained. They have a gray sand surface layer about 4 inches thick. A white sand layer about 20 inches thick underlies the surface layer. Below this, to a depth of 90 inches, are layers of brownish-yellow and light yellowish-brown sand. The water table is at a depth of more than 80 inches.

Tavares soils are moderately well drained. They have a very dark grayish-brown sand surface layer about 7 inches thick. Below this are layers of faintly mottled, mainly very pale brown sand that extend to a depth of about 61 inches. The underlying layer is white sand mottled with very pale brown. The water table is at a depth of 40 to 60 inches for more than 6 months, and during periods of drought, it is at a depth of more than 60 inches.

Among the minor soils in this association are the excessively drained St. Lucie soils on knolls and ridges and the poorly drained Placid soils in the narrow swamps. Part of the association is used for improved pasture; only a small part is farmed. In most areas the vegetation is pine, saw-palmetto, gallberry, and native grass. In drought areas the vegetation is mostly scrub oak and a sparse undergrowth.

The Myakka soils have potential for improved pasture and truck crops. Good water control practices and applications of lime and fertilizer are needed. The Paola soils have limited potential for farming. The Tavares soils have potential for citrus and improved pasture.

3. Astatula-Apopka Association

Nearly level to strongly sloping, excessively drained and well-drained sandy soils on broad ridges interspersed with large lakes, ponds, and wet depressions

Broad, undulating, low, droughty ridges make up most of this association. There are a few short, steep slopes adjacent to streams and around sinks. There are few streams. Surface drainage is mostly through the very porous soil. Many large lakes, ponds, depressions, and sinks occur throughout this association.

This association makes up about 47 percent of the Lake County Area. Astatula soils are dominant and make up about 58 percent of the association. Apopka soils make up about 7 percent. The rest is minor soils, small lakes, and shallow ponds.

Astatula soils are excessively drained. They have a dark-gray sand surface layer about 7 inches thick. Below this and extending to a depth of 80 inches are layers of brown and yellowish-brown sand. The water table is at a depth of more than 120 inches.

Apopka soils are well drained. They have a very dark gray sand surface layer about 6 inches thick. They have subsurface layers of yellowish-brown and light yellowish-brown sand to a depth of about 55 inches. The next layer, to a depth of 84 inches, is red sandy clay loam. The water table is at a depth of more than 84 inches.

The poorly drained and very poorly drained Placid and Myakka soils are among the minor soils in this association. They are in depressions and around some of the large lakes. Other minor soils are the excessively drained and well-drained Lake and Orlando soils that are intermixed with the dominant soils in the higher areas.

The Astatula and Apopka soils in this association are planted mainly to citrus. Soils not in citrus generally are undeveloped and are covered with scrub oak, saw-palmetto, and other shrubs and grasses. Vegetation in the wet depressions and shallow ponds is mainly water grasses.

Where the climate is favorable, the Astatula and Apopka soils are suited to citrus. These soils have some potential for improved pastures. Under natural conditions, the wet, less extensive soils in this association are of little value for farming.

4. Tavares-Myakka Association

Nearly level to gently sloping, moderately well drained sandy soils on low ridges interspersed with nearly level poorly drained sandy soils

This association is characterized by low, nearly level to gently undulating sandy ridges or knolls and broad, nearly level periodically wet areas. There are a few narrow swamps and marshes.

This association makes up about 8 percent of the survey area. Tavares soils are dominant and make up about 50 percent of the association. About 25 percent is Myakka soils, and the rest is minor soils.

Tavares soils are moderately well drained. They have a very dark grayish-brown sand surface layer about 7 inches thick. Below this and extending to a depth of about 61 inches are layers of faintly mottled, mainly very pale brown sand. Below a depth of 61 inches is white sand mottled with very pale brown. The water table is at a depth of 40 to 60 inches for more than half the year. During periods of drought it is at a depth of more than 60 inches.

Myakka soils are poorly drained. They have a black sand surface layer about 6 inches thick. The next layer is leached white sand about 14 inches thick. Below this is a layer of sand about 16 inches thick that is black to dark reddish brown and weakly cemented with organic matter. It is underlain by dark-brown to dark grayish-brown sand. The water table is at a depth of 10 to 40 inches for about half the year. It sometimes rises to the surface during wet seasons and drops to a depth below 40 inches during dry periods.

Among the minor soils in this association are the poorly drained Wauchula, Ona, and Pompano soils on low ridges and in depressions; the very poorly drained Placid soils in low, wet areas; and the very poorly drained organic and mineral soils that are in inaccessible areas of swamp.

Much of the acreage of Tavares soils and soils that have similar or better drainage are in citrus. In the somewhat poorly drained areas, the vegetation is scrub oak and scattered pine. In poorly drained areas the vegetation is commonly pine, saw-palmetto, gallberry, and native grasses. In swampy areas the vegetation is bay, other wetland hardwoods, and cypress.

Most of this association has some potential for improved pasture. The better drained soils are suited to citrus. The poorly drained Myakka soils have good potential for truck crops and improved pasture.

5. Myakka-Placid-Swamp Association

Nearly level, poorly drained sandy soils on broad lowlands interspersed with very poorly drained sandy soils and swamps in large depressions

This association is made up mainly of nearly level, periodically wet, large, shallow depressions, few grassy ponds or lakes, many isolated swamps, and swamps that are connected by narrow, wet drainageways.

This association makes up about 20 percent of the survey area. Myakka soils are dominant and make up about 40 percent of the association. Placid soils make up about 18 percent, and Swamp about 8 percent. The rest is minor soils.

Myakka soils are poorly drained. They have a black sand surface layer about 6 inches thick. A layer of leached white sand about 14 inches thick underlies the surface layer. Below this is a layer of sand about 16 inches thick that is black to dark reddish brown and weakly cemented with organic matter. It is underlain by dark-brown to dark grayish-brown sand. The water table is at a depth of 10 to 40 inches for about 6 months of most years. It sometimes rises to the surface during wet seasons and drops to a depth below 40 inches during dry periods.

The Placid soils in this association are very poorly drained. The surface layer is about 18 inches thick and is black in the upper part and very dark gray in the lower part. The next layer is about 20 inches of grayish-brown sand mottled with dark grayish brown and very dark grayish brown. Below this and extending to a depth of 80 inches is light brownish-gray sand. The water table is at the surface most of the year. During extended dry periods it is 1 to 15 inches below the surface.

Swamp consists of very poorly drained mineral and organic soils that are flooded all year except during extended periods of low rainfall.

Among the minor soils in this association are the poorly drained Immokalee, Wabasso, and Wauchula soils on low ridges, the very poorly drained Anclote soils in low areas and depressions, and the excessively drained Astatula soils and moderately well drained Pomello soils in higher areas.

Only about 15 percent of this association is cultivated. The rest is covered with native vegetation. In the poorly drained areas, the vegetation is mostly pine, saw-palmetto, gallberry, and native grass. In the very poorly drained areas, the vegetation is bay and other water-tolerant hardwoods. The areas of Swamp are covered with a dense stand of cypress, bay, and other water-tolerant hardwoods.

The poorly drained soils in this association are generally not suited to citrus but are suited to vegetables, improved pasture, native range, and pine trees. Water control is needed. The very poorly drained soils and Swamp have little potential for farming.

6. Anclote-Iberia-Emeralda Association

Nearly level, very poorly drained to poorly drained sandy and clayey soils on broad lowlands that are subject to flooding

This association is characterized by broad, nearly level lowlands that are wet most of the time. Many areas are covered with shallow water for part of the year, and some are covered most of the year. The association is subject to flooding.

This association makes up about 4 percent of the survey area. Anclote soils are dominant and make up about 45 percent of the association. Iberia and Emeralda soils each make up about 15 percent. The rest is minor soils.

Anclote soils are very poorly drained. They have a black and very dark gray sand surface layer about 12 inches thick. The next layer is faintly mottled, grayish-brown and light brownish-gray fine sand about 34 inches thick. Below this and extending to a depth of 82 inches is faintly mottled, dark-gray loamy fine sand. The water table is at or near the surface during the wet season and is at a depth of about 20 to 30 inches during the dry season.

Iberia soils are poorly drained. They have a black sandy clay surface layer about 15 inches thick. The subsoil is dark-gray sandy clay to a depth of about 40 inches and is heavy sandy clay mottled with various shades of gray, yellowish brown, and yellowish red between depths of 40 and 54 inches. Below the subsoil and extending to a depth of 60 inches is a layer of white chalky marl and mottled sandy clay. The water table is at the surface or just below the surface most of the year. During periods of drought it is at a depth of about 6 inches. The surface layer is frequently covered with shallow water.

Emeralda soils are poorly drained. They have a very dark gray fine sand surface layer about 6 inches thick. Their subsurface layer is grayish-brown fine sand about 5 inches thick. The subsoil between depths of 11 and 26 inches is mottled gray sandy clay. Below this is mottled light-gray sandy clay that extends to a depth of about 66 inches. The water table is at the surface most of the year. The soils are generally flooded during periods of average rainfall.

Among the minor soils in this association are the poorly drained Eureka soils in low areas and depressions, the very poorly drained Oklawaha soils in depressions and marshy areas, and the somewhat poorly drained Ocilla soils on knolls and ridges.

Drained areas are used extensively for cultivated crops and improved pasture. Where the soils are not cultivated, the vegetation consists of hammock growth and cabbage palm. There are also some treeless, grassy spots. During dry periods, some areas of the association are used for range.

Soils in this association are not suited to citrus. If intensive water-control measures can be developed and maintained, the soils have good potential for cultivated crops, special crops, and improved pasture.

7. Montverde-Ocoee-Brighton Association

Nearly level, very poorly drained organic soils on broad low areas that are subject to flooding

This association consists of broad, low, relatively uniform marshy areas that are subject to flooding.

This association makes up about 11 percent of the survey area. Montverde soils are dominant and make up about 38 percent of the association. About 17 percent is Ocoee soils, 7 percent is Brighton soils, and the rest is minor soils.

Montverde soils are very poorly drained. They have a black muck surface layer about 11 inches thick. Below this and extending to a depth of 80 inches are layers of dark reddish-brown or mixed black and dark reddish-brown peat. The water table is at the surface and the soils are covered with shallow water, except during extended dry periods.

Ocoee soils are very poorly drained. They have a dark reddish-brown peat surface layer about 7 inches thick. The surface layer is underlain by layers of reddish-brown or dark reddish-brown peat that extend to a depth of 38 inches. Grayish-brown sand is at a depth of 38 to 75 inches. The water table is at the surface except during extended dry periods.

Brighton soils are very poorly drained. They have a dark reddish-brown peat surface layer about 9 inches thick. The surface layer is underlain by layers of dark yellowish-brown and dark-brown peat that extend to a depth of about 63 inches. Below the peat layers and extending to a depth of 75 inches is grayish-brown coarse sand. The water table is at the surface, and the soils are covered with water most of the time.

Among the minor soils in this association are the poorly drained Emeralda, Eureka, and Iberia soils and the very poorly drained Oklawaha soils. These soils are in low, wet areas and are subject to flooding.

Most of this association is undeveloped and is used to a limited extent for range and as wildlife habitat. The vegetation is a heavy hammock growth of bay, magnolia, and maple. In treeless areas it is lilies, sedges, sawgrass, flags, and other water-tolerant plants and grasses.

Soils in this association have a good potential for special truck crops. Water-control measures are needed.

8. Swamp Association

Level, poorly drained soils that are subject to prolonged flooding

This is an association of level swamps and a few small marshes, lakes, and long, narrow, very wet areas along creeks and poorly defined drainageways.

This association makes up about 5 percent of the survey area.

Soils in this association are very poorly drained and are in irregular patterns. They are flooded most of the time and are covered with a dense growth of water-tolerant trees. Most areas generally are too wet and inaccessible to permit detailed investigation of the soils. A few small areas of better drained soils are included in this association.

This association is undeveloped and is severely limited for farming. The vegetation is bay, other wetland hardwoods, and cypress. Even during dry periods there is only a small amount of forage for cattle.

Descriptions of the Soils

This section describes the soil series and mapping units in the Lake County Area. Each soil series is described in considerable detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Unless it is otherwise stated, the colors given in the descriptions are those of a moist soil.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Swamp, for example, does not belong to a soil series, but nevertheless is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit, range site, and woodland group in which the mapping unit has been placed. The capability unit, range site, and woodland designation for each soil can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 2. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*6*).[1]

[1] Italic numbers in parentheses refer to Literature Cited, p. 81.

TABLE 2.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Albany sand, 0 to 5 percent slopes	9, 035	1. 6
Albany sand, 5 to 12 percent slopes	561	. 1
Anclote fine sand	5, 124	. 9
Anclote and Myakka soils	21, 960	4. 0
Apopka sand, 0 to 5 percent slopes	11, 520	2. 1
Apopka sand, 5 to 12 percent slopes	8, 127	1. 5
Astatula sand, 0 to 5 percent slopes	1, 720	. 3
Astatula sand, dark surface, 0 to 5 percent slopes	109, 353	19. 9
Astatula sand, dark surface, 5 to 12 percent slopes	37, 687	6. 9
Astatula sand, dark surface, 12 to 40 percent slopes	4, 374	. 8
Brighton soils	4, 589	. 8
Cassia sand	7, 952	1. 5
Emeralda fine sand	4, 089	. 8
Eureka loamy fine sand	2, 025	. 4
Felda fine sand	1, 745	. 3
Fellowship fine sandy loam, ponded	802	. 1
Fill land, loamy materials	9, 674	1. 8
Iberia sandy clay	2, 449	. 4
Iberia and Manatee soils	6, 766	1. 2
Immokalee sand	13, 377	2. 4
Lake sand, 0 to 5 percent slopes	9, 927	1. 8
Lake sand, 5 to 12 percent slopes	3, 597	. 7
Lake sand, 12 to 22 percent slopes	660	. 1
Lucy sand, 0 to 5 percent slopes	2, 000	. 4
Lucy sand, 5 to 8 percent slopes	1, 092	. 2
Manatee fine sand	1, 161	. 2
Montverde muck	23, 376	4. 3
Myakka sand	45, 858	8. 4

TABLE 2.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Myakka and Placid sands, 2 to 8 percent slopes	3, 856	. 7
Ocilla sand	3, 097	. 6
Ocoee peat	10, 742	2. 0
Oklawaha muck	5, 674	1. 0
Ona fine sand	1, 407	. 3
Orlando fine sand	1, 671	. 3
Paola sand, 0 to 5 percent slopes	7, 308	1. 3
Paola sand, 5 to 12 percent slopes	789	. 1
Pelham sand	1, 966	. 4
Placid sand	10, 710	2. 0
Placid sand, slightly wet	2, 998	. 5
Placid and Myakka sands, 0 to 2 percent slopes	23, 735	4. 3
Pomello sand	9, 967	1. 8
Pompano sand, acid	6, 251	1. 1
St. Lucie sand	6, 808	1. 2
Swamp	36, 527	6. 7
Tavares sand	34, 721	6. 3
Tavares sand, white subsurface variant	1, 962	. 4
Vaucluse sand	1, 160	. 2
Wabasso sand	1, 133	. 2
Wauchula sand	11, 869	2. 2
Total [1]	548, 964	100. 0

[1] Includes water areas that are less than 40 acres in size; 12,747 acres of Marsh (indicated by marsh symbols on the soil map); and 1,266 acres of mine pits and dumps (indicated by appropriate symbols on the soil map). Does not include 90,569 acres of lakes more than 40 acres in size.

Albany Series

The Albany series consists of somewhat poorly drained sandy soils that have a loamy subsoil. These soils are on the upland ridge and have slopes of 0 to 12 percent. They formed in sandy and loamy marine sediment.

In a representative profile, the surface layer is very dark gray sand about 7 inches thick. The subsurface layer is sand that extends to a depth of about 52 inches. It is gray in the upper few inches and very pale brown in the lower part. The subsoil is about 35 inches thick. The upper 10 inches is very pale brown sandy clay loam that has distinct mottles of strong brown and reddish yellow and faint mottles of white. The lower 23 inches is white sandy clay loam that has distinct mottles of yellow, reddish yellow, yellowish red, and strong brown. The surface and subsurface layers are strongly acid except where limed, and the other layers are very strongly acid. The water table is normally at a depth of about 50 inches.

Albany soils are rapidly permeable in the sandy layers and moderately permeable in the subsoil. Available water capacity is low in the surface layer and subsurface layers and moderate in the subsoil. The organic-matter content and natural fertility are low.

Representative profile of Albany sand, 0 to 5 percent slopes:

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

A21—7 to 11 inches, gray (10YR 5/1) sand; few, fine, faint mottles of very pale brown and dark gray; single grain; loose; few fine roots; sand grains uncoated; medium acid; clear, wavy boundary.

A22—11 to 31 inches, very pale brown (10YR 8/3, 7/3) sand; few, medium, faint mottles of gray (10YR 5/1) and dark gray (10YR 4/1) and few, fine, faint, white mottles; single grain; loose; few fine roots; sand grains uncoated; strongly acid; clear, wavy boundary.

A23—31 to 52 inches, very pale brown (10YR 7/3) sand; few, fine, faint mottles of gray and dark gray; single grain; loose; few fine roots; sand grains uncoated; strongly acid; abrupt, smooth boundary.

B21tg—52 to 62 inches, very pale brown (10YR 8/3) sandy clay loam; many, coarse, faint mottles of white (10YR 8/2) and common, medium, distinct mottles of strong brown (7.5YR 5/8) or reddish yellow (7.5YR 7/8); weak, fine and medium, subangular blocky structure; friable; sand grains coated and bridged with clay; very strongly acid; gradual, wavy boundary.

B22tg—62 to 70 inches, white (10YR 8/2) sandy clay loam; common, fine and medium, distinct mottles of yellow (10YR 8/8), strong brown (7.5YR 5/8), reddish yellow (7.5YR 7/8), and yellowish red (5YR 5/8); weak, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; few lenses of sandy loam; very strongly acid; clear, smooth boundary.

B23tg—70 to 85 inches, white (10YR 8/1) sandy clay loam; common, medium, distinct mottles of red (2.5YR 4/8), yellowish red (5YR 5/8), brownish yellow (10YR 6/8), and yellow (10YR 8/8); mottles decrease in number with depth; weak, fine, subangular blocky structure; friable; few mica flakes; very strongly acid.

All layers are strongly acid or very strongly acid. The upper layers are not so acid where limed. The A1 and Ap horizons are dark grayish brown to very dark gray and 5 to 11 inches thick. The A2 horizon is white to yellow and normally is mottled with gray, brown, yellow, and white; it is 34 to 57 inches thick. In places the A2 horizon is free of mottles. A B1t horizon of loamy sand or sandy loam, 3 to 5 inches thick, occurs in places. This horizon is very pale brown to yellow and is faintly mottled with gray, brown, yellow, red, and white. The B22tg and B23tg horizons are highly mottled with gray, yellow, red, and brown. Mottles commonly decrease in number with increasing depth, and white becomes the dominant color. The water table is at a depth of 40 to 60 inches most of the time, but it is within a depth of 40 inches for 1 or 2 months during wet seasons and below 60 inches during prolonged droughts.

The Albany soils in the Lake County Area have a slightly higher temperature than is defined for the Albany series, but this difference does not alter their usefulness and behavior.

Albany soils occur in association with Astatula, Apopka, Ocilla, Lucy, and Vaucluse soils. They are not so well drained as Astatula, Apopka, Lucy, and Vaucluse soils. They have a loamy Bt horizon at a depth of 40 inches, whereas the loamy horizon of Ocilla, Lucy, and Vaucluse soils is at a depth of less than 40 inches.

Albany sand, 0 to 5 percent slopes (AbB).—This is a nearly level to sloping, somewhat poorly drained sandy soil that has a sandy clay loam subsoil. This soil has the profile described as representative for the series. The water table is at a depth of 40 to 60 inches for more than 6 months each year. During the wet season, it is at a depth of 15 to 40 inches for 1 to 2 months.

The sandy surface and subsurface layers are rapidly permeable and have very low available water capacity and low organic-matter content. The loamy subsoil is moderately permeable and has medium available water capacity. Natural fertility is low.

Included in mapping are small areas that are more poorly drained than Albany sand, a few small areas of Ocilla sand and Tavares sand, small areas of soils that have weakly cemented lumps of dark-brown sand at a depth of 40 to 60 inches, and some areas where the texture is fine sand.

This soil is poorly suited to vegetables, flowers, and other shallow-rooted plants that have high moisture and fertility requirements. Irrigation of these crops is generally not feasible. Watermelons can be grown successfully, but they require contour cultivation with alternate strips of tall grain, adequate amounts of fertilizer and lime, and irrigation. This soil is well suited to citrus. The water table is near enough to the surface to supply some water to the tree roots in dry seasons. Management should include provisions for removing excess surface water during prolonged wet seasons, growing cover crops between rows, minimum cultivation, applying proper amounts of fertilizer and lime, and irrigating when needed. Deep-rooted tame grasses make good improved pasture if they are properly fertilized and limed and grazing is controlled.

Areas that have not been farmed are either open pine forest or, if the trees have been removed, open grassland. Some of these areas are used for range. Understory plants provide good forage for cattle and wildlife. Major decreaser and increaser forage plants are creeping bluestem, pineland three-awn, indiangrass, splitbeard bluestem, broomsedge bluestem, and runner oak. Under continuous heavy grazing, these plants are subdued and pricklypear cactus, post oak, blackjack oak, natalgrass, dogfennel, a variety of annual grasses, and other less desirable plants and weeds become dominant. Capability unit IIIw-3; Sandhills range site; woodland group 3w2.

Albany sand, 5 to 12 percent slopes (AbD).—This is a sloping and strongly sloping, somewhat poorly drained sandy soil that has a sandy clay loam subsoil at a depth of about 50 inches. The profile of this soil is similar to that described as representative for the series, but the surface layer is 1 to 2 inches thinner, and the sandy clay loam subsoil is about 45 inches thick. In some places slopes are short and choppy; in other places they are fairly long and uniform. The water table is at a depth of more than 40 inches for more than 6 months each year. For 1 or 2 months during the wet season, it is at a depth of 15 to 40 inches.

The surface and subsurface layers have very low available water capacity, low organic-matter content, and rapid permeability. The loamy subsoil has medium available water capacity and moderate permeability. This soil has low natural fertility. It is subject to blowing and water erosion unless protected by a cover of vegetation.

Included in mapping are small areas of Tavares sand and some areas where the texture is fine sand.

This soil is suited to about the same plants as Albany sand, 0 to 5 percent slopes, but it is erodible. Slopes interfere with tillage, irrigation, and harvest. More intensive use of the practices described for the less sloping soil is needed.

Areas that have been farmed are open pine forest. Some of these areas are used for range. Understory plants provide good forage for cattle and wildlife. Major decreaser and increaser forage plants are creeping bluestem, pineland three-awn, indiangrass, splitbeard bluestem, broomsedge bluestem, and runner oak. Major invader plants are pricklypear cactus, post oak, blackjack oak, natalgrass, dogfennel, and a variety of annual grasses and weeds. Capability unit IVs-2; Sandhills range site; woodland group 3w2.

Anclote Series

The Anclote series consists of nearly level, very poorly drained sandy soils that have a thick dark-colored surface layer. These soils are in low areas and depressions on the flood plains. They formed in sandy marine sediments.

In a representative profile, the surface layer is black and very dark gray fine sand about 12 inches thick. Below this is faintly mottled grayish-brown and light brownish-gray fine sand about 34 inches thick. The next layer is faintly mottled, dark-gray loamy fine sand that extends to a depth of 82 inches. These soils are slightly acid in the upper 3 inches of the surface layer, neutral between depths of 3 and 24 inches, and moderately alkaline throughout the rest of the profile. The water table is at a depth of about 6 inches. Many areas are covered with shallow water in wet seasons.

Anclote soils have rapid permeability and medium available water capacity. The organic-matter content and natural fertility are high.

Representative profile of Anclote fine sand:

A11—0 to 3 inches, black (10YR 2/1) rubbed fine sand; single grain; loose; many fine and medium roots; slightly acid; clear, wavy boundary.

A12—3 to 12 inches, very dark gray (10YR 3/1) rubbed fine sand; common, fine and medium, faint, dark-gray (10YR 4/1), gray (10YR 5/1), and black (10YR 2/1) mottles; single grain; loose; many fine and medium roots; neutral; clear, wavy boundary.

C1g—12 to 24 inches, grayish-brown (10YR 5/2) fine sand; many, fine, faint mottles of light brownish gray, dark grayish brown, and gray; single grain; loose; common fine and medium roots; neutral; clear, wavy boundary.

C2g—24 to 46 inches, light brownish-gray (10YR 6/2) fine sand; many, medium, faint mottles of grayish brown (10YR 5/2), dark grayish brown (10YR 4/2), and gray (10YR 6/1); few, fine, faint mottles of yellowish brown along root channels; single grain; loose; few fine and medium roots; moderately alkaline; clear, wavy boundary.

C3g—46 to 82 inches, dark-gray (10YR 4/1) loamy fine sand; few to many, medium, faint mottles of gray (10YR 5/1); single grain; loose; moderately alkaline.

Anclote soils are slightly acid to moderately alkaline throughout the profile. The A11 and A12 horizons are black to very dark gray. Combined, they are 10 to 24 inches thick. The C1g and C2g horizons are gray to light brownish-gray sand that contains few to many streaks and mottles of gray and brown. The C3g horizon is gray to dark-gray loamy sand or loamy fine sand mottled with lighter shades of gray. The water table is at or near the surface during the wet season and is at a depth of about 20 to 30 inches during the dry season. Low areas are covered with shallow water much of the time.

Anclote soils are associated with Emeralda, Iberia, Manatee, and Myakka soils. They are deep sandy soils that do not have a clayey or loamy B horizon within a depth of 40 inches as do Emeralda, Iberia, and Manatee soils. They do not have the Bh horizon that is typical of Myakka soils.

Anclote fine sand (Ac).—This is a nearly level, very poorly drained sandy soil that has a thick dark-colored surface layer. It is in fairly large areas on flood plains. The water table is at or near the surface during the wet season and is about 20 to 30 inches beneath the surface during the dry season. Low areas are covered with shallow water much of the time.

Anclote fine sand has rapid permeability and medium available water capacity. It has a high organic-matter content in the surface layer and high natural fertility.

Included in mapping are small areas of soils that have layers stained with organic matter within a depth of 45 inches, small areas of soils that have a loamy fine sand or fine sandy loam layer at depths of 20 to 40 inches, areas of medium sand, and small areas where the surface layer is less than 10 inches thick.

This soil is suited to vegetables (fig. 2), flowers, and other shallow-rooted crops that are tolerant of wetness. Water control is essential to remove excess surface water rapidly after a heavy rain and to provide subsurface irrigation in times of drought. This soil is very poorly suited to citrus. Tame grasses and clovers grow well if surface drainage and fertilizer are provided.

The native vegetation is mainly grasses. Many areas are used for range that produces forage for cattle and wildlife when properly managed. Important decreaser and increaser forage plants are maidencane, cutgrass, beaked panicums, and sand cordgrass. Under continuous heavy grazing, annual grasses and weeds, pickerelweed, redroot, smartweed, iris, broadleaf carpetgrass, and other less desirable invader plants become dominant. Capability unit IIIw-1; Fresh Marsh (mineral) range site; woodland group 2w3.

Anclote and Myakka soils (Am).—This mapping unit consists of nearly level, very poorly drained and poorly drained sandy soils. These soils are in low, large depressions and poorly defined drainageways. The composition of this unit is more variable than that of most other units in the county, but the soils are similar enough to permit common interpretations for most expected uses.

This unit is about 35 percent Anclote sand, 30 percent Myakka sand, 20 percent Felda sand, and 15 percent minor soils. Each of these soils occurs in most of the areas delineated. The profile of the Myakka soil in this unit is similar to that described as representative for the Myakka series, but the water table is higher and the soil is less acid. The Felda soil has the profile described as representative for the Felda series. Some of the minor soils have a thick, dark colored surface layer over sandy layers. Some are organic. The water table is at the surface, and the soils are covered with water most of the year.

These soils are covered with dense wetland forest. They are not suited to cultivated crops or pasture because adequate water control and the removal of dense vegetation are not feasible. They provide shelter and some browse for cattle and wildlife. The vegetation consists of a variety of wetland hardwoods, cypress, black pine, cabbage palms, and numerous kinds of shrubs, vines, and grasses. Capability unit VIIw-1; Swamp range site; woodland group 2w3.

***Figure 2.*—Setting out young vegetable plants on Anclote fine sand.**

Apopka Series

The Apopka series consists of nearly level to strongly sloping, well-drained sandy soils that have a loamy subsoil. These soils occur throughout the upland ridge. They formed in sandy and loamy marine sediment.

In a representative profile, the surface layer is very dark gray sand about 6 inches thick. The subsurface layers are yellowish-brown and light yellowish-brown sand to a depth of about 55 inches. The subsoil is red sandy clay loam to a depth of about 84 inches. Reaction is medium acid to a depth of about 40 inches, strongly acid to about 55 inches, and very strongly acid in the subsoil. The water table is at a depth of more than 84 inches.

Apopka soils are rapidly permeable in the sandy horizons and moderately permeable in the loamy subsoil. Available water capacity is very low in the sandy horizons and medium to high in the loamy subsoil. The organic-matter content and natural fertility are low.

Representative profile of Apopka sand, 0 to 5 percent slopes:

Ap—0 to 6 inches, very dark gray (10YR 3/1) sand; weak, fine, crumb structure; friable; few fine roots; medium acid; clear, wavy boundary.

A21—6 to 40 inches, yellowish-brown (10YR 5/4) sand; single grain; loose; few fine roots; common fine carbon particles; many uncoated sand grains; medium acid; gradual, wavy boundary.

A22—40 to 55 inches, light yellowish-brown (10YR 6/4) sand; single grain; loose; many fine roots; few fine carbon particles; many uncoated sand grains; strongly acid; abrupt, wavy boundary.

Bt—55 to 84 inches, red (2.5YR 5/8) sandy clay loam; few, medium, faint mottles of red (10YR 4/8); weak, fine, subangular blocky structure; friable when moist, hard when dry; few fine roots; few discontinuous clay films on surfaces of peds and pore walls; sand grains are coated and bridged with clay; few fine gravel 2 millimeters to 10 millimeters; very strongly acid.

Apopka soils are medium acid to very strongly acid throughout the profile. The Ap and A1 horizons are gray to black or grayish brown to very dark grayish brown and 2 to 8 inches thick. The A2 horizon is light gray through yellowish brown and reddish yellow to strong brown. It is 38 to 72 inches thick. The Bt horizon is red to light yellowish-brown sandy loam and sandy clay loam that extends to a depth of 80 inches or more. Mottling, if present, ranges from few, fine to common, coarse, distinct mottles of red, yellow, and brown. Permeability in the Bt horizon is moderate to moderately rapid.

Apopka soils are associated with Astatula, Lake, Lucy, Ocilla, Orlando, Pelham, and Vaucluse soils. The loamy subsoil in Apopka soils is at a depth of 40 to 60 inches. It is at a depth of only 20 to 40 inches in Pelham, Lucy, and Ocilla soils, and within a depth of 20 inches in Vaucluse soils. Astatula, Lake, and Orlando soils, in contrast, do not have a loamy subsoil. The depth to the water table in Apopka soils is greater than it is in Pelham or Ocilla soils.

Apopka sand, 0 to 5 percent slopes (ApB).—This is a nearly level to gently sloping, well-drained sandy soil that has a sandy clay loam subsoil at a depth of about 55 inches. This soil has the profile described as representative for the series. The water table is at a depth of more than 84 inches.

The sandy surface and subsurface layers are rapidly permeable and have very low available water capacity and low organic-matter content. Permeability in the subsoil is moderate or moderately rapid, and available water capacity is medium to high. Natural fertility is low.

Included in mapping are small areas that have a sandy clay loam subsoil at a depth of less than 40 inches, a few small areas that are sandy to a depth of more than 80 inches, small areas around sinks or on short breaks where slopes are more than 5 percent, and areas of fine sand.

This soil is poorly suited to shallow-rooted truck crops, flowers, and other annual crops that have high moisture and fertility requirements. Irrigation of these crops generally is not feasible. Watermelons are well suited, but they require contour cultivation with alternate strips of tall grain, adequate amounts of fertilizer and lime, and occasional irrigation. This soil is well suited to citrus. Cover crops should be grown between the trees. Irrigation is beneficial. If adequately fertilized and limed, deep-rooted tame grasses make good pasture. Grazing should be carefully controlled.

Areas that have not been farmed are either open pine forest or, if trees have been removed, open grassland. Some of these areas are used for range. The understory plants provide good forage for cattle and wildlife. Major decreaser and increaser forage plants are creeping bluestem, pineland three-awn, indiangrass, splitbeard bluestem, broomsedge bluestem, and runner oak. Under continuous heavy grazing, pricklypear, post oak, blackjack oak, natalgrass, dogfennel, annual grasses, weeds, and other less desirable invader plants become dominant. Capability unit IIIs-1; Sandhills range site; woodland group 3s2.

Apopka sand, 5 to 12 percent slopes (ApD).—This is a sloping to strongly sloping, well-drained sandy soil. Unless protected by vegetation, it is readily erodible by wind and water. The water table is at a depth of more than 84 inches.

The sandy surface and subsurface layers are rapidly permeable. Available water capacity is very low, and the organic-matter content is low. The loamy subsoil is moderately permeable or moderately rapidly permeable and has medium to high available water capacity. Natural fertility is low.

Included in mapping are small areas of Lucy sand and Vaucluse sand, small areas of Apopka sand, 0 to 5 percent slopes, and some areas of fine sand.

This soil is suited to most of the same plants that are grown on Apopka sand, 0 to 5 percent slopes, but it is easily eroded and requires more intensive management. Slopes interfere with tillage, irrigation, and harvest.

Areas that have not been farmed are either open pine forest or, if the trees have been removed, open grassland. Capability unit IVs-3; Sandhills range site; woodland group 3s2.

Astatula Series

The Astatula series consists of excessively drained sandy soils that are on rolling uplands of the central ridge. These soils formed in thick beds of marine sands.

In a representative profile, the surface layer is dark-gray sand about 7 inches thick. The next layer is brown sand to a depth of about 24 inches. It is underlain by yellowish-brown sand that extends to a depth of 86 inches. Reaction is medium acid in the surface layer, strongly acid below this to a depth of about 62 inches, and very strongly acid at depths between 62 and 86 inches. The water table is at a depth of more than 120 inches.

Astatula soils are rapidly permeable in all layers. Available water capacity is very low. The organic-matter content and natural fertility are low.

Representative profile of Astatula sand, dark surface, 0 to 5 percent slopes:

Ap—0 to 7 inches, dark-gray (10YR 4/1) sand; single grain; loose; common very fine to fine roots; medium acid; clear, wavy boundary.

C1—7 to 24 inches, brown (10YR 5/3) sand; single grain; loose; very few medium to fine roots; many uncoated sand grains; a few very dark grayish-brown (10YR 3/2) old root channels ½ inch to 1 inch in diameter; few carbon particles; strongly acid; gradual, wavy boundary.

C2—24 to 62 inches, yellowish-brown (10YR 5/4) sand; single grain; loose; few fine and medium carbon particles; many uncoated sand grains; a few very dark grayish-brown (10YR 3/2) old root channels ½ inch to 1 inch in diameter; strongly acid; gradual, wavy boundary.

C3—62 to 86 inches, yellowish-brown (10YR 5/8) sand; single grain; loose; many uncoated sand grains; very strongly acid.

Astatula soils are very strongly acid to medium acid throughout the profile. The Ap and A1 horizons are gray to very dark grayish brown and are 3 to 8 inches thick. In some areas there is an AC horizon 3 to 5 inches thick that is mixed gray, brown, and yellowish brown. The C horizon is very pale brown to yellowish brown. In some areas it is mottled with yellow, brown or red, and in others it contains white sand grains and has common to many, fine to coarse mottles of gray to white. The combined thickness of the A and C horizons is more than 80 inches.

Astatula soils are associated with Apopka, Lake, Lucy, Orlando, Ocilla, Paola, Pelham, and Vaucluse soils. They are sandy throughout and do not have the loamy Bt horizon within a depth of 80 inches that is present in Apopka, Ocilla, Pelham, Lucy, and Vaucluse soils. They do not have the white A2 horizon that distinguishes Paola soils. They are lighter colored than Lake soils and do not have as much silt and clay in the uppermost 40 inches. They do not have the thick, dark-colored A horizon that is typical of Orlando soils.

Astatula sand, 0 to 5 percent slopes (AsB).—This is a nearly level to gently sloping, excessively drained soil. The profile of this soil is similar to that described as representative for the series, but the surface layer is gray sand about 4 inches thick. The water table is at a depth of more than 120 inches.

Permeability is very rapid throughout the profile. Available water capacity and natural fertility are very low. Organic-matter content is low.

Included in mapping are small areas of Paola sand and Apopka sand and some areas of fine sand.

This soil is too porous and dry for most crops. A few areas are suitable for watermelons, but unless irrigated, the crop is seriously affected by drought. This soil is poorly suited to citrus trees and tame grasses. Only a small acreage is used for pasture.

Only a small part is cultivated. The vegetation is sand pine, scrub oaks, saw-palmettos, rosemary, and a sparse growth of the native grasses. This sparse vegetation is of little value for range. Capability unit VIs–1; Sand Scrub range site; woodland group 5s3.

Astatula sand, dark surface, 0 to 5 percent slopes (AtB).—This is a nearly level to gently sloping, excessively drained sandy soil. It is on the undulating upland ridge. It has the profile described as representative for the series. The water table is at a depth of more than 120 inches.

Permeability is very rapid throughout the profile, and available water capacity is very low. Organic-matter content and natural fertility are low.

Included in mapping are small areas of Apopka sand, Lake sand, Lucy sand, Orlando sand, and Vaucluse sand; some areas of loose fine sand in the northern and eastern parts of the area; some small areas in slight depressions that have a water table at a depth of 40 to 60 inches; and small areas where slopes are 5 to 8 percent.

This soil is poorly suited to shallow-rooted field and truck crops and other annual crops that have high moisture and fertility requirements. It is well suited to watermelons. Melons should be planted on the contour in alternate strips with tall grain. They should be fertilized and limed and should be irrigated during dry seasons. If well managed, citrus trees grow well. Much of the acreage is planted to citrus. The trees need irrigation, soil improving cover crops between the trees, and adequate fertilization and lime. The soil is suited to deep-rooted tame grasses, but drought restricts their growth in dry seasons and fertilizer is leached away rapidly by heavy rain. Good pasture management includes controlled grazing, fertilization, and lime.

In the few small areas that are not cultivated, the vegetation is turkey oak, a few scattered longleaf pines, and an understory of grasses and shrubs. The understory plants provide fair forage for cattle and wildlife. Major decreaser and increaser forage plants are creeping bluestem, pineland three-awn, indiangrass, splitbeard bluestem, broomsedge bluestem, and runner oak. Pricklypear cactus, natalgrass, dogfennel, a variety of annual grasses and weeds, and other less desirable plants become dominant under continuous heavy grazing. Capability unit IVs–1; Sandhills range site; woodland group 4s3.

Astatula sand, dark surface, 5 to 12 percent slopes (AtD).—This is a sloping to strongly sloping, excessively drained sandy soil. Its profile is similar to that described as representative for the series, but the surface layer is generally 1 to 2 inches thinner and in some unprotected areas, it is eroded. The water table is at a depth of more than 120 inches.

Permeability is very rapid throughout the profile, and available water capacity is very low. The organic-matter content and natural fertility are low. The soil is readily erodible by wind and water if it is left without protective vegetation.

Included in mapping are small areas of Apopka sand, Lake sand, and Lucy sand and in the northern and eastern parts of the Area, some areas of fine sand.

This soil is suited to most of the same plants that are grown on Astatula sand, dark surface, 0 to 5 percent slopes, but it is easily erodible if left unprotected. More careful attention to maintenance of a good ground cover is needed.

Slopes complicate cultivation, irrigation, and harvesting. This soil is used principally for citrus and improved pasture. Only a small acreage is in native vegetation. It is poorly suited to range. Capability unit VIs–2; Sandhills range site; woodland group 4s3.

Astatula sand, dark surface, 12 to 40 percent slopes (AtF).—This is a very steep, excessively drained sandy soil. It has a profile similar to that described as representative for the series, but the surface layer is about 4 inches thinner. The water table is at a depth of more than 120 inches.

Permeability is very rapid throughout the profile, and available water capacity is very low. The organic-matter content and natural fertility are low. This soil is readily erodible by wind and water unless it has a protective cover of vegetation.

Included in mapping are small areas where slopes are as much as 5 percent, a few small areas of Apopka sand and Lucy sand, and some areas of fine sand.

This soil is not suited to cultivated crops. Unprotected areas erode rapidly. Much of the acreage is in small areas within citrus groves that have been planted on a similar, but less steep soil. These areas are difficult to cultivate, irrigate, fertilize, and harvest. Erosion is severe in unprotected areas. A close-growing cover crop should be maintained between the trees at all times. Part of the acreage is in tame grass pasture. The soil is very droughty, and fertility is difficult to maintain. The native vegetation is mostly scrub oak and an understory of native grasses and shrubs. It is of little value for range. Capability unit VIIs-2; Sandhills range site; woodland group 4s3.

Brighton Series

The Brighton series consists of nearly level, very poorly drained, fibrous, organic soils. These soils are in marshes and swamps and in depressions. Unless drained, they are covered with water most of the time. They formed in the remains of fibrous, nonwoody, aquatic plants.

In a representative profile, the surface layer is dark reddish-brown peat about 9 inches thick. It is underlain by dark yellowish-brown peat that extends to a depth of 18 inches. The next layer is dark-brown peat about 22 inches thick. It is underlain by dark yellowish-brown peat that extends to a depth of about 63 inches. Below the peat layers, and extending to a depth of 75 inches, is grayish-brown coarse sand. The water table is at the surface.

Permeability is rapid, and available water capacity is very high. The organic-matter content is very high, and natural fertility is moderate.

Representative profile of Brighton peat:

Oi1—0 to 9 inches, undecomposed organic material (peat), dark reddish brown (5YR 2/2) rubbed; about 80 percent unrubbed 40 percent rubbed: massive; sodium pyrophosphate extract is light gray (10YR 7/1); estimated 95 percent herbaceous organic material; strongly acid; diffuse, wavy boundary.

Oi2—9 to 18 inches, dark yellowish-brown (10YR 3/4) undecomposed organic material (peat), dark brown (7.5YR 3/2) rubbed; about 80 percent fiber unrubbed, 50 percent fiber rubbed; massive; sodium pyrophosphate extract is light gray (10YR 7/1); estimated 90 percent herbaceous organic material; many fine roots; strongly acid; diffuse, wavy boundary.

