United States
Department of
Agriculture

Soil
Conservation
Service

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

Soil Survey of Indian River County, Florida

HOW TO USE

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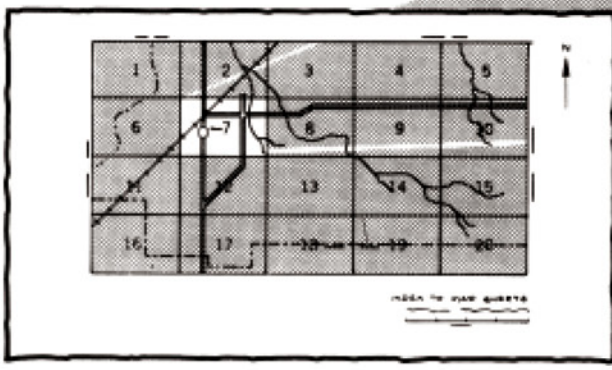

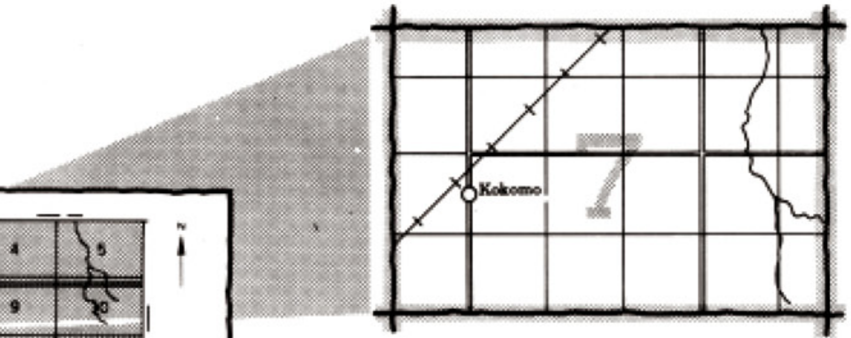

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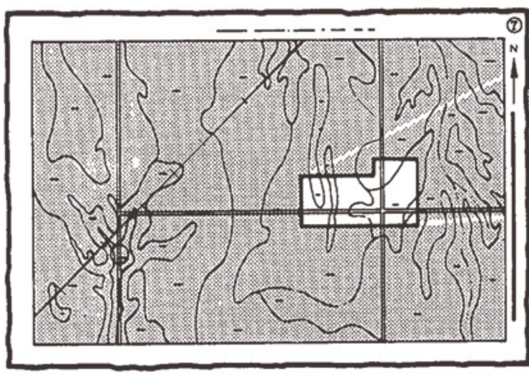

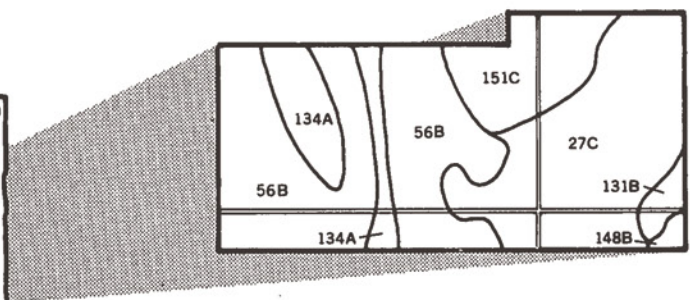

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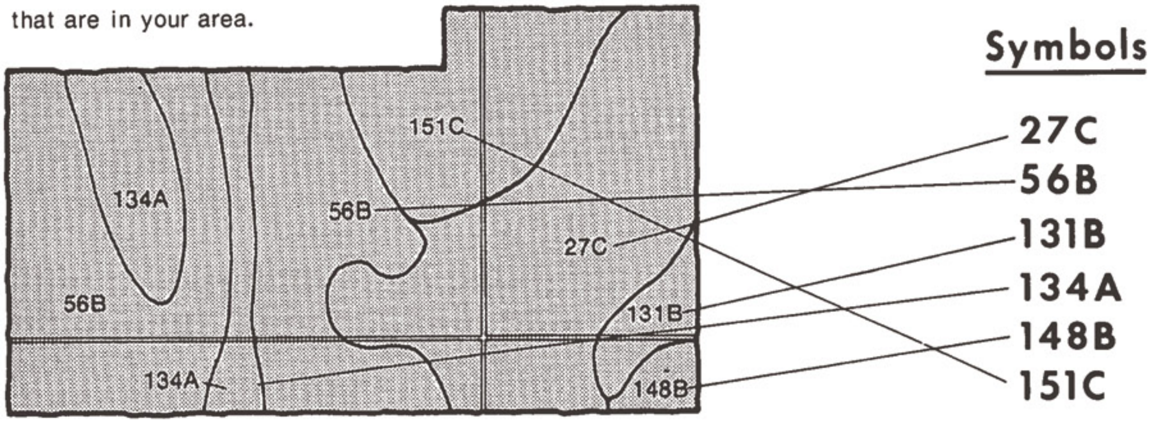
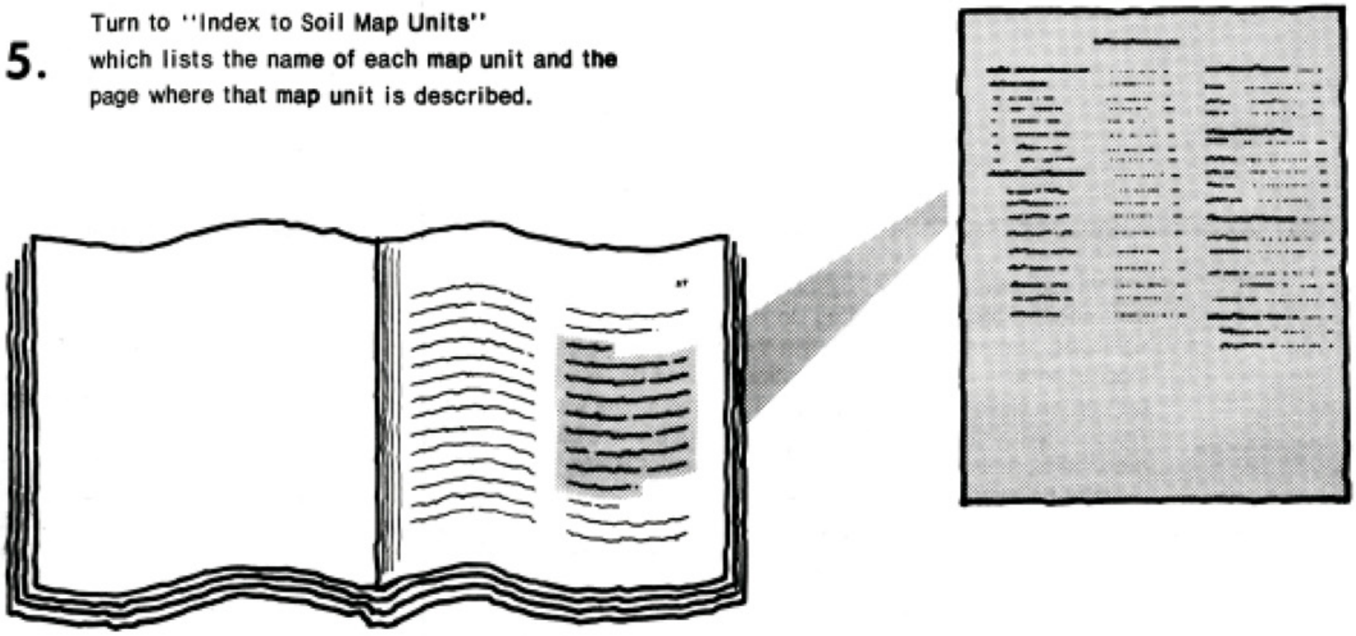
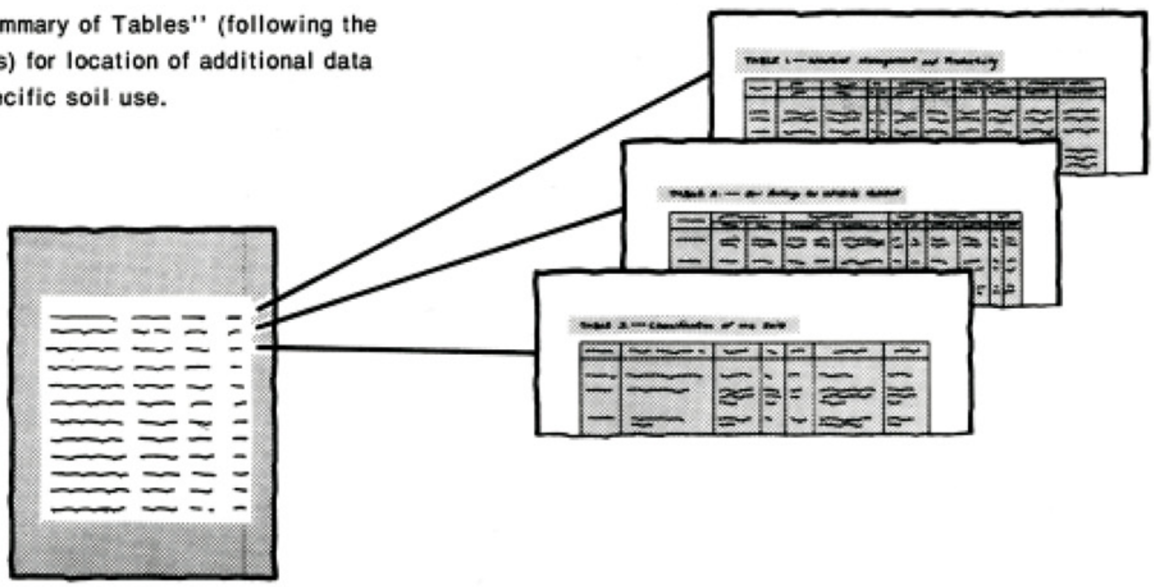


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

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 Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This soil survey was made cooperatively by the Soil Conservation Service; the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department; and the Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the Indian River Soil and Water Conservation District. The Indian River County Board of Commissioners contributed financially to accelerate the completion of the fieldwork for this survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

This survey supersedes the Indian River Area soil survey published in 1913.

Cover: The Indian River is separated from the Atlantic Ocean by a barrier island that is broken only by inlets. The river serves as a transportation artery and has many recreational uses.

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Foreword

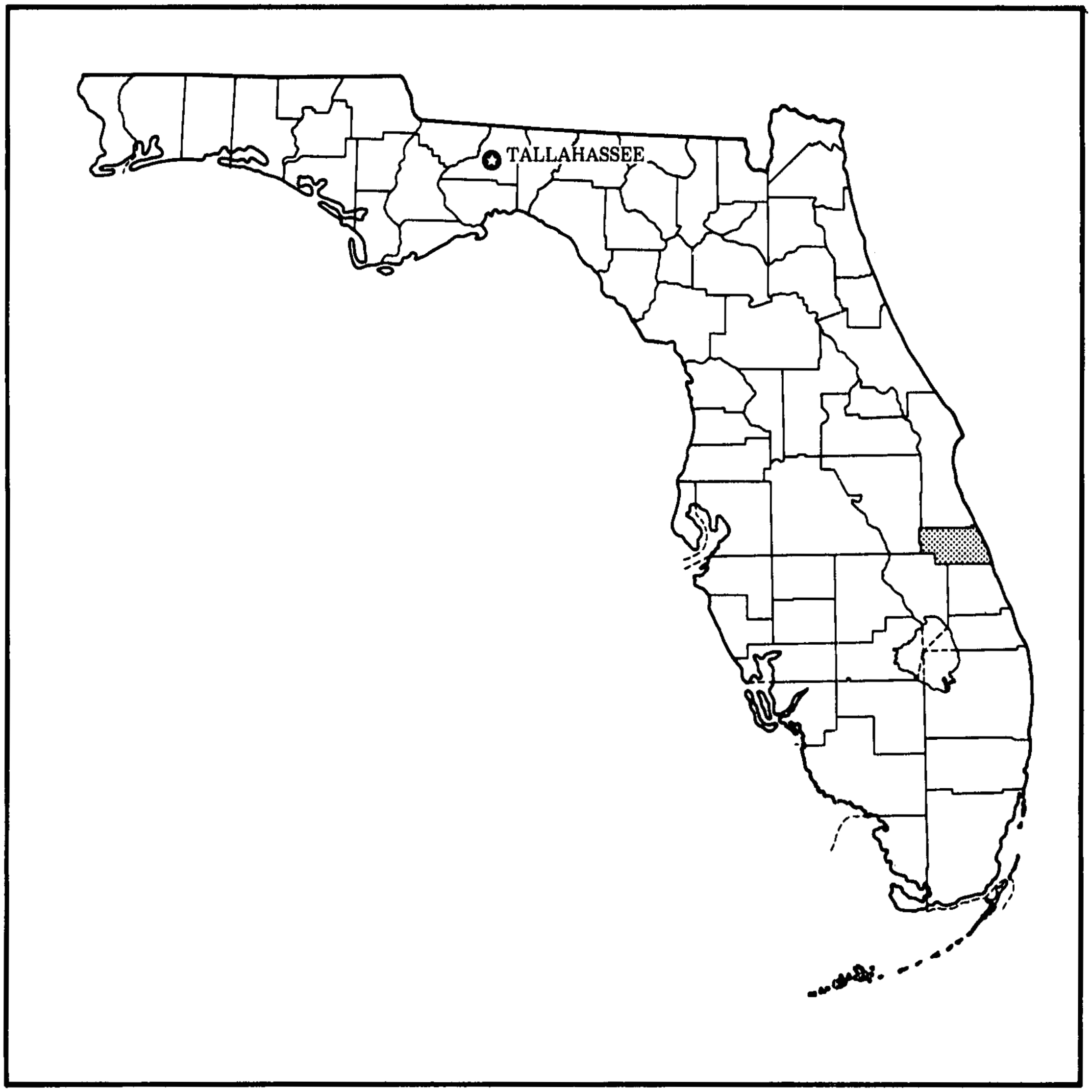
This soil survey contains information that can be used in land-planning programs in Indian River County, Florida. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, 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 insure 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.

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 Soil Conservation Service or the Cooperative Extension Service.

James W. Mitchell
State Conservationist
Soil Conservation Service



Location of Indian River County in Florida.

Soil Survey of
Indian River County, Florida

By Carol A. Wettstein, Chris V. Noble, and James D. Slabaugh,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with
University of Florida, Institute of Food and Agricultural Sciences,
Agricultural Experiment Stations, and Soil Science Department,
and Florida Department of Agriculture and Consumer Services

INDIAN RIVER COUNTY is in the southeastern part of peninsular Florida. It is bordered on the north by Brevard County, on the west by Osceola and Okeechobee Counties, on the south by Okeechobee and St. Lucie Counties, and on the east by the Atlantic Ocean.

The land area in the county covers 318,119 acres or about 497 square miles. The survey area includes 345,383 acres or about 540 square miles. This includes 11,237 acres of freshwater areas throughout the county and 16,027 acres of saltwater in the Indian River.

The county is about 23 miles long and about 28 miles wide at the widest part. Vero Beach, the county seat, is in the eastern part of the county on the west shore of the Indian River.

The economy of Indian River County is fairly well diversified. It mainly consists of tourism, agriculture (the center of the Indian River citrus belt), and light industry. The mild winter temperatures, miles of unspoiled beaches, and numerous recreational activity areas attract many tourists and retirees from all over the world.

General Nature of the Survey Area

In this section, environmental and cultural factors that affect the use and management of soils in Indian River County are described. These factors are climate; history and development; physiography, relief, and drainage; water resources; farming; recreation; and transportation.

Climate

The climate of Indian River County is characterized by long, warm, humid summers and mild winters. The moderating influence of the Atlantic Ocean and the Gulf stream on maximum temperatures in summer and minimum temperatures in winter is strong along the immediate coast, but it diminishes slightly a few miles inland. Because of the moderation of winter and summer temperatures, the climate of Indian River County is considered to be humid and subtropical. The average year round temperature is 73.4 degrees F.

Although the mean annual air temperature seldom varies more than a degree or two from year to year, the annual rainfall may vary 100 percent *(6)*. Yearly rainfall generally is from 50 to 55 inches. September generally has the most rainfall with June, October, and August following next in order. The period of least rain usually occurs from November to April.

The moist, unstable air in the county results in frequent showers that are generally of short duration. Thunderstorms are frequent during the summer, occurring on an average of every other day. Sometimes these storms are heavy, and 2 or 3 inches of rain falls in 1 to 2 hours. More than 60 percent of the annual rainfall occurs during these summer thunderstorms. Winter and spring rains generally are not so intense as summer thunderstorms. Summarized climatic data *(7, 17, 18)* based on records collected at Vero Beach are shown in table 1.

Daylong rains are rare and almost always are associated with a tropical storm. Tropical storms can affect the area any time from late in May through mid-November. Storms of hurricane force with winds of 74 miles per hour or more may be expected in this area about once every 30 years *(11)*.

Extended periods of dry weather can occur in any season, but such periods are most common in spring and fall. Dry periods in April and May generally are of shorter duration than those in fall, but they tend to be more serious because temperatures are higher and the need for moisture is greater in April and May.

Hail falls occasionally during thunderstorms, but the hail is generally small and seldom causes much damage. Snowfall is almost unknown in Indian River County; although, snow flurries occurred throughout south Florida in the winter of 1976-77.

The geographic position of Vero Beach and Indian River County benefits from the prevailing southeasterly breezes. Cold continental air is modified as it travels over water or flows down the Florida Peninsula before reaching the Indian River County area. The coldest temperatures and infrequent frosts occur on the second or third night after the arrival of the cold air because heat is lost through radiation. Frosts and freezing temperatures are rare in the coastal areas but occur occasionally in inland areas. The most recent and most severe freeze that has occurred in the county was in January 1982 with a low of 14.6 degrees F. This was recorded in the southwest section of the county. An important citrus growing industry has been established because of the nearly frost-free winters. Freeze data shown in table 2 were taken at Vero Beach *(7)* and are representative for the area.

Summer temperatures are tempered by the ocean breeze and by the frequent formation of cumulus clouds, which somewhat shade the land without completely obscuring the sun. Temperatures of 88 degrees F. or higher have occurred in all months. A temperature as high as 100 degrees F. has occurred in the past. August is the warmest month and has an average maximum temperature of about 90 degrees F. This temperature is common from June through September.

Flying weather generally is very good in Indian River County, and "instrument" weather occurs only rarely. Since the air has no taint of industrial smoke, the air is clean and very little smog occurs.

Prevailing winds generally are southeasterly except in March when southerly winds prevail. Windspeed generally is between 10 and 15 miles per hour in the afternoon and from 5 to 10 miles per hour at night.

History and Development

The original inhabitants of the Indian River area about 400 years ago were the Ais Indians. These inhabitants were later named the Seminole Indians. The Ais Indians, who occupied this territory long before Ponce de Leon discovered Florida in 1513, were nonagricultural people who lived by hunting, fishing, and eating berries *(8)*. Because of disease and raids by white settlers, they disappeared from this area between 1700 and 1760.

In 1820, the area was ceded to the United States. In March of 1821, General Andrew Jackson became provisional Governor of Florida. During the first legislative council held in 1824, four new counties, including one named Mosquito County, were formed. In 1844, one year before Florida became a state, Santa Lucia County was formed from an area of Mosquito County. In 1845, Mosquito County was renamed Orange County, and at the same time, Santa Lucia County was renamed Brevard County *(11)*.

In 1845, the county of Brevard was bounded by St. Johns County, the Indian River boundary line, and Alachua County. In 1905, the legislature separated an area from Brevard County, which became known as St. Lucie County. Finally, an area was removed from St. Lucie County and created the county that officially became Indian River County on June 29, 1925.

During the Seminole Wars, a military post, which was known as Fort No. 2 and was later called Fort Vinton, was established in 1839 to protect the settlers in the territory. This territory later became part of Indian River County *(11)*.

The area of Johns Island was first settled in 1880. Since the island was practically frostproof, it became one of the most productive areas on the river for the growing of beans.

The community of Gifford was first settled between 1893 and 1894 when the Florida East Coast Railroad was extending its system along the coast. Fellsmere, in the north central part of the county, was founded in 1912. Because of its extensive marshlands, this was once one of the best areas in the state for frogging until drainage systems were created and caused the marshes to disappear. Other communities, such as Viking, Crawford's Point, Oslo, Indian River Shores, Indrio, Ixora Park, Orchid, Roseland, Rockridge, Sebastian, Tropicolony, Wabasso, and Winter Beach, were established along the Indian River, and agricultural interests flourished within the area.

Prior to the actual creation of Indian River County in 1925, the first permanent settlers traveled from the New York area by boat and railroad and came to Vero Beach in 1887. Vero Beach later became the county seat. The city of Vero Beach, which was only a small community of three houses and a general store in the 1880's, has grown to a population of over 16,000. Because of its location along the Indian River and resulting climate, Vero Beach is referred to as the city "Where the Tropics Begin."

Physiography, Relief, and Drainage

Indian River County is in the coastal lowlands of the Atlantic Coastal Plain physiographic province *(10)*. The coastal lowlands consist of an area of low relief that represents several ancient marine terraces. These ancient terraces mark where the sea coast was in past geologic times *(6)*. The county can be divided into four physiographic subdivisions—the Eastern Valley, the Osceola Plain, the Atlantic Coastal Ridge, and Ten Mile Ridge *(21)*, (fig. 1).

The **Eastern Valley** is between the Atlantic Coastal Ridge to the east and the Osceola Plain to the west. It is the largest physiographic region in the county and extends the entire length of the county. The Pamlico Terrace, one of two terraces in Indian River County, encompasses the Eastern Valley. Most of the terrace is less than 25 feet above sea level but ranges from about 15 to 30 feet above sea level. The areas of flatlands occurring on this terrace consist mostly of flatwoods that have numerous, small depressions, low hammocks, and grassy sloughs. The soils are predominantly nearly level and wet and have a sandy surface layer and loamy material at various depths. Native vegetation is mostly pines, sawpalmetto, and pineland threeawn interspersed with areas of maidencane and scattered cabbage palm. The St. Johns Marsh also is on the Pamlico Terrace. It consists of freshwater swamps and marshes. Native vegetation includes red maple, redbay, cypress, willows, sawgrass, maidencane, and ferns. The soils are predominantly nearly level and very wet. These soils are organic throughout or have a moderately thick, organic layer that is underlain by a loamy subsoil. Most of the Eastern Valley has been planted to citrus, crops, or improved pasture grasses, or it is used for native range.

The **Osceola Plain** is in the western part of the county. It begins at the western edge of St. Johns Marsh at an altitude of about 25 feet and begins a gradual rise that flattens out to become the Talbot Terrace. Elevation mostly ranges from about 30 feet to about 60 feet above sea level. This area consists of flatwoods, low knolls, and ridges. In these areas are scattered depressions and poorly defined drainageways. The soils are

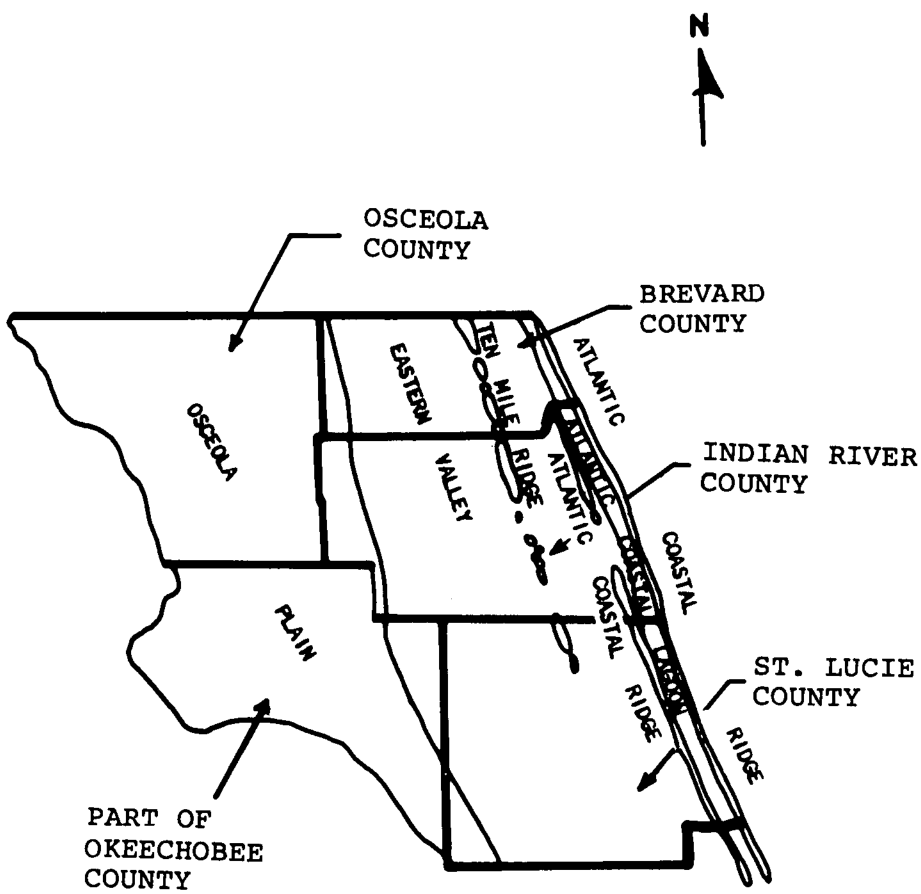


Figure 1.—Physiography of Indian River County and the surrounding area.

predominantly nearly level, wet, and sandy and have a dark sandy subsoil. In a few areas, the soils that are adjacent to the St. Johns Marsh have a sandy surface layer and a deep loamy subsoil. Native vegetation consists of pines, sawpalmetto, sand live oak, pineland threeawn, and maidencane. Most of this region is used for native range or has been planted to improved pasture grasses.

