United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
the University of Florida,
Institute of Food and
Agricultural Sciences,
Agricultural Experiment
Stations, and Soil and
Water Science
Department, and the
Florida Department of
Agriculture and Consumer
Services

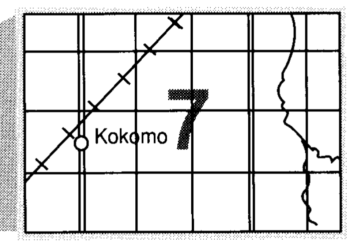
Soil Survey of Okeechobee County, Florida

How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

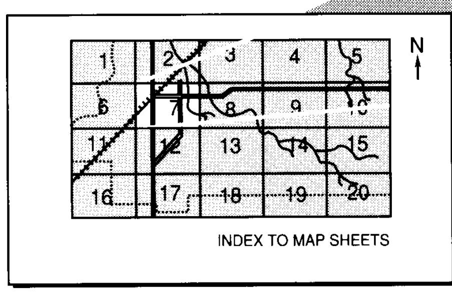
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.



MAP SHEET

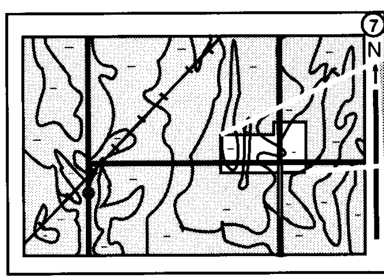
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

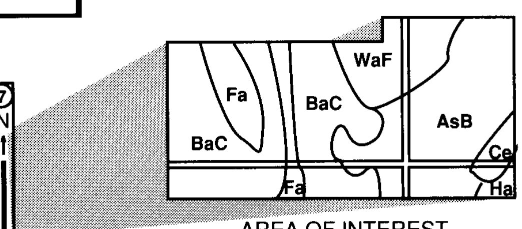


INDEX TO MAP SHEETS

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1997. This survey was made cooperatively by the Natural Resources Conservation Service; the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil and Water Science Department; the Florida Department of Agriculture and Consumer Services; and the Florida Department of Transportation. The survey is part of the technical assistance furnished to the Okeechobee Soil and Water Conservation District.

Cover: The meandering Kissimmee River on the left is the boundary between Highlands and Okeechobee Counties. It was ditched and straightened (center of photo) to control flooding. The right side of the photo is pasture that includes some areas of dense hammock composed of cabbage palm and oak trees. (NRI photo)

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 2003

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

T. Niles Glasgow
State Conservationist
Natural Resources Conservation Service

Soil Survey of Okeechobee County, Florida

By Douglas Lewis, Ken Liudahl, Chris Noble, and Lewis Carter, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil and Water Science Department, and the Florida Department of Agriculture and Consumer Services

OKEECHOBEE COUNTY is in the south-central part of peninsular Florida (fig. 1). The city of Okeechobee, the county seat, is about 3 miles north of Lake Okeechobee, which forms the southern boundary of the county. The Kissimmee River forms the western boundary. Osceola County is to the north, and Indian River, Martin, and St. Lucie Counties are to the east. The survey area covers the entire 499,200 acres of Okeechobee County.

Farming is the major industry in the county. The dominant components are citrus, dairy products, and beef cattle. The main nonagricultural enterprise in the county is tourism, including winter visitors and year-round visitors to Lake Okeechobee, which is the second largest freshwater lake wholly within a state.

The city of Okeechobee is the only municipality in the county and accounts for the majority of the population of the county.

This soil survey updates the survey of Ockeechobee County, Florida, published in 1971 (USDA, 1971). It provides additional information and has larger maps, which show the soils in greater detail.

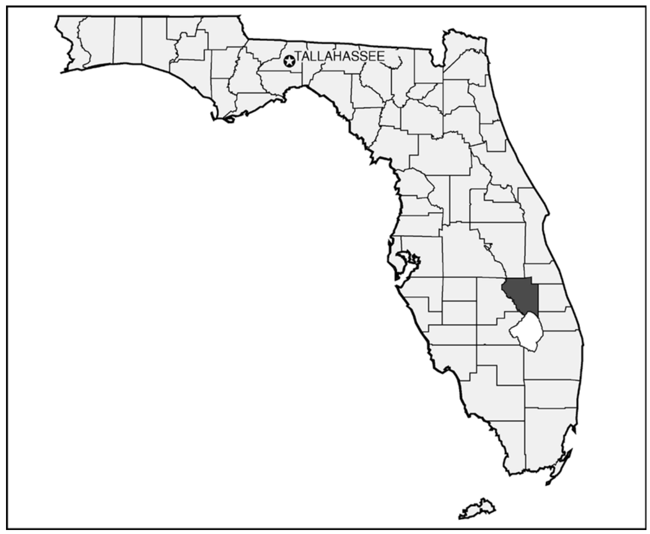


Figure 1.—Location of Okeechobee County in Florida.

General Nature of the County

This section provides general information about the county. It describes history and development, water resources, farming, and climate.

History and Development

Betty Chandler Williamson prepared this section.

In 1896, Peter Raulerson and his wife, Louisana Chandler Raulerson, moved from Basinger, Florida, to a remote area near the big lake (Anon. n.d.). They traveled with a covered wagon pulled by oxen and with a horse and buggy, bringing their children, livestock, and household furnishings. It was reported that they moved because Basinger was getting too crowded.

Peter Raulerson had chosen a place known only as “The Bend” on Taylor Creek just north of Lake Okeechobee. He sought land that was high and dry and that had water nearby and soil of good quality. The only other human inhabitants were the few Seminole Indians who occasionally traveled through the area. The woods abounded with deer, turkey, and other critters and included a few bear, panthers, and wild cats. As other families arrived, the good soil, native pinelands, and nearby lake supported farming, cattle raising, timbering, and fishing.

When the little community was given a post office in 1902, the community was named “Tanti” in honor of Tanti Huckaby, one of the early school teachers. In 1911, the town changed its name to Okeechobee, a Seminole word meaning “Big Water.” In 1915, the Florida East Coast Railway arrived and the young town became the focus of high economic expectations. In 1917, Okeechobee County was created from parts of Osceola, Palm Beach, and St. Lucie Counties.

People from far away came to open businesses because Okeechobee was to be the “Chicago of the South.” Prosperity was enjoyed during the Florida boom years of the early 1920’s, but hurricanes during 1926 and 1928 killed hundreds of people, halting the economic growth of the county. As a result of the hurricanes, the Hoover Dike was built around parts of Lake Okeechobee. The dike was built to prevent the lake from flooding the southern portion of the county.

Water Resources

Sam Sharpe, district conservationist, Natural Resources Conservation Service, prepared this section.

Okeechobee County is on the north shore of Lake Okeechobee and is bordered on the west by the Kissimmee River. Taylor Creek and Nubbin Slough are the main drainage basins that flow into Lake Okeechobee in the county. Lake Okeechobee is the main source of municipal water and provides substantial recreational resources to the county. The surface waters in the county are commonly used for agricultural irrigation.

The Floridan aquifer and the Surficial aquifer underlie Okeechobee County. The Floridan aquifer is a deep, artesian aquifer that was used primarily for agricultural irrigation. Due to increasing salinity in most areas of the county, however, this use has predominantly ceased. The quality of the water in the Surficial aquifer is superior to that in the Floridan aquifer. The Surficial aquifer is the main source of water for privately owned wells and is sometimes used for irrigation by homeowners and agriculture managers.

Farming

Sam Sharpe, district conservationist, Natural Resources Conservation Service, prepared this section.

Agriculture is the major industry in Okeechobee County. Beef cattle and dairies produce the largest agricultural revenues in the county. In 1997, the county had 68,234 beef cattle and 35,707 milk cows (Florida Crop and Livestock Reporting Services, 1997). Citrus is also an important industry and occupies about 12,250 acres. In recent years, the diversity of agriculture in the county has increased. Potatoes, sweet corn, watermelons, beans, cucumbers, bell peppers, squash, egg plants, Chinese cabbage, and other vegetables are now grown commercially in the county. Cotton and about 2,500 acres of sod are also grown in the county. The most recently started agricultural operations in the county are a commercial egg farm and a fish farm.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Ft. Drum, Florida, in the period 1961 to 1990.

In winter, the average temperature is 64 degrees F and the average daily minimum temperature is 52 degrees. In summer, the average temperature is 80 degrees and the average daily maximum temperature is 88 degrees. During occasional cold periods, the temperature drops into the thirties. Only seldom does the temperature drop below 32 degrees, and rarely does it drop into the twenties. Frost occurs in the farming areas only a few days each winter and is generally light and scattered.

The total annual precipitation is about 49 inches. Of this, about 33 inches, or 67 percent, usually falls in June through September. During this time, most of the rain falls during late afternoon or early evening as thundershowers that provide a cooling effect for hot summer days. These thundershowers seldom last very long, although they often produce large amounts of rain. Exceptions can occur during late summer or fall when tropical storms pass through the area. These storms can result in a heavy downpour of torrential proportions. In 24 hours, 6 to more than 12 inches of rain can fall. During the winter, the rainfall is generally light and associated with cold fronts moving through the area.

The prevailing wind direction is generally from the east. High wind velocities are usually associated with tropical storms and occasionally with fast moving fronts in the spring. Thunderstorms in the summer are sometimes accompanied by strong gusts of wind for brief periods. Heavy fog can occur in the early morning during winter. Most of the fog appears as ground fog and dissipates after sunrise.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Ground Penetrating Radar

In Okeechobee County, a ground penetrating radar system and hand transects were used to determine and document the type of variability of the soils in the detailed soil map units (Doolittle, 1982). Information from these transects, along with observations made in the field, were then used to classify the soils and to determine the composition of the map units. The map units, as described in the section “Detailed Soil Map Units” are based on these data.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent (Soil Survey Staff, 1999).

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called similar inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior different enough to affect use or management. These are dissimilar inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of dissimilar soils are usually mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soils data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource planning, but onsite investigation is needed to plan intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils of the Uplands

The general soil map unit in this group consists of nearly level and gently sloping, somewhat poorly drained and moderately well drained soils in the higher landscape positions. Some of the soils are sandy throughout. Others have a weakly developed, organically coated subsoil.

1. Pomello-Orsino

Nearly level and gently sloping, somewhat poorly drained and moderately well drained, sandy soils that have an organically coated subsoil

This map unit occupies several small areas in the northeastern part of the county. These areas are commonly adjacent to small streams. The areas that are adjacent to streams have better drainage than those areas that are not.

The natural vegetation is dominated by scrub oak and includes scattered slash pine and saw palmetto and an understory of pineland threeawn.

This map unit makes up 5,491 acres, or about 1.1 percent of the survey area. It is about 79 percent Pomello soils, 11 percent Orsino soils, and 10 percent soils of minor extent.

Pomello soils are somewhat poorly drained and moderately well drained. Typically, the surface layer is gray fine sand about 4 inches thick. The subsurface layer, which extends to a depth of 42 inches, is white fine sand. The subsoil, which extends to a depth of 66 inches, is fine sand. It is dark reddish brown in the upper part and brown in the lower part. The brown colors are from organic particles that coat the sand grains. The substratum is light gray sand to a depth of 80 inches.

Orsino soils are moderately well drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer, which extends to a depth of 12 inches, is light gray fine sand. The subsoil, which is about 2 inches thick, is dark reddish brown fine sand. The substratum is fine sand to a depth of 80 inches. It is brown in the upper part, very pale brown in the next part, and light gray in the lower part.

The soils of minor extent in this map unit are Immokalee and Myakka soils.

Most areas of this map unit are used as pasture or still support native range. A few areas have been used for urban development, and some are used for citrus production.

Soils of the Flatwoods, Hammocks, and Sloughs

The five general soil map units in this group consist of nearly level, poorly drained soils. Some are sandy throughout, and some have shallow to deep sandy layers that have a loamy or organically coated subsoil. The soils in this group are throughout the survey area in areas of flatwoods, in sloughs, and on hammocks.

2. Myakka-Immokalee-Basinger

Nearly level, poorly drained, sandy soils that have a weakly developed, organically coated subsoil

This map unit occupies large areas throughout the county. It has the largest extent of any of the general soil map units in the county.

This map unit consists of nearly level, poorly drained soils in areas of flatwoods and in sloughs. The natural vegetation in the areas of flatwoods is mainly saw palmetto and includes scattered slash pine, gallberry, wax-myrtle, and pineland threeawn. The natural vegetation in the sloughs consists of scattered slash pine, cabbage palm, saw palmetto, wax-myrtle, sand cordgrass, pineland threeawn, and chalky bluestem.

This map unit makes up 301,017 acres, or about 60.3 percent of the survey area. It is about 44 percent Myakka soils, 35 percent Immokalee soils, 5 percent Basinger soils, and 16 percent soils of minor extent.

Typically, the surface layer of the Myakka soils is black fine sand about 4 inches thick. The subsurface layer, which extends to a depth of 27 inches, is fine sand. It is gray in the upper part and white in the lower part. The upper part of the subsoil extends to a depth of 46 inches and is mixed very dark grayish brown and black fine sand. The lower part of the subsoil is brown fine sand to a depth of 80 inches.

Typically, the surface layer of the Immokalee soils is very dark gray fine sand about 6 inches thick. The subsurface layer, which extends to a depth of 35 inches, is fine sand. It is gray in the upper part and white in the lower part. The subsoil is fine sand to a depth of 80 inches. It is black in the upper part, dark reddish brown in the next part, and dark brown in the lower part.

Typically, the surface layer of the Basinger soils is very dark gray fine sand 2 inches thick. The subsurface layer, which extends to a depth of 18 inches, is light gray fine sand. The subsoil, which extends to a depth of 36 inches, is mixed light brownish gray and brown fine sand. The substratum is light brownish gray fine sand to a depth of 80 inches.

The soils of minor extent in this map unit are Pomello and St. Johns soils.

Most areas of this map unit are used as pasture or still support native range. Some areas are used for citrus production.

3. Riviera-Pineda

Nearly level, poorly drained, sandy soils that have a loamy subsoil

This map unit occupies one large area and one small area in the northeastern part of the county.

This map unit consists of nearly level, poorly drained soils in broad, low areas of flatwoods, in sloughs, and in poorly defined drainageways. The natural vegetation mainly consists of maidencane, wax-myrtle, sand cordgrass, pineland threeawn, and chalky bluestem and includes scattered slash pine, cabbage palm, and saw palmetto.

This map unit makes up 13,978 acres, or about 2.8 percent of the survey area. It is about 44 percent Riviera soils, 29 percent Pineda soils, and 27 percent soils of minor extent.

Typically, the surface layer of the Riviera soils is black fine sand that has pockets of gray fine sand. It is about 7 inches thick. The subsurface layer, which extends to a depth of 27 inches, is light gray, light brownish gray, very pale brown, and grayish brown fine sand. The subsoil, which extends to a depth of 40 inches, is gray and light gray fine sandy loam and sand having yellowish brown mottles. The substratum is grayish brown sandy loam to a depth of 80 inches.

Typically, the surface layer of the Pineda soils is very dark grayish brown and very dark gray fine sand about 6 inches thick. The subsurface layer, which extends to a depth of 38 inches, is yellowish brown, strong brown, pale brown, and light gray fine sand that has yellowish red mottles. The subsoil, which extends to a depth of 52 inches, is olive gray sandy loam that has yellowish brown mottles. The substratum is gray sandy loam to a depth of 80 inches.

The soils of minor extent in this map unit are Ft. Drum and Wabasso soils.

Most areas of this map unit are used as pasture or still support native range. Some areas are used for citrus production.

4. Valkaria-Basinger-Myakka

Nearly level, poorly drained, sandy soils that have an organically coated subsoil

This map unit occupies a large area in the northern part of the county and several smaller areas in the central part.

This map unit consists of nearly level, poorly drained soils in areas of flatwoods and in sloughs. The natural vegetation in the areas of flatwoods is mainly saw palmetto and includes scattered slash pine, gallberry, wax-myrtle, and pineland threeawn. The natural vegetation in the sloughs consists of scattered slash pine, cabbage palm, saw palmetto, wax-myrtle, sand cordgrass, pineland threeawn, and chalky bluestem.

This map unit makes up 69,880 acres, or about 14.0 percent of the survey area. It is about 46 percent Valkaria soils, 20 percent Basinger soils, 19 percent Myakka soils, and 15 percent soils of minor extent.

Typically, the surface layer of the Valkaria soils is very dark gray fine sand about 6 inches thick. The subsurface layer, which extends to a depth of 19 inches, is grayish brown fine sand. The subsoil, which extends to a depth of 46 inches, is fine sand. In the upper part, it is brownish yellow and dark yellowish brown. In the lower part, it is yellowish brown and has brown mottles. The substratum is white fine sand to a depth of 80 inches.

Typically, the surface layer of the Basinger soils is very dark gray fine sand about 2 inches thick. The subsurface layer, which extends to a depth of 18 inches, is light gray fine sand. The subsoil, which extends to a depth of 36 inches, is mixed light brownish gray and brown fine sand. The substratum is light brownish gray fine sand to a depth of 80 inches.

Typically, the surface layer of the Myakka soils is black fine sand about 4 inches thick. The subsurface layer, which extends to a depth of 27 inches, is fine sand. It is gray in the upper part and white in the lower part. The upper part of the subsoil extends to a depth of 46 inches and is mixed very dark grayish brown and black fine sand. The lower part is brown sand fine to a depth of 80 inches.

The soils of minor extent in this map unit are Pineda, Riviera, and St. Johns soils.

Most areas of this map unit are used as pasture or still support native range. Some areas are used for citrus production.

5. Riviera-Basinger-Myakka

Nearly level, poorly drained, sandy soils; some that have a loamy subsoil and some that have an organically coated subsoil

This map unit occupies several areas in the northern part of the county.

This map unit consists of nearly level, poorly drained soils in areas of flatwoods and in sloughs. The natural vegetation in the areas of flatwoods is mainly saw palmetto and includes scattered slash pine, gallberry, wax-myrtle, and pineland threeawn. The natural vegetation in the sloughs consists of scattered slash pine, cabbage palm, saw palmetto, wax-myrtle, sand cordgrass, pineland threeawn, and chalky bluestem.

This map unit makes up 9,984 acres, or about 2.0 percent of the survey area. It is about 37 percent Riviera soils, 23 percent Basinger soils, 22 percent Myakka soils, and 18 percent soils of minor extent.

Typically, the surface layer of the Riviera soils is black fine sand that has pockets of gray fine sand. It is about 7 inches thick. The subsurface layer, which extends to a depth of 27 inches, is light gray, light brownish gray, very pale brown, and grayish brown fine sand. The subsoil, which extends to a depth of 40 inches, is gray and light gray fine sandy loam and sand having yellowish brown mottles. The substratum is grayish brown sandy loam to a depth of 80 inches.

Typically, the surface layer of the Basinger soils is very dark gray fine sand about 2 inches thick. The subsurface layer, which extends to a depth of 18 inches, is light gray fine sand. The subsoil, which extends to a depth of 36 inches, is mixed light brownish gray and brown fine sand. The substratum is light brownish gray fine sand to a depth of 80 inches.

Typically, the surface layer of the Myakka soils is black fine sand about 4 inches thick. The subsurface layer, which extends to a depth of 27 inches, is fine sand. It is gray in the upper part and white in the lower part. The upper part of the subsoil extends to a depth of 46 inches and is mixed very dark grayish brown and black fine sand. The lower part of the subsoil is brown sand to a depth of 80 inches.

The soils of minor extent in this map unit are Pineda, Valkaria, and Wabasso soils.

Most areas of this map unit are used as pasture or still support native range. Some areas are used for citrus production.

6. Wabasso-Parkwood-Bradenton

Nearly level, poorly drained, sandy soils that have a loamy subsoil

This map unit occupies several areas in the northeastern and central parts of the county.

This map unit consists of nearly level, poorly drained soils on low flats, on cabbage palm hammocks, and in areas of flatwoods adjacent to sloughs and streams. The natural vegetation in the areas of the flatwoods is mainly saw palmetto and includes scattered slash pine, gallberry, wax-myrtle, and pineland threeawn. The natural vegetation in the sloughs consists of scattered slash pine, cabbage palm, saw palmetto, wax-myrtle, sand cordgrass, pineland threeawn, and chalky bluestem. The natural vegetation on the hammocks is dominated by cabbage palm and oak trees and includes some scattered saw palmetto and pineland threeawn.

This map unit makes up 6,989 acres, or about 1.4 percent of the survey area. It is about 40 percent Wabasso soils, 24 percent Parkwood soils, 16 percent Bradenton soils, and 20 percent soils of minor extent.

Typically, the surface layer of the Wabasso soils is very dark gray fine sand about 4 inches thick. The subsurface layer, which extends to a depth of 16 inches, is gray fine sand. The subsoil, which extends to a depth of 32 inches, is also fine sand. It is dark reddish brown in the upper part and very pale brown in the lower part. The upper part of the substratum is gray fine sandy loam that has brownish yellow mottles.

The next part of the substratum is light gray loamy fine sand. The lower part of the substratum to a depth of 80 inches is gray fine sand.

Typically, the surface layer of the Parkwood soils is very dark gray and black fine sand about 9 inches thick. The subsoil, which extends to a depth of 52 inches, is gray fine sandy loam and loamy fine sand and is calcareous. The substratum to a depth of 80 inches is light gray loamy fine sand that has a few calcareous nodules.

Typically, the surface layer of the Bradenton soils is very dark gray fine sand about 4 inches thick. The subsurface layer, which extends to a depth of 10 inches, is grayish brown fine sand. The subsoil, which extends to a depth of 26 inches, is mixed dark gray and gray fine sandy loam that has common white calcium carbonate accumulations. The substratum to a depth of 80 inches is mixed white and light brownish gray fine sandy loam that has many calcareous nodules.

The soils of minor extent in this map unit are Ft. Drum, Pineda, and Riviera soils.

Most areas of this map unit are used as pasture or still support native range. Some areas are used for citrus production.

Soils of the Swamps, Marshes, and Flood Plains

The two general soil map units in this group consist of nearly level, very poorly drained soils in swamps and marshes and on flood plains. They are located throughout the county. Some of the soils are organic and have a substratum of loamy material, and some are sandy. The sandy soils have a loamy substratum in some areas.

7. Floridana-Manatee-Placid

Nearly level, very poorly drained, sandy soils that are subject to ponding and flooding and that have a sandy or loamy substratum

This map unit occupies several areas throughout the county, including some areas on the flood plains along minor streams.

This map unit consists of nearly level, very poorly drained soils in swamps and marshes and adjacent to streams. The natural vegetation consists mainly of maidencane, arrowhead, pickerelweed, sawgrass, cutgrass, and St. Johnswort. It includes cypress and bay trees in some areas.

This map unit makes up 51,915 acres, or about 10.4 percent of the survey area. It is about 42 percent Floridana soils, 33 percent Manatee soils, 16 percent Placid soils, and 9 percent soils of minor extent.

Typically, the surface layer of the Floridana soils is black fine sand about 18 inches thick. The subsurface layer, which extends to a depth of 38 inches, is gray fine sand. The subsoil, which extends to a depth of 60 inches, is dark grayish brown fine sandy loam. The substratum is grayish brown loamy fine sand to a depth of 80 inches.

Typically, the surface layer of the Manatee soils is black loamy fine sand about 18 inches thick. The subsoil, which extends to a depth of 36 inches, is mixed very dark grayish brown and dark gray fine sandy loam that has light gray streaks of fine sand. The substratum is dark gray fine sandy loam in the upper part and is light gray fine sandy loam in the lower part to a depth of 80 inches. It has common calcium carbonate nodules throughout.

Typically, the surface layer of the Placid soils is fine sand about 20 inches thick. It is black in the upper part and very dark gray in the lower part. The substratum is fine sand. It is gray in the upper part, is grayish brown in the next part, and is dark grayish brown in the lower part to a depth of 80 inches. It has very dark gray mottles throughout.

The soils of minor extent in this map unit are Okeelanta and Terra Ceia soils.

Most areas of this map unit remain in their natural state. A few small areas have been cleared for pasture.

8. Manatee-Floridana-Tequesta

Nearly level, very poorly drained, sandy soils that are subject to flooding; some that are organic and have a loamy subsoil and some that are sandy and have a loamy substratum

This map unit is along the Kissimmee River and the other large streams in the county.

This map unit consists of nearly level, very poorly drained soils adjacent to the major streams in the county. The natural vegetation consists mainly of maidencane, arrowhead, pickerelweed, sawgrass, cutgrass, and St. Johnswort. It includes cypress and bay trees in some areas.

This map unit makes up 39,936 acres, or about 8.0 percent of the survey area. It is about 38 percent Manatee soils, 25 percent Floridana soils, 22 percent Tequesta soils, and 15 percent soils of minor extent.

Typically, the surface layer of the Manatee soils is black loamy fine sand about 18 inches thick. The subsoil, which extends to a depth of 36 inches, is mixed very dark grayish brown and dark gray fine sandy loam that has light gray streaks of fine sand. The substratum is dark gray fine sandy loam in the upper part and is gray fine sandy loam in the lower part to a depth of 80 inches. It has common calcium carbonate nodules throughout.

Typically, the surface layer of the Floridana soils is black fine sand about 18 inches thick. The subsurface layer, which extends to a depth of 38 inches, is gray fine sand. The subsoil, which extends to a depth of 60 inches, is dark grayish brown fine sandy loam. The substratum is grayish brown loamy fine sand to a depth to 80 inches.

Typically, the surface layer of the Tequesta soils extends to a depth of about 18 inches. It is black muck in the upper part and black fine sand in the lower part. The subsurface layer, which extends to a depth of 33 inches, is light brownish gray fine sand. The subsoil, which extends to a depth of 62 inches, is dark gray fine sandy loam. The substratum is light gray fine sand to a depth of 80 inches.

The soils of minor extent in this map unit are Okeelanta and Placid soils.

Most areas of this map unit remain in their native state.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading “Use and Management of the Soils.”

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Myakka fine sand is a phase of the Myakka series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are associations or undifferentiated groups.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Basinger and Placid soils, depressional, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Manatee, Floridana, and Tequesta soils, occasionally flooded, is an undifferentiated group in this survey area.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

2—Basinger fine sand

This poorly drained and very poorly drained soil is in sloughs, in depressions, on low flats, and in poorly defined drainageways. Individual areas are irregular in shape. They range from 10 to more than 50 acres in size. Slopes are smooth, are slightly concave, and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 2 inches thick. The subsurface layer, which extends to a depth of about 18 inches, is light gray fine sand. The subsoil, which extends to a depth of about 36 inches, is brown and light brownish gray fine sand that has yellowish brown mottles. The substratum is light brownish gray fine sand to a depth of 80 inches.

Included in mapping are small areas of Immokalee, Myakka, Placid, and St. Johns soils. Immokalee, Myakka, and St. Johns soils have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. Placid soils have a dark, thick surface layer. The included soils make up 10 to 25 percent of the mapped area in 85 percent of the areas mapped as Basinger fine sand.

The seasonal high water table in the Basinger soil is at the surface to a depth of 12 inches from June through February. During the remainder of the year, it is typically at a depth of 12 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid. Available water capacity, natural fertility, and organic matter content are low.

Most areas of this soil still support the natural vegetation of maidencane, chalky bluestem, wax-myrtle, pineland threeawn, and scattered saw palmetto and slash pine. Some areas have been cleared for pasture and citrus production.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass, bahiagrass, and white clover produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Proper site preparation helps to minimize plant competition. South Florida slash pine and slash pine are preferred for planting.

This soil has moderate to high potential for producing significant amounts of desirable range plants, such as blue maidencane, chalky bluestem, and bluejoint panicum. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the Slough ecological community.

This soil is poorly suited to urban development. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing can help to overcome these limitations.