Oi3—18 to 40 inches, dark-brown (7.5YR 3/2), unrubbed and rubbed, undecomposed organic material (peat); about 90 percent fiber unrubbed. 45 percent rubbed; massive; sodium pyrophosphate extract is light gray (10YR 7/1); about 90 percent herbaceous material; strongly acid; diffuse, wavy boundary.

Oi4—40 to 63 inches, dark yellowish-brown (10YR 3/4), undecomposed organic material (peat), very dark brown (10YR 2/2) rubbed; about 80 percent fiber unrubbed. 60 percent fiber rubbed; massive; sodium pyrophosphate is light gray (10YR 7/1); about 95 percent organic material; about 95 percent herbaceous; strongly acid: abrupt smooth boundary.

IICg—63 to 75 inches, grayish-brown (10YR 5/2) coarse sand; single grain; loose; strongly acid.

Brighton soils are extremely acid to strongly acid throughout the profile. The surface layer is 4 to 10 inches thick and is black, dark reddish brown, and very dark gray to black. The peat horizons below the surface layer are dark reddish brown to dark brown. The organic material extends to a depth of 52 inches or more. The underlying layer is sand to coarse sand. The water table is at the surface. The soil is covered with shallow water except during extended dry periods, when the water table falls to a depth of about 6 inches. In drained areas, an efficient water-control system maintains the level of the water table at a depth of 12 to 48 inches.

Brighton soils are associated with Immokalee, Myakka, Ocoee, and Placid soils. They are organic, whereas Immokalee, Myakka, and Placid soils are mineral. They have a fibrous organic layer that is more than 52 inches thick in contrast with the organic surface layer of Ocoee soils that is less than 52 inches thick.

Brighton soils (Br).—These are nearly level, very poorly drained, fibrous organic soils. The surface layer is peat and muck. The soils are in low, broad wet areas. They have the profile described as representative for the series, but the surface layer is muck in some places. The water table is at the surface, and the soils are covered with shallow water except during extended dry periods, when the water table falls to a depth of about 6 inches. In drained areas, the water table is generally maintained at depths between 12 and 48 inches, depending upon need.

Permeability is rapid, and available water capacity is very high. Organic-matter content is very high, and natural fertility is moderate. The soils are high in nitrogen content but low in other plant nutrients.

Included in mapping are small areas of organic soils that have organic layers less than 52 inches thick and small areas of mineral soils.

Excess water is the main limitation. The soils are well suited to truck crops and flowers if surface water is controlled. Water control provides for removal of excess surface water in wet seasons and supplies subsurface irrigation in dry seasons. The water table should be lowered only enough to permit healthy root development during cropping seasons, and it should be raised again when crops have been harvested. This practice reduces the rate of subsidence by oxidation. These soils are not suited to citrus. Tame grasses and clovers grow well, and excellent pastures can be maintained. Pastures require surface drainage, fertilization, lime, and controlled grazing.

Undeveloped areas are natural grasslands. Some are used for range and produce forage for cattle and wildlife. Important decreaser and increaser plants are maidencane, cutgrass, pickerelweed, duckpotato, sedges, rushes, and sawgrass. Under continuous heavy grazing, the more desirable plants are weakened and replaced by the less desirable ones. Some invaders in heavily grazed areas are redroot, willow primrose, Ft. Thompson grass, lizardtail, and numerous annual grasses and weeds. Sawgrass naturally dominates the vegetation in some places. It has little value for range. Capability unit IIIw-2; Fresh Marsh (organic) range site; no woodland classification.

Cassia Series

The Cassia series consists of nearly level, somewhat poorly drained sandy soils that have a layer stained by organic matter. These soils are on low ridges in the flatwoods and in depressions or low level areas on the upland ridge. They formed in thick beds of sandy marine sediment.

In a representative profile, the surface layer is gray sand about 4 inches thick. The subsurface layer is light-gray sand to a depth of about 25 inches. The subsoil is dark reddish-brown sand coated with organic matter and is weakly cemented. It is about 12 inches thick. Below this is mottled very pale brown sand to a depth of 80 inches. Reaction is very strongly acid throughout the profile. The water table is at a depth of about 24 inches.

Permeability is moderately rapid at depths between 25 and 37 inches. At depths above 25 inches and below 37 inches, the sandy layers are very rapidly permeable. Available water capacity in the sandy layers is low, organic-matter content is very low, and natural fertility is low. Between depths of 25 and 37 inches, available water capacity is moderate and the organic-matter content is high.

Representative profile of Cassia sand:

A1—0 to 4 inches, gray (10YR 5/1) sand; single grain; loose; many fine roots; very strongly acid; clear, wavy boundary.

A2—4 to 25 inches, light-gray (10YR 7/1) sand; few, medium, faint, dark-gray (10YR 4/1) mottles along root channels; single grain; loose; few fine to medium roots; very strongly acid; abrupt, smooth boundary.

B21h—25 to 28 inches, dark reddish-brown (5YR 2/2) sand; few coarse pockets that are light brownish gray; massive; weakly cemented; sand grains coated with organic matter; many fine roots; very strongly acid; clear, wavy boundary.

B22h—28 to 37 inches, dark reddish-brown (5YR 3/3) sand; massive; weakly cemented; sand grains coated with organic matter; very strongly acid; clear, wavy boundary.

C—37 to 80 inches, very pale brown (10YR 7/3) sand; common, medium, brown (10YR 5/3, 4/3) mottles; few, fine, distinct, strong-brown (7.5YR 5/6) mottles; single grain; loose; very strongly acid.

Cassia soils are medium acid to very strongly acid throughout the profile. The A1 horizon is 3 to 5 inches thick and is light gray or gray. The A2 horizon is 18 to 24 inches thick, is light gray to white, and has few, fine to medium, faint, dark-gray and brown mottles along root channels. A transitional horizon occurs between the A2 and B21h horizons in many places. It is less than 2 inches thick and is dark gray to black. In some areas this horizon is discontinuous. The B21h horizon is black to very dark gray or dark reddish brown. The B22h horizon is very dark brown to black and dark reddish brown. The Bh horizon is normally 10 to 18 inches thick. It is 1 to 4 percent organic matter. In places there is a B3 horizon. It is yellowish brown to very dark grayish brown and is 3 to 10 inches thick. The C horizon is yellowish brown to white and has few, fine, faint to common, medium, distinct mottles of gray, brown, and yellow. The water table is at a depth of 10 to 40 inches except during extended dry periods when it falls to a depth of 40 to 60 inches.

Cassia soils are associated with Astatula, Immokalee, Myakka, Paola, St. Lucie, and Pomello soils. They are more poorly drained than Astatula, Paola, St. Lucie, and Pomello soils. They are better drained than Immokalee and Myakka soils.

Cassia sand (Ca).—This is a nearly level, somewhat poorly drained soil. The water table is at a depth of 10 to 40 inches except during extended dry periods when it falls to a depth of 40 to 60 inches.

Permeability is very rapid to a depth of about 25 inches; it is moderately rapid in the weakly cemented layer and rapid between depths of 37 and 80 inches. The organic-matter content and available water capacity are very low except in the layer that is at a depth of 25 to 37 inches. In this layer the organic-matter content is moderately high and available water capacity is moderate.

Included in mapping are small areas of soils that have a thin subsoil only lightly stained with organic matter and areas of soils that have a fine sand texture.

This soil is poorly suited to truck crops, flowers, and other shallow-rooted crops that have high moisture and fertilizer requirements. The capacity of the soil for holding available water and plant nutrients is slight in the sandy surface layer. The soil is not well suited to citrus and tame grasses. Deep-rooted plants obtain some water from the water table during dry seasons. Drainage is needed to remove excess water after heavy rain.

Much of the acreage is used for range. Vegetation is scrub oaks, palmettos, rosemary, scattered pine trees, and a sparse understory of grasses and shrubs, none of which provides adequate forage for range. Capability unit VIs-3; Sand Scrub range site; woodland group 4s3.

Emeralda Series

The Emeralda series consists of nearly level, poorly drained sandy soils that have a clayey subsoil. These soils are in broad, low areas, generally near lakes and streams. They formed in clayey marine sediment.

In a representative profile, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer is grayish-brown fine sand about 5 inches thick. The subsoil, at a depth of 11 to 26 inches, is a mottled gray sandy clay. Below this is mottled light-gray sandy clay that extends to a depth of about 66 inches. Except where drained, these soils have a water table at the surface most of the year. They are usually flooded during periods of average rainfall.

Emeralda soils are strongly acid in the surface layer, medium acid in the subsurface layer, neutral in the subsoil to a depth of about 26 inches, and moderately alkaline between depths of 26 and 66 inches. They are slowly permeable, have high available water capacity, and have high natural fertility. The organic-matter content in the surface layer is moderately high.

Representative profile of Emeralda fine sand:

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

A2g—6 to 11 inches, grayish-brown (10YR 5/2) fine sand; few, fine, faint mottles of dark grayish brown; single grain; loose; few fine roots; medium acid; abrupt, wavy boundary.

B21tg—11 to 26 inches, gray (10YR 5/1) sandy clay; many, medium, distinct, light olive-brown (2.5Y 5/4) mottles, common, medium, faint, grayish-brown (2.5Y 5/2) mottles and few, medium, prominent, red (2.5YR 4/6) mottles; moderate, medium, angular blocky structure; firm, plastic; few fine roots and partially decomposed root fragments; many shiny ped surfaces appear to be clay film; few fine lenses of fine sand; neutral; clear, wavy boundary.

B22tg—26 to 44 inches, light-gray (10YR 6/1) sandy clay; common, medium, distinct, brownish-yellow (10YR 6/8) mottles; few, fine, prominent mottles of red and few, fine, faint, light brownish-gray and gray mottles; weak, medium, angular blocky structure; very firm, plastic; shiny ped surfaces, most of which appear to be clay films; some are pressure faces; few slickensides; few fine lenses of fine sand; moderately alkaline; clear, wavy boundary.

B31g—44 to 56 inches, light-gray (5Y 7/2) sandy clay; many, medium, distinct, brownish-yellow (10YR 6/6) and yellowish-brown (10YR 5/8) mottles, common, medium, faint, gray (10YR 5/1) and grayish-brown (10YR 5/2) mottles; massive; firm, plastic; few pressure faces; few medium pockets of white chalky marl and few, small, hard, fine concretions in lower part; many, coarse, thin lenses of gray (10YR 5/1) to dark-gray (10YR 4/1) fine sand; moderately alkaline; clear, wavy boundary.

B32gca—56 to 66 inches, light-gray (5Y 7/2) sandy clay; many, medium to coarse, distinct, yellowish-brown (10YR 5/8) and brownish-yellow (10YR 6/8) mottles and common, medium, faint, gray (10YR 5/1) and grayish-brown (10YR 5/2) mottles; massive; firm, plastic; contains about 15 percent white chalky marl with few hard lime concretions less than 10 millimeters in size occurring in pockets; few small pressure faces; many thin lenses of gray (10YR 5/1) and dark-gray (10YR 4/1) fine sand; moderately alkaline.

Emeralda soils are strongly acid to slightly acid in the A horizon and slightly acid to moderately alkaline in the B horizon. The A1 or Ap horizon is dark brown to black and 4 to 9 inches thick. The A2 horizon is 4 to 10 inches thick and is light gray to brown. The A horizon is fine sand or loamy fine sand and is no more than 20 inches thick. The Btg horizon is gray through light gray and grayish brown through light olive gray mottled with gray, yellow, brown, or red. It is sandy clay or clay. The B3g horizon is sandy clay or clay and contains numerous fragments of hard and soft lime. It is mildly alkaline to moderately alkaline. In places it contains sand lenses. The water table is at or near the surface in wet seasons and is at a depth of 15 to 30 inches in dry seasons. Some areas are covered with shallow water most of the time.

Emeralda soils are closely associated with Eureka, Fellowship, Iberia, Montverde, and Oklawaha soils. They have a sandy A2 horizon that is not present in Iberia and Fellowship soils. They are less acid and have a thicker A1 horizon than Eureka soils. They do not have the thick organic horizons that are typical of Montverde and Oklawaha soils.

Emeralda fine sand (Em).—This is a nearly level, poorly drained soil that has a clayey subsoil. It is generally flooded during periods of average rainfall. Except in drained areas, the water table is at the surface most of the year.

Permeability is rapid in the surface and subsurface layers and is slow in the subsoil. Available water capacity and natural fertility are high. The surface layer is moderately high in organic-matter content.

Included in mapping are small areas of Iberia sandy clay, areas of soils that have a sandy surface layer 20 to 40 inches thick, and areas of soils that have a sand surface layer.

This soil is not suited to most cultivated crops. It is wet and subject to frequent flooding. Adequate flood control measures and drainage are generally not feasible. In a few small areas where drainage and protection from flooding are feasible the soil is well suited to truck crops and flowers. Tame grasses and clovers are suited, but they require surface drainage. Improved pastures require fertilization and controlled grazing. At times they are severely damaged by extended flooding.

Only a small acreage is cultivated. The vegetation is mainly grasses, sedges, and rushes. Some areas are used for range and provide good forage for cattle and wildlife. Decreaser and increaser forage plants are maidencane, cutgrass, beaked panicum, and sand cordgrass. If the range is overgrazed, the better forage plants are replaced by pickerelweed, redroot, smartweed, iris, broadleaf carpetgrass, annual grasses and weeds, and other less desirable plants. Capability unit Vw-1; Fresh Marsh (mineral) range site; woodland group 2w3c.

Eureka Series

The Eureka series consists of nearly level, poorly drained sandy soils that have a clayey subsoil. These soils are in low areas or in depressions. They formed in acid, clayey marine sediment.

In a representative profile, the surface layer is very dark grayish-brown loamy fine sand about 5 inches thick. The subsurface layer is mottled dark grayish-brown loamy fine sand about 3 inches thick. The subsoil is about 82 inches thick. The upper 6 inches is dark-gray clay mottled with yellowish brown and red. The next 37 inches is gray sandy clay that has red and dark red mottles. The next 11 inches is gray sandy clay mottled with red, dark red, and grayish brown, and the lower 28 inches is gray clay mottled with red and strong brown. The profile is very strongly acid throughout. The water table is at a depth of about 6 inches.

Eureka soils are very slowly permeable. They are high in available water capacity and medium in natural fertility. The surface layer is moderately high in organic-matter content.

Representative profile of Eureka loamy fine sand:

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; weak, fine, granular structure; very friable; many fine to coarse roots; very strongly acid; clear, wavy boundary.

A2—5 to 8 inches, dark grayish-brown (10YR 4/2) loamy fine sand; common, medium, faint mottles of light yellowish brown (10YR 6/4), very dark grayish brown (10YR 3/2), and dark gray (10YR 4/1), and few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, fine, granular structure; very friable; many coarse roots; very strongly acid; abrupt, wavy boundary.

B21tg—8 to 14 inches, dark-gray (10YR 4/1) clay; many, fine, distinct, yellowish-brown (10YR 5/8) mottles and few, fine, prominent, red (2.5YR 5/8) mottles; moderate, fine and medium, subangular and angular blocky structure; plastic; many fine and medium roots; thin clay films on surfaces of peds, few, fine, vertical, gray sand lenses along root channels and between peds; very strongly acid; gradual, wavy boundary.

B22tg—14 to 51 inches, gray (10YR 5/1) sandy clay; common, fine and medium, prominent, red (2.5YR 4/6) and dark-red (10YR 3/6) mottles; moderate, fine and medium, angular and subangular blocky structure; plastic; thin clay films on surfaces of peds; few, fine, vertical, gray sand lenses along root channels and between peds; very strongly acid; diffuse, wavy boundary.

B23tg—51 to 62 inches, gray (10YR 5/1) sandy clay; many, medium, prominent, red (2.5YR 4/6) and dark-red (10YR 3/6) mottles and few, fine, faint, grayish-brown mottles; strong, fine and medium, angular and subangular blocky structure; plastic; few fine roots; thin clay films on ped surfaces; few, fine to medium, vertical, gray sand lenses along root channels and between peds; very strongly acid; gradual, wavy boundary.

B24tg—62 to 90 inches, gray (10YR 6/1) clay; common, medium, prominent mottles of dusky red (10R 3/4), weak red (10R 4/2), red (10R 5/8), strong brown (7.5YR 5/8), and reddish yellow (7.5YR 6/8) and few, medium, faint mottles of light brownish gray (10YR 6/2); few, fine, prominent, vertical, red streaks along root channels; strong, fine and medium, angular and subangular blocky structure; plastic; few fine roots and a few extremely fine hairlike roots of filaments along surfaces of peds; thin clay fibers on ped surfaces; few vertical streaks and pockets of gray (10YR 5/1) sand 1/8 inch to 1/2 inch in width; very strongly acid.

Eureka soils are strongly acid to very strongly acid in all horizons. The A1 horizon is 2 to 6 inches thick. It ranges from grayish-brown to black fine sand or loamy fine sand. The A2 horizon is light-gray to dark-gray or light grayish-brown to dark grayish-brown fine sand or loamy fine sand. It ranges in thickness from 2 to 16 inches. The A horizon is no more than 20 inches thick. The Btg horizon is light-gray to dark-gray sandy clay or clay that is distinctly mottled with red, brown, and yellow. Structure ranges from moderate to strong, from fine to medium, and from subangular to angular blocky. In places, a massive Cg horizon occurs beneath the Btg horizon. It is light-gray to dark-gray sandy clay or clay and has few to common mottles of yellow, brown, or red. In places, sand pockets are in sufficient quantity to make an aggregate texture of sandy clay loam in the Cg horizon.

Eureka soils are associated with Brighton, Emeralda, Iberia, Montverde, and Oklawaha soils. They are mineral soils, but Brighton, Montverde, and Oklawaha soils are organic. They have a thinner A1 horizon and are more acid than Emeralda and Iberia soils.

Eureka loamy fine sand (Eu).—This is a nearly level, poorly drained soil that has a clayey subsoil. It occupies low areas. The water table is within a depth of 10 inches during periods of average rainfall. During dry periods, it is at a depth of 10 to 20 inches.

Permeability is very slow, available water capacity is high, and natural fertility is medium. The surface layer is moderately high in organic-matter content.

Included in mapping are small areas of Iberia sandy clay and Emeralda fine sand and small areas of soils that have a sandy surface layer that is 20 to 40 inches thick over a clayey subsoil.

This soil is not suited to general farm crops and citrus. Providing adequate drainage for these crops is impractical because there are no good drainage outlets and permeability is very low. The soil is suited to truck crops and flowers if surface drainage is provided, but there is a hazard of occasional crop failure because of flooding. Only a small acreage is cultivated. Much of the acreage is used for improved pasture. In these areas a reliable means for the rapid removal of surface water after rain is needed. In addition, grazing should be controlled, and complete fertilizers must be applied regularly.

Most undeveloped areas are open forest of longleaf pine, slash pine, and in places, cabbage palm. Understory grasses and shrubs provide forage for cattle and wildlife if the wooded areas are used for range. The amount of forage depends on the amount of tree cover and the extent of grazing. The major forage plants are creeping bluestem, indiangrass, little blue maidencane, Florida paspalum, pineland three-awn, tall panicums, deerstongue, swamp sunflower, grassleaf goldaster, milkpeas, and peavines. In areas that are overgrazed, saw-palmetto, gallberry, fetterbush, broadleaf carpetgrass, and annual grasses and weeds become dominant and reduce forage production. Capability unit IIIw-1; Acid Flatwoods range site; woodland group 2w3c.

Felda Series

The Felda series consists of nearly level, poorly drained soils that have a sandy surface layer and a loamy subsoil. These soils are in slightly elevated areas bordering sloughs and ponds. They formed in stratified sandy and loamy marine sediment.

In a representative profile, the surface layer is black fine sand about 3 inches thick. The subsurface layer is gray fine sand about 22 inches thick. The subsoil is about 31 inches thick. The uppermost 13 inches is mottled dark-gray fine sandy loam and the next 18 inches is mottled dark-gray sandy clay loam. Below the subsoil is a layer of olive-gray marly clay. The sandy surface layer and subsurface layer are strongly acid. The loamy subsoil is mildly alkaline, and the marly clay layer is moderately alkaline. The water table is at a depth of about 10 inches.

Felda soils are rapidly permeable in the sandy layers, moderately permeable in the loamy layers, and slowly permeable in the marly clay layer. Available water capacity is low in the sandy surface layer and moderate in the loamy layers. Natural fertility is moderate, and the organic-matter content is low.

Representative profile of Felda fine sand:

A1—0 to 3 inches, black (10YR 2/1) rubbed fine sand; weak, fine, granular structure; very friable; many fine to coarse roots; strongly acid; clear, wavy boundary.

A2—3 to 25 inches, gray (10YR 5/1) rubbed fine sand; single grain; loose; many fine to coarse roots; strongly acid; abrupt, wavy boundary.

B21tg—25 to 30 inches, dark-gray (10YR 4/1) fine sandy loam; few, fine and medium, faint mottles of brown (7.5YR 5/2), dark grayish brown (2.5Y 4/2), and very dark gray (N 3/0); weak, fine and medium, subangular blocky structure; friable, slightly sticky; common fine to coarse roots; few fine and medium sand lenses; few fine and medium pockets of sandy clay loam; mildly alkaline; clear, wavy boundary.

B22tg—30 to 38 inches, dark-gray (10YR 4/1) heavy fine sandy loam; common, medium, faint mottles of gray (10YR 5/1) and very dark gray (10YR 3/1); weak, fine and medium, subangular blocky structure; friable, sticky; few fine stains of dark brown and dark yellowish brown along root channels; common fine and medium roots; common fine sand lenses; mildly alkaline; clear, wavy boundary.

B23tg—38 to 56 inches, dark-gray (10YR 4/1) sandy clay loam; many, medium, faint mottles of very dark gray (10YR 3/1) and gray (10YR 5/1) and few, fine and medium, faint mottles of dark grayish brown (2.5Y 4/2); weak, fine and medium, subangular blocky structure; firm, sticky; few fine stains of dark reddish brown and dark yellowish brown along root channels; common fine and medium sand lenses; mildly alkaline; abrupt, wavy boundary.

IICca—56 to 60 inches, olive-gray (5Y 5/2) marly clay; few, medium, faint mottles of light olive gray; massive; very firm, very sticky; 10 percent dark-gray pockets of fine sandy clay loam and fine sandy loam; 50 percent marl; moderately alkaline.

Felda soils are strongly acid to slightly acid in the A2 horizon and neutral to mildly acid in the Btg horizon. The A1 horizon is 3 to 4 inches thick and very dark grayish brown to black. The A2 horizon is light gray to dark gray or light brownish gray to dark grayish brown. These horizons are mottled with gray and brown in some places. The A horizon is a fine sand 17 to 27 inches thick. The Btg horizon is fine sandy loam to sandy clay loam 30 to 36 inches thick. It is dark gray to very dark gray or dark grayish brown to very dark grayish brown. In places the sand lenses are absent and in places the B22tg and B23tg horizons are absent. The IICca horizon is light gray to gray, light brownish gray to grayish brown, or light olive gray to olive gray. It ranges from fine sand to clay and is more than 45 percent marl, lime nodules, or shell fragments. The IICca horizon is below a depth of 50 inches. The water table is at a depth of 10 to 30 inches for 6 months or more each year and is within a depth of 10 inches for 2 to 6 months. These soils are frequently covered by shallow water.

Felda soils are closely associated with Immokalee, Myakka, Wauchula, and Wabasso soils. They are less acid and do not have the Bh horizon stained with organic matter that is typical of the associated soils.

Felda fine sand (Fd).—This is a nearly level, poorly drained soil in narrow sloughs and depressions and slightly elevated areas bordering sloughs and depressions. It is occasionally covered with shallow water. The water table is commonly at a depth of 10 to 30 inches, but is within a depth of 10 inches for 2 to 6 months during the rainy season.

This soil is rapidly permeable in the sandy layers, moderately permeable in the loamy subsoil, and slowly permeable in the underlying marly clay. It has low available water capacity in the sand layers and medium available water capacity in the subsoil. It is moderate in natural fertility and low in organic-matter content.

Included in mapping are small areas of soils that have a Btg horizon at a depth of 12 to 20 inches, small areas of Wabasso sand, some areas of Felda soil that has a sand texture, and a few areas that have fine sand at a depth of 40 to 80 inches.

This soil is suitable for truck crops, flowers, and other shallow-rooted crops that tolerate wetness. These crops require reliable surface drainage that will remove excess water soon after a rain. They should be rotated with soil-improving cover crops. Fertilization is needed. In areas where deep drainage is practical, this soil is suited to citrus, but the trees are subject to occasional severe damage by freezing in winter. Good grove management includes fertilization, cover crops between the trees, and deep drainage to assure good internal drainage at all times. Good pasture of tame grasses and clovers can be maintained by surface drainage, fertilization, and controlled grazing.

Most of the acreage is in grassy vegetation, and much of it is used as range. If well managed, it produces good forage. On range in good condition, the important decreaser and increaser grasses are maidencane, cutgrass, beaked panicum, cordgrass, perennial sedges, and rushes. Under continuous heavy grazing, pickerelweed, redroot, smartweed, iris, broadleaf carpetgrass, and numerous annual grasses and weeds invade and become dominant. Capability unit IIIw-1; Fresh Marsh (mineral) range site; woodland group 3w2.

Fellowship Series

The Fellowship series consists of nearly level, poorly drained soils that have a dominantly clayey subsoil. These soils are mostly in small depressions. They formed in thick beds of clayey marine sediment.

In a representative profile, the surface layer is very dark grayish-brown fine sandy loam about 6 inches thick. The subsoil is 56 inches thick. The uppermost 24 inches is mottled black sandy clay loam. The next 28 inches is mottled dark-gray and gray clay, and the lower 4 inches is mottled dark-gray, gray, and very dark gray clay. Reaction is very strongly acid to a depth of about 30 inches, medium acid from about 30 to 58 inches, and moderately alkaline below a depth of 58 inches. The water table is within a depth of 10 inches for more than 6 months in most years, and the soils are frequently covered with shallow water.

Fellowship soils are moderately permeable in the surface layer and very slowly permeable in the subsoil. Available water capacity is moderate. The organic-matter content and natural fertility are moderately high.

Representative profile of Fellowship fine sandy loam, ponded:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) fine sandy loam, matrix is of fine sandy clay, containing many dark-gray (10YR 4/1) and gray (10YR 5/1) pockets of fine sand, which makes an aggregate texture of fine sandy loam when crushed and mixed; many, medium, faint mottles of very dark gray (10YR 3/1), few, fine, mottles of dark yellowish brown (10YR 4/4) along root channels; weak, medium and fine, granular structure; friable; few fine roots and common, fine, partially decomposed roots; few earthworms and worm channels; very strongly acid; abrupt, wavy boundary.

B1tg—6 to 30 inches, black (10YR 2/1) sandy clay loam; common, fine and medium, prominent mottles of yellowish red (5YR 4/6), reddish yellow (5YR 6/8), and dark brown (7.5YR 4/4); moderate, medium, subangular and angular blocky structure; firm, plastic; very fine roots; surface of peds is somewhat shiny; very strongly acid; clear, wavy boundary.

B21tg—30 to 58 inches, mottled dark-gray (10YR 4/1) and gray (10YR 5/1) clay; common, medium, prominent mottles of yellowish red (5YR 4/6) along old root channels; moderate, medium, angular blocky structure; firm, plastic; few fine and medium pockets of dark-brown (7.5YR 4/4) fine sandy loam; medium acid; abrupt, wavy boundary.

B22tg—58 to 62 inches, mottled dark-gray (N 4/0), gray (N 5/0), and very dark gray (N 3/0) clay; common, fine and medium, prominent mottles of yellowish red (5YR 4/6) along old root channels; weak, medium, angular blocky structure; firm, plastic; moderately alkaline.

Fellowship soils are very strongly acid to strongly acid in the A1, Ap, and B1tg horizons, very strongly acid to medium acid in the B21tg horizon, and mildly alkaline to moderately alkaline in the B22tg horizon. The A1 and Ap horizons are 4 to 8 inches thick and range from very dark gray to black or very dark grayish brown to very dark gray. The B1tg horizon is very dark gray to black and is 18 to 24 inches thick. The B21tg horizon is gray to dark gray or mottled dark gray and gray sandy clay to clay. It is 15 to 30 inches thick. The B22tg horizon is gray to very dark gray sandy clay or clay mottled with red, brown, and yellow. In places there are gray mottles with a greenish cast. The water table is within a depth of 10 inches for more than 6 months in most years. The soil is frequently covered with shallow water.

Fellowship soils are associated with Eureka, Emeralda, and Iberia soils. They have a thicker, darker colored surface layer than Eureka soils. They are more acid in the uppermost 50 inches of the profile than Emeralda and Iberia soils. They do not have the A2 horizon that is typical of Emeralda and Eureka soils.

Fellowship fine sandy loam, ponded (Fe).—This is a nearly level, poorly drained loamy soil. The water table is within a depth of 10 inches for more than 6 months in most years. The soil is frequently covered with shallow water.

This soil is moderately permeable in the surface layer and very slowly permeable in the subsoil. Natural fertility and organic-matter content are high, and available water capacity is medium.

Included in mapping are small areas that have a surface layer of organic material 2 to 12 inches thick and small areas that have a fine sand surface layer.

This soil is not suitable for cultivation. Providing adequate drainage is impractical because of the very slow permeability and ponding. The soil is well suited to tame grasses and clovers if surface drainage is provided. Pastures should not be overgrazed. They should be fertilized occasionally.

This soil is not extensive, and few areas are large enough for independent development. Most areas are in native grass and are used for range. On range in good condition, the important decreaser and increaser grasses are maidencane, cutgrass, beaked panicum, and cordgrass. Perennial sedges and rushes provide additional forage. Under continuous heavy grazing, these plants are replaced by pickerelweed, redroot, smartweed, iris, broadleaf carpetgrass, numerous annual grasses and weeds, and other invader plants. Capability unit Vw-1; Fresh Marsh (mineral) range site; woodland group 2w3c.

Fill Land, Loamy Materials

Fill land, loamy materials (Fm) consists of loamy soil material that has been mixed, reworked, and leveled or shaped by earth-moving equipment. It is mostly 12 to 60 inches thick. There is no orderly sequence of layers. The material is highly variable within short distances. Some areas are filled with material from adjacent areas, and others are filled with various materials from distant areas. The dominant texture is sandy loam to sandy clay loam. The water table is at a depth of about 30 to 60 inches except in the low-lying areas, where it is at a depth of 10 to 30 inches, and in a few dry areas, where it is at a depth of more than 60 inches.

Fill land, loamy materials, is used mainly for building sites, recreational areas, parking lots, and roadbeds. Soil properties are so variable that onsite determination is needed in each area. No capability unit, range site, or woodland classification.

Iberia Series

The Iberia series consists of nearly level, poorly drained clayey soils. These soils are in broad areas near lakes and on the flood plains of the St. Johns and Wekiva Rivers. They formed in beds of clayey marine and fluvial materials.

In a representative profile, the surface layer is black sandy clay about 15 inches thick. The subsoil is 39 inches thick. The uppermost 25 inches is dark-gray sandy clay, and the lower 14 inches is heavy sandy clay mottled with gray, yellowish brown, and yellowish red. At a depth of 54 inches is a mixed layer of white chalky marl and mottled sandy clay that is more than 6 inches thick. The soils are medium acid in the surface layer, slightly acid below the surface to a depth of about 40 inches, and moderately alkaline in the rest of the profile. The water table is at the surface, and the soils are frequently covered with shallow water.

Iberia soils are very slowly permeable. Available water capacity is medium, and natural fertility and the organic-matter content are high.

Representative profile of Iberia sandy clay:

A1—0 to 15 inches, black (N 2/0) sandy clay; weak, medium, subangular blocky structure breaking to weak, medium and fine, granular in the upper part; firm, very hard, plastic; many coarse roots; medium acid; clear, wavy boundary.

B21g—15 to 40 inches, dark-gray (10YR 4/1) sandy clay; few, fine, faint, gray mottles; common fine stains of yellowish red (5YR 5/8), very dark gray (10YR 3/1), and black (10YR 2/1) along root channels; moderate, medium, angular blocky structure; firm, plastic; common partially decomposed root fragments; few fine lenses of fine and medium sand; few pressure faces; slightly acid; clear, wavy boundary.

B22g—40 to 54 inches, reticulately mottled dark-gray (N 4/0), gray (N 5/0), olive-gray (5Y 5/2 and 5Y 4/2), yellowish-brown (10YR 5/6), yellowish-red (5YR 4/8), very dark grayish-brown (10YR 3/2), and greenish-gray (5G 5/1) sandy clay; few, fine, black and very dark gray stains along root channels; weak, medium, angular and subangular blocky structure; very firm, plastic; few, fine, partially decomposed root fragments; few pressure faces and slickensides; moderately alkaline; clear, wavy boundary.

Cca—54 to 60 inches, mixture of 60 percent white chalky marl and 40 percent sandy clay that is mottled with yellow, brown, and gray; massive; marl is friable when moist, slightly hard when dry; sandy clay is firm when moist and hard when dry; few, fine, partially decomposed root fragments; moderately alkaline.

Iberia soils are medium acid to neutral in the A horizon, slightly acid to moderately alkaline in the Bg horizon, and mildly alkaline in the Cca horizon. The A horizon is sandy clay 10 to 20 inches thick. The Bg horizon is gray to very dark gray sandy clay or clay and contains lime concretions in some places. The Cca horizon commonly consists of white chalky marl and mottled clay or sandy clay in varying proportions. In some places the marl is shelly rather than chalky. In other places sandy pockets are present in this horizon. Also in places there is a noncalcareous Cg horizon, instead of the Cca horizon, that is commonly mottled gray sandy clay to fine sandy clay loam and contains pockets of sandy materials. Iberia soils crack during dry seasons. The cracks are at least 1 centimeter wide and extend to a depth of as much as 20 inches. The water table is at the surface or just beneath it most of the year. During periods of drought it falls to a depth of about 26 inches.

The Iberia soils mapped in the Lake County Area have slightly higher temperatures than are defined for the Iberia series, but this difference does not alter their usefulness and behavior.

Iberia soils occur in association with Anclote, Emeralda, Fellowship, Manatee, Montverde, and Oklawaha soils. They do not have the thick sand surface layer that is typical of Anclote and Manatee soils. They do not have the Btg horizon that is typical of Emeralda and Fellowship soils. They are mineral soils in contrast with Montverde and Oklawaha soils, which are organic.

Iberia sandy clay (Ib).—This is a nearly level, poorly drained soil in broad areas near lakes. The water table is at the surface, except during dry periods when it is at a depth of about 26 inches. During wet seasons this soil is covered by shallow water.

Iberia sandy clay is very slowly permeable. It has medium to high available water capacity, high natural fertility, and high organic-matter content.

Included in mapping are small areas of Oklawaha muck and Montverde muck and small areas of soils that have a sand to fine sandy loam surface layer.

This soil is poorly suited to row crops and it is too wet and cold for citrus. Providing adequate drainage and flood control for row crops and citrus is not feasible. The soil is suited to tame grasses and clovers, and much of the acreage is used for improved pasture. Pastures should be protected from flooding and from overgrazing, and they should be fertilized occasionally.

Areas that have not been developed are in native grass vegetation and are used as range. The vegetation is mainly cordgrass, primrose willow, pickerelweed, iris, redroot, and annual grasses and weeds. Capability unit Vw-1; Fresh Marsh (mineral) range site; woodland group 2w3c.

Iberia and Manatee soils (Im).—This mapping unit consists of nearly level, poorly drained and very poorly drained soils on flood plains of the St. Johns and Wekiva Rivers. The flood plain is dissected by meanders of old channels, sloughs, swamps, and marshes. The composition of this unit is more variable than that of most other units in the county, but the component soils are enough alike to permit interpretations for most expected uses. These soils are flooded for more than 2 months during most years. They are the first to flood during periods of high water and the last to dry out as the water recedes.

About 29 percent of this unit is Iberia sandy clay, about 21 percent is Manatee fine sand, about 28 percent is soils of the Anclote, Felda, and Emeralda series, and about 22 percent is an unnamed soil. The Iberia, Manatee, Anclote, Felda, and Emeralda soils have a profile similar to that described as representative for their respective series. The unnamed soil has a black loamy fine sand surface layer about 8 inches thick and a black, very dark gray, and light-gray sandy clay loam subsoil. The subsoil is mottled. The solum is more than 62 inches thick. The water table is at the surface most of the year.

The soils of this mapping unit are covered with dense swamp vegetation. Because of this heavy vegetation and the very slow permeability of the Iberia soils, development of the soils for cultivated crops or pasture is not practical. These areas of dense vegetation provide shelter and some browse for cattle and wildlife. The vegetation is wetland hardwoods, cypress, black pine, cabbage palms, and numerous kinds of shrubs, vines, and grasses. Capability unit VIIw-1; Swamp range site; woodland group 2w3c.

Immokalee Series

The Immokalee series consists of nearly level, poorly drained sandy soils. These soils are in broad areas in the flatwoods and in low areas between sand ridges and lakes, ponds, and sloughs. They formed in beds of marine sands.

In a representative profile, the surface layer is black sand about 4 inches thick. The subsurface layer is 34 inches thick. It is light brownish-gray sand in the uppermost 8 inches and is white sand in the lower 26 inches. The subsoil is 30 inches thick. It is black in the uppermost 7 inches and is dark reddish-brown sand in the middle 11 inches. These layers are weakly cemented, and the sand grains are well coated or stained with organic matter. The lower 12 inches is dark yellowish-brown sand that is about 15 percent medium to coarse fragments that are weakly cemented. These soils are very strongly acid throughout. The water table is normally at a depth of about 30 inches.

Immokalee soils are moderately permeable in the weakly cemented layers and rapidly permeable in all other layers. They have medium available water capacity, moderately high organic-matter content, and low natural fertility in the weakly cemented layers. They have very low available water capacity and very low natural fertility in the surface and subsurface layers and in the layer that is at a depth of 56 to 68 inches. These layers, except the surface layer, are very low in organic-matter content. The surface layer is moderate.

Representative profile of Immokalee sand:

A1—0 to 4 inches, black (10YR 2/1) sand; many clean sand grains; weak, fine, granular structure; very friable; many fine roots; very strongly acid; clear, smooth boundary.

A21—4 to 12 inches, light brownish-gray (10YR 6/2) sand; coarse faint mottles of grayish brown (10YR 5/2), gray (10YR 6/1), and light gray (10YR 7/2); single grain; loose; few fine roots; very strongly acid; clear, wavy boundary.

A22—12 to 38 inches, white (N 8/0) sand: few, fine and medium, faint, light brownish-gray (10YR 6/2) and dark grayish-brown (10YR 4/2) vertical streaks along root channels; single grain; loose; few fine roots; very strongly acid; ½-inch to 1-inch transitional layer of dark grayish brown (10YR 4/2); abrupt, wavy boundary.

B21h—38 to 45 inches, black (5YR 2/1) sand; few fine tongues of dark reddish brown (5YR 2/2); moderate, fine to medium, granular structure; firm, weakly cemented; few small pockets and fine streaks of light brownish gray (10YR 6/2); sand grains are well coated with organic matter; very strongly acid; gradual, wavy boundary.

B22h—45 to 56 inches, dark reddish-brown (5YR 3/2) sand; few, medium, distinct, vertical tongues of very dark brown (10YR 2/2) and dark brown (10YR 3/3); weak, fine, granular structure; firm, weakly cemented; sand grains are well coated with organic matter; very strongly acid; gradual, smooth boundary.

B3—56 to 68 inches, dark yellowish-brown (10YR 4/4) sand; common, coarse, faint, vertical streaks of brown (10YR 5/3) and dark grayish brown (10YR 4/2); single grain; loose; 15 percent medium to coarse fragments of dark yellowish brown (10YR 3/4) that are weakly cemented; very strongly acid.

Immokalee soils are strongly acid to very strongly acid throughout the profile. The A1 horizon is a mixture of dark-gray organic matter and light-gray clean sand about 3 to 6 inches thick. It has a salt-and-pepper appearance. The A2 horizon is white to dark-gray sand to fine sand 27 to 44 inches thick. Along root channels it is mottled or streaked with gray and brown. Transitional horizons ½ inch to 1½ inches thick are commonly between the A and B horizons. These are grayish brown to black and have many uncoated sand grains. The B21h horizon is black to dark reddish-brown or very dark brown sand or fine sand 5 to 14 inches thick. The B22h horizon is dark-brown to dark reddish-brown sand or fine sand 6 to 11 inches thick. The B3 horizon is dark yellowish-brown to dark-brown sand or fine sand. The B3-Bh horizon has colors like those of the B3 horizon but also has weakly cemented, dark-brown or dark reddish-brown scattered fragments that are similar to the Bh material. The water table normally is at a depth of 10 to 40 inches, but is within a depth of 10 inches for 1 to 2 months during wet seasons and is below a depth of 40 inches after extended dry seasons.

Immokalee soils occur in association with Astatula, Myakka, Ona, Paola, Pelham, Pomello, Pompano, Placid, St. Lucie, and Wabasso soils. Immokalee soils are not so well drained as Astatula, Paola, Pelham, Pompano, and St. Lucie soils. They are better drained and have a thinner black surface layer than Placid soils. They are wetter than Pomello soils and have a darker colored A1 horizon. They have a thicker A2 horizon than Myakka and Ona soils, and they do not have a Bt horizon underlying the Bh horizon as do Wabasso soils.

Immokalee sand (Is).—This is a nearly level, poorly drained soil that has a layer at a depth of 30 inches or more that is stained by organic matter. The water table is normally at a depth of 10 to 40 inches. It is within a depth of 10 inches for 1 to 2 months during rainy seasons and falls below 40 inches during prolonged drought.

Immokalee sand is moderately permeable in the weakly cemented layer, at depths between 38 and 56 inches, and is rapidly permeable in the other layers. The weakly cemented layers have medium available water capacity, moderately high organic-matter content, and low natural fertility. The sandy surface and subsurface layers and the layer between depths of 56 to 68 inches have very low available water capacity and very low natural fertility. The thin surface layer is moderate in organic-matter content. The other layers are very low.

Included in mapping are small areas of soils that have little or no organic stain in the lower part of the profile, small areas of soils that have slopes of 2 to 5 percent, and small areas of soils that have sandy clay loam beneath the weakly cemented organic-stained layers.

If intensively managed, this soil is suited to truck crops, flowers, and other shallow-rooted crops. Water-control measures are needed to remove excess surface water after heavy rain and to supply subsurface irrigation during dry seasons. Also needed are regular fertilization, adequate liming, and a cropping system that includes cover crops. This soil is poorly suited to citrus because, in addition to cover crops between the trees, special fertilization, liming, irrigation, and drainage must be provided. Citrus is subject to severe damage by occasional high water and by cold in winter. The soil is suited to tame grasses, but if it is to be used for improved pasture, it should be drained, fertilized, and limed, and grazing should be controlled.