The **Atlantic Coastal Ridge** is in the eastern part of the county. It is bordered on the east by the Atlantic Ocean. The Atlantic Coastal Ridge consists of relic beach ridges that formed by wind and wave action along the shore. It rises to a maximum height of about 25 feet above sea level. The Indian River separates the present day barrier island from the mainland. The part of the Atlantic Coastal Ridge on the mainland is an elongated broken ridge that reaches altitudes of more than 50 feet. This ridge is a remnant of an offshore bar that was formed in the Pamlico Sea *(6)*. The soils on the mainland ridge are predominantly nearly level to gently sloping, very dry, and sandy. Native vegetation consists of sand pine, sand live oak, slash pine, rosemary, sawpalmetto, scrub oak, and pineland threeawn. The ridge on the barrier island consists of beach, primary dune, trough, inland dune, and back dune. The soils on the ridge of the barrier island are nearly level to gently sloping, wet to extremely dry, and sandy. These soils have varying amounts of shell fragments. Natural vegetation is sawpalmetto, sand live oak, cabbage palm, seagrape, and sea-oats. Many areas of the Atlantic Coastal Ridge on the mainland are used for urban development, and on the barrier island they are used for urban development and recreation.

The **Ten Mile Ridge** is in the Eastern Valley about 7 miles west of the Coastal Ridge. This intermittently occurring, less pronounced ridge ranges from about 25 to 35 feet above sea level. This ridge is made up of flatwoods, low knolls, and ridges. The soils on Ten Mile Ridge are nearly level to level, wet to somewhat dry, and sandy. Some of these soils have a dark, sandy subsoil that is underlain by loamy material. The native vegetation on the knolls and ridges consists of slash pine, longleaf pine, sand live oak, and sawpalmetto; on the flatwoods, it consists of slash pine, sawpalmetto, waxmyrtle, pineland threeawn, and bluestems. Most of Ten Mile Ridge is used for native range.

The low ridges that occur within the county have a great effect on surface water drainage, although this has been altered by manmade drainage systems. A few small streams enter the eastern part of the county from areas of higher elevation from the west. The St. Johns Marsh is also in the eastern part of the county and is the headwaters of the St. Johns River. It has no well defined channels or prominent streams except Blue Cypress Lake. Natural drainage is to the north through the entire width of the marsh.

Originally the area between the Atlantic Coastal Ridge and the Ten Mile Ridge was swampy. This area had no prominent stream channels other than the South Prong of Sebastian Creek that is to the north. Manmade drainage systems, such as the Main Canal and the North and South Relief Canals, extensively altered the natural flow pattern.

Water Resources

Water resources are of vital importance to the economy and future development of Indian River County. The importance of suitable water resources will continually need to be recognized as the development of new citrus groves increases. Citrus is a high value economic crop in the county, but also it is the largest user of agricultural water. The population in Indian River County increased from 36,000 in 1970 to approximately 60,000 in 1980. By 1982, an additional increase in population was estimated at 11.7 percent. This population increase has created the growing competition for the water resources in the county, especially since the availability of potable water is limited *(4, 6)*.

Indian River County has three main sources of water. These sources are surface and ground water bodies, a shallow aquifer, and the Floridan Aquifer (fig. 2).

The first major source of water supply is surface and ground water bodies. The surface water of the county is being used for irrigation in increasing quantities *(6)*. The trends indicate that such usage of water will probably exceed that of ground water. Ground water is the subsurface water in the zone of saturation; that is, the zone in which all soil pore spaces are filled with water under pressure no greater than atmospheric pressure. With the drainage of wetlands, especially in the area of the St. Johns Marsh, the amount of available surface water storage areas has been reduced. This situation will improve if the St. Johns Water Management District is successful in their attempt to acquire lands as water storage areas.

The yearly rainfall in Indian River County is 50 to 55 inches. Almost two-thirds of it occurs during the summer and early in the fall. Large streams do not exist in the county. Runoff is to the north through the St. Johns Marsh, into the St. Johns River basin, and eastward to the Indian River through several improved channels and canals. Blue Cypress Lake is the only large body of freshwater in the county. The Indian River, technically a lagoon between the mainland and an offshore bar, is at sea level and is highly saline *(6)*.

A second major source of water supply is a shallow aquifer consisting of variable compositions of sand, shell fragments, and some silt and clay. This shallow aquifer underlies all of the county. Its base reaches to a depth of 150 feet. This aquifer is underlain by the Hawthorn Formation, which acts as a confining bed or aquiclude and impedes upward movement of water from the

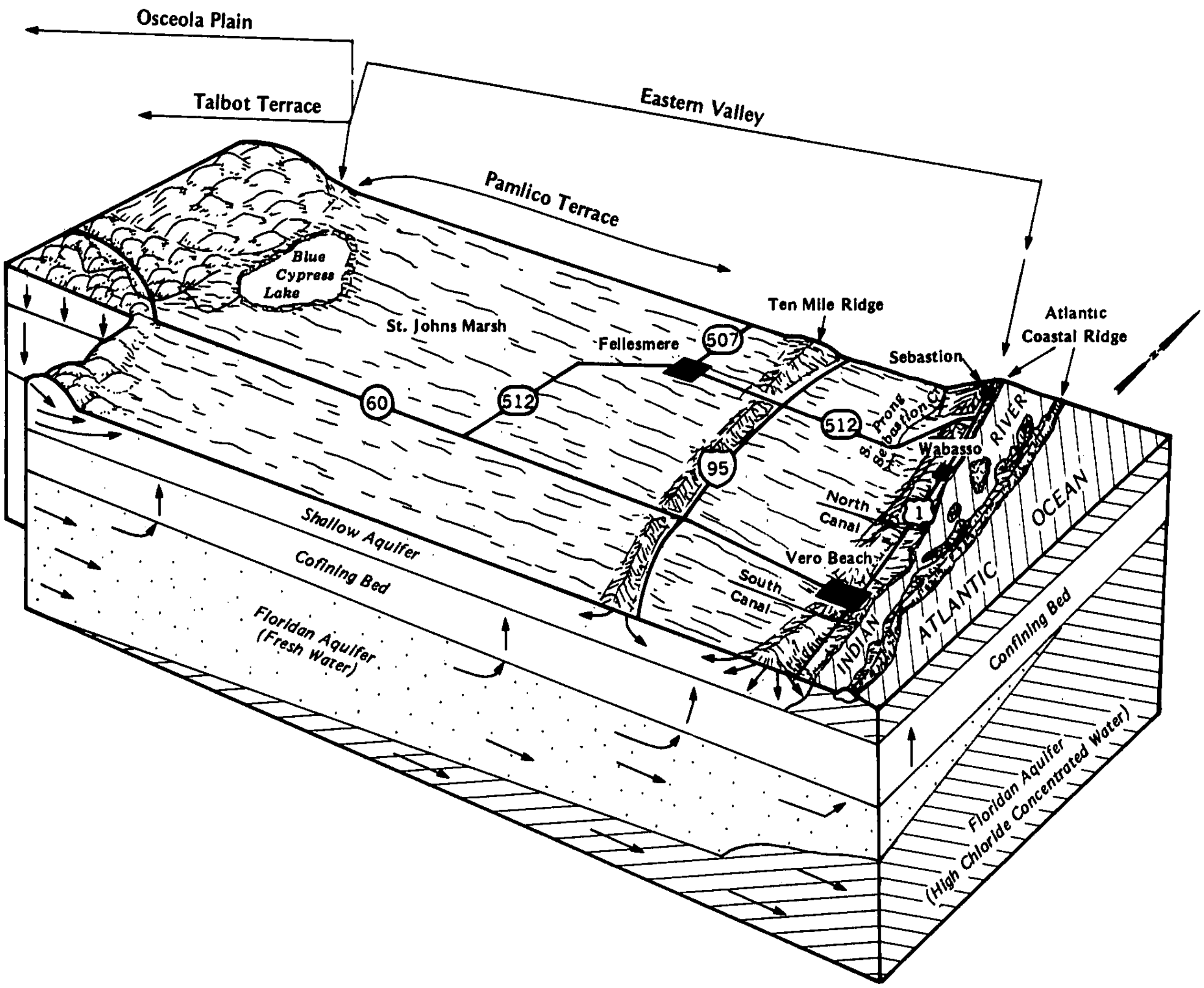


Figure 2.—Physiographic subdivisions of Indian River County (Eastern Valley, Pamlico terrace; Osceola Plain, Talbot terrace; Atlantic Coastal Ridge, mainland, barrier island; and Ten Mile Ridge) and water resources showing principal aquifers and movement of the ground water.

underlying Floridan Aquifer. Water from the shallow aquifer is of good quality and has a chloride concentration that is usually less than 60 milligrams per liter. This aquifer is the principal source for both municipal and domestic use. Recharge is primarily from the rainfall which occurs in the county. This shallow aquifer receives some recharge of water which is withdrawn for irrigation from the Floridan Aquifer within the drainage districts. Two areas within the county have the best potential for meeting the future demands of withdrawal for water. These areas are in the eastern third and the extreme western part of the county. The shallow aquifer near the Indian River consists of discontinuous layers, or lenses, or cemented or impermeable materials that appear to act as a barrier to saltwater intrusion from the river. Extensive development of this shallow aquifer for municipal water supply should be monitored to maintain water quality and quantity.

The third major source of water supply is the Floridan Aquifer, which underlies the county at a depth of 300 to

600 feet. This aquifer consists of Eocene and Oligocene carbonate rocks. This is a confined or artesian aquifer. Recharge to this aquifer is almost entirely from the area that is west and outside of the county. Discharge from the aquifer is from wells that are scattered throughout the surface area. These wells are primarily used for irrigation, and the artesian wells that are left open naturally discharge to the ocean. The quality of water from this aquifer varies greatly throughout the county. The water from this aquifer has a high chloride concentration that generally increases as the depth increases. Because of the chloride concentration, this water is used for irrigation of citrus and improved pasture but is not used for public supply. Rainfall and ground water help to dilute the chloride concentration and help make the water suitable for irrigation.

Two additional sources of water that are available for future development are the surface water (nonsaline) and water (saline) from the Indian River. The nonsaline surface water is discharged into the Indian River from the canal network of three drainage districts in the county. Most of this water occurs as storm runoff and has a wide variation in chloride concentration. The floodwater from drainage districts can be stored in areas that are similar to the St. Johns Marsh and pumped back to the district when needed. The saline water is almost unlimited in supply and can be used for thermoelectric coolings.

Farming

Farming has always been an important factor in the economy of Indian River County. Before 1900, Johns Island and other areas of the barrier island were known for producing truck crops, such as beans, and for growing pineapples and citrus. Some areas also were used for raising hogs.

Beans, strawberries, tomatoes, and other garden crops and citrus were grown from Roseland to the Winter Beach area. When the network of canals and ditches that were dug in the early 1900's began draining the lowlands, the hammocks and highlands became dry. Irrigation became necessary and expensive, which resulted in truck farming gradually giving way to citrus production in these areas. At one time, large amounts of tomatoes and other crops were grown in the area south of Fellsmere and north of Florida State Road 60. Because tomatoes were susceptible to nematodes and disease, the freezing weather and the requirement that land be newly cleared for use each year made the growing of these crops too costly.

In the early 1920's, experimental sugar cane plantings were conducted in Fellsmere. A mill was constructed in 1932 and a refinery was added in 1935. This was the only factory in Florida that produced refined sugar from domestically grown sugar cane. This sugar mill closed in 1966 and gave way to citrus production, to ranching, and to raising tropical fish. The raising of tropical fish has been severely affected by the recent freezing temperatures. In 1923, a muck plant was built in Fellsmere to experiment in the making of fertilizer from muck. This operation was discontinued 2 years later because of the costly process involved.

The main farming enterprise in Indian River County today is citrus production. In 1982, approximately 62,700 acres was planted to citrus. Additional citrus acreage comes into production each year *(7)*. Most of this acreage is in oranges and grapefruit, and some small acreages are in tangelos and tangerines. At present, the western part of Indian River County is open for the development of new groves, but limitations of water for irrigation is a restricting factor for the future.

The second most important agricultural interest in Indian River County is cattle raising. About 125,000 acres is used for livestock. This includes approximately 62,200 acres that is used for improved pasture for beef and dairy production *(7, 19)*. Most of this pasture consists of improved bahiagrass and white clover. In 1983, only one dairy farm was in the survey area. Hogs are still raised in the county.

Various crops, such as field corn, sorghum, soybeans, and rice, are grown on approximately 7,200 acres in the western one-third of the county. The soils on this acreage are mainly organic. In some small areas, sweet corn, cabbage, tomatoes, melons, and strawberries are also grown.

Each year, urban development has encroached on many acres of land that if left undeveloped would have good potential for agricultural use. Because of wetness, many of the soils in these areas have severe limitations for most agricultural use. But, with today's technology, which includes intensive management and a good water control system to remove excess water rapidly and to provide water during dry periods, these soils are well suited to most agricultural uses.

Recreation

A wide variety of recreational activity areas are available in Indian River County. These areas include 23 miles of coastline, Indian River, Sebastian Inlet, Sebastian River, and Blue Cypress Lake. These areas offer many recreational activities for those who enjoy freshwater or saltwater fishing, boating, birding, surfing, shellfishing, or sunbathing.

The Sebastian Inlet is a state recreation area that is well known for its excellent fishing. There are two jetties in the inlet, as well as areas for camping and other recreational facilities. Near the inlet is the McLarty Museum. This museum houses the treasures that were salvaged from Spanish shipwrecks off the Florida coast. Also in the Sebastian Inlet area is the Pelican Island Wildlife Refuge, which has been designated as the first national wildlife refuge in the nation. This refuge was established in 1903.

At Vero Beach are other recreation attractions, such as Dodgertown, which serves as the spring training camp for the Los Angeles Dodgers and, during the summer, is home for their farm team, the Vero Beach Dodgers. This facility is also used as a summer camp for the New Orleans Saints during July and August. In the Vero Beach area are many golf courses, tennis courts, and shuffleboard facilities. There are also many playgrounds and parks throughout the county.

Transportation

Indian River County is served by several major highways. U.S. Highway 1 and Florida State Road A1A are in the eastern part of the county, parallel to the coast. U.S. Highway 1 is on the mainland, and Florida State Road A1A serves as the major road that extends the entire length of the county on the barrier island. U.S. Interstate 95 crosses through the eastern one-third of the county in a north to south direction. Florida State Road 60 extends westward from Vero Beach to Yeehaw Junction in Osceola County. The Sunshine State Parkway, which is also called the Florida Turnpike, crosses the far southwestern edge of the county in two places. Restricted access to this road is at Yeehaw Junction and Ft. Pierce in St. Lucie County. Several county roads connect the outlying towns or the outlying areas, such as Fellsmere, with the major roads in the county.

The Florida East Coast Railway runs north to south, basically parallel to U.S. Highway 1. The Sebastian Inlet at the north end of the county provides access from the Indian River and Intracoastal Waterway out to the Atlantic Ocean.

The two commercial airports in the county are in Vero Beach and Sebastian. There are several private landing fields in the county. Bus service is available throughout the area. A few large trucking firms that have facilities for handling interstate trade also serve the area.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; 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 from 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 in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil 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-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 soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, 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. 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 are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were 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 were 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 state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure 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.

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 several 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.

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 noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (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 contrasting soils are 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 of 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 soil 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 plans, but onsite investigation is needed to plan for 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, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units 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 a 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.

The soils in the survey area vary widely in their potential for major land uses. Table 3 shows the extent of the map units shown on the general soil map. It lists the suitability and potential of each of the map units for major land uses and shows soil properties that limit use. Soil ratings are based on the practices commonly used in the survey area to overcome soil limitations. These ratings reflect the ease of overcoming the limitations. They also reflect the problems that will persist even if such practices are used.

Each map unit is rated for *cropland, pasture, woodland, sanitary facilities, building sites,* and *recreation areas.* Cultivated crops are those grown extensively in the survey area. Pasture is improved pasture grasses grown extensively in the survey area. Woodland refers to areas of native trees. Sanitary facilities include septic tank absorption fields and trench sanitary landfills. Building sites include residential, commercial, and industrial developments. Recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic.

Soils of the Sand Ridges

The one map unit in this group consists of nearly level to gently sloping, excessively drained and moderately well drained soils in high dunelike areas. These soils are sandy throughout. This map unit is in the eastern part of Indian River County. It is on the mainland coastal ridge along U.S. Highway 1 and extends from Brevard County to St. Lucie County.

1. Astatula-Archbold-St. Lucie

Nearly level to gently sloping, excessively drained and moderately well drained soils that are sandy to a depth of 80 inches or more

This map unit consists of deep, nearly level to gently sloping, sandy soils on high, discontinuous dunelike ridges (fig. 3). These soils are on the Atlantic Coastal Ridge, which extends in a north-south direction from Brevard County to St. Lucie County parallel to the Indian River.

The natural vegetation is sand pine, sand live oak, slash pine, rosemary, Chapman oak, sawpalmetto, pricklypear cacti, pineland threeawn, lichens, and reindeer moss.

This map unit makes up about 5,728 acres, or about 1.8 percent of the survey area. It is about 27 percent Astatula soils, 14 percent Archbold soils, 14 percent St. Lucie soils, and 45 percent soils of minor extent.

Astatula soils are excessively drained. Typically, the surface layer is grayish brown sand about 4 inches thick. The subsurface layer is brown sand about 1 inch thick. The substratum to a depth of 80 inches or more is brownish yellow sand.

Archbold soils are moderately well drained. Typically, the surface layer is gray sand about 2 inches thick. Underlying that is sand to a depth of 80 inches or more. The upper 36 inches of the underlying sand is white, the next 13 inches is light gray, and the lower 29 inches or more is gray.

St. Lucie soils are excessively drained. Typically, the surface layer is gray sand about 3 inches thick. Below that is white sand to a depth of 80 inches or more.

The soils of minor extent in this map unit are Orsino, Paola, and Jonathan soils.

Some areas of this map unit are used for urban development. Part of the cities of Vero Beach, Sebastian, and Roseland has been developed on these soils. Also, some commercial buildings and many houses have been built in the areas of this map unit. Some small areas are used for citrus or as sources of fill material.

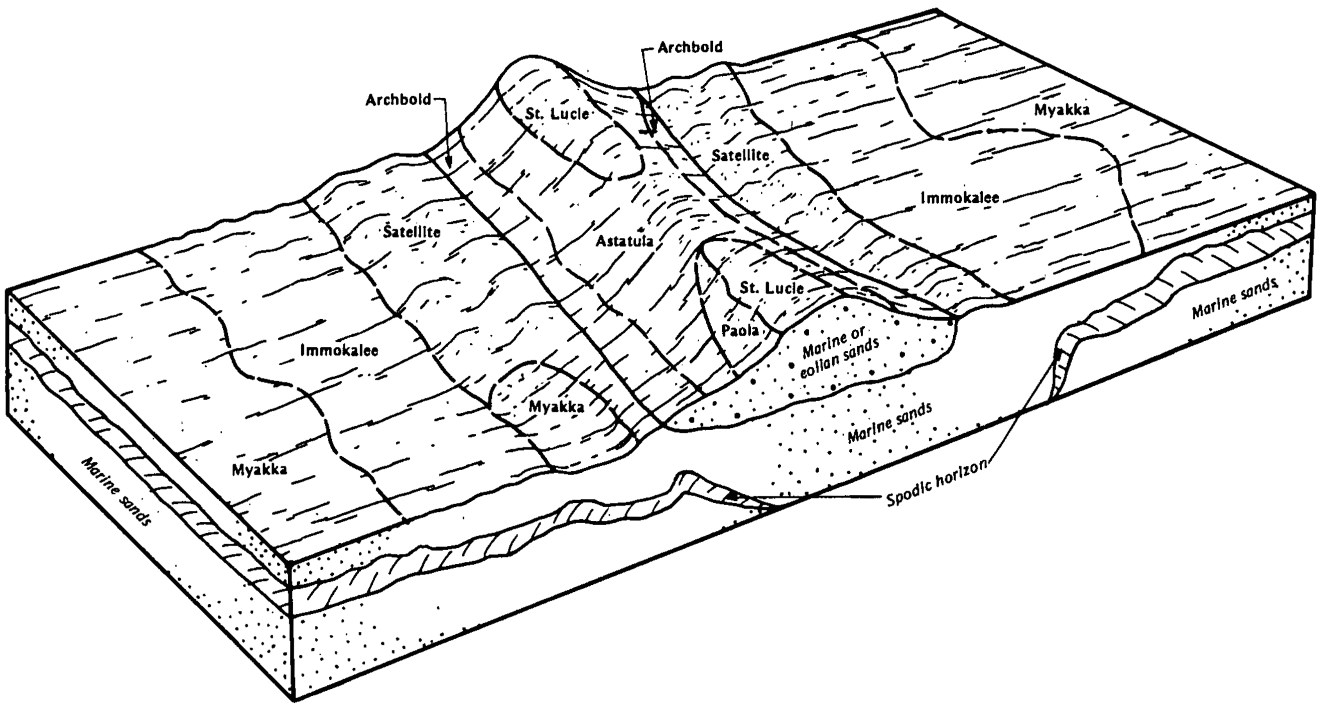


Figure 3.—Typical pattern of soils and parent material in the Astatula-Archbold-St. Lucie map unit and the Immokalee-Myakka-Satellite map unit.

Soils of the Coastal Islands and Tidal Marshes

The two map units in this group consist of nearly level to gently sloping, poorly drained to excessively drained soils that are sandy throughout and contain shell fragments. The map units also consist of some level, very poorly drained soils that formed in loamy or clayey tidal deposits that have very low soil strength. These soils are on low, gently undulating dunelike ridges, on elongated sloughs, on the higher dunelike ridges of the barrier island, and on islands and mangrove tidal swamps. Some soils are in nearly level areas that were former sloughs and tidal marshes. These areas have been drained and filled with sand or with mixed sand and shell fragments. These materials were derived from river dredging or from hauling and filling operations. The soils of the coastal islands and tidal marshes are in the eastern part of Indian River County.

2. Canaveral-Captiva-Palm Beach

Nearly level to gently sloping, somewhat poorly drained to moderately well drained, poorly drained, and well drained to excessively drained sandy soils that contain shell fragments

This map unit consists of nearly level to gently sloping soils. These soils are on low, gently undulating dunelike ridges, in elongated sloughs, and on the higher dunelike ridges of the barrier island (fig. 4). There is only one area of this map unit, and it makes up the barrier island, which extends the length of the survey area and is adjacent to the Atlantic Ocean.

The natural vegetation in most areas of this map unit is sawpalmetto, sand live oak, cabbage palm, wild-coffee, waxmyrtle, and seagrape. The natural vegetation on the outer edge of the higher dunelike ridges that are adjacent to the ocean is Spanish-bayonet and sea-oats. Introduced vegetation consists of thick stands of Australian pine and Brazilian pepper.

This map unit makes up about 6,308 acres, or about 2 percent of the survey area. It is about 40 percent Canaveral soils, 27 percent Captiva soils, 25 percent Palm Beach soils, and 8 percent soils of minor extent.

Canaveral soils are on low, gently undulating dunelike ridges. These soils are somewhat poorly drained to moderately well drained. Typically, the surface layer is 5 inches thick. It is dark gray and gray fine sand that is about 10 percent sand-size shell fragments. The underlying material to a depth of 80 inches or more is light gray, light yellowish brown, very pale brown, and light brownish gray fine sand that is about 10 to 40 percent sand-size multicolored shell fragments.

Captiva soils are poorly drained. These soils are on narrow, elongated sloughs between the low, dunelike ridges and the mangrove swamps. Typically, the surface layer is about 8 inches thick. It is very dark gray fine sand that is about 2 percent shell fragments. The underlying material to a depth of 80 inches or more is grayish brown, olive gray, and greenish gray fine sand that is about 2 to 15 percent shell fragments.

Palm Beach soils are well drained to excessively drained. These soils are on the higher dunelike ridges parallel to the coastline. Typically, the surface layer is very dark gray sand about 4 inches thick. The underlying material, to a depth of about 65 inches, is grayish brown and pale brown sand that has stratified layers of shell fragments throughout. Below that to a depth of 80 inches or more is very pale brown sand.

Areas of minor extent in this map unit are Beaches.

The soils in most areas of this map unit are in natural vegetation. A large area near the town of Orchid is used for citrus. Increasing acreages are being developed for residential and recreation uses.

3. McKee-Quartzipsamments-St. Augustine

Level, very poorly drained, loamy soils that have very low soil strength; some nearly level, somewhat poorly drained to moderately well drained soils that are sand or mixed sand and shell fragments; and some level, somewhat poorly drained soils that are mixed sand and shell fragments

This map unit consists of level soils on mangrove islands and in swamps that are inundated daily by high tides. It also consists of nearly level soils in areas that were former sloughs and tidal marshes. These areas have been drained and filled with sand or with mixed sand and shell fragments, or they have been drained and filled with mixed sand, shell fragments, and loamy and silty sediment. These materials resulted from river dredging or from hauling and filling operations. Most of these areas include the islands in the Indian River and those areas that are adjacent to the river on the eastern edge of the mainland and on the western edge of the barrier island. The soils in this map unit extend from Brevard County to St. Lucie County.