The capability subclass is IVw.

3—Basinger and Placid soils, depressional

These very poorly drained soils are in swamps, marshes, and low lying areas. Individual areas are generally circular or slightly elongated in shape. They range from 10 to more than 35 acres in size. Slopes are smooth to concave and range from 0 to 2 percent.

The composition of this map unit is variable, but the mapping was sufficiently controlled to evaluate the soils for the expected uses. Some areas mainly consist of a single soil, and other areas contain both soils in varied proportions.

Basinger and similar soils make up about 55 percent of the map unit. Typically, the surface layer is very dark gray fine sand about 2 inches thick. The subsurface layer, which extends to a depth of about 18 inches, is light gray fine sand. The subsoil, which extends to a depth of about 36 inches, is brown and light brownish gray fine sand and brown fine sand having yellowish brown mottles. The substratum is light brownish gray fine sand to a depth 80 of inches.

Placid and similar soils make up about 45 percent of the map unit. Typically, the upper part of the surface layer extends to a depth of 10 inches, is black fine sand, and has stripped areas or pockets of dark gray and gray. The lower part of the surface layer extends to a depth of 20 inches, is very dark gray fine sand, and has black, dark gray, and very grayish brown tongues and pockets. The upper part of the substratum is gray fine sand that has very dark gray and dark gray mottles, the next part is grayish brown fine sand that has very dark gray and very dark grayish brown mottles, and the lower part to a depth of 80 inches is dark grayish brown fine sand that has very dark gray mottles.

Included in mapping are small areas of Myakka and St. Johns soils. These included soils are in the slightly higher landscape positions and have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. The included soils make up 5 to 10 percent of the mapped area in 90 percent of the areas mapped as Basinger and Placid soils, depressional.

From June through March, the seasonal high water table is at the surface to 24 inches above the surface. During the remainder of the year, it is typically at the surface to a depth of 12 inches. It may, however, recede below 12 inches during extended dry periods. Permeability is rapid. Available water capacity and natural fertility are low.

Most areas of this map unit still support the natural vegetation of sawgrass, maidencane, pickerelweed, and St. Johnswort.

This map unit is not suited to cultivated crops, citrus production, pasture and hay crops, or forest production. Wetness and ponding are severe limitations.

This map unit has moderate potential for producing significant amounts of desirable range plants, such as maidencane and cutgrass. This map unit can produce excellent forage for cattle during dry periods and the winter months. A well managed range plan that includes proper stocking rates and cattle rotation is needed to maintain the range in a productive state. This map unit is in the Freshwater Marshes and Ponds ecological community.

This map unit is not suited to urban development or to recreational development. Wetness and ponding are severe limitations.

The capability subclass is VIIw.

4—Bradenton fine sand

This poorly drained soil is dominantly on low lying ridges and flood plains. Individual areas are irregular in shape. They range from 5 to more than 25 acres in size. Slopes are smooth, are slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 4 inches thick. The subsurface layer, which extends to a depth of about 10 inches, is grayish brown fine sand that has dark gray mottles. The subsoil, which extends to a depth of 26 inches, is fine sandy loam. In the upper part, it is dark gray and has yellowish brown mottles. In the lower part, it is gray and has yellowish brown and olive brown mottles. The upper 10 inches of the substratum is white fine sandy loam. The lower part of the substratum to a depth of 80 inches is light brownish gray fine sandy loam that has light olive brown and olive brown mottles.

Included in mapping are small areas of Ft. Drum, Parkwood, Riviera, and Wabasso soils. Ft. Drum soils do not have loamy horizons. Parkwood soils have a thick, dark A horizon. Riviera soils have a loamy horizon at a depth of 20 to 40 inches. Wabasso soils are in areas of flatwoods and have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. The included soils make up 9 to 25 percent of the mapped area in 80 percent of the areas mapped as Bradenton fine sand.

The seasonal high water table in the Bradenton soil is at a depth of 6 to 18 inches from June through September. During the remainder of the year, it is typically at a depth of 12 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is moderate. Available water capacity, natural fertility, and organic matter content are low.

Most areas of this soil still support the natural vegetation of cabbage palm and oak with an understory of saw palmetto, wax-myrtle, pineland threeawn, and various bluestems. Some areas have been cleared for pasture.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass and bahiagrass produce higher yields if well managed. Applications of fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Proper site preparation helps to minimize plant competition. Slash pine is preferred for planting.

This soil has low potential for range production. Due to the large amount of shade produced by cabbage palms, areas of this soil are preferred resting places for livestock and are therefore generally severely grazed. This soil is in the Wetland Hardwood Hammocks ecological community.

This soil is poorly suited to urban development. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and sandy textures are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IIIw.

5—Valkaria fine sand

This poorly drained soil is in sloughs, on low flats, in depressions, and in poorly defined drainageways. Individual areas are irregular in shape. They range from 10 to more than 100 acres in size. Slopes are smooth, are slightly concave, and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer, which extends to a depth of about 19 inches, is grayish brown fine sand. The subsoil, which extends to a depth of about 46 inches, is fine sand. In the upper part, it is brownish yellow and has dark yellowish brown mottles. In the lower part, it is yellowish brown and has very pale brown, dark grayish brown, and dark yellowish brown mottles. The substratum is white fine sand to a depth of 80 inches.

Included in mapping are small areas of Ft. Drum, Pineda, and Riviera soils. Ft. Drum soils have a calcareous horizon. Pineda and Riviera soils are in landscape positions similar to those of the Valkaria soil but have a loamy horizon. The included soils make up 2 to 24 percent of the mapped area in 90 percent of the areas mapped as Valkaria fine sand.

The seasonal high water table in the Valkaria soil is at the surface to a depth of 12 inches from June through September. During the remainder of the year, it is typically at a depth of 12 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid. Available water capacity, natural fertility, and organic matter content are low.

Most areas of this soil still support the natural vegetation of maidencane, chalky bluestem, wax-myrtle, pineland threeawn, and scattered saw palmetto and slash pine. Some areas have been cleared for pasture and citrus production.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass, bahiagrass, and white clover produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Proper site preparation helps to minimize plant competition. South Florida slash pine and slash pine are preferred for planting.

This soil has moderate to high potential for producing significant amounts of blue maidencane, chalky bluestem, and bluejoint panicum. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the Slough ecological community.

This soil is poorly suited to urban development. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IVw.

6—Manatee loamy fine sand, depressional

This very poorly drained soil is in depressions, in broad drainageways, and on flood plains. Individual areas are irregular in shape. They range from 3 to more than 40 acres in size. Slopes are smooth, are slightly concave, and range from 0 to 2 percent.

Typically, the surface layer is black loamy fine sand about 18 inches thick. It has a few light gray sand grains. The upper part of the subsoil extends to a depth of 24 inches, is very dark grayish brown sand, and has a few streaks and pockets of light gray. The lower part of the subsoil extends to a depth of about 36 inches, is dark gray fine sandy loam, and has olive brown mottles and streaks of gray sand. The upper part of the substratum is dark gray fine sandy loam, has grayish brown mottles, and has masses and nodules of calcium carbonate. The lower part to a depth of 80 inches is light gray fine sandy loam that has greenish gray and bluish gray mottles and has masses and nodules of calcium carbonate.

Included in mapping are small areas of Floridana, Parkwood, and Placid soils. Floridana soils have a sandy horizon that ranges from 30 to 40 inches in thickness. Parkwood soils have a thinner A horizon than that of the Manatee soil. Placid soils do not have a loamy horizon. The included soils make up 5 to 25 percent of the mapped area in 80 percent of the areas mapped as Manatee loamy fine sand, depressional.

The seasonal high water table in the Manatee soil is at the surface to 24 inches above the surface from June through March. During the remainder of the year, it is typically at the surface to a depth 12 inches. It may, however, recede below 12 inches during extended dry periods. Permeability is moderate. Available water capacity is moderate in the surface layer and moderate to high in the subsoil. Natural fertility is medium. Organic matter content is high in the surface layer.

Most areas of this soil still support the natural vegetation of maidencane, arrowhead, pickerelweed, and sawgrass.

This soil is not suited to cultivated crops, citrus production, pasture and hay crops, or forest production. Wetness and ponding are management concerns.

This soil has moderate potential for producing significant amounts of desirable range plants, such as blue maidencane, chalky bluestem, and bluejoint panicum. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. Cattle graze these areas during the winter months when other range plants are of lesser value and quantity and the water table is below the surface. This soil is in the Freshwater Marshes and Ponds ecological community.

This soil is not suited to urban development or to recreational development. Wetness and ponding are management concerns.

The capability subclass is VIIw.

7—Floridana, Riviera, and Placid soils, depressional

These very poorly drained soils are in freshwater swamps and marshes and in low lying areas. Areas are irregular in shape or oval. They range from 5 to more than 100 acres in size. Slopes are smooth, are slightly concave, and range from 0 to 2 percent.

The composition of this map unit is variable, but the mapping was sufficiently controlled to evaluate the soils for the expected uses. Some areas mainly consist of only one soil, and other areas contain two or all three soils in varied proportions.

Floridana and similar soils make up about 45 percent of the map unit. Typically, the surface layer is black fine sand about 18 inches thick. The subsurface layer, which extends to a depth of about 38 inches, is gray fine sand. The subsoil, which extends to a depth of about 60 inches, is dark grayish brown fine sandy loam that has yellowish brown mottles. The substratum to a depth 80 inches is grayish brown loamy fine sand.

Riviera and similar soils make up about 35 percent of the map unit. Typically, the surface layer is fine sand 7 inches thick. It is black in the upper part and gray in the lower part. The subsurface layer, which extends to a depth of about 22 inches, is also fine sand. In the upper part, it is light brownish gray and has brownish yellow mottles. In the next part, it is light gray and has brownish yellow mottles. In the lower part, it is very pale brown and has brownish yellow mottles. The subsoil, which extends to a depth of 40 inches, is fine sandy loam. In the upper part, it is light gray and has tongues of very pale brown sand. In the lower part, it is mixed light gray and gray and has yellowish brown mottles. The substratum to a depth 80 inches is grayish brown sandy loam.

Placid and similar soils make up about 20 percent of the map unit. Typically, the surface layer is fine sand 20 inches thick. In the upper part, it is black and has stripped areas or pockets of dark gray and gray. In the lower part, it is very dark gray and has black, dark gray, and very grayish brown tongues and pockets. The substratum is also fine sand. In the upper part, it is gray and has dark gray and very dark gray mottles. In the next part, it is grayish brown and has very dark gray and very dark grayish brown mottles. In the lower part to a depth of 80 inches, it is dark grayish brown and has very dark gray mottles.

Included in mapping are small areas of Manatee and Okeelanta soils in landscape positions similar to those of the Floridana, Riviera, and Placid soils. Manatee soils have a loamy horizon within a depth of 20 inches. Okeelanta soils are organic. The included soils make up about 5 to 10 percent of the map unit in 90 percent of the areas mapped as Floridana, Riviera, and Placid soils, depressional.

From June through March, the seasonal high water table is at the surface to 24 inches above the surface. During the remainder of the year, it is typically at the surface to a depth 12 inches. It may, however, recede below 12 inches during extended dry periods. Permeability is very slow in the Floridana soil and rapid in the Placid soil. In the Riviera soil, it is rapid in the surface layer and slow or very slow in the subsoil. Available water capacity is low, except in the subsoil of Floridana and Riviera soils, where it is moderate. Natural fertility is low.

Most areas of this map unit still support the natural vegetation of sawgrass, maidencane, pickerelweed, and St. Johnswort.

This map unit is not suited to cultivated crops, citrus production, pasture and hay crops, or forest production. Wetness and ponding are severe limitations.

This map unit has moderate potential for producing significant amounts of desirable range plants. Maidencane and cutgrass are the most desirable. This map unit can produce excellent forage for cattle during dry periods and the winter months. A well managed range plan that includes proper stocking rates and cattle rotation helps to maintain the range in a productive state. This map unit is in the Freshwater Marshes and Ponds ecological community.

This map unit is not suited to urban development or to recreational development. Wetness and ponding are severe limitations.

The capability subclass is VIIw.

8—Pineda fine sand

This poorly drained soil is in broad, low areas of flatwoods, in sloughs, and in poorly defined drainageways. Individual areas are irregular in shape. They range from 20 to more than 40 acres in size. Slopes are smooth, are slightly concave or slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The upper part of the subsurface layer, to a depth of 6 inches, is dark gray fine sand. In sequence downward, the lower part of the subsurface layer is 6 inches of yellowish brown fine sand that has yellowish red mottles, 9 inches of strong brown fine sand that has yellowish red mottles, and 17 inches of pale brown fine sand. Below this is 4 inches of light gray fine sand. The subsoil extends to a depth of about 52 inches, is olive gray sandy loam, has olive brown and olive mottles, and has tongues of light gray sand. The substratum to a depth of 80 inches is gray sandy loam.

Included in mapping are small areas of Riviera, Valkaria, and Wabasso soils. Riviera soils do not have a sandy, yellowish brown horizon. Valkaria soils are sandy throughout. Wabasso soils are in areas of flatwoods and have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. The included soils make up 2 to 24 percent of the mapped area in 90 percent of the areas mapped as Pineda fine sand.

The seasonal high water table in the Pineda soil is at the surface to a depth of 12 inches from June through November. During the remainder of the year, it is typically at a depth of 12 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid in the surface layer and slow or very slow in the subsoil. Available water capacity is low in the surface layer and moderate in the subsoil. Natural fertility is low. Organic matter content is low.

Most areas of this soil still support the natural vegetation of maidencane, chalky bluestem, wax-myrtle, pineland threeawn, and scattered saw palmetto and slash pine. Some areas have been cleared for pasture and citrus production.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass, bahiagrass, and white clover produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Proper site preparation helps to minimize plant competition. South Florida slash pine and slash pine are preferred for planting.

This soil has moderate to high potential for producing significant amounts of blue maidencane, chalky bluestem, and bluejoint panicum. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the Slough ecological community.

This soil is poorly suited to urban uses. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IIIw.

9—Riviera fine sand

This poorly drained soil is in broad, low areas of flatwoods, in sloughs, and in poorly defined drainageways. Individual areas are irregular in shape. They range from 20 to more than 100 acres in size. Slopes are smooth, are slightly concave or slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is fine sand about 7 inches thick. It is black in the upper part and gray in the lower part. The subsurface layer, which extends to a depth of about 22 inches, is also fine sand. In the upper part, it is light brownish gray and has brownish yellow mottles. In the next part, it is light gray and has brownish yellow mottles. In the lower part, it is very pale brown and has brownish yellow mottles. The subsoil extends to a depth of 40 inches. In the upper part, it is light gray fine sandy loam and has tongues of very pale brown sand. In the lower part, it is mixed light gray and gray fine sandy loam that has yellowish brown mottles. The substratum is grayish brown sandy loam to a depth of 80 inches.

Included in mapping are small areas of Bradenton, Pineda, Valkaria, and Wabasso soils. Bradenton soils have a loamy horizon at a depth of less than 20 inches and typically are on hammocks. Pineda and Valkaria soils do not have a loamy horizon. Wabasso soils are in areas of flatwoods and have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. The included soils make up 0 to 20

Figure 2.—Sorghum growing in an area of Riviera fine sand.

percent of the mapped area in 95 percent of the areas mapped as Riviera fine sand.

The seasonal high water table in the Riviera soil is at the surface to a depth of 12 inches from June through December. During the remainder of the year, it is typically at a depth of 12 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid in the surface and subsurface layers and slow or very slow in the subsoil. Available water capacity is low in the surface and subsurface layers and moderate in the subsoil. Natural fertility and organic matter content are low.

Most areas of this soil still support the natural vegetation of maidencane, various species of bluestem, wax-myrtle, panicums, and sand cordgrass, and scattered saw palmetto, cabbage palm, and slash pine. Some areas have been cleared for pasture, citrus production, or cultivated crops.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop (fig. 2).

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass, bahiagrass, and white clover produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, windthrow, seedling mortality, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Leaving an adequate number of trees in place helps to minimize the hazard of windthrow. Proper site preparation helps to minimize plant competition. Slash pine is preferred for planting.

This soil has moderate to high potential for producing significant amounts of maidencane, chalky bluestem, and bluejoint panicum. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the Slough ecological community.

This soil is poorly suited to urban development. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IIIw.

10—Ft. Drum fine sand

This poorly drained soil is on low ridges and flats next to sloughs, depressions, and drainageways. Individual areas are irregular in shape. They range from 10 to more than 75 acres in size. Slopes are smooth, are slightly concave or slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 3 inches thick. The upper part of the subsurface layer extends to a depth of about 5 inches and is dark gray fine sand. The lower part extends to a depth of about 17 inches, is brown fine sand, and has yellowish brown and very pale brown mottles. The subsoil, which extends to a depth of about 25 inches, is very pale brown fine sandy loam that has brownish yellow and yellow mottles. The upper part of the substratum is brownish yellow fine sand that has yellowish brown and very pale brown mottles, the next part is grayish brown fine sand that has yellowish brown mottles, and the lower part to a depth of 80 inches is gray fine sand.

Included in mapping are small areas of Bradenton, Parkwood, Pineda, and Wabasso soils. These included soils do not have a calcareous horizon. Wabasso soils are in areas of flatwoods and have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. Parkwood soils have a thick A horizon. The included soils make up 10 to 25 percent of the mapped area in 80 percent of the areas mapped as Ft. Drum fine sand.

The seasonal high water table in the Ft. Drum soil is at a depth of 6 to 18 inches from June through September. During the remainder of the year, it is typically at a depth of 18 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid, except in the subsoil, where it is moderate. Available water capacity is low, except in the subsoil, where it is moderate. Natural fertility and organic matter content are low.

Most areas of this soil still support the natural vegetation of cabbage palm and oak with an understory of saw palmetto, wax-myrtle, pineland threeawn, and various bluestems. Some areas have been cleared for pasture.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass and bahiagrass produce higher yields if well managed. Applications of fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, windthrow, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Leaving an adequate number of trees in place helps to minimize the hazard of windthrow. Proper site preparation helps to minimize plant competition. Slash pine and South Florida slash pine are preferred for planting.

This soil has moderate potential for range production. Areas of this soil can produce significant amounts of South Florida bluestem, chalky bluestem, creeping bluestem, and Indiangrass. This soil is in the Cabbage Palm Flatwoods ecological community.

This soil is poorly suited to urban development. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and sandy textures are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IVw.

11—Immokalee fine sand

This poorly drained soil is in broad areas of flatwoods. Individual areas are irregular in shape. They range from 15 to more than 100 acres in size. Slopes are smooth, are slightly concave or slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer, which extends to a depth of 35 inches, is fine sand. In the upper part, it is gray and has gray and dark gray mottles. In the lower part, it is light gray. The subsoil, which extends to a depth of 54 inches, is fine sand. In the upper part, it is black grading to dark reddish brown. In the lower part, it is dark reddish brown. The substratum to a depth of 80 inches is dark brown fine sand that has pale brown and light gray mottles.

Included in mapping are small areas of Basinger, Myakka, Pomello, and St. Johns soils. Basinger soils are in sloughs and do not have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. Myakka and St. Johns soils are in the landscape positions similar to those of the Immokalee soil and have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon within a depth of 30 inches. Pomello soils are on slightly higher ridges than the Immokalee soil and are better drained. The included soils make up 4 to 18 percent of the mapped area in 95 percent of the areas mapped as Immokalee fine sand.

The seasonal high water table in the Immokalee soil is at a depth of 6 to 18 inches from June through September. During the remainder of the year, it is typically at a depth of 18 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid in the surface and subsurface layers and moderate to moderately rapid in the subsoil. Available water capacity, natural fertility, and organic matter content are low.

Most areas of this soil still support the natural vegetation of slash pine and scattered oak with an understory of saw palmetto, gallberry, fetterbush, pineland threeawn, chalky bluestem, and Indiangrass. Some areas have been cleared for pasture.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop (fig. 3).

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass, bahiagrass, and white clover produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, windthrow, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Leaving an adequate number of trees in place helps to minimize the hazard of windthrow. Proper site preparation helps to minimize plant competition. South Florida slash pine and slash pine are preferred for planting.

This soil has moderate potential for producing significant amounts of chalky bluestem, creeping bluestem, and Indiangrass. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the South Florida Flatwoods ecological community.

This soil is poorly suited to urban development.

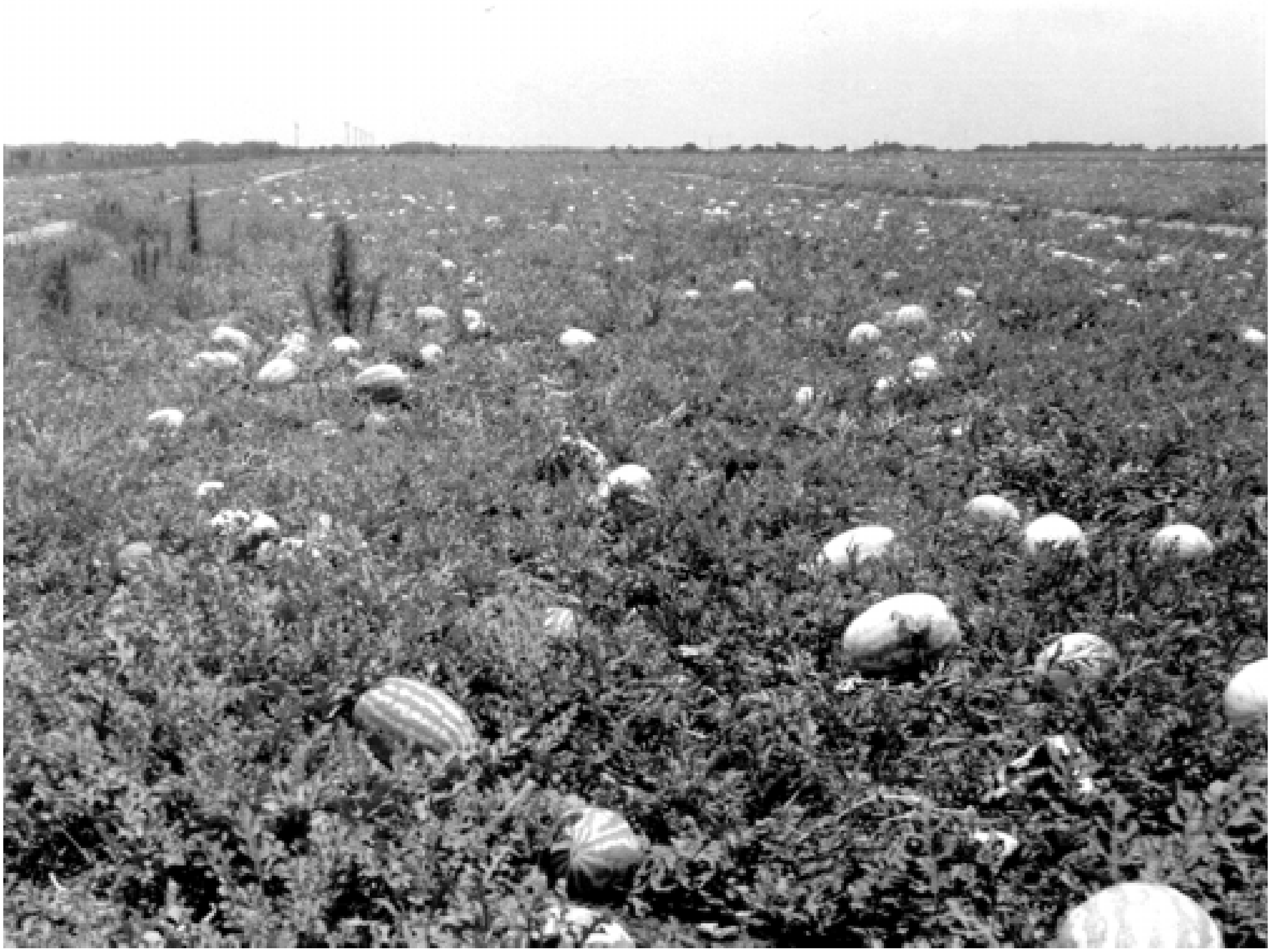


Figure 3.—Watermelons growing in an area of Immokalee fine sand.

Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and sandy textures are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IVw.

12—Udorthents, 2 to 35 percent slopes

This map unit consists of excessively drained, unconsolidated soil material that has been excavated from canals and redeposited along the side of the canal (fig. 4). The major extent of this unit is on the Herbert Hoover dike, which surrounds Lake Okeechobee, and next to the flood control canals along the Kissimmee River. The areas of this unit vary in size and shape. They are typically more than 6 feet deep and can be 25 to 30 feet deep. Slopes range from 2 to 35 percent. Areas of this unit are typically smoothed on the top and used as access roads.

The texture and thickness of the soil layers vary highly from site to site. A commonly observed profile, however, has a surface layer of olive gray sand 2 inches thick. Below this are various layers of fine sand and loamy materials from former natural soil layers. Colors vary from black, gray, and olive brown to white. Some areas have various amounts of shell fragments.

Included in mapping are small areas that are not in association with canals. These areas are normally in urban areas and consist of materials used to help maintain structures above the seasonal high water table. Also included are some areas where the slope is

Figure 4.—An area of Udorthents, 2 to 35 percent slopes. This soil makes up the Herbert Hoover dike, which was built to prevent flooding around Lake Okeechobee.

more than 35 percent. The included soils make up 0 to 10 percent of the mapped area in 95 percent of the areas mapped as Udorthents, 2 to 35 percent slopes.

The seasonal high water table is usually below a depth of 72 inches. Permeability is variable but is generally rapid. Available water capacity is also variable but usually is low. Natural fertility is low.

This map unit is not suited to cultivated crops, citrus production, pasture and hay crops, forest production, rangeland, or urban development, except as previously noted. This map unit has not been assigned a range site.

The capability subclass is VIIs.

13—Manatee, Floridana, and Tequesta soils, frequently flooded

These very poorly drained soils are in hardwood swamps and marshes that are part of the Kissimmee River basin. Individual areas are generally long and narrow and are dissected by stream action. They range from 25 to more than 50 acres in size. Slopes are dominantly 0 to 2 percent, but stream dissection has created numerous short, steep slopes.

The composition of this map unit is variable, but the mapping was sufficiently controlled to evaluate the soils for the expected uses. Some areas mainly consist of only one soil, and other areas contain two or all three soils in varied proportions.

Manatee and similar soils make up about 50 percent of the map unit. Typically, the surface layer is about 18 inches thick. It is black loamy fine sand and has light gray grains of sand. The upper part of the subsoil is very dark grayish brown sand that has a few streaks and pockets of light gray. The lower part of the subsoil to a depth of about 36 inches is dark gray fine sandy loam that has olive brown mottles and streaks of gray fine sand. The upper part of the substratum is dark gray fine sandy loam that has grayish brown mottles. The lower part of the substratum to a depth 80 inches is light gray fine sandy loam that has greenish gray and bluish gray mottles.

Floridana and similar soils make up about 30 percent of the map unit. Typically, the surface layer is black fine sand 18 inches thick. The subsurface layer, which extends to a depth of about 38 inches, is gray fine sand. The subsoil, which extends to a depth of about 60 inches, is dark grayish brown fine sandy loam that has yellowish brown mottles. The substratum is grayish brown loamy fine sand to a depth of 80 inches.

Tequesta and similar soils make up about 20 percent of the map unit. Typically, the upper part of the surface layer to a depth of 10 inches is black muck. The lower part to a depth of about 18 inches is black fine sand. The subsurface layer, which extends to a depth of about 33 inches, is light brownish gray fine sand. The subsoil, which extends to a depth of about 62 inches, is dark gray fine sandy loam that has dark grayish brown mottles. The substratum is light gray fine sand to a depth of 80 inches.