Areas that have not been farmed are open pine forest or, where trees have been removed, open grassland. Some areas are used for range. The understory plants provide good forage for cattle and wildlife. The major decreaser and increaser plants are creeping bluestem, indiangrass, little blue maidencane, Florida paspalum, pineland three-awn, species of panicum, deerstongue, swamp sunflower, grassleaf goldaster, milkpeas, tarflower, huckleberry, and runner oak. Frequent fires and overgrazing have left saw-palmetto, gallberry, and fetterbush. Minor plants of the original understory are now dominant over extensive areas of this soil. Capability unit IVw–1; Acid Flatwoods range site; woodland group 3w2.

Lake Series

The Lake series consists of well-drained to excessively drained sandy soils that are nearly level to steep. These soils formed in thick beds of marine and eolian sands.

In a representative profile, the surface layer is dark-brown sand about 7 inches thick. It is underlain by a layer of brown loose sand about 11 inches thick. The next layer is strong-brown loose sand about 15 inches thick. Below this, and extending to a depth of 98 inches, is yellowish-red loose sand. The soils are strongly acid throughout. In limed areas, however, the surface layer is less acid. The water table is at a depth of more than 120 inches.

Lake soils have very rapid permeability, very low available water capacity, low organic-matter content, and low natural fertility.

Representative profile of Lake sand, 0 to 5 percent slopes:

Ap—0 to 7 inches, dark-brown (10YR 3/3) sand; weak, fine, granular structure; very friable; many very fine to medium roots; few clean light-gray sand grains; medium acid; gradual, wavy boundary.

Cl—7 to 18 inches, brown (7.5YR 5/4) sand; many, coarse, faint, dark-brown (7.5YR 4/4) splotches; single grain; loose; many very fine and fine roots; many thinly coated and some well-coated sand grains; strongly acid; gradual, wavy boundary.

C2—18 to 33 inches, strong-brown (7.5YR 5/6) sand; single grain; loose; few fine roots; many coated sand grains; few carbon particles; strongly acid; gradual, wavy boundary.

C3—33 to 98 inches, yellowish-red (5YR 5/8) sand; single grain; loose; many coated sand grains; strongly acid.

Lake soils are very strongly acid to strongly acid throughout the profile. Where limed, the surface layer is less acid. The Ap horizon is brown to dark brown or dark grayish brown to reddish brown and is 4 to 9 inches thick. The C horizon is light yellowish brown to dark yellowish-brown, light brown to reddish-yellow, or light reddish-brown to yellowish-red sand or fine sand. Redder colors are dominant in the C2 and C3 horizons. In places the C2 and C3 horizons are absent, and there is a uniform strong-brown to yellowish-red C horizon that is more than 70 inches thick. In many places the C horizon has few to many, fine to coarse, soft iron concretions at a depth of more than 50 inches. The content of silt and clay ranges from 5 to 10 percent between the depths of 10 and 40 inches.

Lake soils are associated with Apopka, Astatula, Lucy, Ocilla, Orlando, and Pelham soils. They do not have the sandy clay loam Bt horizon that is present in Apopka, Lucy, Ocilla, and Pelham soils, and they are better drained than Ocilla and Pelham soils. They are more than 5 percent silt and clay within the uppermost 40 inches, in contrast with Astatula soils which are less than 5 percent. They do not have the 10-inch, dark-colored surface layer that is present in the Orlando soils.

Lake sand, 0 to 5 percent slopes (LaB).—This is a nearly level to gently sloping, well-drained to excessively drained soil. It has the profile described as representative for the series. The water table is at a depth of more than 120 inches.

Lake sand is very rapidly permeable and has very low available water capacity, low organic-matter content, and low natural fertility.

Included in mapping are small areas of Astatula sand and Apopka sand and areas of soils that have a fine sand texture.

This soil is droughty. It is not well suited to truck crops, flowers, and other shallow-rooted annual crops that have high moisture and fertility requirements. Providing adequate irrigation for these crops is not practical. Watermelons are well suited. They should be grown on the contour with alternate strips of tall grain to retard soil blowing and limed, fertilized, and irrigated. This soil is well suited to citrus, and most of the acreage is in citrus groves. The trees should be irrigated and adequately fertilized. Close-growing, soil improving plants should be grown between the trees, and tillage should be kept to a minimum. Deep-rooted tame grasses are suited, but adequate fertilization and liming are needed. Drought restricts growth of the grasses in dry seasons, and fertilizer is rapidly leached out during heavy rain. Grazing of these grasses should be controlled to permit continued healthy growth.

In areas that have not been cultivated, the vegetation is scattered longleaf pines and scrub oaks and an understory of native grasses and shrubs. A few acres are used for range. Decreaser and increaser forage plants are creeping bluestem, pineland three-awn, indian grass, splitbeard bluestem, broomsedge bluestem, and runner oak. If the range is overgrazed, the increasers and decreasers are replaced by pricklypear cactus, natalgrass, post oak, dogfennel, annual grasses and weeds, and other less desirable forage plants. Capability unit IVs–1; Sandhills range site; woodland group 3s2.

Lake sand, 5 to 12 percent slopes (LaD).—This is a sloping and strongly sloping, well-drained to excessively drained soil. It has a profile similar to that described as representative for the series, but it is steeper and in some unprotected areas, it is eroded and the surface layer is only about 4 to 5 inches thick. The water table is at a depth of more than 120 inches.

This soil is very rapidly permeable. It has very low available water capacity, low organic-matter content, and low natural fertility.

Included in mapping are small areas of Lake sand, 0 to 5 percent slopes; Apopka sand; and areas of soil that have a fine sand texture.

This soil is poorly suited to truck crops, flowers, and other shallow-rooted annual crops that have high moisture and fertility requirements. Slopes are steep enough to be easily eroded if left unprotected. If well managed, this soil is well suited to watermelons. Slopes, however, complicate irrigation, cultivation, and harvest. Melons should be planted on the contour with alternate strips of tall grain to retard soil blowing. Irrigation during dry seasons, and fertilization and lime are needed. Close-growing plants should be planted after the melons are harvested. This soil is well suited to citrus. Irrigation, fertilization, and lime are needed, close-growing, soil-improving plants should be grown between the trees, and cultivation should be kept to a minimum. Deep-rooted tame grasses are suited. Growth of the grass is retarded by drought in dry seasons, and fertilizer is rapidly leached out during heavy rain. Good management of pasture includes careful control of grazing and regular applications of fertilizer.

Only a few small areas have not been cultivated. In these areas the vegetation is scattered longleaf pines and scrub oaks and an understory of grasses and shrubs. This soil is not used for range. Capability unit VIs–2; Sandhills range site; woodland group 3s2.

Lake sand, 12 to 22 percent slopes (LaE).—This is a moderately steep to steep, excessively drained soil. It occurs as relatively small areas surrounded by larger, less steep areas of Lake sand. It has a profile similar to that described as representative for the series, but the surface layer is 2 or 3 inches thinner. In some unprotected areas this soil is eroded well into the subsurface layers. The water table is at a depth of more than 120 inches.

This soil is very rapidly permeable. It has very low available water capacity, low organic-matter content, and low natural fertility.

Included in mapping are small areas of Lake sand, 5 to 12 percent slopes, and areas of Astatula sand, dark surface, 5 to 12 percent slopes.

This soil is not suited to truck crops, flowers, and other shallow-rooted annual crops that have high moisture and fertility requirements. The steep slopes erode rapidly if left exposed; cultivation and irrigation are difficult. This soil is suited to watermelons, but cultivation and irrigation are impractical because of slope. There are many areas of this soil interspersed with similar but less sloping soils in citrus groves. Steep slopes complicate cultivation, harvesting, and irrigation. This soil is fairly well suited to deep-rooted tame grasses, but growth of grass is retarded by drought and irrigation is not practicable.

In a few areas that have not been cultivated, the vegetation consists of a few pine trees and scrub oak and a sparse understory of grasses and shrubs. These areas are small and are not used for range. Capability unit VIIs–2; Sandhills range site; woodland group 3s2.

Lucy Series

The Lucy series consists of well-drained sandy soils that have a loamy subsoil. They are nearly level to sloping and are on the upland ridge. They formed in thick beds of sandy and loamy marine sediment.

In a representative profile, the surface layer is very dark grayish-brown sand about 5 inches thick. The subsurface layer is yellowish-brown sand about 27 inches thick. The subsoil is red sandy clay loam that extends to a depth of 75 inches. The soils are medium acid in the surface and subsurface layers and strongly acid in the subsoil. The water table is at a depth of more than 120 inches.

Lucy soils are rapidly permeable in the surface and subsurface layers and moderately permeable in the subsoil. Available water capacity is low in the sandy layer and medium in the subsoil. The organic-matter content and natural fertility are low.

Representative profile of Lucy sand, 0 to 5 percent slopes:

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) sand; weak, fine, granular structure; very friable; many fine and medium roots; medium acid; clear, smooth boundary.

A2—5 to 32 inches, yellowish-brown (10YR 5/4) sand; few, medium, faint mottles of dark yellowish brown (10YR 4/4) and dark brown (10YR 3/3); single grain; loose; few fine carbon particles; medium acid; abrupt, smooth boundary.

B21t—32 to 45 inches, red (2.5YR 5/8) sandy clay loam; few, medium, distinct mottles of reddish yellow (7.5YR 7/8) and dusky red (10R 3/4); moderate, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; strongly acid; gradual, wavy boundary.

B22t—45 to 75 inches, red (2.5YR 5/8) sandy clay loam; many, fine and medium, distinct mottles of reddish yellow (7.5YR 6/8); moderate, fine, subangular blocky structure; friable; strongly acid.

Lucy soils range from very strongly acid to medium acid in all layers. Both the A1 and Ap horizon are grayish-brown to black sand 3 to 7 inches thick. The A2 horizon is dark grayish brown to brownish yellow and is generally mottled with gray, brown, and yellow. In places it is free of mottles. An A22 horizon occurs in places. It is grayish brown to yellow mottled with gray, brown, and yellow. In some areas it is free of mottles. The A horizon is 20 to 40 inches thick. In places a thin, discontinuous B1 horizon 3 inches or less thick occurs between the A and B2t horizon. It is strong-brown or reddish-yellow to yellowish-red loamy fine sand to sandy loam. Generally it is faintly mottled with yellow, brown, and red. The B21t and B22t horizons are reddish yellow to yellowish red and are mottled with yellow, brown, and red. In places there is a B23t horizon. It is generally strongly mottled with red, brown, yellow, and gray. The Bt horizon is sandy loam to sandy clay loam. In some areas it contains quartzite gravel.

The Lucy soils mapped in the Lake County Area have a slightly higher temperature than is defined for the Lucy series, but this difference does not alter their usefulness and behavior.

Lucy soils are associated with Astatula, Apopka, Ocilla, and Vaucluse soils. They have a sandy surface layer that is not so thick as the sandy surface layer of Astatula and Apopka soils, but is thicker than the sandy surface layer of Vaucluse soils. Lucy soils are better drained than Ocilla soils.

Lucy sand, 0 to 5 percent slopes (LuB).—This is a nearly level to gently sloping soil that has a well-drained, loamy subsoil. It has the profile described as representative for the series. The water table is at a depth of more than 120 inches.

This soil is rapidly permeable in the surface and subsurface layers and moderately permeable in the subsoil. The available water capacity is low in the sandy layers and medium in the loamy subsoil. The organic-matter content and natural fertility are low.

Included in mapping are small areas of Apopka sand, areas of a soil that has a yellower and browner subsoil than is typical for Lucy soils, and a few small areas of fine sand.

This soil is droughty and is only moderately well suited to shallow-rooted truck crops and flowers. These crops are affected by lack of water during long dry seasons. They respond well to irrigation. All plantings should be on the contour and rotated with close-growing, soil-improving crops. Liming and regular fertilization are needed. Citrus trees grow well if they are fertilized and limed and occasionally irrigated. Areas between the trees should be under vegetation. If fertilized and limed, this soil is suitable for tame grasses. Controlled grazing is important.

Most of the acreage is planted to citrus or improved pasture. In the few small areas that have not been cultivated, the vegetation is an open pine forest and an understory of native plants. Only a small acreage is available for range. Capability unit IIIs-1; Sandhills range site; woodland group 3s2.

Lucy sand, 5 to 8 percent slopes (LuC).—This is a sloping, well-drained soil that has a loamy subsoil. Its profile is similar to the one described as representative for the series, but the surface layer is about 5 inches thinner. In some areas slopes are short and choppy; in others they are longer and more uniform. The water table is at a depth of more than 120 inches.

This soil is rapidly permeable in the surface and subsurface layers and moderately permeable in the subsoil. The available water capacity is low in the sandy layers and medium in the loamy subsoil. The organic-matter content and natural fertility are low.

Included in mapping are small areas of soils that have a yellower and browner subsoil than is typical for Lucy soils, and small areas of fine sand.

This soil is moderately well suited to cultivated crops. It is steep enough to be seriously eroded unless protected by a vegetative cover. The sandy surface layer is droughty, and shallow-rooted crops are seriously affected by lack of water during dry seasons. Slopes adversely affect tillage and irrigation. Crops should be planted on the contour and adequately fertilized, limed, and irrigated. Cropping systems should include close-growing, soil-improving crops in rotation with harvested crops. This soil is well suited to citrus, but fertilization, lime, and irrigation are needed and a vegetative cover should be maintained between the trees at all times. This soil is suitable for tame grasses if it is properly fertilized and limed and if grazing is controlled.

The few acres of this soil that are not cultivated have a cover of scattered pine trees, scrub oak, native grasses, and shrubs. These areas are small. Little acreage is available for range. Capability unit IVs-4; Sandhills range site; woodland group 3s2.

Manatee Series

The Manatee series consists of nearly level, very poorly drained soils. These soils are in low areas and are covered with shallow water during much of the rainy season. They formed in sandy and loamy marine sediment.

In a representative profile, the surface layer is black fine sand about 10 inches thick. The subsoil is 38 inches thick. The upper 8 inches is black fine sandy loam. The next 22 inches is mottled very dark gray fine sandy loam. The lower 8 inches is mottled dark-gray loamy fine sand. Below this is mottled light-gray loamy fine sand that extends to a depth of 60 inches. These soils are slightly acid in the surface layer and mildly alkaline in all other layers. The water table is at a depth of about 2 inches.

Manatee soils are moderately permeable and have high available water capacity and high natural fertility. The organic-matter content is high to a depth of about 18 inches.

Representative profile of Manatee fine sand:

A1—0 to 10 inches, black (10YR 2/1) fine sand; weak, fine, granular structure; very friable; many fine to coarse roots; slightly acid; abrupt, wavy boundary.

B21tg—10 to 18 inches, black (10YR 2/1) fine sandy loam; weak, medium and fine, subangular blocky structure; friable, slightly sticky; many fine to coarse roots; many sand grains are coated and bridged with clay; mildly alkaline; clear, wavy boundary.

B22tg—18 to 40 inches, very dark gray (10YR 3/1) fine sandy loam; many, medium and fine, faint mottles of black (10YR 2/1), dark gray (10YR 4/1), gray (10YR 5/1), and dark grayish brown (2.5Y 4/2); weak, medium and fine, subangular blocky structure; very friable; common fine to coarse roots; many sand grains are coated and bridged with clay; mildly alkaline; clear, wavy boundary.

B3g—40 to 48 inches, dark-gray (10YR 4/1) loamy fine sand; many, coarse and medium, faint mottles of very dark gray (10YR 3/1), few, fine, and medium, distinct mottles of gray (N 6/0), light brownish gray (2.5Y 6/2), and dark grayish brown (10YR 4/2); weak, medium and fine, subangular blocky structure; very friable; few fine root fragments; mildly alkaline; clear, wavy boundary.

C—48 to 60 inches, light-gray (10YR 6/1) loamy fine sand; common, medium and coarse, faint mottles of light brownish gray (10YR 6/2) and pale brown (10YR 6/3); few, medium, faint mottles of grayish brown (10YR 5/2) and gray (N 5/0); few, medium, prominent mottles of dark yellowish brown and black; massive; very friable; few fine root fragments; mildly alkaline.

Manatee soils are slightly acid to neutral in the A horizon and slightly acid to mildly alkaline in the B and C horizons. The Ap and A1 horizons are 10 to 20 inches thick. The B21tg and B22tg horizons are black to very dark gray. They are generally mottled with black to dark gray or dark brown and are 30 to 34 inches thick. These horizons are fine sandy loam that contains pockets and lenses of loamy fine sand. The clay content is 10 to 18 percent. The B3g horizon is gray or dark gray mottled with gray and brown. It is fine sandy loam that contains pockets and lenses of loamy fine sand. In many places this horizon is absent. The C horizon is at a depth of 48 inches or more and is very dark gray to light gray. It is mottled with black, gray, pale brown, and olive. The water table is at or near the surface, except during dry periods, when it is at a depth of 20 inches in places.

Manatee soils are associated with Anclote, Emeralda, and Iberia soils. They have a loamy subsoil, and Emeralda and Iberia soils have a clayey subsoil. Manatee soils have a Bt horizon and siliceous mineralogy, but Anclote soils do not have a Bt horizon and have mixed mineralogy.

Manatee fine sand (Ma).—This is a nearly level, very poorly drained soil that is covered with shallow water during much of the rainy season. The water table is at or near the surface much of the year. During dry periods it may be as deep as 20 inches.

Permeability is moderately rapid in the surface layer and moderate in all other layers. The available water capacity, natural fertility, and organic-matter content are high to a depth of about 18 inches.

Included in mapping are small areas of soils that have a loamy fine sand surface layer 20 to 80 inches thick, small areas of soils that have organic materials 4 to 10 inches thick, and small areas of Iberia sandy clay.

This soil is well suited to truck crops, flowers, and other shallow-rooted crops that are tolerant of wetness. Water control is needed to remove excess surface water rapidly after heavy rain and to provide subsurface irrigation during dry periods. This soil is very poorly suited to citrus. If drained and fertilized, it is suited to tame grasses and clovers.

The native vegetation in most areas is grass. In some it is wetland hardwoods and cabbage palm. Grassy areas are used extensively for range and if properly managed, provide good forage. Important decreaser and increaser forage plants are maidencane, cutgrass, beaked panicum, and cordgrass. Some areas are covered with sawgrass. In overgrazed areas pickerelweed, redroot, smartweed, iris, carpetgrass, weeds, and other invader plants are dominant. Capability unit IIIw-1; Fresh Marsh (mineral) range site; woodland group 2w3.

Montverde Series

The Montverde series consists of nearly level, very poorly drained organic soils that are covered with shallow water except during extended dry periods. These soils are in low areas, marshes, and swamps. They formed in the remains of fibrous, nonwoody plants.

In a representative profile, the surface layer is black muck about 11 inches thick. Below this are layers of peat that extend to a depth of more than 80 inches. The upper 9 inches is dark reddish brown. The next 17 inches is mixed black and dark reddish brown, and the lower 43 inches is dark reddish-brown peat. These soils are medium acid in the surface layer, slightly acid below this to a depth of about 20 inches, and mildly alkaline in the other layers. The water table is at the surface except during extended dry periods.

Montverde soils are rapidly permeable. They have a very high available water capacity, a very high organic-matter content, and high natural fertility.

Representative profile of Montverde muck:

Oap—0 to 11 inches, black (5YR 2/1) unrubbed and rubbed, well-decomposed organic material (muck); less than 5 percent fiber rubbed; moderate, medium, granular structure; friable; pale-brown (10YR 6/3) sodium pyrophosphate extract; estimated 5 percent mineral material; medium acid; clear, wavy boundary.

Oi1—11 to 20 inches, dark reddish-brown (5YR 2/2) undecomposed organic materials (peat), black (5YR 2/1) rubbed; 80 percent fiber, 70 percent fiber rubbed; massive; sodium pyrophosphate extract is white (10YR 8/2); estimated 5 percent mineral material; about 90 percent herbaceous; slightly acid; gradual, wavy boundary.

Oi2—20 to 37 inches, mixed black (5YR 2/1) and dark reddish-brown (5YR 2/2) undecomposed organic material (peat), black (5YR 2/1) rubbed; 85 percent fiber, 76 percent fiber rubbed; massive; sodium pyrophosphate extract is white (10YR 8/1); estimated 5 percent mineral material; about 90 percent herbaceous; mildly alkaline; gradual, wavy boundary.

Oi3—37 to 80 inches, dark reddish-brown (5YR 3/3) undecomposed organic materials (peat), unrubbed and rubbed; 70 percent fiber, 55 percent fiber rubbed; massive; sodium pyrophosphate extract is white (10YR 8/1); estimated 5 percent mineral material; about 90 percent herbaceous; mildly alkaline.

Montverde soils are medium acid to moderately alkaline throughout the profile. Organic materials are 52 to more than 100 inches in thickness and range in fiber content from 67 to 90 percent unrubbed and from 45 to 80 percent rubbed. The Oap horizon is very dark brown to black or dark reddish-brown peat or muck. The Oi1, Oi2, and Oi3 horizons are dark yellowish brown to black and reddish brown to dark reddish brown. Some profiles are as much as 25 percent woody material. The water table is at the surface much of the time, and the soil is covered with shallow water. During extended dry periods the water table drops to a depth of as much as 10 inches.

Montverde soils are associated with Emeralda, Iberia, Manatee, and Oklawaha soils. They are organic soils, whereas Emeralda, Iberia, and Manatee soils are minerals. Organic layers of Montverde soils are more than 52 inches thick, but the organic layers in Oklawaha soils are less than 52 inches thick.

Montverde muck (Md).—This is a nearly level, very poorly drained soil that is about 95 percent organic material and about 5 percent mineral material. The organic material is more than 52 inches thick. This soil is in low areas, marshes, and swamps. The water table is at the surface, and the soil is covered with shallow water except during extended dry periods when the water table is at a depth of no more than 10 inches.

Permeability is moderately rapid in the surface layer and rapid in the other layers. The soil has high natural fertility, a very high available water capacity, and a very high organic-matter content.

Included in mapping are a few small areas of organic soils that are underlain by neutral to moderately alkaline sands and clays at a depth of less than 52 inches.

This soil is well suited to truck crops (fig. 3), flowers, and other shallow-rooted crops that are tolerant of wetness. Water control is needed to remove excess surface water rapidly after heavy rain. The water table should be lowered only far enough to permit healthy root development during cropping seasons. It should be raised to the surface after crops have been harvested to reduce subsidence by oxidation. This soil is high in nitrogen but needs fertilizers that contain other important elements. It is not suited to citrus. Tame grasses and clovers grow well and make excellent pasture. The water table should be maintained as close to the surface as is consistent with healthy plant growth. Fertilization and controlled grazing are needed.

Most areas that have not been developed are covered with marshland vegetation of sawgrass, waterlilies, pickerelweed, and sedges. They are of little value as range. Capability unit IIIw-2; Fresh Marsh (organic) range site; no woodland classification.

Myakka Series

The Myakka series consists of nearly level, poorly drained, sandy soils that have a layer stained by organic matter at a depth of less than 30 inches. These soils occur mainly as broad areas in the flatwoods. They are also in low areas between lakes, ponds, swamps, and marshes and on the upland ridge. They formed in thick beds of marine sands.

In a representative profile, the surface layer is black sand about 6 inches thick. The subsurface layer is white sand about 14 inches thick. The subsoil is 36 inches thick. The uppermost 4 inches is black, organic-stained, weakly cemented sand. The next 8 inches is dark reddish-brown, organic-stained, weakly cemented sand. The lower 24 inches is dark reddish-brown and dark-brown organic-stained sand. This is underlain by a layer of dark grayish-brown sand that extends to a depth of 85 inches. The soils are strongly acid to a depth of about 20 inches, very strongly acid below this to a depth of about 32 inches, and strongly acid in the other layers to a depth of 85 inches. The water table is normally at a depth of about 24 inches.

The organic-stained layers have moderate permeability, medium available water capacity, moderately high organic-matter content, and low natural fertility. The

Figure 3.—**Carrots growing on Montverde muck.**

surface and subsurface layers and the layers at depths between 56 and 85 inches have rapid permeability, very low available water capacity, and very low natural fertility. The surface layer is moderate in organic-matter content. The rest are very low.

Representative profile of Myakka sand:

A1—0 to 6 inches, black (10YR 2/1) sand; weak, fine, granular structure; very friable; matted with many fine and medium roots; strongly acid; clear, smooth boundary.

A2—6 to 20 inches, white (10YR 8/2) sand; common, fine, faint, vertical streaks of dark grayish brown (10YR 4/2), dark gray (10YR 4/1), and gray (10YR 5/1) along root channels; single grain; loose; common fine and medium roots; strongly acid; abrupt, wavy boundary.

B21h—20 to 24 inches, black (N 2/0) sand; weak, coarse, subangular blocky structure; weakly cemented; many sand grains coated with organic matter; common fine pockets of clean sand grains; many fine and medium roots; very strongly acid; clear, irregular boundary.

B22h—24 to 32 inches, dark reddish-brown (5YR 2/2) sand; common, coarse, faint, vertical tongues of very dark brown (10YR 2/2); weak, coarse, subangular blocky structure; weakly cemented; sand grains coated with organic matter; many fine and medium roots; very strongly acid; clear, smooth boundary.

B23h—32 to 36 inches, dark reddish-brown (5YR 2/2) sand; weak, fine, granular structure; very friable; sand grains coated with organic matter; few fine roots; strongly acid; clear, wavy boundary.

B3—36 to 56 inches, dark-brown (7.5YR 4/4) sand; common, medium, distinct mottles of dark reddish brown (5YR 2/2) that are slightly cemented; weak, fine, granular structure; very friable; few dead roots; strongly acid; clear, wavy boundary

C—56 to 85 inches, dark grayish-brown (10YR 4/2) sand; single grain; loose; few fine roots; strongly acid.

Myakka soils are very strongly acid to slightly acid throughout the profile. The A1 horizon is 5 to 8 inches thick and ranges from dark gray to black. The A2 horizon is white to gray sand or fine sand, 6 to 20 inches thick, and is mottled with gray and brown. A transitional horizon ½ to 1 inch thick commonly is between the A and B horizons. It is very dark gray to black. The Bh horizon is dark-brown to black or dark reddish-brown sand or fine sand 12 to 21 inches thick. The B3 horizon is dark brown to dark yellowish brown but also has weakly cemented dark-brown or dark reddish-brown fragments that are similar to materials in the Bh horizon. The C horizon is dark grayish-brown and pale-brown to dark-brown sand or fine sand. The water table is at a depth of 10 to 40 inches for 6 to 8 months each year. It is within a depth of 10 inches for 1 to 4 months and falls to a depth below 40 inches during extended dry seasons.

Myakka soils are associated with Astatula, Immokalee, Ona, Paola, Pelham, Placid, Pomello, Pompano, and Wabasso soils. They have an organic-stained (Bh) layer that is not present in the Astatula, Paola, Pelham, Placid, and Pompano soils. Depth to the Bh horizon in Myakka soils is less than 30 inches, but in Pomello soils it is deeper. Myakka soils also are more poorly drained than Pomello soils, and they have a leached A2 horizon that is not present in the Ona soils. Myakka soils do not have the sandy loam material below the Bh horizon that is characteristic in Wabasso soils.

Myakka sand (Mk).—This is a nearly level, poorly drained soil that has a layer stained by organic material at a depth of less than 30 inches. The water table is normally at a depth of 10 to 40 inches, but the depth is less than 10 inches in wet seasons and more than 40 inches during extended dry seasons.

The surface and subsurface layers and the layer at a depth of 56 to 85 inches have rapid permeability, very low available water capacity, and very low natural fertility. The thin surface layer is moderate in organic-matter content. The rest are very low. The organic-stained layers at depths between 20 and 56 inches have moderate permeability, medium available water capacity, moderately high organic-matter content, and low natural fertility.

Included in mapping are small areas, on the upland ridges, of similar soils in which the organic-stained layer is only weakly developed, small areas of Immokalee sand and Wauchula sand, and small areas of soils that have a black surface layer more than 10 inches thick.

If intensively managed, this soil is suitable for truck crops, flowers, and other shallow-rooted crops. Water control is needed to remove excess surface water after a rain and to supply subsurface irrigation during dry periods. The cropping system should include soil-improving cover crops in rotation with harvested crops. Regular applications of fertilizer and lime are needed. If this soil is used for citrus, deep drainage, special fertilization, lime, and irrigation must be provided. Close-growing cover crops should be maintained between the trees. On much of the acreage, citrus is subject to severe damage by cold in winter. Good pastures of tame grasses can be maintained under adequate fertilization and lime and controlled grazing.

Much of the acreage is open pine forest and an understory of native grasses and shrubs. In some places the pine trees have been removed. Much of this area is used for range. The understory plants provide good forage for cattle and wildlife. The major decreaser and increaser forage plants are creeping bluestem, indiangrass, little blue maidencane, Florida paspalum, pineland three-awn, species of panicum, deerstongue, swamp sunflower, grassleaf goldaster, milkpeas, tarflower, huckleberry, and runner oak. Because fires have been frequent and the understory plants have been overgrazed, saw-palmetto, gallberry, and fetterbush, which were minor plants in the original vegetation, are now dominant over extensive areas (fig. 4). Capability

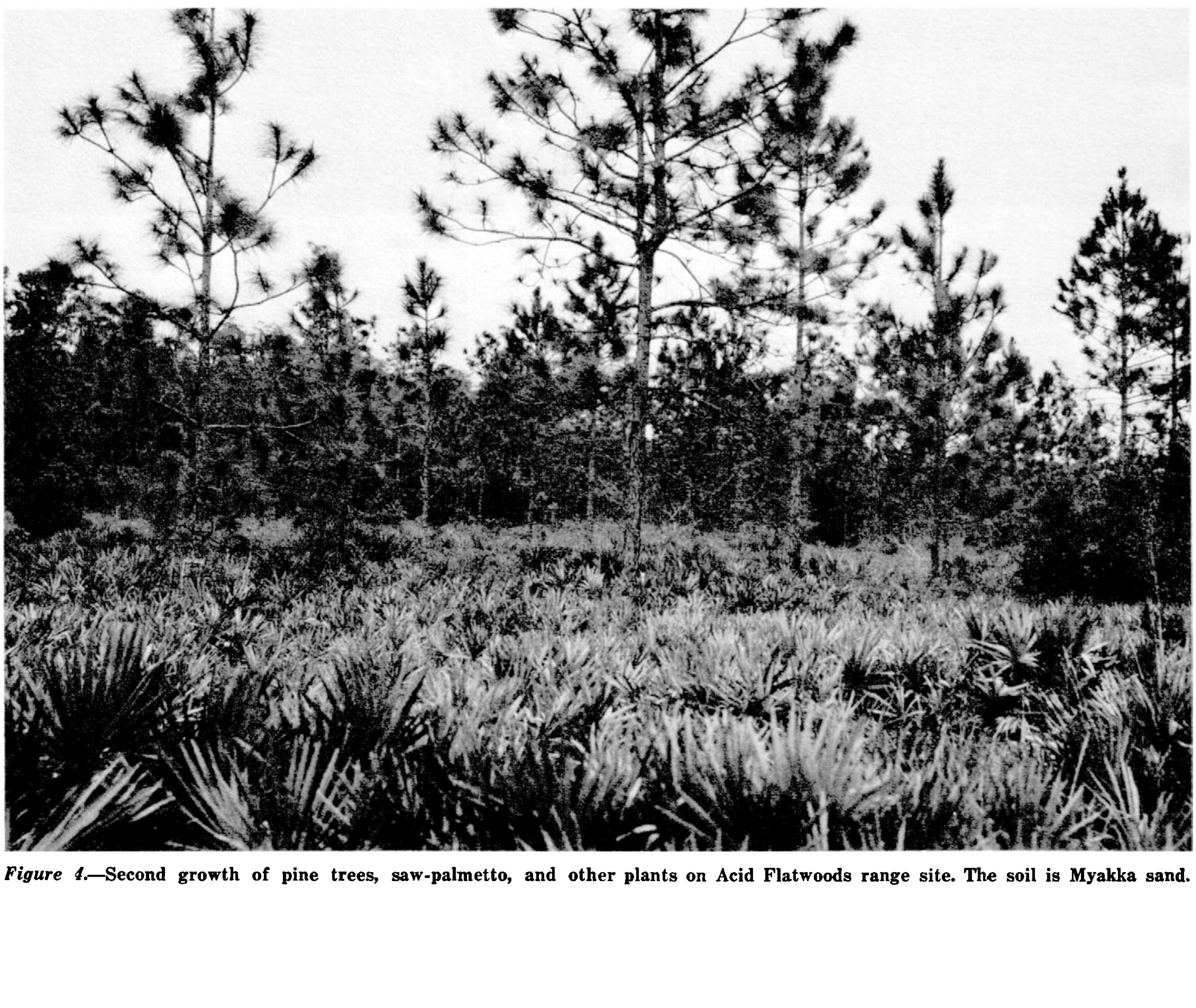

***Figure 4.*—Second growth of pine trees, saw-palmetto, and other plants on Acid Flatwoods range site. The soil is Myakka sand.**

unit IVw-1; Acid Flatwoods range site; woodland group 3w2.

Myakka and Placid sands, 2 to 8 percent slopes (MpC).—These are gently sloping to sloping, poorly drained and very poorly drained soils in seep areas that slope toward natural drains. Each of these named soils has the profile described as representative for its respective series. The water table in these soils is nearer the surface for longer periods than in Myakka sand.

The soils occur together without regular pattern, and the composition of this unit is more variable than that of most other units in the county. The soils are similar enough, however, to permit interpretations for most expected uses. They are so wet during most years, and the vegetation is so dense that it is impracticable to cover these areas sufficiently to accurately identify the component soils.

About 60 percent of this unit is Myakka sand, 20 percent is Placid soils, and about 20 percent is less extensive soils. Some of the less extensive soils have a thick black surface layer and a Bh horizon within a depth of 30 inches; some are sandy soils that have a C horizon and a Bh horizon within a depth of 40 inches; and some are Immokalee soils.

These soils are poorly suited to cultivated crops and are not suited to citrus. Most of the acreage is in native vegetation of black pine, sweetbay, saw-palmetto, myrtle, gallberry, and native grasses. Part of the area is used for range. The more open areas provide forage if grazing is controlled. Areas covered with dense woodland growth have only limited browse for cattle and wildlife. Capability unit Vw-2; Acid Flatwoods range site; woodland group 3w2.

Ocilla Series

The Ocilla series consists of nearly level to gently sloping, somewhat poorly drained sandy soils that have a loamy subsoil. These soils are mainly on the upland ridge and to a lesser extent in the flatwoods on knolls and ridges. They formed in deposits of sandy and loamy marine sediment.

In a representative profile, the surface layer is very dark gray sand about 7 inches thick. The subsurface layer is 26 inches thick. It is grayish-brown sand in the upper 11 inches and light yellowish-brown sand in the lower 15 inches. The subsoil is 49 inches thick. The upper 10 inches is mottled very pale brown, gray, yellow, reddish-yellow, and light yellowish-brown sandy clay loam. The lower 39 inches is light-gray sandy clay loam mottled with yellow, brownish yellow, very pale brown, reddish yellow, and red. These soils are slightly acid in the surface layer and strongly acid throughout the rest of the profile. The water table is at a depth of about 50 inches.

These soils are rapidly permeable in the sandy surface and subsurface layers and moderately permeable in the loamy subsoil. Available water capacity is very low in the surface and subsurface layers and medium in the loamy subsoil. The organic-matter content and natural fertility are low.

Representative profile of Ocilla sand:

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

A21—7 to 18 inches, grayish-brown (10YR 5/2) sand; few, fine, faint mottles of very pale brown; weak, fine, granular structure; very friable; few fine roots; strongly acid; clear, wavy boundary.

A22—18 to 33 inches, light yellowish-brown (10YR 6/4) sand; common, fine, faint mottles of brownish yellow (10YR 6/6); few, fine, faint mottles of gray; weak, fine, granular structure; very friable; few fine roots; many thinly coated sand grains; strongly acid; abrupt, wavy boundary.

B21t—33 to 43 inches, mottled very pale brown (10YR 8/3), gray (10YR 5/1), yellow (10YR 7/8), reddish-yellow (7.5YR 6/8, 7/6), and light yellowish-brown (10YR 6/4) sandy clay loam; moderate, medium, granular structure; friable; few fine roots; cracks filled with gray and very pale brown material slightly finer textured than the matrix; sand grains are coated and bridged with clay; strongly acid; gradual, wavy boundary.

B22tg—43 to 82 inches, light-gray (10YR 6/1) sandy clay loam; many, medium, distinct mottles of yellow (10YR 8/6, 7/8), brownish yellow (10YR 6/8), very pale brown (10YR 7/4), reddish yellow (7.5YR 6/8), light red (2.5YR 6/8), and red (2.5YR 5/6); moderate, medium, granular structure; friable; cracks filled with gray material slightly finer textured than the matrix; sand grains are coated and bridged with clay; strongly acid.

Ocilla soils are strongly acid to very strongly acid. The A1, or Ap, horizon ranges from dark gray to very dark gray and is 4 to 9 inches thick. The A2 horizon is light-gray to brown sand or fine sand. In places, there is a B1 horizon of very pale brown to light yellowish-brown loamy sand to sandy loam less than 4 inches thick. The Bt horizon is heavy sandy loam to heavy sand clay loam. The B21t horizon is 4 to 10 inches thick and has many mottles of yellow, brown, red, and gray. It is not so distinctly gleyed as the B22tg horizon. The B22tg horizon is light gray to light brownish gray mottled with yellow, brown, and red. The yellow, brown, and red mottles vary greatly in abundance, size, and contrast. This horizon is absent in some places. In places there is a highly gleyed B23tg horizon. Some profiles have a highly gleyed, mottle-free loamy sand or sandy loam B3 horizon below a depth of 60 inches. The water table is at a depth of 40 to 60 inches for about 6 months of the year and below 60 inches the rest of the year.

The Ocilla soils mapped in the Lake County Area have a slightly higher temperature than is defined in the range for the series, but this difference does not alter their usefulness and behavior.

The Ocilla soils are associated with Astatula, Apopka, Orlando, Lucy, Vaucluse, and Pelham soils. They are better drained than Pelham soils but more poorly drained than the rest. They have a loamy Bt horizon, which Astatula and Orlando soils do not have. They have a thinner A horizon than Apopka soils. Their Bt horizon is more strongly mottled than that of Lucy soils, and the horizon is not so near the surface as in Vaucluse soils.

Ocilla sand (Oc).—This is a nearly level to gently sloping, somewhat poorly drained soil that has a loamy subsoil. The water table is at a depth of 40 to 60 inches for about 6 months and is below 60 inches during the rest of the year.

Permeability is rapid to a depth of about 33 inches and moderate below. Available water capacity is very low to a depth of 33 inches and medium at depths between 33 and 82 inches. The organic-matter content and natural fertility are low.

Included in mapping are areas where the sandy clay loam subsoil is at a depth of more than 40 inches and areas where it is within a depth of 20 inches.

This soil is suitable for most crops, but it is subject to occasional periods of damaging wetness. Drainage is needed. Truck crops, flowers, and other shallow-rooted crops require irrigation during dry seasons. They should be limed and fertilized and rotated with a soil-improving crop. Much of the acreage is made up of small, wet, cold areas in low places that are surrounded by better drained soils planted to citrus. The trees on these cold spots in groves are often severely damaged by excess water or by freezing in winter. Tame grasses grow well, and some areas are used for improved pasture. Soils in these areas need fertilizer and lime. Grazing should be controlled.

A few small areas have not been cultivated. The vegetation is scattered pine trees and an understory growth of native grasses and shrubs. Some of these areas occur within larger areas that are used for range. Important decreaser and increaser forage plants are creeping bluestem, pineland three-awn, indiangrass, splitbeard bluestem, broomsedge bluestem, and tall panicum. If the range is overgrazed, many of these plants are replaced by natalgrass, carpetgrass, saw-palmetto, annual grasses and weeds, and other less desirable invader plants. Capability unit IIIw-3; Sandhills range site; woodland group 3s2.

Ocoee Series

The Ocoee series consists of nearly level, very poorly drained organic soils that overlie sandy materials. These soils occur in depressions and fresh water marshes. They formed in the remains of fibrous nonwoody plants.

In a representative profile, the surface layer is dark reddish-brown peat about 7 inches thick. The next layer is reddish-brown peat 7 inches thick. Below this, to a depth of about 38 inches, are layers of dark reddish-brown peat. Grayish-brown sand extends to a depth of 75 inches. These soils are very strongly acid in the organic layers and medium acid in the sandy layer. The water table is at the surface.

Ocoee soils are rapidly permeable in the peat layers and very rapidly permeable in the sandy layer. They have very high available water capacity. Organic-matter content is very high in the organic layers and very low in the sandy layer. Natural fertility is moderate. If drained, these soils have high potential subsidence in the organic layers.

Representative profile of Ocoee peat:

Oi1—0 to 7 inches, dark reddish-brown (5YR 3/2) unrubbed and rubbed, well-decomposed organic material (peat); about 70 percent fiber unrubbed, 50 percent fiber rubbed; massive; friable; sodium pyrophosphate extract is pale brown (10YR 6/3); herbaceous fiber; very strongly acid; clear, smooth boundary.

Oi2—7 to 14 inches, reddish-brown (5YR 5/4), undecomposed organic material (peat); about 80 percent fiber unrubbed, 50 percent fiber rubbed; massive; sodium pyrophosphate extract is light gray (10YR 7/1); herbaceous fiber; very strongly acid; gradual, smooth boundary.

Oe1—14 to 20 inches, dark reddish-brown (5YR 3/3), partially decomposed organic material (peat); 70 percent fiber unrubbed, 45 percent rubbed; massive; sodium pyrophosphate extract is brown (7.5YR 4/4); very strongly acid; gradual, smooth boundary.

Oi3—20 to 32 inches, dark reddish-brown (5YR 3/2), undecomposed organic material; about 70 percent fiber unrubbed, 50 percent rubbed; massive; sodium pyrophosphate extract is light gray (10YR 7/1); herbaceous; very strongly acid; gradual, smooth boundary.

Oi4—32 to 38 inches, dark reddish-brown (5YR 3/3), undecomposed organic material (peat); about 80 percent fiber unrubbed, 70 percent rubbed; massive; sodium pyrophosphate extract is light gray (10YR 7/2); herbaceous; estimated mineral content about 10 percent; very strongly acid; clear, smooth boundary.

IIcg—38 to 75 inches, grayish-brown (10YR 5/2) sand; single grain; loose; medium acid.

Ocoee soils are extremely acid to strongly acid in the organic material and extremely acid to medium acid in the mineral material. The Oi1 horizon is 6 to 10 inches thick, dark reddish brown to reddish brown, and 45 to 60 percent fiber rubbed. In cultivated areas there is an Oap layer, 6 to 10 inches thick, that is black or very dark gray to dark reddish brown. The Oi2 horizon is 4 to 8 inches of reddish-brown to dark reddish-brown peat that is 45 to 65 percent fiber rubbed. The Oe1 layer is 0 to 8 inches of reddish-brown to dark reddish-brown peat that is 10 to 50 percent fiber rubbed. The Oi3 and Oi4 layers if present are 6 to 29 inches thick, generally dark reddish brown, and 45 to 70 percent fiber rubbed. Typically, sand or fine sand is at a depth of 16 to 52 inches, but in places it is loamy sand or loamy fine sand. This layer is light gray and grayish brown to black. The water table is at the surface, and the soils are covered with shallow water except during extended dry periods. Where efficient water control systems are installed, the water table is commonly maintained at a depth of 12 to 48 inches.