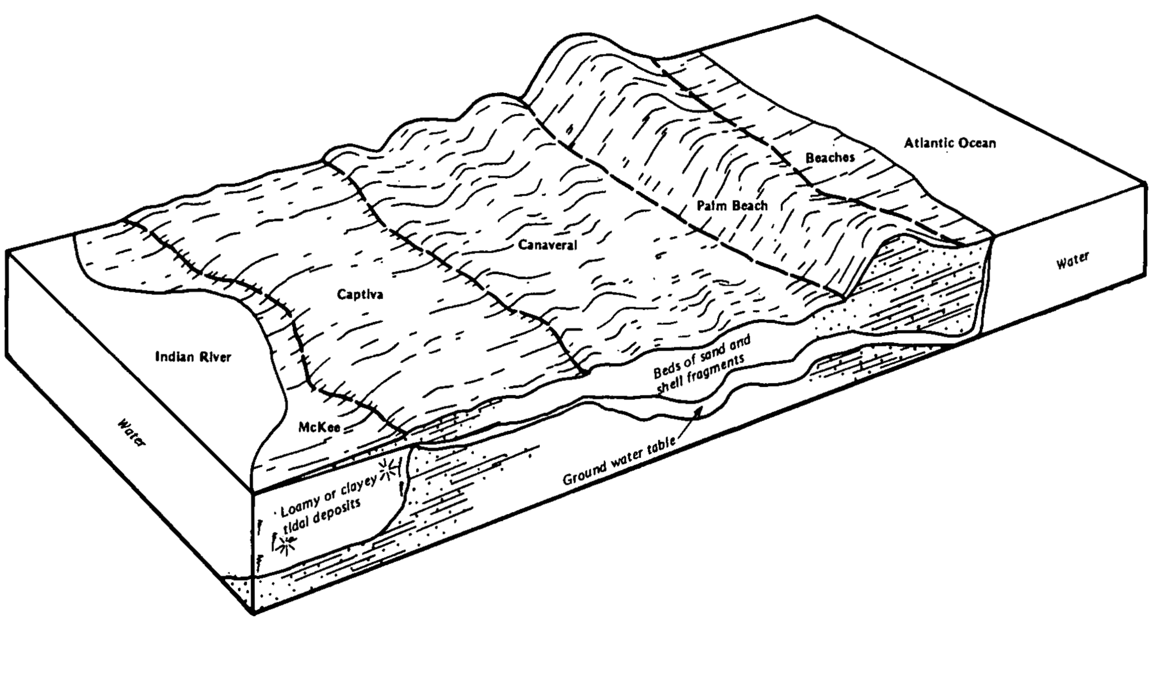


Figure 4.—Typical pattern of soils and parent material in the Canaveral-Captiva-Palm Beach association. These soils make up a cross section of soils on the barrier island.

The natural vegetation in the tidal swamps consists of red, black, and white mangrove, sea rocket, seashore paspalum, seashore saltgrass, and scattered cabbage palm. In many of the areas, the soils that were formed by fill material and earthmoving operations have introduced vegetation that consists of thick stands of Australian pine, Brazilian pepper, and various weeds and grasses.

This map unit makes up about 7,232 acres, or about 2.3 percent of the survey area. It is about 50 percent McKee soils, 21 percent Quartzipsamments soils, 15 percent St. Augustine soils, and 14 percent soils of minor extent.

McKee soils are on the existing mangrove islands and swamps (fig. 5). Tidal water inundates most of the areas at high tide. These soils are very poorly drained. They have very low soil strength and are generally very fluid when squeezed in the hand; the soils in some areas range from very fluid to slightly fluid. Typically, the surface layer is covered by a layer of very dark grayish brown mucky clay loam about 1 inch thick. The underlying material is a layer of very dark gray clay loam to a depth of about 15 inches, grayish green to dark greenish gray clay loam to a depth of about 60 inches, and dark gray sandy loam to a depth of 80 inches or more.

Quartzipsamments soils are on islands and in tidal marshes and sloughs. These areas have been drained and filled with material that resulted from river dredging or from hauling and filling operations. These soils are somewhat poorly drained, but in areas where the fill material is deeper, they can range from somewhat poorly drained to moderately well drained. Typically, the surface layer is mottled light yellowish brown fine sand about 17 inches thick. Below that, to a depth of about 60 inches, is fine sand in various shades of gray, brown, and yellow that is mixed with about 10 percent shell fragments, and underlying that is gray sand to a depth of 80 inches or more.

St. Augustine soils were formed by dredge and fill materials and then spread over the surface of former tidal areas. They are somewhat poorly drained. Typically, the surface layer consists of fill material that is about 30 inches thick. It is light brownish gray sand that contains shell fragments. The underlying material, to a depth of 45 inches, is a mixture of grayish brown sand, fragments of dark gray silty clay loam, and olive gray loamy sand. Below that to a depth of 80 inches or more is a mixture of greenish gray sand and fragments of gray loamy sand. Some areas have a thin organic layer at a depth of 40 inches or more.

The soils of minor extent in this map unit are Kesson and Riomar soils and Arents.

The areas of McKee soils remain in natural vegetation, whereas most areas of Quartzipsamments and St. Augustine soils have been developed for residential use.

Soils of the Flatwoods, Low Knolls, and Ridges

The four map units in this group consist of nearly level, poorly drained and somewhat poorly drained soils. These soils are in broad areas of flatwoods; in slightly higher areas of flatwoods that are surrounded and intersected by broad, low sloughs, poorly defined drainageways, hammocks, and depressional areas; and on low knolls and ridges on the flatwoods. Some soils are sandy throughout, some have a loamy subsoil at a depth of more than 40 inches, and some have a dark sandy subsoil. In some places, these soils are underlain by loamy material at a depth of less than 40 inches. In other areas, they are underlain by loamy material at a depth of more than 40 inches. These soils are mostly in the eastern and extreme western parts of Indian River County.

4. Immokalee-Myakka-Satellite

Nearly level, poorly drained and somewhat poorly drained soils; some are sandy throughout, and some have a dark sandy subsoil

This map unit consists of soils on long, narrow ridges, low knolls on the flatwoods, in broad areas of flatwoods, and in scattered depressions (see fig. 3). These soils are in the eastern one-third of Indian River County and are adjacent to the Atlantic Coastal Ridge on the Ten Mile Ridge along U.S. Interstate 95, north of Florida State Road 60. Small areas of these soils are in the extreme western part of the survey area and are adjacent to the Osceola County line. Part of the cities of Sebastian and Vero Beach is in this map unit.

The natural vegetation in most areas of knolls and ridges is south Florida slash pine, longleaf pine, sand live oak, sawpalmetto, fetterbush, and pineland threeawn. Vegetation on the flatwoods is south Florida slash pine, sawpalmetto, running oak, inkberry, fetterbush, waxmyrtle, pineland threeawn, bluestems, and panicums.

This map unit makes up about 15,711 acres, or about 4.9 percent of the survey area. It is about 33 percent Immokalee soils, 31 percent Myakka soils, 14 percent Satellite soils, and 22 percent soils of minor extent.

Immokalee soils are poorly drained. These soils are on broad flatwoods. Typically, the surface layer is very dark gray fine sand about 5 inches thick. The subsurface layer is light gray fine sand to a depth of 35 inches. The subsoil is very dark gray fine sand to a depth of about 55 inches. Below that to a depth of 80 inches or more is brown fine sand.

Myakka soils are poorly drained. These soils are on broad flatwoods. Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of 28 inches. The upper 15 inches of the subsurface layer is grayish brown, and the lower 8 inches is light brownish gray. The subsoil extends to a

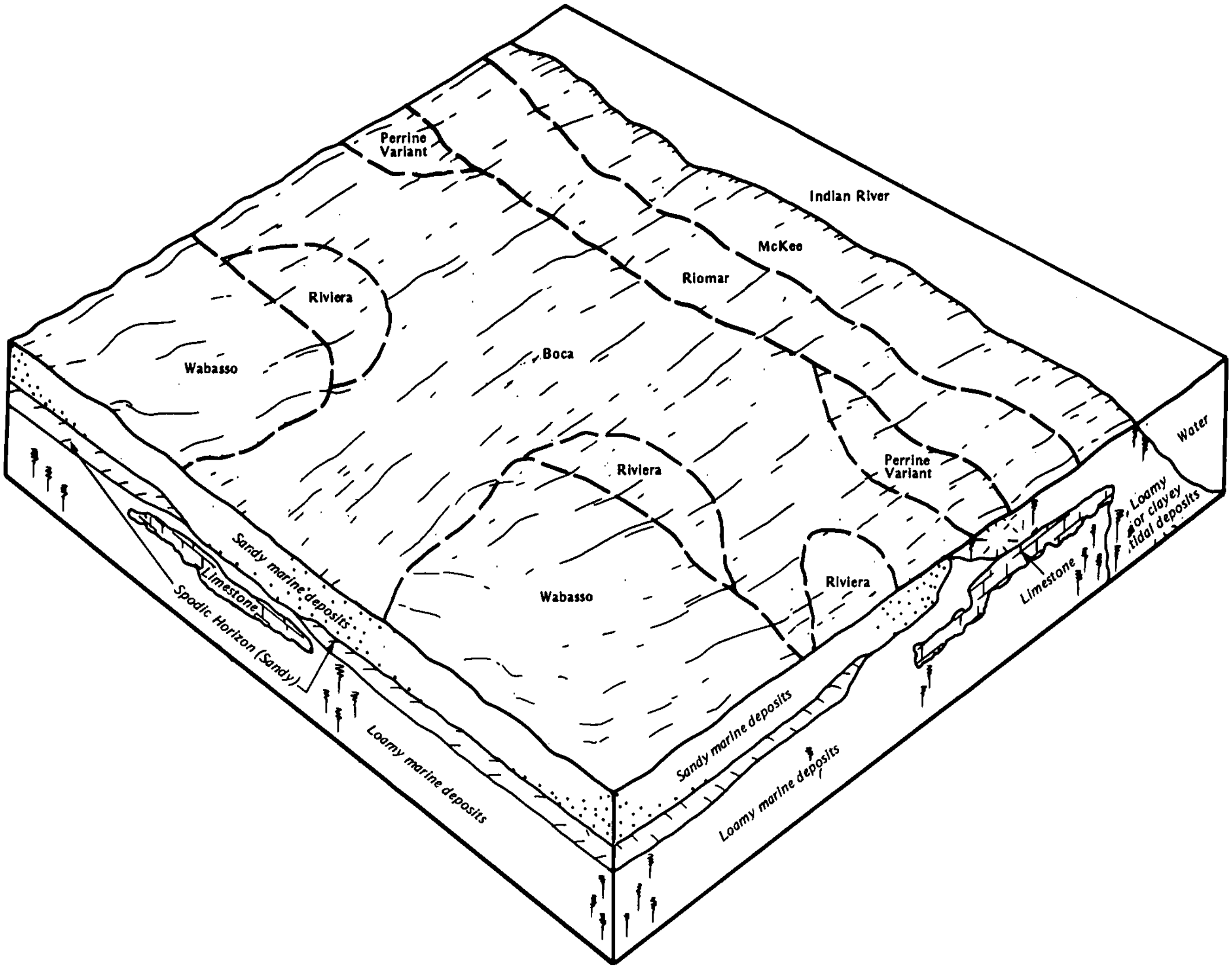


Figure 5.—Typical pattern of soils and parent material in the Boca-Wabasso-Riviera map unit. The adjacent Riomar and McKee soils are in the tidal marsh.

depth of 68 inches. The upper 3 inches of the subsoil is black fine sand, the next 8 inches is dark reddish brown fine sand, the next 11 inches is black fine sand, the next 8 inches is partially weakly cemented, black fine sand, and the lower 10 inches is very dark grayish brown fine sand. The substratum to a depth of 80 inches or more is dark brown fine sand.

Satellite soils are somewhat poorly drained. These soils are on long, narrow ridges and low knolls on the flatwoods. Typically, the surface layer is dark gray fine sand about 4 inches thick. The underlying material is light brownish gray, grayish brown, and dark grayish brown fine sand to a depth of 80 inches or more.

The soils of minor extent in this map unit are Pomello, Pompano, and Archbold soils.

The soils in most areas of this map unit are in natural vegetation. Some large areas are used for residential and urban development. Some small areas are used for citrus.

5. EauGallie-Oldsmar-Wabasso

Nearly level, poorly drained soils that have a dark sandy *subsoil; some have a subsoil that is underlain by loamy material at a depth of less than 40 inches, and some have a subsoil that is underlain by loamy material at a depth of more than 40 inches*

This map unit consists of soils in broad areas of flatwoods and in scattered small wet depressions. These soils are mostly in the eastern one-third of Indian River County, primarily west of the Atlantic Coastal Ridge. The soils in this map unit extend from Brevard County to St. Lucie County. Other areas of soils in this map unit are scattered throughout the eastern one-half of the survey area, which includes the areas around Fellsmere and also those areas east of Ten Mile Ridge. Part of the cities of Sebastian, Vero Beach, Vero Lake Estates, Vero Beach Highlands, and Fellsmere is in this map unit.

The natural vegetation is south Florida slash pine, scattered live oak and laurel oak, sawpaletto, inkberry, fetterbush, waxmyrtle, pineland threeawn, bluestems, and panicums.

This map unit makes up about 45,165 acres, or about 14.2 percent of the survey area. It is about 44 percent EauGallie soils, 18 percent Oldsmar soils, 9 percent Wabasso soils, and 29 percent soils of minor extent.

EauGallie soils are poorly drained. Typically, the surface layer is black grading to dark gray fine sand about 15 inches thick. The subsurface layer is gray fine sand to a depth of about 26 inches. The subsoil extends to a depth of about 62 inches. The upper part of the subsoil is black grading to brown fine sand coated with organic matter about 21 inches thick. The lower 15 inches is grayish brown or gray sandy loam. The substratum is light brownish gray loamy fine sand to a depth of 80 inches or more.

Oldsmar soils are poorly drained. Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 32 inches. The subsoil extends to a depth of about 62 inches. The upper 18 inches of the subsoil is black, dark reddish brown, and dark brown fine sand. The lower 12 inches is grayish brown sandy loam. The substratum is light brownish gray loamy fine sand to a depth of 80 inches or more.

Wabasso soils are poorly drained. Typically, the surface layer is very dark gray fine sand about 7 inches thick. The subsurface layer is gray fine sand to a depth of about 24 inches. The subsoil extends to a depth of 48 inches. The upper part of the subsoil is black and very dark gray fine sand that is coated with organic matter, and the lower part is dark brown and brown sandy loam. The substratum to a depth of 80 inches or more is brown loamy fine sand.

The soils of minor extent in this map unit are Chobee, Holopaw, Lokosee, Malabar, Manatee, Pepper, Riviera, and Electra soils.

The soils in most areas of this map unit are in natural vegetation. Some areas are used for urban development, citrus, improved pasture, and native range.

6. Myakka-Immokalee

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

This map unit consists of soils in broad areas of flatwoods, scattered small wet depressions, and long, narrow, poorly defined drainageways. These soils are mostly in the western one-third of Indian River County. The soils in this map unit extend from Brevard County to Okeechobee County and to adjoining Osceola County.

The natural vegetation is south Florida slash pine, scattered live oak, sawpalmetto, running oak, inkberry, fetterbush, waxmyrtle, pineland threeawn, bluestems, and panicums.

This map unit makes up about 30,205 acres, or about 9.5 percent of the survey area. It is about 51 percent Myakka soils, 31 percent Immokalee soils, and 18 percent soils of minor extent.

Myakka soils are poorly drained. Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of 28 inches. The upper 15 inches of the subsurface layer is grayish brown, and the lower 8 inches is light brownish gray. The subsoil extends to a depth of 68 inches. It is black fine sand in the upper 3 inches, dark reddish brown fine sand in the next 8 inches, black fine sand in the next 11 inches, black fine sand that is partially weakly cemented in the next 8 inches, and very dark grayish brown fine sand in the lower 10 inches. The substratum to a depth of 80 inches or more is dark brown fine sand.

Immokalee soils are poorly drained. Typically, the surface layer is very dark gray fine sand about 5 inches thick. The subsurface layer is light gray fine sand to a depth of 35 inches. The subsoil is very dark gray fine sand to a depth of about 55 inches. The substratum to a depth of 80 inches or more is brown fine sand.

The soils of minor extent in this map unit are Floridana, Holopaw, Pompano, Pomello, and Samsula soils.

The soils in most areas of this map unit are in natural vegetation. Several large areas are used for improved pasture. Other areas are used for native range and woodland.

7. EauGallie-Myakka-Riviera

Nearly level, poorly drained soils; some have a loamy subsoil at a depth of less than 40 inches, some have a dark sandy subsoil at a depth of 20 to 30 inches, and some are sandy throughout and have a dark sandy subsoil at a depth of 20 to 30 inches

This map unit consists of soils in slightly higher areas of flatwoods. These areas are surrounded and intersected by broad, low sloughs, poorly defined drainageways, hammocks, and depressional areas. The areas of this map unit are along the Indian River County and Okeechobee County line, south of Padgett Branch and southward to Fort Drum Creek. Also, another area of these soils is south of Gum Slough to the Okeechobee County line.

The natural vegetation in the areas of flatwoods consists of slash pine, sawpalmetto, waxmyrtle, inkberry, scattered cabbage palm, pineland threeawn, bluestems, and panicums. In the lower surrounding areas on broad, low flats and in poorly defined drainageways, the vegetation consists of scattered slash pine, cabbage palm, laurel oak, sawpalmetto, blue maidencane, pineland threeawn, panicums, and sedges. In the depressional areas, the vegetation consists of St.-Johnswort, maidencane, waxmyrtle, sand cordgrass, and various other water-tolerant weeds and grasses.

This map unit makes up about 3,389 acres, or about 1.1 percent of the survey area. It is about 24 percent EauGallie soils, 23 percent Myakka soils, 14 percent Riviera soils, and 39 percent soils of minor extent.

EauGallie soils are on the flatwoods. Typically, the surface layer is black grading to dark gray fine sand about 15 inches thick. The subsurface layer is gray fine sand to a depth of about 26 inches. The subsoil extends to a depth of about 62 inches. The upper 21 inches of the subsoil is black grading to brown fine sand that is coated with organic matter. The lower 15 inches is grayish brown or gray sandy loam. The substratum is light brownish gray loamy fine sand to a depth of 80 inches or more.

Myakka soils are on the flatwoods. Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer extends to a depth of 28 inches. The upper 15 inches of the subsurface layer is grayish brown fine sand, and the lower 8 inches is light brownish gray fine sand. The subsoil extends to a depth of 68 inches. It is black fine sand in the upper 3 inches, dark reddish brown fine sand in the next 8 inches, black fine sand in the next 11 inches, black fine sand that is partially weakly cemented in the next 8 inches, and very dark grayish brown fine sand in the lower 10 inches. The substratum to a depth of 80 inches or more is dark brown fine sand.

Riviera soils are in low hammocks, poorly defined drainageways, and broad, low sloughs. Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer, to a depth of 26 inches, is light gray and light brownish gray fine sand. The subsoil extends to a depth of 40 inches. The upper 5 inches of the subsoil is gray sandy loam that has intrusions and pockets of grayish brown and dark grayish brown fine sand. The lower 9 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray and greenish gray loamy fine sand that has a few pockets of light brownish gray fine sand.

The soils of minor extent in this map unit are Boca, Delray, Floridana, Holopaw, Malabar, Manatee, Pineda, and Pompano soils.

The soils in most areas of this map unit are in natural vegetation. These areas are used as native rangeland. Some areas are in improved pasture. One small area south of Florida State Road 60 is used for citrus.

Soils of the Sloughs, Poorly Defined Drainageways, and Hammocks

The four map units in this group consist of nearly level, poorly drained and very poorly drained soils. These soils are on broad, low flats and in sloughs, depressions, and poorly defined drainageways. These areas are interspersed with low hammocks and small scattered areas of flatwoods. Some of these soils have a loamy subsoil within a depth of 20 inches of the surface, or at a depth of 20 to 40 inches, or at a depth of more than 40 inches. Some soils are loamy throughout and have a dark colored surface layer, some have a dark sandy subsoil underlain by loamy material at a depth of less than 40 inches, or they have a loamy subsoil underlain by hard limestone at a depth of 40 inches. In some areas, the soils are sandy throughout and have a dark sandy subsoil within a depth of 20 to 30 inches of the surface. In other areas, these sandy soils do not have a dark sandy subsoil within a depth of 20 to 30 inches of the surface. These map units are mostly in the central part and eastern one-third part of Indian River County. They extend from Brevard County to St. Lucie County and also extend east of the Atlantic Coastal Ridge and are adjacent to the tidal marshes on the mainland part of the survey area. Another area of these soils is immediately west of the St. Johns Marsh and extends from Brevard County to Okeechobee County.

8. Riviera-Pineda-Wabasso

Nearly level, poorly drained soils; some have a loamy subsoil at a depth of 20 to 40 inches, and some have a dark sandy subsoil underlain by loamy material at a depth of less than 40 inches

This map unit consists of soils in broad sloughs, depressions, and poorly defined drainageways. These areas are interspersed with low hammocks and small scattered areas of flatwoods. The largest area of this map unit is in the central part of Indian River County, west of U.S. Interstate 95. These areas extend from Brevard County to St. Lucie County. Other areas of the soils in this map unit are scattered throughout the eastern one-third of the survey area, which includes a long, narrow area between the Atlantic Coastal Ridge and Ten Mile Ridge. Part of the cities of Fellsmere, Vero Lake Estates, and Fleming Grant is in this map unit.

In the areas of sloughs and poorly defined drainageways and in areas that are interspersed with depressions and low hammocks, the natural vegetation is south Florida slash pine, cabbage palm, waxmyrtle, scattered sawpalmetto, laurel oak, pineland threeawn, blue maidencane, and various sedges and grasses. In the depressional areas, the native vegetation includes blue maidencane, St.-Johnswort, pipewort, starrush, scattered cabbage palm, waxmyrtle, sedges, and other water-tolerant grasses. On the flatwoods, the native vegetation consists of slash pine, scattered cabbage palm, sawpalmetto, waxmyrtle, inkberry, pineland threeawn, bluestems, and panicums.

This map unit makes up about 78,276 acres, or about 24.6 percent of the survey area. It is about 33 percent Riviera soils, 29 percent Pineda soils, 24 percent Wabasso soils, and 14 percent soils of minor extent.

Riviera soils are in broad sloughs, poorly defined drainageways, low hammocks, and depressions. Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer extends to a depth of 26 inches. The upper 11 inches of the subsurface layer is light gray fine sand, and the lower 12 inches is light brownish gray fine sand. The subsoil extends to a depth of 40 inches. The upper 5 inches of the subsoil is gray sandy loam that has intrusions and pockets of grayish brown and dark grayish brown fine sand. The lower 9 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray and greenish gray loamy fine sand.

Pineda soils are in broad sloughs, low hammocks, and depressions. Typically, the surface layer is black fine sand about 4 inches thick. The subsurface layer, to a depth of 9 inches, is light brownish gray fine sand. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is yellow fine sand that has intrusions of yellowish brown loamy fine sand. The next 10 inches is yellow fine sand. The lower 17 inches is gray and greenish gray sandy loam. The substratum to a depth of 80 inches or more is greenish gray loamy sand. Shell fragments are in the lower 28 inches of the substratum.

Wabasso soils are on flatwoods. Typically, the surface layer is very dark gray fine sand about 7 inches thick. The subsurface layer is gray fine sand to a depth of about 24 inches. The subsoil extends to a depth of 48 inches. The upper part of the subsoil is black and very dark gray fine sand that is coated with organic matter, and the lower part is dark brown and brown sandy loam. The substratum to a depth of 80 inches or more is brown loamy fine sand.

The soils of minor extent in this map unit are Boca, Chobee, Floridana, Manatee, Oldsmar, Holopaw, Malabar, and Winder soils.

The soils in most areas of this map unit are in natural vegetation. Many areas are used for citrus and native range (fig. 6). A few areas have been developed for residential use, or are in improved pasture.

9. Winder-Riviera-Manatee

Nearly level, poorly drained and very poorly drained soils that have a loamy subsoil at a depth of 20 inches or at a depth of 20 to 40 inches; some are loamy throughout and have a dark surface layer

This map unit consists of soils in broad sloughs, depressions, and poorly defined drainageways. These areas are interspersed with low hammocks. Areas of these soils are scattered throughout the central part of Indian River County. One large area is just south of Florida State Road 60 and west of U.S. Interstate 95, adjacent to the St. Lucie County line. Other areas of the soils in this map unit are located between Ten Mile Ridge and the Atlantic Coastal Ridge in the eastern one-third of the survey area and also west of Fellsmere, adjoining St. Johns Marsh and Brevard County.

The natural vegetation in most areas of this map unit consists of south Florida slash pine, cabbage palm, waxmyrtle, laurel oak, scattered sawpalmetto, pineland threeawn, little blue maidencane, chalky bluestem, sand cord grass, sawgrass, and various sedges and grasses. In the depressional areas, the native vegetation consists of red maple, cypress, water oak, waxmyrtle, scattered cabbage palm, and an understory of ferns and water-tolerant grasses. Other vegetation in more open depressional areas includes maidencane, pickerelweed, smartweed, St.-Johnswort, and Carolina willow.

This map unit makes up about 36,412 acres, or about 11.5 percent of the survey area. It is about 54 percent Winder soils, 22 percent Riviera soils, 8 percent Manatee soils, and 16 percent soils of minor extent.

Winder soils are poorly drained and are in low hammocks, depressions, and poorly defined drainageways. Typically, the surface layer is very dark gray fine sand about 7 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 17 inches. The subsoil extends to a depth of 65 inches. The upper 6 inches of the subsoil is grayish brown sandy loam that has grayish brown loamy sand intrusions. The lower part is gray sandy loam. The substratum to a depth of 80 inches or more is greenish gray loamy sand and shell fragments.