Included in mapping are small areas of Basinger, Okeelanta, Placid, and Riviera soils. Basinger and Riviera soils are in the higher positions on the landscape. Okeelanta and Placid soils do not have a loamy subsoil. The included soils make up about 10 to 15 percent of the mapped area in 85 percent of the areas mapped as Manatee, Floridana, and Tequesta soils, frequently flooded.

The seasonal high water table is highly variable. It is mainly dependent on the elevation above the stream bottom and the amount of rainfall. Rainfall over the watershed causes frequent flooding and ponding. Typically, the soils are flooded more than once during the year. The flooding results in yearly depositions or scouring of the surface or both. The water table fluctuates depending on stream flow. During the flooding, the soils are saturated or covered with water. During dry periods, the stream provides drainage to the soils, lowering the water table. Currently, the Kissimmee River channel artificially drains these soils, but there are plans to restore the river to its natural state. Permeability is rapid in the surface soil and moderate to very slow in the subsoil. Available water capacity is moderate. Organic matter content is high. Natural fertility is medium.

Most areas of this map unit still support the natural vegetation of sawgrass, maidencane, cutgrass, pickerelweed, and St. Johnswort.

This map unit is not suited to cultivated crops, citrus production, pasture and hay crops, or forest production. Wetness and the flooding are severe limitations.

This map unit has moderate potential for producing significant amounts of desirable range plants. Maidencane and cutgrass are the most desirable. Areas of this map unit can produce excellent forage for cattle during dry periods and the winter months. A well managed range plan that includes proper stocking rates and cattle rotation helps to maintain the range in a productive state. This map unit is in the Freshwater Marshes and Ponds ecological community.

This map unit is not suited to urban development or to recreational development. Wetness and the flooding are severe limitations.

The capability subclass is VIIw.

14—Myakka fine sand

This poorly drained soil is in broad areas of flatwoods. Individual areas are irregular in shape. They range from 15 to more than 100 acres in size. Slopes are smooth, are slightly concave or slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 4 inches thick. The subsurface layer, which extends to a depth of 27 inches, is fine sand. It is gray in the upper part and white in the lower part. The subsoil, which extends to a depth of about 46 inches, is mixed very dark grayish brown and black fine sand. The substratum is brown fine sand to a depth of 80 inches.

Included in mapping are small areas of Basinger, Immokalee, Pomello, St. Johns, and Wabasso soils. Basinger soils are in depressions and sloughs and do not have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. Immokalee and Pomello soils have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon below a depth of 30 inches. Immokalee soils are in landscape positions similar to those of the Myakka soil. Pomello soils are in the higher landscape positions. St. Johns soils have a thicker A horizon than that of the Myakka soil. Wabasso soils have a loamy horizon below a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. The included soils make up 5 to 18 percent of the mapped area in 95 percent of the areas mapped as Myakka fine sand.

The seasonal high water table in the Myakka soil is at a depth of 6 to 18 inches from June through September. During the remainder of the year, it is typically at a depth of 18 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid in the surface and subsurface layers and moderate or moderately rapid in the subsoil. Available water capacity is low in the surface layer and moderate in the subsoil. Natural fertility and organic matter content are low.

Most areas of this soil still support the natural vegetation of slash pine, scattered oak, saw palmetto,

Figure 5.—Saw palmetto and slash pine in a typical area of South Florida Flatwoods. The soil is Myakka fine sand, which is the Florida State soil.

gallberry, fetterbush, pineland threeawn, chalky bluestem, and low panicum (fig. 5). Some areas have been cleared for pasture.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass, bahiagrass, and white clover produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, windthrow, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Leaving an adequate number of trees in place helps to minimize the hazard of windthrow. Proper site preparation helps to minimize plant competition. South Florida slash pine, long leaf pine, and slash pine are preferred for planting.

This soil has moderate potential for producing significant amounts of chalky bluestem, creeping bluestem, and Indiangrass. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the South Florida Flatwoods ecological community.

This soil is poorly suited to urban development. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IVw.

15—Okeelanta muck

This very poorly drained soil is in small depressions and large freshwater marshes and is subject to ponding much of the year. Individual areas are irregular in shape or oval. They range from 10 to more than 50 acres in size. Slopes are smooth, are slightly concave, and range from 0 to 2 percent.

Typically, the surface layer is muck 28 inches thick. It is black in the upper part and very dark brown in the lower part. The substratum to a depth of 80 inches is gray sand that has dark gray mottles.

Included in mapping are small areas of Placid and Terra Ceia soils. Placid soils are mineral soils and are at the outer edges of the mapped areas. Terra Ceia soils are in the same landscape positions as the Okeelanta soil but have organic layers having a combined thickness of more than 51 inches. The included soils make up 5 to 10 percent of the mapped area in 90 percent of the areas mapped as Okeelanta muck.

The seasonal high water table in areas of the Okeelanta soil is at the surface to 12 inches above the surface from June through January. During the remainder of the year, it is typically at the surface to a depth of 12 inches. It may, however, recede below a depth of 12 inches during extended dry periods. Permeability is rapid. Available water capacity is high. Natural fertility is medium. Organic matter content is high.

Most areas of this soil still support the natural vegetation of maidencane, arrowhead, pickerelweed, primrose willow, and sawgrass.

This soil is not suited to cultivated crops, citrus production, pasture and hay crops, or forest production. Wetness and ponding are management concerns.

This soil has moderate potential for producing significant amounts of maidencane and cutgrass. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. Cattle graze areas of this soil during the winter months when other range plants are of lesser value and quantity and the water table is below the surface. This soil is in the Freshwater Marshes and Ponds ecological community.

This soil is not suited to urban development or to recreational development. Wetness, low strength, and ponding are management concerns.

The capability subclass is VIIw.

17—Orsino fine sand

This moderately well drained soil is on elevated ridges and knolls. Individual areas are irregular in shape. They range from 10 to more than 30 acres in size. Slopes are smooth, are slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer, which extends to a depth of about 12 inches, is light gray fine sand. The subsoil, which extends to a depth of 14 inches, is dark reddish brown fine sand. In some places it has tongues or pockets of light gray, yellowish brown, or pale brown fine sand. The upper part of the substratum is brown fine sand, the next part is very pale brown fine sand that has brownish yellow and reddish yellow mottles, and the lower part to a depth of 80 inches is light gray fine sand that has brownish yellow and yellow mottles.

Included in mapping are small areas of Immokalee and Pomello soils. These included soils are at the lower elevations and have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. The included soils make up 10 to 15 percent of the mapped area in 90 percent of the areas mapped as Orsino fine sand.

The seasonal high water table in the Orsino soil is at a depth of 48 to 60 inches from June through December. During the remainder of the year, it is below a depth of 60 inches. Permeability is rapid. Available water capacity, natural fertility, and organic matter content are low.

Most areas of this soil still support the natural vegetation of slash pine, sand pine, scrub oak, and pineland threeawn.

This soil is poorly suited to cultivated crops. Droughtiness and rapid leaching of plant nutrients are management concerns. A well designed water-control system that provides irrigation water during dry periods is needed. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is suited to citrus production. Droughtiness and leaching of plant nutrients are management concerns. A well designed water-control system should provide water for irrigation year-round. Plant cover should be maintained between rows. Proper management also includes regular applications of fertilizer and lime.

This soil is poorly suited to pasture and hay land. Droughtiness is a management concern. Pangolagrass and bahiagrass are the best adapted species. Controlled grazing is needed to maintain plant vigor.

This soil is poorly suited to forest production. Seedling mortality, equipment limitations, and plant competition are management concerns. Increasing the planting rate helps to offset the seedling mortality rate. Scheduling harvesting during the rainy season helps to minimize the equipment limitations. Proper site preparation helps to minimize plant competition. South Florida slash pine, slash pine, and sand pine are preferred for planting.

This soil has low potential for range production. The vegetative community consists of a dense woody understory that is seldom grazed by cattle. This soil is in the Sand Pine Scrub ecological community.

This soil has high potential for most urban uses.

This soil has moderate potential for recreational development. The sandy texture of the surface layer is a limitation. Adding suitable topsoil or resurfacing can help to overcome this limitation.

The capability subclass is IVs.

18—Parkwood fine sand

This poorly drained soil is on low, broad flats and cabbage palm hammocks. Individual areas are irregular in shape. They range from 5 to more than 35 acres in size. Slopes are smooth, are slightly concave or slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is fine sand 9 inches thick. It is very dark gray in the upper part and black in the lower part. The subsoil extends to a depth of 52 inches. In the upper part, it is gray fine sandy loam that has yellowish brown mottles. In the next part, it is gray loamy fine sand that has yellowish brown mottles and white carbonates. In the lower part, it is light gray loamy fine sand that has yellowish brown mottles. The substratum to a depth of 80 inches is light gray loamy fine sand that has yellowish brown mottles and has a few semihard carbonate pebbles.

Included in mapping are small areas of Bradenton and Ft. Drum soils in landscape positions similar to those of the Parkwood soil. These included soils have a thinner surface layer than that of the Parkwood soil. The included soils make up 0 to 20 percent of the mapped area in 95 percent of the areas mapped as Parkwood fine sand.

The seasonal high water table in the Parkwood soil is at the surface to a depth of 12 inches from June through September. During the remainder of the year, it is typically at a depth of 12 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid in the surface layer and moderate in the subsoil. Available water capacity is moderate. Natural fertility is medium. Organic matter content is low.

Most areas of this soil still support the natural vegetation of cabbage palm and oak with an understory of scattered saw palmetto, greenbrier, and panicums.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass, white clover, and bahiagrass produce higher yields if well managed. Applications of fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Proper site preparation helps to minimize plant competition. South Florida slash pine is preferred for planting.

This soil has low potential for range production. Due to the large amount of shade produced by cabbage palms, areas of this soil are preferred resting places for livestock and are therefore generally severely grazed. This soil is in the Wetland Hardwood Hammocks ecological community.

This soil is poorly suited to urban development. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IIIw.

19—Floridana, Placid, and Okeelanta soils, frequently flooded

These very poorly drained soils are in hardwood swamps and marshes that are part of the major drainageways, except for the Kissimmee River basin, and are dissected by stream action. Individual areas are generally long and narrow. They range from 20 to more than 50 acres in size. Slopes are dominantly 0 to 2 percent, but stream dissection has created numerous short, steep slopes.

The composition of this map unit is variable, but the mapping was sufficiently controlled to evaluate the soils for the expected uses. Some areas mainly consist of only one soil, and others areas contain two or all three soils in varied proportions.

Floridana and similar soils make up about 45 percent of the map unit. Typically, the surface layer is black fine sand 18 inches thick. The subsurface layer, which extends to a depth of about 38 inches, is gray fine sand. The subsoil, which extends to a depth of about 60 inches, is dark grayish brown fine sandy loam that has yellowish brown mottles. The substratum is grayish brown loamy fine sand to a depth of 80 inches.

Placid and similar soils make up about 30 percent of the map unit. Typically, the upper part of the surface layer extends to a depth of 10 inches, is black fine sand, and has stripped areas or pockets of dark gray and gray sand. The lower part of the surface layer extends to a depth of 20 inches, is very dark gray fine sand, and has black, dark gray, and very grayish brown tongues and pockets. The upper part of the substratum is gray fine sand that has dark gray mottles, the next part is grayish brown fine sand that has very dark gray and very dark grayish brown mottles, and the lower part to a depth 80 inches is dark grayish brown fine sand that has very dark gray mottles.

Okeelanta and similar soils make up about 25 percent of the map unit. Typically, the surface layer is muck 28 inches thick. It is black in the upper part and very dark brown in the lower part. The substratum to a depth of 80 inches is gray sand that has dark gray mottles.

Included in mapping are small areas of Basinger, Myakka, St. Johns, Riviera, and Valkaria soils. These included soils are at the edges of the mapped areas and are at slightly higher elevations. The included soils make up about 10 to 25 percent of the mapped area in 80 percent of the areas mapped as Floridana, Placid, and Okeelanta soils, frequently flooded.

The seasonal high water table is highly variable and is mainly dependent on the elevation above the stream bottom and the amount of rainfall. Rainfall over the watershed causes frequent flooding and ponding. Typically, the soils are flooded more than once during the year. The flooding results in yearly depositions or scouring of the surface or both. The water table fluctuates depending on stream flow. During the flooding, the soils are saturated or covered with water. During dry periods, the stream provides drainage to the soils, lowering the water table. Permeability is moderately rapid or rapid in the surface soil and moderately slow or slow in the subsoil. Organic matter content is high. Natural fertility is medium.

Most areas of this map unit still support the natural vegetation of cypress and bay trees in the hardwood swamp areas and sawgrass, maidencane, cutgrass, pickerelweed, and St. Johnswort in the marsh areas.

This map unit is not suited to cultivated crops, citrus production, pasture and hay crops, or forest production. Wetness and the flooding are severe limitations.

This map unit has moderate potential for producing significant amounts of desirable range plants. Maidencane and cutgrass are the most desirable. This map unit can produce excellent forage for cattle during dry periods and the winter months. A well managed range plan that includes proper stocking rates and cattle rotation helps to maintain the range in a productive state. These soils are in the Freshwater Marshes and Ponds ecological community.

This map unit is not suited to urban development or to recreational development. Wetness and the flooding are severe limitations.

The capability subclass is VIIw.

20—Pomello fine sand, 0 to 5 percent slopes

This moderately well drained and somewhat poorly drained soil is on elevated knolls and ridges in areas of flatwoods. Individual areas are irregular in shape. They range from 5 to more than 30 acres in size. Slopes are smooth, are slightly convex, and range from 0 to 5 percent.

Typically, the surface layer is gray fine sand about 4 inches thick. The subsurface layer, which extends to a depth of about 42 inches, is white fine sand. The subsoil, which extends to a depth of 66 inches, is fine sand. In the upper part, it is dark reddish brown. In the lower part, it is brown and has dark brown mottles. The substratum is light gray fine sand to a depth of 80 inches.

Included in mapping are small areas of Immokalee, Myakka, Orsino, and St. Johns soils. Immokalee, Myakka, and St. Johns soils are at the lower elevations in the flatwoods and are poorly drained. Orsino soils are at the higher elevations and have a weakly developed, organic stained horizon. The included soils make up 10 to 15 percent of the mapped area in 90 percent of the areas mapped as Pomello fine sand, 0 to 5 percent slopes.

The seasonal high water table in the Pomello soil is at a depth of 24 to 42 inches from July through November. During the remainder of the year, it is below 42 inches. Permeability is moderately rapid. Available water capacity, natural fertility, and organic matter content are low.

Most areas of this soil still support the natural vegetation of slash pine, sand pine, scrub oak, saw palmetto, and pineland threeawn.

This soil is poorly suited to cultivated crops. Droughtiness and rapid leaching of plant nutrients are management concerns. A well designed water-control system that provides irrigation water during dry periods is needed. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is suited to citrus production. Droughtiness and leaching of plant nutrients are management concerns. A well designed water-control system should provide water for irrigation year-round. Plant cover should be maintained between rows. Proper management also includes regular applications of fertilizer and lime.

This soil has moderate potential for pasture and hay land. Droughtiness is a management concern. Pangolagrass and bahiagrass are the best adapted species. Controlled grazing is needed to maintain plant vigor.

This soil is poorly suited to forest production. Seedling mortality, windthrow, and plant competition are management concerns. Increasing the planting rate helps to offset the seedling mortality rate. Leaving an adequate number of trees in place helps to minimize the hazard of windthrow. Proper site preparation helps to minimize plant competition. South Florida slash pine, sand pine, and slash pine are preferred for planting.

This soil has low potential for range production. The vegetative community consists of a dense woody understory that is seldom grazed by cattle. This soil is in the Sand Pine Scrub ecological community.

This soil has moderate potential for most urban development. Wetness is a management concern. It can be overcome for most uses by water-control systems, such as ditching and mounding.

This soil has moderate potential for recreational development. The sandy texture of the surface layer is a limitation. Adding suitable topsoil or resurfacing can help to overcome this limitation.

The capability subclass is VIs.

21—Adamsville fine sand, organic substratum

This somewhat poorly drained soil is in narrow, elongated areas adjacent to Lake Okeechobee. This soil formed in sandy material that was deposited by wave action over organic material that had developed in a former geologic time. Slopes are smooth, are slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer, which extends to a depth of 36 inches, is white sand. Below this is black muck to a depth of about 53 inches. The substratum is light brownish gray fine sand to a depth of 80 inches.

Included in mapping are small areas of Basinger and Myakka soils in the lower areas. These included soils make up 5 to 25 percent of the mapped area in 90 percent of the areas mapped as Adamsville fine sand, organic substratum.

The seasonal high water table in the Adamsville soil is at a depth of 24 to 42 inches from June through November. During the remainder of the year, it is normally below 42 inches. Permeability is rapid. Available water capacity, natural fertility, and organic matter content are low.

Most areas of this soil still support the natural vegetation of slash pine, oaks, and cabbage palm with an understory of saw palmetto and pineland threeawn. Some areas have been cleared for use as homesites.

This soil is poorly suited to cultivated crops.

Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Pangolagrass and bahiagrass produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Seedling mortality and plant competition are management concerns. Increasing the planting rate helps to offset the seedling mortality rate. Proper site preparation helps to minimize plant competition. South Florida slash pine and slash pine are preferred for planting.

This soil has moderate potential for producing significant amounts of desirable range plants, such as chalky bluestem and creeping bluestem. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the Cabbage Palm Flatwoods ecological community.

This soil is poorly suited to urban development. Wetness and low strength are management concerns. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material. The muck layer causes structures to subside and crack. It should be removed and replaced with suitable fill material.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IIIw.

23—St. Johns fine sand

This poorly drained and very poorly drained soil is on broad flats and in depressions. Individual areas are circular or irregular in shape. They range from 5 to more than 25 acres in size. Slopes are smooth, are slightly concave or slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is fine sand about 14 inches thick. It is black in the upper part and very dark gray in the lower part. The subsurface layer, which extends to a depth of 22 inches, is light gray fine sand that has a few tongues or pockets of dark gray sand. The subsoil, which extends to a depth of 42 inches, is fine sand. It is black in the upper part and dark reddish brown in the lower part. The upper part of the substratum is dark brown sand that has very dark brown, dark grayish brown, and dark yellowish brown mottles. The lower part of the substratum to a depth of 80 inches is pale brown sand.

Included in mapping are small areas of Basinger, Immokalee, and Myakka soils. These included soils do not have a thick, dark surface layer. The included soils make up 5 to 23 percent of the mapped area in 80 percent of the areas mapped as St. Johns fine sand.

The seasonal high water table in the St. Johns soil is at the surface to a depth of 6 inches from June through October. During the remainder of the year, it is typically at a depth of 6 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Available water capacity is low in the surface and subsurface layers and moderate in the subsoil. Natural fertility and organic matter content are low.

Most areas of this soil still support the natural vegetation of slash pine, saw palmetto, gallberry, fetterbush, pineland threeawn, creeping bluestem, and wax-myrtle.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass and bahiagrass produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Proper site preparation helps to minimize plant competition. South Florida slash pine and slash pine are preferred for planting.

This soil has moderate potential for producing significant amounts of chalky bluestem and creeping bluestem. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the South Florida Flatwoods ecological community.

This soil is not suited to urban development. Wetness is a severe limitation.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IIIw.

24—Terra Ceia muck

This very poorly drained soil is in depressions and large freshwater marshes and is subject to ponding during much of the year. Individual areas are irregular in shape. They range from 25 to more than 100 acres in size. Slopes are smooth, slightly concave, and 0 to 1 percent.

Typically, the surface layer is muck 53 inches thick. It is dark reddish brown the upper part and very black in the lower part. The substratum is black fine sand in the upper part and dark gray fine sand in the lower part to a depth of 80 inches.

Included in mapping are small areas of Okeelanta and Placid soils. Placid soils are mineral soils. Okeelanta soils have organic layers that have a combined thickness of less than 50 inches. The included soils make up 5 to 22 percent of the mapped area in 80 percent of the areas mapped as Terra Ceia muck.

The seasonal high water table in areas of the Terra Ceia soil is at the surface to 24 inches above the surface from June through April. During the remainder of the year, it is typically at the surface to a depth of 12 inches. It may, however, recede below 12 inches during extended dry periods. Permeability is rapid. Available water capacity, natural fertility, and organic matter content are high.

Most areas of this soil still support the natural vegetation of maidencane, arrowhead, pickerelweed, primrose willow, and sawgrass.

This soil is not suited to cultivated crops, citrus production, pasture and hay crops, or forest production. Wetness and ponding are management concerns.

This soil has moderate potential for producing significant amounts of maidencane and cutgrass. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. Cattle graze areas of this soil during the winter months when other range plants are of lesser value and quantity and the water table is below the surface. This soil is in the Freshwater Marshes and Ponds ecological community.

This soil is not suited to urban development or to recreational development. Wetness, low strength, and ponding are management concerns.

The capability subclass is VIIw.

25—Wabasso fine sand

This poorly drained and very poorly drained soil is in areas of flatwoods, on flood plains, and in depressions. Individual areas are irregular in shape. They range from 10 to more than 50 acres in size. Slopes are smooth, are slightly concave or slightly convex, and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand 4 inches thick. The subsurface layer, which extends to a depth of about 16 inches, is gray fine sand. The subsoil, which extends to a depth of 32 inches, is fine sand. In the upper part, it is dark reddish brown and has reddish brown and gray mottles. In the lower part, it is very pale brown and has light brownish gray mottles. The upper part of the substratum is light gray fine sandy loam that has pockets of yellowish brown, the next part is yellowish brown fine sandy loam that has gray mottles, and the lower part to a depth of 80 inches is light gray and gray fine sand that has brownish yellow and olive brown mottles.

Included in mapping are small areas of Pineda, Riviera, and Valkaria soils. These included soils are in sloughs and do not have a dark subsoil that is characterized by an accumulation of aluminum and organic carbon. The included soils make up 9 to 13 percent of the mapped area in 90 percent of the areas mapped as Wabasso fine sand.

The seasonal high water table in the Wabasso soil is at a depth of 6 to 18 inches from June through

September. During the remainder of the year, it is typically at a depth of 18 to 40 inches. It may, however, recede below 40 inches during extended dry periods. Permeability is rapid in the surface and subsurface layers and moderate to slow in the subsoil. Available water capacity is low in the surface and subsurface layers and moderate in the subsoil. Natural fertility and organic matter content are low.

Most areas of this soil still support the natural vegetation of slash pine, saw palmetto, gallberry, pineland threeawn, chalky bluestem, low panicum, and creeping bluestem. Some areas have been cleared for pasture.

This soil is poorly suited to cultivated crops. Wetness is a management concern. A well designed water-control system should remove excess surface water during wet periods and provide water for irrigation during dry periods. Fertilizer and lime should be added according to the specific needs of the crop.

This soil is poorly suited to citrus production. Wetness is a management concern. A well designed water-control system should remove excess water during wet periods and provide water for irrigation during dry periods. Citrus trees should be planted in bedded rows. Plant cover should be maintained between the rows to minimize erosion of the beds. Proper management also includes regular applications of fertilizer and lime.

This soil is suited to pasture and hay land. Wetness is a management concern. A water-control system that removes excess surface water after heavy rainfall is needed to ensure good yields. Pangolagrass, bahiagrass, and white clover produce higher yields if well managed. Applications of lime and fertilizer are needed on a regular basis. Controlled grazing is needed to maintain plant vigor.

This soil is suited to forest production. Equipment limitations, seedling mortality, and plant competition are management concerns. Scheduling harvesting for the drier periods helps to minimize the equipment limitations. Increasing the planting rate helps to offset the seedling mortality rate. Proper site preparation helps to minimize plant competition. South Florida slash pine, longleaf pine, loblolly pine, and slash pine are preferred for planting.

This soil has moderate potential for producing significant amounts of chalky bluestem, creeping bluestem, and Indiangrass. A sound range management plan that includes such considerations as grazing time and number of cattle per acre is needed to maintain the range. This soil is in the South Florida Flatwoods ecological community.

This soil is poorly suited to urban development. Wetness is a management concern. Septic tank absorption fields can be maintained above the seasonal high water table by mounding and backfilling with suitable fill material.

This soil is poorly suited to recreational development. Wetness and the sandy texture of the surface layer are management concerns. Installing and maintaining a water-control system and adding suitable topsoil or resurfacing help to overcome these limitations.

The capability subclass is IIIw.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Approximately 36,000 acres in Okeechobee County is used for crops (Florida Crop and Livestock Reporting Service, 1997). Of this total, about 12,500 acres is used for oranges and grapefruit (fig. 6) and the rest is used for such crops as potatoes, sweet corn, cucumbers, cotton, and truck-crop vegetables.

Approximately 270,000 acres in Okeechobee County is used for pasture land. This acreage provides habitat for a host of wildlife species. It also filters and stores some of the counties freshwater supply. The most common grasses are bahiagrass, pangolagrass, limpograss, bermudagrass, and aeschynomene.

Bahiagrass is successfully managed with a stubble height of about 2 inches. Short grazing periods should be followed by a 3-week recovery period. Pangolagrass is best managed with a stubble height of about 4 to 6 inches and a 5-week recovery period. Limpograsses are managed with a stubble height of about 6 inches and a 9-week recovery period.

Drainage is the major management concern on almost all of the acreage used for crops and pasture in the county. Under natural conditions, most of the soils are so wet that the production of crops and pasture grasses common to the area is generally not practical without some sort of water-control system. Unless artificially drained, the poorly drained soils, such as Riviera, Immokalee, Myakka, Wabasso, and Pineda soils, are wet enough to damage crops and pasture plants during wet seasons. These soils also have a low available water capacity and are droughty during dry periods. These soils must have surface and subsurface drainage to achieve maximum production. The design of a drainage and irrigation system varies according to the kind of soil that is present and to the kind of plants that are to be grown. Information

Figure 6.—Citrus trees on raised beds in an area of Immokalee fine sand. If proper management practices are applied, many of the drained soils in the county are suited to the production of citrus.

regarding drainage and irrigation for each kind of soil is available from the local office of the Natural Resources Conservation Service.

Natural fertility is low in most of the soils in the county. Most of the soils also have a sandy surface texture, do not have an appreciable amount of organic matter, and have a strongly acid or very strongly acid surface layer. The soils that have never been limed require applications of lime to raise the pH sufficiently for good growth of plants. The levels of nitrogen, potassium, and phosphorus are naturally low in most of these soils. Additions of fertilizer and lime should be based on the results of soil tests, the needs of the plants, and the expected yields. The Cooperative Extension Service can help in determining the kinds and amounts fertilizer and lime required.

Tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular and porous. Most of the soils in the county have a sandy surface layer that has weak structure and have a low content of organic matter. Regular additions of crop residue, manure, and other organic material improve soil structure and raise the cation-exchange capacity of the soil.

Wind erosion is a hazard on unprotected soils in the county. It reduces soil fertility by removing fine soil particles and organic matter; damages or destroys plants by sandblasting; spreads diseases, insects, and weed seeds; and creates health hazards and cleaning problems. Strong winds can damage soils and tender crops in a few hours in open, unprotected areas where the soil is dry and bare. Maintaining a vegetative cover and surface mulch minimize wind erosion.

Field windbreaks consisting of adapted trees and shrubs, such as slash pine, southern redcedar, and Japanese privet, or strip crops of small grain reduce the hazard of wind erosion and minimize damage to plants.

Information regarding the design of erosion-control measures for each kind of soil in Okeechobee County is contained in “Water and Wind Erosion Control Handbook—Florida,” which is available at the local office of the Natural Resources Conservation Service.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

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 or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that 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.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *w* or *s,* to the class numeral, for example, IIIw. The letter *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), and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

Rangeland

Gregory R. Brannon, soil data quality specialist, Natural Resources Conservation Service, helped prepare this section.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 4 shows, for each soil that supports rangeland vegetation suitable for grazing, the potential annual production of vegetation in favorable, average, and unfavorable years and the ecological community. An explanation of the column headings in the table follows.