The Ocoee soils are associated with the Brighton, Placid, Myakka, and Immokalee soils. In the Ocoee soils, the organic material is less than 52 inches thick, and in the Brighton soils it is more than 52 inches thick. Ocoee soils are organic soils, whereas Myakka and Immokalee soils are sandy mineral soils.

Ocoee peat (Oe).—This is a nearly level, very poorly drained organic soil that overlies sandy materials. The water table is at the surface, and the soils are covered with shallow water except during extended dry periods.

Ocoee peat is rapidly permeable in all organic layers and is very rapidly permeable in the sandy layer to a depth of 75 inches. The organic-matter content is very high in the organic layers and very low in the sandy layer. The available water capacity is very high. Natural fertility is moderate, and potential subsidence is high in the organic layers in drained areas.

Included in mapping are a few small areas of organic soils that are well decomposed, small areas of Brighton soils, and small areas of mineral soils.

This soil is well suited to truck crops, flowers, and other shallow-rooted crops that are tolerant of wetness. Water control is needed to remove excess surface water rapidly after heavy rain. The water table should be lowered only enough to permit healthy root development during cropping seasons. It should be raised to the surface after crops have been harvested, thus reducing subsidence by oxidation. The soil is high in nitrogen, but is low in other important nutrients. It is not suited to citrus. Tame grasses and clovers grow well, and excellent pastures can be maintained. The water table should be kept as near the surface as is consistent with healthy plant growth. Fertilization and controlled grazing are needed.

In most undeveloped areas the native vegetation is sedges, sawgrass, and waterlilies. These areas are poorly suited to range. Capability unit IIIw-2; Fresh Marsh (organic) range site; no woodland classification.

Oklawaha Series

The Oklawaha series consists of nearly level, very poorly drained organic soils that overlie loamy and clayey materials. These soils are in depressions and fresh water marshes. They are the undecomposed remains of hydrophytic, fibrous nonwoody plants.

In a representative profile, the upper 9 inches is very dark brown muck, the next 6 inches is dark reddish-brown peat, and the next layer, to a depth of 25 inches, is mixed dark yellowish-brown and very dark brown peat. Below this, between depths of 25 to 31 inches, is black light sandy loam. The next layer, to a depth of 37 inches, is very dark gray sandy clay. Between depths of 37 and 54 inches there is a layer of white clay. These soils are slightly acid in the organic layers to a depth of 25 inches, neutral between depths of 25 and 31 inches, and moderately alkaline below this to a depth of 54 inches. The water table is at the surface.

Oklawaha soils are moderately rapidly permeable in the surface layer, rapidly permeable at depths between 9 and 31 inches, and very slowly permeable below this to a depth of 54 inches. They have very high available water capacity. The organic-matter content is very high in the organic layers and low in the mineral layers. Natural fertility is moderately high. Potential subsidence is high in the organic layers in drained areas.

Representative profile of Oklawaha muck:

Oap—0 to 9 inches, very dark brown (10YR 2/2) muck; less than 5 percent fiber rubbed; weak, fine, granular structure; friable; sodium pyrophosphate pale brown (10YR 6/3); estimated 5 percent mineral; slightly acid; clear, smooth boundary.

Oi1—9 to 15 inches, dark reddish-brown (5YR 3/2) unrubbed and rubbed, undecomposed organic materials (peat); about 70 percent fiber unrubbed, 55 percent fiber rubbed; massive; sodium pyrophosphate is white (10YR 8/2); fibers are layered; estimated 5 percent mineral materials, about 95 percent herbaceous; slightly acid; clear, smooth boundary.

Oi2—15 to 25 inches, mixed dark yellowish-brown (10YR 3/4) and very dark brown (10YR 2/2) rubbed and undecomposed organic material (peat); 90 percent fiber unrubbed, 50 percent fiber rubbed; massive; sodium pyrophosphate white (10YR 8/1); estimated 5 percent mineral materials, about 95 percent herbaceous; slightly acid; abrupt, smooth boundary.

IIC1g—25 to 31 inches, black (10YR 2/1) light sandy loam; weak, fine, granular structure; very friable; neutral; abrupt, smooth boundary.

IIIC2g—31 to 37 inches, very dark gray (10YR 3/1) sandy clay; massive; very sticky; few, fine, small shell fragments of light gray and white; moderately alkaline; gradual, wavy boundary.

IIIC3g—37 to 54 inches, white (10YR 8/2) clay; few, fine, faint, vertical streaks of dark gray and very dark gray; massive; very sticky; many very fine snail shells and shell fragments; few lime concretions 15 millimeters or less in size; moderately alkaline.

Oklawaha soils are slightly acid to moderately alkaline throughout the profile. The organic material is 18 to 40 inches thick. The Oap horizon is black or very dark brown to dark reddish brown and is 6 to 13 inches thick. The Oi1 and Oi2 horizons are 10 to 22 inches thick and are black or brown to reddish brown or dark yellowish brown. In some places the Oi2 horizon is absent. Fiber content of the Oi1 and Oi2 horizons is more than 45 to 60 percent, rubbed. The IIC1g horizon is black to brown light sandy loam to sandy clay 3 to 28 inches thick. In places this horizon is absent. The IIIC2g horizon is grayish-brown to black heavy sandy clay to clay 4 to 8 inches thick. The IIIC3g horizon is white to dark-gray sandy clay to clay. In places, it is mottled in shades of gray, yellow, and brown. Calcic material in the IIIC3g horizon ranges from few fine concretions to many small pockets of soft white marl. In some places the calcic materials in these horizons are absent. The water table is at the surface, and the soils are covered with water except during long dry seasons.

The Oklawaha soils are associated with the Emeralda, Iberia, Manatee, and Montverde soils. They have organic horizons, whereas the Emeralda, Iberia, and Manatee soils have mineral horizons throughout. Their organic horizons are not so thick as those of the Montverde soils.

Oklawaha muck (Oh).—This is a level, very poorly drained organic soil. It overlies loamy and clayey materials. The water table is at the surface, and the soil is covered with shallow water except during extended dry periods.

Oklawaha muck is moderately rapidly permeable in the surface layer, rapidly permeable between depths of 9 and 31 inches, and very slowly permeable in the clayey layers to a depth of 54 inches. Available water capacity is very high, the organic-matter content is very high in the organic layers and low in the mineral layers, and natural fertility is moderate. Where the soil is drained, potential subsidence is high in the organic layers.

Included in mapping are small areas of soils that have well-decomposed organic material and areas of organic soils that are underlain by sandy material at depths between 20 and 62 inches.

This soil is well suited to truck crops, flowers, and other shallow-rooted crops that are tolerant of wetness. Water control is needed to remove excess surface water rapidly after heavy rain. The water table should be lowered only enough to permit healthy root development during cropping seasons. To reduce subsidence by oxidation, the water table should be raised to the surface after crops have been harvested. Most of the acreage is used for cultivated crops. The soil is high in nitrogen, but low in other important elements. It is not suited to citrus. Tame grasses and clovers grow well and excellent pastures can be maintained. The water table should be maintained as close to the surface as is consistent with healthy plant growth. Fertilization and controlled grazing are needed.

Most areas have been developed for cultivation or improved pasture. The few undeveloped areas have marshland vegetation of sawgrass, waterlily, pickerelweed, and sedges. These areas have little value for range. Capability unit IIIw-2; Fresh Marsh (organic) range site; no woodland classification.

Ona Series

The Ona series consists of nearly level, poorly drained sandy soils that have a layer stained by organic materials just below the surface layer. These soils are mainly in the flatwoods. There are a few areas in small depressions on the upland ridge. These soils formed in sandy marine sediment.

In a representative profile, the surface layer is very dark gray fine sand about 6 inches thick. The subsoil is about 14 inches thick. The uppermost 4 inches is very dark brown fine sand, weakly cemented with organic material. The next 8 inches is mainly black fine sand weakly cemented with organic material. This is underlain by 38 inches of grayish-brown fine sand mottled with very dark gray, dark gray, dark grayish brown, and light brownish gray. Below this is 10 inches of white fine sand and 14 inches of grayish-brown fine sand. These soils are very strongly acid in the surface layer and strongly acid throughout the rest of the profile. The water table is at a depth of about 20 inches.

Ona soils are moderately rapidly permeable in the layers stained with organic matter at depths between 6 and 18 inches and are rapidly permeable in all other layers. Available water capacity is medium. The organic-matter content is moderate to a depth of 18 inches. Below this, available water capacity and organic-matter content are very low. Natural fertility is moderate.

Representative profile of Ona fine sand:

A1—0 to 6 inches, very dark gray (N 3/0) fine sand; weak, fine, crumb structure; friable; many fine and medium roots; mixture of black organic matter and light-gray sand grains when dry; very strongly acid; clear, smooth boundary.

B21h—6 to 10 inches, very dark brown (10YR 2/2) fine sand; weak, coarse, subangular blocky structure; firm, weakly cemented; common fine and medium roots; many sand grains are coated with organic matter; strongly acid; gradual, wavy boundary.

B22h—10 to 18 inches, black (10YR 2/1) fine sand; common, medium, faint, very dark brown (10YR 2/2), very dark gray (10YR 3/1), dark grayish-brown (10YR 4/2), and grayish-brown (10YR 5/2) mottles; weak, fine, granular structure; friable, weakly cemented; common fine roots; many sand grains coated with organic material; strongly acid; clear, wavy boundary.

B3—18 to 20 inches, very dark gray (10YR 3-1) fine sand; common, fine, faint, dark grayish-brown (10YR 4/2) and light brownish-gray (10YR 6/2) mottles; weak, fine, granular structure; friable; common fine roots; many uncoated sand grains; strongly acid; clear, wavy boundary.

C1—20 to 58 inches, grayish-brown (10YR 5/2) fine sand; common, fine, faint, very dark gray (10YR 3/1), dark-gray (10YR 4/1), dark grayish-brown (10YR 4/2), and light brownish-gray (10YR 6/2) mottles; weak, fine, granular structure; very friable; few fine roots; many uncoated sand grains; strongly acid; clear, wavy boundary.

C2—58 to 68 inches, white (10YR 8/1) fine sand; single grain; loose; strongly acid; abrupt, wavy boundary.

C5—68 to 82 inches, grayish-brown (10YR 5/2) fine sand; few, medium, faint, dark-brown (7.5YR 3/2) mottles; single grain; loose; strongly acid.

Ona soils are strongly acid to extremely acid throughout the profile. The A1 horizon is 4 to 9 inches thick and ranges from dark gray to black. The Bh horizon is black or very dark brown to dark reddish-brown sand or fine sand. The upper part normally has darker colors than the lower part. This horizon is 12 to 19 inches thick, firm to friable, and weakly cemented. The B3 horizon is 2 to 4 inches thick and is very dark gray to brown sand or fine sand. The different layers of the C horizon are white to brown sand or fine sand and are mottled with gray and brown. The water table is at a depth of 10 to 40 inches for about 6 months in most years, within a depth of 10 inches for about 1 or 2 months, and below 40 inches the rest of the year.

Ona soils are associated with Astatula, Immokalee, Pelham, Myakka, Pomello, and Pompano soils. They differ from Astatula, Pelham, and Pompano soils in having a weakly cemented layer stained with organic matter. They do not have the leached subsurface layer that is typical of Immokalee, Myakka, and Pomello soils.

Ona fine sand (On).—This is a nearly level, poorly drained soil that has a layer stained with organic matter just below the surface. The water table is at a depth of 10 to 40 inches for about 6 months, within a depth of 10 inches for 1 to 2 months, and below a depth of 40 inches the rest of the year.

Ona fine sand is moderately rapidly permeable in the weakly cemented organic layers, between depths of 6 and 18 inches, and is rapidly permeable in all other layers. The organic-matter content is moderate and available water capacity is medium to a depth of 18 inches. Both are very low below a depth of 18 inches. Natural fertility is moderate.

Included in mapping are small areas of Myakka soils and a few small areas of soils that have layers of sandy loam to sandy clay loam at a depth of 45 to 50 inches.

This soil is well suited to most crops that are tolerant of slight wetness. It is well suited to truck crops and flowers, but water control is needed that removes excess surface water rapidly after rain and provides subsurface irrigation during dry seasons. This soil should be fertilized and limed. Soil-improving cover crops should be rotated with row crops. The soil is poorly suited to citrus. Citrus trees are subject to severe damage by occasional high water and by freezing in winter. The soil is well suited to pasture of tame grasses and clover. High-quality pasture can be maintained if the soil is drained, fertilized, and limed, and grazing is controlled.

Much of the acreage is in natural vegetation of scattered pine trees and an understory of palmettos, grasses, and shrubs. Much of it is used for range. Important decreaser and increaser forage plants are creeping bluestem, indiangrass, little blue maidencane, Florida paspalum, pineland three-awn, species of panicum, deerstongue, grassleaf goldaster, huckleberry, and runner oak. Saw-palmetto, gallberry, fetterbush, and other plants that were minor in the original understory now dominate some areas. If these areas are used for range, grazing should be controlled and protection against fires should be provided to permit healthy growth of decreaser plants. Capability unit IIw-1; Acid Flatwoods range site; woodland group 2w2.

Orlando Series

The Orlando series consists of nearly level to gently sloping, well-drained sandy soils on the upland ridge. These soils formed in sandy marine sediment.

In a representative profile, the plow layer is fine sand about 8 inches thick. Below this, to a depth of 30 inches, is very dark brown fine sand. Brown fine sand extends to a depth of 80 inches. These soils are slightly acid to a depth of 8 inches, medium acid between depths of 8 to 30 inches, and strongly acid between depths of 30 and 80 inches. The water table is at a depth of more than 80 inches.

Orlando soils are rapidly permeable throughout. They are medium in available water capacity and moderate in organic-matter content in the upper 30 inches. Below a depth of 30 inches, they are very low in available water capacity and organic-matter content. They are moderately low in natural fertility.

Representative profile of Orlando fine sand:

Ap—0 to 8 inches, black (10YR 2/1) fine sand; weak, fine, crumb structure; friable; common fine roots and few medium roots; few fine carbon particles; slightly acid; clear, wavy boundary.

A1—8 to 30 inches, very dark brown (10YR 2/2) fine sand; weak, fine, crumb structure; friable; few fine roots; few fine carbon particles; medium acid; clear, wavy boundary.

C—30 to 80 inches, brown (10YR 5/3) fine sand; single grain; loose; few fine roots; many uncoated sand grains; few fine carbon particles; strongly acid.

Orlando soils range from strongly acid to very strongly acid except in the A horizon where lime is applied. The A horizon is very dark brown to black fine sand 10 to 36 inches thick. The AC horizon, if present, is 6 to 10 inches of dark grayish-brown to very dark grayish-brown sand or fine sand. The C horizon is light-gray to brown sand or fine sand. In some areas the AC and C horizons have mottles of strong brown to brownish yellow and mottles or splotches of uncoated, gray to white fine sand.

Orlando soils occur in association with Astatula, Lake, Pelham, and Pompano soils. They have a thicker A horizon than Astatula and Lake soils. They are better drained than

Pelham soils and do not have the sandy clay loam subsoil that is typical of these soils. They are better drained than Pompano soils.

Orlando fine sand (Or).—This is a nearly level to gently sloping, well-drained soil. The water table is at a depth of more than 80 inches.

Orlando fine sand is rapidly permeable throughout. It has medium available water capacity and moderate organic-matter content to a depth of 30 inches. Below this depth available water capacity and organic-matter content are very low. This soil is moderately low in natural fertility.

Included in mapping are small areas that have a sandy, dark reddish-brown surface layer and a strong-brown to yellowish-red subsurface layer; small areas of soils that have a sandy clay loam subsoil at a depth of 20 to 40 inches; and areas where this Orlando soil has slopes of 5 to 8 percent.

This soil is not well suited to truck crops, flowers, and other shallow-rooted crops that have high moisture requirements. It is well suited to citrus. In some low-lying areas citrus is susceptible to severe damage from freezing temperatures in winter. Citrus should be fertilized, limed, and irrigated. A cover of close-growing, soil-improving plants should be maintained between the trees. Good pastures of deep-rooted tame grasses can be maintained by regular applications of fertilizer and lime and by controlled grazing.

Most of the acreage is in citrus or tame grass pasture. A few small areas have pine trees and an understory of native grasses and shrubs. These areas are not used for range. Capability unit IIIs–1; Sandhills range site; woodland group 3s2.

Paola Series

The Paola series consists of nearly level to sloping, excessively drained sandy soils. These soils are on the upland ridge. They formed in beds of marine and eolian sand.

In a representative profile, the surface layer is gray sand about 4 inches thick. The subsurface layer is white sand about 20 inches thick. The subsoil is brownish-yellow sand, 32 inches thick, that contains small, dark-brown, weakly cemented concretions and streaks of white sand along old root channels. The subsoil is underlain by 34 inches of light yellowish-brown sand. These soils are strongly acid throughout. The water table is below a depth of 80 inches.

Paola soils are very rapidly permeable in all layers. They have very low available water capacity, organic-matter content, and natural fertility.

Representative profile of a Paola sand:

A1—0 to 4 inches, gray (10YR 6/1) sand; single grain; loose; many fine and medium roots; many uncoated sand grains, few thinly coated with organic matter; strongly acid; clear, smooth boundary.

A2—4 to 24 inches, white (10YR 8/1) sand; few, fine, faint, gray, dark-gray, and grayish-brown mottles along root channels; single grain; loose; few fine roots; clean sand grains; strongly acid; abrupt, irregular boundary.

B–24 to 56 inches, brownish-yellow (10YR 6/6) sand, reddish yellow (7.5YR 7/8) burned; single grain; loose; few coarse root channels filled with white sand from the A horizon; outer edges of the root channels stained dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) by organic material that is weakly cemented; common, small and coarse, weakly cemented, strong-brown (7.5YR 5/8) spheroidal concretions occur throughout this horizon; thin band 1/4 to 1/2 inch thick of discontinuous dark yellowish brown (10YR 4/4) at the contact of A2 and B horizons; strongly acid; gradual, wavy boundary.

C—56 to 90 inches, light yellowish-brown (10YR 6/4) sand; few, coarse, faint, very pale brown mottles; single grain; loose; few, fine, yellowish-brown spheroidal concretions; strongly acid.

Paola soils are strongly acid to very strongly acid throughout. The A1 horizon is 2 to 4 inches of light-gray to dark grayish-brown sand. The A2 horizon is light brownish-gray to white sand 8 to 34 inches thick. The B horizon is yellow to yellowish brown and has few to many weakly cemented spheroidal concretions scattered in lenses 1/2 to 2 inches thick throughout. There is a higher concentration of these concretions in the upper part of the B horizon than in the lower part. The sand grains are thinly coated with iron oxides. The thin layers stained by organic matter at the contact of the A2 and B horizons are absent in many areas. The C horizon is pale brown to yellow. In many areas it is free of mottles and concretions.

Paola soils are associated with Immokalee, Myakka, Pomello, and St. Lucie soils. They are better drained than Immokalee, Myakka, and Pomello soils. They differ from St. Lucie soils in having a brownish-yellow B horizon.

Paola sand, 0 to 5 percent slopes (PaB).—This is a nearly level to gently sloping, excessively drained soil. It is on ridgetops and knolls on the upland ridge. It has the profile described as representative for the series.

Paola sand, 0 to 5 percent slopes, is very rapidly permeable throughout. It has very low available water capacity, organic-matter content, and natural fertility.

Included in mapping are a few small areas where a sandy clay loam or sandy loam subsoil is at a depth of 40 to 80 inches.

This soil is not suited to most cultivated crops. It is too droughty and too rapidly leached of fertilizer. It is very poorly suited to citrus because of droughtiness and very low fertility.

Most areas are in native vegetation of sand pine, scrub oak, palmettos, and rosemary and a sparse understory growth of grasses and shrubs. These areas have little value for range. Capability unit VIs–1; Sand Scrub range site; woodland group 5s3.

Paola sand, 5 to 12 percent slopes (PaD).—The profile of this soil is similar to that described as representative for the series, but this soil has stronger slopes. The water table is at a depth of more than 80 inches.

Paola sand, 5 to 12 percent slopes, is very rapidly permeable throughout. It has very low available water capacity, organic-matter content, and natural fertility.

Included with this soil in mapping are some areas where slopes are less than 5 percent.

This soil is not suited to cultivated crops. The steep slopes and very poor soil properties make it poorly suited to citrus. It is poorly suited to deep-rooted tame grasses because it is droughty during dry seasons.

Most areas are in sparse native vegetation of sand pines, scrub oak, palmettos, rosemary, and grasses. These areas have little value for range. Capability unit VIIs–1; Sand Scrub range site; woodland group 5s3.

Pelham Series

The Pelham series consists of nearly level, poorly drained sandy soils that have a loamy subsoil. These soils are in depressions or in low areas on the upland ridge. They formed in unconsolidated marine sediment.

In a representative profile, the surface layer is very dark gray sand about 5 inches thick. The subsurface layer is 27 inches thick. The upper 20 inches is dark grayish-brown sand, and the lower 7 inches is white sand. The subsoil is about 48 inches thick. The upper 25 inches is white sandy clay loam mottled with very pale brown, yellow, and brownish yellow. The lower 23 inches is very pale brown sandy clay loam mottled with white, yellow, brownish yellow, and reddish yellow. This soil is slightly acid in the surface layer, medium acid in the subsurface layer to a depth of 25 inches, and strongly acid below this to a depth of 80 inches. The water table is at a depth of about 20 inches.

Pelham soils are rapidly permeable in the sandy layers, to a depth of 32 inches, and are moderately permeable in the loamy subsoil. Available water capacity in the surface and subsurface layers is very low. It is medium in the subsoil. The organic-matter content and natural fertility are low.

Representative profile of Pelham sand:

Ap—0 to 5 inches, very dark gray (10YR 3/1) sand; weak, fine, granular structure; very friable; few fine roots; slightly acid; gradual, wavy boundary.

A21—5 to 25 inches, dark grayish-brown (10YR 4/2) sand; few, fine, faint mottles of dark gray (10YR 4/1) and few, medium, distinct mottles of pale brown (10YR 6/3); weak, fine, granular structure; friable; few fine roots; medium acid; clear, smooth boundary.

A22—25 to 32 inches, white (10YR 8/2) sand; few vertical streaks of gray, dark gray, and brown; single grain; loose; strongly acid; abrupt, smooth boundary.

B21tg—32 to 57 inches, white (10YR 8/2) sandy clay loam; common, fine, faint mottles of very pale brown (10YR 8/4), yellow (10YR 8/8), and brownish yellow (10YR 6/8); moderate, medium, granular structure; friable; many sand grains coated and bridged with clay; strongly acid; gradual, wavy boundary.

B22tg—57 to 80 inches, very pale brown (10YR 8/3) sandy clay loam; common, medium, faint mottles of white (10YR 8/2), yellow (10YR 8/8), and brownish yellow (10YR 6/8) and few, fine, distinct mottles of reddish yellow (7.5YR 6/8); moderate, medium, granular structure; friable; many sand grains coated and bridged with clay; strongly acid.

The A1 or Ap horizon is 5 to 7 inches thick, dark gray to very dark gray, and slightly acid to very strongly acid.

The A21 horizon is dark grayish-brown or dark yellowish-brown to light brownish-gray or pale-brown sand or fine sand 2 to 20 inches thick. In places, the horizon is free of mottles; in other places it has common, fine, faint and distinct mottles of brown, yellow, and gray. The A22 horizon is white to grayish-brown sand or fine sand 2 to 10 inches thick. Mottles are not present in some areas, and in others there are a few mottles of yellow, brown, and gray. In some areas there is a thin A23 horizon of light-gray to very pale brown sand or fine sand. The A2 horizon is medium acid to very strongly acid. The total thickness of the A horizon is 29 to 36 inches. In some places there is a gray loamy sand B1 horizon, 1 to 3 inches thick, at the contact of the A2 and Btg horizons. The Btg horizon is white to light-gray sandy clay loam. Mottles are few, fine, faint to common, medium, faint in shades of gray, brown, and yellow. This horizon extends to a depth of more than 80 inches. It is strongly acid to very strongly acid. The water table is within a depth of 10 inches for about 2 months of the year, at 10 to 40 inches for about 6 months, and below 40 inches for about 4 months.

The Pelham soils mapped in the Lake County Area have a slightly higher temperature than is defined in the range for the Pelham series, but this difference does not alter their usefulness or behavior.

Pelham soils are associated with Astatula, Apopka, Myakka, Ocilla, Wauchula, Pompano, and Vaucluse soils. They are not so well drained as Astatula, Apopka, Ocilla, and Vaucluse soils. They differ from Astatula and Pompano soils in having a Btg horizon. They do not have the weakly cemented layer stained with organic matter that is typical in Myakka and Wauchula soils.

Pelham sand (Pd).—This is a nearly level, poorly drained soil that has a loamy subsoil. The water table is within a depth of 10 inches for about 2 months of the year, at a depth of 10 to 40 inches for about 6 months, and below 40 inches for about 4 months.

Pelham sand has very low available water capacity in the surface and subsurface layers and medium available water capacity in the subsoil. It has rapid permeability in the sandy layers, to a depth of 32 inches, and moderate permeability in the loamy subsoil. It is low in natural fertility and organic-matter content.

Included in mapping are a few small areas of soils that have a layer stained with organic matter and a few small areas of soils that have a sandy clay loam subsoil below a depth of 40 inches.

If intensively managed, this soil is suited to most shallow-rooted, cultivated crops. Water control is needed to remove excess surface water after heavy rain and to provide subsurface irrigation during dry seasons. Crops should be fertilized and limed and rotated with a close-growing, soil-improving crop. Citrus trees grow well in some places if there is deep drainage and if they are properly fertilized and limed. They are, however, subject to damage by excess ground water and severe freezing in winter. Deep-rooted tame grasses grow well and make good pasture if they are fertilized and limed, and if grazing is controlled.

Most areas of this soil are small and are included with better drained soils in citrus groves or improved pastures. The few small areas in native vegetation are not used for range. The native vegetation is scattered pine trees and an understory of saw-palmettos, grasses, and shrubs. Capability unit IVw-1; Acid Flatwoods range site; woodland group 2w3.

Placid Series

The Placid series consists of nearly level, very poorly drained sandy soils. These soils are in low wet areas on the upland ridge and in the flatwoods. They formed in sandy marine sediment.

In a representative profile, the surface layer is sand about 18 inches thick. The upper 12 inches is black, and the lower 6 inches is very dark gray mottled with very dark grayish brown and dark grayish brown. Below this is a layer of grayish-brown sand about 20 inches thick that is mottled with dark grayish brown and very dark grayish brown. The next 42 inches is light brownish-gray sand. These soils are extremely acid in the surface layer, to a depth of about 12 inches, and very strongly acid below this to a depth of 80 inches. The water table is at the surface most of the year. In the slightly higher areas, however, the water table is at a depth of 20 inches most of the year.

Placid soils are rapidly permeable in all layers. They have medium available water capacity, moderate natural fertility, and moderately high organic-matter content to a depth of 18 inches. They are low in these characteristics below a depth of about 18 inches.

Representative profile of Placid sand:

A11—0 to 12 inches, black (N 2/0) sand; weak, fine, granular structure; very friable; many fine roots; extremely acid; clear, wavy boundary.

A12—12 to 18 inches, very dark gray (10YR 3/1) sand; many, medium and coarse, faint mottles of very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) and few, medium, faint mottles of black and dark brown; weak, fine, granular structure: very friable; many fine roots; very strongly acid; clear, smooth boundary.

C1—18 to 38 inches, grayish-brown (10YR 5/2) sand; few, medium, faint mottles of dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2); single grain; loose; few fine roots; very strongly acid; gradual, wavy boundary.

C2—38 to 80 inches, light brownish-gray (10YR 6/2) sand; single grain; loose; very strongly acid.

Placid soils are extremely acid to strongly acid throughout. They range from very poorly drained to poorly drained. The A11 horizon is 8 to 14 inches thick and very dark brown to black. The A12 horizon is 3 to 9 inches of very dark gray to black or dark-brown to very dark brown sand or fine sand. In some places it has mottles of very dark grayish brown and dark grayish brown or very dark gray; in other places it is free of mottles. The A horizon is 1 to about 18 percent organic matter. The C1 and C2 horizons are light-gray to gray or light brownish-gray to grayish-brown sand or fine sand. The C1 horizon is mottled with very dark grayish brown and dark grayish brown. In some areas there is a C3 horizon. It is light gray to gray or light brownish gray to pale brown. In places it has no mottles; in other places it is mottled with gray and brown. The C horizon extends to a depth of 80 inches or more. The water table is at the surface most of the year. During extended dry periods, it is within a depth of 15 inches. In some places the soil is covered with shallow water 4 to 6 months each year. In slightly higher areas the water table is within a depth of 10 inches for about 2 months of the year and fluctuates between 10 and 30 inches during the rest of the year.

Placid soils are associated with Brighton, Immokalee, Montverde, Myakka, and Ona soils. They are mineral soils and Brighton and Montverde soils are organic soils. They do not have the weakly cemented layers stained with organic matter that are typical of Immokalee, Myakka, and Ona soils.

Placid sand (Pe).—This is a nearly level, very poorly drained soil. It has the profile described as representative for the series. The water table is at the surface most of the year. During extended dry periods it is within a depth of 15 inches. Shallow water covers many areas for 4 to 6 months in wet seasons.

Placid sand is rapidly permeable throughout. It has medium available water capacity, moderately high organic-matter content, and moderate natural fertility to a depth of about 18 inches. It is low in these characteristics at depths below 18 inches.

Included in mapping are a few small areas of soils that have very weakly cemented layers stained with organic matter at a depth of less than 40 inches and a few small areas where there is an muck surface layer 6 to 10 inches thick.

This soil is well suited to truck crops, flowers, and other shallow-rooted cultivated crops that are tolerant of wetness. Water control is needed to remove excess surface water rapidly after rain. Fertilizer and lime are needed. Soil-improving cover crops should be rotated with row crops. This soil is very poorly suited to citrus. Tame grasses and clovers grow well for pasture in areas where the soil is drained, fertilized, and limed, and where grazing is controlled.

The native vegetation is mainly grass and low-growing aquatic plants (fig. 5). Some areas have swamp vegetation of wetland hardwoods and cypress. Open areas produce excellent forage for cattle and wildlife if they are well managed as range. Swamp areas produce some browse and shelter for cattle and wildlife. Important decreaser and increaser forage plants are maidencane, longleaf three-awn, and broomsedge three-awn. If the site is overgrazed, these plants are replaced by pickerelweed, redroot, smartweed, iris, carpetgrass, and a variety of annual grasses and weeds. Capability unit IIIw-1; Sand Pond range site; woodland group 2w3.

Placid sand, slightly wet (Pg).—This is a nearly level, poorly drained soil. It is at elevations slightly higher than Placid sand. It occurs as low, broad areas and as narrow bands around ponds and lakes. It covers a transitional zone between the well-drained sandy uplands and the very poorly drained wetlands. The surface layer is about 19 inches thick. The upper 7 inches is black sand, and the lower part is very dark brown sand. Below this, to a depth of 23 inches, is dark grayish-brown sand mottled with very dark gray and dark grayish brown. The next layer is light grayish-brown sand that extends to a depth of 31 inches. It is underlain by light-gray sand, which extends to a depth of 80 inches. The water table is within a depth of 10 inches for about 2 months of the year and at a depth of 10 to 30 inches the rest of the year.

Placid sand, slightly wet, is rapidly permeable throughout. To a depth of about 19 inches, it has medium available water capacity, moderately high organic-matter content, and moderate natural fertility. Below this, the available water capacity and organic-matter content are low.

Included in mapping are a few small areas of soils that have a sandy loam or sandy clay loam subsoil at a depth of about 50 inches.

This soil is well suited to most crops that are tolerant of slight wetness. Truck crops and flowers grow well but require water control that removes excess surface water rapidly and supplies subsurface irrigation in dry seasons. This soil requires fertilizer and lime. Soil-improving cover crops should be planted in rotation with row crops. This soil is very poorly suited to citrus. It is well suited to pastures of tame grasses and clovers. High-quality pasture can be maintained in areas where the soil is drained, fertilized, and limed and grazing is controlled.

Areas that are not cultivated support a native growth of pine trees and an understory vegetation of native grasses and shrubs. In many areas the trees have been cut, and the soil is covered with a good growth of understory plants. Many of these areas are used for range. The main decreaser and increaser plants are creeping bluestem, indiangrass, little blue maidencane, Florida paspalum, pineland three-awn, species of panicum, deerstongue, grassleaf goldaster, milkpeas, huckleberry, and runner oak. Saw-palmetto, gallberry, and fetterbush are minor plants of the original vegetation that now dominate in some areas as a result of fires and overgrazing. Capability unit IIw-1; Acid Flatwoods range site; woodland group 2w2.

Placid and Myakka sands, 0 to 2 percent slopes (PmA).—These are nearly level, very poorly drained and poorly drained soils in low, marshy depressions. Each of the named soils has the profile described as representative for its series. The water table in these soils is nearer the surface for longer periods than in Myakka sand, and the soil is covered with water for 4 to 6 months in most years.

The soils occur together without regular pattern. Separating the soils into more than one mapping unit was not practicable because of extreme wetness. The composition of this unit is more variable than that of most other units in

Figure 5.—Native vegetation on a Sand Pond range site. The soil is Placid sand.

the county, but the soils are similar enough to permit interpretations for most expected uses.

About 33 percent of the unit is Placid soils, 27 percent is Myakka soils, and 40 percent is inclusions of other soils. The inclusions are mostly soils that have a Bt horizon and soils that have a Bh horizon within a depth of 30 inches.

The suitability of these soils for cultivated crops, citrus, and improved pasture is very similar to that described for Placid sand. The soils occur in positions similar to Placid sand and have similar native vegetation and range potential. Capability unit IIIw-1; Sand Pond range site; woodland group 2w3.

Pomello Series

The Pomello series consists of nearly level to gently sloping, moderately well drained sandy soils that occur throughout the flatwoods. These soils formed in beds of marine sand.

In a representative profile, the surface layer is gray sand about 3 inches thick. The subsurface layer is white sand about 36 inches thick. The subsoil is 18 inches thick. It is sand that is weakly cemented and coated with organic matter. The upper 5 inches is dark reddish brown, the next 7 inches is black, and the next 4 inches is dark reddish brown. Below this is mixed very dark gray, black, and dark-gray sand about 2 inches thick. This layer is underlain by light-gray sand mottled with gray and dark gray. These soils are very strongly acid throughout the profile. The water table is at a depth of about 45 inches.

Pomello soils are moderately rapidly permeable in the layer stained with organic matter and very rapidly permeable in all other layers. They have very low available water capacity and very low organic-matter content in the surface and subsurface layers. Available water capacity is medium, and the organic-matter content is moderate in the organic-stained layer. The soils are very low in natural fertility.

Representative profile of Pomello sand:

A1—0 to 3 inches, gray (10YR 5/1) sand; single grain; loose; many fine roots; very strongly acid; clear, smooth boundary.

A2—3 to 39 inches, white (10YR 8/1) sand; common, fine to medium, dark organic-matter stains along root channels; single grain; loose; few medium roots; very strongly acid; abrupt, smooth boundary.

B21h—39 to 44 inches, dark reddish-brown (5YR 2/2) sand; massive; weakly cemented; sand grains coated with organic matter; many small to medium roots; very strongly acid; abrupt, wavy boundary.

B22h—44 to 51 inches, black (5YR 2/1) sand; many, coarse, faint, dark reddish-brown (5YR 2/2) mottles; massive; weakly cemented; sand grains coated with organic matter; few fine roots; very strongly acid; gradual, wavy boundary.

B23h—51 to 55 inches, dark reddish-brown (5YR 3/4) sand; many, coarse, faint, dark reddish-brown (5YR 2/2) mottles; massive; weakly cemented; sand grains coated with organic matter; very strongly acid; clear, wavy boundary.

B3—55 to 57 inches, mixed very dark gray (10YR 3/1), black (10YR 2/1), and dark-gray (10YR 4/1) sand; single grain; loose; many uncoated sand grains; few coated sand grains; very strongly acid; clear, smooth boundary.

C—57 to 80 inches, light-gray (10YR 6/1) sand; many, coarse, faint, gray (10YR 5/1) and dark-gray (10YR 4/1) mottles; single grain; loose; very strongly acid.

Pomello soils are strongly acid to very strongly acid throughout. The A1 horizon is 3 to 6 inches thick and light gray to gray. The A2 horizon is 30 to 43 inches of light brownish-gray to white sand or fine sand. It has a few mottles of gray and brown as a result of organic staining along old root channels. The B21h horizon is very dark gray to black, dark brown to very dark brown, or dark reddish brown. It is 3 to 5 inches thick. The B22h is very dark gray to black, dark yellowish-brown to very dark brown, or reddish-brown to dark reddish-brown sand or fine sand. The B23h is very dark gray, dark-brown to very dark brown, or dark reddish-brown sand or fine sand. The Bh horizon is commonly 12 to 16 inches thick. In some areas it is as much as 36 inches thick. It is massive in places but crushes to weak or moderate, fine to medium, granular structure and is weakly cemented to friable. The Bh horizon becomes no redder when burned. The B3 horizon is very dark gray, grayish brown to brown, or dark brown mottled with black, gray, brown, and red. The C horizon is white to dark gray or very pale brown to yellowish brown. The water table is at a depth of 40 to 60 inches for about 8 months of the year and at 30 to 40 inches for about 4 months.

Pomello soils are associated with Myakka, Immokalee, St. Lucie, Paola, and Astatula soils. They are better drained than Immokalee and Myakka soils. They are not so well drained as Astatula, Paola, and St. Lucie soils.

Pomello sand (Pn).—This is a nearly level to gently sloping, moderately well drained sandy soil. The water table is at a depth of 40 to 60 inches for about 8 months of the year and at a depth of 30 to 40 inches for about 4 months.

Pomello sand has very rapid permeability and very low available water capacity and organic-matter content in the surface and subsurface horizons. The organic-stained layer has moderately rapid permeability and moderate organic-matter content. This soil is very low in natural fertility.

Included in mapping are a few small areas of Immokalee, Tavares, and St. Lucie soils and some small areas where the Bh horizon is as much as 36 inches thick.

This soil is not suitable for truck crops, flower crops, or other shallow-rooted crops that have high moisture and fertilizer requirements. It has little capacity to hold water and plant nutrients in the surface layer. It is poorly suited to citrus and tame grasses.

Much of the acreage is in native vegetation of scrub oaks, scattered pine trees, and a sparse growth of native grasses and shrubs. Part of the acreage is used for range, but forage production is inadequate. Capability unit VIs-4; Sand Scrub range site; woodland group 4s3.

Pompano Series

The Pompano series consists of nearly level, poorly drained sandy soils. These soils are in the flatwoods and in depressions on the upland ridge. They formed in thick beds of marine sand.

In a representative profile the surface layer is black sand about 5 inches thick. Below this is a layer of dark grayish-brown sand about 4 inches thick. The next 52 inches is gray and white sand that overlies 19 inches of pale-brown sand mottled with dark grayish brown, grayish brown, and light brownish gray. These soils are strongly acid throughout. The water table is at a depth of about 20 inches.

Pompano soils are rapidly permeable. They have very low available water capacity, organic-matter content, and natural fertility.

Representative profile of Pompano sand, acid:

A1—0 to 5 inches, black (N 2/0) sand; weak, medium, granular structure; very friable; many fine roots; common uncoated sand grains; strongly acid; clear, wavy boundary.

AC—5 to 9 inches, dark grayish-brown (10YR 4/2) sand; single grain; loose; few fine roots; many uncoated sand grains; strongly acid; clear, wavy boundary.

C1—9 to 30 inches, gray (10YR 5/1) sand; single grain; loose; few fine roots; few small particles of charcoal; many clean sand grains; strongly acid; gradual, wavy boundary.

C2—30 to 61 inches, white (10YR 8/2) sand; few, fine, faint, light-gray and very pale brown mottles; single grain; loose; few fine roots; many clean sand grains; strongly acid; gradual, wavy boundary.

C3—61 to 80 inches, pale-brown (10YR 6/3) sand; common, medium, faint, dark grayish-brown (10YR 4/2), grayish-brown (10YR 5/2), and light brownish-gray (10YR 6/2) mottles; single grain; loose; strongly acid.

Pompano soils are strongly acid to very strongly acid throughout. The A horizon is 3 to 8 inches thick and is gray to black. The AC horizon is 4 to 11 inches thick and is gray to dark grayish brown mottled with shades of gray and brown. In places, this horizon is absent. The C1 and C2 horizons range from white to grayish brown and are without mottles or are only faintly mottled with very pale brown and light gray. In some places a few iron concretions occur at a depth of 45 to 60 inches. The C3 horizon ranges from white to brown and is mottled gray and brown. The water table is within a depth of 10 inches for 2 to 6 months of the year and at a depth of 10 to 40 inches the rest of the year. Low areas are covered with shallow water after heavy rain.

Pompano soils are associated with Astatula, Apopka, Immokalee, Myakka, Ocilla, and Wauchula soils. They are more poorly drained than Astatula, Apopka, and Ocilla soils. They do not have the loamy subsoil that is typical of Apopka and Ocilla soils.

Pompano sand, acid (Po).—This is a nearly level, poorly drained soil. The water table is within a depth of 10 inches for 2 to 6 months of the year and at a depth of 10 to 40 inches during the rest of the year. The lowest areas are covered with shallow water after heavy rain.

Pompano sand, acid, has very low available water capacity and low organic-matter content. It is low in natural fertility.

Included in mapping are small areas of soils that have a sandy clay loam subsoil that begins at a depth of more than 40 inches and areas that have a black surface layer about 12 inches thick.

This soil is suitable for truck crops, flowers, and other shallow-rooted cultivated crops that are tolerant of wetness. Water control is needed to remove excess surface water rapidly after rain. Crops require fertilizer and lime, and they should be rotated with soil-improving cover crops. The soil is very poorly suited to citrus. Tame grasses and clovers grow well for pasture, but surface drainage, fertilizer, lime, and controlled grazing are needed.

Much of the acreage is in native vegetation of pine trees, grasses, shrubs, and saw-palmetto. Some of this is used for range. Important decreaser and increaser forage plants are creeping bluestem, indiangrass, little blue maidencane, Florida paspalum, pineland three-awn, species of panicum, deerstongue, grassleaf goldaster, huckleberry, and runner oaks. Saw-palmetto, gallberry, and fetterbush are now dominant in some areas. If these areas are used for range, grazing and fire should be controlled to permit healthy growth of decreaser plants. Capability unit IVw-2; Acid Flatwoods range site; woodland group 3w2.