Riviera soils are poorly drained to very poorly drained and are in broad sloughs, poorly defined drainageways, low hammocks, and depressions. Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer extends to a depth of 26 inches. The upper 11 inches of the subsurface layer is light gray fine sand, and the lower 12 inches is light brownish gray fine sand. The subsoil extends to a depth of 40 inches. The upper 5 inches of the subsoil is gray sandy loam that has intrusions and pockets of grayish brown and dark grayish brown fine sand. The lower 9 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray and greenish gray loamy fine sand.

Manatee soils are very poorly drained and are in sloughs, depressions, poorly defined drainageways, and on broad, low flats. Typically, the surface layer is black

Figure 6.—Young citrus trees planted on beds help provide good surface drainage on poorly drained soils in the Riviera-Pineda-Wabasso map unit. Insulators are used for freeze protection and for disease and insect control.

loamy fine sand about 12 inches thick. The subsoil is fine sandy loam, sandy loam, and loamy fine sand to a depth of 39 inches. The upper 10 inches of the subsoil is very dark gray, the next 9 inches is dark gray, and the lower 8 inches is dark grayish brown. The substratum extends to a depth of 80 inches or more. The upper 12 inches of the substratum is light brownish gray loamy fine sand. The lower 29 inches or more is light gray loamy fine sand and shell fragments.

The soils of minor extent in this map unit are Chobee, EauGallie, Floridana, Pineda, Oldsmar, Jupiter, and Wabasso soils.

Most areas of this map unit are used for citrus. The soils in a few areas remain in natural vegetation or have been developed for residential use.

10. Boca-Wabasso-Riviera

Nearly level, poorly drained soils; some have a loamy subsoil underlain by hard limestone at a depth of 40 inches, some have a dark sandy subsoil underlain by loamy material at a depth of less than 40 inches, and some have a loamy subsoil at a depth of 20 to 40 inches

This map unit consists of soils in sloughs and poorly defined drainageways. These areas are interspersed with low hammocks and scattered areas of flatwoods. The only area of this map unit is in the extreme east-central part of Indian River County, which is east of the Atlantic Coastal Ridge and adjacent to the tidal marshes on the mainland (see fig. 5).

If present, the natural vegetation in most areas is south Florida slash pine, cabbage palm, waxmyrtle, scattered sawpalmetto, laurel oak, pineland threeawn, blue maidencane, and various sedges and grasses. In the flatwoods, the native vegetation consists of slash pine, scattered cabbage palm, sawpalmetto, waxmyrtle, inkberry, pineland threeawn, bluestems, and panicums.

This map unit makes up about 4,223 acres, or about 1.3 percent of the survey area. It is about 34 percent Boca soils, 13 percent Wabasso soils, 10 percent Riviera soils, and 43 percent soils of minor extent.

Boca soils are on the flatwoods. Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is fine sand to a depth of about 20 inches. The upper 7 inches of the subsurface layer is grayish brown, and the lower 6 inches is brown. The subsoil is yellowish brown fine sandy loam to a depth of 24 inches. Below that is a layer of fractured limestone.

Wabasso soils are on the flatwoods. Typically, the surface layer is very dark gray fine sand about 7 inches thick. The subsurface layer is gray fine sand to a depth of about 24 inches. The subsoil extends to a depth of about 48 inches. The upper part of the subsoil is black and very dark gray fine sand that is coated with organic matter, and the lower part is dark brown and brown sandy loam. The substratum to a depth of about 80 inches or more is brown loamy fine sand.

Riviera soils are in sloughs and poorly defined drainageways. These areas are interspersed with low hammocks. Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer, to a depth of 26 inches, is light gray fine sand in the upper 11 inches, and light brownish gray fine sand in the lower 12 inches. The subsoil extends to a depth of 40 inches. The upper 5 inches of the subsoil is gray sandy loam that has intrusions and pockets of grayish brown and dark grayish brown fine sand. The lower 9 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray and greenish gray loamy fine sand.

The soils of minor extent in this map unit are Chobee, EauGallie, Jupiter, Oldsmar, Perrine Variant, Pompano, Floridana, St. Augustine, Quartzipsamments, and Arents soils.

Most areas of this map unit are used for citrus, although some large areas have been developed for residential use. A few areas remain in natural vegetation.

11. Myakka-Holopaw-Pompano

Nearly level, poorly drained soils that are sandy to a depth of more than 40 inches; some have a dark sandy subsoil at a depth of 20 to 30 inches, and some have a loamy subsoil at a depth of more than 40 inches

This map unit consists of soils on broad, low flats and in sloughs, poorly defined drainageways, and depressional areas. These areas are interspersed with slightly higher areas of flatwoods. The four areas that make up this map unit are west of St. Johns Marsh. They extend from Brevard County southward to the Okeechobee County line. These four areas are separated by major drainageways, which are Blue Cypress Creek, Padgett Branch, Fort Drum Creek, and Gum Slough. These drainageways empty into St. Johns Marsh.

The natural vegetation on the broad, low flats and in sloughs and poorly defined drainageways consists of scattered slash pine, cabbage palm, and laurel oak, waxmyrtle, maidencane, and a variety of other water-tolerant grasses and sedges. In the depressional areas, the native vegetation consists of baldcypress, red maple, waxmyrtle, Carolina willow, St.-Johnswort, maidencane, and other water-tolerant weeds and grasses. The slightly higher areas of flatwoods consists mainly of slash pine, sawpalmetto, pineland threeawn, waxmyrtle, cabbage palm, and various weeds and grasses.

This map unit makes up about 15,948 acres, or about 5 percent of the survey area. It is about 19 percent Myakka soils, 19 percent Holopaw soils, 19 percent Pompano soils, and 43 percent soils of minor extent.

Myakka soils are poorly drained and are in the slightly higher areas of flatwoods, which are interspersed throughout this map unit. Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of 28 inches. The upper 15 inches of the subsurface layer is grayish brown, and the lower 8 inches is light brownish gray. The subsoil extends to a depth of 68 inches. It is black fine sand in the upper 3 inches, dark reddish brown fine sand in the next 8 inches, black fine sand in the next 11 inches, black fine sand that is partially weakly cemented in the next 8 inches, and very dark grayish brown fine sand in the lower 10 inches. The substratum to a depth of 80 inches or more is dark brown fine sand.

Holopaw soils are poorly drained to very poorly drained and are on broad, low flats and in poorly defined drainageways and depressional areas. Typically, the surface layer is very dark gray and dark grayish brown fine sand about 12 inches thick. The subsurface layer extends to a depth of 45 inches. The upper 18 inches of the subsurface layer is pale brown fine sand, and the lower 15 inches is grayish brown fine sand. The subsoil is grayish brown sandy loam with pockets of brown fine sand that extends to a depth of about 62 inches. The substratum to a depth of 80 inches or more is olive gray loamy fine sand.

Pompano soils are poorly drained to very poorly drained and are in sloughs, poorly defined drainageways, and depressional areas. Typically, the surface layer is 16 inches thick. The upper 3 inches of the surface layer is very dark gray fine sand, and the lower 13 inches is dark grayish brown fine sand. The underlying layers are light brownish gray and grayish brown fine sand to a depth of 80 inches or more.

The soils of minor extent in this map unit are Boca, Chobee, Delray, EauGallie, Floridana, Gator, Jupiter, Immokalee, Manatee, Oldsmar, Pineda, Riviera, and Wabasso soils.

Most areas of this map unit are in improved pasture or native rangeland. Some areas that have been drained and cleared for cropland or pasture have since been left idle and have reverted back to various types of wetlands.

Soils of the Freshwater Swamps and Marshes

The two map units in this group consist of nearly level, poorly drained to very poorly drained soils. These soils are in freshwater swamps and marshes, on broad, low flats, and in poorly defined drainageways and depressions that are adjacent to or that drain into the western edge of the St. Johns Marsh. Some of these soils are organic throughout, some have a moderately thick organic layer underlain by a sandy clay loam subsoil, and some have a thin organic surface layer underlain by a loamy subsoil within a depth of 20 to 40 inches of the surface. Also, some of these soils have a dark surface layer that is 10 inches or more thick and have a loamy subsoil at a depth of 20 to 40 inches or at a depth of more than 40 inches. Some of these soils do not have a dark surface layer that is 10 inches or more thick but have a loamy subsoil at a depth of 20 to 40 inches or at a depth of more than 40 inches. These soils are associated with St. Johns Marsh and the major drainageways that empty into the marsh. These map units are in the western part of Indian River County and extend from Brevard County to St. Lucie County.

12. Terra Ceia-Gator-Canova

Nearly level, very poorly drained soils; some are organic throughout, some have a moderately thick organic layer underlain by a sandy clay loam subsoil, and some have a thin organic surface layer underlain by a loamy subsoil at a depth of 20 to 40 inches

This map unit consists of nearly level, very poorly drained soils in freshwater swamps and marshes (fig. 7). The one area of this map unit is the St. Johns Marsh in the western part of Indian River County. The soils in this map unit extend from Brevard County to St. Lucie County.

The natural vegetation consists of a dense swamp growth of red maple, redbay, cypress, Carolina willow, primrose willow, waxmyrtle, pickerelweed, sawgrass,

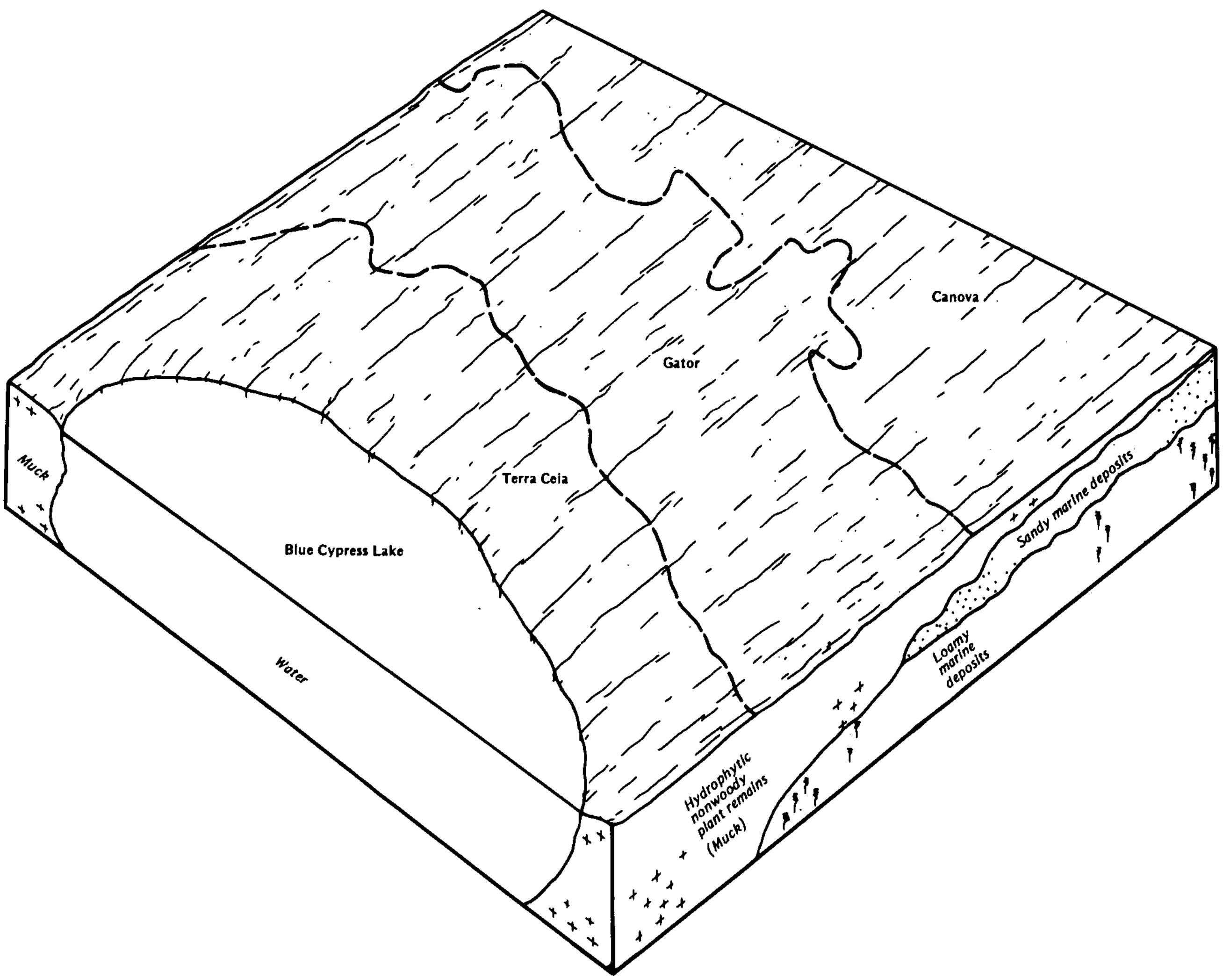


Figure 7.—Typical pattern of soils and parent material in the Terra Ceia-Gator-Canova map unit.

cattail, buttonbush, arrowhead, ferns, cutgrass, and maidencane.

This map unit makes up about 60,513 acres, or about 19 percent of the survey area. It is about 58 percent Terra Ceia soils, 21 percent Gator soils, 18 percent Canova soils, and 3 percent soils of minor extent.

Typically, Terra Ceia soils have a surface layer that is black muck about 38 inches thick. Below that is very dark grayish brown muck to a depth of 60 inches or more.

Typically, Gator soils have a surface layer that is very dark brown muck about 26 inches thick. The next layer is very dark gray sandy loam to a depth of 30 inches. Underlying that to a depth of 40 inches is dark gray sandy clay loam. The next layer is greenish gray sandy clay loam and sandy loam with calcium carbonate accumulations to a depth of about 62 inches. Below that to a depth of 80 inches or more is greenish gray loamy sand.

Canova soils typically have a surface layer of black and very dark brown muck about 12 inches thick. The next layer is black sand to a depth of 13 inches. Below that, to a depth of 24 inches, is gray to grayish brown sand. The subsoil extends to a depth of about 40 inches. The upper 10 inches of the subsoil is grayish brown sandy clay loam that has common coarse tongues of grayish brown sand. The lower 6 inches is gray sandy clay loam. The substratum to a depth of 80 inches or more is greenish gray sandy clay loam and sandy loam with calcium carbonate concretions and accumulations.

The soils of minor extent in this map unit are Chobee, Delray, Floridana, Riviera, and Winder soils.

Most areas of this map unit are in natural vegetation. Some areas have been drained and cleared and are used for improved pasture or for corn, sorghum, and other crops. Also, a small area that has a thin surface layer of muck is used for citrus production.

13. Floridana-Delray-Holopaw

Nearly level, poorly drained to very poorly drained soils; some have a loamy subsoil at a depth of 20 to 40 inches, some have a loamy subsoil at a depth of more than 40 inches, and some have a dark surface layer that is 10 inches or more thick

This map unit consists of soils on broad, low flats and in poorly defined drainageways and depressions that are adjacent to or that drain into the western edge of St. Johns Marsh. Three areas make up this map unit and extend from Brevard County southward to the Okeechobee County line. Branches extend westward from these areas by following the watercourses of Blue Cypress Creek, Padgett Branch, and Fort Drum Creek.

The natural vegetation on the broad, low flats and in the poorly defined drainageways consists of scattered slash pine, laurel oak, cabbage palm, scattered sawpalmetto, waxmyrtle, maidencane, sedges, and other water-tolerant grasses. In the depressional areas, the native vegetation consists of red maple, cypress, water oak, redbay, waxmyrtle, Carolina willow, and an understory of ferns and water-tolerant grasses. Other vegetation in more open depressional areas includes maidencane, pickerelweed, arrowhead, sand cordgrass, St.-Johnswort, primrose willow, ferns, and cattail.

This map unit makes up about 9,009 acres, or about 2.8 percent of the survey area. It is about 25 percent Floridana soils, 25 percent Delray soils, 15 percent Holopaw soils, and 35 percent soils of minor extent.

Floridana soils are very poorly drained and are in depressional areas. These soils are predominantly throughout the major watercourses or drainageways that empty into St. Johns Marsh. Typically, the surface layer is about 14 inches thick. The upper 8 inches of the surface layer is black sand. The lower 6 inches is light brownish gray sand. The subsoil is gray sandy clay loam to a depth of 37 inches. The substratum is gray sandy loam to a depth of 53 inches, dark gray sandy loam to a depth of 68 inches, and light gray sandy clay loam to a depth of 80 inches or more.

Delray soils are very poorly drained. These soils are in depressional areas along the extreme western edge of St. Johns Marsh. They intermittently are throughout the major watercourses or drainageways that empty into the marsh. Typically, the surface layer is about 21 inches thick. The upper 3 inches of the surface layer is black muck, the next 14 inches is black fine sand, and the lower 4 inches is very dark grayish brown sand. The subsurface layer, to a depth of 45 inches, is very dark grayish brown and grayish brown sand. The subsoil is dark grayish brown sandy clay loam to a depth of about 52 inches. The substratum to a depth of 80 inches or more is gray sandy loam.

Holopaw soils are poorly drained to very poorly drained and are on broad, low flats and in poorly defined drainageways adjacent to the western edge of St. Johns Marsh. These soils are also in depressional areas throughout the major watercourses or drainageways that empty into the marsh. Typically, the surface layer is very dark gray and dark grayish brown fine sand about 12 inches thick. The subsurface layer extends to a depth of about 45 inches. The upper 18 inches of the subsurface layer is pale brown fine sand, and the lower 15 inches is grayish brown fine sand. The subsoil is grayish brown sandy loam that has pockets of brown fine sand that extends to a depth of about 62 inches. The substratum to a depth of 80 inches or more is olive gray loamy fine sand.

The soils of minor extent in this map unit are Chobee, Gator, Manatee, Oldsmar, Pompano, and Samsula soils.

Most areas of this map unit are in natural vegetation. Some areas that were drained and cleared for cropland or pasture have since been left idle, and these areas have reverted back to various types of wetlands. Some areas remain as improved pasture.

Detailed Soil Map Units

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

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A number identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil 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 or of the underlying material, 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 or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, 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, Pineda fine sand, depressional, is one of several phases in the Pineda series.

Some map units are made up of two or more major soils. These map units are called soil complexes.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Boca-Urban land complex is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of 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.

1—Canaveral fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and somewhat poorly drained to moderately well drained. It is on low, dunelike ridges and side slopes bordering sloughs and mangrove swamps. The mapped areas range from 20 to about 300 acres. Slopes are smooth to convex.

Typically, the surface layer is about 5 inches thick. It is dark gray grading to gray fine sand mixed with about 10 percent sand-size shell fragments. The underlying layers are light gray, light yellowish brown, very pale brown, and light brownish gray fine sand mixed with about 10 to 40 percent sand-size, multicolored shell fragments to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Quartzipsamments, St. Augustine, Palm Beach, and Captiva soils. Also included are soils that are similar to Canaveral soil but have a thicker, dark colored surface layer or have steeper slopes, and also some soils that are similar but have a thin discontinuous ledge of limestone at various depths. The included soils make up about 15 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of 10 to 40 inches of the surface for 2 to 6 months and within a depth of 60 inches for most of the remainder of the year. Permeability is very rapid, and the available water capacity is very low. Natural fertility and the organic matter content are very low.

Native vegetation consists of sand live oak, cabbage palm, scattered sawpalmetto, southern magnolia, and scattered slash pine. The understory consists of inkberry, pineland threeawn, and various weeds and grasses. In many areas are Australian pine, cabbage palm, and a sparse ground cover of various grasses and sedges.

Under natural conditions, this Canaveral soil is not suited to cultivated crops or improved pasture grasses. Low available water capacity and low natural fertility severely reduce the variety of grasses that can be grown on this soil.

Under natural conditions, this soil is poorly suited to citrus. However, if intensive management practices are used, including irrigation and regular applications of fertilizer, this soil has fair suitability for citrus. A close-growing cover crop between trees protects the soil from blowing.

This soil generally is not used for rangeland or forest land. Canaveral soil is in the South Florida Coastal Strand ecological plant community.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to help overcome excessive wetness. The sandy surface layer should be stabilized for recreational uses. Water control measures and sealing and lining of trench sanitary landfills and sewage lagoons with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored. Native plants are best suited to landscaping because of the droughtiness of the soil.

This Canaveral soil is in capability subclass VIs.

2—Chobee loamy fine sand. This soil is nearly level and very poorly drained. It is in depressions and poorly defined drainageways and on broad, low flats. The mapped areas range from 5 to 10 acres in isolated depressions and from 5 to 100 acres or more in other areas. Slopes are smooth to concave. They are dominantly less than 1 percent but range to 2 percent.

Typically, the surface layer is black loamy fine sand about 5 inches thick. The subsoil extends to a depth of about 46 inches. The upper 12 inches of the subsoil is black sandy loam, the next 11 inches is very dark gray sandy clay loam, the next 7 inches is dark grayish brown sandy loam, and the lower 11 inches is gray sandy loam. The substratum extends to a depth of 80 inches or more. The upper 8 inches of the substratum is gray loamy fine sand, and the lower 26 inches or more is greenish gray loamy fine sand.

Included with this soil in mapping are small areas of Floridana, Manatee, and Winder soils. Also included are small areas of soils that are similar to Chobee soil but have up to 4 inches of organic material on the surface. Also there are a few areas of soils that have a limestone ledge below the subsoil at a depth of 20 to 40 inches or more and have a thin, soft marl layer in the upper part of the subsoil. The included soils make up less than 20 percent of the map unit.

The water table is within a depth of 10 inches of the surface for more than 6 months during most years. It is above the surface for short periods after heavy rainfall and at a depth of 10 to 30 inches for short periods during dry seasons. The available water capacity is medium throughout. Permeability is moderate in the surface layer, moderately slow to slow in the subsoil, and moderate in the substratum.

A large part of this soil is used for citrus, but some areas are being used for improved pasture. The natural vegetation in the depressional areas consists of red maple, cypress, water oak, waxmyrtle, scattered cabbage palm, and an understory of ferns and water-tolerant grasses. On other open marsh areas are maidencane, pickerelweed, smartweed, Carolina willow, and patches of sawgrass.

Under natural conditions, this Chobee soil is too wet for cultivated crops, citrus, and improved pasture. Management practices needed are bedding, crop rotation, and regular applications of fertilizer. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter.

The suitability of this soil for citrus is good if a water control system that maintains good soil aeration to a depth of about 4 feet is provided. Planting trees in beds lowers the effective depth of the water table. A close-growing cover crop should be maintained between the tree rows to help control erosion. Regular applications of fertilizer are needed.

The suitability of this soil for improved pasture grasses is good. A water control system is needed for rapid removal of excess surface water. If adequately fertilized, high yields of pangolagrass, bahiagrass, and white clover can be obtained. Grazing should be controlled to maintain plant vigor.

The potential productivity of this soil for pine trees is high, but a water control system is needed to remove excessive surface water if the production potential is to be realized. South Florida slash pine is better adapted to this soil than other trees. Equipment limitations and seedling mortality are the main concerns in management.

This soil is well suited to desirable range plant production. The dominant forage consists of blue maidencane, chalky bluestem, and blue joint panicum. Management practices should include deferred grazing. Chobee soil is in the Slough range site.

This soil has severe limitations for sewage lagoons, sanitary landfills, and shallow excavations. Water control measures are needed to overcome excessive wetness. This soil has severe limitations for dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Limitations are also severe for septic tank absorption fields. Installing water control measures, adding fill material, and mounding the septic tank absorption field can help overcome excessive wetness.

This Chobee soil is in capability subclass IIIw.

3—EauGallie fine sand. This soil is deep, nearly level, and poorly drained. It is on broad flatwoods. The mapped areas range from 20 to 700 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black grading to dark gray fine sand about 15 inches thick. The subsurface layer is gray fine sand to a depth of about 26 inches. The subsoil extends to a depth of about 62 inches. The upper 21 inches of the subsoil is black, very dark gray, dark reddish brown, dark brown, brown fine sand. The lower 15 inches is grayish brown or gray sandy loam. The substratum is light brownish gray loamy fine sand to a depth of about 80 inches.

Included with this soil in mapping are small areas of Myakka, Pepper, Wabasso, and Oldsmar soils. Also included are soils in scattered small wet depressions. The included soils make up less than 15 percent of the map unit.

In most years, the water table is at a depth of less than 10 inches of the surface for 2 to 4 months during the wet season and within a depth of 40 inches for more than 6 months. Permeability is rapid in the surface and subsurface layers and moderate to moderately rapid in the subsoil and substratum. The available water capacity is very low in the surface and subsurface layers, low to medium in the subsoil, and low in the substratum. Natural fertility is low.

Most areas of this soil are in natural vegetation. However, in areas that have been cleared, the dominant use is for citrus. The natural vegetation is south Florida slash pine, sawpalmetto, wiregrass, cabbage palm, waxmyrtle, bluestems, panicums, and various other grasses.

Citrus trees are well suited to this soil if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. A suitable cover crop should be maintained between tree rows. Regular applications of fertilizer and lime are needed.

This EauGallie soil has very severe limitations for cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil improving measures used, this soil has fair suitability for many vegetable crops. A water control system is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil has good suitability for improved pasture. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of lime and fertilizers are needed. Overgrazing should be prevented.

The potential productivity of the soil for pine trees is moderately high. Equipment limitations, seedling mortality, and plant competition are the main concerns in management. South Florida slash pine is the preferred tree to plant.

This soil is moderately suited to desirable range plant production. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. EauGallie soil is in the South Florida Flatwoods range site.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of slow permeability. Sealing or lining of sewage lagoons with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This EauGallie soil is in capability subclass IVw.

4—Immokalee fine sand. This nearly level, poorly drained soil is on broad flatwoods. The mapped areas range from 5 to 300 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 5 inches thick. The subsurface layer is light gray fine sand to a depth of 35 inches. The subsoil is very dark gray fine sand to a depth of about 55 inches. Below that to a depth of 80 inches or more is brown fine sand.