Potential annual production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, average, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only.

One objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

An *ecological community* comprises a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities in other ecological communities in kind, amount, and proportion of range plants. The relationship between soils and vegetation was ascertained during this survey; thus, ecological communities generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

The ecological community concept is based on the knowledge that a soil type commonly supports a specific vegetative community, which in turn provides the habitat needed by specific wildlife species.

Vegetative communities form recognizable units on the landscape, most of which are apparent to the casual observer after only a little training. Even without prior botanical training, an observer can quickly learn to distinguish between Cabbage Palm Flatwoods and Sand Pine Scrub and between Wetland Hardwood Hammocks and Freshwater Marshes and Ponds. Once a community is recognized, information can be found concerning the general characteristics of the soil on which it occurs and the types of plants and animals it supports.

Although some plants are found only within a very narrow range of conditions, many plants can survive throughout a wide range of conditions. Individual plants that have a wide tolerance level can occur in many different communities and on a variety of soils. When describing ecological communities, plant scientists study the patterns in which vegetation occurs. They study what species occur, the relative abundance of each species, the stage of plant succession, the dominance of species, the position of species on the landscape, and the soil or soils on which the patterns occur. Recognizable patterns of vegetation are typically found in a small group of soil types that have common characteristics.

During many years of field observations while conducting soil surveys, the Natural Resources Conservation Service determined which vegetative communities commonly occur on which soils throughout Florida. This information is summarized in a booklet named “26 Ecological Communities of Florida” (USDA, 1989).

The native vegetation in Okeechobee County consists mainly of grasses, grasslike plants, herbaceous plants, and shrubs that are suitable for gazing. The rangeland includes natural grasslands, savannas, and wooded lands. A large percentage of the native rangeland has been converted to pasture.

The productivity of the rangeland in the county is closely related to the natural drainage of the soil. The wettest soils, such as those in marshes and ponded areas, generally produce the greatest amounts of vegetation. The sandy, doughtier soils normally produce the least amount of herbage annually.

In the following paragraphs, the vegetative community on individual map units during the climax state of plant succession is described. The community described is based on relatively natural conditions. Human activities, such as commercial production of pine, agriculture, urbanization, and fire suppression, can alter the community on a specific site. Six ecological communities are important for livestock and wildlife in Okeechobee County.

Cabbage Palm Flatwoods

The Cabbage Palm Flatwoods ecological community consists of nearly level areas that have scattered cabbage palm trees. If kept in good condition, these areas are preferred for livestock grazing. Creeping bluestem, chalky bluestem, and many types of panicums are the dominant grasses and are excellent forage. The amount of pineland threeawn and saw palmetto increases if the condition of the site is allowed to deteriorate. The map units that support the Cabbage Palm Flatwoods ecological community in Okeechobee County are:

10 Ft. Drum fine sand
21 Adamsville fine sand, organic substratum

Freshwater Marshes and Ponds

The Freshwater Marshes and Ponds ecological community consists of open grassland marshes and ponds. The water level in areas of this ecological community fluctuates throughout the year. Areas of this community have the potential for producing large amounts of maidencane. Livestock should be allowed to forage only during dry periods. These areas deteriorate if prolonged grazing occurs. Pickerelweed, sawgrass, willow, and primrose dominate if overgrazing continues. The map units that support the Freshwater Marshes and Ponds ecological community in Okeechobee County are:

3 Basinger and Placid soils, depressional
6 Manatee loamy fine sand, depressional
7 Floridana, Riviera, and Placid soils, depressional
13 Manatee, Floridana, and Tequesta soils, frequently flooded
15 Okeelanta muck
19 Floridana, Placid, and Okeelanta soils, frequently flooded
24 Terra Ceia muck

Sand Pine Scrub

The Sand Pine Scrub ecological community is on nearly level to gently sloping uplands. Due to doughtiness, it has limited potential for producing and sustaining native forage vegetation. Sand pine form a dense stand along with a dense, woody understory. The native forage plants include lopsided Indiangrass, bluestems, and low panicums. These areas are not favorable for livestock. The map units that support the Sand Pine Scrub ecological community in Okeechobee County are:

17 Orsino fine sand
20 Pomello fine sand, 0 to 5 percent slopes

Slough

The Slough ecological community consists primarily of open grassland in nearly level, broad drainage areas. The plant community is dominated by blue maidencane, chalky bluestem, and bluejoint panicum. Areas of this ecological community are readily utilized by livestock. Carpetgrass and sedges replace the more desirable grasses if prolonged overgrazing occurs. The map units that support the Slough ecological community in Okeechobee County are:

2 Basinger fine sand
5 Valkaria fine sand
8 Pineda fine sand
9 Riviera fine sand

South Florida Flatwoods

The South Florida Flatwoods ecological community is in nearly level areas. The plant community is dominated by scattered pine trees with saw palmetto, gallberry, and other woody plants in the understory. Creeping bluestem is the dominant grass. Other significant grasses are Indiangrass, chalky bluestem, panicums, and pineland threeawn. Annual burning and uncontrolled livestock grazing result in a significant increase in the amount of saw palmetto and pineland threeawn and a corresponding decrease in bluestems, Indiangrass, panicums, and the other more desirable grasses. The map units that support the South Florida Flatwoods ecological community in Okeechobee County are:

11 Immokalee fine sand
14 Myakka fine sand
23 St. Johns fine sand
25 Wabasso fine sand

Wetland Hardwood Hammocks

The Wetland Hardwood Hammocks ecological community is generally forested and nearly level.

Laurel oak, live oak, water oak, red maple, and cypress dominate the overstory. Switchgrass, maidencane, perennial blue maidencane, and chalky bluestems are the important understory plants. Due to the extensive, dense tree canopy, areas of this ecological community are not very productive. The map units that support the Wetland Hardwood Hammocks ecological community in Okeechobee County are:

4 Bradenton fine sand
18 Parkwood fine sand

Woodland Management and Productivity

Table 5 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *W* indicates excess water in or on the soil, and *S* indicates a sandy texture.

In the table, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are soil wetness and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table, and the length of the period when the water table is high. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restriction that affects rooting is the seasonal high water table. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from high wind and heavy rains. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 6 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness and the texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations, if any, are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9 and interpretations for dwellings without basements and for local roads and streets in table 8.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, and are not subject to flooding during the period of use.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use.

Figure 7.—A poorly drained Myakka soil in the foreground and a somewhat poorly drained Pomello soil in the background. The vegetation on the Pomello soil is mostly sand live oak. Wildlife thrives in such areas.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Okeechobee County has an abundant population of wildlife. Due to the generally rural nature of the county, good wildlife habitat is common throughout the county, except for in the areas of urban development and intensive agriculture.

The primary game species are mourning dove, bobwhite quail, wild hog, and whitetail deer. Other species include squirrel, snipe, raccoon, skunk, bobcat, otter, songbirds, woodpeckers, reptiles, amphibians, and wading birds.

Numerous species of fish, such as specs (black crappie), largemouth bass, bream (bluegill), and catfish, provide superb opportunities for freshwater fishing in the county. These game fish are mainly in the Kissimmee River, at the mouth of Taylor Creek, and in Lake Okeechobee, which has about 448,000 acres of surface water.

A number of endangered or threatened species inhabit Okeechobee County. They include species ranging from the seldom-seen Eastern indigo snake to more familiar species, such as wood stork and bald eagle. A complete list of information about range and habitat can be obtained from the local office of the Natural Resources Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover (fig. 7). They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 7, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and sesbania.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, partridge pea, and bristlegrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, sweetbay, wild grape, cabbage palm, blackgum, redbay, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are beautyberry and mulberry.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cypress.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, and reaction. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, armadillo, and blackbirds.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, egrets, herons, shore birds, alligator, and otter.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the

Figure 8.—A new home in an area of Basinger fine sand. The house has been elevated to overcome the severe wetness.

soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section (fig. 8). This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and easily overcome; *moderate* if soil properties or site features are somewhat restrictive for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable that special design, soil reclamation, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to a cemented pan, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 9 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations, if any, are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are somewhat restrictive for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to a cemented pan, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent and surfacing of effluent can affect public health. Ground water can be polluted if highly permeable sand is less than 4 feet below the base of the absorption field or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to a cemented pan, flooding, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and coarse fragments affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 10 gives information about the soils as a source of roadfill, sand, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand is a natural aggregate suitable for commercial use with a minimum of processing. It is used in many kinds of construction. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or a layer of sand that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, or soils that have only 20 to 40 inches of suitable material. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil.

Drainage is the removal of excess surface and

Figure 9.—Small citrus trees in an area of Immokalee fine sand. A subsurface drainage system and slightly raised beds offset the inherent high water table to make this a very productive site.

subsurface water from the soil (fig. 9). How easily and effectively the soil is drained depends on the depth to a cemented pan or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; susceptibility to flooding; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by depth to a cemented pan and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The performance of a system is affected by the depth of the root zone and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness, slope, and depth to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Estimates of soil properties are based on field examinations and on laboratory tests of samples of similar soils in nearby areas.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 13 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 14 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in the table, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 15 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Psammaquent (*Psamm*, meaning sandy, plus *Aquent*, the suborder of the Entisol that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Spodic* identifies the subgroup that typifies the great group. An example is Spodic Psammaquent.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is siliceous, hyperthermic Spodic Psammaquents.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA, 1975) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section “Detailed Soil Map Units.”

Adamsville Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Rapid
Landform: Natural levees adjacent to Lake Okeechobee
Parent material: Sandy sediments over buried organic matter

Slope: 0 to 5 percent
Taxonomic class: Hyperthermic, uncoated Aquic Quartzipsamments

Adamsville soils are closely associated with Basinger and Myakka soils. These associated soils do not have a buried organic layer.

Typical pedon of Adamsville fine sand, organic substratum; about 1,400 feet south and 2,300 feet west of the northeast corner of sec. 23, T. 38 S., R. 36 E.

A—0 to 5 inches; dark gray (10YR 4/1) fine sand; weak fine crumb structure; many fine roots; slightly acid; clear smooth boundary.
C—5 to 36 inches; very pale brown (10YR 8/2) sand; single grained; loose; few fine, medium, and coarse roots; slightly acid; clear wavy boundary.
Ob—36 to 53 inches; black (10YR 2/1) muck; moderate medium granular structure; friable; many fine roots; many distinct very pale brown (10YR 8/2) sand pockets; neutral; gradual wavy boundary.
C´—53 to 80 inches; light brownish gray (10YR 6/2) sand; single grained; loose; neutral.

The texture of the mineral part of the soil is either fine sand or sand. Reaction ranges from very strongly acid to neutral.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2.

The C and C´ horizons have hue of 10YR, value of 5 to 8, and chroma of 1 to 3. In some pedons they do not have a dominant color and are multicolored in shades of yellow, gray, and brown.

The Ob horizon has hue of 5YR to 10YR, value of 1 to 3, and chroma of 1 or 2. It has few to many small pockets of white or gray sand.

Basinger Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Rapid
Landform: Sloughs, low flats, depressions, and poorly defined drainageways
Parent material: Sandy marine sediments
Slope: 0 to 2 percent
Taxonomic class: Siliceous, hyperthermic Spodic Psammaquents

Basinger soils are closely associated with Adamsville, Immokalee, Myakka, Pomello, and St. Johns soils. Adamsville soils have a buried organic layer. Immokalee, Myakka, Pomello, and St. Johns soils have a Bh horizon.

Typical pedon of Basinger fine sand; about 4.5 miles northeast of Basinger, 250 feet west of Durrance Road, and 1 mile south of Eagle Island Road, NE1/4 of sec. 10, T. 35 S., R. 33 E.

A—0 to 2 inches; fine sand, very dark gray (10YR 3/1) when rubbed; weak fine granular structure; very friable; many fine roots; many uncoated light gray (10YR 7/2) sand grains; strongly acid; clear smooth boundary.
Eg—2 to 18 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine and medium roots; strongly acid; clear wavy boundary.
Bh/Eg—18 to 36 inches; light brownish gray (10YR 6/2) (Eg) and brown (10YR 5/3) (Bh) fine sand; common medium distinct dark reddish brown (5YR 3/2) weakly cemented bodies; common medium distinct very dark grayish brown (10YR 3/2) streaks along root channels; single grained; loose; few fine and medium roots; many uncoated sand grains in the Bh material; few fine faint yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid; gradual wavy boundary.
C—36 to 80 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; many uncoated sand grains; strongly acid.

The combined thickness of the sand layers is more than 80 inches. Reaction ranges from extremely acid to neutral throughout.

Some pedons have an Oa horizon. It is muck and is less than 7 inches thick.

The A or Ag horizon has hue of 10YR, value of 2 to 6, and chroma of 1 or 2; or it is neutral in hue and has value of 2 to 6. It is sand, fine sand, or their mucky analogs.

The E or Eg horizon has hue of 2.5Y or 10YR, value of 5 to 8, and chroma of 1 to 4; or it is neutral in hue and has value of 5 to 8. The quantity of redoximorphic features in shades of gray, yellow, and brown ranges from none to common. The texture is sand or fine sand. Some pedons have a thin, transitional EB horizon between the E horizon and Bh/Eg horizon.

The Bh part of the Bh/Eg horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. The Eg part has colors similar to those of the E horizon. The Bh/Eg horizon has few to many redoximorphic features, weakly cemented bodies, or streaks having hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 3 to 8. Some pedons have a Bh horizon, which has a range in color and texture similar to that of the Bh part of the Bh/Eg horizon. The Bh/Eg horizon is sand or fine sand.

The C horizon has hue of 5Y to 10YR, value of 5 to 8, and chroma of 1 to 4. It is sand or fine sand. In some pedons it has thin strata of loamy sand or loamy fine sand.

Bradenton Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate
Landform: Hammocks, low lying ridges, and flood plains
Parent material: Loamy marine sediments influenced by calcareous materials
Slope: 0 to 2 percent
Taxonomic class: Coarse-loamy, siliceous, superactive, hyperthermic Typic Endoaqualfs

Bradenton soils are closely associated with Ft. Drum and Parkwood soils. Ft. Drum soils have a Bk horizon. Parkwood soils have a thicker A horizon than that of the Bradenton soils.

Typical pedon of Bradenton fine sand; 8.0 miles north of the center of the town of Okeechobee and 2.5 miles west of U.S. Highway 441 on G-Bar-E Ranch, SE1/4 of SE1/4 of sec. 7, T. 36 S., R. 35 E.

A—0 to 4 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; salt-and-pepper appearance due to mixture of organic matter and light gray (10YR 7/1) sand grains; moderately acid; clear smooth boundary.

E—4 to 10 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many fine and medium roots; few medium distinct dark gray (10YR 4/1) areas of iron depletion; moderately acid; abrupt smooth boundary.

Btg1—10 to 19 inches; dark gray (10YR 4/1) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; few faint clay films on faces of peds and in root channels; few fine streaks of gray (10YR 5/1) sand; many fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; slightly acid; gradual wavy boundary.

Btg2—19 to 26 inches; gray (10YR 5/1) fine sandy loam; weak medium subangular blocky structure parting to moderate fine granular; very friable; few medium and coarse roots; few fine streaks of light gray (10YR 7/1) sand grains in root channels; sand grains coated and bridged with clay; common fine soft white (10YR 8/1) accumulations of calcium carbonate and common fine white (10YR 8/1) nodules of calcium carbonate; many fine distinct yellowish brown (10YR 5/6) and olive brown (2.5Y 4/4) areas of iron accumulation; slightly alkaline; gradual wavy boundary.

Cg1—26 to 34 inches; white (N 8/0) fine sandy loam; massive; slightly sticky and slightly plastic; few coarse roots; sand grains are coated with carbonates; few root channels; common streaks and pockets of grayish brown (10YR 5/2) fine sand; moderately alkaline; clear wavy boundary.

Cg2—34 to 70 inches; light brownish gray (2.5Y 6/2) fine sandy loam; massive; slightly sticky; many medium nodules of calcium carbonate; sand grains coated with carbonates; common streaks and pockets of light gray (10YR 7/1) fine sand; common medium distinct light olive brown (2.5Y 5/6) and few fine distinct olive brown (2.5Y 4/4) masses of iron accumulation; moderately alkaline.

The thickness of the solum ranges from 20 to 50 inches. Reaction ranges from strongly acid to neutral in the A and E horizons, from slightly acid to moderately alkaline in the Btg horizon, and from neutral to moderately alkaline in the BC and C horizons.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or it is neutral in hue and has value of 2 to 4. It is fine sand, sand, loamy sand, or loamy fine sand.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3; or it is neutral in hue and has value of 4 to 7. In some pedons it has iron accumulations in shades of brown and yellow. It is fine sand, sand, loamy sand, or loamy fine sand.

The Btg horizon has hue of 5Y to 10YR, value of 3 to 7, and chroma of 1 or 2; or it is neutral in hue and has value of 4 to 7. The quantity of redoximorphic features in shades of yellow, brown, or red ranges from none to common. The texture of the horizon is dominantly fine sandy loam or sandy loam but ranges from loamy fine sand to sandy clay loam. In some pedons the lower part of the horizon contains soft accumulations of calcium carbonate and nodules of calcium carbonate.

The BC horizon, where present, has chroma of 1 to 3 and otherwise has the same range in color as the Btg horizon. The BC horizon is loamy sand, loamy fine sand, sandy loam, fine sandy loam, or very fine sandy loam. In some pedons it contains soft accumulations of calcium carbonate and nodules of calcium carbonate.

The C horizon has hue of 10YR to 5Y, value of 5 to 8, and chroma of 1 or 2; or it is neutral in hue and has value of 5 to 8. The texture ranges from sand to sandy clay loam. In some pedons the lower part of the horizon is a mixture of shells, shell fragments, and sand.

Some pedons have a layer of soft limestone underlying the Btg, BC, or C horizon. The limestone is at a depth of 40 to 80 inches, is about 1.5 to 3.0 feet in thickness, and has few or common solution holes or fractures. In some pedons variable layers of sand to sandy clay loam mixed with shells and shell fragments are beneath the limestone.

Floridana Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow or very slow
Landform: Depressions and flood plains
Parent material: Sandy and loamy marine sediments
Slope: 0 to 1 percent
Taxonomic class: Loamy, siliceous, superactive, hyperthermic Arenic Argiaquolls

Floridana soils are closely associated with Manatee, Okeelanta, Placid, Tequesta, and Terra Ceia soils. Manatee soils have a Bt horizon of sandy loam at a depth of less than 20 inches. Okeelanta and Terra Ceia soils are organic. Placid soils are sandy throughout. Tequesta soils do not have a mollic epipedon.

Typical pedon of Floridana soil, in an area of Floridana, Riviera, and Placid soils, depressional; about 1,300 feet east and 50 feet north of the southwest corner of sec. 34, T. 34 S., R. 34 E.

A—0 to 18 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine roots; sand grains coated with organic material; slightly acid; clear smooth boundary.

Eg—18 to 38 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine and medium roots; slightly acid; clear wavy boundary.

Btg—38 to 60 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak coarse subangular blocky structure; slightly plastic; sand grains coated and bridged with clay; few fine distinct yellowish brown (10YR 5/6) areas of iron accumulation; slightly alkaline; gradual wavy boundary.

Cg—60 to 80 inches; grayish brown (10YR 5/2) loamy fine sand; massive; friable; slightly alkaline.

Reaction ranges from very strongly acid to moderately alkaline in all horizons.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral in hue and has value of 2. It is sand, fine sand, or mucky fine sand.

The Eg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The quantity of masses of iron accumulation in shades of yellow and brown ranges from none to common. The texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The quantity of redoximorphic features in shades of brown, gray, and yellow ranges from none to common. The texture is sandy clay loam, fine sandy loam, or loamy sand.

The BCg horizon, where present, has the same range in color and texture as the Btg horizon.

The Cg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. It is loamy fine sand or loamy sand. The quantity of small pockets of shells and soft calcium carbonate ranges from none to common.

Ft. Drum Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Rapid in the A horizon and the lower parts of the Cg horizon and moderate in the Bkg horizon
Landform: Hammocks, low ridges, and flats
Parent material: Sandy marine sediments
Slope: 0 to 2 percent
Taxonomic class: Sandy, siliceous, hyperthermic Aeric Endoaquepts

Ft. Drum soils are closely associated with Bradenton and Parkwood soils. These associated soils have an argillic horizon.

Typical pedon of Ft. Drum fine sand; about 0.25 mile south of Eagle Island Road and 200 feet west of Durrance Road, NE1/4 of NE1/4 of sec. 3, T. 35 S., R. 33 E.

A1—0 to 3 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; common fine and medium roots; many uncoated light gray (10YR 7/1) sand grains; strongly acid; gradual smooth boundary.

A2—3 to 5 inches; dark gray (10YR 4/1) fine sand; single grained; loose; common fine and medium roots; common uncoated light gray (10YR 7/1) sand grains; strongly acid; gradual wavy boundary.

A3—5 to 17 inches; brown (10YR 4/3) fine sand; single grained; loose; few fine and medium roots; many sand grains coated with organic matter, some clean sand grains; few fine faint yellowish brown (10YR 5/6) and common medium faint very pale brown (10YR 7/4) areas of iron accumulation; slightly acid; abrupt wavy boundary.

Bkg—17 to 25 inches; very pale brown (10YR 8/2) fine sandy loam; weak medium subangular blocky structure parting to moderate fine granular; very friable; common medium and coarse roots; sand grains coated with calcium carbonate; common fine and medium distinct brownish yellow (10YR 6/6) and yellow (10YR 8/6/) masses of iron accumulation; slightly alkaline; gradual smooth boundary.

Cg1—25 to 38 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few medium roots; many coarse distinct yellowish brown (10YR 5/6) and few coarse distinct yellowish brown (10YR 5/8) and very pale brown (10YR 7/3) masses of iron accumulation; few coarse distinct light gray (10YR 7/2) areas of iron depletions; neutral; gradual wavy boundary.

Cg2—38 to 56 inches; grayish brown (2.5Y 5/2) fine sand; single grained; loose; few fine roots; many medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/8) masses of iron accumulation; slightly acid; gradual wavy boundary.

Cg3—56 to 80 inches; gray (5Y 6/1) fine sand; single grained; loose; few fine white (10YR 8/1) calcium carbonate nodules; slightly alkaline.

The thickness of the solum ranges from 15 to 42 inches. Reaction ranges from very strongly acid to neutral in the A horizon, from moderately acid to neutral in the E horizon, and from slightly acid to moderately alkaline in the Bkg and Cg horizons.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3. It is fine sand or sand.

The Eg horizon, where present, has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is fine sand or sand.

The Bkg horizon has hue of 2.5Y or 10YR, value of 5 to 8, and chroma of 2 or less; or it doesn't have a dominant matrix color and is multicolored in shades of gray, brown, and yellow. The quantity of redoximorphic features in shades of brown or yellow ranges from none to common. The texture is sand, fine sand, or loamy fine sand.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y; value of 5 to 7; and chroma of 1 to 6. The quantity of redoximorphic features in shades of gray, yellow, and brown ranges from none to common. The texture is sand, fine sand, or loamy fine sand.

Immokalee Series

Depth class: Deep or very deep
Drainage class: Poorly drained or very poorly drained
Permeability: Rapid or very rapid in the A and E horizons and moderate or moderately rapid in the Bh horizon
Landform: Flatwoods and depressions
Parent material: Sandy marine sediments
Slope: 0 to 2 percent
Taxonomic class: Sandy, siliceous, hyperthermic Arenic Alaquods

Immokalee soils are closely associated with Basinger, Myakka, Orsino, Pomello, and St. Johns soils. Basinger and Orsino soils do not have a spodic horizon. Myakka soils have a spodic horizon within a depth of 30 inches. Pomello soils are somewhat poorly drained or moderately well drained. St. Johns soils have an umbric epipedon.

Typical pedon of Immokalee fine sand; 7.0 miles north of the center of the town of Okeechobee and 100 yards west of U.S. Highway 441, SW1/4 of sec. 10, T. 36 S., R. 35 E.

A—0 to 6 inches; very dark gray (10YR 3/1) fine sand; salt-and-pepper appearance when dry due to mixture of organic matter and light gray (10YR 7/1) sand grains; weak fine crumb structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

E1—6 to 12 inches; gray (10YR 6/1) fine sand; single grained; loose; common fine and medium roots; many coarse faint gray (10YR 5/1) and few coarse faint dark gray (10YR 4/1) areas of iron depletion; very strongly acid; gradual wavy boundary.

E2—12 to 35 inches; white (10YR 8/1) fine sand; single grained; loose; few fine, medium, and coarse roots; few fine very dark gray streaks in root channels; very strongly acid; abrupt wavy boundary.

Bh1—35 to 43 inches; black (10YR 2/1) fine sand; lower 2 inches grades to dark reddish brown (5YR 2/2); weak fine granular structure; friable; common fine and medium roots; very strongly acid; clear wavy boundary.

Bh2—43 to 54 inches; dark reddish brown (5YR 3/3) fine sand; single grained; loose; few fine and medium roots; few fine distinct gray (10YR 5/1) sand lenses and pockets; very strongly acid; gradual wavy boundary.

BC—54 to 80 inches; dark brown (10YR 4/3) fine sand; single grained; loose; few fine faint dark brown (10YR 3/3), pale brown (10YR 6/3), and light gray (10YR 7/1) areas of iron accumulation and depletion; strongly acid.

Reaction ranges from extremely acid to moderately acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2; or it is neutral in hue and has value of 2 to 4. Where value is less than 3, the horizon is less than 10 inches thick. The texture is sand or fine sand.

The E horizon has hue of 2.5Y or 10YR, value of 5 to 8, and chroma of 1 or 2; or it is neutral in hue and has value of 5 to 8. The quantity of redoximorphic features in shades of gray, yellow, brown, or red ranges from none to common. The E horizon is sand or fine sand. Commonly, a transitional horizon that ranges from 1/2 inch to 2 inches in thickness is between the base of the E horizon and the Bh horizon.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 3 or less. It is sand, fine sand, loamy sand, or loamy fine sand. It has few or common vertical or horizontal intrusions or masses of dark gray to light gray or light brownish gray sand or fine sand.

Some pedons have a second sequum of E´ and B´h horizons. Where present, the E´ horizon has the same range in color as the E horizon and the Bh´ horizon has the same range in color as the Bh horizon.

The BC horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Some pedons have a BC/Bh horizon. It has a matrix color similar to that of BC horizon and has medium and coarse fragments of material from the Bh horizon. The BC horizon is fine sand or sand.

The C horizon, where present, has hue of 10YR, value of 4 to 7, and chroma of 1 to 4. The quantity of redoximorphic features in shades of brown, yellow, or gray ranges from none to common. The C horizon is fine sand or sand.

Manatee Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate
Landform: Depressions, broad drainageways, and flood plains
Parent material: Sandy and loamy marine sediments
Slope: 0 to 2 percent
Taxonomic class: Coarse-loamy, siliceous, superactive, hyperthermic Typic Argiaquolls

Manatee soils are closely associated with Floridana, Okeelanta, Placid, Tequesta, and Terra Ceia soils. Floridana soils have a sandy epipedon that is 30 to 40 inches in thickness. Okeelanta and Terra Ceia soils are organic. Placid soils do not have an argillic horizon. Tequesta soils do not have a mollic epipedon.

Typical pedon of Manatee loamy fine sand, depressional; about 6.0 miles north of the center of the town of Okeechobee and 1.0 mile east of U.S. Highway 441 on Williamson’s Ranch, NW1/4 of NW1/4 of sec. 23, T. 36 S., R. 35 E.