St. Lucie Series

The St. Lucie series consists of nearly level to gently sloping, excessively drained sandy soils. These soils are on ridgetops, knolls, and dunes. They formed in thick beds of marine sand.

In a representative profile, the surface layer is sand about 4 inches thick. Below this is white, loose sand to a depth of 80 inches. These soils are very strongly acid throughout. The water table is at a depth of more than 80 inches.

St. Lucie soils are very rapidly permeable. Available water capacity, organic-matter content, and natural fertility are very low.

Representative profile of St. Lucie sand:

A1—0 to 4 inches, gray (10YR 5/1) sand; single grain; loose; common fine and medium roots; very strongly acid; clear, wavy boundary.

C1—4 to 40 inches, white (10YR 8/1) sand; single grain; loose; common fine and medium roots; few, fine, vertical, very pale brown stains along root channels; clean sand grains; very strongly acid; diffuse, wavy boundary.

C2—40 to 80 inches, white (10YR 8/1) sand; single grain; loose; clean sand grains; very strongly acid.

The A horizon is 2 to 5 inches thick and is gray to white. In some areas the A horizon is a mixture of small black bits of organic matter and white sand grains. The C horizon is light gray to white. White is the dominant color.

St. Lucie soils are associated with Paola, Astatula, Pomello, Myakka, and Immokalee soils. They are better drained than Immokalee, Myakka, and Pomello soils, and do not have the weakly cemented layers stained with organic matter that are typical of those soils. They differ from Astatula and Paola soils in not having yellow and yellowish-brown colors in the C horizon.

St. Lucie sand (Sc).—This is a nearly level to gently sloping excessively drained soil. It has a gray, loose sand surface layer about 4 inches thick. Below this to a depth of 80 inches is white, loose sand. The water table is at a depth of more than 80 inches.

St. Lucie sand is very rapidly permeable. Available water capacity, organic-matter content, and natural fertility are very low.

Included in mapping are a few small areas of Pomello soils, areas where slopes are 5 to 17 percent, and areas of soils that have a fine sand texture.

This soil is not suitable for most cultivated crops. It is too droughty and too rapidly leached of fertilizers. It is very poorly suited to citrus and tame grasses because of droughtiness and very low fertility.

Only a small acreage is farmed. Most of the acreage is in native vegetation of scrub oaks, sand pines, and a sparse undergrowth of native grasses and shrubs that do not provide adequate forage for range. Capability unit VIIs-1; Sand Scrub range site; woodland group 5s3.

Swamp

Swamp (Sw) consists of level, very poorly drained mineral and organic soils that have not been classified because excess water and dense vegetation make detailed investigation impractical. Swamp occurs as broad drainageways, as broad, poorly defined streams, as large depressions having no outlets, and as large bay heads. The soils are flooded with water all the year except during prolonged periods when rainfall is light. Some places in the Green Swamp area are always covered with water.

Included in mapping are a few small islands of higher lying soils. These inclusions make up no more than 2 percent of any mapped area.

Swamp is covered with a dense wetland forest. Establishing adequate water control and removing the dense vegetation to prepare this soil for cultivated crops or pasture are not feasible. Swamp provides shelter and some browse for cattle and wildlife. The vegetation is wetland hardwoods, cypress, black pines, cabbage palms, shrubs, vines, and grasses. Capability unit VIIw-2; Swamp range site; no woodland classification.

Tavares Series

The Tavares series consists of nearly level to gently sloping, moderately well drained sandy soils. These soils formed in beds of marine sand.

In a representative profile, the surface layer is about 7 inches thick. It is underlain by 92 inches of sand. The upper 18 inches is very pale brown, faintly mottled with yellowish brown. The next 9 inches is light yellowish brown, and the next 27 inches is very pale brown faintly mottled with yellow. Below this is 38 inches of white sand that is mottled with very pale brown. The water table is at a depth of about 50 inches.

Tavares soils are very rapidly permeable. Available water capacity and the organic-matter content are very low. Natural fertility is low.

Representative profile of Tavares sand:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) sand; weak, fine, granular structure; friable; many fine and medium roots; common, uncoated, light-gray sand grains; strongly acid; abrupt, wavy boundary.

C1—7 to 25 inches, very pale brown (10YR 7/4) sand; few, fine, faint, yellowish-brown mottles; single grain; loose; common fine roots; common very fine carbon particles; many uncoated sand grains; strongly acid; gradual, wavy boundary.

C2—25 to 34 inches, light yellowish-brown (10YR 6/4) sand; single grain; loose; few fine roots; many uncoated sand grains; strongly acid; gradual, wavy boundary.

C3—34 to 61 inches, very pale brown (10YR 7/4) sand; few, medium, faint, yellow mottles; single grain; loose; many uncoated sand grains; strongly acid; clear, wavy boundary.

C4—61 to 99 inches, white (10YR 8/2) sand; common, medium, faint, very pale brown mottles; single grain; loose; many uncoated sand grains; abundance of mottles decreases at lower depths; strongly acid.

Tavares soils are very strongly acid to strongly acid throughout the profile. The A1 or Ap horizon is very dark gray to dark grayish brown and 4 to 9 inches thick. The C horizon is light brownish-gray to brown or very pale brown sand or fine sand. Few faint mottles in shades of brown or yellow occur below a depth of 30 inches. Large splotches of white or light gray occur within depths of 40 inches in some profiles. The water table commonly is at a depth of 40 to 60 inches for more than 6 months of the year. During periods of drought, it is below 60 inches.

Tavares soils are associated with Apopka, Astatula, Orlando, Ocilla, and Pompano and Tavares, white subsurface variant, soils. They are not so well drained as Apopka, Astatula, and Orlando soils. They also have a thinner A horizon than Orlando soils. They do not have the Bt horizon that is typical of the Ocilla soils. They are better drained than Pompano soils. They differ from the Tavares, white subsurface variant, soils in not having the white subsurface layer.

Tavares sand (Ta).—This is a nearly level to gently sloping, moderately well drained soil. It has a very dark grayish-brown sand surface layer about 7 inches thick. Below this is a layer of very pale brown sand that has faint yellowish-brown mottles to a depth of 25 inches. The next layer, to a depth of 34 inches, is light yellowish-brown sand. Very pale brown sand that has faint yellow mottles is at depths between 34 and 61 inches. Below this is white sand mottled with very pale brown. The water table is at a depth of 40 to 60 inches for more than 6 months of the year. During periods of drought, it is below 60 inches.

Tavares sand is very rapidly permeable. Available water capacity and organic-matter content are very low. Natural fertility is low.

Included in mapping are a few small areas of soils that have a sandy clay loam subsoil at a depth of 40 to 80 inches.

This soil is poorly suited to shallow-rooted truck crops, flowers, and other annual crops that have high moisture and fertility requirements. Irrigation of these crops generally is not feasible. The soil is well suited to watermelons, but melons should be cultivated on the contour with alternate strips of tall grain, adequatelv fertilized and limed, and occasionally irrigated. Tavares sand is suitable for citrus trees if they are properly fertilized and irrigated. Soil-improving cover crops should be grown between the trees. If adequately fertilized and limed, and if grazing is controlled, deep-rooting tame grasses grow well for pasture.

Areas that have not been farmed are open pine forest or, if the trees have been removed, open grassland. Where wooded areas are used for range, the understory plants provide good forage for cattle. Major decreaser and increaser forage plants are creeping bluestem, pineland three-awn, indiangrass, splitbeard bluestem, broomsedge bluestem, and runner oak. Under continuous heavy grazing less desirable plants invade. Major invaders are pricklypear, post oak, blackjack oak, natalgrass, dogfennel, and annual grasses and weeds. Capability unit IIIs-1; Sandhills range site; woodland group 3s2.

Tavares Series, White Subsurface Variant

The Tavares series, white subsurface variant, consists of nearly level to gently sloping, moderately well drained sandy soils. These soils formed in thick beds of marine sands.

In a representative profile, the surface layer is dark-gray sand about 3 inches thick. The subsurface layer is white sand about 19 inches thick. It is underlain by 58 inches of sand. The upper 20 inches is light yellowish brown and has a few mottles of yellowish brown and tongues of white material from the subsurface layer. The tongues are lined with coatings of dark reddish brown, dark brown, and brown. The next 16 inches is pale brown. Below this is 22 inches of light-gray sand. These soils are strongly acid throughout. The water table is commonly at a depth of about 45 inches.

These soils are very rapidly permeable. They have very low available water capacity and very low organic-matter content. Natural fertility is low.

Representative profile of Tavares sand, white subsurface variant:

A1—0 to 3 inches, dark-gray (10YR 4/1) crushed sand; single grain; loose; many fine roots; many uncoated sand grains; many undecomposed organic particles; strongly acid; abrupt, wavy boundary.

A2—3 to 22 inches, white (N 8/0) sand; few old root channels filled with gray color; few medium pockets of very dark gray and dark gray; single grain; loose; clean sand grains; strongly acid; abrupt, wavy boundary.

C1—22 to 42 inches, light yellowish-brown (10YR 6/4) fine sand; few, medium, faint mottles of yellowish brown; single grain; loose; most sand grains in the matrix are uncoated; a discontinuous dark-brown (7.5YR 3/2) band less than ¼ inch thick is between the A2 and B horizons; a few vertical tongues of material from the A2 horizon, 1 to 4 inches in diameter, extend throughout the horizon; they are lined with dark reddish-brown (5YR 2/2), dark-brown (7/5YR 3/2), and brown (7.5YR 4/4) coatings that are ⅛ inch to 1 inch thick; strongly acid; gradual, wavy boundary.

C2—42 to 58 inches, pale-brown (10YR 6/3) sand; few, fine, faint mottles of light brownish gray; single grain; loose; few concretions 2 millimeters to 5 millimeters in size that are red (2.5YR 4/6) to yellowish brown (10YR 5/6); strongly acid; gradual, wavy boundary.

C3—58 to 80 inches, light-gray (10YR 7/1) sand; few, fine and medium, distinct mottles of pale brown (10YR 6/3); single grain; loose; few dark yellowish-brown to brown streaks in old root channels; few, fine and medium, yellowish-red concretions in upper part; strongly acid.

The A1 horizon is 2 to 4 inches thick and is dark gray to gray and dark grayish brown to light brownish gray. The A2 horizon is white to light gray and 8 to 34 inches thick. The C1 horizon is yellowish brown to very pale brown and 18 to 22 inches thick. Few to many weakly cemented spheroidal concretions are scattered throughout the C1 horizon, but are typically concentrated in the upper part. Sand grains are coated with iron oxides, but they turn only slightly redder when burned. The thin-stained layer at the contact of the A2 and B horizons is absent in many areas. The C2 and C3 horizons are light gray to very pale brown and light olive brown to pale yellow. In many areas the C horizon is free of mottles and concretions. The water table is at a depth of 25 to 40 inches for 1 to 2 months during periods of high rainfall and at a depth of 40 to 60 inches the rest of the year. During extended periods of low rainfall, however, it falls below 60 inches.

These soils are outside the defined range for the Tavares series in that they have a white to light-gray A2 horizon and are slightly wetter.

Tavares, white subsurface variant, soils are associated with Apopka, Astatula, Ocilla, Pompano, and Tavares soils. They are not so well drained as Apopka and Astatula soils. They do not have the Bt horizon that is typical of Ocilla soils. They are better drained than Pompano soils. They differ from Tavares soils in having a white subsurface layer.

Tavares sand, white subsurface variant (Te).—This is a nearly level to gently sloping, moderately well drained soil. The water table is at a depth of 25 to 40 inches for 1 to 2 months during periods of high rainfall and at a depth of 40 to 60 the rest of the year. During extended periods of low rainfall, however, it is below 60 inches.

Tavares sand, white subsurface variant, soil is very rapidly permeable. Available water capacity and the organic-matter content are very low. Natural fertility is low.

Included in mapping are a few small areas that have a loamy subsoil that begins between depths of 55 to 70 inches.

This soil is poorly suited to shallow-rooted truck crops, flowers, and other annual crops that have high moisture and fertility requirements. Irrigation of these crops generally is not practicable. If the soil is properly fertilized, limed, and irrigated, it is suitable for citrus trees.

A vegetative cover should be maintained between the trees. This soil is suitable for tame grasses if it is limed and fertilized and if grazing is controlled.

About half the acreage is open pine forest or, if the trees have been removed, open grassland. Where wooded areas are used for range, the understory plants provide good forage for cattle. Major decreaser and increaser forage plants are creeping bluestem, pineland three-awn, indiangrass, splitbeard bluestem, broomsedge bluestem, and runner oak. Under continuous heavy grazing, less desirable plants invade. Major invaders are pricklypear, post oak, blackjack oak, natalgrass, dogfennel, annual grasses and weeds. Capability unit IIIs–1; Sand Scrub range site; woodland group 3s2.

Vaucluse Series

The Vaucluse series consists of gently sloping, well-drained sandy soils that have a loamy subsoil. These soils occur as fairly small areas at or near the crest of larger more sloping areas on the upland ridge. They formed in stratified loamy marine sediment.

In a representative profile, the surface layer is gray sand about 5 inches thick. The subsurface layer is light yellowish-brown sand about 10 inches thick. The subsoil extends to a depth of 70 inches. The upper 5 inches is mottled reddish-yellow sandy clay loam. The next 50 inches is mottled sandy clay loam. These soils are slightly acid in the surface layer, strongly acid below this to a depth of 15 inches, and very strongly acid at depths between 15 and 70 inches. The water table is at a depth of more than 60 inches.

Vaucluse soils are moderately slowly permeable. They are medium in available water capacity and low in organic-matter content. Natural fertility is low.

Representative profile of Vaucluse sand:

Ap—0 to 5 inches, very dark gray (10YR 3/1) sand; weak, very fine, granular structure; very friable; common fine carbon particles; strongly acid; abrupt, wavy boundary.

A2—5 to 15 inches, light yellowish-brown (10YR 6/4) sand; few, fine and medium, faint, yellow mottles; weak, very fine, granular structure; very friable; common fine carbon particles; strongly acid; abrupt, wavy boundary.

B21t—15 to 20 inches, reddish-yellow (7.5YR 6/8) sandy clay loam; common, fine to coarse, distinct mottles of red (2.5YR 5/8), yellow (10YR 8/6), strong brown (7.5YR 5/8), and brown (10YR 5/3); moderate, medium, subangular blocky structure; firm; common discontinuous clay films; few sand lenses; many fine to medium quartzite pebbles; very strongly acid; clear, smooth boundary.

B22t—20 to 37 inches, mottled red (2.5YR 4/8), reddish-yellow (5YR 6/8), strong-brown (7.5YR 5/8), yellow (10 YR 8/6), light yellowish-brown (10YR 6/4), and very pale brown (10YR 8/4) sandy clay loam; strong, coarse, subangular blocky structure; firm, hard; many clay films and sand lenses; very strongly acid; gradual, wavy boundary.

B23t—37 to 70 inches, mottled pink (7.5YR 8/4), reddish-yellow (5YR 6/8), red (2.5YR 5/8), light-gray (10YR 7/2), and very pale brown (10YR 8/3) sandy clay loam; moderate, fine to medium, subangular blocky structure; firm, hard; common clay films; very strongly acid.

The Al, or Ap, horizon is dark gray to very dark gray and brown to very dark grayish brown and 4 to 8 inches thick. The A2 horizon is 4 to 10 inches of light yellowish-brown to yellowish-brown or brownish-yellow sand or fine sand. Most of it is mottled with yellow and brown. In some areas the A2 horizon is free of mottles. The B21t horizon is 3 to 6 inches thick and is reddish yellow or light yellowish brown to strong brown mottled with yellow, brown and red. In some areas the mottles are absent. The B21t is typically firm, but in some areas it is friable. The B22t and B23t horizons are sandy loam to sandy clay loam mottled with red, brown, yellow, and gray. They are hard when dry and firm when wet. The clay content is commonly 18 to 25 percent, but in places it is as much as 35 percent. Quartzite gravel occurs in some areas.

The Vaucluse soils mapped in Lake County Area have a slightly higher temperature than is defined in the range for the Vaucluse series. The soils also lack the brittleness and cementation in the B22t and B23t horizons that is typical of the Vaucluse series. These differences, however, do not alter the usefulness and behavior of these soils.

Vaucluse soils are associated with Astatula, Apopka, Ocilla, and Lucy soils. They differ from the Astatula soils in having a Bt horizon. In these soils this horizon occurs within a depth of 20 inches, but in the Apopka, Ocilla, and Lucy soils it is at a greater depth. Vaucluse soils are better drained than Ocilla soils.

Vaucluse sand (Va).—This is a gently sloping, well-drained soil that has a loamy subsoil. It has a very dark gray sand surface layer about 5 inches thick. Below this is a light yellowish-brown sand subsurface layer about 10 inches thick. It overlies a sandy clay loam subsoil that extends to a depth of 70 inches. Between depths of 15 and 20 inches, the subsoil is mottled with reddish yellow; below this it has many mottles of various colors. The water table is at a depth of more than 60 inches.

Vaucluse sand is moderately slowly permeable. It has medium available water capacity and is low in organic-matter content and natural fertility.

Included in mapping are a few small areas of Lucy soils and a few areas of soils that are similar to Vaucluse sand but have slopes of less than 2 percent or of 5 to 12 percent.

This soil is suited to most crops. Row crops should be planted in horizontal rows on the contour and should be irrigated, fertilized, and limed and rotated with soil-improving cover crops. Much of the acreage is planted to citrus, to which the soil is well suited. The trees should be fertilized adequately and irrigated during dry seasons. A good cover of vegetation should be maintained between the trees. Excellent pastures of tame grasses can be maintained if they are properly fertilized and limed and grazing is controlled.

Most of the acreage is used for citrus or improved pasture. Only a small acreage is open pine forest. None is used for range. Capability unit IIIe–1; Sandhills range site; woodland group 3s2.

Wabasso Series

The Wabasso series consists of nearly level, poorly drained sandy soils that have a loamy subsoil below a layer stained with organic matter. These soils are on broad low ridges in the flatwoods. They formed in beds of sandy loamy and loamy marine sediment.

In a representative profile, the surface layer is very dark gray sand 5 inches thick. The subsurface layer is gray sand about 13 inches thick. The subsoil is about 50 inches thick. The upper 10 inches is black sand weakly cemented with organic matter. The lower 40 inches is mottled sandy clay loam. These soils are strongly acid in the surface layer, medium acid in the subsurface layer, neutral between depths of 18 and 28 inches, and moderately alkaline in the subsoil to a depth of 68 inches. The water table is typically at a depth of 25 inches.

Wabasso soils are moderately permeable. Available water capacity is medium and organic-matter content is low. Natural fertility is moderate.

Representative profile of Wabasso sand:

A1—0 to 5 inches, very dark gray (N 3/0) sand; weak, fine crumb structure; many fine roots; strongly acid; clear, smooth boundary.

A2–5 to 18 inches, gray (10YR 5/1) sand; few, fine, faint, very dark gray streaks along root channels; single grain; loose; few fine roots; strongly acid; abrupt, smooth boundary.

B2h—18 to 28 inches, black (5YR 2/1) sand; common, medium, faint streaks of dark brown (7.5YR 3/2); moderate, medium, granular structure; weakly cemented; neutral; abrupt, smooth boundary.

B′21tg—28 to 38 inches, light brownish-gray (2.5YR 6/2) sandy clay loam; common, medium, distinct mottles of very dark grayish brown (2.5Y 3/2), light gray (N 6/0), yellowish brown (10YR 5/8), and brownish yellow (10YR 6/8) and few, fine, faint streaks of white; weak, coarse, subangular blocky structure; firm when moist, very plastic when wet; many fine to medium roots; moderately alkaline; diffuse, irregular boundary.

B′22tg—38 to 50 inches, mottled white (N 8/0), light-gray (N 6/0), light brownish-gray (2.5Y 6/2), yellow (10YR 7/8), and brownish-yellow (10YR 6/8) sandy clay loam; weak, medium, subangular blocky structure; firm when moist, very plastic when wet; many hard lime nodules 2 millimeters to 15 millimeters in size; few fine roots; moderately alkaline; diffuse, wavy boundary.

B′23tg—50 to 68 inches, light-gray (10YR 7/1) sandy clay loam; common, medium, faint mottles of gray (N 6/0) and common, fine, faint mottles of yellow (10YR 7/8), brownish yellow (10YR 6/8), and yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; friable, plastic; few lime nodules 2 millimeters to 15 millimeters in size; lenses of sandy loam; few medium roots; moderately alkaline.

The A1 horizon is very dark gray to black and is 5 to 7 inches thick. The A2 horizon is 10 to 20 inches thick, light gray to gray, and generally mottled with gray or very dark gray. The Bh horizon is dark-brown to black or dark reddish-brown sand or fine sand 8 to 15 inches thick. It is 1 to 4 percent organic matter. In some areas there is an A′2 horizon between the Bh and B′tg horizons. It is 2 to 6 inches thick and is mottled gray, yellow, and brown. The B′tg horizon is white, light gray, and light brownish gray to yellowish brown and has few to many faint to distinct mottles in shades of gray, yellow, and brown. This horizon occurs at a depth of 26 to 40 inches. In some areas sand lenses occur in the B′tg horizon and in some places this horizon is free of lime nodules. The water table is within a depth of 10 inches for 1 to 2 months in wet seasons. The rest of the time it fluctuates between depths of 10 and 40 inches, except during extended dry periods when it falls below 40 inches.

The Wabasso soils are associated with Immokalee, Myakka, and Felda soils. They differ from Immokalee and Myakka soils in having a B′t horizon. They differ from Felda soils in having a weakly cemented layer stained with organic matter.

Wabasso sand (Wa).—This is a nearly level, poorly drained soil that has a loamy subsoil below an organic-stained layer. It has a very dark gray sand surface layer about 5 inches thick and a gray sand subsurface layer about 13 inches thick. A layer of black sand weakly cemented with organic matter is between depths of 18 and 28 inches. Below this, and extending to a depth of 68 inches, is a mottled sandy clay loam subsoil. The water table is within a depth of 10 inches for 1 to 2 months in wet seasons; the rest of the time it fluctuates between depths of 10 and 40 inches, except during extended dry periods, when it is below 40 inches.

Wabasso sand is moderately permeable. Available water capacity is medium and the organic-matter content is low. Natural fertility is moderate.

Included in mapping are small areas of Felda soils and small areas that have thin, weakly expressed layers stained with organic matter.

If intensively managed, this soil is suitable for truck crops, flowers, and other shallow-rooted crops. Water control is needed to remove excess surface water after a rain and to supply subsurface irrigation during dry seasons. Soil-improving cover crops should be rotated with harvested crops.

Regular applications of fertilizer and lime are needed. This soil is poorly suited to citrus trees. If used for citrus, deep drainage is necessary. Citrus crops also have to be fertilized, limed, and irrigated. Close-growing cover crops should be maintained between the trees. In many areas of this soil, citrus trees are subject to severe damage by cold in winter. Good pastures of tame grasses can be maintained if the soil is adequately fertilized and limed and grazing is controlled.

Much of the acreage is in native vegetation, typically open pine forest and scattered cabbage palms and an understory of native grasses and shrubs. In some places the pine trees have been removed and the soil is covered with grassy vegetation that improves drainage. The understory plants provide good forage for cattle and wildlife. The major decreaser and increaser forage plants are creeping bluestem, indiangrass, little blue maidencane, Florida paspalum, pineland three-awn, species of panicum, deerstongue, swamp sunflower, grassleaf goldaster, milkpeas, tarflower, huckleberry, and runner oak. Frequent fires and overgrazing have allowed saw-palmetto, gallberry, and fetterbush to dominate in extensive areas. These were minor plants in the original understory. Capability unit IVw–1; Acid Flatwoods range site; woodland group 3w2.

Wauchula Series

The Wauchula series consists of nearly level, poorly drained sandy soils that have a loamy subsoil below a layer stained with organic matter. These soils are on low ridges in the flatwoods. They formed in sandy and loamy marine sediment.

In a representative profile, the surface layer is black sand about 6 inches thick. The subsurface layer is light brownish-gray sand about 16 inches thick. Below this is a layer of sand that is weakly cemented with organic matter. It is black in the upper 6 inches and reddish brown in the lower 4 inches. Between depths of 32 and 35 inches is dark-brown sand that has weakly cemented fragments of dark reddish-brown sand. Below this is a layer of very pale brown sand about 3 inches thick mottled with brown and strong brown. The next layer, to a depth of 44 inches, is very pale brown sandy loam. Below this, to a depth of 80 inches, is mottled sandy clay loam. These soils are strongly acid throughout. The water table is at a depth of about 25 inches.

Wauchula soils are rapidly permeable in the surface and subsurface layers and moderately permeable below this. Available water capacity is very low in the surface and subsurface layers and is medium in the layers stained with organic matter and the loamy subsoil. The organic-matter content is low, and natural fertility is low.

Representative profile of Wauchula sand:

A1—0 to 6 inches, black (10YR 2/1) sand; weak, fine, crumb structure; friable; many fine to medium roots; strongly acid; clear, wavy boundary.

A2—6 to 22 inches, light brownish-gray (10YR 6/2) sand; single grain; loose; many fine and medium roots; strongly acid; abrupt, wavy boundary.

B21h—22 to 28 inches, black (5YR 2/1) sand; moderate, medium, granular structure; weakly cemented; common fine and medium roots; strongly acid; clear, wavy boundary.

B22h—28 to 32 inches, dark reddish-brown (5YR 2/2) sand; common, medium, faint mottles of black (5YR 2/1); moderate, medium, granular structure; weakly cemented; few fine roots; strongly acid; clear, wavy boundary.

B3&B3h—32 to 35 inches, dark-brown (7.5YR 4/4) sand; common, medium, weakly cemented fragments of dark reddish brown (5YR 3/2); common, fine, distinct mottles of light gray (10YR 7/2); weak, fine, granular structure; friable; strongly acid; clear, wavy boundary.

A'2—35 to 38 inches, very pale brown (10YR 7/3) sand; common, medium, faint mottles of brown (10YR 5/3); few, fine, distinct mottles of strong brown (7.5YR 5/6); single grain; loose; strongly acid; clear, smooth boundary.

B'21tg—38 to 44 inches, very pale brown (10YR 7/3) sandy loam; few, fine, faint mottles of yellow; weak, fine, granular structure; friable; slightly sticky; few lenses of sandy clay loam; few fine roots; sand grains coated and bridged with clay; strongly acid; gradual, wavy boundary.

B'22tg—44 to 59 inches, light-gray (10YR 7/2) sandy loam; common, medium, distinct mottles of yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), and yellowish red (5YR 4/8) along old root channels; weak, fine, subangular blocky structure; firm, plastic; few fine roots; sand grains coated and bridged with clay; strongly acid; clear, smooth, boundary.

B'23tg—59 to 80 inches, light-gray (10YR 7/2) sandy clay loam; common, medium, distinct mottles along old root channels of yellowish brown (10YR 5/8); few fine, faint mottles of brownish yellow and dark yellowish brown; moderate, medium, granular structure; hard when dry, friable when moist, slightly plastic when wet; few fine roots; sand grains coated and bridged with clay; strongly acid.

The A1 horizon is gray to black and 4 to 8 inches thick. The A2 horizon is white to brown and 10 to 24 inches thick. In some places it is mottled with vertical streaks of darker grays and browns. A transitional layer ¼ to 1 inch thick is present in most areas between the A2 and B21h horizons. It is dark grayish-brown to black sand or fine sand and is single grain or weak, fine, granular and loose to friable. The Bh horizon is reddish brown or dark brown to black sand. Where the Bh horizon is reddish brown to black, it is 6 to 13 inches thick. Where it is dark brown to black, it is 12 to 24 inches thick. The B3&Bh horizon, if present, is reddish yellow or yellowish brown to dark brown and 3 to 4 inches thick. It is mottled with light gray, brown, or yellow, and has few to many dark reddish-brown weakly cemented fragments. The A'2 horizon is white to pale-brown sand or fine sand mottled with darker browns and grays. In some areas this horizon is absent. The B'tg horizon is light gray or very pale brown to brown and has few to many faint to distinct mottles of gray, yellow, brown, and red. This horizon is sandy loam to sandy clay loam. It is at a depth of 30 to 40 inches. The water table is within a depth of 10 inches for about 2 months each year and fluctuates between 10 and 40 inches the rest of the year, except during extended dry periods, when it drops below 40 inches.

Wauchula soils are associated with Astatula, Immokalee, Pelham, Myakka, Ona, and Pompano soils. They differ from Astatula soils in being more poorly drained and in having a B't horizon. They differ from Immokalee, Myakka, and Ona soils in having a B't horizon, and differ from Pelham soils in having a Bh horizon.

Wauchula sand (Wc).—This is a nearly level, poorly drained soil that has a loamy subsoil below a layer stained with organic matter. It has a black sand surface layer about 6 inches thick and a light brownish-gray sand subsurface layer about 16 inches thick. Below this is a layer of black sand, about 6 inches thick, that is weakly cemented with organic matter. The next layer is about 4 inches of weakly cemented dark reddish-brown sand. A layer of dark-brown sand that has weakly cemented fragments of dark reddish-brown sand is present between depths of 32 and 35 inches. Below this is a layer of very pale brown sand, about 3 inches thick, mottled with brown and strong brown. The next layer, to a depth of 44 inches, is very pale brown sandy loam. Below this, and extending to a depth of 80 inches, is mottled sandy clay loam. The water table is within a depth of 10 inches for about 2 months each year. It fluctuates between depths of 10 to 40 inches the rest of the year, except during extended dry periods, when it is below 40 inches.

Wauchula sand is rapidly permeable to a depth of about 22 inches and moderately permeable below this to a depth of 80 inches. Available water capacity is very low to a depth of 22 inches and medium below this to a depth of 80 inches. The organic matter content and natural fertility are low.

Included in mapping are small areas of soils that have weakly cemented layers stained with organic matter at a depth of more than 32 inches.

If intensively managed, this soil is suited to truck crops, flowers, and other shallow-rooted crops. Water control is needed to remove excess surface water after a rain and to supply subsurface irrigation during dry seasons. Soil improving cover crops should be rotated with harvested crops. Regular applications of fertilizer and lime are needed. This soil is poorly suited to citrus trees. If used for citrus, deep drainage is needed. Citrus crops should be fertilized, limed, and irrigated. Close-growing cover crops should be maintained between the trees. In many areas of this soil, citrus trees are subject to severe damage by cold in winter. Good pasture of tame grasses can be maintained if the soil is adequately fertilized and limed, and if grazing is controlled.

Much of the acreage is in native vegetation, typically, open pine forest and an understory of native grasses and shrubs. In some places the pine trees have been removed and the soil is covered with grassy vegetation. Many of these areas are used for range. The understory plants provide good forage for cattle and wildlife. The major decreaser and increaser forage plants are creeping bluestem, indiangrass, little blue maidencane, Florida plaspalum, pineland three-awn, species of panicum, deerstongue, swamp sunflower, grassleaf goldaster, milkpeas, tarflower, huckleberry, and runner oak. Frequent fires and overgrazing have left saw-palmetto, gallberry, and fetterbush dominant over extensive areas. These were minor plants in the original understory. Capability unit IVw-1; Acid Flatwoods range site; woodland group 3w2.

Use and Management of the Soils

Oranges, grapefruit, cabbage, celery, cucumbers, sweet corn, lettuce, carrots, watermelons, peppers, and pasture mixtures are the principal crops grown in the Lake County Area. General practices of good soil management for cultivated crops and pasture are suggested in the pages that follow. The capability grouping used by the Soil Conservation Service, in which the soils are grouped according to their suitability for crops, is explained, and the capability units in the survey area are defined.

Suggested use and management of each soil in the Area and its classification by capability unit can be found in the mapping unit description of the specified soil in the section "Descriptions of the Soils." Estimated yields of the principal crops grown under two levels of management are shown in table 3.

This part of the survey also contains information on range management and the suitability of the soils for woodland and general suggestions for improving wildlife habitat. It reports data from engineering tests and interpretations of soil properties that affect highway construction and other engineering structures. It also contains information on use of the soils for community development.

Cultivated Crops and Pasture

Most of the soils in the Lake County Area have important limitations that must be overcome before they are well suited to cultivated crops. Under proper management these limitations are recognized, and measures are taken to deal with them. Water control can be established on wet soils to provide the optimum moisture content in the soil at all times. Sloping soils can be protected from erosion by adequate erosion control practices. Soils that have inherently poor qualities can be improved, infertile soils can be fertilized and limed, and the drier soils can be irrigated.

About 42 percent of the acreage in the survey area is affected by a high water table. Crops are damaged by excess water during wet periods and, in some areas, by lack of water during dry periods. Management practices that remove excess water and supply water to the soil are needed to overcome these hazards. Good water control on wet soils can be provided by subsurface irrigation systems. Overhead sprinkler systems are also used.

Erosion is not a severe hazard in the Lake County Area. The soils are predominantly rapidly permeable and very gently sloping. There are, however, several thousand acres of sloping to moderately steep sandy soils where soil loss is severe unless erosion control is practiced. In these areas intensive use of close-growing vegetation, minimum tillage, and other erosion control measures are needed. Though most of these areas are deep sandy soils that show little permanent damage from erosion, loss of surface soil seriously affects crops. Erosion in citrus groves often exposes the tree roots and sometimes undermines the trees.

Almost half the soils in the Lake County Area are well drained to excessively drained sandy soils that have a low available water capacity and a low cation-exchange capacity. Intensive use of soil-improving crops is beneficial. A good cropping system provides a sod of perennial grass or an annual cover crop between periods of cultivation.

All the soils are highly leached of important nutrient elements. The response to fertilization varies. Irrigated truck crops, citrus crops, and other high-value crops generally respond well to large applications of fertilizer. Many plants on the dry, very sandy soils show only limited response to fertilizer. The amount and mineral composition of the fertilizer to be applied are best determined through soil tests.

Soil preparation, planting, and good management, often including water control measures, are needed for improved pasture. A good pasture can serve several purposes. Besides supplying food for livestock, it protects the soil against blowing or water erosion; it improves the quality of the soil by adding organic matter, thereby increasing healthy microorganism activity; and it improves tilth.

Current information on the kinds of crops, improved varieties of plants, and specific soil management practices can be obtained from local representatives of the Soil Conservation Service, the Florida Agricultural Experiment Stations, or the Extension Service.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils 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 landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and 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 engineering.

In the capability system, all kinds of soil are grouped at three levels, the capability class, subclass, and unit. These levels are described 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, defined as follows:

Class I soils have few limitations that restrict their use. (None in survey area.)

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

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

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

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

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

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

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (None in survey area.)

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.

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, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIIe-1 or IVs-1. 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 capability units in Lake County Area are as follows:

Unit IIw-1. Nearly level, poorly drained sandy soils that have a water table at a depth of less than 10 inches for 1 to 2 months during the year.

Unit IIIe-1. Gently sloping, well-drained sandy soils that have a loamy subsoil.

Unit IIIs-1. Nearly level to gently sloping, well drained to moderately well drained soils that are sandy to a depth of more than 20 inches.

Unit IIIw-1. Nearly level, poorly drained to very poorly drained sandy soils that have a water table at or within a depth of 10 inches for more than 2 months during the year.

Unit IIIw-2. Nearly level, very poorly drained organic soils.

Unit IIIw-3. Nearly level to gently sloping, somewhat poorly drained sandy soils.

Unit IVs-1. Nearly level to gently sloping, well-drained to excessively drained soils that are sandy to a depth of 86 inches or more.

Unit IVs-2. Sloping to strongly sloping, somewhat poorly drained sandy soils that have a loamy subsoil.

Unit IVs-3. Sloping to strongly sloping, well-drained soils that are sandy to a depth of 84 inches or more.

Unit IVs-4. Sloping, well drained sandy soils that have a loamy subsoil.

Unit IVw-1. Nearly level, poorly drained sandy soils that have weakly cemented layers, a loamy subsoil, or both.

Unit IVw-2. Nearly level, poorly drained soils that are sandy to a depth of 80 inches or more.

Unit Vw-1. Nearly level, poorly drained soils that have a clayey subsoil, are slowly or very slowly permeable, and are covered with water in wet seasons.

Unit Vw-2. Gently sloping to sloping, poorly drained and very poorly drained sandy soils on seepy slopes.

Unit VIs-1. Nearly level to gently sloping, excessively drained soils that are sandy to a depth of 86 inches or more.

Unit VIs-2. Sloping to strongly sloping, well-drained to excessively drained soils that are sandy to a depth of 86 inches or more.

Unit VIs-3. Nearly level, somewhat poorly drained sandy soils that have weakly cemented layers.

Unit VIs-4. Nearly level to gently sloping, moderately well drained soils that are sandy to a depth of 80 inches or more.

Unit VIIs-1. Nearly level to sloping, excessively drained soils that are sandy to a depth of 80 inches or more.

Unit VIIs-2. Moderately steep to very steep, excessively drained soils that are sandy to a depth of 86 inches or more.

Unit VIIw-1. Nearly level, poorly drained and very poorly drained soils that are covered with water or have a water table at the surface most of the year.

Unit VIIw-2. Nearly level, very poorly drained soils in swamps.

To find the capability classification of any given soil, refer to the "Guide to Mapping Units" or to the soil descriptions. Use and management of each soil are described in the mapping unit description.

Estimated yields

The estimated average acre yields that can be expected from the principal crops grown on the arable soils in the Lake County Area, under two levels of management, are shown in table 3. Yields in columns A are those obtained under prevailing or ordinary management, for example, insufficient lime and fertilizer, no definite cropping system, and inadequate erosion control, drainage, and irrigation. Improved varieties of crops are not planted, and certified seed are not always used.

Yields in columns B are those to be expected under an adequate level of management. Such management commonly includes proper amounts of fertilizer, lime, or manure; a well-planned cropping system and proper use of crop residue; water control measures that drain the soils of excess surface water and maintain adequate soil moisture by irrigation; improved plant varieties and certified seed; control of insects and plant diseases; control of runoff and erosion; and protection for crops against cold weather damage.

Improved pasture management includes seedbed preparation, application of lime and fertilizer, good plant varieties and plant mixtures, regulated grazing, and control of undesirable plants.

The yields in columns A and B are based largely on observations made by members of the soil survey party, records and experience of the district conservationist assigned to the Lake Soil and Water Conservation District, information obtained by interviews with farmers and other workers who have experience with the soils and crops of the area, bulletins and other information obtained from the Experiment Stations, comparisons with yield tables for other counties in central Florida that have similar soils and climatic conditions, and on records of crop yields from the Florida Crop Reporting Service.

Range and Woodland Grazing

Approximately 125,000 acres in the southwestern and northeastern parts of the survey area are used for grazing by domestic livestock and as wildlife habitat. These areas are predominantly woodland that is used as range. Since the earliest days of the cattle industry, native grasses have played an important role. Present day cow-calf operations still depend heavily on these forage resources. Range and woodland grazing is one of the largest single land uses directly coordinated with wildlife habitat management. Native grasses, legumes, and shrubs are an important supply of forage and feed for livestock and wildlife. New concepts of grassland management recognize the importance of native grasses in a coordinated program of improved pasture and animal husbandry practices.

The soils of the Lake County Area are grouped into seven range sites—Acid Flatwoods, Fresh Marsh (mineral), Fresh Marsh (organic), Sand Pond, Sand Scrub, Sandhills, and Swamp.

The information in the following paragraphs will help those who manage soils for range and woodland grazing.

Range sites and condition classes

Conservation management and use of native forages depend on an evaluation of the forage resource. This is an evaluation of the potential productive capacity in relation to present production of desirable vegetation. The productive capacity of different areas of rangeland (table 4) is largely determined by the soils and the climate and by the effect of shading in wooded sites.

The site expresses these differences in productive capacity. Simply defined, a site is a distinctive kind of rangeland that has specific kinds of soil that have capacity for producing a combination of native plants. Different sites are recognized if the combined effects of soil and climate result in significantly different kinds and quantity of vegetation.

Condition classes are expressions of the present amount of desirable vegetation in relation to the potential plant community on a given group of soil. The condition class provides an approximate measure of any change that has taken place in the native plant cover. Thus, condition class becomes a basis for measuring production or needs for conservation treatment. Four condition classes have been set up for this purpose: excellent, good, fair, and poor.

Excellent condition means that 76 to 100 percent by weight of the climax plant community is the same as described for the original on the site.

Good condition means that overuse has changed the potential plant community. At present only 51 to 75 percent, by weight, of the decreaser and increaser species remain on the site in the same proportion as in the climax plant community.

Fair condition means that only 26 to 50 percent, by weight, of the present plant community is made up of the decreaser and increaser species that occurred in the climax plant community.

Poor condition means that potential plant community has deteriorated to the extent that less than 25 percent of the plant community is made up of increaser and decreaser species that once made up the climax plant community.

To determine condition class more easily, the types of vegetation are grouped in accordance with their response to grazing by livestock. These vegetation types are decreaser, increaser, and invader plants.

Decreaser plants are the climax range plants most heavily grazed. Because they are the most palatable, they are the first to be destroyed by overgrazing. Creeping bluestem on the Flatwoods site and maidencane on Fresh Marsh sites are examples of decreasers.

Increaser plants are species in the climax vegetation that increase in relative amount as the more desirable plants are reduced by close grazing; increasers commonly are shorter than decreasers, and some are less palatable to livestock. Broomsedge bluestem is a common increaser.

Invader plants invade the site and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface. They may be annuals or perennials. Most weeds are invaders. Bottlebrush three-awn, carpetgrass, and annual watergrasses, for example, are invaders on the Flatwoods site. Gallberry and waxmyrtle are common woody invaders.

Grazing of the native forage that occurs as an understory in woodland is important. The productive capacity of the understory herbage depends not only on the combined effect of soils, climate, and changes in stand development, but also on the density of the crown canopy. Canopy classes are determined by the percent of ground shaded by overstory and are designated as 0 to 25 percent shade, open; 26 to 50 percent, sparse; 51 to 75 percent, medium; 76 to 100 percent, dense. Table 4 indicates the productive capacity of grazeable woodland as affected by the degree of canopy for the seven sites in the survey area.

Range management

Conservation treatment of rangeland and grazed woodland under livestock, wildlife, and recreational uses involves the planning and application of appropriate conservation practices. Following are conservation practices that apply to the range areas in the Lake County Area.