Included with this soil in mapping are small areas of Myakka, Oldsmar, Pomello, Pompano, and Myakka depressional soils. Also included are areas of soils that are similar to Immokalee soil but have a subsoil that is more than 28 inches thick. The included soils make up 15 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of 10 to 40 inches for more than 6 months and at a depth of less than 10 inches for 1 to 3 months during the wet season. Permeability is rapid in the surface and subsurface layers and underlying material, and it is moderate in the subsoil. The available water capacity is very low in the surface and subsurface layers and underlying material, and it is moderate in the subsoil. Natural fertility and the organic matter content are low.

Most areas of this soil are in natural vegetation consisting of south Florida slash pine and scattered live oak. The understory consists of sawpalmetto, running oak, inkberry, fetterbush, waxmyrtle, pineland threeawn, bluestems, panicums, and various other grasses.

Suitability of this soil for citrus trees is good if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. Regular applications of lime and fertilizer are needed.

Under natural conditions, this Immokalee soil is poorly suited to cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil improving measures are used, this soil has fair suitability for many vegetable crops. A water control system is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Other good management practices are seedbed preparation, including bedding of rows, and regular application of fertilizer and lime.

This soil has good suitability for improved pasture. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of lime and fertilizers are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. Equipment limitations, seedling mortality, and plant competition are the main concerns in management. South Florida slash pine is the preferred tree to plant.

This soil is moderately suited to desirable range plant production. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, south Florida bluestem, and chalky bluestem. Management practices should include deferred grazing and brush control. Immokalee soil is in the South Florida Flatwoods range site.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. Sealing or lining of sewage lagoons with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Immokalee soil is in capability subclass IVw.

5—Myakka fine sand. This nearly level, poorly drained soil is on broad flatwoods. The mapped areas range from 20 to 350 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 28 inches. The upper 15 inches of the subsurface layer is grayish brown, and the lower 8 inches is light brownish gray. The subsoil extends to a depth of about 68 inches. It is black fine sand in the upper 3 inches of the subsoil, dark reddish brown fine sand in the next 8 inches, black fine sand in the next 11 inches, black fine sand that is partially weakly cemented in the next 8 inches, and very dark grayish brown fine sand in the lower 10 inches. The substratum to a depth of 80 inches or more is dark brown fine sand.

Included with this soil in mapping are small areas of EauGallie, Immokalee, Pompano, Riviera, and Myakka depressional soils. Also included are areas of soils that are similar to Myakka soil but have a thicker, dark colored surface layer, some soils in scattered small wet depressions, and also soils that are similar to Myakka soil but have a layer of shell fragments or limestone at a depth of more than 60 inches. The included soils make up about 15 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of 10 to 40 inches for more than 6 months and at a depth of less than 10 inches for 1 to 3 months during the wet season. Permeability is rapid in the surface and subsurface layers and substratum, and it is moderate to moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers and substratum, and it is moderate in the subsoil. Natural fertility and organic matter content are low.

Most areas of this soil are in natural vegetation consisting of south Florida slash pine. The understory consists of sawpalmetto, running oak, inkberry, fetterbush, waxmyrtle, pineland threeawn, bluestems, panicums, and other grasses.

Suitability of this soil for citrus trees is good if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. A suitable cover crop should be maintained between tree rows to control erosion and protect the soil from blowing. Regular applications of lime and fertilizer are needed.

This Myakka soil has very severe limitations to cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil improving measures are used, it has a fair suitability for many vegetable crops. A water control system generally is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil has a good suitability for improved pasture. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures are normally needed to remove the excess surface water after heavy rains. Regular applications of lime and fertilizers are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. Equipment limitations, seedling mortality, and plant competition are the main concerns in management. South Florida slash pine is the preferred tree to plant.

This soil is moderately suited to desirable range plant production. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. Myakka soil is in the South Florida Flatwoods range site.

This soil has severe limitations for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoons. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons can reduce excessive seepage. This soil has severe limitations for septic tank absorption fields, recreational uses, trench sanitary landfills, and shallow excavations. Septic tank absorption fields may need to be enlarged because the permeability of this soil is lower than is acceptable. Water control measures help overcome excessive wetness. The sandy surface layer should be stabilized for recreational uses. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Side walls of shallow excavations should be shored.

This Myakka soil is in capability subclass IVw.

6—Oldsmar fine sand. This soil is deep, nearly level, and poorly drained. It is on broad flatwoods. The mapped areas range from 20 to 300 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 32 inches. The subsoil extends to a depth of about 62 inches. The upper 18 inches of the subsoil is black, dark reddish brown, and dark brown fine sand, and the lower 12 inches is grayish brown sandy loam. The substratum is light brownish gray loamy fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of EauGallie, Holopaw, Malabar, and Wabasso soils. Also included are soils in scattered small wet depressions. The included soils make up less than 15 percent of the map unit.

In most years, the water table is at a depth of less than 10 inches of the surface for 2 to 4 months during the wet season and within a depth of 40 inches for more than 6 months. Permeability is rapid in the surface and subsurface layers, moderate to moderately rapid in the upper part of the subsoil, and slow in the lower part. The available water capacity is very low in the surface and subsurface layers and low to medium in the subsoil. Natural fertility is low.

Most areas of this soil are in natural vegetation. However, in areas that have been cleared, the dominant use is for citrus. The natural vegetation consists of south Florida slash pine, sawpalmetto, inkberry, rusty lyonia, blackroot, pennyroyal, pineland threeawn, chalky bluestem, panicum, and various other weeds and grasses.

Suitability of this soil for citrus trees is good if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. A suitable cover crop should be maintained between tree rows to control erosion and protect the soil from blowing. Regular applications of fertilizers and lime are needed.

This Oldsmar soil has very severe limitations for cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil improving measures are used, this soil has fair suitability for many vegetable crops. A water control system is needed to remove excess water in wet seasons and provide for subsurface irrigation in dry seasons. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil has good suitability for improved pasture. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of lime and fertilizers are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderately high. Equipment limitations, seedling mortality, and plant competition are the main concerns in management. South Florida slash pine is the preferred tree to plant.

This soil is moderately suited to desirable range plant production. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. Oldsmar soil is in the South Florida Flatwoods range site.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of slow permeability. Sealing or lining of sewage lagoons can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Oldsmar soil is in capability subclass IVw.

7—Palm Beach sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and well drained to excessively drained. It is on dunelike ridges that are parallel to the coastline. The acreage mapped is in one linear unit that varies from 100 feet in width to more than 1,600 feet. This map unit is adjacent to the beach. Slopes are mainly 0 to 5 percent but can range from 0 to 8 percent (fig. 8).

Figure 8.—A dune crossover on Palm Beach sand provides beach access but primarily serves as a form of erosion control to insure dune stabilization.

Typically, the surface layer is very dark gray sand about 4 inches thick. The underlying material to a depth of 65 inches is sand that has stratified layers of shell fragments throughout. The upper 16 inches of the underlying material is grayish brown sand, and the lower 45 inches is pale brown sand. Below that to a depth of 80 inches or more is very pale brown sand.

Included with this soil in mapping are small areas of Canaveral soils. Also included are areas of soils that have a thick, dark surface layer. The included soils make up less than 10 percent of the map unit.

This soil is low in natural fertility and organic matter content. It is moderately alkaline throughout. Permeability is very rapid, and the available water capacity is very low. This soil is droughty. It has no water table within a depth of 80 inches.

A large part of the acreage is in natural vegetation. The natural vegetation consists of cabbage palm, scrub oak, sawpalmetto, seagrape, and pricklypear cacti (fig. 9).

This Palm Beach soil is not suited to cropland, citrus, or improved pasture because of droughtiness and low fertility. Some areas of this soil are used for sites for buildings or recreation use.

This soil generally is not used for woodland or rangeland. Palm Beach soil is in the South Florida Coastal Strand ecological plant community.

This soil has slight limitations for septic tank absorption fields, dwellings with or without basements, and local roads and streets. No corrective measures are needed. Land shaping may be needed on the more sloping areas. Limitations are severe for recreational uses, sanitary landfills, sewage lagoons, and shallow excavations. The sandy surface layer must be stabilized for recreational uses, and land shaping may be needed on the more sloping areas. Sealing or lining of sanitary landfills and sewage lagoons with impervious soil material generally reduces excessive seepage. Shoring of sidewalls for shallow excavations is needed.

This Palm Beach soil is in capability subclass VIIs.

8—Paola sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and excessively drained. It is on the Atlantic Coastal Ridge. The mapped areas range from about 10 to 100 acres. Slopes are smooth to convex.

Typically, the surface layer is dark gray sand about 2 inches thick. The subsurface layer is grayish brown sand to a depth of about 9 inches. Below that is yellowish brown and strong brown sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Archbold, Astatula, Pomello, Satellite, and St. Lucie soils. Also included are areas of soils that are similar to Paola soil but have a thicker subsurface layer. The included soils make up less than 20 percent of the map unit.

The water table is a depth of more than 6 feet throughout the year. Permeability is very rapid, and the available water capacity is very low throughout. Natural fertility and the organic matter content are very low.

Most areas of this soil remain in native vegetation consisting of sand pine, scrub live oak, rosemary, sawpalmetto, Chapman oak, goldleaf goldaster, pricklypear cacti, mosses, and lichens. Scrub hickory trees are in some areas.

This Paola soil is not suited to cultivated crops, citrus, or improved pasture. Droughtiness and low natural fertility are the main limitations. Suitability for citrus is poor. Citrus production is only fair if intensive management practices are used. Management practices should include irrigation and regular applications of fertilizer and lime. A close-growing cover crop must be maintained between tree rows to protect the soil from blowing.

The potential productivity for pine trees is low. Equipment limitations and seedling mortality are the main concerns in management. Sand pine is the best tree to plant.

This soil is poorly suited to desirable range plant production. The vegetative community consists of a dense, woody understory of sawpalmetto, Florida rosemary, scrub oak, indiangrass, creeping bluestem, beaked panicums, and perennial legumes. Although this site is seldom grazed by livestock, it does furnish winter

Figure 9.—An area of native vegetation on Palm Beach sand on high dunelike ridges on the barrier island along the Atlantic coast.

protection. Paola soil is in the Sand Pine Scrub range site.

This soil has slight limitations for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed, but the proximity to a stream or canal should be considered when installing a septic tank absorption field to prevent lateral seepage and pollution. This soil has slight limitations for small commercial buildings. Land shaping may be needed on the more sloping soils. This soil has severe limitations for recreational uses, trench sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for recreational uses, and land shaping may be needed on the more sloping soils. Sealing or lining of trench sanitary landfills with impervious soil material generally reduces excessive seepage. Sidewalls of shallow excavations should be shored. This soil has severe limitations for sewage lagoons. Sealing or lining of sewage lagoons with impervious soil material can reduce excessive seepage.

This Paola soil is in capability subclass VIs.

9—Pepper sand. This soil is deep, nearly level, and poorly drained. It is on broad flatwoods. The mapped areas range from 20 to 400 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is 8 inches thick. The upper 2 inches of the surface layer is very dark gray sand, and the lower 6 inches is dark gray sand. The subsurface layer is gray sand to a depth of about 22 inches. The subsoil extends to a depth of 60 inches or more. It is black noncemented sand in the upper 5 inches of the subsoil, black strongly cemented sand in the next 5 inches, dark brown sand in the next 7 inches, dark grayish brown sand in the next 8 inches, and grayish brown sandy loam in the lower 13 inches or more.

Included with this soil in mapping are small areas of EauGallie, Malabar, Myakka, Oldsmar, and Wabasso soils. Also included are a few areas of soils that are not weakly cemented and also a few areas of soils that have only fragments of weakly cemented spodic bodies. The included soils make up less than 20 percent of the map unit.

In most years, the water table is at a depth of less than 10 inches of the surface for 2 to 4 months during the wet season and within a depth of 40 inches for more than 6 months. Permeability is rapid in the surface and subsurface layers and slow to very slow in the subsoil. The available water capacity is very low in the surface and subsurface layers and low to medium in the subsoil. Natural fertility and the organic matter content are low.

Most areas of this soil are in natural vegetation. The natural vegetation consists of south Florida slash pine, sawpalmetto, running oak, inkberry, waxmyrtle, fetterbush, pineland threeawn, chalky bluestem, panicums, and various other weeds and grasses.

The suitability of this soil for citrus trees is good if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. A suitable cover crop should be maintained between rows to control erosion and protect the soil from blowing. Regular applications of fertilizer and lime are needed.

This Pepper soil is poorly suited to cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil improving measures are used, this soil is moderately well suited to many vegetable crops. A water control system is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil has good suitability for improved pasture. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of lime and fertilizers are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderately high. Equipment limitations, seedling mortality, and plant competition are the main concerns in management. South Florida slash pine is the preferred tree to plant.

This soil is moderately suited to desirable range plant production. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, south Florida bluestem, and chalky bluestem. Management practices should include deferred grazing and brush control. Pepper soil is in the South Florida Flatwoods range site.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of slow permeability. Sealing or lining of sewage lagoons can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Pepper soil is in capability subclass IVw.

10—Riviera fine sand. This soil is nearly level and poorly drained. It is on low hammocks and in poorly defined drainageways and broad, low sloughs. The mapped areas range from 20 to 50 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer is 23 inches thick. The upper 11 inches of the subsurface layer is light gray fine sand, and the lower 12 inches is light brownish gray fine sand. The subsoil extends to a depth of 40 inches. The upper 5 inches of the subsoil is gray sandy loam that has intrusions and pockets of grayish brown and dark grayish brown fine sand. The lower 9 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray and greenish gray loamy fine sand that has a few pockets of light brownish gray fine sand.

Included with this soil in mapping are small areas of Holopaw, Floridana, Manatee, Oldsmar, Pineda, Wabasso, and Winder soils. Also included are areas of soils that have a weakly stained layer of organic material above the subsoil and extending into it and also other areas of soils that have small fragments or nodules of iron cemented sandstone or calcareous material at a depth of 10 to 30 inches. The included soils make up less than 15 percent of the map unit.

The water table is within a depth of 10 inches of the surface for 1 to 6 months and between a depth of 10 to 40 inches for more than 6 months. It recedes to a depth of more than 40 inches during extended dry periods. The water table is above the surface for short periods after heavy rainfall. The available water capacity is very low in the surface and subsurface layers, low in the upper part of the subsoil and moderate in the lower part, and low in the substratum. Permeability is rapid in the surface and subsurface layers, slow to very slow in the subsoil, and moderately rapid in the substratum. Natural fertility and the organic matter content are low.

A large part of the acreage of this soil has been cleared and is planted to citrus (fig. 10). Natural vegetation consists of scattered slash pine, cabbage palm, waxmyrtle, scattered palmetto, laurel oak, blue maidencane, pineland threeawn, creeping bluestem, south Florida bluestem, sand cordgrass, low panicums, and various weeds and grasses.

Under natural conditions, this Riviera soil is poorly suited to cultivated crops. However, it is fairly suited to vegetable crops if a water control system is installed to remove excess water rapidly and provide for subsurface irrigation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crop.

Suitability of this soil for citrus trees is good if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover

Figure 10.—These citrus trees planted on beds have a close-growing cover crop to protect the soil from blowing.

crop between tree rows protects the soil from blowing. Regular applications of fertilizers should be applied.

This soil has good suitability for pasture and hay crops. Pangolagrass, improved bahiagrass, and clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer, and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary to remove excess surface water. Equipment limitations and seedling mortality are the main concerns in management.

This soil is highly suited to desirable range plant production. The dominant forage is creeping bluestem, chalky bluestem, and blue maidencane. Management practices should include deferred grazing and brush control. Riviera soil is in the Cabbage Palm Flatwoods range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material generally reduces excessive seepage. Mounding of the septic tank absorption field can help overcome excessive wetness. The sandy surface layer should be stabilized for recreational uses. Sidewalls of shallow excavations should be shored.

This Riviera soil is in capability subclass IIIw.

11—St. Lucie sand, 0 to 8 percent slopes. This soil is deep, nearly level to sloping, and excessively drained. It is on the Atlantic Coastal Ridge and other elevated knolls on the flatwoods. The mapped areas range from about 20 to 200 acres. Slopes generally are uniform.

Typically, the surface layer is gray sand about 3 inches thick. The underlying material is white sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Archbold, Astatula, Paola, Pomello, and Satellite soils. Also included are small areas of soils that are similar to St. Lucie soil but have a brownish yellow fine sand layer at a depth of 70 inches or more. Because of the excavation of St. Lucie soil for fill material, the soils in these areas have short, steep slopes that range from 20 to 40 percent. The included soils make up less than 15 percent of the map unit.

The water table is at a depth of more than 72 inches. The available water capacity is very low, and permeability is very rapid. Natural fertility and the organic matter content are very low.

Most areas of this soil are in native vegetation consisting of sand pine, scrub and sand live oak, sawpalmetto, Florida rosemary, pricklypear cacti, goldleaf goldaster, lichens, and deer moss. Pineland threeawn and bluestems are the most common native grasses, but these grasses can be quite sparse because of the droughty nature of the soil.

Under natural conditions, this soil is not suited to cultivated crops, citrus, or improved pasture because it is very droughty and has low natural fertility. Response to fertilizers is low. Irrigation water moves through the soil rapidly, and little moisture is retained for plant use.

The potential productivity for pine trees is low. Equipment limitations and seedling mortality are the main concerns in management. Sand pine is the preferred tree to plant.

This soil is poorly suited to desirable range plant production. The vegetative community consists of a dense, woody understory of sawpalmetto, Florida rosemary, scrub oak, indiangrass, creeping bluestem, beaked panicums, and perennial legumes. Although this site is seldom grazed by livestock, it does furnish winter protection. St. Lucie soil is in the Sand Pine Scrub range site.

This soil has slight limitations to septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed, although the proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and pollution. This soil has slight limitations for small commercial buildings. Land shaping may be needed on the more sloping areas. This soil has severe limitations for recreational uses, trench sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for recreational uses, and land shaping may be needed on the more sloping areas. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls for shallow excavations should be shored. This soil has severe limitations for sewage lagoons. Sealing or lining of sewage lagoons with impervious soil material can reduce excessive seepage.

This St. Lucie soil is in capability subclass VIIs.

12—Archbold sand, 0 to 5 percent slopes. This soil is nearly level to sloping and moderately well drained. It is on the Atlantic Coastal Ridge and other elevated knolls on the flatwoods. The mapped areas range from 20 to 200 acres. Slopes are smooth to convex.

Typically, the surface layer is gray sand about 2 inches thick. The underlying material extends to a depth of more than 80 inches. The upper 36 inches of the underlying material is white sand, the next 13 inches is light gray sand, and the lower 29 inches or more is gray sand.

Included with this soil in mapping are small areas of Astatula, Jonathan, Orsino, Pomello, and Satellite soils. The included soils make up less than 15 percent of the map unit.

The water table is at a depth of 40 to 60 inches for more than 6 months during most years, between a depth of 24 to 40 inches for about 1 to 4 months during the wet season, and at a depth of more than 80 inches during droughty periods. Permeability is very rapid throughout. The available water capacity is very low. Natural fertility and the organic matter content are very low.

Most areas of this soil remain in natural vegetation. The natural vegetation consists of slash pine, sand pine, sawpalmetto, scrub oak, fetterbush, running oak, turkey oak, longleaf pine, indiangrass, broomsedge bluestem and other bluestem species, and pineland threeawn.

In its natural state, this Archbold soil is poorly suited to cultivated crops. Citrus is fairly well suited if good management practices are used. Management practices include irrigation and regular applications of fertilizer and lime. A close-growing cover crop between trees protects the soil from blowing.

This soil has poor suitability for improved pasture grasses. Intensive management practices are needed to overcome soil limitations, which include droughtiness and low fertility. Bahiagrass is better adapted to this soil than most other grasses. Clover is not suited to this soil.

The potential productivity of this soil for pine trees is moderately high. Seedling mortality and equipment limitations are the main concerns in management. South Florida slash pine and sand pine are the preferred trees to plant.

This soil is poorly suited to desirable range plant production. The vegetative community consists of a dense, woody understory of sawpalmetto, Florida rosemary, scrub oak, indiangrass, creeping bluestem, beaked panicums, perennial legumes, and various other grasses. Although this site is seldom grazed by livestock, it does furnish winter protection. Archbold soil is in the Sand Pine Scrub range site.

This soil is well suited to dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed. These soils have severe limitations for septic tank absorption fields and recreational uses. Water control measures are needed for septic tank absorption fields. The sandy surface layer should be stabilized for recreational uses. Sidewalls of shallow excavations should be shored. These soils have severe limitations for trench sanitary landfills and sewage lagoons. Sealing or lining of trench sanitary landfills and sewage lagoons with impervious soil material can reduce excessive seepage. Water control measures are needed for trench sanitary landfills.

This Archbold soil is in capability subclass VIs.

13—Wabasso fine sand. This soil is nearly level and poorly drained. It is on broad flatwoods. Individual mapped areas are 20 to 300 acres. Slopes are 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 7 inches thick. The subsurface layer is gray fine sand to a depth of about 24 inches. The subsoil extends to a depth of about 48 inches. The upper 8 inches of the subsoil is black fine sand that is coated with colloidal organic matter. The next 3 inches is very dark gray fine sand. The next 6 inches is dark brown sandy loam. The lower 7 inches is brown fine sandy loam. The substratum to a depth of about 80 inches or more is brown loamy fine sand.

Included with this soil in mapping are small areas of Boca, EauGallie, Oldsmar, Riviera, and Winder soils. Also included are areas of soils that are similar to Wabasso soil but have a thicker, dark colored surface layer and also some areas of soils in scattered small wet depressions. The included soils make up less than 15 percent of the map unit.

The water table is at a depth of 10 to 40 inches for more than 6 months in most years and at a depth of less than 10 inches for 1 to 2 months. The available water capacity is very low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. Permeability is rapid in the surface and subsurface layers, moderate in the sandy part of the subsoil, and slow or very slow in the loamy part. Natural fertility is low.

Most areas of this soil are in citrus, although some areas remain in natural vegetation. The natural vegetation consists of slash pine, scattered cabbage palm, sawpalmetto, waxmyrtle, fetterbush, inkberry, pineland threeawn, bluestems, panicums, and other grasses.

The suitability of this soil for citrus trees is good if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. A suitable cover crop should be maintained between tree rows to control erosion and protect the soil from blowing. Regular applications of lime and fertilizer are needed.

This Wabasso soil has very severe limitations for cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil improving measures are used, this soil has fair suitability for many vegetable crops. A water control system is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil has good suitability for pasture. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of lime and fertilizers are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderately high. Equipment limitations, seedling mortality, and plant competition are the main concerns in management. South Florida slash pine is the preferred tree to plant.

This soil is moderately suited to desirable range plant production. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. Wabasso soil is in the South Florida Flatwoods range site.

This soil has severe limitations for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoons. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of slow permeability. Sealing or lining of sewage lagoons can reduce excessive seepage. This soil has severe limitations for septic tank absorption fields, recreational uses, trench sanitary landfills, and shallow excavations. Water control measures generally are needed to overcome excessive wetness. The sandy surface layer should be stabilized for recreational uses. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Wabasso soil is in capability subclass IIIw.

14—Winder fine sand. This soil is nearly level and poorly drained. It is on low hammocks and in poorly defined drainageways. The mapped areas range from 10 to 35 acres. Slopes are concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 7 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 17 inches. The subsoil extends to a depth of 65 inches. The upper 6 inches of the subsoil is grayish brown sandy loam that has yellowish brown mottles and grayish brown loamy sand intrusions. The next 11 inches is gray sandy loam that has yellowish brown and yellow mottles, the next 14 inches is gray sandy loam that has yellowish brown and light olive brown mottles, and the lower 17 inches is gray sandy loam that has light olive brown mottles. The substratum to a depth of 80 inches or more is greenish gray loamy sand and shell fragments.

Included with this soil in mapping are small areas of Chobee, Jupiter, Manatee, Pineda, and Riviera soils. Also included are soils that are similar to Winder soil that have a dark surface layer more than 7 inches thick and also soils that have accumulations of calcium carbonate concretions in the subsurface layer and in the upper part of the subsoil. The included soils make up about 15 percent of the map unit.

In most years, under natural conditions, the water table is within a depth of 0 to 10 inches of the surface for 2 to 4 months and between a depth of 10 to 40 inches for about 4 to 6 months or more. Only for short periods in dry seasons is the water table below a depth of 40 inches. The available water capacity is very low in the surface and subsurface layers. It is moderate in the subsoil and low in the substratum. Permeability is slow in the subsoil and rapid in the surface and subsurface layers. Natural fertility is low.

Most of the acreage of this soil has been cleared and planted to citrus. The natural vegetation consists of cabbage palm, laurel oak, and slash pine and an understory of waxmyrtle, blue maidencane, chalky bluestem, sand cordgrass, sawgrass, sedges, and other water-tolerant grasses and weeds.

This Winder soil has severe limitations for cultivated crops. It has fair suitability for vegetable crops if a water control system is installed to remove excess water rapidly and provide for subsurface irrigation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crop.

Citrus trees are well suited to this soil if a water control system is installed to help maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizers are needed.

The suitability of this soil is good for pasture and hay crops. Pangolagrass, improved bahiagrass, and clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizers, and controlled grazing.

The potential productivity of this soil for pine trees is high. Slash pine is the best adapted specie to plant. Water control measures are necessary to remove excess surface water. Equipment limitations and seedling mortality are additional concerns in management.

This soil is poorly suited to desirable range plant production. The vegetative community consists of cabbage palm, live oak, scattered sawpalmetto, grapevine, and wild coffee. Because of the dense canopy of palm trees, this site is a preferred shading and resting area for cattle. As a result, this range site generally is severely grazed. Management practices should include deferred grazing, brush control, and proper stocking. Winder soil is in the Cabbage Palm Hammocks range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to help overcome excessive wetness.