Ap—0 to 12 inches; black (10YR 2/1) loamy fine sand; moderate fine and medium granular structure; very friable; many fine and medium roots; 10 to 15 percent organic matter; common distinct light gray (10YR 7/1) fine sand grains; neutral; gradual wavy boundary.

A—12 to 18 inches; black (10YR 2/1) loamy fine sand; weak fine granular structure; very friable; many fine and medium roots; many light gray (10YR 7/1) fine sand grains and many medium granules of mucky fine sand; neutral; gradual wavy boundary.

Bt—18 to 24 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak coarse subangular blocky structure parting to moderate medium granular; friable; many fine and medium roots; many sand grains coated and bridged with clay; few medium distinct light gray (10YR 7/1) areas of iron depletion; slightly alkaline; clear wavy boundary.

Btg—24 to 36 inches; dark gray (10YR 4/1) fine sandy loam; weak coarse subangular blocky structure parting to moderate medium granular; friable; common fine and medium roots; few thin streaks of light gray (10YR 7/1) fine sand; many sand grains coated and bridged with clay; few fine distinct olive brown (2.5Y 4/4) areas of iron accumulation; moderately alkaline; gradual wavy boundary.

BCkg—36 to 48 inches; dark gray (10YR 4/1) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots in upper part of the horizon; common medium soft accumulations of calcium carbonate and many fine nodules of calcium carbonate; many medium faint grayish brown (10YR 5/2) areas of iron accumulation; moderately alkaline; gradual wavy boundary.

Cg—48 to 80 inches; light gray (5Y 6/1) fine sandy loam; massive; slightly sticky and slightly plastic; common medium nodules of calcium carbonate; common coarse distinct greenish gray (5G 5/1) and bluish gray (5G 6/1) areas of iron depletion; moderately alkaline; calcareous.

The thickness of the solum ranges from 30 to 60 inches. Reaction in the A horizon ranges from moderately acid to slightly alkaline. Reaction in the B and C horizons ranges from neutral to moderately alkaline.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or it is neutral in hue and has value of 2 or 3. It is fine sandy loam, loamy fine sand, loamy sand, fine sand, mucky loamy sand, mucky loamy fine sand, or mucky fine sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. The quantity of redoximorphic features in shades of gray, brown, and yellow ranges from none to common. The Bt horizon is fine sandy loam or sandy loam. In some pedons it has small pockets or streaks of fine sand or loamy fine sand.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1. The quantity of redoximorphic features in shades of gray and brown ranges from none to common. The Btg horizon is fine sandy loam, sandy loam, or loamy fine sand. In some pedons it has small pockets or streaks of fine sand or loamy fine sand.

The BCkg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2; or it is neutral in hue and has value of 4 to 7. The quantity of redoximorphic features in shades of gray and brown ranges from none to common. The BCkg horizon has few or common nodules of calcium carbonate. The nodules can be soft, hard, or both. Some pedons have a BCk horizon instead of a BCkg horizon. The BCk horizon has the same range in color as the BCkg horizon. The BCkg horizon is fine sandy loam, sandy loam, or loamy fine sand.

The Cg horizon has hue of 10YR to 5GY, value of 4 to 7, and chroma of 1 or 2; or it is neutral in hue and has value of 2 or 3. The quantity of accumulations or nodules of calcium carbonate ranges from none to common. In some pedons, the Cg horizon contains streaks of sandy clay loam, contains few to many shell fragments, or is underlain by layers of shell fragments. The texture of the Cg horizon ranges from fine sand to sandy loam.

Myakka Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Rapid in the A and E horizons and moderate or moderately rapid in the Bh horizon
Landform: Flatwoods
Parent material: Sandy marine sediments
Slope: 0 to 2 percent
Taxonomic class: Sandy, siliceous, hyperthermic Aeric Alaquods

Myakka soils are closely associated with Adamsville, Basinger, Immokalee, Pomello, and St. Johns soils. Adamsville and Basinger soils do not have a spodic horizon. Immokalee soils have A and E horizons with a combined thickness of more than 30 inches. Pomello soils are better drained than the Myakka soils. St. Johns soils have an umbric epipedon.

Typical pedon of Myakka fine sand; about 1,800 feet north and 1,300 feet east of the southwest corner of sec. 22, T. 35 S., R. 34 E.

A—0 to 4 inches; fine sand, black (10YR 2/1) crushed; weak fine granular structure; very friable; common fine and medium roots; very strongly acid; clear smooth boundary.

E1—4 to 16 inches; gray (10YR 6/1) fine sand; single grained; loose; common fine roots; very strongly acid; gradual wavy boundary.

E2—16 to 27 inches; white (10YR 8/1) fine sand; single grained; loose; strongly acid; abrupt wavy boundary.

Bh—27 to 46 inches; mixed very dark grayish brown (10YR 3/2) and black (10YR 2/1) fine sand; weak fine granular structure; very friable; sand grains coated with organic matter; very strongly acid; gradual wavy boundary.

C/B—46 to 80 inches; brown (10YR 5/3) fine sand; single grained; loose; moderately acid.

The solum is more than 30 inches thick. Reaction ranges from extremely acid to slightly acid throughout.

The A horizon, when crushed, has hue of 10YR, value of 2 to 4, and chroma of 1. Uncrushed, it has a salt-and-pepper appearance. It is sand or fine sand.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. In some pedons it has small pockets and streaks of gray sand. The E horizon is sand or fine sand. The combined thickness of the A and E horizons ranges from 20 to 30 inches.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. The quantity of medium to coarse, vertical or horizontal, tongues or pockets of gray or light gray sand ranges from none to common. The Bh horizon is sand, fine sand, or loamy fine sand.

Some pedons have a second sequum of E´ and Bh´ horizons. Where present, the E´ horizon has the same range in color and texture as the E horizon and the Bh´ horizon has the same range in color and texture as the Bh horizon.

The C part of the C/B horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. The B part has the same range in color as the Bh horizon. The C/B horizon is fine sand or sand.

The C horizon, where present, has hue of 10YR, value of 4 to 7, and chroma of 1 to 3. It is sand or fine sand.

Okeelanta Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Rapid
Landform: Large freshwater marshes and small depressions
Parent material: Hydrophytic plant remains over marine sands

Slope: 0 to 2 percent
Taxonomic class: Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists

Okeelanta soils are closely associated with Floridana, Manatee, Placid, Tequesta, and Terra Ceia soils. Floridana, Manatee, Placid, and Tequesta soils are of mineral origin. Terra Ceia soils have organic horizons with a combined thickness of more than 51 inches.

Typical pedon of Okeelanta muck; about 1,200 feet south and 2,100 feet east of the northwest corner of sec. 30, T. 36 S., R. 36 E.

Oa1—0 to 3 inches; black (10YR 2/1) muck; moderate medium granular structure; very friable; many fine and medium roots; 30 percent fiber unrubbed, 10 percent rubbed; slightly acid; clear smooth boundary.

Oa2—3 to 24 inches; very dark brown (10YR 2/2) muck; weak coarse subangular blocky structure; very friable; many fine and medium roots; 15 percent fiber unrubbed, 5 percent rubbed; slightly acid; gradual wavy boundary.

Oa3—24 to 28 inches; very dark brown (10YR 2/2) muck; massive; friable; 10 percent fiber unrubbed, 5 percent rubbed; about 15 percent mineral content; slightly acid; clear wavy boundary.

C—28 to 80 inches; gray (10YR 5/1) sand; single grained; loose; many coarse faint gray (10YR 6/1) areas of iron depletion and few coarse faint dark gray (10YR 4/1) areas of iron accumulation; slightly acid.

Reaction ranges from moderately acid to moderately alkaline. The combined thickness of the organic layers ranges from 16 to 50 inches.

The Oa horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3. The content of fiber ranges from 5 to 50 percent unrubbed and from 3 to 15 percent rubbed. In some pedons the surface layer is composed of hemic materials.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or less. It is sand, fine sand, or loamy sand. The quantity of shell fragments ranges from none to many.

Orsino Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very rapid
Landform: Moderately high ridges and knolls
Parent material: Sandy marine or eolian deposits
Slope: 0 to 2 percent
Taxonomic class: Hyperthermic, uncoated Spodic Quartzipsamments

Orsino soils are closely associated with Immokalee and Pomello soils. These associated soils have a spodic horizon.

Typical pedon of Orsino fine sand; about 2,000 feet west and 200 feet south of the northeast corner of sec. 3, T. 34 S., R. 35 E.

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

E—4 to 12 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine roots; very strongly acid; abrupt irregular boundary.

B/E and Bh—12 to 14 inches; dark reddish brown (5YR 3/3) fine sand (Bh); common light gray (10YR 7/1) 1- to 5-inch diameter tongues of fine sand E material; weak fine granular structure; very friable; few fine roots; few or common pockets of yellowish brown (10YR 5/6) and pale brown (10YR 6/3) areas of iron accumulation; very strongly acid; clear irregular boundary.

Bw1—14 to 24 inches; brown (10YR 5/3) fine sand; single grained; loose; strongly acid; gradual irregular boundary.

Bw2—24 to 45 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few fine distinct brownish yellow (10YR 6/6) and reddish yellow (7.5YR 6/6) areas of iron accumulation; strongly acid; gradual wavy boundary.

C—45 to 80 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine distinct brownish yellow (10YR 6/6) and yellow (10YR 7/6) areas of iron accumulation; strongly acid.

The thickness of the solum is 40 inches or more. Reaction ranges from extremely acid to moderately acid. The content of silt plus clay in the 10- to 40-inch control section is less than 5 percent.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It commonly has a salt-and-pepper appearance. It is sand or fine sand.

The E horizon has hue of 2.5Y or 10YR, value of 6 to 8, and chroma of 1 or 2. It is sand or fine sand.

The E part of the B/E and Bh horizon has the same range in color as the E horizon. The Bh parts of the horizon have hue of 5YR to 10YR, value of 2 to 4, and chroma of 2 to 4. They occur at the contact of the E and B horizons as discontinuous layers or lenses that range from 1/4 inch to 2 inches in thickness. The texture is sand or fine sand.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 8.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 4. The quantity of redoximorphic features in shades of gray, red, yellow, or brown ranges from none to common.

Parkwood Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Rapid, except slow or moderately slow in the upper part of the B2tca horizon
Landform: Hammocks and poorly defined drainageways
Parent material: Marine sediments
Slope: 0 to 2 percent
Taxonomic class: Coarse-loamy, siliceous, superactive, hyperthermic Mollic Endoaqualfs

Parkwood soils are closely associated with Bradenton and Ft. Drum soils. These associated soils do not have a thick A horizon.

Typical pedon of Parkwood fine sand; about 3/8 mile north of the intersection of U.S. Highway 98 and the entrance to Basswood Estates, 3.0 miles northwest of the town of Okeechobee, NW1/4 of SW1/4 of sec. 6, T. 37 S., R. 35 E.

A1—0 to 6 inches; fine sand, very dark gray (10YR 3/1) crushed; weak fine crumb structure; friable; many fine and coarse roots; salt-and-pepper appearance when uncrushed due to mixture of organic matter and gray sand grains; calcareous in lower 2 inches; neutral; gradual wavy boundary.

A2—6 to 9 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable, nonsticky; many fine to coarse roots; calcareous; moderately alkaline; clear wavy boundary.

B2tca—9 to 22 inches; gray (10YR 5/1) fine sandy loam; moderate medium granular structure; friable, nonsticky; few to many fine and coarse roots; calcareous; few fine faint yellowish brown (10YR 5/6) areas of iron accumulations; moderately alkaline; gradual wavy boundary.

B31ca—22 to 39 inches; gray (10YR 5/1) loamy fine sand; weak medium granular structure; friable; few fine roots; sand grains coated and bridged with clay; many root channels filled with white (N 8/0) calcium; lower part of the horizon has thin pockets or lenses of white (N 8/0) fragmental carbonatic material; calcareous; many coarse distinct yellowish brown (10YR 5/6 and 5/8) areas of iron accumulation; moderately alkaline; gradual wavy boundary.

B32ca—39 to 52 inches; gray (10YR 6/1) loamy fine sand; weak fine granular structure; friable; few fine roots; root channels filled with carbonates; calcareous; many coarse distinct yellowish brown (10YR 5/8) areas of iron accumulation; moderately alkaline; gradual wavy boundary.

Cg—52 to 80 inches; light gray (N 7/0) loamy fine sand; single grained; loose; few small semihard carbonate nodules; few fine distinct yellowish brown (10YR 5/6) areas of iron accumulation; moderately alkaline.

The thickness of the solum ranges from 35 to 65 inches. Reaction in the A horizon ranges from neutral to moderately alkaline. Reaction in the B and C horizons is slightly alkaline or moderately alkaline.

The A horizon has hue of 5Y to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral in hue and has value of 1 or 2. It is fine sand, loamy fine sand, or sandy loam. Some pedons have a thin, continuous A2 horizon. Where present, it has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2 or is neutral in hue and has value of 4 to 6.

The Bt horizon has hue of 2.5Y or 10YR, value of 4 to 8, and chroma of 1 or 2. It has few to many redoximorphic features in shades of yellow and brown. It is sandy loam or fine sandy loam. In some pedons it has thin subhorizons of sandy clay loam, but the weighted content of clay is less than 18 percent in the upper 20 inches. Common or many secondary carbonate accumulations are present in old root channels and occur as pockets or lenses. In some pedons the horizon has fragments of shell.

The B3 horizon has the same range in characteristics as the Bt horizon, except that the range in texture includes loamy fine sand.

The Cg horizon has hue of 5Y to 10YR, value of 4 to 7, and chroma of 1 or 2; or it is neutral in hue and has value of 5 to 7. It is loamy fine sand, fine sand, or sand. In some pedons it contains shell fragments.

Pineda Series

Depth class: Deep or very deep
Drainage class: Poorly drained
Permeability: Rapid over slow or very slow
Landform: Sloughs and poorly defined drainageways
Parent material: Marine sediments
Slope: 0 to 2 percent
Taxonomic class: Loamy, siliceous, active, hyperthermic Arenic Glossaqualfs

Pineda soils are closely associated with Riviera, Valkaria, and Wabasso soils. Riviera soils do not have a Bw horizon. Valkaria soils are sandy throughout. Wabasso soils have a spodic horizon.

Typical pedon of Pineda fine sand; about 100 feet north and 1,400 feet east of the southwest corner of sec. 25, T. 36 S., R. 35 E.

A—0 to 3 inches; very dark grayish brown 10YR (3/2) fine sand; single grained; loose; many fine roots; moderately acid; clear smooth boundary.

E—3 to 6 inches; dark gray (10YR 4/1) fine sand; single grained; loose; many fine roots; moderately acid; clear wavy boundary.

Bw1—6 to 12 inches; yellowish brown (10YR 5/6) fine sand; single grained; loose; many fine roots; many fine yellowish red (5YR 5/8) masses of iron accumulation; moderately acid; gradual wavy boundary.

Bw2—12 to 21 inches; strong brown (7.5YR 5/8) fine sand; single grained; loose; few fine roots; common medium distinct yellowish red (5YR 5/8) areas of iron accumulation; moderately acid; clear wavy boundary.

Bw3—21 to 34 inches; pale brown (10YR 6/3) fine sand; single grained; loose; slightly acid; clear wavy boundary.

E´—34 to 38 inches; light gray (10YR 7/2) fine sand; single grained; loose; neutral; abrupt irregular boundary.

B/E—38 to 52 inches; olive gray (5Y 5/2) sandy loam (Btg); weak coarse subangular blocky structure; friable; tongues of light gray (10YR 7/2) material from the E´ horizon; common medium distinct olive brown (2.5Y 4/4) and olive (5Y 5/3) areas of iron accumulation; neutral; gradual wavy boundary.

Cg—52 to 80 inches; gray (5Y 5/1) sandy loam; massive; very friable; slightly alkaline.

The thickness of the soil ranges from 40 to 80 inches. The combined thickness of the A, E, Bw, and E´ horizons ranges from 20 to 40 inches. Reaction ranges from strongly acid to neutral in the A, E, Bw, and E´ horizons, from strongly acid to moderately alkaline in the Btg horizon, where present, and from moderately acid to moderately alkaline in the Cg horizon.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. It is sand or fine sand.

The E horizon, where present, has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The quantity of redoximorphic features in shades of yellow and brown ranges from none to common. The texture is sand or fine sand.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 3 to 8. It is sand or fine sand.

The E´ horizon and E part of the B/E horizon have hue of 10YR, value of 5 to 8, and chroma of 2 to 4. They are sand or fine sand.

The B/E horizon has vertical sandy intrusions or tongues of the overlying albic materials (E). The tongues are about 5 centimeters or more in length and width and make up more than 15 percent of the B/E horizon. The Btg part of the B/E horizon has hue of 5BG to 10YR, value of 4 to 7, and chroma of 1 or 2. The quantity of redoximorphic features in shades of yellow or brown ranges from none to common. The B/E horizon is sandy loam, fine sandy loam, or sandy clay loam.

The Btg horizon, where present, has colors and textures similar to those of the Btg part of the B/E horizon.

The C horizon has hue of 5Y to 10YR, value of 5 to 8, and chroma of 1 or 2. It is sand, fine sand, loamy sand, sandy loam, or sandy clay loam. In some pedons it has shell fragments in the lower part.

Placid Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Rapid
Landform: Depressions, low flats, flood plains, and poorly defined drainageways on uplands
Parent material: Sandy marine sediments
Slope: 0 to 2 percent
Taxonomic class: Sandy, siliceous, hyperthermic Typic Humaquepts

Placid soils are closely associated with Floridana, Manatee, Okeelanta, Tequesta, and Terra Ceia soils. Floridana and Manatee soils have an argillic horizon. Okeelanta and Terra Ceia soils are organic. Tequesta soils have a histic epipedon.

Typical pedon of Placid fine sand, in an area of Floridana, Riviera, and Placid soils, depressional; about 1.5 miles north of the Okeechobee city limits, 2.25 miles west of U.S. Highway 441, and 0.5 mile south of Highway 68, NW1/4 of sec. 32, T. 35 S., R. 35 E.

A1—0 to 10 inches; black (10YR 2/1) fine sand; moderate medium crumb structure; friable; many fine and medium roots; few root channels; few small pockets (stripped matrix) of dark gray (10YR 4/1) and gray (10YR 5/1) fine sand; very strongly acid; gradual smooth boundary.

A2—10 to 20 inches; very dark gray (10YR 3/1) fine sand; weak fine crumb structure; very friable; many fine and medium roots; few root channels; narrow tongues and small pockets of black (10YR 2/1), dark gray (10YR 4/1), and very dark grayish brown (10YR 3/2) material in lower part of the horizon; very strongly acid; clear wavy boundary.

Cg1—20 to 30 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine roots; few fine faint dark gray (10YR 4/1) and very dark gray (10YR 3/1) areas of iron accumulation; strongly acid; gradual wavy boundary.

Cg2—30 to 48 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; common medium faint very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) areas of iron accumulation; strongly acid; gradual wavy boundary.

Cg3—48 to 80 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; few fine faint very dark gray (10YR 3/1) areas of iron accumulation; strongly acid.

The soil is more than 80 inches thick. Reaction in the A horizon ranges from extremely acid to strongly acid. Reaction in the underlying horizons ranges from extremely acid to slightly acid.

The A horizon dominantly has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 3 or less. In some pedons it has value of 4 in the lower 3 to 6 inches. The A horizon is sand, fine sand, loamy sand, loamy fine sand, or their mucky analogs. In some pedons it has up to 3 inches of muck on the surface.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 8, and chroma of 3 or less. It is sand, fine sand, loamy sand, or loamy fine sand. The quantity of redoximorphic features in shades of yellow or brown ranges from none to common.

Pomello Series

Depth class: Very deep
Drainage class: Moderately well drained or somewhat poorly drained
Permeability: Moderately rapid
Landform: Ridges and knolls
Parent material: Sandy marine sediments
Slope: 0 to 5 percent
Taxonomic class: Sandy, siliceous, hyperthermic Oxyaquic Alorthods

Pomello soils are closely associated with Basinger, Immokalee, Myakka, Orsino, and St. Johns soils. Basinger and Orsino soils do not have a spodic horizon. Immokalee, Myakka, and St. Johns soils are poorly drained and are in the lower landscape positions.

Typical pedon of Pomello fine sand, 0 to 5 percent slopes; about 2.5 miles west of U.S. Highway 441 on County Road 68 and 200 feet north of the southwest corner of sec. 29, T. 35 S., R. 35 E.

A—0 to 4 inches; gray (10YR 6/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear wavy boundary.

E—4 to 42 inches; white (10YR 8/1) fine sand; single grained; loose; common fine and medium roots; few dark gray (10YR 4/1) strata in root channels; very strongly acid; abrupt wavy boundary.

Bh1—42 to 47 inches; dark reddish brown (5YR 2/2), black (5YR 2/1), and dark reddish brown (2.5Y 3/4) fine sand; weakly cemented; massive; friable; common fine and medium roots; sand grains coated with organic matter; very strongly acid; clear wavy boundary.

Bh2—47 to 54 inches; dark reddish brown (5YR 3/3) fine sand; few coarse faint dark brown (7.5YR 3/2) iron accumulations; massive; friable; few medium roots; sand grains coated with organic matter; very strongly acid; clear wavy boundary.

Bw—54 to 66 inches; brown (10YR 4/3) fine sand; single grained; loose; common medium faint dark brown (10YR 3/3) areas of iron accumulation; very strongly acid; clear wavy boundary.

Cg—66 to 80 inches; light gray (10YR 7/2) sand; single grained; loose; very strongly acid.

The thickness of the solum is 40 inches or more. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 2.5Y or 10YR, value of 4 to 7, and chroma of 2 or less. It is sand or fine sand.

The E horizon has hue of 2.5Y or 10YR, value of 5 to 8, and chroma of 2 or less. It is sand or fine sand.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. In some pedons streaks or tongues of the E horizon extend into the Bh horizon. The Bh horizon is sand or fine sand.

The Bw horizon, where present, has hue of 5YR to 10YR and value and chroma of 3 to 6. It is sand or fine sand.

The C horizon has hue of 2.5Y or 10YR, value of 5 to 7, and chroma of 1 to 4. It is sand, fine sand, or coarse sand.

In some pedons a B´h horizon is present instead of the C horizon. The B´h horizon has the same range in texture and color as the Bh horizon and is as much as 14 inches thick.

Riviera Series

Depth class: Deep
Drainage class: Poorly drained
Permeability: Rapid in the A horizon and slow or very slow in the B horizon
Landform: Broad, low flats (sloughs) and depressions
Parent material: Marine sediments
Slope: 0 to 2 percent
Taxonomic class: Loamy, siliceous, active, hyperthermic Arenic Glossaqualfs

Riviera soils are closely associated with Pineda, Valkaria, and Wabasso soils. Pineda and Valkaria soils have a high-chroma Bw horizon. Wabasso soils have a spodic horizon.

Typical pedon of Riviera fine sand; about 2,000 feet north and 1,600 feet east of the southwest corner of sec. 19, T. 36 S., R. 36 E.

A1—0 to 3 inches; black (10YR 2/1) fine sand; weak fine crumb structure; very friable; common fine and medium roots; very strongly acid; clear smooth boundary.

A2—3 to 7 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; clear smooth boundary.

E1—7 to 12 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; common fine roots; common fine and medium distinct brownish yellow (10YR 6/6) areas of iron accumulation; moderately acid; gradual smooth boundary.

E2—12 to 16 inches; light gray (10YR 7/2) fine sand; single grained; loose; moderately acid; gradual smooth boundary.

E3—16 to 22 inches; very pale brown (10YR 8/2) fine sand; single grained; loose; common coarse distinct brownish yellow (10YR 6/6) areas of iron accumulation; moderately acid; abrupt wavy boundary.

Bt/E—22 to 27 inches; light gray (10YR 7/2) fine sandy loam (Bt) and very pale brown (10YR 8/2) tongues of sand (E); weak coarse subangular blocky structure; slightly sticky; sand grains coated and bridged with clay; neutral; strongly acid; clear wavy boundary.

Btg—27 to 40 inches; 40 percent light gray (10YR 7/1) and 60 percent gray (10YR 6/1) fine sandy loam; weak fine subangular blocky structure; friable; common coarse distinct yellowish brown (10YR 5/8) areas of iron accumulation; slightly alkaline; clear smooth boundary.

IIC—40 to 80 inches; grayish brown (2.5Y 5/2) fine sandy loam; massive; slightly sticky; slightly alkaline.

The thickness of the solum ranges from 35 to 65 inches.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. It is sand or fine sand. Reaction ranges from very strongly acid to neutral.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. It is sand or fine sand. Reaction ranges from strongly acid to neutral.

The Bt/E horizon has hue of 5Y to 10YR, value of 3 to 7, and chroma of 1 or 2. The texture of the B part is sandy loam, fine sandy loam, or sandy clay loam. The tongues and interfingering material from the E horizon are sand or fine sand. Reaction of the Bt/E horizon ranges from slightly acid to moderately alkaline.

The Btg horizon has hue of 5Y to 10YR, value of 3 to 7, and chroma of 1 or 2. It has few to many redoximorphic features in shades of brown and yellow. Reaction ranges from slightly acid to moderately alkaline. The Btg horizon is fine sandy loam, sandy loam, or sandy clay loam.

The IIC horizon ranges from fine sandy loam to either a mixture of sand and shell fragments or to a mixture of shell fragments and marl.

St. Johns Series

Depth class: Very deep
Drainage class: Poorly drained or very poorly drained
Permeability: Moderate
Landform: Broad flats and depressions
Parent material: Marine sediments
Slope: 0 to 2 percent
Taxonomic class: Sandy, siliceous, hyperthermic Typic Alaquods

St. Johns soils are closely associated with Basinger, Immokalee, Myakka, and Pomello soils. Basinger soils do not have a spodic horizon. Immokalee, Myakka, and Pomello soils do not have a thick, dark A horizon.

Typical pedon of St. Johns fine sand; about 1.75 miles north of State Road 68 and 4.0 miles southeast of Ft. Drum, SE1/4 of sec. 31, T. 34 S., R. 36 E.

A1—0 to 10 inches; black 10YR (2/1) fine sand; weak fine crumb structure; friable; many fine, medium, and coarse roots; many clean sand grains; about 15 percent organic matter; very strongly acid; clear smooth boundary.

A2—10 to 14 inches; very dark gray (10YR 3/1) sand; single grained; loose; common fine roots; many clean light-colored sand grains; very strongly acid; gradual smooth boundary.

E—14 to 22 inches; light gray (10YR 6/1) sand; few tongues and small pockets of dark gray (10YR 4/1) sand; single grained; loose; few fine and medium roots; very strongly acid; abrupt wavy boundary.

Bh1—22 to 34 inches; black (10YR 2/1) sand; massive; firm; common fine, medium, and coarse roots; few small pockets of light gray (10YR 6/1) sand grains; very strongly acid; clear wavy boundary.

Bh2—34 to 42 inches; dark reddish brown (5YR 2/2) sand; common very dark brown (10YR 2/2) and dark reddish brown (5YR 3/3) pockets in the lower few inches; massive; friable; few fine roots and pores; few medium black (10YR 2/1) concretions or firm fragments; very strongly acid; gradual wavy boundary.

BC—42 to 66 inches; dark brown (7.5YR 3/2) sand; single grained; loose; few fine roots; common medium faint very dark brown (7.5YR 2/2 and 2/4), dark grayish brown (10YR 4/2), and dark yellowish brown (10YR 3/4 and 4/4) areas of iron accumulation and depletion; very strongly acid; gradual wavy boundary.

C—66 to 80 inches; pale brown (10YR 6/3) sand; single grained; loose; very strongly acid.