Proper grazing use is controlled grazing, or grazing at an intensity that will maintain adequate vegetative cover

TABLE 3.—*Estimated yields of important crops*

[Absence of a yield figure indicates that the soil

Soil name	Oranges		Grapefruit		Cabbage [1]		Celery	
	A	B	A	B	A	B	A	B
	Boxes	*Boxes*	*Boxes*	*Boxes*	*50-lb. Crates*	*50-lb. Crates*	*60-lb. Crates*	*60-lb. Crates*
Albany sand, 0 to 5 percent slopes	350	400	450	550				
Albany sand, 5 to 12 percent slopes	350	400	450	550				
Anclote fine sand					250	400	700	800
Apopka sand, 0 to 5 percent slopes	400	500	600	700				
Apopka sand, 5 to 12 percent slopes	400	500	600	700				
Astatula sand, 0 to 5 percent slopes	250	350	300	400				
Astatula sand, dark surface, 0 to 5 percent slopes	350	450	550	650				
Astatula sand, dark surface, 5 to 12 percent slopes	350	450	550	650				
Astatula sand, dark surface, 12 to 40 percent slopes	300	400	500	600				
Brighton soils					300	500	700	900
Cassia sand	150	250	250	350				
Emeralda fine sand								
Eureka loamy fine sand								
Felda fine sand	325	425	525	625	225	375	650	750
Fellowship fine sandy loam, ponded								
Iberia sandy clay								
Immokalee sand	175	300	325	425	200	300		
Lake sand, 0 to 5 percent slopes	400	500	600	700				
Lake sand, 5 to 12 percent slopes	400	500	600	700				
Lake sand, 12 to 22 percent slopes	300	400	500	700				
Lucy sand, 0 to 5 percent slopes	400	500	600	700				
Lucy sand, 5 to 8 percent slopes	400	500	600	700				
Manatee fine sand					300	500		
Montverde muck					300	500	700	900
Myakka sand	200	350	350	450	200	300		
Ocilla sand	350	450	500	600				
Ocoee peat					300	500	700	900
Oklawaha muck					300	500	700	900
Ona fine sand	250	350	350	450	225	325		
Orlando fine sand	350	450	500	650				
Paola sand, 0 to 5 percent slopes	200	300	300	400				
Paola sand, 5 to 12 percent slopes	150	200	250	300				
Pelham sand	225	375	375	472	200	300		
Placid sand					200	300		
Placid sand, slightly wet	250	350	350	450	225	325		
Pomello sand								
Pompano sand, acid	225	375	375	475	200	300		
St. Lucie sand								
Tavares sand	350	400	450	550				
Tavares sand, white subsurface variant	300	400	400	500				
Vaucluse sand	400	500	600	700				
Wabasso sand	200	350	350	450				
Wauchula sand	200	325	350	450	200	300		

[1] Yields for all truck crops were obtained from fields under established water control systems, or sprinkler irrigation, or both.

and pasture under two levels of management

is not suited to the crop or data are not available]

Cucumbers		Sweet corn		Lettuce		Carrots		Watermelons		Peppers		Permanent improved pasture	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bushels	*Bushels*	*5-doz. Crates*	*5-doz. Crates*	*35-lb. Crates*	*35-lb. Crates*	*Tons*	*Tons*	*Number*	*Number*	*Bushels*	*Bushels*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
								800	1,600			200	275
								800	1,600			200	275
140	250	80	125	200	300					250	350	200	275
								800	1,600			150	250
								800	1,600			150	250
												100	200
								800	1,600			125	220
								800	1,600			125	220
		95	140	250	350	5	8					300	400
												125	200
												290	375
												290	375
130	225	75	120							240	325	275	350
												275	350
												290	375
130	225	60	85	70	120					250	350	200	275
								800	1,600			200	275
								800	1,600			200	275
								800	1,600			250	325
								800	1,600			250	325
		80	125	200	300					250	350	290	375
		95	140	250	350	5	8					300	400
150	250	65	90	75	130					250	350	200	275
								800	1,600			200	275
		95	140	250	350	5	8					300	400
		95	140	250	350	5	8					300	400
150	250	70	100	75	130					250	350	200	275
								800	1,600			200	275
												75	175
												75	125
150	250	65	90	75	130					250	350	200	275
150	250	70	100	75	130					250	350	200	275
150	250	70	100	75	130					250	350	200	275
												125	250
150	250	65	95	75	130					250	350	200	275
												70	150
								800	1,600			200	275
												125	200
								800	1,600			275	350
												200	275
150	250	65	90	75	130					250	350	200	275

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

TABLE 4.—*Annual acre yields in air-dry weight of herbage and forage on grazeable woodland and rangeland in excellent condition*

[Fill land, loamy materials (Fm) is not rated for range]

Site and map symbols	Total herbage—		Estimated forage—	
	Dry years	Average years	Dry years	Average years
Acid Flatwoods: Eu, Is, Mk, MpC, On, Pd, Pg, Po, Wa, Wc.[1]	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Open canopy (0–25 percent shade)	3, 600	4, 800	3, 000	4, 000
Sparse canopy (25–50 percent shade)	1, 200	3, 000	1, 000	3, 000
Medium canopy (50–75 percent shade)	550	1, 100	500	1, 000
Dense canopy (75–100 percent shade)	0	550	0	500
Sandhills: AbB, AbD, ApB, ApD, AtB, AtD, AtF, LaB, LaD, LaE, LuB, LuC, Oc, Or, Ta, Va.[1]				
Open canopy (0–25 percent shade)	2, 000	3, 000	1, 500	2, 500
Sparse canopy (25–50 percent shade)	1, 000	1, 800	800	1, 300
Medium canopy (50–75 percent shade)	300	1, 000	200	700
Dense canopy (75–100 percent shade)	0	300	0	200
Fresh Marsh (mineral): Ac, Em, Fd, Fe, Ib, Ma	6, 600	8, 800	6, 000	8, 000
Fresh Marsh (organic): Br, Md, Oe, Oh	6, 600	8, 800	6, 000	8, 000
Swamp: Am, Im, Sw.				
Yields were not determined for this site.				
Sand Scrub: AsB, Ca, PaB, PaD, Pn, Sc, Te.				
Yields were not determined for this site.				
Sand Pond: Pe, PmA	2, 000	3, 000	1, 800	2, 700

[1] Needle fall not included in weight.

for soil protection and maintain or improve the quantity and quality of desirable vegetation. To achieve proper use, approximately 50 percent, by weight, of the key forage species should be removed by grazing during any particular season of use. This practice applies to all sites.

Deferred grazing periodically postpones or defers the grazing on rangeland or in grazeable woodland for a prescribed period during the year. Deferring the grazing promotes natural vegetation by increasing vigor of the forage stand and permitting desirable grasses to produce seed. It also provides a feed reserve for fall and winter grazing or emergency use. This practice applies to all sites and is especially needed following brush control measures.

Controlled burning refers to the practice of using fire to assist in managing vegetation. The area to be burned is predetermined, and the intensity and time of the fire are controlled. Controlled burning helps to control undesirable vegetation, improve wildlife habitat, and enhance forage plant management.

Current, detailed information on the planning and application of conservation practices can be obtained from the local soil conservationist of the Soil Conservation Service.

Woodland

The early growth of Lake County was closely related to the development of the wood products industry. Before the Civil War, turpentine was distilled from the sap of pine trees. In the early 1880's, this business became a sizable commercial enterprise. After the "big freeze" of 1894–95, this industry flourished and enabled some of the people to carry on until their citrus groves could be established again.

Many of the population centers in the Area can trace their beginning to lumber and turpentine camps. The first building in Tavares was the sawmill commissary, which stood on the site of the present packing house. The Oklawaha River was used to move timber products to northern markets, and the Doral Canal was first dredged to assist the movement of lumber barges from Tavares. Fruitland Park was developed initially by a lumber company. As late as 1928, the largest commercial operation in the county was a lumber company located at Groveland.

After the "big freeze" of 1894–95 an increasing number of citrus growers moved into the Lake County Area. Many acres of forest were cleared for use as citrus groves. The large timber and turpentine operations had come to an end by 1935. The better soils were converted to pasture and row crops and the warmer areas to citrus groves.

About 37 percent, or 220,000 acres, of the privately owned land in the Lake County Area is classified as woodland. About 5,000 acres of this land is in planted pines. Part of the Ocala National Forest is in Lake County, but it is outside this survey area.

The forests have an important part in the present and future of the Lake County Area. The demand for timber, recreation areas, and wildlife habitat is increasing as the population of Central Florida grows.

The soils of the Lake County Area differ greatly in their capacity to grow trees. The combinations of species, or forest types, that grow on a particular soil are determined principally by the physical qualities of the soil and the climate.

Among the most important factors that affect the productive capacity of the soil for growing trees is the ability of the soil to supply moisture and permit the development of an adequate root system. Other significant characteristics of the soil that affect the site are the thickness of the surface layer, the organic-matter content, the natural supply of plant nutrients, the texture and consistency of the soil material, the aeration, the depth of mottling, and the depth to the water table.

On the Coastal Plains, drainage is an important factor that affects the suitability of a site for trees. Drainage is classified as *excessive*, *good*, *poor*, and *very poor*, depending on the depth to the water table, the amount of organic matter in the soil, and the amount and depth of mottling that indicate the presence of soil moisture.

Potential soil productivity for trees is rated by determining the average site index of different soils. The site index is determined by measuring the height of representative trees, determining the age of these trees, and estimating from these measurements the height the trees will likely attain at the age of 50 years. Some sites are better suited to hardwoods; others are better suited to pines. These sites that are most suitable for pines produce better yields if competition from inferior hardwoods is controlled.

Woodland grouping

A woodland group is made up of kinds of soil 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 woodland groups to which the soils of the Lake County Area have been assigned are shown in table 5. Ratings are given for each group, according to productivity, limitations, and degree of hazard for woodland use. The ratings are based largely upon the experience and judgment of local soil scientists, foresters, and landowners. They represent the best information available at the present time about how soils influence the growth and management of trees.

Each woodland group designation has three symbols. The first element indicates potential productivity. It is an Arabic numeral ranging from 1 to 5; class 1, for example, is the highest in potential productivity.

The second element is a lowercase letter. It expresses selected soil properties that cause moderate to severe hazards or limitations in woodland use or management. The letters used for the Lake County Area are *w*. *c*. and *s*. The letter *w* denotes excessive wetness, *c* denotes a clayey soil, and *s* denotes a sandy soil.

Soils in subclass *w* are those in which excessive water, either seasonally or year round, causes significant limitations for woodland use or management. These soils have restricted drainage, a high water table, or an overflow hazard that adversely affects either stand development or management.

Soils in subclass *c* have restrictions or limitations for woodland use or management because of the kind or amount of clay in the upper part of the soil profile.

TABLE 5.—*Woodland groups*

Woodland group [1] and map symbols	Potential productivity—			Pine species suitable for planting	Degree of hazard or limitation		
	Pine species	Site index	Average annual growth to age 30		Seedling mortality	Erosion hazard	Equipment limitation
			Cords/acre				
2w2: Poorly drained sandy soils that have high potential productivity. On, Pg.	Slash Longleaf	90 80	1. 4–1. 8 1. 0–1. 4	Slash	Moderate	Slight	Moderate.
2w3: Very poorly drained and poorly drained sandy soils that have high potential productivity. Ac, Am, Ma, Pd, Pe, PmA.	Slash Longleaf	90 80	1. 4–1. 8 1. 0–1. 4	Slash	Severe	Slight	Severe.
2w3c: Poorly drained clayey subsoil soils that have high potential productivity. Em, Eu, Fe, Ib, Im.	Slash Longleaf	90 80	1. 4–1. 8 1. 0–1. 4	Slash	Moderate	Slight	Severe.
3w2: Poorly drained and somewhat poorly drained sandy soils that have moderately high potential productivity. AbB, AbD, Fd, Is, Mk, MpC, Po, Wa, Wc.	Slash Longleaf	80 70	1. 2–1. 6 0. 6–1. 0	Slash	Moderate	Slight	Moderate.
3s2: Moderately well drained to excessively drained sandy soils that have moderately high potential productivity. ApB, ApD, LaB, LaD, LaE, LuB, LuC, Oc, Or, Ta, Te, Va.	Slash Longleaf	80 70	1. 2–1. 6 0. 8–1. 2	Slash	Moderate	Slight	Moderate.
4s3: Somewhat poorly drained to excessively drained sandy soils that have moderate potential productivity. AtB, AtD, AtF, Ca, Pn.	Slash Longleaf Sand	70 60 60	1. 0–1. 4 0. 7–1. 1 1. 0–1. 4	Sand, slash	Severe	Slight	Moderate.
5s3: Excessively drained sandy soils that have low potential productivity. AsB, PaB, PaD, Sc.	Sand	55	0. 8–1. 2	Sand	Severe	Slight	Severe.

[1] See also "Guide to Mapping Units."

Soils in subclass *s*, sandy soils, have little or no textural B horizon and have moderate to severe restrictions or limitations for woodland use or management. They generally have a low available water capacity and normally are low in available plant nutrients.

The third element of the symbol indicates the degree of the hazard or limitation. The three management concerns considered are equipment limitation, plant competition, and seedling mortality.

The numeral 1 indicates little or no hazard or limitation. No soils in Lake County Area are in this category. The numeral 2 indicates soils that have one or more than one moderate hazard or limitation. The numeral 3 indicates soils that have one or more than one severe hazards or limitation.

Equipment limitation.—Ratings reflect limitations in the use of equipment for managing or harvesting the tree crop. A rating of *slight* indicates equipment use is seldom limited in kind or time of year. *Moderate* indicates a need for modified equipment or seasonal restrictions because of wetness or coarse texture. *Severe* indicates the need for specialized equipment.

Plant competition.—When woodland is disturbed by fire, cutting, grazing, or some other means, undesirable brush, trees, and plants may invade. The invading growth competes with the desirable trees and hinders their establishment and growth.

Competition is *slight* if unwanted plants present no special problem. It is *moderate* if the invaders delay but do not prevent the establishment of a normal fully stocked stand. It is *severe* if trees cannot regenerate naturally.

Seedling mortality.—Even when healthy seedlings are planted or occur naturally in adequate numbers, some will not survive if soil characteristics are unfavorable. A rating of *slight* indicates that mortality will be less than 25 percent of the seedlings during the first 2 years after establishment. *Moderate* indicates mortality of 25 to 50 percent. *Severe* indicates that mortality of more than 50 percent can generally be expected.

The following soils are not assigned to woodland groups: Brighton soils, Montverde muck, Ocoee peat, Oklawaha muck, Swamp, and Fill land, loamy materials. The Brighton soils, Montverde muck, Ocoee peat, and Oklawaha muck are very poorly drained soils that have a water table at or near the surface most of the time and are flooded for lengthy periods. These soils are not suited to pine trees, mainly because of excessive wetness. Swamp is very poorly drained and is commonly covered with water all year. It is not suited to pine trees because of flooding. Fill land, loamy materials, does not have an orderly sequence of layers and is highly variable within short distances. Consequently, it is not rated for pine tree production. Some areas of Fill land, loamy materials, however, have been planted to slash pine.

Wildlife

The wildlife population of the Lake County Area has decreased because a steadily increasing proportion of the land has been planted to citrus trees. Available habitat for wildlife has been correspondingly reduced.

The principal game species in the survey area are bobwhite quail, mourning doves, rabbits, gray squirrel, fox squirrel, turkey, whitetail deer, bear, wild hogs, and waterfowl. There are also gray fox and raccoons.

Wildlife is abundant in the northeastern and southwestern parts of the county where wooded areas, swamps, and large open areas furnish adequate habitat. Birds, squirrels, foxes, and raccoons inhabit the smaller, less densely wooded areas throughout the Area. Wildlife in limited numbers is also found throughout areas that are planted to citrus.

The optimum environment for wildlife is afforded by plants that provide food and cover. An adequate supply of water well dispersed within the range of the species is also essential. The food and cover suitable for one species, however, may not be satisfactory for another. Some species consume foods only from animal sources; others eat plants; and others eat combinations of vegetative and animal foods. Destruction by fire or overuse of the plants that provide food and cover can seriously reduce the population of native wildlife species. Replanting with woody plants and shrubs and using other practices that help to restore native plant cover improve wildlife habitat. Most of the soils in the survey area can support one or more species of wildlife.

Listed in the following paragraphs are some of the foods needed by a number of the important animals in the area.

Bear.—Bears require a large acreage on which to roam and feed. Acorns are the most important fall-winter food of the Florida bear. Other choice foods include the fruits of gallberry, cabbage palm, blackgum, and saw-palmetto. Bears also eat armadillo, carpenter ants, acorn weevils, and water bugs. Interspersed flatwoods, swamps, sand scrub, and hammock areas are suitable range areas for bears.

Quail.—Choice foods for quail are acorns, blackberries, partridge peas, wild black cherries, dewberries, beggarweed, flowering dogwood, lespedeza, pine seeds, sweetgum, corn, browntop millet, and tick clover. These birds also eat many insects. The correct interspersion of food and escape cover is necessary to maintain good quail populations.

Deer.—Choice foods for deer include acorns, smilax, saw-palmetto berries, red maple, mushrooms, sumac trumpetvine, and tender oak leaves. Other foods suitable for deer when choice foods are not available are blackberry, dewberry, carpetgrass, and waxmyrtle.

Dove (mourning).—Pine seeds, partridge peas, common ragweed, corn, browntop millet, and sweetgum seed are choice foods for doves. Other suitable food is bahiagrass seed and carpetgrass seed. Generally doves do not eat insects, green leaves, or fruits. They drink water daily and need water in the free state within a reasonable distance.

Waterfowl.—Choice food for ducks are acorns, browntop millet, corn, and smartweed seeds. Their food generally needs to be flooded.

Squirrel.—Food that squirrels seem to prefer includes acorns, blackgum seeds, gallberry fruit, pine seeds, sweetbay seed, black cherry, corn, flowering dogwood, magnolia, and cypress seeds. Other foods that squirrels will eat are sweetgum seed, blackberry fruit, dewberries, and briers.

Turkey.—Turkeys find their best habitat in large wooded areas interspersed with small openings in blocks of 2,000 acres or more. They need surface water for daily drinking. Choice foods are insects, acorns, bahiagrass seeds, blackberries, dewberries, flowering dogwood, gallberry, wild grapes, browntop millet, carpetgrass seed, corn, oats, peanuts, saw-palmetto berries, sweetbay seed, waxmyrtle, chufas, and pine seeds. Other foods that turkeys will eat are sumac seed, sweetgum seed, tick clover, blackgum fruit, black cherry fruit, cypress seed, greenbrier fruit, and magnolia fruit.

Wildlife production is associated with range and woodland grazing sites. Each site has its own kind of plant community. The site designation for each soil in the survey area is given in the "Guide to Mapping Units."

Acid Flatwoods.—These areas are greatly affected by grazing and forestry practices. Overgrazing and heavy cutting of pine for timber and pulpwood have caused a decrease in wildlife food and a heavy invasion by saw-palmetto in many areas. Controlling grazing, planting pine trees, and leaving strips between the pine blocks reduce rough vegetation and enhance wildlife habitat.

Habitat management has long been used to increase wildlife populations. Controlled burning and chopping of the flatwoods late in fall or early in winter suppress the perennial vegetation and favor growth of many annuals that are important as wildlife foods. Deer, quail, and turkey, as well as cattle, thrive on the succulent new growth. Small areas that are burned every 2 or 3 years offer the most ideal conditions for quail because of the increased "edge effect." Periodic burning also reduces the fire hazard.

Fresh Marsh (mineral).—These sites furnish much food for deer and turkey and both food and cover for waterfowl. Plants are maidencane, cutgrass, beaked panicums, sand cordgrass, and numerous perennial sedges and rushes.

Fresh Marsh (organic).—These sites furnish much the same food for deer and turkey as the Fresh Marsh (mineral) sites. They also furnish both food and cover for ducks and other aquatic birds. Plants are maidencane, cutgrasses, pickerelweed, duck potato, sedges, rushes, sawgrass, and willow primrose.

Sand Pond.—These depressions intermittently hold water several inches deep but produce some food for certain birds and animals. Turkey and quail feed on yellow-eye grass, watergrass, smartweed, and other seed producers. Deer feed on rushes, bonnets, watershield, St. Johns wart, and willow. These ponds also provide water for wildlife. Management of these areas for wildlife requires that a strip of native vegetation 50 to 100 feet wide surrounding these sites be left for cover.

Sand Scrub.—These areas provide some wildlife food and fairly good cover. The sites that are thickly covered with sand pine provide very good cover but few food plants. In areas where stands of sand pine are scattered, scrub oaks grow in abundance and provide most food for deer, quail, turkeys, and squirrels. Palmetto berries and pine seeds also are game food.

Sandhills.—These sites provide food and cover for most species of wildlife. Beggarweeds, blackberries, acorns, and pine seeds are considered choice food for quail, dove, squirrels, and turkeys. Browse production for deer can be maintained at high levels. Palmetto berries and some grasses also are food for deer. Controlled grazing and strip planting of pines reduce rough vegetation and improve wildlife habitat. Creating open areas of bahiagrass and other paspalums provides feeding areas for deer, turkey, and quail.

Swamp.—Swamp sites are important because they provide food and cover for wildlife, especially deer and turkeys. Some of the desirable food plants in the swamps and transitional areas are gallberry, greenbrier, blackberry, sumac, and waxmyrtle. Leaves and fruit of cypress, bay, gum, and maple trees in swamps are good wildlife foods.

Town and Country Planning [2]

The purpose of this section of the survey is to supply additional information about the interpretation of soils in the Lake County Area. This information assists planning commissions, boards, contractors, realtors, engineers, landowners, home builders, and others in understanding and interpreting soils for town and country planning.

This part of the survey contains information on the limitations of soils in the area for building construction, landscaping, sanitation, transportation, recreation, and other selected uses, and on interpretations of soils for engineering.

Table 6 shows the degree and kind of soil limitation, restriction, or hazard for selected uses of the soils.

A rating of *none to slight* means that soil properties are favorable for a particular use, limitations are so minor that they can be overcome easily and good performance and low maintenance can be expected. *Moderate* means that soil properties are moderately favorable for a particular use, and limitations can be overcome or modified by planning, design, or special maintenance. *Severe* means that the soil has one or more properties unfavorable for a particular use, limitations are difficult and costly to modify or overcome, and major soil reclamation, special design, or intense maintenance is needed. *Very severe* means that the soil has one or more properties so unfavorable for a particular use that overcoming the limitation is very difficult and costly. Necessary reclamation measures require that the soil material be removed, replaced, or completely modified.

The ratings shown in table 6 do not indicate suitability, because suitability involves more than soil properties. Most soils can be made suitable for many uses if their limitations or hazards are overcome. The ratings do show the degree or intensity of the problems requiring solution before the soils can be used for the purpose indicated. Soils that have severe limitations for a specified use can be made suitable for that use if it is feasible to apply the intensive treatment needed to overcome the limitations.

Some soil properties are significant to only one or two uses; others are significant to a number of uses. Flooding, for example, is significant to most uses, but natural fertility affects only those uses that involve growing plants. In rating the soils for each use shown in table 6, all of the soil characteristics considered pertinent to that use were rated. Only the most limiting soil characteristics, however, are shown. Other limiting characteristics are significant and must be considered, but their effect is not so great. This information does not eliminate the need for onsite inspection of the soil and site for a specific use. Additional soil tests are needed in some areas.

[2] BISHOP C. BEVILLE, agricultural engineer, Soil Conservation Service, helped prepare this section.

TABLE 6.—*Degree and kind*

[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 in for referring to other series that

Soil series and map symbols	Foundations for low buildings	Lawns and ornamental plants	Septic tank filter fields	Roads, airports, and paved parking areas
Albany: AbB, AbD	Moderate: high water table.	Moderate: very low available water capacity in surface and subsurface layers; low natural fertility.	Moderate: high water table.	Moderate: high water table.
*Anclote: Ac, Am. For Myakka part of Am, see Myakka series.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Apopka:				
ApB	Slight	Moderate: very low available water capacity; low natural fertility.	Slight	Slight
ApD	Moderate: slope	Moderate: very low available water capacity; low natural fertility.	Moderate: slope	Moderate: slope
Astatula:				
AsB, AtB	Slight	Moderate: very low available water capacity; low natural fertility.	Slight: possible contamination of ground water supplies.	Slight
AtD	Moderate: slope	Moderate: very low available water capacity; low natural fertility.	Moderate: slope; possible contamination of ground water supplies.	Moderate: slope
AtF	Severe: slope	Severe: slope; very low available water capacity; low natural fertility.	Severe: slope; possible contamination of ground water supplies.	Severe: slope
Brighton: Br	Very severe: high water table; high potential subsidence; flooding.	Very severe: high water table; flooding.	Very severe: high water table; flooding.	Very severe: high water table; very low traffic-supporting capacity; high potential subsidence.
Cassia: Ca	Severe: high water table.	Moderate: high water table: low natural fertility.	Severe: high water table.	Moderate: high water table; flooding.
Emeralda: Em	Severe: high water table; flooding; high shrink-swell potential.	Severe: high water table; flooding.	Severe: high water table; flooding; slow permeability.	Severe: high water table; flooding; high shrink-swell potential; low traffic-supporting capacity.
Eureka: Eu	Severe: high water table; flooding; high shrink-swell potential.	Severe: high water table; flooding.	Severe: high water table; flooding; very slow permeability.	Severe: water table; flooding; high shrink-swell potential; low traffic-supporting capacity.

of limitation for selected uses

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]

Campsites and picnic areas	Playgrounds	Golf courses	Paths and trails	Basements and below-ground fallout shelters	Cemeteries
Moderate: sandy texture.	Severe: sandy texture.	Moderate: very low available water capacity in surface and subsurface layers; low natural fertility.	Moderate: sandy texture.	Moderate: high water table.	Moderate: high water table.
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Moderate: sandy texture.	Severe: sandy texture.	Moderate: very low available water capacity; low natural fertility.	Moderate: sandy texture.	Slight	Moderate: very low available water capacity; low natural fertility.
Moderate: sandy texture.	Severe: sandy texture.	Moderate: very low available water capacity; low natural fertility.	Moderate: sandy texture.	Slight	Moderate: very low available water capacity; low natural fertility.
Severe: loose sand.	Severe: loose sand	Moderate: very low available water capacity; low natural fertility.	Severe: loose sand	Slight	Moderate: very low available water capacity; low natural fertility.
Severe: loose sand.	Severe: loose sand	Moderate: very low available water capacity; low natural fertility.	Severe: loose sand	Slight	Moderate: very low available water capacity; low natural fertility.
Severe: loose sand.	Severe: loose sand	Severe: slope; very low available water capacity; low natural fertility.	Severe: loose sand	Moderate: slopes	Severe: slope; very low available water capacity; low natural fertility.
Very severe: high water table; organic soil.	Very severe: high water table; organic soil.	Very severe: high water table; organic soil.	Very severe: high water table; organic soil.	Very severe: high water table.	Very severe: high water table.
Severe: high water table; loose sand.	Severe: sandy texture.	Moderate: high water table; low natural fertility.	Severe: high water table; loose sand.	Severe: high water table.	Severe: high water table.
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding; high shrink-swell potential.	Severe: high water table; flooding.
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding; high shrink-swell potential.	Severe: high water table; flooding.

TABLE 6.—*Degree and kind*

Soil series and map symbols	Foundations for low buildings	Lawns and ornamental plants	Septic tank filter fields	Roads, airports, and paved parking areas
Felda: Fd	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Fellowship: Fe	Severe: high water table; flooding; high shrink-swell potential.	Severe: high water table; flooding.	Severe: high water table; flooding; very slow permeability.	Severe: high water table; flooding; high shrink-swell potential; low traffic-supporting capacity.
Fill land, loamy, materials: Fm. No valid estimates can be made.				
*Iberia: Ib, Im. For Manatee part of Im, see Manatee series.	Severe: high water table; flooding; high shrink-swell potential.	Severe: high water table; flooding.	Severe: high water table; flooding; very slow permeability.	Severe: high water table; flooding; high shrink-swell potential; low traffic-supporting capacity.
Immokalee: Is	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Lake:				
LaB	Slight	Moderate: very low available water capacity; low natural fertility.	Slight	Slight
LaD	Moderate: slope	Moderate: very low available water capacity; low natural fertility.	Moderate: slope	Moderate: slope
LaE	Severe: slope	Moderate: very low available water capacity; low natural fertility; slope.	Severe: slope	Severe: slope
Lucy:				
LuB	Slight	Moderate: low available water capacity in surface and subsurface layers; low natural fertility.	Slight	Slight
LuC	Moderate: slope	Moderate: low available water capacity in surface and subsurface layers; low natural fertility.	Moderate: slope	Moderate: slope
Manatee: Ma	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Montverde: Md	Very severe: high water table; flooding; high potential subsidence.	Very severe: high water table; flooding.	Very severe: high water table; flooding.	Very severe: high water table; flooding; high potential subsidence; very low traffic-supporting capacity.

of limitation for selected uses—Continued

Campsites and picnic areas	Playgrounds	Golf courses	Paths and trails	Basements and below-ground fallout shelters	Cemeteries
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding; high shrink-swell potential.	Severe: high water table; flooding.
Severe: high water table; flooding; sandy clay texture.	Severe: high water table; flooding; sandy clay texture.	Severe: high water table; flooding.	Severe: high water table; flooding; sandy clay texture.	Severe: high water table; flooding; high shrink-swell potential.	Severe: high water table; flooding.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; flooding.	Severe: high water table; flooding.
Moderate: sandy texture.	Severe: sandy texture.	Moderate: very low available water capacity; low natural fertility.	Moderate: sandy texture.	Slight	Moderate: very low available water capacity; low natural fertility.
Moderate: sandy texture.	Severe: sandy texture.	Moderate: very low available water capacity; low natural fertility.	Moderate: sandy texture.	Moderate: slope	Moderate: very low available water capacity; low natural fertility.
Severe: slope; sandy texture.	Severe: slope; sandy texture.	Severe: slope	Severe: slope; sandy texture.	Severe: slope	Moderate: very low available water capacity; low natural fertility; slope.
Moderate: sandy texture.	Severe: sandy texture.	Moderate: low available water capacity in surface and subsurface layers; low natural fertility.	Moderate: sandy texture.	Slight	Moderate: low available water capacity in surface and subsurface layers; low natural fertility.
Moderate: sandy texture.	Severe: sandy texture.	Moderate: low available water capacity in surface and subsurface layers; low natural fertility.	Moderate: sandy texture.	Slight	Moderate: low available water capacity in surface and subsurface layers; low natural fertility.
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding.	Very severe: high water table; flooding.

TABLE 6.—*Degree and kind*

Soil series and map symbols	Foundations for low buildings	Lawns and ornamental plants	Septic tank filter fields	Roads, airports, and paved parking areas
*Myakka: Mk, MpC. For Placid part of MpC, see Placid series.	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.
Ocilla: Oc	Moderate: high water table.	Moderate: low available water capacity in surface and subsurface layers; low natural fertility.	Moderate: high water table.	Moderate: high water table.
Ocoee: Oe	Very severe: high water table; flooding; high potential subsidence.	Very severe: high water table; flooding.	Very severe: high water table; flooding.	Very severe: high water table; high potential subsidence; very low traffic-supporting capacity.
Oklawaha: Oh	Very severe: high water table; flooding; high potential subsidence.	Very severe: high water table; flooding.	Very severe: high water table; flooding.	Very severe: high water table; flooding; high potential subsidence; very low traffic-supporting capacity.
Ona: On	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe:. high water table
Orlando: Or	Slight	Slight	Slight	Slight
Paola:				
PaB	Slight	Moderate: very low available water capacity; very low natural fertility.	Slight	Slight
PaD	Moderate: slope	Moderate: very low available water capacity; very low natural fertility.	Moderate: slope	Moderate: slope
Pelham: Pd	Severe: high water table.	Moderate: high water table; very low available water capacity in surface and subsurface layers.	Severe: high water table.	Severe: high water table.
*Placid: Pe, Pg, PmA. For Myakka part of PmA, see Myakka series.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Pomello: Pn	Moderate: high water table.	Moderate: very low available water capacity in surface and subsurface layers; very low natural fertility.	Moderate: high water table.	Slight
Pompano: Po	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.

of limitation for selected uses—Continued

Campsites and picnic areas	Playgrounds	Golf courses	Paths and trails	Basements and below-ground fallout shelters	Cemeteries
Severe: high water table.	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: sandy texture.	Severe: sandy texture.	Moderate: low available water capacity in surface and subsurface layers; low natural fertility.	Moderate: sandy texture.	Moderate: high water table.	Moderate: high water table.
Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding.	Very severe: high water table; flooding.
Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding; organic soil.	Very severe: high water table; flooding.	Very severe: high water table; flooding.
Severe: high water table; sandy texture.	Severe: high water table; sandy texture.	Moderate: high water table.	Severe: high water water table; sandy texture.	Severe: high water table.	Severe: high water table.
Moderate: sandy texture.	Severe: sandy texture.	Slight	Moderate: sandy texture.	Slight	Slight.
Severe: loose sand.	Severe: loose sand	Moderate: very low available water capacity; very low natural fertility.	Severe: loose sand	Slight	Slight.
Severe: loose sand.	Severe: loose sand	Moderate: very low available water capacity; very low natural fertility.	Severe: loose sand	Slight	Moderate: very low available water capacity; very low natural fertility.
Severe: high water table; sand texture.	Severe: high water table; sandy texture.	Moderate: high water table; very low available water capacity in surface and subsurface layers.	Severe: high water table; sandy texture.	Severe: high water table.	Severe: high water table.
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Severe: loose sand.	Severe: loose sand	Moderate: very low available water capacity in surface and subsurface layers; very low natural fertility.	Severe: loose sand.	Moderate: high water table.	Moderate; high water table.
Severe: high water table.	Severe: high water table; sandy texture.	Moderate: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.

TABLE 6.—*Degree and kind*

Soil series and map symbols	Foundations for low buildings	Lawns and ornamental plants	Septic tank filter fields	Roads, airports, and paved parking areas
St. Lucie: Sc	Slight	Moderate: very low available water capacity; very low natural fertility.	Slight: possible contamination of ground water supplies.	Slight
Swamp: Sw	Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: flooding; high water table.
Tavares:				
Ta	Slight	Moderate: very low available water capacity; low natural fertility.	Slight: possible contamination of ground water supplies.	Slight
Te	Moderate: high water table.	Moderate: very low available water capacity; low natural fertility.	Slight: possible contamination of ground water supplies.	Moderate: high water table.
Vaucluse: Va	Slight	Slight	Severe: moderately slow permeability.	Moderate: moderate traffic-supporting capacity.
Wabasso: Wa	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.
Wauchula: Wc	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Moderate: high water table.

of limitation for selected uses—Continued

Campsites and picnic areas	Playgrounds	Golf courses	Paths and trails	Basements and below-ground fallout shelters	Cemeteries
Severe: loose sand.	Severe: loose sand	Moderate: very low available water capacity; very low natural fertility.	Severe: loose sand	Slight	Moderate: very low available water capacity; very low natural fertility.
Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: flooding; high water table.	Very severe: flooding; high water table.
Moderate: sandy texture.	Severe: sandy texture.	Moderate: very low available water capacity; low natural fertility.	Moderate: sandy texture.	Moderate: high water table.	Moderate: high water table.
Severe: loose sand.	Severe: loose sand	Moderate: very low available water capacity; low natural fertility.	Moderate: sandy texture.	Moderate: high water table.	Moderate: high water table.
Moderate: sandy texture.	Severe: sandy texture.	Slight	Moderate: sandy texture.	Slight	Slight.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: high water table.	Severe: high water table; sandy texture.	Moderate: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.

Among the important soil properties and features considered in rating the soils in table 6 are depth to water table, flood hazard, permeability, available water capacity, shrink-swell potential, reaction, and slope. With the exception of slope, these properties and features are described under the heading "Estimated Properties Significant in Engineering."

Slope is an important consideration in most land uses. It is directly related to the kind and level of management required to control erosion and maintain production on cultivated lands. On native range it influences the rate of grazing that can be permitted without damage.

For residential use, slope has both practical and aesthetic implications. Steeper areas require more excavation before laying the foundation and there are other problems, such as erosion control and access roads. Level areas are likely to have poor drainage. Gently sloping to moderately sloping sites are generally more desirable than a level or steep site. Septic tanks function best in nearly level areas, but they operate successfully on gentle slopes if other factors are favorable. Slopes of more than 10 percent are considered unsuitable as a septic tank drain field.

Grading is necessary to prepare an adequate roadbed on sloping soils. The amount of grading needed is proportional to the steepness of the slope. Airport runways, for example, must be almost level; extensive grading would be required on sloping land.

Uses of soils for recreational purposes are many and varied. In this survey, campsites, picnic areas, playgrounds, and golf courses are the uses considered.

The limitations of soils for recreational uses are based on soil characteristics. Other factors, such as the number of trees, lakes, and streams, that affect the desirability of the site were not considered.

The appraisal of a general soil area for campsites and picnic areas is only indirectly governed by slope. A general area that is predominantly steep or very steep may be an excellent place for a camp or picnic if there are small, nearly level areas big enough for tents and picnic tables. Without such small areas, the general site would be poorly suited to such use. More appropriately for this planning region, the lack of adequate slope could result in severe limitations for such use. Final appraisal of a general soil area should be based on study of the area's individual component soils.

Sports areas are best adapted to the more gentle slopes. For football fields and baseball diamonds, gently sloping areas require less grading and filling. Golf courses are normally more interesting on gently sloping to moderately sloping areas. The suitability for fairways is reduced on slopes over about 12 percent.

Some of the selected uses of soils shown in table 6 are defined in the following paragraphs.

Foundations for low buildings.—The first column in table 6 indicates the degree of limitation for soils on which building foundations are to be constructed. The buildings referred to include houses, churches, individual stores, filling stations, and motels. They also include light industrial plants, no more than two stories high, where no heavy machinery is to be installed. All of these structures require stable foundations. They must also be built on a site reasonably free from flooding.

Building foundations must be placed on soils strong enough to hold the weight of the building. The capacity of a soil to support a dead weight without settling is most important in designing and construction foundations for buildings. The suitability of soils for foundations differs with differences in texture, consistence, shrink-swell potential, depth to water table, degree of compaction, or an interaction of two or more of these properties. The depth to the water table is also important because it affects excavation and construction cost.

Lawns and ornamentals.—Landscaping is important to many nonfarm uses. Soils differ widely in their ability to grow the various kinds of plants used in landscaping.

Lawns and ornamental plants are vital to most landscaping efforts. The capacity of the soils to grow grass and ornamental trees and shrubs is especially important for homesites and for many suburban business establishments (fig. 6). It is also significant in highway beautification and most recreational uses. There is a wide range in the kinds of adapted plants available for landscaping. but local variations in the soils may limit the kinds that can be grown in a specific area. Properties of soils that most affect landscaping are available water capacity, depth to the water table (fig. 7), low fertility, effective rooting depth, and susceptibility to flooding.

Septic tank filter fields.—One of the most urgent needs is for information about the limitations of soils in relation to public sanitation. Low, wet soils provide a less healthful environment for man than well-drained soils on the ridges. Two of the most significant uses of soils related to sanitation are for septic tank filter fields and sanitary land fills.

Septic tank filter fields are a common means for disposing of sewage. They are used for homes in rural sections and in some subdivisions where rapidly expanding residential areas have outgrown existing sewer lines. To function properly, these systems must be installed on soils that have adequate absorptive capacity and are not affected by a shallow water table. Many soils that are poorly drained are highly permeable and absorb water rapidly when drained, but are severely limited for use as a septic tank filter field because they have a high water table. A septic tank filter field may function well on these soils during dry seasons, but fail when the water table rises during wet seasons. Septic tank filter fields function well if soil permeability is very rapid, but in some areas, pollution of the water supply is a hazard.

Soil properties that most affect the use of soils for septic tank filter fields are depth to water table, permeability, and flood hazard.

Roads, airports, and paved parking areas.—Problems in highway construction, especially in land shaping and roadbed preparation, are directly related to soils (fig. 8). Even air transportation requires runways constructed on a soil base. In table 6 the soils are rated according to their suitability as foundation material for pavement on roads, airports, and paved parking areas.

Highways and airports must be built on strong foundations and nearly level grades. The preparation of a strong foundation is greatly affected by the physical properties of the soils on which they are built. Soils differ greatly in their ability to support heavy mobile loads and in the properties that affect grading operations. Some soils require very little alteration prior to use as a foundation; others are totally unsuited and must be replaced by more suitable material. Preliminary estimates for design and

***Figure 6.*—Landscaped trailer park on Tavares sand.**

construction are based mainly on the kinds of soil and on slope. Properties of soils that affect their use for highways, paved streets, and airports are traffic-supporting capacity, depth to water table, flood hazard, potential subsidence, and shrink-swell potential.

Campsites.—Campsites are small areas suitable for camping equipment and the accompanying activities of outdoor living. Limitations to soil use for sewage disposal facilities and service buildings to be used in camp areas are described under previously listed columns. Picnic areas have similar requirements and should be suitable for leisure time outings during which a meal is eaten. The selection of picnic areas and campsites is generally limited or influenced by factors other than soil properties because campers and picnickers prefer sites that will also provide beautiful scenery, hunting, fishing, or swimming. Such sites should be accessible and provide, at least, minimum conveniences. Accessibility and desirability of campsites and picnic areas are greatly influenced by such soil properties as depth to water table, flood hazard, and soil texture.

Playgrounds.—The playgrounds considered include city parks, football and baseball fields, tracks, and other small areas where competitive sports are played outdoors. These areas should be nearly level and have a firm surface. They should also be free from flood hazard and excessive wetness. The suitability of the soil for supporting vegetation should also be considered. Depth to the water table, soil texture, and flood hazard are the soil properties that have the greatest effect on the use of soil for playgrounds.

Golf courses.—Golf courses can be established on sites where the soils vary widely if the site has a potentially good balance between fairways and rough areas or hazards. The ratings in table 6 are based on the limitations of the soils for fairways. A fairway requires moderately well drained soils, gentle slopes, and a good cover of grass. People should be able to move freely over the fairway on foot or in a golf cart or other light motor vehicle. The main qualities that limit the use of soils for golf course fairways are susceptibility to flooding, depth to the water table, available water capacity, natural fertility, soil texture, and slope.

Basements and below-ground fallout shelters.—Basements and below-ground fallout shelters should be located on well-drained sites. There should be no ground water within a depth of 6 feet throughout the year and no flood hazard. The principal soil properties affecting limitations of soils for below-ground fallout shelters and basements in the Lake County Area are depth to water table and flood hazard.