This Winder soil is in capability subclass IIIw.

15—Manatee loamy fine sand. This soil is nearly level and very poorly drained. It is in depressions and poorly defined drainageways and on broad, low flats.

The mapped areas range from 5 to 10 acres in isolated depressions and from 5 to 100 acres or more in other areas. Slopes are smooth to concave. They dominantly are less than 1 percent but range from 1 to 2 percent.

Typically, the surface layer is black loamy fine sand about 12 inches thick. The subsoil extends to a depth of about 31 inches. The upper 10 inches of the subsoil is very dark gray fine sandy loam, the next 9 inches is dark gray sandy loam, and the lower 8 inches is dark grayish brown loamy fine sand. The substratum extends to a depth of 80 inches or more. The upper 12 inches of the substratum is light brownish gray loamy fine sand. The lower 29 inches or more is light gray loamy fine sand and shell fragments.

Included with this soil in mapping are small areas of Chobee, Floridana, and Winder soils. Also included are small areas of soils that are similar to Manatee soil but have a surface layer that is lighter in color. The included soils make up less than 20 percent of the map unit.

The water table is within a depth of 10 inches of the surface for more than 6 months during most years or above the surface for short periods after heavy rainfall. It is at a depth of 10 to 30 inches for short periods during dry seasons. The available water capacity is medium. Permeability is moderate. Natural fertility is medium.

A large part of this soil is used for citrus. Some areas are used for improved pasture. The natural vegetation in depressional areas consists of red maple, cypress, water oak, waxmyrtle, scattered cabbage palm, and an understory of ferns and water-tolerant grasses. In other open marsh areas are maidencane, cutgrass, pickerelweed, smartweed, St.-Johnswort, Carolina willow, and patches of sawgrass.

Under natural conditions, this Manatee soil is too wet for cultivated crops, citrus, and improved pasture. If water control is adequate, the suitability is good for these uses. A properly designed and maintained water control system should rapidly remove the excess surface water. Other management practices needed are good seedbed preparation, including bedding of rows, crop rotation, and regular applications of fertilizer. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter.

This soil is well suited to citrus if a water control system is installed to help maintain good soil aeration to a depth of about 4 feet. Planting trees in beds lowers the effective depth of the water table. A close-growing cover crop should be maintained between the rows to control erosion. Regular applications of fertilizer are needed.

This soil has good suitability for most improved pasture grasses. A water control system is needed to rapidly remove the excess surface water. High yields of pangolagrass, bahiagrass, and white clover can be obtained if they are adequately fertilized. Grazing should be controlled to maintain plant vigor.

The potential productivity of this soil for pine trees is high, but a water control system is needed to remove excess surface water if the production potential is to be realized. South Florida slash pine is the preferred tree to plant. Equipment limitations and seedling mortality are the main concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. Manatee soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to overcome excessive wetness. Adding fill material and mounding of the septic tank absorption field help overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Manatee soil is in capability subclass IIIw.

16—Pineda fine sand. This soil is nearly level and poorly drained. It is on low hammocks and in broad, poorly defined sloughs. The mapped areas range from 10 to 200 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 4 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 9 inches. The subsoil extends to a depth of about 40 inches. The upper 14 inches of the subsoil is yellow fine sand with brownish yellow mottles, and the lower 17 inches is gray and greenish gray sandy loam that has yellowish brown, dark brown and light olive brown and olive yellow mottles. The upper 4 inches of the loamy subsoil material has intrusions of yellowish brown loamy fine sand. The substratum extends to a depth of 80 inches or more. The upper 12 inches of the substratum is greenish gray loamy sand, and the lower 28 inches is greenish gray loamy sand mixed with shell fragments.

Included with this soil in mapping are small areas of EauGallie, Riviera, Wabasso, and Winder soils. Also included are a few areas of soils that have a thin layer of very friable, calcareous material at a depth of 10 to 30 inches. The included soils make up less than 20 percent of the map unit.

The water table is above the surface for a short period after heavy rainfall. It is within a depth of 10 inches of the surface for 1 to 6 months and at a depth of 10 to 40 inches for more than 6 months. The available water capacity is very low in the surface and subsurface layers and the substratum. It is very low in the upper part of the subsoil and moderate in the lower part. Permeability is rapid in the surface and subsurface layers, rapid in the upper part of the subsoil and slow or very slow in the lower part, and moderately rapid in the substratum. Natural fertility and the organic matter content are low.

A large part of the acreage of this soil has been cleared and is planted to citrus. Natural vegetation consists of scattered slash pine, cabbage palm, waxmyrtle, scattered sawpalmetto, blue maidencane, pineland threeawn, low panicums, other bluestem species, and various weeds and grasses.

This Pineda soil has severe limitations for cultivated crops. It has fair suitability for vegetable crops if a water control system is installed to remove excess water rapidly and provide for subsurface irrigation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crop.

Suitability of this soil for citrus trees is good if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds provides good surface drainage. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizers are needed.

This soil has good suitability for pasture and hay crops. Pangolagrass, improved bahiagrasses, and clover grow well if properly managed. A water control system is needed to remove excess surface water after heavy rains. Management practices should include regular applications of fertilizers and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. Slash pine is the best adapted specie to plant. Water control measures are necessary to remove excess surface water. Equipment limitations and seedling mortality are concerns in management.

This soil is highly suited to desirable range plant production. The dominant forage is blue maidencane, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. Pineda soil is in the Slough range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons with impervious soil material can reduce excessive seepage. Mounding may be needed for septic tank absorption fields. The sandy surface layer should be stabilized for recreational uses. Sealing or lining of trench sanitary landfills with impervious material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Pineda soil is in capability subclass IIIw.

17—Quartzipsamments, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained to somewhat poorly drained. It consists of thick deposits of sand and of mixed sand and shell fragments. This fill material is the result of earthmoving operations. The soil in this map unit is used to fill such areas as sloughs, marshes, shallow depressions, swamps, and other low-lying areas above their natural ground levels. The mapped areas range from about 10 to 300 acres.

No one pedon represents this map unit, but one of the most common profiles has a surface layer of light yellowish brown fine sand that has brownish yellow mottles about 17 inches thick. The next layer, to a depth of about 30 inches, is brownish yellow fine sand mixed with 5 percent shell fragments. The next layer, to a depth of 35 inches, is yellowish brown fine sand that has very dark grayish brown mottles. Below that, to a depth of about 60 inches, is dark grayish brown fine sand that has very dark gray streaks and yellowish brown splotches and is mixed with 10 percent shell fragments. The underlying material to a depth of 80 inches or more is gray sand.

Included with this soil in mapping are small areas of soils that have slopes that are more than 5 percent, which is the result of stockpiling. Also included are some areas of pits and areas of former St. Lucie, Astatula, or Paola soils that were excavated to a depth of about 10 to 20 feet and also some areas of soils on Johns Island that are moderately well drained because of the amount of fill material that has been added. The included soils make up about 15 percent of the map unit.

The water table varies with the amount of fill material and artificial drainage within the map unit. In most years, it is at a depth of 24 to 36 inches below the surface of the fill for 2 to 4 months. It is below a depth of 40 inches during extended dry periods. Permeability is very rapid, and the available water capacity is very low. Reaction is slightly acid to alkaline. The content of shell fragments ranges from about 5 to 50 percent.

Most areas of this soil are used for urban development. The existing vegetation consists of south Florida slash pine, scattered sawpalmetto, and various weeds.

Quartzipsamments have not been assigned to a capability subclass.

18—Captiva fine sand. This soil is nearly level and poorly drained. It is in narrow, elongated sloughs that are between low, dunelike ridges and mangrove swamps. The mapped areas range from 10 to 200 acres. Slopes are smooth and range from 0 to 1 percent.

Typically, the surface layer is very dark gray fine sand mixed with about 2 percent shell fragments. It is about 8 inches thick. The underlying material to a depth of 80 inches or more is grayish brown, olive gray, and greenish gray fine sand mixed with about 2 to 15 percent shell fragments.

Included with this soil in mapping are small areas of Canaveral, Kesson, and Quartzipsamments soils. Also included are soils that are similar to Captiva soil but have a thin light colored surface horizon and have a thin discontinuous ledge of limestone at various depths. The included soils make up about 15 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of 10 to 40 inches for 6 to 9 months or more and within a depth of 10 inches of the surface for 1 to 3 months during the wet season. In some years, the soil is covered by standing water for about 1 month. Permeability is rapid in the surface layer and very rapid in the underlying layers. The available water capacity is medium in the surface layer and low to very low in the subsurface layer. Natural fertility and the organic matter content are low.

A large part of the acreage has been cleared and planted to citrus. If present, natural vegetation consists of cabbage palm, tamarind, Australian pine, waxmyrtle, strangler fig, wild coffee, and leatherleaf fern.

The suitability of this soil for citrus trees is fair if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. Water control measures are needed to remove excess surface water after heavy rains and prohibit saltwater intrusion. A suitable cover crop should be maintained between tree rows. Regular applications of lime and fertilizer are needed.

Under natural conditions, this Captiva soil is poorly suited to cultivated crops because of wetness. However, if water control measures are used, this soil has fair suitability for many vegetable crops. A water control system is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crop.

This soil has fair suitability for improved pasture. Improved bahiagrass grows well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer are needed. Overgrazing should be prevented.

This soil generally is not used for pine trees.

This soil generally is not used for rangeland. Captiva soil is in the South Florida Coastal Strand ecological plant community.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. Sealing or lining of sewage lagoons can reduce excessive seepage. The sandy surface should be stabilized for recreational uses. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Captiva soil is in capability subclass IVw.

20—Beaches. This map unit consists of nearly level to sloping, narrow strips of tide and surf washed sands and shell fragments. Beaches are along the Atlantic Ocean shoreline. They commonly are a mixture of moderately alkaline sand and fine shell fragments.

Beaches range from less than 100 feet to about 300 feet in width. About half of the beach area may be flooded daily during high tides, and all of the beaches can be flooded by storm tides. Most beaches have a uniform gentle slope to the water's edge, although the shape and slope can change with every storm.

Beaches are generally devoid of vegetation, although some sparse growth of sea-oats, or railroad vine, or other salt-tolerant plants is near the inland edges.

Depth to the water table is highly variable depending on distance from the shore, elevation of the beach, and the tidal condition. Commonly, the water table ranges from a depth of 0 to 6 feet.

These areas generally are not used for rangeland or woodland. They are included in the South Florida Coastal Strand ecological plant community.

Beaches are not suited to any use except for recreation and as habitat for wildlife. Severe erosion is often a problem during severe storms. Because the beaches have great esthetic value, they are an important part of the coastline.

Beaches have not been assigned to a capability subclass.

21—Pomello sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on low ridges and knolls on the flatwoods. The mapped areas range from 20 to 150 acres. Slopes are smooth to convex.

Typically, the surface layer is gray sand about 2 inches thick. The subsurface layer extends to a depth of about 61 inches. The upper 18 inches of the subsurface layer is white sand, and the lower 41 inches is light gray sand. The subsoil extends to a depth of about 80 inches or more. The upper 4 inches of the subsoil is dark reddish brown sand, the next 12 inches is black sand, and the lower 8 inches is very dark gray sand.

Included with this soil in mapping are small areas of Immokalee, Myakka, Satellite, and Archbold soils. Also included are areas of soils that are similar to Pomello soil but have a thin brownish yellow layer just below the surface layer, also areas of soils that have a subsoil below a depth of 50 inches, and areas of soils that have a weakly cemented subsoil. The included soils make up less than 15 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of 24 to 40 inches for about 1 to 4 months during the wet season and at a depth of 40 to 60 inches during the drier seasons. Permeability is very rapid in the surface and subsurface layers and moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the organic matter content are very low.

Most areas of this soil are in natural vegetation. The natural vegetation consists of south Florida slash pine, scrub live oak, sawpalmetto, fetterbush, rusty lyonia, running oak, indiangrass, pineland threeawn, grassleaf goldaster, flag pawpaw, mosses and lichens, panicums, bluestems, and various other grasses. Sand pine is in some areas.

This soil is poorly suited to citrus trees. Only fair yields can be obtained if the level of management is high. A water control system is necessary to maintain the water table at a depth of about 4 feet during the wet season and to provide water for irrigation during periods of low rainfall. Regular applications of fertilizer and lime are needed for maximum yields. A suitable cover crop should be maintained between tree rows to protect the soil from blowing.

This Pomello soil is poorly suited to cultivated crops, but if intensive management practices are used, a few special crops can be grown. The adapted crops are limited unless intensive management practices are followed. For maximum yields, irrigation should be provided and fertilizer and lime should be applied according to the need of the crop.

The suitability for growing improved pasture grasses is fair. Bahiagrass is better suited to this soil than other grasses. Droughtiness is the major limitation except during the wet season. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. Seedling mortality, plant competition, and equipment mobility are the main concerns in management. South Florida slash pine and sand pine are the preferred trees to plant.

This soil is poorly suited to desirable range plant production. The vegetative community consists of a dense, woody understory of sawpalmetto, Florida rosemary, and scrub oak. Although this site is seldom grazed by livestock, it does furnish winter protection. Pomello soil is in the Sand Pine Scrub range site.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. It has moderate limitations for dwellings without basements and small commercial buildings. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. The very rapid permeability of this soil causes pollution of ground water in areas of septic tank absorption fields. Water control measures and sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Water control measures are needed, and sidewalls of shallow excavations should be shored.

This Pomello soil is in capability subclass VIs.

22—Urban land. More than 70 percent of this miscellaneous area is covered by urban facilities, such as shopping centers, parking lots, industrial buildings, houses, streets, sidewalks, airports, and related facilities. The natural soil cannot be observed. Soils in the unoccupied areas in this map unit, such as on lawns, vacant lots, playgrounds, and parks, mostly consist of Astatula, Boca, EauGallie, Paola, and St. Lucie soils. These soils generally have been altered by grading and shaping or have been covered to a depth of about 12 inches by fill material. This fill material consists of sandy and loamy materials that in places contain limestone and shell fragments. These areas of soils are so small that it was not practical to map them separately.

Urban land has not been assigned to a capability subclass.

23—Arents, 0 to 5 percent slopes. This soil consists of material dug from several areas that have different kinds of soil. This fill material is the result of earthmoving operations. This soil is used to fill such areas as sloughs, marshes, shallow depressions, swamps, and other low-lying areas above their natural ground levels.

The surface layer is about 30 to 50 inches thick. It is very dark gray, dark gray, dark grayish brown, and yellowish brown fine sand or sand mixed with discontinuous grayish brown and light brownish gray loamy textured fragments. Fragments and thin discontinuous lenses of a dark colored sandy subsoil are also scattered through the matrix. Below that is undisturbed soil to a depth of 80 inches. The upper 2 inches of the undisturbed soil is commonly black, the next 20 inches is light gray or gray, and the lower 8 inches is black or very dark brown. The fill material that formed this soil was from excavated areas of EauGallie, Riviera, and Wabasso soils. Texture ranges from fine sand to sandy clay loam.

Included with this soil in mapping are small areas of soils that are similar to Arents soil but have slopes of more than 5 percent, which is a result of stockpiling. Also included are areas that are used as sanitary landfills and contain up to 50 percent or more of solid waste materials. These areas are delineated as "Sanitary landfill" on the soil map. Fragments of shells, whole shells, and a few rock fragments are also present in some areas of fill material. Inclusions make up less than 10 percent of the map unit.

Most soil properties are variable. However, permeability is moderately rapid to rapid. The water table varies with the amount of fill material and artificial drainage in any mapped area. In most years, the water table is at a depth of 24 to 36 inches for 2 to 4 months. During extended dry periods, no water table is within 5 feet of the surface. Reaction ranges from slightly acid to alkaline.

These soils mainly are used for urban development. The existing vegetation consists of south Florida slash pine and various scattered weeds. Some small areas that have natural vegetation of cabbage palm, sawpalmetto, waxmyrtle, Brazilian pepper, greenbriar, and various weeds and grasses are scattered throughout the map unit.

Arents have not been assigned to a capability subclass.

24—Floridana sand. This soil is nearly level and very poorly drained. It is in poorly defined drainageways on broad, low flats. The mapped areas range from 10 to 150 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is black sand about 14 inches thick. The subsurface layer is light brownish gray sand to a depth of 20 inches. The subsoil extends to a depth of about 37 inches. The upper 14 inches of the subsoil is gray sandy clay loam. The next 3 inches is gray sandy clay loam that has pockets of soft calcium carbonate. The substratum extends to a depth of 80 inches or more. The upper 31 inches of the substratum is gray or dark gray sandy loam that has pockets of soft calcium carbonate masses. The lower 12 inches is light gray sandy clay loam that has yellowish brown and greenish gray mottles.

Included with this soil in mapping are small areas of Chobee, Manatee, Riviera, and Winder soils. Also included are small areas of soils that are similar to Floridana soil but have a thin layer of muck on the surface. The included soils make up 15 percent of the map unit.

The water table is above the surface for short periods after heavy rainfall or within a depth of 10 inches of the surface for more than 6 months during most years. It is at a depth of 10 to 30 inches for short periods during dry seasons. Permeability is rapid in the surface and subsurface layers and slow to very slow in the subsoil and substratum. The available water capacity is medium to high in the surface layer and subsoil and low in the subsurface layer. Natural fertility is medium, and the organic matter content is high.

Many areas of this soil are drained and used for citrus or cultivated crops. Natural vegetation consists of sand cordgrass, maidencane, St.-Johnswort, scattered waxmyrtle, Carolina willow, pickerelweed, cutgrass, primrose willow, sawgrass, and other water-tolerant grasses.

Under natural conditions this Floridana soil is not suited to cultivated crops. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil has fair suitability for many vegetable crops. Good management practices are good seedbed preparation, including bedding of rows, and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suited to citrus trees. However, the suitability for citrus trees is fair if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly. A water control system is needed to maintain good drainage to a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizer are needed.

In its natural state, this soil is poorly suited to improved pasture. However, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass and improved bahiagrass grow well if properly managed. Regular applications of fertilizer and lime are needed. Controlled grazing is necessary.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary before trees can be planted. Equipment limitations and seedling mortality are the main concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. This Floridana soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Fill material is needed for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. Sidewalls of shallow excavations should be shored. Mounding may be needed for septic tank absorption fields.

This Floridana soil is in capability subclass IIIw.

25—St. Augustine sand. This soil is nearly level and somewhat poorly drained. It formed from dredge and fill materials from small manmade harbors that were spread over the surface of former tidal areas. The mineral soils in these areas are very poorly drained. The fill material consists of a mixture of sand, shell fragments, and loamy and silty sediment. The mapped areas are adjacent to the Indian River and are about 10 to 100 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the fill material in the surface layer is about 30 inches thick. It is light brownish gray sand that contains shell fragments and a few medium distinct yellowish brown streaks. Next is a mixture of grayish brown sand, fragments of dark gray silty clay loam, and olive gray loamy sand to a depth of about 45 inches. Below that is a mixture of greenish gray sand and fragments of gray loamy sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of fill material that do not have loamy pockets or layers. Also included are some areas of soils that have a thin or weakly pronounced organic layer at a depth of more than 60 inches and some areas of soils that are poorly drained. The included soils make up less than 15 percent of the map unit.

The water table is at a depth of 20 to 40 inches for 2 to 6 months in most years. It is above a depth of 20 inches during periods of high rainfall. In some areas, daily tides influence the water table. These soils are subject to flooding for very brief periods during the hurricane season. Permeability is rapid in the sand and muck fill material and slow to very slow in the loamy and silty clay loam. The available water capacity is very low in the sandy part of the fill material and moderate to high in the loam, silty clay loam, and organic layers.

Some areas have been developed for urban use, but most of the acreage consists of stands of Australian pine, Brazilian pepper, sea daisy, and weedy grasses.

This soil is not used for cropland, improved pasture, citrus, woodland, wildlife, or rangeland. It consists of mixed soil material used to fill low tidal areas to make them more suitable for building sites or other urban use. The suitability for urban use is fair, but wetness and flooding for very brief periods are limiting factors. Onsite investigation is recommended for all uses.

This St. Augustine soil is in capability subclass VIIs.

26—St. Augustine fine sand, organic substratum. This soil is nearly level and somewhat poorly drained. It formed from dredge and fill materials from river channels and small manmade harbors that were spread over the surface of former tidal areas. The organic soils in these areas are very poorly drained. The overlying fill material consists of a mixture of sand, shell fragments, and loamy and silty sediment. The thickness of this fill material ranges from 40 to 60 inches. Slopes are smooth and range from 0 to 2 percent.

Typically, the fill material in the surface layer is about 40 inches thick. This fill material is very dark gray fine sand and shell fragments. Below that is 19 inches of gray sand and shell fragments and pockets of sandy clay loam. The next 14 inches is greenish gray fine sand. The next 3 inches is grayish green clay loam. Underlying is the natural undisturbed soil in which the upper 20 inches is dark brown muck. Below that to a depth of 80 inches or more is gray sand mixed with about 50 percent shell fragments.

Included with this soil in mapping are small areas of fill material that do not have loamy pockets or layers, areas of fill material that are less than 40 inches thick. Also included are some areas of soils that have a thin or weakly pronounced organic layer and some areas of soils that are poorly drained. The included soils make up less than 25 percent of the map unit.

The water table is at a depth of 20 to 40 inches for 2 to 6 months in most years. It is above a depth of 20 inches during periods of high rainfall. In some areas, daily tides influence the water table. These soils are subject to flooding for very brief periods during the hurricane season. Permeability is very rapid in the sandy fill material and slow to very slow in the loamy and silty clay layers. Permeability is rapid in the underlying organic and sandy layers. The available water capacity is very low in the sandy part of the fill material and underlying natural layers and moderate to high in the loamy, silty clay, and organic layers.

Some small areas have been developed for urban use, but most of the acreage consists of stands of Australian pine, Brazilian pepper, and weedy grasses.

This soil is not used for cropland, improved pasture, citrus, woodland, wildlife, or rangeland. It consists of mixed soil material that is used to fill low tidal areas. The suitability for urban use is low because of low strength of the organic layers and subsidence. Onsite investigation is recommended for all uses.

This St. Augustine soil is in capability subclass VIIs.

27—Boca-Urban land complex. This complex consists of Boca fine sand and Urban land. The soils in this map unit are so intermingled that it was not practical to map them separately at the scale used in mapping. The mapped areas of this complex are rectangular or short and broad. They range from 25 to 200 acres. Slopes are 0 to 2 percent.

About 50 to 70 percent of the complex consists of nearly level Boca soil or of Boca soil that has been reworked or reshaped but is still recognizable as Boca soil. The open areas in this complex consist of Boca soil. The areas are mostly lawns, vacant lots, or playgrounds (fig. 11). About 20 to 30 percent of the mapped area is Urban land. This land is used for houses, streets, driveways, buildings, parking lots, and other related uses.

Typically, the surface layer of Boca soil is 14 inches thick. It is pale brown and dark grayish brown fine sand fill material. The underlying material, to a depth of 30 inches, is 3 inches of very dark gray fine sand, 7 inches of grayish brown fine sand, and 6 inches of light olive gray sandy loam. Below that is a layer of hard limestone containing fractures and solution holes.

Included in mapping are some areas of Chobee, EauGallie, Floridana, and Jupiter soils. Also included are

Figure 11.—The soils in this Boca-Urban land complex have severe limitations for sanitary facilities, building site development, and recreational uses.

a few areas that are about 80 percent Urban land or a few areas that are only 10 percent Urban land. The included soils make up about 15 percent of this map unit.

Areas of the soils that have been modified by grading and shaping are not as extensive in the older communities as in the newer ones. Sandy and loamy materials, fragments of hard limestone and shell material from drainage ditches, or material that is hauled in are often used to fill low areas. In undrained areas, the water table is at a depth of 10 to 30 inches for 2 to 6 months and within a depth of 10 inches of the surface during the wet season. Drainage systems have been established in most areas. Depth to the water table is dependent upon the functioning of the drainage system.

Present land use precludes the use of this soil for cultivated crops, citrus, improved pasture, rangeland, or woodland.

This complex has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to overcome excessive wetness. Mounding may be needed for septic tank absorption fields because of wetness and the shallow depth to bedrock. Sealing or lining of sewage lagoons can reduce excessive seepage. Many of these areas have been previously drained or modified by grading or shaping. Some water control measures, including adding of fill material and installing a drainage system to remove excess surface water after heavy rains, may be necessary for building site development. Because of the moderate depth to bedrock, excavation is difficult. The sandy surface layer should be stabilized for recreational uses.

This complex has not been assigned to a capability subclass.

28—EauGallie-Urban land complex. This complex consists of EauGallie fine sand and Urban land. The soils in this map unit are so intermingled that it was not practical to map them separately at the scale used in mapping. The mapped areas of this complex are rectangular or elongated. They range from 25 to 350 acres. Slopes are 0 to 2 percent.

About 55 to 65 percent of the complex consists of nearly level EauGallie soil or of EauGallie soil that has been reworked or reshaped but is still recognizable as EauGallie soil. The open areas in this complex consist of EauGallie soil. These areas are mostly lawns, vacant lots, or playgrounds. About 25 to 30 percent of the mapped area is Urban land. This land is used for houses, streets, driveways, buildings, parking lots, and other related uses.

Typically, EauGallie soil has a black fine sand surface layer about 5 inches thick. The subsurface layer is light gray fine sand to a depth of about 23 inches. The subsoil extends to a depth of 80 inches or more. The upper 13 inches of the subsoil is black fine sand. The next 19 inches is dark reddish brown and dark brown fine sand. The next 13 inches is light brownish gray fine sand. The lower 12 inches or more is grayish brown sandy loam.