The A horizon is less than 30 inches thick. Reaction ranges from extremely acid to strongly acid throughout the profile. Texture is sand or fine sand in all horizons, except the Bh horizon, which is loamy sand or loamy fine sand in some pedons.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral in hue and has value of 2.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or it is neutral in hue and has value of 5 to 7.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral in hue and has value of 2. Some pedons have a continuous layer about 1 inch thick at the top of the Bh horizon. This layer contains about 4 percent or more organic matter. In some pedons the Bh horizon has vertical or horizontal tongues or masses or both of gray or light gray sand.

The BC horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 4.

Some pedons have a second sequum of E´ and Bh´ horizons. Where present, the E´ horizon has colors similar to those of the E horizon and the Bh´ horizon has colors similar to those of the Bh horizon.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 3.

Tequesta Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Rapid over moderately slow
Landform: Flood plains and depressional areas
Parent material: Hydrophytic plant remains over marine sediments
Slope: 0 to 2 percent
Taxonomic class: Loamy, siliceous, active, hyperthermic Arenic Glossaqualfs

Tequesta soils are closely associated with Floridana, Manatee, Okeelanta, Placid, and Terra Ceia soils. Floridana, Manatee, and Placid soils do not have a histic epipedon. Okeelanta and Terra Ceia soils are organic.

Typical pedon of Tequesta muck in an area of Manatee, Floridana, and Tequesta soils, frequently flooded; about 2,700 feet north and 800 feet west of the southeast corner of sec. 33, T. 36 S., R. 33 E.

Oa—0 to 10 inches; black (10YR 2/1) muck; 30 percent fiber unrubbed, 10 percent rubbed; moderate medium granular structure; friable; many fine and medium roots; few clean sand grains; slightly acid; clear smooth boundary.

A1—10 to 18 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many fine and medium roots; slightly acid; gradual wavy boundary.

A2—18 to 33 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; neutral; clear wavy boundary.

Btg—33 to 62 inches; dark gray (10YR 4/1) fine sandy loam; weak medium subangular blocky structure; slightly sticky; common medium faint dark grayish brown (10YR 4/2) areas of iron accumulation; slightly alkaline; gradual wavy boundary.

IIC—62 to 80 inches; light gray (10YR 7/2) fine sand; single grained; loose; neutral.

The solum is 30 inches or more in thickness. Reaction ranges from strongly acid to neutral in the Oa and A horizons and from slightly acid to moderately alkaline in the B and IIc horizons.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 4; or it is neutral in hue and has value of 2.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or it is neutral in hue and has value of 4 to 6. The quantity of redoximorphic features in shades of gray and brown ranges from none to common. The texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. In some pedons tongues of material from the A2 horizon extend into the Btg horizon. The Btg horizon is sandy loamy, fine sandy loam, or sandy clay loam.

The IIC horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. It is sand, fine sand, or loamy sand. In some pedons it contains shell fragments.

Terra Ceia Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Rapid

Landform: Freshwater marshes and depressions
Parent material: Hydrophytic plant remains over marine sediments
Slope: 0 to 1 percent
Taxonomic class: Euic, hyperthermic Typic Medisaprists

Terra Ceia soils are closely associated with Floridana, Manatee, Okeelanta, Placid, and Tequesta soils. Floridana, Manatee, Placid, and Tequesta soils are mineral soils. Okeelanta soils have sandy mineral material within a depth of 50 inches.

Typical pedon of Terra Ceia muck; about 1,600 feet east and 1,700 feet north of the southwest corner of sec. 23, T. 37 S., R. 35 E.

Oa1—0 to 8 inches; dark reddish brown (5YR 2/2) muck; 10 percent fiber unrubbed, 2 percent rubbed; moderate coarse subangular blocky structure; friable; many fine and medium roots; slightly acid; clear wavy boundary.
Oa2—8 to 53 inches; black (10YR 2/1) muck; 45 percent fiber unrubbed, 5 percent rubbed; weak coarse subangular blocky structure; friable; many fine and medium roots; neutral; gradual wavy boundary.
IIC1—53 to 60 inches; black (10YR 2/1) fine sand; single grained; loose; common tongues and small pockets of black (10YR 2/1) muck; neutral; gradual smooth boundary.
IIC2—60 to 80 inches; dark gray (10YR 4/1) fine sand; single grained; loose; black and very dark gray streaks in old root channels; neutral.

Reaction ranges from moderately acid to moderately alkaline. The thickness of the organic matter is more than 51 inches.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral in hue and has value of 2. The content of fiber ranges from 5 to 30 percent unrubbed and from 3 to 15 percent rubbed. The content of mineral material ranges from 5 to 20 percent. In some pedons the surface layer is composed of hemic materials.

The IIC horizon, where present, has hue of 10YR, value of 2 to 6, and chroma of 2 or less. It is sand, fine sand, or loamy sand. In some pedons it contains shell fragments.

Valkaria Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Rapid
Landform: Sloughs, depressions, and poorly defined drainageways
Parent material: Marine sands
Slope: 0 to 2 percent
Taxonomic class: Siliceous, hyperthermic Spodic Psammaquents

Valkaria soils are closely associated with Pineda, Riviera, and Wabasso soils. These associated soils have a Bt horizon.

Typical pedon of Valkaria fine sand; about 2,050 feet north and 800 feet west of the southeast corner of sec. 20, T. 34 S., R. 34 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak fine crumb structure; friable; many fine roots; slightly acid; clear smooth boundary.
E—6 to 19 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many fine roots; neutral; clear wavy boundary.
Bw1—19 to 30 inches; brownish yellow (10YR 6/8) fine sand; single grained; loose; few fine roots; common medium distinct dark yellowish brown (10YR 4/6) areas of iron accumulation; slightly alkaline; gradual wavy boundary.
Bw2—30 to 46 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; few fine roots; few coarse distinct very pale brown (10YR 7/4) and common medium distinct dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) areas of iron accumulation and depletion; slightly alkaline; clear wavy boundary.
C—46 to 80 inches; white (10YR 8/1) fine sand; single grained; loose; slightly alkaline.

The thickness of the solum ranges from 35 to more than 60 inches. The texture of the soil is sand or fine sand. Reaction ranges from strongly acid to moderately alkaline.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The quantity of redoximorphic features in shades of gray, yellow, and brown ranges from none to common.

The Bw horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 3 to 8. It has few to many redoximorphic features in shades of brown, red, and yellow.

The C horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2.

Wabasso Series

Depth class: Deep or very deep
Drainage class: Poorly drained or very poorly drained
Permeability: Rapid in the A and E horizons and slow or very slow in the Bt horizon

Landform: Flatwoods, flood plains, and depressions
Parent material: Sandy and loamy marine sediments
Slope: 0 to 2 percent
Taxonomic class: Sandy, siliceous, hyperthermic Alfic Alaquods

Wabasso soils are closely associated with Pineda, Riviera, and Valkaria soils. These associates soils do not have a spodic horizon.

Typical pedon of Wabasso fine sand; about 300 feet north of Airport Road and 2.5 miles northwest of the center of the town of Okeechobee, NE1/4 of NE1/4 of sec. 7, T. 37 S., R. 35 E.

A—0 to 4 inches; very dark gray (10YR 3/1) fine sand; salt-and-pepper appearance due to mixture of light gray sand grains; weak fine crumb structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

E—4 to 16 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bh—16 to 28 inches; dark reddish brown (5YR 2/2) fine sand; massive; friable; few fine and medium roots; reddish brown (5YR 4/4) masses of iron accumulation and gray iron depletions lining pores along old root channels; strongly acid; gradual smooth boundary.

E´—28 to 32 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; common fine and medium roots; few fine faint yellow (10YR 7/6) masses of iron accumulation and few medium faint light brownish gray (10YR 6/2) iron depletions lining pores along old root channels; neutral; clear wavy boundary.

Bt1—32 to 36 inches; light gray (10YR 6/1) fine sandy loam; weak coarse subangular blocky structure; friable; few fine and medium roots; few patchy clay films in root channels; sand grains coated with clay; many medium distinct brownish yellow (10YR 6/8) masses of iron accumulation and few fine ironstone nodules; neutral; gradual wavy boundary.

Bt2—36 to 48 inches; yellowish brown (10YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; sand grains bridged and coated with clay; streaks of white carbonates in root channels; many coarse distinct gray (10YR 6/1) masses of iron depletion; slightly alkaline; gradual wavy boundary.

Cg1—48 to 60 inches; light gray (10YR 7/1) loamy fine sand; massive; friable; few fine and medium roots; many medium and coarse distinct yellow (10YR 6/6) masses of iron accumulation; common small to large strong brown (7.5YR 5/6) ironstone nodules; slightly alkaline; gradual wavy boundary.

Cg2—60 to 80 inches; gray (N 6/0) fine sand; single grained; loose; common medium and coarse light olive brown (2.5Y 5/6) masses of iron accumulation; slightly alkaline.

The A horizon has hue of 2.5Y or 10YR, value of 2 to 4, and chroma of 1 or 2; or it is neutral in hue and has value of 2 to 4. It is sand or fine sand. Reaction ranges from extremely acid to slightly acid.

The E horizon has hue of 2.5Y or 10YR, value of 5 to 7, and chroma of 1 or 2; or it is neutral in hue and has value of 5 or 6. The quantity of redoximorphic features in shades of yellow and brown ranges from none to common. The texture is sand or fine sand. Reaction ranges from extremely acid to slightly acid. The combined thickness of the A and E horizons is less than 30 inches.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 4; or it is neutral in hue and has value of 2 or 3. It is loose to friable and is noncemented. In some pedons it has thin, firm, weakly cemented ortstein in less than half of the pedon. Some pedons have a BC/Bh horizon. Where present, this horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4 and may contain spodic fragments. The texture of the Bh horizon and the BC/Bh horizon is sand, fine sand, loamy sand, or loamy fine sand. Reaction ranges from very strongly acid to neutral.

The E´ horizon, where present, has hue of 2.5Y or 10YR, value of 5 to 8, and chroma of 1 to 3; or it is neutral in hue and has value of 5 or 6. It is sand or fine sand. Reaction ranges from very strongly acid to moderately alkaline.

The Bt horizon is at a depth of less than 40 inches. It has hue of 2.5Y or 10YR, value of 5 to 7, and chroma of 1 to 8; has hue of 5Y, 5G, or 5GY, value of 4 to 7, and chroma of 1 or 2; or is neutral in hue and has value of 5 or 6. It has few to many redoximorphic features in shades of gray, brown, yellow, and red. The content of small ironstone nodules ranges from none to common. The texture is fine sandy loam, sandy loam, or sandy clay loam. In many pedons the Bt horizon has pockets or intrusions of coarser textured material. Reaction ranges from very strongly acid to moderately alkaline.

The Cg horizon has hue of 5Y or 10YR, value of 5 to 8, and chroma of 1 or 2. The quantity of redoximorphic features in shades of brown and yellow ranges from none to common. The quantity of small to large ironstone nodules ranges from none to common. In some pedons the Cg horizon contains shell fragments. The texture is sand, fine sand, or loamy sand. Reaction is slightly alkaline or moderately alkaline.

Formation of the Soils

In this section, the factors and processes of soil formation are described and related to the soils in the survey area. Also described is the geology of the county, including the geomorphology, hydrogeology, and mineral resources.

Factors of Soil Formation

Soil is produced by forces of weathering acting on parent material deposited or accumulated by geologic agencies. The kind of soil that develops depends on five major factors. These factors are the type of parent material; the climate under which soil material has existed since accumulation; the plant and animal life in and on the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material (Jenny, 1941).

The five soil-forming factors are interdependent; each modifies the effect of the others. Any one of the five factors can have more influence than the others on the formation of a soil and can account for most of its properties. For example, if the parent material is quartz sand, the soil generally has weakly expressed horizons. In places the effect of the parent material is modified greatly by the effects of climate, relief, and plants and animals. As a soil forms, it is influenced by each of the five factors, but in places one factor may be dominant. A modification or variation in any of the five factors results in a different kind of soil.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It determines the limits of the chemical and mineralogical composition of the soil. In Okeechobee County, the parent material consists of beds of sandy and clayey materials that were transported and deposited by ocean currents. The ocean covered the area a number of times during the Pleistocene period. In some parts of the county, many depressions contain organic material from decomposed plant remains.

Climate

The climate of Okeechobee County is generally warm and humid. Few differences between the soils are caused by climate; however, the climate aids in rapid decomposition of organic matter and hastens chemical reactions in the soil. Heavy rainfall leaches the soils of most plant nutrients and produces an acid condition in many of the sandy soils. It also carries the less soluble fine particles downward.

Because of the climatic conditions, many of the soils in the county have a low content of organic matter, low natural fertility, and low available water capacity.

Plants and Animals

Plants have been the principal biological factor in the formation of soils in the county. Animals, insects, bacteria, and fungi have also been important. Plants and animals furnish organic matter to the soil and bring nutrients from lower soil layers to upper soil layers. In places, plants and animals cause differences in the amount of organic matter, nitrogen, and nutrients in the soil and differences in soil porosity and structure. For example, crayfish penetrate different layers of soil, thereby mixing loamy layers with sandy layers.

Microorganisms, including bacteria and fungi, help to weather and break down minerals and to decompose organic matter. These organisms are most numerous in the upper few inches of the soil. Earthworms and other small animals that inhabit the soil alter its physical and chemical composition and mix the soil material. In Okeechobee County, the native vegetation has affected soil formation more than other living organisms.

Relief

In Okeechobee County, relief has affected the formation of soils primarily through its influence on soil-water relationships.

The three general areas of relief in the county are flatwoods, slightly elevated knolls and ridges, and depressions and flood plains. Differences between the soils, which all formed in similar parent materials, are directly related to relief.

In areas of the flatwoods, the water table is at a shallow depth and the soils are periodically saturated to the surface. These soils display less leaching and greater retention of organic matter than the soils in the other areas. The soils on the elevated knolls and ridges have a greater depth to the water table. They are highly leached and have less organic matter. The soils in depressions have a medium to high content of organic matter.

Time

Time is an important factor affecting soil formation. The physical and chemical changes brought about by climate, living organisms, and relief are relatively slow. The length of time needed to convert geological material into soil varies according to the nature of the material and the interaction of the other soil forming factors. Some basic minerals from which soils are formed weather fairly rapidly, while others are chemically inert and show little change over time. Within the soil, the translocation of fine particles to form horizons varies under differing conditions, but the processes take a relatively long period of time.

Processes of Soil Formation

Soil genesis refers to the formation of soil horizons. The differentiation of horizons in soils in the county is the result of accumulation of organic matter, leaching of carbonates, reduction and transfer of iron, or accumulation of silicate clay minerals. Sometimes more than one of these processes is involved.

Some organic matter has accumulated in the upper layers of most of the soils. The content of organic matter is low in some of the soils and fairly high in others.

The soils in the county are leached to varying degrees. Carbonates and salts have been leached in most of the soils. Because the leaching permitted the subsequent translocation of silicate clay materials in some soils, the effects have been indirect.

The reduction and transfer of iron have occurred in most of the soils in the county, except in the organic soils. In some of the wet soils, iron in the subsoil forms yellowish brown horizons and redoximorphic features (mottles).

Geology

Joseph D. Robertson and Richard Green, P.G., Florida Geological Survey, prepared this section.

Geomorphology

Okeechobee County is located within the Central or Mid-Peninsular zone and the Southern or Distal zone of White (1970). The terrain of the county is generally flat. Land-surface altitudes range from 10 feet (3.1 meters) above mean sea level (MSL) in the southern part of the county to 75 feet (22.9 meters) above MSL in the northern part. White (1970) noted three main geomorphic features in Okeechobee County: the Osceola Plain, the Okeechobee Plain, and the Eastern Valley (fig. 10). The high areas in the northern portion of the county are part of the Osceola Plain (White, 1970). The Osceola Plain grades into the Okeechobee Plain in the southern portion of the county. A south-facing scarp with a 60-foot (18.3 meter) crest defines the boundary between the two geomorphic provinces. In the northeastern and southeastern portions of the county, the 30- to 40-foot (9.1 to 12.2 meter) contour line is the boundary between the Osceola Plain and the Eastern Valley (White, 1970).

Marine Terraces

The topography of Okeechobee County has been greatly influenced by five Quaternary-age marine terraces. These terraces are comprised mainly of quartz-rich sands that have varying quantities of shell fragments and represent the marginal area between the continent and the ocean in the past when sea level was at a higher elevation (Parker et al., 1955). From highest to lowest elevations, the terraces are the Wicomico Terrace, the Penholoway Terrace, the Talbot Terrace, the Pamlico Terrace, and the Silver Bluff Terrace (Bradner, 1994).

The Wicomico Terrace, which is located in the northeastern portion of the county, has a lower limit of 70 feet (21.4 meters) above MSL. The Penholoway Terrace, which covers most of the county, has a lower limit of 42 feet (12.8 meters) above MSL. The Talbot Terrace, which is located in the western portion of the county around the Kissimmee River and in the southern portion of the county in the Taylor Creek basin, has a lower limit of 25 feet (7.6 meters) above MSL. The Pamlico and Silver Bluff Terraces, which are situated along the northern flanks of Lake Okeechobee, have elevations of less than 25 feet (7.6 meters) above MSL.

Okeechobee County is poorly drained, and large portions of the county are marshland. The main drainage basins for the county are the Kissimmee River basin; the Taylor Creek and Upper Okeechobee basin; the Upper St. Johns River basin; and the St. Lucie-Martin County basin (Bradner, 1994). Several other tributaries drain the county, including Pine Island Slough, Seven-mile Slough, Cypress Slough, Popash Slough, Duck Slough, and Nubbin Slough.

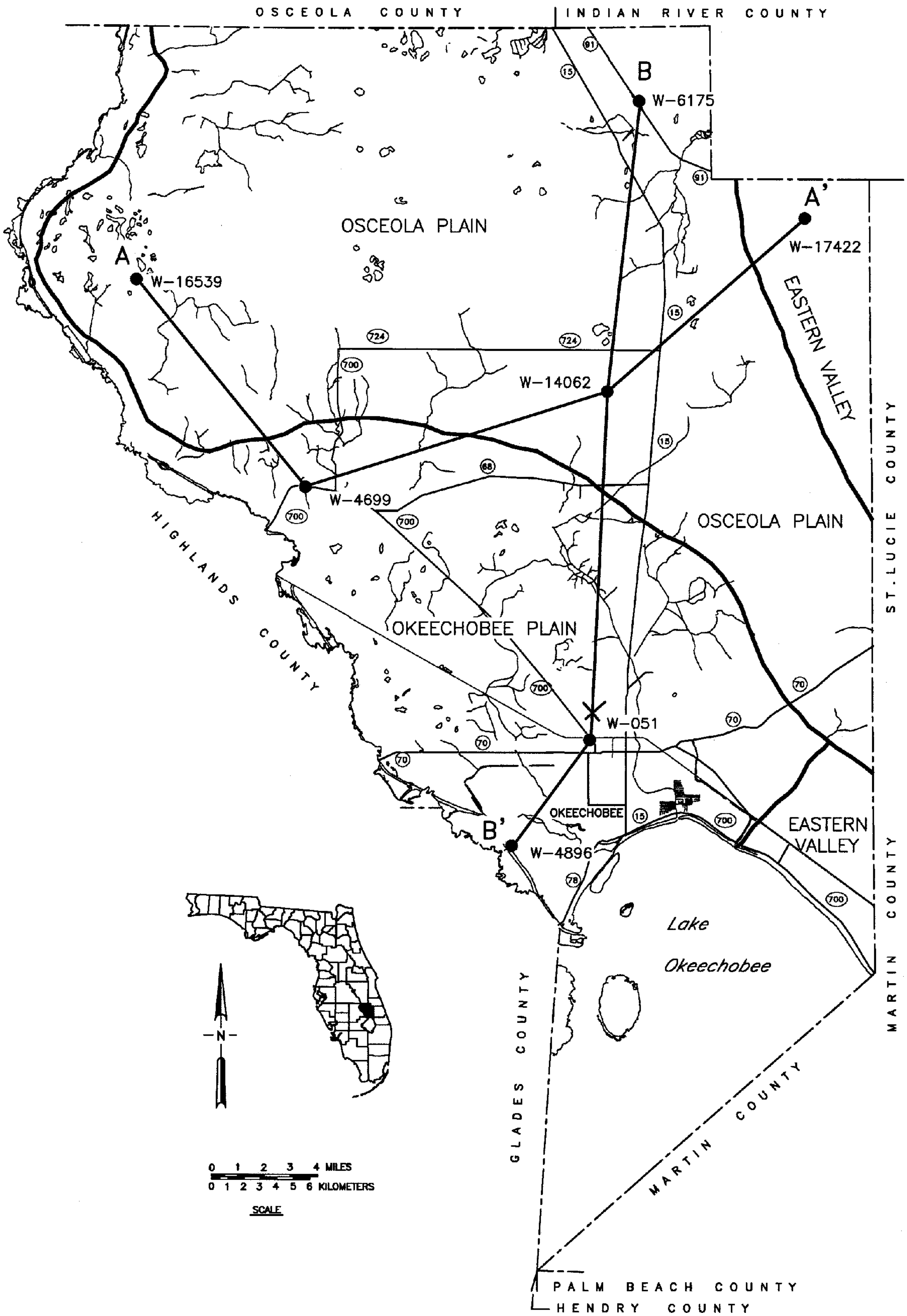


Figure 10.—Locator map for cross sections and geomorphic features in Okeechobee County (modified from White, 1970).

Stratigraphy

Okeechobee County is underlain by about 8,000 to 12,000 feet (2,440 to 3,660 meters) of interbedded sand, limestone, dolomite, clay, anhydrite, and gypsum. The oldest lithologic unit utilized for ground water in Okeechobee County is the Middle Eocene Avon Park Formation (Bradner, 1994). The youngest sediments present at land surface in the county are undifferentiated sediments of Pliocene to Holocene age (5 million years old and younger). The Eocene and younger units are important water-bearing units for the county; thus, the following description is limited to the corresponding formations.

Eocene Series

Oldsmar Formation

In Okeechobee County, the Lower Eocene Oldsmar Formation is composed of limestone and dolostone. The top of the Oldsmar Formation is at about 1,800 feet (458 meters) below MSL in the northern part of the county and at about 2,100 feet (640 meters) below MSL in the southern part. The thickness of the Oldsmar Formation ranges from 1,000 to 1,200 feet (308 to 365 meters), increasing in thickness towards the southwest (Miller, 1986).

The Oldsmar Formation forms the Middle permeable zone and the Boulder zone of the Lower Floridan aquifer system (Tibbals, 1990; Bradner, 1994). Due to high salinity, water from the Oldsmar Formation is rarely used as a domestic water supply (Bradner, 1994).

Avon Park Formation

Miller (1986) combined the Lake City Limestone and the Avon Park Formation of Applin and Applin (1944) into the Avon Park Formation because the two units could not be differentiated on the basis of either lithologic or faunal differences. Therefore, the Avon Park Formation as described below includes the Lake City Limestone and the Avon Park Limestone.

In Okeechobee County, the Middle Eocene Avon Park Formation is normally a tan to yellowish gray interbedded limestone and dolostone and is characterized by indurated zones alternating with porous zones. The formation typically contains the following foraminifers: *Coskinolina floridana, Dictyoconus cookei, Dictyoconus gunteri, Lituonella floridana,* and *Spirolina coryensis*. The top of the Avon Park Formation ranges from 400 to 700 feet (122 to 213 meters) below MSL in the county. The formation, which generally dips south to southwest, ranges in thickness from 1,400 feet to 1,500 feet (427 to 457 meters) in the county (Miller, 1986).

The Avon Park Formation forms the Upper permeable zone of the Lower Floridan aquifer system and the Middle semi-confining hydrogeologic unit of the Upper Floridan aquifer system (Tibbals, 1990; Bradner, 1994). The formation is the oldest geologic unit utilized for water in Okeechobee County.

Ocala Limestone

The Upper Eocene Ocala Limestone unconformably overlies the Avon Park Formation in Okeechobee County. The formation is generally a white to gray, highly fossiliferous limestone with minor occurrences of dolostone. The Ocala Limestone is characteristically a grainstone or packstone with a calcilutite or dolomite matrix. The formation typically contains the following foraminifers: *Lepidocyclina ocalana, Nummulites (Camerina) vanderstoki, Nummulites (Operculinoides) ocalanus, Amphistegina pinarensis cosdeni, Eponides jacksonensis,* and *Heterostegina ocalana*. The top of the Ocala Limestone ranges from 350 feet (106.7 meters) below MSL in the northern portion of the county to 600 feet (183 meters) below MSL in the southern portion (fig. 11 and 12). The surface of the Ocala Limestone dips to the south (Miller, 1986). The thickness of the Ocala Limestone ranges from 100 feet (30.5 meters) in the northern part of the county to 200 feet (61 meters) in the southern part (Miller, 1986).

In Okeechobee County, the Ocala Limestone is part of Upper Floridan aquifer system (Tibbals, 1990; Bradner, 1994).

Miocene Series

Hawthorn Group

In Okeechobee County, the Miocene Hawthorn Group unconformably overlies the Ocala Limestone. Lithologies of the Hawthorn Group in southern Florida are highly variable, both laterally and vertically (Scott, 1988). The Hawthorn Group in the county includes, in ascending order, the Arcadia Formation and the Peace River Formation.

The Hawthorn Group is considered to be the Upper semi-confining hydrogeologic unit in Okeechobee County by Tibbals (1990) and the Intermediate aquifer system/confining unit by Bradner (1994).

Arcadia Formation

The Miocene Arcadia Formation unconformably overlies the Ocala Limestone in Okeechobee County. The Arcadia Formation characteristically consists of

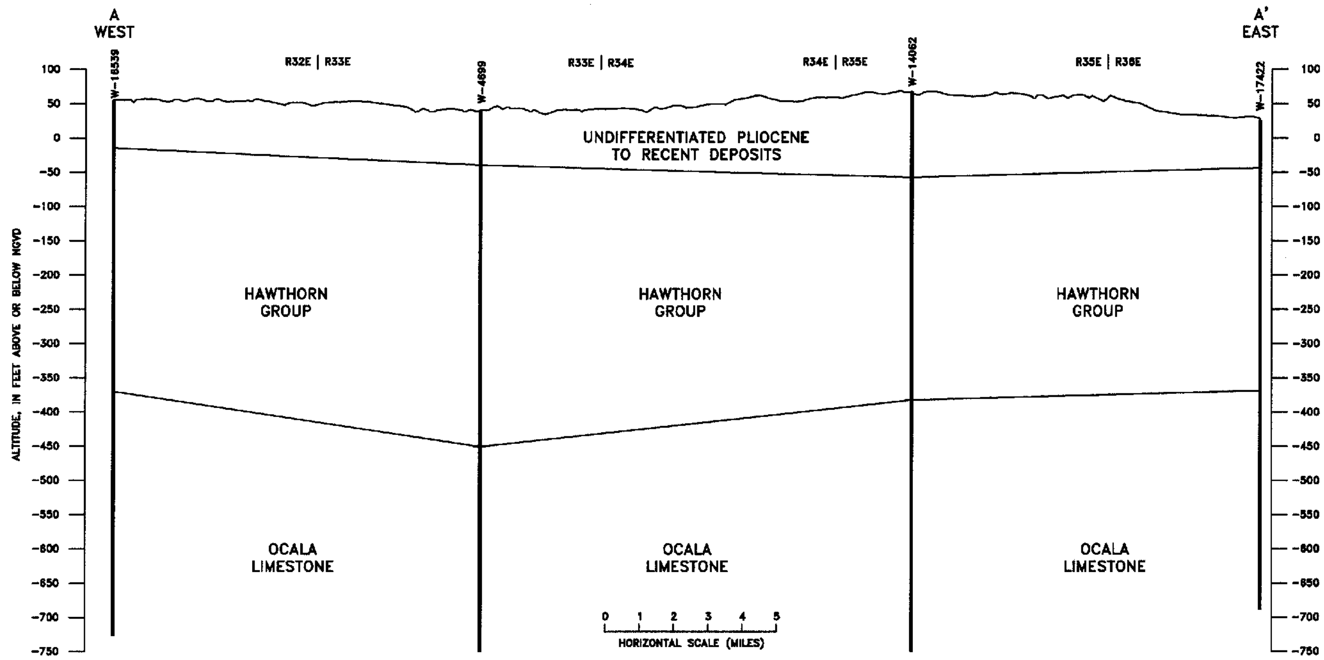


Figure 11.— Cross section of geologic materials at sites A to A´.