Cemeteries.—Cemeteries should be located on well-drained soils that can support lawn grasses and ornamental plants for landscaping. There should be no ground water within a depth of 6 feet throughout the year. On wetter soils, sites should be selected carefully to assure

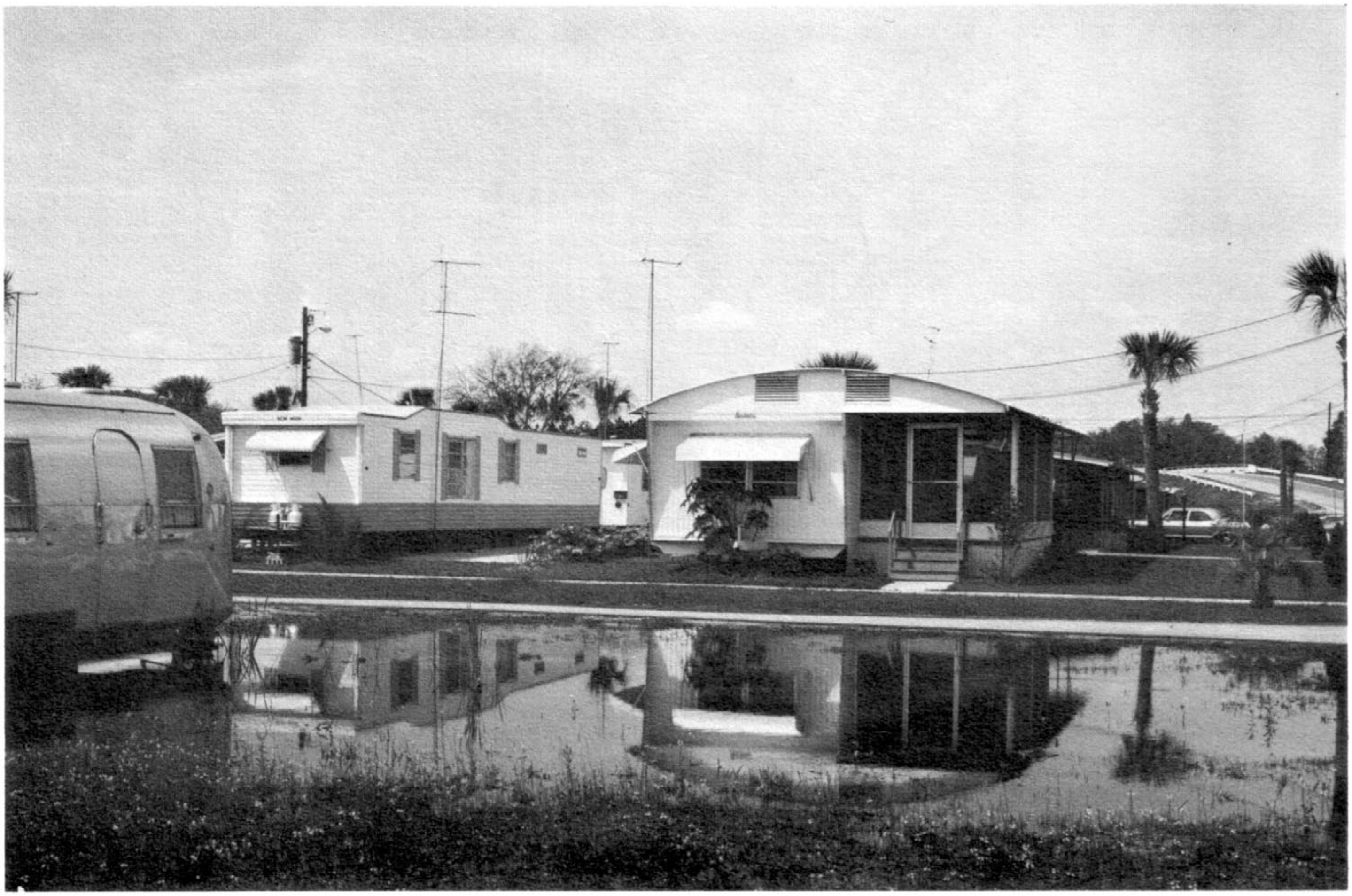

Figure 7.—**Trailer court on soil that has a high water table.**

that adequate artificial drainage can be provided. The soil properties most limiting to the use of soils for cemeteries are depth to water table, flood hazard, available water capacity, and natural fertility.

Soil surveys can be interpreted for many other nonfarm uses, but most are of limited significance at this particular time. Additional interpretations can be made as the need arises by determining from the soil descriptions the significant soil properties and correlating them with the intended use.

Use of the Soils in Engineering

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. Among the properties most important to engineers are permeability, strength, consolidation characteristics, texture, plasticity, and soil reaction.

Information concerning these and related soil properties is given in tables 7, 8, and 9. The estimates and interpretations in these tables can be used to—

1. Make studies that will aid in selecting and developing industrial, commercial, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in planning drainage systems, farm ponds, irrigation systems, terraces, waterways, and diversion terraces.
3. Make preliminary evaluations of soil conditions that will aid in selecting sites for highways, airports, pipelines, and cables and in planning detailed investigations at selected locations.
4. Locate probable sources of gravel, sand, and other construction material.
5. Correlate performance of soil mapping units to develop information that will be useful in planning engineering practices and in designing and maintaining engineering structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement other publications, such as maps, reports, and aerial photographs that are used in preparation of engineering reports for a specific area.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

Figure 8.—**Deteriorating road built on Eureka loamy fine sand. This soil has a high shrink-swell potential.**

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or excavations deeper than the depths reported (ordinarily about 7 feet). Even in these situations, however, the soil map is useful in planning more detailed field investigations and in indicating the kinds of problems that may be expected.

Some of the terms used by soil scientists have special meanings in soil science that may not be familiar to engineers. These terms are defined in the Glossary.

Engineering classification systems

The two systems most commonly used in classifying soils for engineering are the systems approved by the American Association of State Highway Officials (AASHO) and the Unified system.

The AASHO system (*1*) is used to classify soils according to those properties that affect use in highway construction. In this system all soil material is classified in seven principal groups. The groups range from A–1, which consists of soils that have the highest bearing strength and are the best soils for subgrade, to A–7, which consists of soils that have the lowest strength when wet. Within each group, the relative engineering value of the soil material is indicated by a group index number. The numbers range from 0, for the best material, to 20, for the poorest. The group index number is shown in parentheses following the soil group system (see table 7).

In the Unified system (*8*) soils are classified according to their texture and plasticity and their performance as engineering construction material. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC, six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. GP and GW are clean gravels, and GM and GC are gravels that include, respectively, an appreciable amount of nonplastic and plastic fines. SP and SW are clean sands. SM and SC are sands that include fines of silt and clay. ML and CL are silts and clays that have a low liquid limit, and MH and CH are silts and clays that have a high liquid limit. Soils on the borderline between two classes are designated by symbols for both classes; for example, SP–SM.

Soil scientists use the USDA textural classification (*6*). In this, the texture of the soil is determined according to the proportion of soil particles smaller than 2 millimeters in diameter, that is, the proportion of sand, silt, and clay.

TABLE 7.—*Engineering*

[Tests performed by the Florida Department of Transportation, Bureau of Materials and Research,

Soil name and location	Parent material	Sample No. S67 FLA-35-	Depth	Moisture density [1]	
				Maximum dry density	Optimum moisture
			In.	*Lb./cu. ft.*	*Pct.*
Apopka sand: Approximately 2½ miles south of Astatula and 1 mile west of intersection of Florida State Highway Nos. 455 and 561. (Modal profile.)	Loamy marine sediment.	3-2	6-50	104	14
		3-4	64-144	118	12
Eureka loamy fine sand: About 2 miles north of midtown Eustis and approximately ⅛ mile east of Florida State Highway No. 19 on Pine Meadows Country Club Road. (Modal profile.)	Acid clayey marine sediment.	1-1	0-5	105	14
		1-3	8-14	86	24
		1-4	14-51	96	23
		1-6	62-90	93	24
Lake sand: Approximately 2½ miles south of Astatula and ½ mile west of intersection of Florida State Highway Nos. 455 and 561. (Modal profile.)	Marine sands	4-4	33-98	106	14
Lucy sand: Approximately 1 mile north of Fruitland Park and about 600 feet east of U.S. Highway No. 441. (Profile of the B2t horizon is reddish yellow.)	Unconsolidated marine sediment.	8-4	35-80	121	11
Vaucluse sand: Approximately ¼ mile north of intersection of U.S. Highway No. 27 and Citrus Experiment Station Road. (Modal profile.)	Stratified loamy sediment.	2-2	5-13	110	12
		2-5	20-37	116	13
		2-6	37-70	106	17

[1] Based on AASHO Designation: T 99-57, Method A (*1*).
[2] Mechanical analysis according to AASHO Designation: T 88-57 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including

test data

in accordance with standard procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis [2]							Liquid limit	Plasticity index	Classification	
Percentage less than 3 inches in diameter passing sieve—			Percentage smaller than—							
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.			AASHO	Unified
100	87	4	4	3	2	1	NP[3]	NP	A-3(0)	SP
100	64	21	21	20	18	18	30	13	A-2-6(0)	SC
100	91	24	18	14	8	4	NP	NP	A-2-4(0)	SM
100	95	66	63	58	55	52	68	37	A-7-5(17)	CH
100	92	57	55	54	49	48	84	56	A-7-6(15)	CH
100	95	68	66	61	56	53	75	50	A-7-6(18)	CH
100	86	6	6	6	5	5	NP	NP	A-3(0)	SP-SM
100	69	25	24	23	21	20	25	14	A-2-6(0)	SC
100	75	8	7	6	2	2	NP	NP	A-3(0)	SP-SM
100	86	26	26	25	23	23	26	11	A-2-6(0)	SC
100	91	40	40	39	37	36	49	27	A-7-6(5)	SC

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

[3] Nonplastic.

TABLE 8.—*Estimated soil properties*

[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

Soil series and map symbols	Depth to seasonally high water table [1]	Flood hazard [2]	Depth from surface	Classification		
				USDA	Unified	AASHO
	In.		*In.*			
Albany: AbB, AbD	15–40	None	0–52	Sand	SP, SP–SM	A–3, A–2–4.
			52–85	Sandy clay loam	SC	A–2–6.
*Anclote: Ac, Am. For Myakka part of Am, see Myakka series.	0–10	Every year for more than 6 months.	0–46	Fine sand	SP–SM	A–3, A–2–4.
			46–82	Loamy fine sand	SM, SM–SC	A–2–4, A–4.
Apopka: ApB, ApD	>84	None	0–55	Sand	SP, SP–SM	A–3, A–2–4.
			55–84	Sandy clay loam	SC, SM	A–2–6, A–2–4, A–4
Astatula: AsB, AtB, AtD, AtF	>120	None	0–86	Sand	SP, SP–SM	A–3.
Brighton: Br	0	Flooded most of year.	0–63	Peat	Pt	Organic.
			63–75	Coarse sand	SP, SP–SM	A–3, A–2–4.
Cassia: Ca	10–40	None	0–25	Sand	SP, SP–SM	A–3.
			25–37	Sand	SM, SP–SM	A–2–4, A–3.
			37–80	Sand	SP, SP–SM	A–3.
Emeralda: Em	0	Every year for more than 6 months.	0–11	Fine sand	SP–SM, SM	A–2, A–3.
			11–66	Sandy clay	CH, SC	A–6, A–7.
Eureka: Eu	0–10	Every year for 1 to 2 months.	0–8	Loamy fine sand	SM	A–2–4.
			8–90	Heavy sandy clay and clay.	CH	A–7.
Felda: Fd	0–10	Every year for more than 6 months.	0–25	Fine sand	SP	A–3.
			25–38	Fine sandy loam	SM–SC, SC	A–2–4, A–2–6.
			38–56	Sandy clay loam	SC	A–4, A–6.
			56–60	Clay	CH	A–7.
Fellowship: Fe	0	Every year for more than 6 months.	0–6	Fine sandy loam	SM–SC, SM	A–4, A–2–4.
			6–62	Sandy clay loam to clay.	CH	A–7–6.
Fill land, loamy materials: Fm. No valid estimates can be made.						
*Iberia: Ib, Im. For Manatee part of Im, see Manatee series.	0	Every year for more than 6 months.	0–54	Sandy clay	CH	A–7–6.
			54–60	Marl and sandy clay.	CH, SC	A–7–6, A–6.
Immokalee: Is	0–10	Every year for a few days.	0–38	Sand	SP, SP–SM	A–3.
			38–56	Sand	SP–SM, SM	A–2–4, A–3.
			56–68	Sand	SP, SP–SM	A–3.
Lake: LaB, LaD, LaE	>120	None	0–98	Sand	SP, SP–SM	A–3, A–2–4.
Lucy: LuB, LuC	>120	None	0–32	Sand	SP, SP–SM	A–3, A–2–4.
			32–75	Sandy clay loam	SC	A–2–6, A–7.
Manatee: Ma	0	Every year for more than 6 months.	0–10	Fine sand	SP, SP–SM	A–3, A–2–4.
			10–60	Loamy fine sand to fine sandy loam.	SM, SM–SC	A–2–4, A–4.
Montverde: Md	0	Fvery year for more than 6 months.	0–11	Muck	Pt	Organic.
			11–80	Peat	Pt	Organic.

significant in engineering

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions this table. Symbol > means greater than, < means less than]

Percentage less than 3 inches passing sieve [3]—				Permeability	Available water capacity	Reaction	Shrink-swell potential [4]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
				In./hr.	*In./in. of soil*	*pH*	
100	95–100	90–100	3–12	6.0–20.0	<0.05	4.5–5.5	Low.
100	95–100	85–99	15–35	0.63–2.0	0.10–0.15	4.5–5.5	Low to moderate.
100	100	70–100	5–12	6.3–20.0	0.10–0.15	6.1–8.4	Low.
100	100	70–100	25–40	6.3–20.0	0.10–0.15	6.1–8.4	Low.
100	100	80–95	3–12	6.3–20.0	<0.05	4.5–6.0	Low.
95–100	90–100	60–90	20–40	0.63–6.3	0.13–0.17	4.5–6.0	Low to moderate.
100	100	90–99	2–7	>20.0	0.02–0.05	4.5–6.0	Low.
----------	----------	----------	----------	6.3–20.0	0.45–0.50	<4.5–5.0	High.
100	90–95	25–50	2–12	6.3–20.0	<0.05	<4.5–5.0	Low.
100	100	95–100	1–7	>20.0	0.02–0.05	4.5–6.0	Low.
100	100	70–100	5–20	2.0–6.3	0.10–0.15	4.5–6.0	Low.
100	100	95–100	2–10	6.3–20.0	0.02–0.05	4.5–6.0	Low.
100	100	90–99	10–25	6.3–20.0	0.10–0.15	5.1–6.5	Low.
100	100	90–99	45–80	0.06–0.20	0.15–0.20	6.1–8.4	High.
100	100	90–99	13–25	6.3–20.0	0.05–0.10	4.5–5.5	Low.
100	100	90–99	51–80	<0.06	0.15–0.20	4.5–5.5	High.
100	100	90–99	2–5	6.3–20.0	0.02–0.05	5.1–6.5	Low.
100	100	90–99	23–35	0.63–2.0	0.10–0.15	6.6–7.8	Moderate.
100	95–100	85–99	36–50	2.0–6.3	0.10–0.15	6.6–7.8	Moderate.
90–100	85–90	70–90	51–80	0.06–0.20	0.10–0.15	7.4–8.4	High.
100	100	90–100	25–40	0.63–2.0	0.15–0.20	4.5–5.5	Low.
100	95–100	90–100	51–80	<0.06	0.10–0.15	4.5–8.4	High.
100	100	90–100	51–80	<0.06	0.10–0.15	5.6–8.4	High.
100	100	80–100	36–70	<0.06	0.10–0.15	7.4–8.4	High.
100	100	80–100	2–10	6.3–20.0	0.02–0.05	4.5–5.5	Low.
100	100	80–100	5–20	0.63–2.0	0.10–0.15	4.5–5.5	Low.
100	100	80–100	2–10	6.3–20.0	0.02–0.05	4.5–5.5	Low.
100	100	85–99	3–12	>20.0	0.03–0.05	4.5–5.5	Low.
100	100	85–99	3–12	6.3–20.0	0.05–0.10	4.5–6.0	Low.
100	100	65–100	20–45	0.63–2.0	0.10–0.15	4.5–6.0	Low.
100	100	90–100	3–12	2.0–6.3	0.10–0.15	6.1–7.3	Low.
100	100	90–100	25–40	0.63–2.0	0.15–0.20	6.1–7.8	Moderate.
----------	----------	----------	----------	2.0–6.3	0.20–0.25	5.6–8.4	High.
----------	----------	----------	----------	6.3–20.0	0.45–0.50	5.6–8.4	High.

TABLE 8.—*Estimated soil properties*

Soil series and map symbols	Depth to seasonally high water table [1]	Flood hazard [2]	Depth from surface	Classification		
				USDA	Unified	AASHO
	In.		*In.*			
*Myakka: Mk, MpC	0–10	Every year for a few days.	0–20	Sand	SP, SP–SM	A–3
For Placid part of MpC, see Placid series.			20–56	Sand	SP–SM, SM	A–2–4, A–3
			56–85	Sand	SP, SP–SM	A–3
Ocilla: Oc	40–60	None	0–33	Sand	SP, SP–SM	A–3, A–2–4
			33–82	Sandy clay loam to sandy loam.	SC	A–2–6, A–6
Ocoee: Oe	0	Every year for more than 6 months.	0–38	Peat	Pt	Organic
			38–75	Sand	SP, SP–SM	A–2–4, A–3
Oklawaha: Oh	0	Every year for about 12 months.	0–9	Muck	Pt	Organic
			9–25	Peat	Pt	Organic
			25–31	Sandy loam	SM–SC	A–2–4, A–4
			31–54	Sandy clay to clay	CH	A–7–6
Ona: On	0–10	Every year for a few days.	0–6	Fine sand	SP, SP–SM	A–3, A–2–4
			6–18	Fine sand	SP–SM	A–2–4, A–3
			18–82	Fine sand	SP–SM	A–3, A–2–4
Orlando: Or	>80	None	0–30	Fine sand	SP–SM	A–2–4, A–3
			30–80	Fine sand	SP–SM	A–2, A–3
Paola: PaB, PaD	>80	None	0–90	Sand	SP	A–3
Pelham: Pd	0–10	Every year for a few days.	0–32	Sand	SP, SP–SM	A–3, A–2–4
			32–80	Sandy clay loam	SC	A–2–4
*Placid:						
PmA, Pe	0	Every year for about 12 months.	0–80	Sand	SP, SP–SM	A–2–4, A–3
For Myakka part of PmA, see Myakka series.						
Pg	0–10	Every year for a few days.	0–19	Sand	SP–SM, SP	A–2–4, A–3
			19–80	Sand	SP, SP–SM	A–2–4, A–3
Pomello: Pn	30–40	None	0–39	Sand	SP, SP–SM	A–3
			39–55	Sand	SM, SP–SM	A–2–4, A–3
			55–80	Sand	SP, SP–SM	A–3
Pompano: Po	0–10	Every year for a few days.	0–80	Sand	SP, SP–SM	A–3, A–2–4
St. Lucie: Sc	>80	None	0–80	Sand	SP	A–3
Swamp: Sw						
No valid estimates can be made.						
Tavares: Ta, Te	40–60	None	0–99	Sand	SP, SP–SM	A–3
Vaucluse: Va	>60	None	0–15	Sand	SP, SP–SM	A–3, A–2–4
			15–70	Sandy clay loam	SC	A–2–6, A–6, A–7

See footnotes at end of table.

significant in engineering—Continued

Percentage less than 3 inches passing sieve [3]—				Permeability	Available water capacity	Reaction	Shrink-swell potential [4]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
				In./hr.	*In./in. of soil*	*pH*	
100	100	80–100	2–10	6.3–20.0	0.02–0.05	4.5–6.5	Low.
100	100	80–100	5–20	0.63–2.0	0.10–0.15	4.5–6.5	Low.
100	100	80–100	2–10	0.63–20.0	0.02–0.05	4.5–6.5	Low.
100	95–100	95–100	3–12	6.3–20.0	0.02–0.05	4.5–6.5	Low.
100	95–100	95–100	25–40	0.63–2.0	0.10–0.15	4.5–5.5	Moderate.
				6.3–20.0	0.20–0.30	4.0–5.5	High.
100	90–100	90–100	3–12	>20.0	0.02–0.05	4.0–5.5	Low.
				2.0–6.3	0.20–0.30	5.6–8.4	High.
				6.3–20.0	0.25–0.40	5.6–8.4	High.
			25–40	6.3–20.0	0.10–0.15	5.6–8.4	Low to moderate.
			51–80	<0.06	0.15–0.18	5.6–8.4	High.
100	100	90–100	3–12	6.3–20.0	0.10–0.15	4.0–5.5	Low.
100	100	90–100	5–12	2.0–6.3	0.10–0.15	4.0–5.5	Low.
100	100	90–100	5–12	6.3–20.0	0.02–0.05	4.0–5.5	Low.
100	100	90–100	5–12	6.3–20.0	0.10–0.15	4.5–6.5	Low.
100	95–100	90–100	5–12	6.3–20.0	0.02–0.05	4.5–5.5	Low.
100	100	90–100	1–4	>20.0	0.02–0.05	4.5–5.5	Low.
100	100	90–100	2–12	6.3–20.0	0.02–0.05	4.5–6.5	Low.
100	100	90–100	15–35	0.63–20.0	0.10–0.15	4.5–5.5	Moderate.
100	100	90–100	3–12	6.3–20.0	0.10–0.15	4.0–5.5	Low.
100	100	90–100	3–12	6.3–20.0	0.10–0.15	4.0–5.5	Low.
100	100	90–100	3–12	6.3–20.0	0.05–0.10	4.0–5.5	Low.
100	100	75–100	1–8	>20.0	0.02–0.05	4.5–5.5	Low.
100	100	85–100	5–20	2.0–6.3	0.10–0.15	4.5–5.5	Low.
100	100	75–100	4–10	>20.0	0.02–0.05	4.5–5.5	Low.
100	100	80–95	4–12	6.3–20.0	0.02–0.05	4.5–5.5	Low.
100	100	95–99	1–4	>20.0	0.02–0.05	4.5–5.5	Low.
100	100	95–100	2–7	>20.0	0.02–0.05	4.5–5.5	Low.
100	100	70–100	3–12	6.3–20.0	0.05–0.10	4.5–6.5	Low.
100	100	85–100	20–40	0.20–0.63	0.10–0.15	4.5–6.5	Low to moderate.

See footnotes at end of table.

TABLE 8.—*Estimated soil properties*

Soil series and map symbols	Depth to seasonally high water table [1]	Flood hazard [2]	Depth from surface	Classification		
				USDA	Unified	AASHO
	In.		*In.*			
Wabasso: Wa	0–10	Every year for a few days.	0–18	Sand	SP, SP–SM	A–3
			18–28	Sand	SP–SM, SM	A–2–4, A–3
			28–68	Sandy clay loam	SC	A–4, A–6, A–2–4, A–2–6
Wauchula: Wc	0–10	Every year for a few days.	0–22	Sand	SP, SP–SM	A–3, A–2–4
			22–38	Sand	SP–SM	A–2–4, A–3
			38–80	Sandy loam to sandy clay loam.	SC	A–2–6, A–6

[1] Level expected at some period during the normal wet season.
[2] Water standing or flowing above the surface of the soil under natural conditions without artificial drainage.

TABLE 9.—*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 in for referring to other series that

Soil series and map symbols	Suitability as source for—		Soil features adversely affecting—
	Topsoil	Road fill	Sanitary land fill [1]
Albany: AbB, AbD	Poor: sand texture	Good: high water table	High water table
*Anclote: Ac, Am. For Myakka part of Am, refer to Myakka series.	Poor: sand texture	Poor: high water table	High water table
Apopka: ApB, ApD	Poor: sand texture	Good	None
Astatula: AsB, AtB	Poor: sand texture	Good	None
AtD	Poor: sand texture	Good	None
AtF	Poor: sand texture	Good	None
Brighton: Br	Poor: high water table	Very poor: traffic-supporting capacity; high water table.	High water table; flooding

See footnotes at end of table.

significant in engineering—Continued

Percentage less than 3 inches passing sieve [3]—				Permeability	Available water capacity	Reaction	Shrink-swell potential [4]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
				In./hr.	*In./in. of soil*	*pH*	
100	100	95–100	2–10	6. 3–20. 0	0. 02–0. 05	4. 5–5. 5	Low.
100	100	95–100	5–20	0. 63–2. 0	0. 10–0 15	5. 1–7. 3	Moderate.
100	100	95–100	20–40	0. 63–2. 0	0. 10–0. 15	5. 6–8. 4	Moderate.
100	100	90–100	2–12	6. 3–20. 0	0. 02–0. 05	4. 5–5. 5	Low.
100	100	90–100	5–12	0. 63–2. 0	0. 10–0. 15	4. 5–5. 5	Low.
100	95–100	85–100	20–40	0. 63–2. 0	0. 10–0. 15	4. 5–5. 5	Moderate.

[3] The estimated percentage coarse fraction greater than 3 inches is 0 in all soils but Felda fine sand. This soil has an estimated 5 percent coarse fraction greater than 3 inches at depths of 38 to 56 inches.
[4] The mucks and peats have a high potential subsidence rate.

interpretations

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 adversely affecting—Continued				
Excavated ponds	Drainage	Sprinkler irrigation	Subsurface irrigation	Ditches and canals
Rapid permeability; seasonal low water table; loose sands; unstable side slopes.	Loose erodible sands	Very low available water capacity in surface and subsurface layers.	Rapid permeability; depth to water table.	Loose erodible sands; unstable side slopes.
Loose sands; unstable side slopes.	Loose sand; some areas have no outlets.	Flooding	Flooding	Loose erodible sands; unstable side slopes.
Depth to water table	Well drained	Very low available water capacity.	Rapid permeability in upper layers; depth to water table.	Loose erodible sands; unstable side slopes.
Very rapid permeability; depth to water table.	Excessively drained	Very low available water capacity.	Very rapid permeability; depth to water table.	Loose erodible sands; unstable side slopes.
Very rapid permeability; depth to water table.	Excessively drained	Very low available water capacity; slope.	Very rapid permeability; depth to water table; slope.	Slope; loose erodible sands; unstable side slopes.
Very rapid permeability; depth to water table.	Excessively drained	Very low available water capacity.	Very rapid permeability; depth to water table.	Slope; loose erodible sands; unstable side slopes.
Flooding	Inadequate outlets; rapid oxidation.	High water table; flooding.	Flooding	High organic-matter content.

TABLE 9.—*Engineering*

Soil series and map symbols	Suitability as source for—		Soil features adversely affecting—
	Topsoil	Road fill	Sanitary land fill [1]
Cassia: Ca	Poor: sand texture	Good: high water table	High water table.
Emeralda: Em	Poor: high water table	Poor: high shrink-swell potential; high water table.	Clayey subsoil; high water table; flooding.
Eureka: Eu	Poor: high water table; clayey texture.	Poor: high shrink-swell potential; high water table.	Clayey subsoil; high water table; flooding.
Felda: Fd	Poor: sand texture; high water table.	Fair to good: high water table a hazard in places.	High water table; flooding
Fellowship: Fe	Poor: high water table	Poor: high shrink-swell potential; high water table.	High water table; flooding
Fill land: Fm. No valid estimates can be made.			
*Iberia: Ib, Im. For Manatee part of Im, see Manatee series.	Poor: high water table	Poor: high shrink-swell potential; high water table.	High water table; flooding
Immokalee: Is	Poor: sand texture; high water table.	Good: high water table a hazard in places.	High water table
Lake: LaB, LaD	Poor: sand texture	Good	None
LaE	Poor: sand texture	Good	None
Lucy: LuB, LuC	Good at depths below 32 inches; poor above 32 inches; sand texture.	Good	None
Manatee: Ma	Poor: high water table	Good: high water table a hazard in places.	High water table; flooding
Montverde: Md	Poor: high water table	Very poor: high water table; traffic-supporting capacity.	High water table; flooding.
*Myakka: Mk, MpC. For the Placid part of MpC, see the Placid series.	Poor: sand texture	Good: high water table a hazard in places.	High water table
Ocilla: Oc	Poor: sand texture	Good	High water table
Ocoee: Oe	Poor: high water table	Very poor: traffic-supporting capacity.	High water table; flooding
Oklawaha: Oh	Poor: high water table	Very poor: traffic-supporting capacity; high water table.	High water table; flooding
Ona: On	Poor: sand texture	Good: high water table a hazard in places.	High water table

See footnote at end of table.

interpretations—Continued

Soil features adversely affecting—Continued				
Excavated ponds	Drainage	Sprinkler irrigation	Subsurface irrigation	Ditches and canals
Loose sands; unstable side slopes.	Loose erodible sands	Very low available water capacity in surface and subsurface layers.	None	Loose erodible sands; unstable side slopes.
Flooding	Slow permeability; flooding.	High water table; flooding.	Slow permeability; flooding.	None.
Flooding	Very slow permeability; flooding.	High water table; flooding.	Very slow permeability; flooding.	None.
None	Flooding	Low available water capacity in surface and subsurface layers.	Flooding	None.
Flooding	Very slow permeability	High water table; flooding.	Very slow permeability; flooding.	None.
Flooding	Very slow permeability; flooding.	High water table; flooding.	Very slow permeability; flooding.	None.
Loose sands; unstable side slopes.	Loose erodible sands	Very low available water capacity in surface and subsurface layers.	None	Loose erodible sands; unstable side slopes.
Rapid permeability; deep to water table.	Well drained to excessively drained.	Very low available water capacity.	Rapid permeability; deep to water table.	Loose erodible sands; unstable side slopes.
Rapid permeability; deep to water table.	Well drained to excessively drained.	Very low available water capacity; slope.	Rapid permeability; deep to water table; slope.	Slope; loose erodible sands; unstable side slopes.
Deep to water table	Well drained	Low available water capacity in surface and subsurface layers.	Deep to water table	Well drained.
Moderate permeability	Moderately permeable subsoil.	High water table; flooding.	None	None.
Flooding	Inadequate outlets; rapid oxidation.	High water table; flooding.	Flooding	High organic-matter content.
Seasonal low water table; loose sands; unstable side slopes.	Loose erodible sands	Very low available water capacity in surface and subsurface layers.	None	Loose erodible sands; unstable side slopes.
Moderate permeability in subsoil.	Moderately permeable subsoil.	Very low available water capacity in surface and subsurface layers.	Rapid permeability in surface and subsurface layers; deep to water table; flooding.	Loose erodible sands; unstable side slopes.
Flooding	Inadequate outlets; rapid oxidation.	High water table; flooding.	Flooding	High organic-matter content.
Flooding	Inadequate outlets; rapid oxidation.	High water table; flooding.	Flooding	High organic-matter content.
Loose sands; unstable side slopes.	Loose erodible sands	High water table	Rapid permeability at depths below Bh horizon.	Loose erodible sands; unstable side slopes.

TABLE 9.—*Engineering*

Soil series and map symbols	Suitability as source for—		Soil features adversely affecting—
	Topsoil	Road fill	Sanitary land fill [1]
Orlando: Or	Poor: sand texture	Good	None
Paola: PaB, PaD	Poor: sand texture	Good	None
Pelham: Pd	Poor: sand texture; high water table.	Good: high water table a hazard in places.	High water table
*Placid:			
Pe, PmA. For the Myakka part of PmA, see the Myakka series.	Poor: sand texture; high water table.	Good: high water table a hazard in places.	High water table; flooding
Pg	Poor: sand texture; high water table.	Good: high water table a hazard in places.	High water table
Pomello: Pn	Poor: sand texture	Good: high water table a hazard.	High water table.
Pompano: Po	Poor: sand texture; high water table.	Good: high water table a hazard in places.	High water table
St. Lucie: Sc	Poor: sand texture	Good	None
Swamp: Sw. No valid estimates can be made.			
Tavares:			
Ta	Poor: sand texture	Good	High water table
Te	Poor: sand texture	Good	High water table
Vaucluse: Va	Poor: sand texture to a depth of 15 inches and firm, hard consistence below a depth of 15 inches.	Good	None
Wabasso: Wa	Poor: sand texture	Good: high water table a hazard in places.	High water table
Wauchula: Wc	Poor: sand texture; high water table.	Good: high water table a hazard in places.	High water table

[1] Onsite study is needed of the deep underlying strata and water tables to determine the hazards of aquifer pollution and drainage into ground water.

interpretations—Continued

Soil features adversely affecting—Continued				
Excavated ponds	Drainage	Sprinkler irrigation	Subsurface irrigation	Ditches and canals
Rapid permeability; seasonal low water table.	Well drained	Rapid permeability	Rapid permeability; depth to water table.	Loose erodible sands; unstable side slopes.
Rapid permeability; depth to water table more than 80 inches.	Excessively drained	Very low available water capacity.	Rapid permeability; depth to water table.	Loose erodible sands; unstable side slopes.
Loose sands; unstable side slopes.	Loose erodible sands	Very low available water capacity in the surface and subsurface layers.	None	Loose erodible sands; unstable side slopes.
Loose sands; unstable side slopes.	Loose sand: no suitable outlets in places.	Flooding	Flooding	Loose erodible sands; unstable side slopes.
Loose sands; unstable side effects.	Loose erodible sands	None	None	Loose erodible sands; unstable side slopes.
Very rapid permeability in surface and subsurface layers, and below Bh horizon; seasonal low water table.	Moderately well drained	Very low available water capacity in surface and subsurface layers.	Very rapid permeability in surface and subsurface layers and below Bh horizon; depth to water table.	Loose erodible sands; unstable side slopes.
Loose sands; unstable side slopes.	Loose erodible sands	Very low available water capacity.	None	Loose erodible sands; unstable side slopes.
Very rapid permeability; depth to water table; loose sands.	Excessively drained	Very low available water capacity.	Rapid permeability; depth to water table.	Loose erodible sands; unstable side slopes.
Very rapid permeability; seasonal low water table.	Loose erodible sands	Very low available water capacity.	Very rapid permeability; depth to water table.	Loose erodible sands; unstable side slopes.
Very rapid permeability; seasonal low water table.	Moderately well drained	Very low available water capacity.	Very rapid permeability; depth to water table.	Loose erodible sands; unstable side slopes.
Water table is at a depth of more than 60 inches.	Well drained	None	Water table at a depth of more than 60 inches.	None.
Loose sands in subsurface layers.	Loose erodible sands in subsurface layers.	None	None	Loose erodible sands in subsurface layers.
Loose sands in subsurface layers.	Loose erodible sands in subsurface layers.	Very low available water capacity in surface and subsurface layers.	High water table	Loose erodible sands in subsurface layers.

478-433 O—73——6

Textural modifiers, such as gravelly, stony, shaly, and cobbly, are used as needed.

Table 7 shows the AASHO and Unified classifications of specified soils in the Area, as determined by laboratory tests. Table 8 shows the estimated classification of all the soils according to all three systems of classification.

Engineering test data

The engineering interpretations made in this section are based on data obtained by testing samples from Lake County Area soil profiles in the Soils Laboratory, Florida Department of Transportation, Bureau of Materials and Research (see table 7) and from other data obtained on similar soils outside the county.

All samples were obtained at depths of less than about 8 feet with the exception of Apopka sand that was sampled to a depth of 12 feet. Consequently, the test data may not be adequate for estimating the characteristics of soil material at lower depths. These samples were tested for moisture density, grain-size distribution, liquid limit, and plasticity index. According to results of the tests, the soils were assigned ratings in the AASHO Classification System and the Unified System. In the procedure of the AASHO System, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material in the soil sample, including that coarser than 2 millimeters in diameter. The Soil Conservation Service uses the pipette method and excludes material coarser than 2 millimeters in diameter from the calculation. Percentages of clay obtained by the hydrometer method are not used in naming soil textural classes.

The liquid limit and plastic limit tests measure water content at these consistency limits in percent dry weight of the soil. They provide a means of determining the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the 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.

Estimated properties significant in engineering

Table 8 lists, for each soil in the Lake County Area, some estimated properties that might affect the suitability of the soil for various engineering purposes in town and country planning. These estimates are based on the information in table 7, on various test data, and on field performance. The estimates in table 8 are general and represent the central concept of each mapping unit. They are not intended to take the place of examination and evaluation of the soil at the exact site of a planned engineering project.

The estimated USDA, Unified, and AASHO classifications and the percentages less than 3 inches passing sieve numbers 4, 10, 40, and 200 are given in table 8. In addition, depth to a seasonally high water table, flood hazard, permeability, available water capacity, shrink-swell potential, and reaction are shown in table 8 and discussed as follows. Depth to bedrock has been omitted from the table. This property is not important for any of the soils in this survey area.

High water table relates directly to the kind and degree of management needed if the soils are to be used for improved pasture or cultivation. To a great extent, it controls the kinds of trees and plants and the rate of growth of native vegetation.

Unless adequately drained, soils that have a high water table are poorly suited to dwellings or structures for light industry. A high water table affects strength of the foundation, growth of vegetation used for landscaping, hazard of flooding, and general comfort of living. Where septic tanks are required for sewage disposal, a high water table is a serious problem. The restrictions imposed by a high water table can be overcome only by effective drainage.

A high water table directly affects design and construction of roads, railroads, and airport runways. Good drainage is required for maximum bearing capacity of soil material in subgrades. The design and intensity of drainage facilities needed to assure a sound roadbed are directly related to wetness.

A high water table affects wildlife because game is usually more abundant in wet areas than in very dry areas. Wet areas provide better refuge. In this classification, a high water table is considered an important limitation on wild game hunting only where soils are wet enough to seriously affect accessibility.

Good drainage is necessary for campsites or picnic areas. Wet areas often provide attractions for campers, but they also present serious problems in locating or developing good campsites. Where playgrounds are developed on wetland, adequate drainage is required.

Underground basements and cellars are best placed in well-drained areas where the water table is below the bottom of the excavation. Keeping basements and cellars dry is difficult if they are constructed below the level of a seasonal high water table.

Flood hazard is a significant factor in almost all soil uses. Frequency of flooding, duration of flooded condition, and depth and velocity of floodwaters all contribute to the degree of the hazard. Flood hazard is related to two principal conditions: (1) flooding by rise of ground water above the land surface in low places during seasons of high rainfall and (2) flooding from surface runoff that collects in stream channels to produce floods in river bottoms.

Permeability is that quality of a soil that enables the soil to transmit water or air. Permeability is measured in terms of rate of flow of water through a cross section of saturated undisturbed soil in a specified time. The rate is expressed in inches per hour. The estimates given in the table are based on texture and structure of the soil as it occurs in place. Permeability is significant for all uses that require drainage, and it is especially significant in determining the limitations or restrictions on use of soils for septic tank drainage fields.

Available water capacity refers to the capacity of soils under free drainage to store water that is usable for plant growth. It is the difference between the amount of water in a soil at field capacity (the amount of water held by the soil under free drainage after thorough wetting and adequate time for water tension adjustments) and the amount at wilting point (the amount of water held by the soil under tension too great for plant use). It is expressed in inches of available water per inch of soil. Total available water capacity of any soil is the product of available water capacity times the effective root depth.

Available water capacity is important to all uses that involve growth of plants. However, it is a seriously limiting factor only when it is very low. Soils that have a very low available water capacity are droughty in dry seasons and require frequent irrigation to maintain healthy vegetation of the types used for landscaping.

Shrink-swell potential is related to the change in volume of a soil with change in moisture content. Coarse-textured soils that have very little fine material change in volume only slightly as moisture content changes. However, some fine-textured soils that have little sand or silt undergo considerable change in volume as moisture content varies. The amount of change in volume depends on the amount and kind of clay in the soil.

Change in volume of a soil with change in moisture content is important in designing foundations for buildings. Where buildings are on soils that have a high shrink-swell potential, floating slabs or other special foundations can be used. If these are not used, it is essential that the foundations extend below the soil layers that expand and contract or that special measures can be used to guarantee uniform moisture conditions. Otherwise, uneven lifting and settling will cause serious cracking and warping in the building.

Soils having high shrink-swell potential present special problems in roadbuilding. Unless provisions are made to maintain uniform moisture in such soils, roads built over them are subject to serious heaving and cracking.

Reaction refers to the pH of the soil or its acidity, neutrality, or alkalinity. Reaction of the soils is given in the soil series description. In table 8 the pH range only is shown under the reaction heading.

Engineering interpretations

Rainfall in Lake County Area is normally adequate for farm crops, but it is often poorly distributed. Optimum moisture conditions for most crops must often be maintained by irrigation. The two principal methods used are sprinkler irrigation and subsurface irrigation. In the sprinkler method the water is pumped through pipes and applied to the soil through sprinklers in a simulated rain. The soil is brought to field capacity by water moving downward through the soil from the surface. Subsurface irrigation is suitable for use only on nearly level soils that normally have a high water table. In this method the water table is maintained at a constant level that permits adequate capillary movement of water from the water table into the root zone. This is done by adding water through a system of underground tile or shallow open ditches. These systems serve also as drainage systems to remove excess water in time of heavy rains.

Table 9 lists, for each soil, suitability and factors that may affect certain engineering practices or uses. These practices or uses are topsoil, road fill, sanitary land fill, excavated farm ponds, agricultural drainage, sprinkler irrigation, subsurface irrigation, and ditches and canals.

Topsoil is a term used to designate a fertile soil or soil material, ordinarily rich in organic matter, used as a topdressing for lawns, gardens, roadbanks, and the like. The ratings indicate the suitability of the soil as a source of topsoil.

Road fill is material used to build embankments. The ratings indicate performance of soil material moved from borrow areas for these purposes.

Sanitary land fill is an area where the soil has been excavated and where trash, garbage, and other unwanted material is put in and covered over with soil material. Sanitary land fill should be on well-drained soils that have a water table at a depth of at least 6 feet throughout the year. Soil features that adversely affect sanitary land fill are high water table, flooding, and slope.

Excavated ponds are affected mainly by loss of water from seepage and the soil features are those that influence this seepage.

Drainage refers to the need of the soils for drainage when used for farming. The physical features and position that unfavorably affect drainage are listed.

Sprinkler irrigation is most useful on productive soils that can be made more productive by irrigation. Only the soils in Capability Classes II, III, and IV are included in the sprinkler irrigation groups.

Soils must be well drained if they are to be suited to sprinkler irrigation. The slightly wet to moderately wet soils that are included in the irrigation groups must be artificially drained before they are used for cultivated crops. The wet and very wet soils are not included.

Water for sprinkler irrigation systems may be obtained from wells, streams, natural lakes, or irrigation pits just as for subsurface systems. Most of the water used for sprinkler irrigation in Lake County Area comes from lakes. Streams or lakes that have a constant source of water during extended droughts are the only suitable sources of water for sprinkler irrigation systems. The storage capacity of an excavated irrigation pit must be large enough to meet crop needs in the irrigation season.

Though most sources of surface water are suitable for irrigation, deep wells are more reliable. The quality and quantity of the water must be determined before it is used for sprinkler irrigation.

Subsurface irrigation is feasible only on nearly level soils that have a natural ground water table near the surface. Subirrigation has been used for many years on celery, carrots, radishes, sweet corn, cabbage, and other truck crops and other high value crops. Subsurface irrigation of improved pastures and clovers is expanding somewhat in the survey area.

Much of the highly developed farmland in the Lake County Area is at low elevations in the Bay Lake and Umatilla areas and adjacent to Lake Apopka. The Lake Apopka area uses flowing wells for irrigation. In this area water control systems of open ditches or tile remove excess surface water in wet seasons and distribute water from wells for irrigation in dry weather. Such systems make it possible to maintain a fairly uniform depth of water table throughout crop growing seasons. This provides good moisture conditions in the soil for a wide variety of truck crops, pasture grasses, legumes, and ornamental plants.