Included in mapping are some areas of Immokalee, Myakka, and Oldsmar soils. Also included are a few areas that are about 80 percent Urban land, or a few areas that are only 10 percent Urban land. The included soils make up about 15 percent of this map unit.

Areas of the soils that have been modified by grading and shaping are not as extensive in the older communities as in the newer ones. Sandy and loamy material from drainage ditches or material that is hauled in are often used to fill low areas. In undrained areas, the water table is at a depth of 10 to 40 inches for periods of 2 to 6 months and is within 10 inches of the surface during the wet season. Drainage systems have been established in most areas. The depth to the water table is dependent upon the functioning of the drainage system.

Present land use precludes using this soil for cultivated crops, citrus, improved pasture, rangeland, or woodland.

The soils in this complex have severe limitations for sanitary facilities. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. Sealing or lining of sewage lagoons with impervious soil material can reduce excessive seepage. The limitations to use for building sites and recreational uses are moderate. Many of the soils in these areas have been previously drained or modified by grading and shaping. Some water control measures, including the addition of fill material and installing of a drainage system to remove excess surface water after a heavy rain, may be necessary. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses.

This complex has not been assigned to a capability subclass.

29—Immokalee-Urban land complex. This complex consists of Immokalee fine sand and Urban land. The soils in this map unit are so intermingled that it was not practical to map them separately at the scale used in mapping. The mapped areas of this complex are rectangular or elongated. They range from 20 to 250 acres. Slopes are 0 to 2 percent.

About 60 to 70 percent of the complex consists of nearly level Immokalee soil or of Immokalee soil that has been reworked or reshaped but is still recognizable as Immokalee soil. The open areas in this complex consist of Immokalee soil. These areas are mostly lawns, vacant lots, or playgrounds. About 20 to 30 percent of the mapped area is Urban land. This land is used for houses, streets, driveways, buildings, parking lots, and other related uses.

Typically, Immokalee soil has a black fine sand surface layer about 7 inches thick. The subsurface layer is light brownish gray and light gray fine sand to a depth of about 42 inches. The subsoil is black and very dark gray fine sand to a depth of about 58 inches. The substratum to a depth of 80 inches or more is dark brown and dark grayish brown fine sand.

Included in mapping are some areas of EauGallie and Oldsmar soils. Also included are a few areas that are about 80 percent Urban land or a few areas that are only 10 percent Urban land. The included soils make up about 15 percent of this map unit.

Areas of the soils that have been modified by grading and shaping are not as extensive in the older communities as in the newer ones. Sandy material from drainage ditches or material that is hauled in are often used to fill low areas. In undrained areas, the water table is at a depth of 10 to 40 inches for 2 to 6 months and within a depth of 10 inches of the surface during the wet season. Drainage systems have been established in most areas. Depth to the water table is dependent upon the functioning of the drainage system.

Present land use precludes the use of this soil for cultivated crops, citrus, improved pasture, rangeland, or woodland.

This complex has severe limitations for sanitary facilities. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. Sealing or lining of sewage lagoon areas can reduce excessive seepage. The limitations for building site development and recreational uses are moderate. Many of these areas have been previously drained or modified by grading and shaping. Some water control measures, including adding of fill material and installing a drainage system to remove excess surface water after heavy rains, may be necessary. Sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses.

This complex has not been assigned to a capability subclass.

31—Jupiter fine sand. This soil is shallow, nearly level, and poorly drained. It is on low flats and hammocks. The mapped areas range from 5 to 50 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is fine sand about 12 inches thick. The upper 5 inches of the surface layer is black, and the lower 7 inches is very dark brown. Below that is hard, fractured limestone.

Included with this soil in mapping are small areas of Boca, Pineda, Riviera, and Winder soils. Also included are small areas of soils that are similar to Jupiter soil but have a thin layer of loamy material or marl underlain by limestone, some areas of soils that are similar but have less than 10 inches of sandy material underlain by limestone, small areas of soils that are similar but have a lighter colored sandy surface, and some soils in scattered spots of exposed limestone. The included soils make up less than 20 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of less than 10 inches of the surface for 2 to 4 months in the wet season. Some areas of this soil are covered with shallow water for brief periods. In drained areas, the water table fluctuates with the water level of the canals and ditches. It recedes to a depth below the limestone in the dry season. Permeability is rapid in the sandy layer above the bedrock. The hard limestone is impermeable but has sufficient fractures and solution holes to permit water movement. The available water capacity is low to medium in the sandy layer. Natural fertility and the organic matter content are medium.

Many areas of this soil are used for citrus. Natural vegetation consists of water oak, cabbage palm, strangler fig, Florida holly, scattered slash pine, wild coffee, wild grape, greenbriar, ferns, and a few various weeds and sprigs of grasses.

Under natural conditions, this Jupiter soil is very poorly suited to cultivated crops because of wetness and shallow depth to bedrock. However, if a water control system is installed to remove excess water rapidly, this soil is suitable for adapted vegetable crops. The shallow depth to bedrock makes the installation of an adequate system very difficult. Row crops should be placed on beds. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizers should be applied according to the need of the crop.

This soil has fair suitability for citrus only after a properly designed water control system has been installed and intensive management practices are used. A water control system is needed to maintain a good drainage system to a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizers are needed.

This soil has fair suitability for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if properly managed. Water control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizers are needed. Grazing should be controlled to prevent overgrazing and to maintain plant vigor.

The potential productivity of this soil for pine trees is moderate. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary to remove excess surface water. Equipment limitations and windthrow hazard are the main concerns in management.

This soil is poorly suited to desirable range plant production. The vegetative community consists of cabbage palm, live oak, scattered sawpalmetto, grapevine, and wild coffee. Because of the dense canopy of palm trees, this site is a preferred shading and resting area for cattle. As a result, this range site generally is severely grazed. Management practices should include deferred grazing, brush control, and proper stocking. Jupiter soil is in the Cabbage Palm Hammocks range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Fill material is needed to overcome the shallow depth to bedrock. Sealing or lining of sewage lagoons and sanitary landfills with impervious soil material can reduce excessive seepage. Mounding may be needed for septic tank absorption fields. The sandy surface layer should be stabilized for recreational uses. Because of the shallow depth to bedrock, excavation is difficult. The use of special equipment may be required.

This Jupiter soil is in capability subclass IVw.

32—Jonathan sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and somewhat excessively drained. It is on the Atlantic Coastal Ridge and on slightly elevated knolls on the flatwoods. These soils mainly are in the eastern part of the county. The mapped areas range from 30 to 200 acres. Slopes are smooth to convex.

Typically, the surface layer is dark gray sand about 3 inches thick. The subsurface layer is white sand to a depth of about 75 inches. The subsoil to a depth of 80 inches or more is dark reddish brown sand that is 60 to 75 percent strongly cemented.

Included with this soil in mapping are small areas of Immokalee, Pomello, and St. Lucie soils. Also included are areas of soils that are similar to Jonathan soil but are better drained. The included soils make up about 15 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of 40 to 60 inches for 1 to 4 months during the wet season. It is below 60 inches for the remainder of the year. Permeability is moderately rapid to very rapid in the surface and subsurface layers and slow or very slow in the subsoil. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the organic matter content are very low.

Most areas of this soil are in natural vegetation. The natural vegetation consists of south Florida slash pine, sand pine, scattered scrub hickory, scrub live oak, Chapman oak, rosemary, pricklypear cacti, grassleaf goldaster, flag pawpaw, mosses and lichens, pineland threeawn, and various other grasses.

This Jonathan soil is not suited to cultivated crops because of droughtiness and sandy texture. A ground cover of close-growing plants is needed between the tree rows to protect the soil from blowing. A properly designed irrigation system is needed to maintain optimum moisture and obtain high yields.

This soil has poor suitability for improved pasture grasses. Deep-rooted plants, such as coastal bermudagrass and bahiagrass, are well adapted species to plant, but yields are reduced by periodic droughts. Regular applications of fertilizer and lime are needed. Controlled grazing is needed to help maintain plant vigor.

The potential productivity of this soil for pine trees is low. South Florida slash pine and sand pine are the recommended trees to plant. Equipment limitations and seedling mortality are the main concerns in management.

This soil is poorly suited to desirable range plant production. The vegetative community consists of a dense, woody understory of sawpalmetto, Florida rosemary, and scrub oak. Although this site is seldom grazed by livestock, it does furnish winter protection. Jonathan soil is in the Sand Pine Scrub range site.

This soil has slight limitations for dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed. This soil is well suited to septic tank absorption fields and playgrounds. Some water control measures are needed for septic tank absorption fields to lower the water table during wet seasons. The sandy surface layer should be stabilized for playground use. This soil has severe limitations for trench sanitary landfills, sewage lagoons, and shallow excavations. Sealing or lining of landfills and lagoons with impervious soil material can reduce excessive seepage. Water control practices are needed for trench sanitary landfills. Sidewalls should be shored for shallow excavations.

This Jonathan soil is in capability subclass VIs.

33—Astatula sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and excessively drained. It is on the Atlantic Coastal Ridge. The mapped areas range from about 20 to 200 acres. Slopes are smooth to convex.

Typically, the surface layer is grayish brown sand about 4 inches thick. The subsurface layer is brown sand about 1 inch thick. The underlying material to a depth of 80 inches or more is brownish yellow or strong brown sand.

Included with this soil in mapping are small areas of Paola, Pomello, and St. Lucie soils. Because of excavation of the Astatula soils for fill material, some included soils have short, steep slopes that range from 5 to 40 percent. The included soils make up less than 15 percent of the map unit.

This soil has no water table within a depth of 6 feet throughout the year. Permeability is very rapid, and the available water capacity is very low throughout. Natural fertility and the organic matter content are very low.

Most areas of this soil remain in natural vegetation consisting of cabbage palm, scrub hickory, longleaf and sand pine, sawpalmetto, sand live oak, and scrub oak. Pineland threeawn and bluestems are the most common native grasses, but these grasses can be quite sparse in occurrence because of the droughty nature of the soil.

Under natural conditions, this Astatula soil is not suited to cultivated crops. It has poor suitability for vegetable crops and citrus. A ground cover of close-growing plants between the tree rows should be maintained to protect the soil from blowing. A properly designed irrigation system is needed to maintain optimum moisture and obtain high yields. Regular applications of fertilizer and lime are also needed.

This soil has poor suitability for improved pasture grasses. Deep-rooted plants, such as coastal bermudagrass and bahiagrass, are well adapted to this soil, but yields are reduced by periodic droughts. Regular applications of fertilizer and lime are needed. Controlled grazing is needed to help maintain plant vigor.

The potential productivity of this soil for pine trees is low. Slash pine and sand pine are the preferred trees to plant. Equipment limitations and seedling mortality are the main concerns in management.

This soil is poorly suited to desirable range plant production. The vegetative community consists of a dense, woody understory of sawpalmetto, Florida rosemary, scrub oak, indiangrass, creeping bluestem, beaked panicums, and perennial legumes. Although this site is seldom grazed by livestock, it does furnish winter protection. Astatula soil is in the Sand Pine Scrub range site.

This soil has slight limitations for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed, although the proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and pollution. This soil is also well suited to small commercial buildings. Land shaping may be needed on the more sloping areas. This soil has severe limitations for playgrounds, trench sanitary landfills, and shallow excavations. The sandy surface should be stabilized for playground use, and land shaping may be needed on the more sloping areas. Sealing or lining of trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Astatula soil is in capability subclass VIs.

34—Satellite fine sand. This soil is nearly level and somewhat poorly drained. It is on low knolls and ridges on the flatwoods. The mapped areas range from 10 to 250 acres. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The underlying material is light brownish gray, grayish brown, and dark grayish brown fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Archbold, Immokalee, Myakka, Pomello, and Pompano soils. The included soils make up less than 15 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of 18 to 24 inches for 2 to 6 months and at a depth of 40 to 72 inches for 6 months or more. Permeability is very rapid, and the available water capacity is very low. Natural fertility and the organic matter content are low.

Most areas of this soil are in natural vegetation. The natural vegetation consists of south Florida slash pine, longleaf pine, sand live oak, sawpalmetto, pineland threeawn, indiangrass, bluestems, fetterbush, and various other sedges and grasses.

The suitability of this soil for citrus trees is fair if good management practices are used. A water control system is necessary to maintain the water table at a depth of about 4 feet during the wet season and to provide for subsurface irrigation during periods of low rainfall. Regular applications of fertilizer and lime help to obtain good yields. A suitable cover crop should be maintained between tree rows to prevent soil blowing.

This Satellite soil is poorly suited to cultivated crops, but if intensive management practices are used, a few special crops can be grown. A water control system should be installed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Applications of fertilizer and lime should be applied according to the need of the crop.

The suitability for growing improved pasture grasses is fair. Bahiagrass and pangolagrass will grow when properly managed. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. Seedling mortality is the main concern in management. South Florida slash pine is preferred for planting.

This soil is poorly suited to desirable range plant production. The vegetative community consists of a dense, woody understory of sawpalmetto, Florida rosemary, and scrub oak. Although this site is seldom grazed by livestock, it does furnish winter protection. Satellite soil is in the Sand Pine Scrub range site.

This soil has severe limitations for sanitary facilities and building site development. It has moderate limitations for local roads and streets and recreation use. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. The very rapid permeability of this soil can cause pollution of ground water in areas of septic tank absorption fields. Water control measures and sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Sidewalls of shallow excavations should be shored. Water control measures are needed.

This Satellite soil is in capability subclass VIs.

35—McKee mucky clay loam. This soil is level and very poorly drained. It is in mangrove islands and swamps. This soil formed in unconsolidated loamy or clayey tidal deposits and is inundated by fluctuating tides twice a day. These areas are at or near sea level and are in and adjacent to the Indian River (fig. 12). Individual mapped areas range from 10 to 450 acres. Slopes are less than 1 percent.

Typically, the surface layer is very dark grayish brown mucky clay loam about 1 inch thick. The underlying material is very dark gray clay loam to a depth of 15 inches, grayish green to dark greenish gray sandy clay to a depth of about 60 inches, and dark gray sandy loam to a depth of 80 inches or more. Most layers are very fluid when squeezed in the hand, and some layers range from very fluid to slightly fluid.

Included with this soil in mapping are small areas of soils that are similar to McKee soil but have limestone boulders at a depth of more than 40 inches, also some small areas of soils that are similar but have limestone boulders at a depth of less than 40 inches, and some areas of soils that are similar but have a thin organic

Figure 12.—This red and black mangrove is in an area of McKee mucky clay loam.

surface. Also included are soils in areas that have a high content of sand or soil in some areas that have been affected by drainage. These soils do not behave as fluid when subjected to pressure. In addition, included are some small areas of soils that contain a high amount of sulfites that become extremely acid when drained and exposed to air. The included soils make up less than 20 percent of the map unit.

Under natural conditions, McKee soil remains saturated. Soil strength is low. The water content may be as high as 80 percent at field condition. Fluctuating tides overwash the surface layer twice daily. Natural fertility is high for saltwater-tolerant plants. The organic matter content is very high.

The native vegetation consists of red, black, and white mangroves, and in some areas it consists of sea rocket, saltwort, perennial glasswort, seashore saltgrass, and seashore paspalum. The red mangroves, which have an extensive prop root system and shed floating seed pods, are mainly along the river's edge and along ditches where tidal water is deeper. The black and white mangroves, which propagate by sending up pneumatophores or erect extensions of their root systems above the soil surface, are mainly on slightly higher elevations.

Because of tidal flooding and low soil strength, this McKee soil is not suited to cropland, citrus, improved pasture, or woodland. Drainage of these soils would probably cause them to become so acid that they could not support much plant growth. However, if accessible by an elevated road or levee, these soils are well suited to beekeeping for mangrove honey production.

This soil generally is not used for rangeland. McKee soil is in the Mangrove Swamps ecological plant community.

This soil is not suited to urban use because of tidal flooding and low soil strength.

McKee soil is in mangrove swamps, which are unique and biologically productive areas that are very important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds. Mangrove swamps also serve as protective barriers in estuaries against excessive wave action during tropical storms.

This McKee soil is in capability subclass VIIIw.

36—Boca fine sand. This soil is nearly level and poorly drained. It is on the flatwoods, but most of the acreage is in citrus groves. The mapped areas range from 10 to 200 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is fine sand to a depth of about 20 inches. The upper 7 inches of the subsurface layer is grayish brown, and the lower 6 inches is brown. The subsoil is yellowish brown fine sandy loam to a depth of 24 inches. Below that is a layer of fractured limestone.

Included with this soil in mapping are small areas of Jupiter, Pineda, and Riviera soils. Also included are soils that are similar to Boca soil but have limestone at a depth of less than 20 inches. The included soils make up about 15 percent of the map unit.

In most years, under natural conditions, the water table is within a depth of 10 inches of the surface for 2 to 4 months. It recedes to a depth below the limestone for about 6 months. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. The available water capacity is low in the surface layer, very low in the subsurface layer, and medium in the subsoil. Natural fertility and the organic matter content are low.

Natural vegetation consists of sawpalmetto, pineland threeawn, indiangrass, bluestems, panicums, south Florida slash pine, and waxmyrtle. Many areas of this soil are in citrus groves.

Under natural conditions, this Boca soil is not suitable for cultivated crops because of wetness and shallow depth to bedrock. However, if intensive management practices and soil improving measures are used and a good water control system is installed to remove excess water rapidly, this soil is fairly suited to many vegetable crops. A good water control system is needed to remove excess water in wet seasons and provide for subsurface irrigation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Other good management practices are seedbed preparation, including bedding of rows, and applying fertilizer according to the need of the crop.

This soil has fair suitability for citrus only if a properly designed water control system is installed. A water control system to maintain good drainage to a depth of about 4 feet is needed. Planting the trees on beds lowers the effective depth of the water table. A cover crop should be maintained between the tree rows to protect the soil from blowing in dry weather and washing away during heavy rain. Regular applications of fertilizer and lime are needed.

Boca soil has fair suitability for improved pasture grasses. Bahiagrass, pangolagrass, and white clover grow well if properly managed. Water control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing and to maintain plant vigor.

The potential productivity of this soil for pine trees is high. Water control is needed before the potential can be attained. Seedling mortality, equipment limitations, and plant competition are the main concerns in management. South Florida slash pine is the preferred tree to plant.

This soil is moderately suited to desirable range plant production. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, south Florida bluestem, and chalky bluestem. Boca soil is in the South Florida Flatwoods range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench landfills with impervious soil material can reduce excessive seepage. Mounding may be needed for septic tank absorption fields. The sandy surface layer should be stabilized for recreational uses. Because of the moderate depth to bedrock, excavation is difficult. The use of special equipment may be required.

This Boca soil is in capability subclass IIIw.

39—Malabar fine sand. This soil is nearly level and poorly drained. It is in low, narrow to broad sloughs and poorly defined drainageways and on flats. The mapped areas range from 20 to 250 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer extends to a depth of 17 inches. The upper 7 inches of the subsurface layer is light brownish gray fine sand, and the lower 7 inches is light yellowish brown fine sand. The subsoil extends to a depth of 65 inches. The upper 24 inches of the subsoil is brownish yellow and reddish yellow fine sand. The next 5 inches is dark grayish brown sandy clay loam. The lower 19 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray loamy sand.

Included with this soil in mapping are small areas of Holopaw, Lokosee, Oldsmar, Pineda, and Riviera soils. Also included are soils in small depressional areas that are ponded. The included soils make up less than 15 percent of the map unit.

The water table is at a depth of less than 10 inches of the surface for 2 to 6 months and between a depth of 10 and 40 inches for most of each year. Permeability is rapid in the surface and subsurface layers. It is rapid in the upper part of the subsoil and slow to very slow in the lower part and moderately rapid in the substratum. The available water capacity is low to very low in the surface and subsurface layers. It is low to very low in the upper part of the subsoil and moderate in the lower part and low in the substratum. Natural fertility and the organic matter content are low.

Most areas of this soil are in natural vegetation. The natural vegetation consists of slash pine, cabbage palm, scattered sawpalmetto, waxmyrtle, inkberry, maidencane, creeping bluestem, pineland threeawn, laurel oak, bulrush, greenbrier, panicums, and various other sedges and grasses.

This Malabar soil is poorly suited to cultivated crops. However, it is moderately well suited to vegetable crops if a water control system is installed to remove excess surface water rapidly and provide for subsurface irrigation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crop.

The suitability for citrus trees is good if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizers are needed.

The suitability of this soil for pasture and hay crops is good. Pangolagrass, improved bahiagrasses, and clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer, and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary to remove excess surface water. Equipment limitations and seedling mortality are the main concerns in management.

This soil is well suited to desirable range plant production. The dominant forage is creeping bluestem, chalky bluestem, and blue maidencane. Management practices should include deferred grazing and brush control. Malabar soil is in the Cabbage Palm Flatwoods range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures and fill material are needed to overcome excessive wetness (fig. 13). Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Mounding may be needed for septic tank absorption fields. The sandy surface layer should be stabilized for recreational uses. Sidewalls of shallow excavations need to be shored.

This Malabar soil is in capability subclass IVw.

40—Gator muck. This soil is nearly level and very poorly drained. It is in freshwater swamps and marshes. The mapped areas range from 20 to 1,500 acres. Slopes are smooth and are less than 1 percent.

Typically, the surface layer is very dark brown muck about 26 inches thick. The underlying material extends to a depth of about 80 inches. The upper 4 inches of the underlying material is very dark gray sandy clay loam, the next 19 inches is dark gray sandy clay loam, and the next 13 inches is greenish gray sandy clay loam that has few to common light gray calcium carbonate accumulations. Below that is greenish gray sandy clay loam that has yellowish brown sandy loam stains and splotches.

Included with this soil in mapping are small areas of Chobee, Floridana, and Terra Ceia soils. Also included are small areas of soils that are similar to Gator soil but have a thin layer of fibers from woody plants in the organic layer. The included soils make up less than 20 percent of the map unit.

Under natural conditions, the water table is above the surface for most of the year. In drained areas, the water table is controlled at a depth of 10 to 36 inches or according to the need of the crop. The water table is at or above the surface for short periods after heavy rainfall and during the normal periods of high seasonal rainfall. Permeability is rapid in the surface layer and moderately slow to slow in the underlying material. The available water capacity is very high in the organic surface layer and medium in the underlying material. Natural fertility and the organic matter content are high.

Some areas of this soil are drained and used for improved pasture and crops. Natural vegetation consists of a dense swamp growth of red maple, red bay, cypress, Carolina willow, primrose willow, waxmyrtle, pickerelweed, sawgrass, cattail, buttonbush, arrowhead, ferns, maidencane, and other water-tolerant grasses. Areas of this soil provide cover for deer and are excellent habitat for wading birds and other wetland wildlife.

This Gator soil is not suitable for cultivated crops under natural conditions. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess surface water rapidly, this soil has good suitability for many vegetable crops. A properly designed water control system is needed to remove the excess water when crops are on the soil and to maintain the water table near the surface to help prevent subsidence of organic material needed for crop and pasture production. Good management practices include seedbed preparation and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In its natural state, this soil is not suited to citrus trees. It is poorly suited even if intensive management

Figure 13.—This area of Malabar fine sand is in sloughs and poorly defined drainageways.

practices, such as bedding of rows, are used and the water control system is adequate.

In its natural state, this soil is not suited to improved pasture grasses. However, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is good. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

This soil is not suited to pine trees.

This soil generally is not used for rangeland. Gator soil is in the Swamp Hardwoods ecological plant community.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures are needed to overcome excessive wetness. Organic materials, which have low soil strength, should be removed and backfilled with a suitable soil material for urban use. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored, and water control measures should be used. Mounding may be needed for septic tank absorption fields.

This Gator soil is in capability subclass IIIw.

41—Canova muck. This soil is nearly level and very poorly drained. It is in freshwater swamps and marshes. The mapped areas range from 100 to 1,800 acres. Slopes are smooth to concave and range from 0 to 1 percent.

Typically, the organic surface layer is black and very dark brown muck about 12 inches thick underlain by 1 inch of black sand. The subsurface layer, to a depth of 24 inches, is gray to grayish brown sand. The subsoil extends to a depth of about 40 inches. The upper 10 inches of the subsoil is grayish brown sandy clay loam that has common coarse tongues of grayish brown sand, and the lower 6 inches is gray sandy clay loam that has few light gray and yellowish brown calcium carbonate concretions. The substratum to a depth of 80 inches or more is greenish gray sandy clay loam and sandy loam that have common to many light gray calcium carbonate concretions and soft calcium carbonate accumulations.

Included with this soil in mapping are small areas of Gator, Delray, Floridana, Chobee, Winder, and Riviera soils. Also included are small areas of soils that are similar to Canova soil but have a subsoil that is at a depth of more than 30 inches. The included soils make up less than 20 percent of the map unit.

Under natural conditions, the water table is above the surface for most of the year. In drained areas, the water table is controlled at a depth of 10 to 36 inches or according to the need of the crop. The water table is at or above the surface for short periods after heavy rainfall and during the normal periods of high seasonal rainfall. Permeability is rapid in the surface and subsurface layers and moderately slow to slow in the subsoil and substratum. The available water capacity is very high in the organic surface layer, low in the mineral subsurface layer, and medium to high in the subsoil and underlying material. Natural fertility is medium, and the organic matter content is high.

Many areas of this soil are drained and are used for improved pasture. Natural vegetation consists of maidencane, cutgrass, Carolina willow, primrose willow, pickerelweed, sawgrass, cattail, buttonbush, arrowhead, and other water-tolerant grasses.