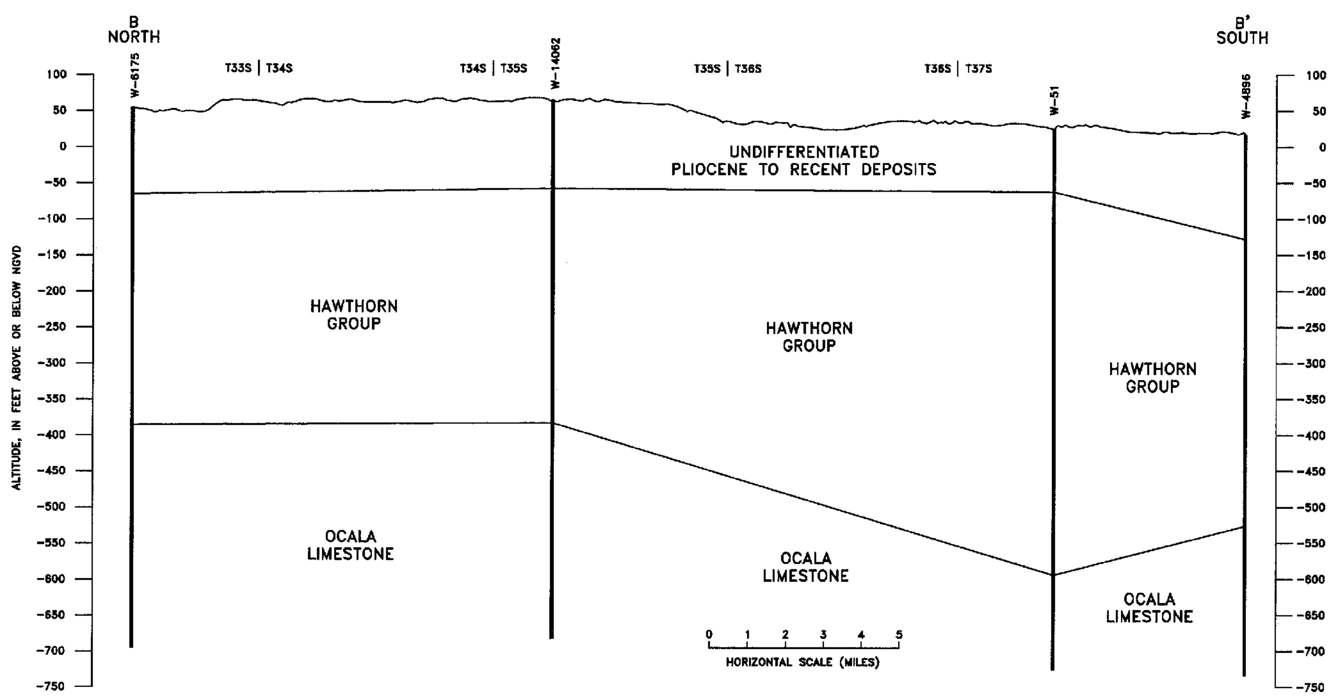


Figure 12.— Cross section of geologic materials at sites B to B´.

dolostone and limestone with sporadic beds of sand, clay, and/or chert. The dolostones are typically quartz sandy, phosphoritic, altered, soft to hard, crystalline, and gray. The limestones are typically white to gray, quartz sandy, phosphatic, recrystallized, and fine grained.

The top of the Arcadia Formation ranges from about 150 feet (45.8 meters) below MSL in the northwestern portion of the county to 300 feet (91.5 meters) below MSL in the southern portion. The thickness of the formation ranges from 100 feet (30.5 meters) in the north-northwest portion of the county to 200 feet (61 meters) in the southwest portion (Scott, 1988).

Peace River Formation

In Okeechobee County, the Peace River Formation unconformably overlies the Arcadia Formation (Scott, 1988). The Peace River Formation generally consists of interbedded carbonates, clays, and quartz sands. Siliciclastics generally comprise two-thirds of the formation (Scott, 1988). The carbonates are either limestone or dolostone. The limestones are generally gray to white mudstones to wackestones, and the dolostones are typically yellowish-gray to gray and microcrystalline.

The top of the Peace River Formation ranges from about 100 feet (30.5 meters) below MSL in the eastern portion of the county to 50 feet (15.3 meters) below MSL in the western portion. The formation, which dips gently towards the southeast, ranges in thickness from less than 100 feet (30.5 meters) in northeast portion of the county to 250 feet (76.3 meters) in the south-southeast portion (Scott, 1988).

Pliocene to Holocene Undifferentiatied Sediments

Pliocene to Holocene deposits of clayey sand, coarse to fine-grained sand, silt, clay, marl, and shell beds overlie the Hawthorn Group in Okeechobee County. These deposits, which are highly variable both laterally and vertically, are commonly interbedded. The Pliocene to Holocene undifferentiated sediments characteristically range from 100 to 200 feet (30.5 to 61 meters) in thickness.

Hydrogeology

The three hydrogeologic units recognized within Okeechobee County are the surficial aquifer system, the intermediate aquifer system/confining unit, and the Floridan aquifer system. The two main sources for domestic ground water in Okeechobee County are the surficial aquifer system and the Floridan aquifer system (Bradner, 1994). Some localized permeable lenses within the intermediate aquifer system/ confining unit may produce minor amounts of water for public supply. Due to the limited areal extent of these permeable zones, however, this aquifer system is rarely used for domestic water supply in the county.

Surficial Aquifer System

The surficial aquifer system consists of a thin unit of undifferentiated sand, shells, and silt overlying a more permeable unit of undifferentiated sand, shell, and silt of Pliocene age. The permeable Pliocene unit is interbedded with coarse sand and limestone (Bradner, 1994). In Okeechobee County, the surficial aquifer system reaches a maximum thickness of about 100 feet (30.5 meters).

The water table acts as the upper surface for the surficial aquifer in the county. It generally ranges from land surface to 10 feet (3.1 meters) below land surface. Typically, the water table fluctuates seasonally with changes in precipitation, evaporation, transpiration, and pumping (Bradner, 1994).

The surficial aquifer system is primarily recharged through rainfall and surficial infiltration from local streams and rivers. Minor recharge to the system may occur from upward leakage of the Floridan aquifer system and the intermediate aquifer system/confining unit.

Intermediate Aquifer System/Confining Unit

In Okeechobee County, sediments of the Miocene Hawthorn Group act as an intermediate confining unit between the Floridan aquifer system and the surficial aquifer system. The impermeable layers of the Hawthorn Group act as confining units, whereas the permeable sands, silts, and carbonates may act as localized sources of ground water. Because these water-bearing units are commonly discontinuous, both laterally and vertically, the intermediate aquifer system/confining unit is of limited use for domestic water supply in the county. The uppermost impermeable units of the Hawthorn Group act as the lower confining units for the surficial aquifer system (Bradner, 1994).

Floridan Aquifer System

The Floridan aquifer system is comprised of the Early Eocene Oldsmar Formation, the Middle Eocene Avon Park Formation, and the Late Eocene Ocala Limestone. These carbonate formations range from 2,700 to 3,000 feet (823.5 to 915 meters) in thickness (Bradner, 1994). In Okeechobee County, the base of the Hawthorn Group may vary from permeable beds to impermeable beds. The permeable beds at the base of the Hawthorn Group may be considered part of the Floridan aquifer system, and the impermeable beds act as the upper-most confining unit for the Floridan aquifer system.

Recharge areas for the Floridan aquifer system occur in the central and northern portions of the county where the water table is above the potentiometric surface of the system (Bradner, 1994). In this case, recharge to the Floridan aquifer system occurs by downward leakage of water through the surficial aquifer and the intermediate confining unit (Hawthorn Group) into the Floridan aquifer system. Water also enters the Floridan aquifer system via lateral movement of water from adjacent counties. Discharge occurs in the eastern and western portions of the county and in much of the southern portion. Most of the discharge in these portions of the county is from artesian flow (Bradner, 1994).

Mineral Resources

According to Campbell (1986), no mineral resources were commercially mined in Okeechobee County as of 1986. Due to the highly variable nature of the surficial sediments and the general lack of good shell beds and limestone deposits near the surface, the economic potential for commercially mined mineral resources is relatively low in the county.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (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 moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

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.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flatwoods (colloquial). Broad, linear-relief landforms that have slightly convex relief along flats, depressions, and flood plains and have concave relief along rises and knolls.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. 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 of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential climax plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential. The four classes used to measure range condition are excellent—sites that produce more than 75 percent of their potential; good—sites that produce 51 to 75 percent of their potential; fair—sites that produce 26 to 51 percent of their potential; and poor—sites that produce less than 26 percent of their potential.

Rangeland. Land on which the potential climax vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide; an indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	0 to 5 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. 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 either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

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.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth’s surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Ft. Drum, Florida)

Month	Temperature						Precipitation			
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more
	°F	°F	°F	°F	°F	Units	In	In	In	
January-----	74.3	49.3	61.8	86	23	670	1.88	0.54	3.07	3
February----	75.5	50.1	62.8	87	28	642	2.67	1.11	3.99	4
March-------	79.8	54.4	67.1	90	33	838	3.01	1.06	4.62	4
April-------	84.2	57.2	70.7	93	40	916	1.74	0.60	2.90	2
May---------	88.0	62.8	75.4	96	49	1,088	4.59	1.52	7.12	6
June--------	90.1	68.7	79.4	97	59	1,182	7.57	4.36	10.43	10
July--------	91.5	70.3	80.9	98	64	1,254	7.31	4.45	9.88	10
August------	91.4	70.9	81.1	96	65	1,260	6.83	3.98	9.37	10
September---	89.8	69.9	79.8	95	63	1,194	6.63	3.18	9.62	9
October-----	85.4	64.3	74.8	93	47	1,067	3.39	1.15	5.24	5
November----	79.9	56.8	68.3	88	35	848	2.02	0.78	3.18	3
December----	75.5	51.3	63.4	86	26	717	1.76	0.80	2.80	3
Yearly:										
Average----	83.8	60.5	72.1	---	---	---	---	---	---	---
Total------	---	---	---	---	---	11,676	49.39	40.73	55.44	69

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
2	Basinger fine sand	33,589	6.7
3	Basinger and Placid soils, depressional	26,946	5.4
4	Bradenton fine sand	2,721	0.5
5	Valkaria fine sand	37,090	7.4
6	Manatee loamy fine sand, depressional	4,329	0.9
7	Floridana, Riveria, and Placid soils, depressional	41,198	8.4
8	Pindea fine sand	4,138	0.8
9	Riviera fine sand	11,017	2.2
10	Ft. Drum fine sand	1,400	0.3
11	Immokalee fine sand	109,563	22.0
12	Udorthents, 2 to 35 percent slopes	6,554	1.3
13	Manatee, Floridana, and Tequesta soils, frequently flooded	16,871	3.4
14	Myakka fine sand	154,870	31.0
15	Okeelanta muck	5,794	1.3
17	Orsino fine sand	754	0.1
18	Parkwood fine sand	3,966	0.8
19	Floridana, Placid, and Okeelanta soils, frequently flooded	16,361	3.3
20	Pomello fine sand, 0 to 5 percent slopes	6,729	1.3
21	Adamsville fine sand, organic substratum	476	0.1
23	St. Johns fine sand	3,114	0.6
24	Terra Ceia muck	1,171	0.2
25	Wabasso fine sand	5,358	1.1
	Water	4,480	0.9
	Total	499,200	100.0

Table 3.--Land Capability Classes and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Soil name and map symbol	Land capability	Oranges	Grapefruit	Watermelons	Tomatoes	Cucumbers	Bahiagrass
		Boxes	Boxes	Tons	Tons	Tons	AUM*
2--------------- Basinger	IVw	350	450	---	13	---	---
3--------------- Basinger and Placid	VIIw	---	---	---	---	---	---
4--------------- Bradenton	IIIw	450	550	---	---	---	9.0
5--------------- Valkaria	IVw	350	450	---	12	---	---
6--------------- Manatee	VIIw	---	---	---	---	---	---
7--------------- Floridana, Riveria, and Placid	VIIw	---	---	---	---	---	---
8--------------- Pineda	IIIw	425	575	16	13	10	8.0
9--------------- Riviera	IIIw	425	575	16	---	10	8.0
10-------------- Ft. Drum	IVw	375	500	---	---	---	8.0
11-------------- Immokalee	IVw	350	550	20	15	10	8.0
12-------------- Udorthents	VIIs	---	---	---	---	---	---
13-------------- Manatee, Floridana, and Tequesta	VIIw	---	---	---	---	---	---
14-------------- Myakka	IVw	350	550	20	15	10	9.0
15-------------- Okeelanta	VIIw	---	---	---	---	---	---
17-------------- Orsino	IVs	350	450	---	---	---	5.0
18-------------- Parkwood	IIIw	450	650	---	---	---	9.0

See footnote at end of table.

Table 3.--Land Capability Classes and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Oranges	Grapefruit	Watermelons	Tomatoes	Cucumbers	Bahiagrass
		Boxes	Boxes	Tons	Tons	Tons	AUM*
19: Floridana, Placid, and Okeelanta	VIIw	---	---	---	---	---	---
20: Pomello	VIs	250	400	---	---	---	3.5
21: Adamsville	IIIw	---	---	---	---	---	---
23: St. Johns	IIIw	300	550	---	---	---	8.5
24: Terra Ceia	VIIw	---	---	---	---	---	---
25: Wabasso	IIIw	400	575	20	13	11	8.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 4.--Rangeland Productivity

(Only the soils that support rangeland vegetation suitable for grazing are listed.)

Map symbol and soil name	Ecological Community	Potential annual production for kind of growing season		
		Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
2: Basinger	Slough	8,000	5,500	4,000
3: Basinger and Placid	Freshwater Marshes and Ponds	10,000	8,000	5,000
4: Bradenton	Wetland Hardwood Hammocks	3,500	2,500	2,000
5: Valkaria	Slough	8,000	5,500	4,000
6: Manatee	Freshwater Marshes and Ponds	10,000	8,000	5,000
7: Floridana, Riviera, and Placid	Freshwater Marshes and Ponds	10,000	8,000	5,000
8: Pineda	Slough	8,000	5,500	4,000
9: Riviera	Slough	8,000	5,500	4,000
10: Ft. Drum	Cabbage Palm Flatwoods	6,000	5,000	3,000
11: Immokalee	South Florida Flatwoods	6,000	5,000	3,000
13: Manatee, Floridana, and Tequesta	Freshwater Marshes and Ponds	10,000	8,000	5,000
14: Myakka	South Florida Flatwoods	6,000	5,000	3,000
15: Okeelanta	Freshwater Marshes and Ponds	10,000	8,000	5,000
17: Orsino	Sand Pine Scrub	3,500	2,000	1,500
18: Parkwood	Wetland Hardwood Hammocks	3,500	2,500	2,000
19: Floridana, Placid, and Okeelanta	Freshwater Marshes and Ponds	10,000	8,000	5,000
20: Pomello	Sand Pine Scrub	3,500	2,000	1,500

Table 4.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological Community	Potential annual production for kind of growing season		
		Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
21----------------------- Adamsville	Cabbage Palm Flatwoods-----------	7,000	5,500	4,000
23----------------------- St. Johns	South Florida Flatwoods----------	6,000	5,000	3,000
24----------------------- Terra Ceia	Freshwater Marshes and Ponds-----	10,000	8,000	5,000
25----------------------- Wabasso	South Florida Flatwoods----------	6,000	5,000	3,000

Table 5.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available.)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
2 Basinger	8W	Slight	Severe	Severe	Slight	Severe	Slash pine	70	8	Slash pine, South Florida slash pine.
							Longleaf pine	60	4	
							South Florida slash pine	35	3	
							Loblolly pine	---	---	
							Live oak	---	---	
							Laurel oak	---	---	
3:										
Basinger	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	
							Baldcypress	---	---	
							Pond pine	---	---	
							Blackgum	---	---	
							Cabbage palm	---	---	
							Carolina ash	---	---	
							Loblollybay gordonia	---	---	
							Red maple	---	---	
							Sweetbay	---	---	
Placid.										
4 Bradenton	11W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	90	11	Slash pine.
							Longleaf pine	75	6	
							South Florida slash pine	70	13	
5 Valkaria	8W	Slight	Severe	Moderate	Slight	Moderate	Slash pine	70	8	Slash pine, South Florida slash pine.
							Longleaf pine	60	4	
							South Florida slash pine	35	3	
							Live oak	---	---	
							Water oak	---	---	
							Laurel oak	---	---	

See footnote at end of table.

Table 5.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
6------------------ Manatee	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	2	
							Baldcypress---------	---	---	
							Blackgum------------	---	---	
							Cabbage palm--------	---	---	
							Pond pine-----------	---	---	
							Loblollybay gordonia	---	---	
							Red maple-----------	---	---	
							Sweetbay------------	---	---	
7:										
Floridana---------	3W	Slight	Severe	Severe	Slight	Severe	Pondcypress---------	75	3	
							Baldcypress---------	---	---	
							Blackgum------------	---	---	
							Cabbage palm--------	---	---	
							Carolina ash--------	---	---	
							Loblollybay gordonia	---	---	
							Red maple-----------	---	---	
							Sweetbay------------	---	---	
							Pond pine-----------	---	---	
Riveria-----------	3W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	3	
							Baldcypress---------	---	---	
							Blackgum------------	---	---	
							Cabbage palm--------	---	---	
							Pond pine-----------	---	---	
							Loblollybay gordonia	---	---	
							Red maple-----------	---	---	
							Sweetbay------------	---	---	
Placid.										
8------------------ Pineda	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine----------	80	10	Slash pine, South Florida slash pine.
							Longleaf pine-------	70	6	
							South Florida slash pine---------------	45	4	
							Cabbage palm--------	---	---	
9------------------ Riviera	10W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine----------	80	10	Slash pine.
							Longleaf pine-------	70	6	

See footnote at end of table.

Table 5.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	Trees to plant
10----------------- Ft. Drum	10W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine---------- South Florida slash pine--------------- Cabbage palm--------	80 45 ---	10 4 ---	Slash pine, South Florida slash pine.
11----------------- Immokalee	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	70 65 35	8 5 3	Slash pine, South Florida slash pine.
13:										
Manatee-----------	2W	Slight	Severe	Severe	Moderate	Severe	Pond cypress--------	75	2	
Floridana---------	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress--------- Red maple----------- Sweetgum------------ Cabbage palm-------- Laurel oak---------- Water oak----------- Pondcypress--------- Pond pine-----------	100 --- --- --- --- --- --- ---	6 --- --- --- --- --- --- ---	
Tequesta----------	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress--------- Baldcypress--------- Blackgum------------ Cabbage palm-------- Carolina ash-------- Loblolly pine------- Red maple----------- Sweetbay------------ Pond pine-----------	75 --- --- --- --- --- --- --- ---	2 --- --- --- --- --- --- --- ---	
14----------------- Myakka	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine--------------- Live oak------------ Water oak-----------	70 60 35 --- ---	8 4 3 --- ---	Slash pine, South Florida slash pine, longleaf pine.

See footnote at end of table.

Table 5.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
15. Okeelanta	6W	Slight	Severe	Severe	Slight	Severe	Baldcypress	100	6	
							Sweetgum	---	---	
							Blackgum	---	---	
							Sweetbay	---	---	
							Water oak	---	---	
							Red maple	---	---	
							Cabbage palm	---	---	
17. Orsino	8S	Slight	Moderate	Severe	Slight	Moderate	Slash pine	70	8	Slash pine, sand pine, South Florida slash pine.
							Longleaf pine	60	4	
							Sand pine	70	4	
							South Florida slash pine	35	3	
							Sand live oak	---	---	
							Turkey oak	---	---	
18. Parkwood	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
							Cabbage palm	---	---	
19: Floridana	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	
							Red maple	---	---	
							Sweetgum	---	---	
							Cabbage palm	---	---	
							Laurel oak	---	---	
							Water oak	---	---	
							Pondcypress	---	---	
							Pond pine	---	---	
Placid	6W	Slight	Severe	Severe	Moderate	Moderate	Baldcypress	100	6	
							Sweetgum	---	---	
							Water oak	---	---	
							Laurel oak	---	---	
							Red maple	---	---	
							Pondcypress	---	---	
							Pond pine	---	---	

See footnote at end of table.

Table 5.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns: Erosion hazard	Management concerns: Equip-ment limita-tion	Management concerns: Seedling mortal-ity	Management concerns: Wind-throw hazard	Management concerns: Plant competi-tion	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Produc-tivity class*	Trees to plant
19: Okeelanta	6W	Slight	Severe	Severe	Slight	Severe	Baldcypress	100	6	
							Sweetgum	---	---	
							Blackgum	---	---	
							Sweetbay	---	---	
							Water oak	---	---	
							Red maple	---	---	
							Cabbage palm	---	---	
20 Pomello	8S	Slight	Moderate	Severe	Moderate	Moderate	Slash pine	70	8	Sand pine, slash pine, South Florida slash pine.
							Longleaf pine	60	4	
							Sand pine	60	3	
							South Florida slash pine	35	3	
23 St. Johns	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
24 Terra Ceia	6W	Slight	Severe	Severe	Severe	Severe	Baldcypress	100	6	
							Cypress	---	---	
							Sweetgum	---	---	
							Blackgum	---	---	
							Cabbage palm	---	---	
							Sweetbay	---	---	
							Water oak	---	---	
							Pond pine	---	---	
							Red maple	---	---	
25 Wabasso	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine, longleaf pine, loblolly pine.
							South Florida slash pine	45	4	
							Longleaf pine	65	5	
							Loblolly pine	80	8	
							Live oak	---	---	
							Water oak	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

Table 6.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definition of "severe." Absence of an entry indicates that the soil was not rated.)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2 Basinger	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
3:					
Basinger	Severe: ponding.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
Placid	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
4 Bradenton	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
5 Valkaria	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness.
6 Manatee	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
7:					
Floridana	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
Riveria	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
Placid	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
8 Pineda	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
9 Riviera	Severe: wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
10 Ft. Drum	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
11 Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.

Table 6.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13:					
Manatee	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.
Floridana	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, flooding.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy, flooding.	Severe: wetness, flooding.
Tequesta	Severe: ponding, excess humus, flooding.	Severe: ponding, excess humus, flooding.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus, flooding.	Severe: ponding, excess humus, flooding.
14 Myakka	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
15 Okeelanta	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
17 Orsino	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
18 Parkwood	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
19:					
Floridana	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, flooding.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy, flooding.	Severe: wetness, flooding.
Placid	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy, flooding.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy, flooding.	Severe: wetness, flooding.
Okeelanta	Severe: ponding, excess humus, flooding.	Severe: ponding, excess humus, flooding.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus, flooding.	Severe: ponding, excess humus, flooding.
20 Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
21 Adamsville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
23 St. Johns	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
24 Terra Ceia	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.

Table 6.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
25-------------------- Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.

Table 7.--Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated.)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
2. Basinger	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
3:										
Basinger	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Placid	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
4. Bradenton	Poor	Fair	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
5. Valkaria	Poor	Fair	Fair	Fair	Fair	Good	Fair	Poor	Poor	Good.
6. Manatee	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
7:										
Floridana	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Riveria	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Placid	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
8. Pineda	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
9. Riviera	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair.
10. Ft. Drum	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
11. Immokalee	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
13:										
Manatee	Very poor.	Poor	Poor	Poor	Fair	Good	Good	Poor	Poor	Good.
Floridana	Very poor.	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
Tequesta	Fair	Good	---	---	---	Good	Good	Good	---	Good.

Table 7.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
14: Myakka	Poor	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor.
15: Okeelanta	Very poor.	Very poor.	Poor	Poor	Very poor.	Good	Good	Very poor.	Poor	Good.
17: Orsino	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
18: Parkwood	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
19:										
Floridana	Very poor.	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
Placid	Very poor.	Very poor.	Poor	Fair	Poor	Good	Fair	Very poor.	Poor	Good.
Okeelanta	Very poor.	Very poor.	Poor	Poor	Very poor.	Good	Good	Very poor.	Poor	Good.
20: Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
21: Adamsville	Poor	Poor	Poor	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
23: St. Johns	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
24: Terra Ceia	Very poor.	Very poor.	Poor	Poor	Very poor.	Good	Good	Very poor.	Poor	Good.
25: Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.

Table 8.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2----------------- Basinger	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3:						
Basinger---------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Placid-----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
4----------------- Bradenton	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
5----------------- Valkaria	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
6----------------- Manatee	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
7:						
Floridana--------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Riveria----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Placid-----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
8----------------- Pineda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
9----------------- Riviera	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
10---------------- Ft. Drum	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
11---------------- Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
12---------------- Udorthents	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, droughty.
13:						
Manatee----------	Severe: cutbanks cave, wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Floridana--------	Severe: cutbanks cave, wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Tequesta---------	Severe: cutbanks cave, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding.	Severe: ponding, flooding.	Severe: ponding, flooding.	Severe: ponding, excess humus, flooding.
14---------------- Myakka	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
15---------------- Okeelanta	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
17---------------- Orsino	Severe: cutbanks cave.	Slight-------	Moderate: wetness.	Slight-------	Slight-------	Severe: droughty.
18---------------- Parkwood	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
19:						
Floridana--------	Severe: cutbanks cave, wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Placid-----------	Severe: cutbanks cave, wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Okeelanta--------	Severe: cutbanks cave, excess humus, ponding, flooding.	Severe: subsides, ponding, low strength, flooding.	Severe: subsides, ponding, flooding.	Severe: subsides, ponding, low strength, flooding.	Severe: subsides, ponding, flooding.	Severe: ponding, excess humus, flooding.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
20----------------- Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
21----------------- Adamsville	Severe: cutbanks cave, excess humus, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty.
23----------------- St. Johns	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
24----------------- Terra Ceia	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
25----------------- Wabasso	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

Table 9.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "severe," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2-----------------Basinger	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
3:					
Basinger----------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Placid------------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
4-----------------Bradenton	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
5-----------------Valkaria	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
6-----------------Manatee	Severe: ponding.	Severe: seepage, ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
7:					
Floridana---------	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding.	Severe: seepage, ponding.	Poor: ponding.
Riveria-----------	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Placid------------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
8-----------------Pineda	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
9----------------- Riviera	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
10----------------- Ft. Drum	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
11----------------- Immokalee	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
13:					
Manatee-----------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Floridana---------	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Tequesta----------	Severe: ponding, percs slowly, poor filter, flooding.	Severe: seepage, excess humus, ponding, flooding.	Severe: seepage, ponding, too sandy, flooding.	Severe: seepage, ponding, flooding.	Poor: seepage, too sandy, ponding.
14----------------- Myakka	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
15----------------- Okeelanta	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
17----------------- Orsino	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
18----------------- Parkwood	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: too sandy, wetness.
19:					
Floridana---------	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
19:					
Placid	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Okeelanta	Severe: ponding, poor filter, flooding.	Severe: seepage, excess humus, ponding, flooding.	Severe: seepage, ponding, too sandy, flooding.	Severe: seepage, ponding, flooding.	Poor: seepage, too sandy, ponding.
20 Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
21 Adamsville	Severe: wetness, poor filter.	Severe: seepage, excess humus, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
23 St. Johns	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
24 Terra Ceia	Severe: subsides, ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
25 Wabasso	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.