Subsurface irrigation may be applied through open ditches, mole drains, or tile. Open ditches are most widely used because they are relatively inexpensive and operate satisfactorily. Mole drains can be used only on organic soils. Tile drains can be used in both organic and sandy soils. Tile systems are expensive and are used primarily where celery and other high-value crops are grown.

Water for irrigation may be obtained from artesian or deep wells, ground water wells, streams, natural lakes, and constructed irrigation pits. Irrigation of crops on the muck farms west of Zellwood is accomplished by allowing water to run back into the farming area by gravity from Lake Apopka. Approximately 2,500 acres of this muck area are flooded to reduce oxidation when crops are not growing. When ground water wells are used, they are located at the highest point in the area to be irrigated. When streams or lakes are used, the water must be pumped to the highest points. The water is then distributed by gravity to all points in the irrigated area through a system of ditches, field laterals, or tile lines.

Ditches and canals are used for controlling the level of the water table, for subsurface irrigation, and for drainage. Soil features affecting this use are mainly texture, slope, and erodibility.

Formation and Classification of the Soils

This section describes the major factors of soil formation, tells how these factors have affected the soils of the Lake County Area, and explains some of the principal processes in horizon development. It also defines the current system for classifying soils and classifies the soils of the Lake County Area according to that system.

Factors of Soil Formation

Soil is the living surface layer of the earth in which plants grow. It is a veneer of mineral and organic materials teeming with living organisms; it covers the lifeless mineral foundation of the earth. Soil is formed by the interaction of five primary factors: (1) the physical and parent material that has existed since it was originally exposed at the earth's surface; (2) the climate in which the parent material has existed since it was originally exposed at the earth's surface; (3) the plant and animal life on and in the soil; (4) the relief or slope of the land; and (5) the length of time the process of soil formation has been in progress.

The five major soil-forming factors are closely interrelated, and each modifies the effects of the others. Climate and living organisms are the active forces of soil genesis, but their effects are influenced by relief. Relief affects climate by modifying the degree of surface drainage, the amount of water that percolates through the soil, and the rate of erosion. The length of time that the forces of soil formation have worked is reflected in the degree of soil profile development. Time, also, is relative, for some soils develop much faster than others, depending on the interrelationship of the other four factors. The working together of these five primary soil forming factors, plus a number of secondary factors, is so close that few generalizations can be made about one without specifying the conditions for the other four.

Parent material

The Lake County Area is in the middle of the Florida sand ridge section that runs in a north-south direction. The soils have formed in thick beds of sandy and clayey materials that were transported by the waters of the sea and deposited in stratified layers. The sea covered Lake County Area five different times during the Pleistocene period (*3*). Each time, the sea left sandy materials over the earlier deposits; in places, the earlier deposits were reworked and redeposited in new locations. In many low depressions, recent accumulations of organic material have covered the mineral deposits.

The sandy layers, which are principally quartz, are as much as 20 feet thick. This sandy sediment has resisted the forces of soil formation and has developed into Quartzipsamments. These soils lack textural B horizons. Thick sandy sediment that has high fluctuating water tables and no B horizon has developed into Psammaquents. Some of this wet sandy sediment has formed a Bh horizon and has developed into Haplaquods. Soils formed in deposits that contained various proportions of sands and clays have formed a thick textural B horizon and, therefore, have developed into Paleudults.

The parent materials in the survey area differ widely in mineral and chemical composition and in their physical constitution. The main physical differences, such as those between sand, silt and clay, can be observed in the field. Other differences, such as mineralogical and chemical composition, are important to soil formation and to present physical and chemical characteristics. Many differences among soils in the survey area appear to reflect original differences in the geological materials as they were laid down.

Climate

The climate of the Lake County Area is subtropical and humid. Relatively high year-round temperature and rainfall have strongly influenced soil formation in a number of ways. Where there is no restricting layer and water is free to move downward by gravity, leaching of soluble minerals from the upper horizons has been extensive. Most of the very porous sandy soils are well aerated, highly oxidized, and have accumulated very little organic matter. Fine-textured soil particles, the silts and clays, have been transported from the surface layer into lower horizons, and the result is very sandy texture in the surface layer.

More than 45 percent of the soils in Lake County Area are soils that are underlain by impervious strata and have a high and fluctuating water table. These soils do not have free drainage, and they formed under wet, poorly aerated conditions. These conditions have produced an internal soil climate entirely different from the soil climate of the well-drained soils. Both chemical and biological activity are different from that of the well-drained soils. Many of these soils have accumulated significant amounts of organic matter in the surface layer. Strong organic acids released by decaying organic matter have hastened the leaching processes in the mineral layers. For additional information on the climate, refer to the section "General Nature of the Area."

Living organisms

Plants, micro-organisms, earthworms, and other forms of life that live on and in the soil are active in the soil-forming processes. The changes they bring about depend mainly on the kind of life processes peculiar to each. The kinds of plants and animals are determined by the climate, parent material, relief, age of the soil, and by other organisms. From the standpoint of soil development, the chief functions of plants and animals are to furnish organic matter to the soil, stir the soil, and bring plant nutrients from the lower horizons to the upper horizons.

The original vegetation on the better drained areas was longleaf pine, numerous native grasses, scattered saw-palmetto, a few low shrubs, and some hardwoods. The natural vegetation on these areas now consists principally of turkey and blackjack oaks, wiregrass, scattered longleaf and slash pine, and scattered saw-palmetto. The present vegetation of the excessively drained areas consists predominantly of the original plant cover. This vegetation is scrub and runner oak, rosemary, sandy pine, and saw-palmetto. The vegetative cover of the poorly drained areas (flatwoods) is composed of longleaf and slash pine, saw-palmetto, gallberry, and native grasses. The vegetation of the very poorly drained swamp areas consists of black pine, bays, magnolia, blackgum, saw-palmetto, shrubs, cypress, cabbage palms, and other water-tolerant grasses and hardwoods.

In a few swampy areas organic soils have formed under a forest of swamp hardwoods and grasses. These areas were inundated most of the time. In some of these areas the organic material is derived from fallen trees and is woody. In other areas, the hardwoods have come in at a later period, and the organic material is derived mainly from grasses. In these areas, the material is classed as a fibrous peat.

Relief

Relief has affected soil formation in the Lake County Area primarily by the influence it has had on soil-water relations. Erosion, temperature, plant cover, and other factors normally associated with relief are of minor importance.

A sand ridge runs generally north and south through the middle of Lake County. This ridge is gently sloping to very steep. The highest points are west of Lake Apopka in the Sugarloaf Mountain area. Elevation of the highest point is about 315 feet.

This ridge drops off to the south and west to an elevation of about 100 feet, to 60 feet in the north near Lake Griffin, and to 50 to 70 feet east and northeast. Areas along the St. Johns River are only 25 feet in elevation. This is the lowest area in the county.

Approximately 65 percent of the survey area is gently sloping to steep uplands that are predominantly well drained and dotted with numerous lakes of various sizes and shapes. Short, very steep slopes are adjacent to many of the lakes, ponds, and depressions. It is on this well-drained sand ridge that the greater part of the Astatula, Lake, Paola, and St. Lucie soils formed.

Bordering the sand ridge, mainly to the southwest and northwest, are broad, less sloping, almost level stretches of flatwoods that are dissected by a few slow-flowing streams and dotted with lakes, ponds, and swamps. The dominant soils of these areas are on the low, broad, nearly level ridges. They have a water table that fluctuates within the upper 4 feet. They are highly leached in the upper part and in many places have developed a dark-brown to black humus B horizon within a depth of 42 inches. Myakka, Immokalee, and Ona soils are representative of these areas. The better drained soils, in which the water table fluctuates at lower levels, are on low knolls and slightly elevated ridges in the lower areas. Tavares and Pomello soils are dominant in these areas. The depressions and stream bottoms are wet most of the time, and in many places they have formed dark surfaces. Placid and Anclote soils dominate the low, wet areas.

Adjacent to many of the large lakes are large areas of low, nearly level soils that stay wet most of the time and are subject to flooding during periods of high rainfall. The soils here are predominantly very wet and have developed black, highly organic surface layers. Manatee, Emeralda, Anclote, Placid, and Felda soils are representative soils of this area. Organic soils are also representative of these areas. The area just west of Lake Apopka is an example.

Microrelief within any of these three major landscapes influences specific sites in a manner similar to that described for the major landscapes. Thus, small areas of flatwoods occur in the sand ridge area, and small areas of well-drained soils occur in the flatwoods. Internal drainage conditions are not specifically related to elevations but to the relative position above ground water levels.

Time

Time is an important factor in soil formation. The physical and chemical changes brought about by climate, living organisms, and relief are slow. The length of time needed to convert raw geologic materials into soil varies according to the nature of the geologic material and the interaction of the other factors. Some basic minerals from which soils are formed weather fairly rapidly, while other minerals are chemically inert and show little change over long periods of time. The translocation of fine particles within the soil to form the various horizons is variable under different conditions. But the processes always involve relatively long periods of time.

In the Lake County Area the dominant geologic materials are inactive. The sands that predominate are almost pure quartz and are highly resistant to weathering. The finer materials, the silts and clays, are also inert. They are the end products of earlier weathering. In terms of geologic time, the soil material is young.

Processes of Horizon Formation

Processes involved in the formation of soil horizons or horizon differentiation are accumulation of organic matter, leaching of calcium carbonates and bases, reduction and transfer of iron, and formation and translocation of silicate clay materials. In the formation of most soils in the survey area, two or more of these processes have been active.

Most soils have three main horizons—A, B, and C. In many young, sandy soils such as the Entisols, the B horizon has not developed.

The A horizon is the surface layer. It is the combination of the horizon of maximum organic-matter content called the A1 and the horizon of maximum leaching of soluble or suspended materials called the A2.

The B horizon lies immediately below the A horizon and is called the subsoil. It is the horizon of maximum accumulation of dissolved or suspended materials, such as organic matter, iron, or clay. The B horizon is generally more firm than horizons immediately above and below, and it may have a blocky structure.

The C horizon is the substratum. It has been very little affected by the soil-forming processes, but it can be somewhat modified by weathering.

Some organic matter has accumulated in the surface layer of all soils in the survey area to form an A1 horizon. In many places this horizon has been mixed by cultivation with material from underlying horizons. The content of organic matter varies in the different soils and ranges from very low to high as was stated in the preceding discussion of the effects of relief and wetness.

Leaching of carbonates and bases has occurred in nearly all the soils. Much of this removal probably took place in the parent material even before it was deposited. The leaching of bases in soils generally precedes translocation of silicate clay materials. Most of the soils in the survey area are leached to varying degrees. This has contributed to the development of horizons.

The process of chemical reduction and transfer of iron, or gleying, is evident in some part of most of the soils that have high, fluctuating water tables; however, the high, dry soils do not show evidence of this process. Gleying is brought about by the generally wet conditions that exist. Gray color in the subsoil horizons and grayish-colored mottles in other horizons indicate the reduction and loss of iron. Some horizons contain reddish-brown mottles and concretions that indicate a segregation of iron.

The translocation of clay has contributed to horizon development in some of the soils in the survey area. There is some evidence of weathering and clay movement, or alteration of clay. Primarily, this consists of a light-colored, leached A2 horizon and a loamy B2t horizon that have sandy grains bridged and coated with clay minerals and a few patchy clay-films on ped faces and in root channels. A thin B1 horizon that is intermediate in texture between the A2 and B2t horizons is also present in some soils. Although translocation of silicate clays may be of minor importance, all the other processes involved in soil formation have been important in the development of horizons in these soils.

The soil forming processes left a succession of layers or horizons in the soil from the surface downward. These horizons may differ in one or more properties, such as color, texture, structure, consistence, and reaction. They may also be thick or thin.

Classification of the Soils

Classification consists of any orderly grouping of soils according to a system designed to make it easier to remember soil characteristics and interrelationships. Classification is useful in organizing and applying the results of experience and research. Soils are placed in narrow classes for discussion in detailed soil surveys and for application of knowledge within farms and fields. The many thousands of narrow classes are then grouped into progressively fewer and broader classes in successively higher categories, so that information can be applied to large geographic areas.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and revised later (*5*). The system currently used by the National Cooperative Soil Survey was developed in the early sixties (*4*) and was adopted in 1965 (*7*). It is under continual study.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family and the series. The criteria for classification are soil properties that are observable or measurable, but the properties are selected so that soils of similar genesis are grouped together. The placement of some soil series in the current systems of classification, particularly in families, may change as more precise information becomes available.

Table 10 shows the classification of each soil series of the survey area by family, subgroup, and order, according to the current system.

ORDER.—There are ten orders in the classification system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. Seven of the ten orders are recognized in the Lake County Area. They are Entisols, Inceptisols, Mollisols, Spodosols, Alfisols, Ultisols, and Histosols. The properties used to differentiate the orders are those that tend to give broad climatic groupings of soils. Two exceptions to this are the Entisols and Histosols; these occur in many different climates. Each order is named with a word of three or four syllables ending in *sol*.

Entisols are recent mineral soils that lack genetic horizons or have only the beginning of such horizons.

Inceptisols are mineral soils that most often develop on young but not recent land surfaces.

Mollisols are mineral soils that have thick, dark-colored surfaces with a characteristic soft, fluffy feel. They have developed under grass-type vegetation and moist conditions. They have a high base saturation.

Spodosols are mineral soils that have a spodic horizon often referred to as a Bh horizon (organic pan). Above the Bh horizon they have an A2 horizon that generally has the appearance of wood ash.

Alfisols are mineral soils that have a clay-enriched B horizon that has a high base saturation.

Ultisols are mineral soils that have a clay-enriched B horizon of low base saturation.

Histosols are organic soils that formed in swamps and marshes where conditions were favorable for the accumulation of decaying plant remains.

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 order. The criteria for suborders reflect either the presence or absence of waterlogging or soil differences resulting from climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is Psamments (*Psamm*, meaning sandy, and *ent* from Entisol).

GREAT GROUP.—Each suborder is divided into great groups according to the presence or absence of genetic

TABLE 10.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Albany [1]	Loamy, siliceous, thermic	Grossarenic Paleudults	Ultisols.
Anclote	Sandy, siliceous, hyperthermic	Typic Haplaquolls	Mollisols.
Apopka	Loamy, siliceous, hyperthermic	Grossarenic Paleudults	Ultisols.
Astatula	Hyperthermic, uncoated	Typic Quartzipsamments	Entisols.
Brighton	Dysic, hyperthermic	Typic Medifibrists	Histosols.
Cassia	Sandy, siliceous, hyperthermic	Typic Haplohumods	Spodosols.
Emeralda	Fine, mixed, hyperthermic	Mollic Albaqualfs	Alfisols.
Eureka	Fine, mixed, hyperthermic	Typic Albaqualfs	Alfisols.
Felda	Loamy, siliceous, hyperthermic	Arenic Ochraqualfs	Alfisols.
Fellowship	Fine, montmorillonitic, hyperthermic	Typic Umbraqualfs	Alfisols.
Iberia [2]	Fine, montmorillonitic, noncalcareous, thermic	Vertic Haplaquolls	Mollisols.
Immokalee	Sandy, siliceous, hyperthermic	Arenic Haplaquods	Spodosols.
Lake	Hyperthermic, coated	Typic Quartzipsamments	Entisols.
Lucy [3]	Loamy, siliceous, thermic	Arenic Paleudults	Ultisols.
Manatee	Coarse-loamy, mixed, hyperthermic	Typic Argiaquolls	Mollisols.
Montverde	Euic, hyperthermic	Typic Medifibrists	Histosols.
Myakka	Sandy, siliceous, hyperthermic	Aeric Haplaquods	Spodosols.
Ocilla [4]	Loamy, siliceous, thermic	Aquic Arenic Paleudults	Ultisols.
Ocoee	Sandy, siliceous, dysic, hyperthermic	Terric Medifibrists	Histosols.
Oklawaha	Clayey, mixed, euic, hyperthermic	Terric Medifibrists	Histosols.
Ona	Sandy, siliceous, hyperthermic	Typic Haplaquods	Spodosols.
Orlando	Sandy, siliceous, hyperthermic	Quartzipsammentic Haplumbrepts	Inceptisols.
Paola	Hyperthermic, uncoated	Spodic Quartzipsamments	Entisols.
Pelham [5]	Loamy, siliceous, thermic	Arenic Paleaquults	Ultisols.
Placid	Sandy, siliceous, hyperthermic	Typic Humaquepts	Inceptisols.
Pomello	Sandy, siliceous, hyperthermic	Arenic Haplohumods	Spodosols.
Pompano	Siliceous, hyperthermic	Typic Psammaquents	Entisols.
St. Lucie	Hyperthermic, uncoated	Typic Quartzipsamments	Entisols.
Tavares	Hyperthermic, uncoated	Typic Quartzipsamments	Entisols.
Vaucluse [6]	Fine-loamy, siliceous, thermic	Fragic Paleudults	Ultisols.
Wabasso	Sandy over loamy, siliceous, hyperthermic	Alfic Haplaquods	Spodosols.
Wauchula	Sandy over loamy, siliceous, hyperthermic	Ultic Haplaquods	Spodosols.

[1] Taxadjunts to the Albany series. The Albany soils in this survey area have a mean annual soil temperature of more than 72° F. at a depth of 20 inches.
[2] Taxadjuncts to the Iberia series. The Iberia soils in this survey area have a mean annual soil temperature of more than 72° F. at a depth of 20 inches.
[3] Taxadjuncts to the Lucy series. The Lucy soils in this survey area have a mean annual soil temperature of more than 72° F. at a depth of 20 inches.
[4] Taxadjuncts to the Ocilla series. The Ocilla soils in this survey area have a mean annual soil temperature of more than 72° F. at a depth of 20 inches.
[5] Taxadjuncts to the Pelham series. The Pelham soils in this survey area have a mean annual soil temperature of more than 72° F. at a depth of 20 inches.
[6] Taxadjuncts to the Vaucluse series. The Vaucluse soils in this survey area have a mean annual soil temperature of more than 72° F. at a depth of 20 inches. They also lack the brittleness and compaction in the B22t and B23t horizons that are typical of the Vaucluse series.

horizons and the arrangement of these horizons. The horizons used to make separations are those in which clay, iron, or humus have accumulated or those that have pans that interfere with growth of roots or movement of water. The names of great groups have three or four syllables and are formed by adding prefixes to the names of the suborders.

SUBGROUP.—Each great group is divided into subgroups. One subgroup represents the central (typic) segment of the group, and there are others called intergrades that have properties of the group and one or more properties of another great group, suborder, or order. The names of the subgroups are formed by preceding the name of the great group with one or more adjectives. For example, a Typic Quartzipsamment is typical of those soils classed as Quartzipsamment, or a Spodic Quartzipsamment is a Quartzipsamment that has one or more properties of a Spodosol.

FAMILIES.—Families are established within a subgroup primarily on the basis of properties important to the growth of plants or to the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, slope, coatings, and consistence. A family name consists of a number of adjectives preceding the subgroup name. An example is the Hyperthermic, uncoated family of Typic Quartzipsamments.

SERIES.—The series is a group of soils that have major horizons that are similar in important characteristics and sequence in the pedon. They may be dissimilar in texture of the surface layer. The series is given the name of a geographic location near the place where that series was first observed and mapped. An example is the Astatula series, which was first described near Astatula, Fla.

A detailed description of each soil series in the Lake County Area is given in the section "Descriptions of the Soils."

General Nature of the Area

The first permanent settlers in what is now Lake County came from the Carolinas, Georgia, and Alabama in the 1840's and settled near present day Leesburg. About 1830, before the arrival of these first permanent settlers, a military post was established at Fort Mason on the eastern shore of Lake Eustis. Settlement was slow at first and did not reach the southern part of Lake County until 1862. In this same year, a farmer from Georgia settled south of what is now South Clermont. The second settler to this area did not arrive until 1873.

These early settlers made their living by farming, hunting, and fishing. Fish and game were plentiful. The Green Swamp area was a favorite hunting area.

In 1866, a store was opened by Evander and Calvin Lee on land homesteaded by the Lee family. A combination cottongin and gristmill was built near Lake Griffin by Josiah Lee. A town was beginning to develop, and Calvin Lee called it "Leesburg." Today Leesburg is the largest city in Lake County. It has a population of approximately 12,000. Other towns began to develop between 1870 and 1880. Among these were Tavares, Eustis, Mt. Dora, Umatilla, Lady Lake, Fruitland Park, Okahumpka, Yalaha, Astatula, Clermont, and Minneola. The population increased with the coming of the railroads in the early 1880's.

In 1887, a new county was formed from parts of Orange and Sumter Counties. The new county was called Lake County because of the more than 1,400 lakes within its boundaries. Tavares was selected as the county seat.

Lake County continued a healthy rate of growth until the devastating freeze of 1895. This freeze nearly ruined the citrus and truck farming industries. But the county recovered and now enjoys a continuing healthy rate of growth. The population of Lake County increased from 8,034 in 1890 to 57,383 in 1960.

Transportation facilities in the county are good. A railroad provides service across the county, connecting it with cities and markets in the surrounding counties and other States. Several bus and truck lines also provide transportation to places outside the county. Any community in Lake County can be reached easily from within or outside the county by hard-surface roads. The Sunshine State Parkway and U.S. Highways 27 and 441 cross the county (fig. 9), and a network of approximately 35 State and county highways connect various parts of the county.

Excellent boating, swimming, water skiing, and fishing facilities can be enjoyed in the many large and medium-size lakes in the county, and there are many fine locations throughout the county for camping and picnicking.

***Figure 9.*—Prime citrus land and the Sunshine State Parkway.**

Farming

The early settlers were pioneers seeking adventures to be found in frontier life. Cattle raising was the easiest and most alluring means of using the land. Range was free to all comers, and game abounded everywhere.

Once each year the earliest settlers went to the coast. They boiled sea water to get their year's supply of salt. On the return trip they stopped at New Smyrna and collected orange seeds from the Turnbull tree that had been brought there by early Spanish or English colonists. Thus, citrus farming began in Lake County. At first, citrus farming was secondary to cattle raising. Citrus was not grown commercially.

Commercial citrus production began in the 1870's when planters, mainly from the Carolinas and Georgia, came to Florida. They searched for hammock land along the streams and lakes where oranges could be grown at minimal cost and transported to market by water.

Wild sour orange trees were commonly found growing in many hammock areas. The undergrowth was cleared, the sour orange trees were thinned, and the remaining trees were budded with sweet oranges.

Today citrus farming is the most important agricultural endeavor in the county. Lake County is the second largest citrus producing county in the State. There are 77,700 acres of bearing citrus trees.

The leading truck crops are celery, beans, cucumbers, sweet corn, cabbage, carrots, peppers, and other vegetables. Field corn, sweetpotatoes, Irish potatoes, peas, peanuts, sugarcane, velvet beans, and hay crops are grown to some extent in all parts of the county. Lake County is also one of the leading counties in the State in watermelon production.

Naval stores operations began in 1897 in the southern part of the county where there were vast areas of pine forests. These operations have steadily decreased with the cutting of the pine forests.

Climate [3]

The climate of the Lake County Area is characterized by long, warm, somewhat humid summers and by mild, dry winters. The average annual rainfall is about 51 inches. Rainfall is seasonally distributed; nearly 60 percent of the average annual total falls during the 4-month period June through September. Warm air from the Atlantic Ocean and the Gulf of Mexico largely accounts for the mild, moist climate. These bodies of water and the numerous inland lakes in the county have a moderating effect on the temperature in both summer and winter. Summarized climatic data, based on records kept at Eustis and Clermont, are shown in table 11.

In any year the temperature varies only slightly from day to day in summer. During June, July, and August, the average daily maximum temperature is 90° to 91° F., and the average daily minimum is 70° and 73°. Although the temperature reaches 90° on an average of about 125 days a year, it infrequently reaches 100° or higher. Relative humidity seldom drops below 50 percent during June, July, and August. Consequently, hot, dry winds are almost unknown in Lake County.

The temperature in winter varies considerably from day to day, largely as a result of periodic invasions of cold, dry air from Canada. The average daily maximum temperature in December, January, and February is about 74°. The average daily minimum temperature in winter is about 50°. Freezing temperatures can be expected at least once every winter in farming areas in the colder sections of the Area. In the colder areas, freezing temperatures occur on about 10 days during an average winter and the temperature drops to 28° or lower on about 4 days. Periods of winter cold generally last only 2 or 3 days. Even on the colder days, the temperature almost always rises to 40° or higher at some time during the day.

Table 12 shows probable dates of the last freezing temperature in spring and the first in fall. These data are based on temperatures observed at the Weather Bureau cooperative weather station 6 miles south of Clermont. Because the minimum temperature varies considerably from place to place in winter, freeze data for other points in the county may differ significantly from those shown in table 12.

Rainfall in summer comes mostly in showers and thundershowers of short duration in the afternoon and evening. During June, July, August, and September, a measurable amount of rain can be expected on about half the days. Summer showers are sometimes heavy; a rainfall of 2 or 3 inches in an hour or two is not uncommon. Rains that last all day are rare in summer. When such rains occur, they are almost always associated with a tropical storm. Rains in winter and early in spring are usually less intense than the thundershowers, but may last 24 hours or longer and release a large amount of rainfall over a large area. Seven inches or more of rainfall in 24 hours can be expected at some time during the year in about 1 year in 10.

Nearly all the precipitation in Lake County Area falls as rain. Hail falls occasionally during thundershowers late in spring and early in summer, but the hailstones are generally small and seldom cause much damage. Snow is rare.

Tropical storms can affect the area at any time from early in June through about the middle of November. Because these storms rapidly diminish in intensity as they move inland, winds of hurricane force, 73 miles per hour or greater, seldom occur in Lake County. When these storms and the associated copious rains do occur, flooding may cause considerable damage to crops and fields.

Extended periods of dry weather can be expected during any season, but are most likely in winter and spring. Such dry periods can seriously affect farming in areas that do not have irrigation facilities. According to weather station records, less than 1 inch of precipitation has been recorded each month from November through February. Dry periods in April and May, although generally of shorter duration than those in winter, are more damaging because of the higher temperature. Forest fires are a serious threat during extended periods of little or no rainfall, especially in spring.

Prevailing winds in this Area are generally southerly in spring and summer and northerly in fall and winter. Windspeed by day generally ranges from 8 to 15 miles per hour, but nearly always drops below 8 miles per hour at night.

[3] Prepared by KEITH D. BUTSON, climatologist for Florida, National Weather Service, U.S. Department of Commerce.

TABLE 11.—*Temperature and precipitation*

[Data based on records of the Environmental Science Services Administration, National Weather Service]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—		Average number of days with—	
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—	0.10 inch	0.50 inch
	° F.	° F.	° F.	° F.	In.	In.	In.		
January	73	50	82	33	2.0	0.5	4.8	4	2
February	74	52	85	36	2.6	.9	5.3	5	2
March	79	56	89	41	3.9	1.0	7.9	6	3
April	82	60	91	49	3.7	1.6	5.9	6	3
May	87	66	96	58	3.4	.9	5.0	7	3
June	90	71	97	66	7.1	4.4	9.2	9	4
July	91	73	96	69	8.8	3.9	11.8	13	5
August	91	73	97	69	6.6	4.6	10.3	10	4
September	89	72	95	68	6.5	3.3	11.4	9	4
October	85	65	91	53	3.1	1.2	6.5	6	3
November	78	56	85	41	1.5	.2	3.6	3	1
December	74	51	81	35	2.0	.7	3.7	3	1

TABLE 12.—*Probable dates of last critical temperatures in spring and first in fall*

Probability	Dates for given probability and temperature of—				
	28° F. or lower	32° F. or lower	34° F. or lower	38° F. or lower	42° F. or lower
Spring:					
1 year in 10 later than	February 11	February 13	March 3	March 22	April 17
2 years in 10 later than	January 15	February 6	February 24	March 11	March 30
5 years in 10 later than	(1)	January 15	January 27	March 8	March 17
Fall:					
1 year in 10 earlier than	December 11	November 28	November 26	November 4	November 3
2 years in 10 earlier than	December 30	December 7	November 30	November 18	November 5
5 years in 10 earlier than	(1)	December 25	December 19	December 1	November 22

[1] Occurs fewer than 5 years in 10.

Geology [4]

Six geologic formations are on or near the surface in the Lake County Area (fig. 10). From the oldest and deepest formation of Eocene age to the youngest formation of Pleistocene-Recent age, they are the Crystal River, the Suwannee Limestone, the Hawthorn, the Fort Preston, the Fort Thompson, and Ocala Limestone. Recently deposited sandy and clayey marine terraces cover these formations, except in a few small areas where erosion has exposed the older strata.

An overlapping, or transgressive, sea flooded and eroded the land and deposited the water-worked sediment identified in these geologic formations. Although there are six distinctive kinds of deposits in the survey area, only three are important. The soils formed wholly or in part in the most recent, overlying sandy or clayey material.

The Crystal River Formation, a hard, cavernous, and porous limestone, is the only formation that underlies the entire county. This formation is not exposed any place in the county.

The Suwannee Limestone overlies the Crystal River Formation. The only exposure in the county is at the bottom of the Palatlakaha River near State Highway 48. There may be other exposures in the southwestern part of the county. The formation is so deeply buried by the sandy deposits that it has had little effect on soil formation.

The Hawthorn Formation consists of interbedded sand, clay, marl, limestone, fuller's earth, and phosphate. Land pebble phosphate, old oyster shells (Ostrea normalis), manatee ribs, and many different shell fragments are scattered over the land surface 1 mile southwest of Howey-In-The-Hills. Phosphatic material is exposed along the sides

[4] L. O. ROWLAND, geologist, Soil Conservation Service, helped prepare this section.

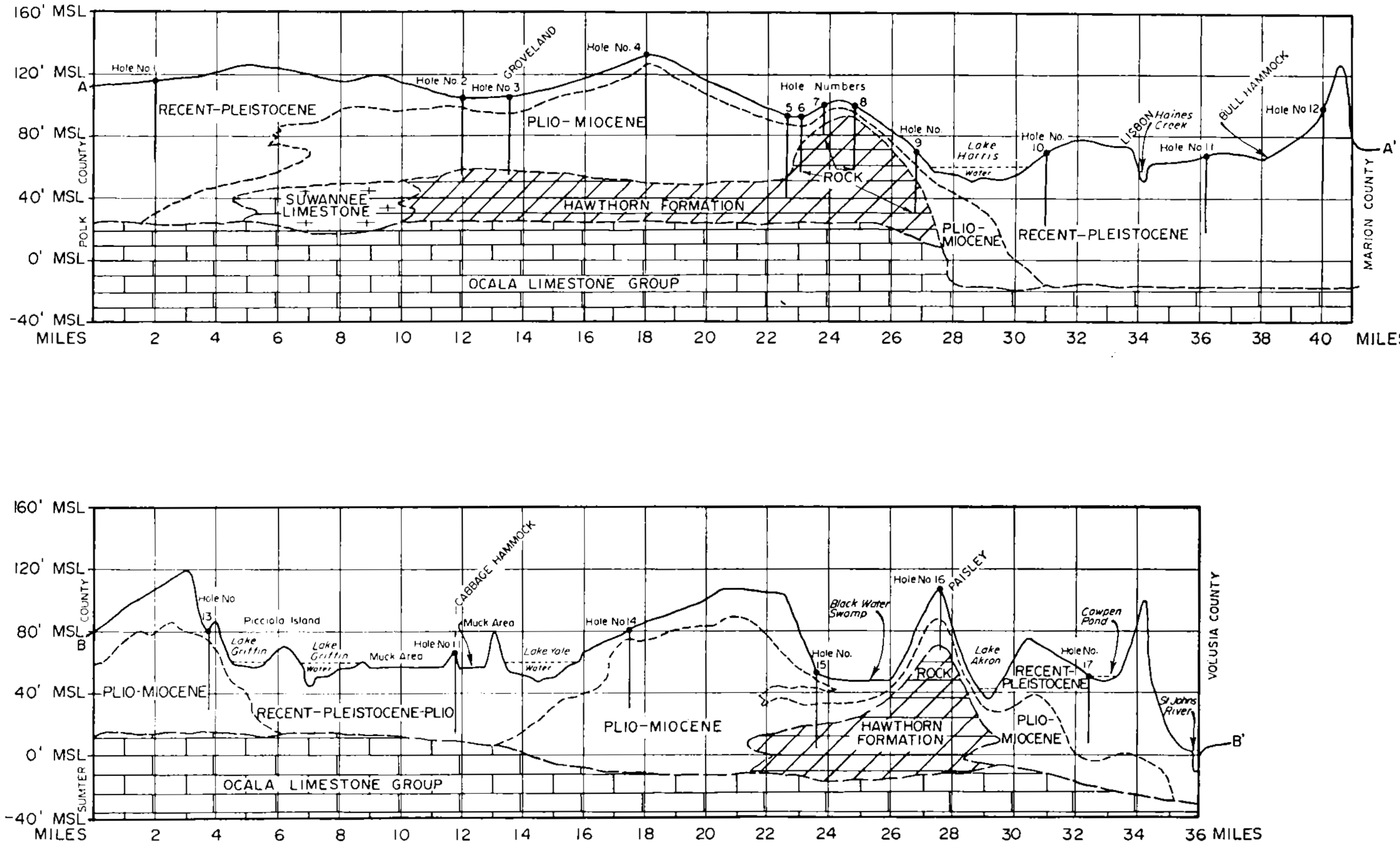

***Figure 10.*—Geologic cross section of the Lake County Area.**

and bottoms of some of the nearby sinks. The recently deposited sand is so thick, however, that none of the phosphatic material was reached in the course of regular soil mapping.

The Fort Preston Formation underlies approximately 54 percent of the county. The sediment is poorly sorted quartz grains in a clay matrix. It ranges in size from very fine sand to pebbles. The clay fraction is predominantly kaolin. The coarse sands in this formation are the chief source of Florida's construction sand (fig. 11). The Vaucluse, Lucy, Astatula, and Apopka soils are derived from the Fort Preston Formation. In some places in the northern part of the county, sweet soils have formed in a finer textured sediment that was deposited at a later period. Emeralda soils are an example.

The Fort Thompson Formation, just north and east of Lake Apopka, underlies about 3 percent of the survey area. This formation consists of both fresh and marine deposits that were laid down during several oscillations of the sea. Most of this area is capped with fibrous organic material, in which the Montverde and Oklawaha soils formed. Sweet mineral soils that formed in these sediments are the Manatee and Emeralda soils.

Recent and Pleistocene deposits also influenced a large percentage of the soils of the survey area. The greatest single area of these deposits is in the northeastern part of the county, bordering on the St. Johns River. The sediments range from sand to clay. There is also organic material and fresh water marl. The fresh water marl, Lake Flirt, and the recent deposits of organic material also occur among all other formations in the county. Many stream valleys and low depressions contain pockets of recently deposited organic material and fresh water marl. Paola, St. Lucie, Pomello, and Myakka soils formed in this material.

The Ocala Limestone Formation (*3*) underlies the entire survey area. This formation is as much as 98 percent carbonates. Water moved downward through the blanket of sand that overlies the Ocala Formation. The water dissolved and removed much of the carbonate material and created many caverns of various sizes and shapes. The collapse of these caverns created the many fine lakes in the area.

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Figure 11.—One of the many areas where sand is mined for construction.

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Glossary

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.

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.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Drainage class (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 deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

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.

Mottling, soil. 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.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permability are as follows: *Very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

pH value. A numerical means for designating relatively weak acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

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 or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

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 separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Soil variant. A soil having properties sufficiently different from those other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not believed to be justified.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), prismatic (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular.* Structureless soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically the part of the soil below the solum.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

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For a full description of a mapping unit, read both the description of the mapping unit and that of the soi
refer to the mapping unit description of that soil. The capability grouping

Acreage and extent, table 2, page 6.
Estimated yields, table 3,
page 42.

Map symbol	Mapping unit	Described on page	Capability unit	Range site	Woodland group
			Symbol	Name	Symbol
AbB	Albany sand, 0 to 5 percent slopes----------------	7	IIIw-3	Sandhills	3w2
AbD	Albany sand, 5 to 12 percent slopes---------------	8	IVs-2	Sandhills	3w2
Ac	Anclote fine sand---------------------------------	8	IIIw-1	Fresh Marsh (mineral)	2w3
Am	Anclote and Myakka soils--------------------------	9	VIIw-1	Swamp	2w3
ApB	Apopka sand, 0 to 5 percent slopes----------------	10	IIIs-1	Sandhills	3s2
ApD	Apopka sand, 5 to 12 percent slopes---------------	10	IVs-3	Sandhills	3s2
AsB	Astatula sand, 0 to 5 percent slopes--------------	11	VIs-1	Sand Scrub	5s3
AtB	Astatula sand, dark surface, 0 to 5 percent slopes--	11	IVs-1	Sandhills	4s3
AtD	Astatula sand, dark surface, 5 to 12 percent slopes--	11	VIs-2	Sandhills	4s3
AtF	Astatula sand, dark surface, 12 to 40 percent slopes--	11	VIIs-2	Sandhills	4s3
Br	Brighton soils------------------------------------	12	IIIw-2	Fresh Marsh (organic)	------
Ca	Cassia sand---------------------------------------	13	VIs-3	Sand Scrub	4s3
Em	Emeralda fine sand--------------------------------	14	Vw-1	Fresh Marsh (mineral)	2w3c
Eu	Eureka loamy fine sand----------------------------	15	IIIw-1	Acid Flatwoods	2w3c
Fd	Felda fine sand-----------------------------------	15	IIIw-1	Fresh Marsh (mineral)	3w2
Fe	Fellowship fine sandy loam, ponded----------------	16	Vw-1	Fresh Marsh (mineral)	2w3c
Fm	Fill land, loamy materials------------------------	17	------	--------------	------
Ib	Iberia sandy clay---------------------------------	17	Vw-1	Fresh Marsh (mineral)	2w3c
Im	Iberia and Manatee soils--------------------------	17	VIIw-1	Swamp	2w3c
Is	Immokalee sand------------------------------------	18	IVw-1	Acid Flatwoods	3w2
LaB	Lake sand, 0 to 5 percent slopes------------------	19	IVs-1	Sandhills	3s2
LaD	Lake sand, 5 to 12 percent slopes-----------------	19	VIs-2	Sandhills	3s2

series to which the mapping unit belongs. For information on the suitability of a given soil for crops and pasture, defined on pages 39 and 40. Other information is given in tables as follows:

Woodland groups and wood crops, table 5, page 45.
Use of the soils in engineering, tables 7, 8, and 9, pages 60 through 71.

Map symbol	Mapping unit	Described on page	Capability unit	Range site	Woodland group
			Symbol	Name	Symbol
LaE	Lake sand, 12 to 22 percent slopes	20	VIIs-2	Sandhills	3s2
LuB	Lucy sand, 0 to 5 percent slopes	20	IIIs-1	Sandhills	3s2
LuC	Lucy sand, 5 to 8 percent slopes	21	IVs-4	Sandhills	3s2
Ma	Manatee fine sand	21	IIIw-1	Fresh Marsh (mineral)	2w3
Md	Montverde muck	22	IIIw-2	Fresh Marsh (organic)	------
Mk	Myakka sand	24	IVw-1	Acid Flatwoods	3w2
MpC	Myakka and Placid sands, 2 to 8 percent slopes	25	Vw-2	Acid Flatwoods	3w2
Oc	Ocilla sand	25	IIIw-3	Sandhills	3s2
Oe	Ocoee peat	26	IIIw-2	Fresh Marsh (organic)	------
Oh	Okalwaha muck	27	IIIw-2	Fresh Marsh (organic)	------
On	Ona fine sand	28	IIw-1	Acid Flatwoods	2w2
Or	Orlando fine sand	29	IIIs-1	Sandhills	3s2
PaB	Paola sand, 0 to 5 percent slopes	29	VIs-1	Sand Scrub	5s3
PaD	Paola sand, 5 to 12 percent slopes	29	VIIs-1	Sand Scrub	5s3
Pd	Pelham sand	30	IVw-1	Acid Flatwoods	2w3
Pe	Placid sand	31	IIIw-1	Sand Pond	2w3
Pg	Placid sand, slightly wet	31	IIw-1	Acid Flatwoods	2w2
PmA	Placid and Myakka sands, 0 to 2 percent slopes	31	IIIw-1	Sand Pond	2w3
Pn	Pomello sand	33	VIs-4	Sand Scrub	4s3
Po	Pompano sand, acid	33	IVw-2	Acid Flatwoods	3w2
Sc	St. Lucie sand	34	VIIs-1	Sand Scrub	5s3
Sw	Swamp	34	VIIw-2	Swamp	------
Ta	Tavares sand	35	IIIs-1	Sandhills	3s2
Te	Tavares sand, white subsurface variant	35	IIIs-1	Sand Scrub	3s2
Va	Vaucluse sand	36	IIIe-1	Sandhills	3s2
Wa	Wabasso sand	37	IVw-1	Acid Flatwoods	3w2
Wc	Wauchula sand	38	IVw-1	Acid Flatwoods	3w2

Powell

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Box 1208, Gainesville, FL 32602

SUBJECT: SOILS - Lake County published soil survey, map symbol S.M. missing from text

DATE: November 4, 1975

TO: Jim Spieth, AC
SCS, Tavares, FL

As a follow-up of recent correspondence and discussion of map symbol S.M. which appears on the Lake County soil maps but is omitted from the legend and text, we are enclosing a supply of an erratum sheet for Jerry Joiner to use with the remaining copies of the report.

We would suggest this sheet be placed between pages 22 and 23 in the text.

Robert W. Johnson
State Soil Scientist

cc: J. R. Coover w/6 copies
Lindo J. Bartelli w/6 copies
Jerry Joiner w/extras

MARSH

Marsh (S.M.) consists of nearly level, very poorly drained mineral and organic soils that have not been classified because excess water makes detailed investigation impractical. Marsh occurs as broad drainageways, as broad, poorly defined streams, as large depressions having no outlets, and as large shallow grassy ponds. The soils are flooded all the year in most years except briefly during prolonged periods of little rainfall, usually in late winter and early spring. Some places adjacent to the larger lakes such as Lake Yale, Lake Griffin, Little Lake Harris and in the Mascotte area are always covered with water.

Included in mapping are a few small islands of higher lying soils. These inclusions make up no more than 4 percent of any mapped area.

Marsh has a dense cover of wetland grasses. Establishing adequate water control to prepare this soil for cultivated crops or pasture would require extreme engineering measures and is considered not feasible. Marsh provides food for cattle and shelter, food, and resting places for wildlife and waterfowl; it is a good habitat for waterfowl. The vegetation is maidencane, sawgrass and other wetland plants like pickerelweed and lilies. Marsh is not assigned to a woodland group since woodland production is not feasible due to excessive wetness and flooding.

Marsh has very severe limitations for all the uses discussed in the section "Town and Country Planning" and detailed in table 6, page 48. The limitations are flooding and high water table. In many places, outlets are not available for removal of excess water. (Capability unit VIIw-2, marsh range sites, no woodland classification)

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