Table 10.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "poor," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Roadfill	Sand	Topsoil
2--------------------- Basinger	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.
3:			
Basinger-------------	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.
Placid---------------	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.
4--------------------- Bradenton	Poor: wetness.	Probable-------------	Poor: thin layer, wetness.
5--------------------- Valkaria	Poor: wetness.	Probable-------------	Poor: wetness, too sandy.
6--------------------- Manatee	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
7:			
Floridana------------	Poor: wetness.	Improbable: excess fines.	Poor: too sandy, wetness.
Riveria--------------	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.
Placid---------------	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.
8--------------------- Pineda	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.
9--------------------- Riviera	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.
10-------------------- Ft. Drum	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.
11-------------------- Immokalee	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Topsoil
12: Udorthents	Fair: large stones, slope.	Probable	Poor: too sandy, small stones, area reclaim.
13:			
Manatee	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Floridana	Poor: wetness.	Improbable: excess fines.	Poor: too sandy, wetness.
Tequesta	Poor: wetness.	Probable	Poor: too sandy, wetness.
14: Myakka	Poor: wetness.	Probable	Poor: too sandy, wetness.
15: Okeelanta	Poor: wetness.	Probable	Poor: excess humus, wetness.
17: Orsino	Good	Probable	Poor: too sandy.
18: Parkwood	Poor: wetness.	Improbable: excess fines.	Poor: too sandy, wetness.
19:			
Floridana	Poor: wetness.	Improbable: excess fines.	Poor: too sandy, wetness.
19:			
Placid	Poor: wetness.	Probable	Poor: wetness, too sandy.
Okeelanta	Poor: wetness.	Probable	Poor: excess humus, wetness.
20: Pomello	Fair: wetness.	Probable	Poor: too sandy.
21: Adamsville	Fair: wetness.	Probable	Poor: too sandy.
23: St. Johns	Poor: wetness.	Probable	Poor: too sandy, wetness.
24: Terra Ceia	Poor: wetness.	Probable	Poor: excess humus, wetness.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Topsoil
25-------------------- Wabasso	Poor: wetness.	Probable-------------	Poor: too sandy, wetness.

Table 11.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "moderate" and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
2----------------- Basinger	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake.	Wetness.
3:						
Basinger---------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, fast intake.	Wetness.
Placid-----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, fast intake, soil blowing.	Wetness.
4----------------- Bradenton	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake.	Wetness.
5----------------- Valkaria	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake.	Wetness.
6----------------- Manatee	Moderate: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding--------	Ponding, fast intake, soil blowing.	Wetness.
7:						
Floridana--------	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, fast intake.	Wetness, percs slowly.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
7:						
Riveria----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, cutbanks cave.	Ponding, fast intake.	Wetness, percs slowly.
Placid------------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, fast intake, soil blowing.	Wetness.
8----------------- Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, fast intake.	Wetness, percs slowly.
9----------------- Riviera	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, fast intake.	Wetness, percs slowly.
10---------------- Ft. Drum	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake.	Wetness.
11---------------- Immokalee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, droughty.
12---------------- Udorthents	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, droughty.	Droughty, slope.
13:						
Manatee----------	Moderate: seepage.	Severe: thin layer, wetness.	Severe: cutbanks cave.	Flooding-------	Wetness, fast intake, soil blowing.	Wetness.
Floridana--------	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, fast intake.	Wetness, percs slowly.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
13:						
Tequesta	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, cutbanks cave, flooding.	Ponding, soil blowing.	Wetness.
14 Myakka	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness.	Wetness.
15 Okeelanta	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, subsides, cutbanks cave.	Ponding, soil blowing.	Wetness.
17 Orsino	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake.	Droughty.
18 Parkwood	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, fast intake.	Wetness, percs slowly.
19:						
Floridana	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, fast intake.	Wetness, percs slowly.
Placid	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, fast intake.	Wetness.
Okeelanta	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, subsides, cutbanks cave, flooding.	Ponding, soil blowing.	Wetness.
20 Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Droughty.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Grassed waterways
21---------------- Adamsville	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Subsides, cutbanks cave.	Wetness, droughty.	Droughty.
23---------------- St. Johns	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness.	Wetness.
24---------------- Terra Ceia	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Wetness.
25---------------- Wabasso	Severe: seepage.	Severe: thin layer, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, fast intake.	Wetness, rooting depth.

Table 12.--Engineering Index Properties

(Absence of an entry indicates that data were not estimated.)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liq- uid limit	Plas- ticit index
	In				Pct					Pct	
2------------- Basinger	0-2	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	2-18	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	18-36	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	36-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
3:											
Basinger-----	0-2	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	2-18	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	18-36	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	36-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
Placid-------	0-20	Fine sand--------	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
	20-80	Sand, fine sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
4------------- Bradenton	0-4	Fine sand--------	SP-SM	A-3, A-2-4	0	100	100	80-100	5-12	---	NP
	4-10	Sand, fine sand	SP-SM	A-3, A-2-4	0-1	99-100	99-100	80-100	5-12	---	NP
	10-26	Sandy loam, fine sandy loam, loamy fine sand.	SC, SC-SM	A-2-4, A-2-6	0-2	97-100	95-100	80-100	20-35	<40	4-18
	26-80	Fine sand, loamy fine sand, fine sandy loam.	SP-SM, SM, SC-SM, SC	A-3, A-2-4 A-2-6	0-2	97-100	95-100	80-100	5-35	<40	NP-18
5------------- Valkaria	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	75-100	75-100	2-10	---	NP
	6-19	Sand, fine sand	SP, SP-SM	A-3	0	100	75-100	75-100	2-10	---	NP
	19-46	Sand, fine sand	SP, SP-SM	A-3	0	100	75-100	75-100	3-10	---	NP
	46-80	Sand, fine sand	SP, SP-SM	A-3	0	100	75-100	75-100	2-10	---	NP
6------------- Manatee	0-18	Loamy fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	8-15	---	NP
	18-36	Fine sandy loam, sandy loam.	SC-SM, SC, SM	A-2-4	0	100	100	90-100	18-30	<30	NP-10
	36-48	Fine sandy loam, sandy loam, loamy fine sand.	SM, SC-SM, SC	A-2-4	0	95-100	90-100	85-100	13-30	<30	NP-10
	48-80	Fine sandy loam, sandy loam, loamy fine sand.	SM, SC-SM, SC, GM	A-2-4	0-5	60-100	50-100	50-100	13-30	<30	NP-10

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liq- uid limit	Plas- ticit index
	In				Pct					Pct	
7:											
Floridana----	0-18	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	18-38	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	38-80	Sandy loam, fine sandy loam, sandy clay loam.	SC-SM, SC	A-2-4, A-2-6	0	100	100	85-95	20-35	20-40	7-18
Riveria------	0-27	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	27-40	Sandy loam, sandy clay loam.	SM, SC-SM, SC	A-2-4, A-2-6	0	100	100	80-100	15-35	<35	NP-15
	40-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	0	60-100	50-95	40-90	3-10	---	NP
Placid-------	0-20	Fine sand--------	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
	20-80	Sand, fine sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
8------------- Pineda	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-95	2-8	---	NP
	6-38	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-95	2-10	---	NP
	38-80	Sandy loam, fine sandy loam, sandy clay loam.	SC, SC-SM, SM	A-2-4, A-2-6	0	100	100	65-95	15-35	<35	NP-20
9------------- Riviera	0-27	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	27-40	Sandy loam, sandy clay loam.	SM, SC-SM, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	40-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	0	60-80	50-75	40-70	3-10	---	NP
10------------ Ft. Drum	0-5	Fine sand--------	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
	5-17	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
	17-25	Fine sandy loam, loamy fine sand, fine sand.	SM, SC-SM, SC, SP-SM	A-2-4, A-3	0	100	100	90-100	5-30	<30	NP-10
	25-80	Sand, fine sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	95-100	95-100	90-100	2-15	---	NP
11------------ Immokalee	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	6-35	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	35-54	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	70-100	5-21	---	NP
	54-72	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
12------------ Udorthents	0-57	Sand-------------	SP, SP-SM, GP-GM, GP	A-1-b	0-40	50-100	40-60	30-50	2-12	---	NP

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liq- uid limit	Plas- ticit index
	In				Pct					Pct	
13:											
Manatee------	0-18	Loamy fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	8-15	---	NP
	18-36	Fine sandy loam, sandy loam.	SC-SM, SC	A-2-4	0	100	100	90-100	18-30	<30	4-10
	36-48	Fine sandy loam, sandy loam, loamy fine sand.	SM, SC-SM, SC	A-2-4	0	95-100	90-100	85-100	13-30	<30	NP-10
	48-80	Fine sandy loam, sandy loam, loamy fine sand.	SM, SC-SM, SC	A-2-4	0-5	60-100	50-100	50-100	13-30	<30	NP-10
Floridana----	0-18	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	18-38	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-95	2-10	---	NP
	38-80	Sandy loam, fine sandy loam, sandy clay loam.	SC-SM, SC	A-2-4, A-2-6	0	100	100	85-95	20-35	20-40	7-18
Tequesta-----	0-10	Muck-------------	PT	---	0	---	---	---	---	---	---
	10-33	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	33-62	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC-SM, SC	A-2-4, A-2-6	0	100	100	80-100	15-35	<40	NP-20
	62-80	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4 A-1-b	0	60-100	50-100	40-80	3-20	---	NP
14------------ Myakka	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	4-27	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	27-46	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	46-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
15------------ Okeelanta	0-28	Muck-------------	PT	A-8	0	---	---	---	---	---	---
	28-80	Fine sand, sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	85-100	80-95	2-15	---	NP
17------------ Orsino	0-4	Fine sand--------	SP	A-3	0	100	100	88-100	1-3	---	NP
	4-14	Sand, fine sand	SP	A-3	0	100	100	88-100	1-3	---	NP
	14-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	88-100	2-5	---	NP
18------------ Parkwood	0-9	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-99	3-7	---	NP
	9-22	Fine sandy loam, sandy loam.	SM, SC-SM, SC	A-2-4, A-2-6	0	100	97-100	80-95	20-35	<28	NP-12
	22-80	Fine sand, loamy fine sand.	SM	A-2-4	0	100	88-97	85-95	13-25	---	NP
19:											
Floridana----	0-18	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	18-38	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	38-80	Sandy loam, fine sandy loam, sandy clay loam.	SC-SM, SC	A-2-4, A-2-6	0	100	100	80-95	15-35	20-30	7-16
Placid-------	0-20	Fine sand--------	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
	20-80	Fine sand, sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liq- uid limit	Plas- ticit index
	In				Pct					Pct	
19:											
Okeelanta----	0-28	Muck-------------	PT	A-8	0	---	---	---	---	---	---
	28-80	Fine sand, sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	85-100	80-95	2-15	---	NP
20------------	0-42	Fine sand--------	SP, SP-SM	A-3	0	100	100	60-100	1-8	---	NP
Pomello	42-54	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	60-100	6-15	---	NP
	54-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	0	100	100	60-100	4-10	---	NP
21------------	0-36	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-95	2-10	---	NP
Adamsville	36-53	Muck-------------	PT	---	---	---	---	---	---	---	---
	53-80	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-95	2-10	---	NP
23------------	0-10	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-95	3-10	---	NP
St. Johns	10-22	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	3-10	---	NP
	22-66	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	66-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
24------------	0-53	Muck-------------	PT	A-8	---	---	---	---	---	---	---
Terra Ceia	53-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	0	100	100	80-90	2-12	---	NP
25------------	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
Wabasso	4-16	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	16-28	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
	28-32	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	32-48	Sandy loam, fine sandy loam, sandy clay loam.	SC, SC-SM	A-2-4, A-2-6	0	100	100	95-100	20-35	20-30	5-13
	48-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP

Table 13.--Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated.)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
2--------------- Basinger	0-2	0-4	1.40-1.55	6.0-20	0.03-0.07	3.6-8.4	<2	Low-------	0.10	5	2	.5-2
	2-18	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
	18-36	1-6	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low-------	0.10			
	36-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
3:												
Basinger-------	0-2	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10	5	2	1-8
	2-18	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
	18-36	1-3	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low-------	0.10			
	36-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
Placid---------	0-20	<10	1.20-1.40	6.0-20	0.15-0.20	3.6-5.5	<2	Low-------	0.10	5	2	2-10
	20-80	<10	1.30-1.60	6.0-20	0.05-0.08	3.6-5.5	<2	Low-------	0.10			
4--------------- Bradenton	0-4	1-6	1.25-1.50	6.0-20	0.10-0.15	5.1-7.3	<2	Low-------	0.10	5	1	2-8
	4-10	1-6	1.50-1.70	6.0-20	0.03-0.07	5.1-7.3	<2	Low-------	0.20			
	10-26	10-18	1.55-1.70	0.6-2.0	0.10-0.15	6.1-8.4	<2	Low-------	0.24			
	26-80	1-18	1.55-1.70	0.6-6.0	0.03-0.10	7.4-8.4	<2	Low-------	0.24			
5--------------- Valkaria	0-6	1-3	1.35-1.50	6.0-20	0.05-0.10	4.5-7.3	<2	Low-------	0.10	5	2	1-4
	6-19	0-2	1.45-1.60	6.0-20	0.03-0.08	4.5-7.3	<2	Low-------	0.10			
	19-46	2-5	1.45-1.60	6.0-20	0.05-0.10	4.5-7.3	<2	Low-------	0.10			
	46-80	1-5	1.45-1.60	6.0-20	0.03-0.08	5.1-8.4	<2	Low-------	0.10			
6--------------- Manatee	0-18	2-8	1.20-1.40	2.0-6.0	0.15-0.20	5.6-7.8	<2	Low-------	0.10	5	2	4-15
	18-36	10-20	1.50-1.65	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low-------	0.24			
	36-48	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low-------	0.24			
	48-80	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low-------	0.24			
7:												
Floridana------	0-18	3-10	1.40-1.50	6.0-20	0.10-0.20	4.5-8.4	<2	Low-------	0.10	5	2	6-15
	18-38	1-7	1.50-1.55	6.0-20	0.05-0.10	4.5-8.4	<2	Low-------	0.10			
	38-80	15-30	1.60-1.70	<0.2	0.10-0.20	4.5-8.4	<2	Low-------	0.24			
Riveria--------	0-27	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	<2	Low-------	0.10	4	2	.1-2
	27-40	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low-------	0.24			
	40-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	Low-------	0.15			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
7:												
Placid---------	0-20	<10	1.20-1.40	6.0-20	0.15-0.20	3.6-5.5	<2	Low-------	0.10	5	2	2-10
	20-80	<10	1.30-1.60	6.0-20	0.05-0.08	3.6-5.5	<2	Low-------	0.10			
8--------------- Pineda	0-6	1-6	1.25-1.60	6.0-20	0.05-0.10	4.5-7.3	<2	Low-------	0.10	5	2	.5-6
	6-38	1-8	1.40-1.70	6.0-20	0.02-0.05	4.5-7.3	<2	Low-------	0.10			
	38-80	10-25	1.50-1.70	<0.2	0.10-0.15	5.1-8.4	<2	Low-------	0.24			
9--------------- Riviera	0-27	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	<2	Low-------	0.10	4	2	.1-2
	27-40	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low-------	0.24			
	40-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	Low-------	0.15			
10-------------- Ft. Drum	0-5	1-3	1.30-1.55	6.0-20	0.05-0.10	4.5-7.3	<2	Low-------	0.10	5	2	1-2
	5-17	1-3	1.30-1.55	6.0-20	0.05-0.08	5.6-8.4	<2	Low-------	0.10			
	17-25	10-20	1.40-1.65	0.6-2.0	0.10-0.15	7.4-8.4	<2	Low-------	0.24			
	25-80	2-5	1.30-1.60	6.0-20	0.05-0.08	6.1-8.4	<2	Low-------	0.17			
11-------------- Immokalee	0-6	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	Low-------	0.10	5	2	1-2
	6-35	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low-------	0.10			
	35-54	2-7	1.30-1.70	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low-------	0.15			
	54-72	1-5	1.40-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low-------	0.10			
12-------------- Udorthents	0-57	0-5	1.35-1.45	6.0-20	0.02-0.05	7.4-8.4	<2	Low-------	0.10	5	8	---
13:												
Manatee--------	0-18	2-8	1.20-1.40	2.0-6.0	0.15-0.20	5.6-7.8	<2	Low-------	0.10	5	2	4-10
	18-36	10-20	1.50-1.65	0.6-2.0	0.10-0.15	6.6-7.8	<2	Low-------	0.24			
	36-48	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low-------	0.24			
	48-80	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low-------	0.24			
Floridana------	0-18	3-10	1.40-1.50	6.0-20	0.10-0.20	4.5-8.4	<2	Low-------	0.10	5	2	6-15
	18-38	1-7	1.50-1.60	6.0-20	0.05-0.10	4.5-8.4	<2	Low-------	0.10			
	38-80	15-30	1.60-1.70	<0.2	0.10-0.20	4.5-8.4	<2	Low-------	0.24			
Tequesta-------	0-10	---	0.20-0.40	6.0-20	0.20-0.25	5.1-7.3	<2	Low-------	----	5	2	35-60
	10-33	1-6	1.45-1.65	6.0-20	0.05-0.10	5.1-7.3	<2	Low-------	0.10			
	33-62	15-25	1.50-1.70	0.2-0.6	0.10-0.15	6.1-8.4	<2	Low-------	0.24			
	62-80	5-12	1.40-1.65	6.0-20	0.02-0.05	6.1-8.4	<2	Low-------	0.10			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
14-------------- Myakka	0-4	1-3	1.25-1.45	6.0-20	0.05-0.15	3.6-6.5	<2	Low--------	0.10	5	2	2-5
	4-27	0-2	1.45-1.60	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.10			
	27-46	1-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	<2	Low--------	0.15			
	46-80	0-2	1.48-1.70	6.0-20	0.02-0.10	3.6-6.5	<2	Low--------	0.10			
15-------------- Okeelanta	0-28	---	0.22-0.38	6.0-20	0.30-0.50	4.5-6.5	<2	Low--------	----	2	2	60-90
	28-80	1-5	1.30-1.55	6.0-20	0.05-0.10	5.1-7.8	<2	Low--------	0.15			
17-------------- Orsino	0-4	0-1	1.25-1.50	>20	0.02-0.08	3.6-6.0	<2	Low--------	0.10	5	1	0-1
	4-14	0-1	1.35-1.60	>20	0.02-0.07	3.6-6.0	<2	Low--------	0.10			
	14-80	0-1	1.35-1.60	>20	0.02-0.08	3.6-6.0	<2	Low--------	0.10			
18-------------- Parkwood	0-9	3-13	1.40-1.60	>20	0.05-0.10	6.6-8.4	<2	Low--------	0.10	4	2	2-5
	9-22	15-22	1.30-1.60	0.06-0.6	0.10-0.20	7.4-8.4	<2	Low--------	0.15			
	22-80	3-13	1.45-1.65	6.0-20	0.05-0.20	7.4-8.4	<2	Low--------	0.10			
19:												
Floridana------	0-18	3-10	1.40-1.50	6.0-20	0.10-0.20	4.5-8.4	<2	Low--------	0.10	5	2	6-15
	18-38	1-7	1.50-1.60	6.0-20	0.05-0.10	4.5-8.4	<2	Low--------	0.10			
	38-80	15-30	1.60-1.70	<0.2	0.10-0.20	4.5-8.4	<2	Low--------	0.24			
Placid---------	0-20	0-10	1.20-1.40	6.0-20	0.15-0.20	3.6-5.5	<2	Low--------	0.10	5	2	2-10
	20-80	0-10	1.30-1.60	6.0-20	0.05-0.08	3.6-5.5	<2	Low--------	0.10			
Okeelanta------	0-28	---	0.22-0.38	6.0-20	0.30-0.50	4.5-6.5	<2	Low--------	----	2	2	60-90
	28-80	1-5	1.30-1.55	6.0-20	0.05-0.10	5.1-7.8	<2	Low--------	0.15			
20-------------- Pomello	0-42	<2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	Low--------	0.10	5	1	<1
	42-54	<2	1.45-1.60	2.0-6.0	0.10-0.30	4.5-6.0	<2	Low--------	0.15			
	54-80	<2	1.35-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	Low--------	0.10			
21-------------- Adamsville	0-36	2-8	1.35-1.45	6.0-20	0.02-0.05	4.5-6.5	<2	Low--------	0.10	5	2	<1
	36-53	---	0.20-0.40	6.0-20	0.20-0.25	4.5-6.5	<2	Low--------	0.10			
	53-80	2-8	1.45-1.60	6.0-20	0.02-0.05	4.5-6.5	<2	Low--------	0.10			
23-------------- St. Johns	0-10	1-4	1.30-1.50	6.0-20	0.10-0.15	3.6-5.5	<2	Low--------	0.10	5	1	2-4
	10-22	1-3	1.50-1.70	6.0-20	0.03-0.08	3.6-5.5	<2	Low--------	0.10			
	22-66	2-6	1.50-1.60	0.2-2.0	0.10-0.30	3.6-5.5	<2	Low--------	0.15			
	66-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-5.5	<2	Low--------	0.10			
24-------------- Terra Ceia	0-53	---	0.15-0.35	6.0-20	0.30-0.50	4.5-8.4	<2	Low--------	----	3	2	60-90
	53-80	2-10	1.35-1.50	6.0-20	0.02-0.08	4.5-8.4	<2	Low--------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
25--------------- Wabasso	0-4	1-5	1.25-1.50	6.0-20	0.03-0.08	3.6-6.5	<2	Low-------	0.10	4	2	1-4
	4-16	0-5	1.35-1.70	6.0-20	0.02-0.05	3.6-6.5	<2	Low-------	0.10			
	16-28	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low-------	0.15			
	28-32	2-5	1.40-1.70	6.0-20	0.02-0.05	5.1-8.4	<2	Low-------	0.10			
	32-48	12-30	1.60-1.85	<0.2	0.10-0.15	5.1-8.4	<2	Low-------	0.24			
	48-80	2-12	1.40-1.70	6.0-20	0.05-0.10	7.4-8.4	<2	Low-------	0.10			

Table 14.--Soil and Water Features

("Flooding" and "water table" and terms such as "frequent," "long," and "apparent" are explained in the text. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Ini-tial	Total	Uncoated steel	Concrete
					Ft			In	In		
2-------------- Basinger	B/D	None------	---	---	0-1.0	Apparent	Jun-Feb	---	---	High-----	Moderate.
3:											
Basinger-------	D	None------	---	---	+2-0	Apparent	Jun-Mar	---	---	High-----	Moderate.
Placid---------	D	None------	---	---	+2-0	Apparent	Jun-Mar	---	---	High-----	High.
4-------------- Bradenton	B/D	None------	---	---	0.5-1.5	Apparent	Jun-Sep	---	---	High-----	Low.
5-------------- Valkaria	B/D	None------	---	---	0-1.0	Apparent	Jun-Sep	---	---	High-----	Moderate.
6-------------- Manatee	D	None------	---	---	+2-0	Apparent	Jun-Mar	---	---	High-----	Low.
7:											
Floridana------	D	None------	---	---	+2-0	Apparent	Jun-Mar	---	---	Moderate	Low.
Riveria--------	D	None------	---	---	+2-0	Apparent	Jun-Mar	---	---	High-----	High.
Placid---------	D	None------	---	---	+2-0	Apparent	Jun-Mar	---	---	High-----	High.
8-------------- Pineda	B/D	None------	---	---	0-1.0	Apparent	Jun-Nov	---	---	High-----	Low.
9-------------- Riviera	C/D	None------	---	---	0-1.0	Apparent	Jun-Dec	---	---	High-----	High.
10------------- Ft. Drum	C	None------	---	---	0.5-1.5	Apparent	Jun-Sep	---	---	High-----	Low.
11------------- Immokalee	B/D	None------	---	---	0.5-1.5	Apparent	Jun-Sep	---	---	High-----	High.
12------------- Udorthents	A	None------	---	---	>6.0	---	---	---	---	High-----	High.

Table 14.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
13:											
Manatee	D	Frequent	Long	Jun-Nov	0-0.5	Apparent	Jun-Oct	---	---	Moderate	Low.
Floridana	D	Frequent	Long	Jun-Nov	0-0.5	Apparent	Jun-Oct	---	---	Moderate	Low.
Tequesta	B/D	Frequent	Long	Jun-Nov	+2-0	Apparent	Jan-Dec	3-6	8-12	Moderate	Low.
14 Myakka	B/D	None	---	---	0.5-1.5	Apparent	Jun-Sep	---	---	High	High.
15 Okeelanta	B/D	None	---	---	+1-0	Apparent	Jun-Jan	16-20	16-30	High	Moderate.
17 Orsino	A	None	---	---	4.0-5.0	Apparent	Jun-Dec	---	---	Low	Moderate.
18 Parkwood	B/D	None	---	---	0-1.0	Apparent	Jun-Sep	---	---	High	Low.
19:											
Floridana	D	Frequent	Long	Jun-Nov	0-0.5	Apparent	Jun-Oct	---	---	Moderate	Low.
Placid	D	Frequent	Long	Jun-Nov	0-1.0	Apparent	Jun-Nov	---	---	High	High.
Okeelanta	B/D	Frequent	Long	Jun-Nov	+1-0	Apparent	Jun-Jan	16-20	16-30	High	Moderate.
20 Pomello	C	None	---	---	2.0-3.5	Apparent	Jul-Nov	---	---	Low	High.
21 Adamsville	C	None	---	---	2.0-3.5	Apparent	Jun-Nov	1-2	5-10	High	Moderate.
23 St. Johns	B/D	None	---	---	0-0.5	Apparent	Jun-Oct	---	---	High	High.
24 Terra Ceia	B/D	None	---	---	+2-0	Apparent	Jun-Apr	16-20	50-60	Moderate	Moderate.
25 Wabasso	B/D	None	---	---	0.5-1.5	Apparent	Jun-Sep	---	---	Moderate	High.

Table 15.--Classification of the Soils

Soil name	Family or higher taxonomic class
Adamsville	Hyperthermic, uncoated Aquic Quartzipsamments
Basinger	Siliceous, hyperthermic Spodic Psammaquents
Bradenton	Coarse-loamy, siliceous, superactive, hyperthermic Typic Endoaqualfs
Floridana	Loamy, siliceous, superactive, hyperthermic Arenic Argiaquolls
Ft. Drum	Sandy, siliceous, hyperthermic Aeric Endoaquepts
Immokalee	Sandy, siliceous, hyperthermic Arenic Alaquods
Manatee	Coarse-loamy, siliceous, superactive, hyperthermic Typic Argiaquolls
Myakka	Sandy, siliceous, hyperthermic Aeric Alaquods
Okeelanta	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists
Orsino	Hyperthermic, uncoated Spodic Quartzipsamments
Parkwood	Coarse-loamy, siliceous, superactive, hyperthermic Mollic Endoaqualfs
Pineda	Loamy, siliceous, active, hyperthermic Arenic Glossaqualfs
Placid	Sandy, siliceous, hyperthermic Typic Humaquepts
Pomello	Sandy, siliceous, hyperthermic Oxyaquic Alorthods
Riviera	Loamy, siliceous, active, hyperthermic Arenic Glossaqualfs
St. Johns	Sandy, siliceous, hyperthermic Typic Alaquods
Tequesta	Loamy, siliceous, active, hyperthermic Arenic Glossaqualfs
Terra Ceia	Euic, hyperthermic Typic Medisaprists
Valkaria	Siliceous, hyperthermic Spodic Psammaquents
Wabasso	Sandy, siliceous, hyperthermic Alfic Alaquods

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