Under natural conditions, this Canova soil is not suited to cultivated crops. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess surface water rapidly, this soil has a fair suitability for many vegetable crops. Good management practices are seedbed preparation, including bedding of rows, and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suited to citrus trees. However, citrus trees have a fair suitability if intensive management practices are used. These practices and measures include the mixing of the organic material and the sandy mineral material or by removing the material and backfilling with a suitable soil material. Also, a water control system should be installed to remove excess surface water rapidly. A water control system that maintains good drainage to a depth of about 4 feet is needed. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizer are needed.

In its natural state, this soil is not suited to improved pasture. However, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is good. Improved pangolagrass, bahiagrass, and white clover grow well if properly managed. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is high. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary before trees can be planted. Equipment limitations and seedling mortality are the main concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. Canova soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures are needed to overcome wetness. Organic materials need to be removed and backfilled with suitable soil material for urban use. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shaped, and water control measures are needed. Mounding may be needed for septic tank absorption fields.

This Canova soil is in capability subclass IIIw.

42—Terra Ceia muck. This soil is nearly level and very poorly drained. It is in freshwater marshes. The mapped areas range from 1,800 to 15,000 acres. Slopes are smooth and are less than 1 percent.

Typically, the surface layer is black muck about 38 inches thick. Below that is very dark grayish brown muck to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Gator soils. Also included are small areas of soils that are similar to the Terra Ceia soil but have thin layers that contain fibers from woody plants at a depth of 30 to 51 inches. The included soils make up less than 20 percent of the map unit.

Under natural conditions, the water table is above the surface for most of the year. In drained areas, the water table is controlled at a depth of 10 to 36 inches or controlled according to the need of the crop. The water table is at or above the surface for short periods after heavy rainfall and during the normal periods of high seasonal rainfall. Permeability is rapid throughout, but internal drainage is impeded by the shallow water table.

The available water capacity is very high throughout. The natural fertility is high, and the organic matter content is very high.

In some areas, this soil is drained and used for improved pasture and crops. Natural vegetation consists of a dense swamp growth of red maple, redbay, cypress, Carolina willow, waterprimrose willow, waxmyrtle, pickerelweed, sawgrass, cattail, buttonbush, arrowhead, ferns, maidencane, and other water-tolerant grasses. Areas of this soil provide cover for deer and are excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this Terra Ceia soil is not suited to cultivated crops. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil has good suitability for many vegetable crops. A properly designed water control system should be installed and maintained to remove the excess water when crops are on the land and to keep the soil saturated at all other times. Good management practices include seedbed preparation and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In its natural state, this Terra Ceia soil is not suited to citrus trees. It is poorly suited to this use even if intensive management practices, such as bedding of rows, are used and the water control system is adequate.

In its natural condition, this soil is not suited to improved pasture grasses; however, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is good. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

This soil is not suited to pine trees.

This soil generally is not used for rangeland. Terra Ceia soil is in the Swamp Hardwoods ecological plant community.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures are needed to overcome excessive wetness. Because of low strength, the organic surface layer must be removed and backfilled with a soil material that is suitable for urban use. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored, and water control measures are needed to overcome excessive wetness. Mounding may be needed for septic tank absorption fields.

This Terra Ceia soil is in capability subclass IIIw.

44—Perrine Variant fine sandy loam. This soil is nearly level and poorly drained. It is on narrow to broad, elongated, low flats. This soil is primarily adjacent to tidal areas along the Indian River. The mapped areas range from 5 to 200 acres. Slopes are smooth to concave and are dominantly less than 1 percent.

Typically, the surface layer is very dark gray fine sandy loam about 6 inches thick. The underlying material is gray sandy clay loam to a depth of about 24 inches. The lower 4 inches of the underlying material has fragments and small white to light brownish gray carbonate nodules. Below that to a depth of 36 inches is a ledge of hard, continuous limestone.

Included with this soil in mapping are Chobee and Boca soils. The included soils make up about 15 percent of the map unit.

For more than 6 months in most years, under natural conditions, the water table is within 10 inches of the surface about 30 to 50 percent of the time. Permeability is moderately slow or moderate. The available water capacity is medium in the surface layer and medium to high in the subsurface layer. The natural fertility is high, and the organic matter content is moderate.

Most areas have been cleared for citrus. If present, the natural vegetation consists of cabbage palm, water oak, Brazilian pepper, waxmyrtle, sedges, reeds, and various grasses. Areas that are nearer to the coast include American and white mangrove trees, sea rocket, saltwort, and perennial glasswort.

Under natural conditions, this Perrine Variant soil has severe limitations for cultivated crops because of wetness and shallow depth to bedrock. If a water control system is installed and maintained, this soil has fair suitability for fruit and vegetable crops. A water control system is needed to remove excess water during wet periods, provide for subsurface irrigation, and prohibit saltwater intrusion because of the soil's proximity to the coast. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Other good management practices are seedbed preparation, including bedding of rows, and applying fertilizer according to the need of the crop.

This Perrine Variant soil is poorly suited to citrus even if a properly designed water control system is installed. A water-control system that maintains good drainage to a depth of about 4 feet is needed. Planting trees on beds lowers the effective depth of the water table and depth to the shallow limestone. Removal of the limestone ledges allows for saltwater intrusion. Therefore, it is further necessary to plant trees on beds. A cover crop should be maintained between the trees, and regular applications of fertilizer are needed.

This soil has fair suitability for improved pasture grasses. Bahiagrass and pangolagrass grow well if properly managed. Water-control measures are needed to remove excess surface water after heavy rains and to prohibit saltwater intrusion. Regular applications of fertilizer are needed. Grazing should be controlled to maintain plant vigor.

This soil is not suited to pine trees. The shallow depth to limestone and wetness are the main limitations.

This soil generally is not used for rangeland. In its natural condition, Perrine Variant soil is in the Salt Marsh ecological plant community.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. The shallow depth to bedrock and wetness are the main limiting factors. Mounding is needed for septic tank absorption fields. Because of the shallow depth to bedrock and hardness of limestone, excavation is difficult. The use of special equipment may be required.

This Perrine Variant soil is in capability subclass IIIw.

45—Myakka fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 5 to 100 acres. Slopes are concave and are less than 1 percent.

Typically, the surface layer is black fine sand about 4 inches thick. The subsurface layer is gray fine sand to a depth of about 17 inches. The subsoil extends to a depth of about 65 inches. The upper 3 inches of the subsoil is weakly cemented black fine sand. The next 18 inches is dark brown fine sand. The next 12 inches is black fine sand. The lower 15 inches is dark grayish brown sand. The substratum to a depth of 80 inches or more is light gray sand.

Included with this soil in mapping are small areas of Immokalee, Pompano, and Samsula soils. Also included are soils that are similar to the Myakka soil but have a muck or mucky fine sand surface layer less than 15 inches thick. The included soils make up less than 20 percent of the map unit.

This soil is ponded for 6 to 9 months or more each year. The water table is within a depth of 10 inches of the surface for 2 to 4 months, and it is at a depth of 10 to 40 inches for most of the remainder of the year. Permeability is rapid in the surface and subsurface layers and in the substratum. It is moderate or moderately rapid in the subsoil. The available water capacity is low in the surface layer, very low in the subsurface layer and substratum, and moderate in the subsoil. The natural fertility is low, and the organic matter content is low.

Natural vegetation consists of blue maidencane, broomsedge, St.-Johnswort, waxmyrtle, red maple, sand cordgrass, milkwort, chalky bluestem, white bracted sedge, pipewort, arrowhead, water hyacinth, and various other water-tolerant weeds and grasses.

This soil has poor suitability for cultivated crops because of ponding. Most areas do not have a suitable drainage outlet, which makes an adequate drainage system difficult to establish. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil is moderately suited to vegetable crops. Good management practices are crop rotation and seedbed preparation, including bedding of rows. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this Myakka soil is not suited to citrus trees. It is poorly suited to this use even if intensive management practices are used and the water control system is adequate.

This soil has fair suitability for improved pasture if very intensive management practices and soil improving measures are used and a water control system is installed. Pangolagrass and improved bahiagrass grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential productivity of this soil for pine trees is moderate. South Florida slash pine is the best adapted tree to plant. Water control measures are necessary before trees can be planted. Equipment limitations and seedling mortality are the main concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. This Myakka soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Fill material to raise the level of the land surface is needed for septic tank absorption fields, local roads and streets, and small commercial buildings and for playground use. Sidewalls of shallow excavations should be shored. Mounding may be needed for septic tank absorption fields.

This Myakka soil is in capability subclass VIIw.

46—Orsino fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on slightly higher ridges and knolls adjacent to Sebastian Creek. The mapped areas range from 40 to 100 acres. Slopes are smooth to convex.

Typically, the surface layer is gray fine sand about 2 inches thick. The subsurface layer is white fine sand to a depth of about 23 inches. The subsoil is dark reddish brown and brown fine sand that has discontinuous lenses of brown and reddish brown fine sand to a depth of 43 inches. The next layer is very pale brown fine sand to a depth of 62 inches. Below that to a depth of 80 inches or more is light gray fine sand.

Included with this soil in mapping are small areas of Satellite, St. Lucie, Electra, Oldsmar, Pomello, and Immokalee soils. The included soils make up less than 15 percent of the map unit.

In most years, under natural conditions, the water table is between a depth of 40 and 60 inches for 6 months or more but recedes to a depth of more than 60 inches during droughty periods. Permeability is very rapid. The available water capacity is very low. Natural fertility and the organic matter content are very low.

Most areas of this soil are in natural vegetation consisting of slash pine, sand pine, sand live oak, scattered blackjack oak, turkey oak, and scrub oak. The understory consists of pineland threeawn, indiangrass, bluestems, grassleaf goldaster, and various other grasses and forbs.

This soil has fair suitability for citrus trees. A close-growing cover crop should be maintained between the tree rows to protect the soil from blowing and washing away during heavy rains. High yields of fruit can be obtained in some years without irrigation, but a properly designed irrigation system to maintain optimum moisture is generally necessary.

This Orsino soil has poor suitability for cultivated crops. Droughtiness and rapid leaching of plant nutrients reduce the variety of adapted crops that can be grown and reduce crop yields. Row crops should be planted on contourlike strips that alternate with strips of close-growing crops. Close-growing crops are needed in the crop rotation at least three-fourths of the time. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. An intensively managed irrigation system is needed, and fertilizer and lime should be applied according to the need of the crop.

This soil has fair suitability for pasture and hay crops. Deep-rooting plants, such as coastal bermudagrass and bahiagrass, are well adapted to this soil, but yields are reduced by droughts. Regular applications of fertilizer and lime should be applied. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. Equipment limitations, seedling mortality, and plant competition are the main concerns in management. South Florida slash pine and sand pine are the preferred trees to plant.

This soil is poorly suited to desirable range plant production. The vegetative community consists of a dense, woody understory of sawpalmetto, Florida rosemary, and scrub oak. Although this site is seldom grazed by livestock, it does furnish winter protection. Orsino soil is in the Sand Pine Scrub range site.

This soil has moderate limitations for septic tank absorption fields. Septic tank absorption fields may need to be enlarged because of wetness. The proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and pollution. The limitations are slight for dwellings without basements, small commercial buildings, and local roads and streets. Land shaping may be needed on the more sloping areas. This soil has severe limitations for sewage lagoons, trench sanitary landfills, shallow excavations, and recreational uses. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Water control measures are needed to lower the water table. Sidewalls of shallow excavations need to be shored. The sandy surface layer should be stabilized for recreational uses, and land shaping may be needed on the more sloping areas.

This Orsino soil is in capability subclass IVs.

47—Holopaw fine sand. This soil is nearly level and poorly drained. It is on broad, low flats and in poorly defined drainageways. The mapped areas range from 10 to 50 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray and dark grayish brown fine sand about 12 inches thick. The subsurface layer extends to a depth of about 45 inches. The upper 18 inches of the subsurface layer is pale brown fine sand, and the lower 15 inches is grayish brown fine sand. The subsoil is grayish brown sandy loam that has pockets of brown fine sand to a depth of about 62 inches. The substratum to a depth of 80 inches or more is olive gray loamy fine sand.

Included with this soil in mapping are small areas of Riviera, EauGallie, Oldsmar, and Malabar soils. Also included are areas of soils that have a weakly stained layer of organic matter above the subsoil and that are in small depressional areas that are ponded. The included soils make up less than 15 percent of the map unit.

The water table is within a depth of 10 inches of the surface for 2 to 6 months each year. It is above the surface for short periods after heavy rainfall. Permeability is rapid in the surface and subsurface layers and is moderately rapid in the subsoil. The available water capacity is low to very low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. Natural fertility and the organic matter content are low.

Most areas of this soil are in natural vegetation. The natural vegetation consists of scattered slash pine, cabbage palm, scattered sawpalmetto, waxmyrtle, blue maidencane, pineland threeawn, panicums, sedges, and other water-tolerant grasses.

Under natural conditions, this Holopaw soil is poorly suited to cultivated crops. However, it has a fair suitability for vegetable crops if a water control system is installed to remove excess water rapidly and provide for subsurface irrigation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crop.

This soil has good suitability for citrus trees if a properly designed water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizer are needed.

The suitability of this soil for pasture and hay crops is good. Pangolagrass, improved bahiagrass, and clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer, and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary to remove excess surface water. Equipment limitations and seedling mortality are the main concerns in management.

This soil is well suited to desirable range plant production. The dominant forage consists of blue maidencane, chalky bluestem, and blue joint panicum. Management practices should include deferred grazing. Holopaw soil is in the Slough range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Mounding may be needed for septic tank absorption fields. The sandy surface layer should be stabilized for recreational uses. Sidewalls of shallow excavations should be shored.

This Holopaw soil is in capability subclass IVw.

48—Electra sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and somewhat poorly drained. It is on knolls on the flatwoods and is adjacent to natural drainageways. The mapped areas range from 20 to 300 acres. The areas that are along streams are generally elongated. Slopes are smooth to convex.

Typically, the surface layer is dark gray sand about 5 inches thick. The subsurface layer is light gray sand to a depth of about 30 inches. The subsoil extends to a depth of about 80 inches. The upper 17 inches of the subsoil is dark reddish brown sand and brown loamy sand. The lower 33 inches or more is light brownish gray sandy loam that has strong brown mottles.

Included with this soil in mapping are small areas of Immokalee and Oldsmar soils. Also included are soils that are similar to Electra soil but are moderately well drained. The included soils make up about 15 percent of the map unit.

In most years, under natural conditions, the water table is at a depth of 25 to 40 inches for cumulative periods of 4 months during the drier periods. Permeability is rapid in the surface and subsurface layers and moderate to slow in the sandy part of the subsoil and slow in the loamy part. The available water capacity is low to very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the organic matter content are very low.

Most areas of this soil are in natural vegetation. The natural vegetation consists of south Florida slash pine, scattered long leaf pine, scrub oak, sawpalmetto, fetterbush, rusty lyonia, running oak, flag pawpaw, pineland threeawn, and various other grasses, vines, and forbs.

Under natural conditions this Electra soil is not suited to cultivated crops because of droughtiness and the sandy texture in the root zone. Citrus and vegetable crops have fair suitability if good management practices are used. A properly designed irrigation system is necessary to maintain optimum moisture and obtain high yields. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Regular applications of fertilizer and lime are needed. A ground cover of close-growing plants should be maintained between tree rows to protect the soil from blowing.

This soil has fair suitability for improved pasture grasses. Deep-rooted plants, such as coastal bermudagrass and bahiagrass, are well adapted to droughty conditions. Regular applications of fertilizer and lime are needed. Controlled grazing is needed to maintain plant vigor.

The potential productivity of this soil for pine trees is moderate. Equipment limitations and seedling mortality are the main concerns in management. South Florida slash pine and sand pine are the preferred trees to plant.

This soil is moderately suited to desirable range plant production. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, south Florida bluestem, and chalky bluestem. Management practices should include deferred grazing and brush control. Electra soil is in the South Florida Flatwoods range site.

This soil is very well suited to dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed. This soil has severe limitations for septic tank absorption fields and recreational uses. Water control measures are needed for septic tank absorption fields, and the proximity to a stream should be considered in its placement to prevent lateral seepage and pollution. The sandy surface layer should be stabilized for playground use. This soil has severe limitations for trench sanitary landfills, shallow excavations, and sewage lagoons. Water control measures are needed. Sealing or lining of trench sanitary landfills and sewage lagoons with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This Electra soil is in capability subclass VIs.

49—Pompano fine sand. This soil is nearly level and poorly drained. It is in sloughs and poorly defined drainageways. The mapped areas range from 10 to 100 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is 16 inches thick. The upper 3 inches of the surface layer is very dark gray fine sand. The lower 13 inches is dark grayish brown fine sand. The underlying material is fine sand to a depth of 80 inches or more. The upper 44 inches of the underlying material is light brownish gray; and the lower 20 inches or more is grayish brown.

Included with this soil in mapping are small areas of Immokalee, Holopaw, and Myakka soils. Also included are areas of soils that are similar to Pompano soil but have a weakly stained layer of organic matter at a depth of more than 20 inches and also some areas of Pompano soils that are occasionally flooded. The included soils make up less than 20 percent of the map unit.

In most years, under natural conditions, the water table is within a depth of 10 inches of the surface for 2 to 6 months. During the drier months, it is within a depth of 30 inches for more than 9 months each year. Some areas are subject to sheet flow during periods of high rainfall. Permeability is rapid, and the available water capacity is very low. Natural fertility and the organic matter content are low.

Most areas of this soil are in natural vegetation. The natural vegetation consists of south Florida slash pine, laurel oak, sawpalmetto, cabbage palm, blue maidencane, pineland threeawn, sand cordgrass, low panicums, and various weeds and grasses.

The suitability of this soil for citrus trees is fair, if a properly designed water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of lime and fertilizers are needed.

Under natural conditions, this Pompano soil is poorly suited to cultivated crops because of wetness and sandy texture. The number of adapted crops that can be grown is limited if very intensive management practices are not followed. If good management practices are used, this soil has fair suitability for cropland. A water control system to remove excess water rapidly and provide for subsurface irrigation is necessary. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil has good suitability for pasture and hay crops. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer and lime, and controlled grazing.

The potential productivity of this soil for pine trees is moderate. Equipment limitations and seedling mortality are the main concerns in management. Water control measures are necessary to remove excess surface water. South Florida slash pine is the best adapted specie to plant.

This soil is well suited to desirable range plant production. The dominant forage consists of blue maidencane, chalky bluestem, and blue joint panicum. Management practices should include deferred grazing. Pompano soil is in the Slough range site.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures are needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Sidewalls of shallow excavations should be shored. Water control measures are needed.

This Pompano soil is in capability subclass IVw.

50—Pits. This map unit consists of open excavations from which soil and shell fragments have been removed for use as fill material when constructing roads and streets and for building site development. Most areas of this map unit include mounds of waste material piled between the excavated overburden, unusable material, or fill material. This fill material will be used as needed. Some small areas that contain water are included. Pits are locally called borrow pits. They range in size from small to large.

Pits have not been assigned to a capability subclass.

51—Riviera fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 5 to 200 acres. Slopes are mostly concave, but a few slopes along slight ridges are smooth to convex. They range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 2 inches thick. The subsurface layer extends to a depth of about 28 inches. The upper 23 inches of the subsurface layer is light gray fine sand, and the lower 3 inches is gray fine sand. The subsoil extends to a depth of about 45 inches. The upper 3 inches of the subsoil is dark gray sandy clay loam that has intrusions and pockets of gray and dark gray fine sand. The lower 14 inches is olive gray sandy clay loam. The substratum to a depth of 80 inches or more is light olive gray sandy loam and loamy sand mixed with shell fragments.

Included with this soil in mapping are small areas of Wabasso, Chobee, Floridana, Holopaw, Manatee, Oldsmar, Pineda, and Winder soils. Also included are areas of soils that have a thin organic surface layer and also some Riviera soils that are flooded for about 1 to 3 months. These soils are in the south prong of Sebastian Creek. The included soils make up less than 15 percent of the map unit.

This Riviera soil is ponded for 6 to 9 months or more each year. The water table is within 10 inches of the surface for 2 to 4 months and between a depth of 10 and 40 inches for most of the remainder of the year. The available water capacity is very low in the surface and subsurface layers, moderate in the subsoil, and low to moderate in the substratum. Permeability is rapid in the surface and subsurface layers, slow to very slow in the subsoil, and slow to moderately rapid in the substratum. Natural fertility and the organic matter content are low.

Natural vegetation consists of blue maidencane, St.-Johnswort, scattered cypress trees, red maple, waxmyrtle, sand cordgrass, milkwort, white bracted sedge, pipewort, arrowhead, water hyacinth, and various other water-tolerant weeds and grasses.

This Riviera soil has poor suitability for cultivated crops. However, it has fair suitability for vegetable crops if a good water system is installed to protect the soil from ponding and to remove excess surface water rapidly. Good management practices include crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crops.

This soil has poor suitability for citrus trees. A water control system that maintains good drainage to a depth of about 4 feet is needed. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizers are needed.

This soil has fair suitability for pasture and hay crops. Pangolagrass and improved bahiagrass grow well if proper water control measures are provided to remove excess surface water after heavy rains. Regular applications of fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary before trees can be planted. Equipment limitations and seedling mortality are the main concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. Riviera soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce seepage. Fill material is needed for septic tank absorption fields, local roads and streets, and small commercial buildings and for playground use. Sidewalls of shallow excavations should be shored. Mounding may be needed for septic tank absorption fields.

This Riviera soil is in capability subclass VIIw.

52—Oldsmar fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 4 to 30 acres. Slopes are concave and are less than 1 percent.

Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is gray and light gray fine sand to a depth of 35 inches. The subsoil extends to a depth of 65 inches or more. The upper 17 inches of the subsoil is black, dark reddish brown, and dark brown fine sand. The lower 13 inches is grayish brown sandy loam. Below that is light brownish gray loamy fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of EauGallie, Malabar, Pineda, Riviera, and Floridana soils. Also included are soils that are similar to Oldsmar soil but have a muck or mucky fine sand surface layer less than 15 inches thick and also a few small areas of soils that have a sandy subsoil that is not as well developed as that in Oldsmar soil. These soils also are lighter colored rather than the typical black color. The included soils make up less than 20 percent of the map unit.

This Oldsmar soil is ponded for 6 to 9 months or more each year. The water table is within 10 inches of the surface for 2 to 4 months and between a depth of 10 and 40 inches for most of the remainder of the year. Permeability is rapid in the surface and subsurface layers. It is moderate to moderately rapid in the sandy upper part of the subsoil and slow in the loamy lower part. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the organic matter content are low.

Natural vegetation consists of blue maidencane, broomsedge, St.-Johnswort, bulrush, pipewort, ferns, pickerelweed, white bracted sedge, and various other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

This Oldsmar soil is not suited to cultivated crops because of ponding. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil has fair suitability for vegetable crops. Good management practices include crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suited to citrus trees. It has poor suitability even if intensive practices are used and the water control system is adequate.

Under natural conditions, this soil is not suited to pasture. However, this soil has fair suitability for improved pasture if very intensive management practices and soil improving measures are used and a water control system is installed. Pangolagrass and improved bahiagrass grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential productivity of this soil for pine trees is moderate. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary before trees can be planted. Equipment limitations, seedling mortality, and plant competition are the main concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. This soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Fill material is needed for septic tank absorption fields, local roads and streets, and small commercial buildings and for playground use. Sidewalls of shallow excavations should be shored. Mounding may be needed for septic tank absorption fields.

This Oldsmar soil is in capability subclass VIIw.

53—Manatee mucky loamy fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 5 to 50 acres. Slopes are concave and are less than 1 percent.

Typically, the surface layer is black mucky loamy fine sand about 8 inches thick. The subsoil extends to a depth of about 42 inches. The upper 16 inches of the subsoil is black sandy loam that has few dark grayish brown fine sand splotches. The lower 18 inches is very dark gray sandy loam. Below that is dark grayish brown loamy fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Chobee, Floridana, Holopaw, Malabar, Pineda, Riviera, Samsula, and Winder soils. Also included are soils that are similar to this Manatee soil but have a muck surface layer more than 15 inches thick. The included soils make up less than 20 percent of the map unit.

This soil is ponded for 6 to 9 months or more during most years. The water table is within 10 inches of the surface for most of the remainder of the year. Permeability is moderately rapid in the surface layer and moderate in the subsoil and underlying material. The available water capacity is low to medium throughout. Natural fertility is medium, and the organic matter content is high.

Natural vegetation consists of sawgrass, blue maidencane, pickerelweed, red maple, cypress, scattered waxmyrtle, sedges, ferns, and other water-tolerant grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

This Manatee soil is not suited to cultivated crops because of ponding. Most areas do not have a suitable drainage outlet, which makes an adequate drainage system difficult to establish. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil has fair suitability for many vegetable crops. Important management practices are seedbed preparation, including bedding of rows, and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suited to citrus trees. It has poor suitability even if intensive management practices, such as bedding of rows, are used and the water control system is adequate.

This soil has poor suitability for improved pasture. Intensive management practices and soil improving measures should be used and a water control system should be installed to remove excess surface water rapidly. Pangolagrass and improved bahiagrass grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

This soil generally is not used for woodland because of wetness.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. Manatee soil is in the Freshwater Marshes and Ponds range site.

Ponding is a severe limitation for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Fill material is needed for urban use. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored, and water control measures are needed. Mounding may be needed for septic tank absorption fields.

This Manateee soil is in capability subclass VIIw.

54—Riomar clay loam. This soil is nearly level and very poorly drained and is frequently flooded. It is in mangrove swamps adjacent to the Indian River. This soil formed in loamy or clayey tidal deposits that are underlain by limestone. Tidal water inundates most of these areas at high tide. Some areas in the counties have been leveled off and are used as mosquito control structures. Individual mapped areas range from 10 to 260 acres. Slopes are less than 1 percent.

Typically, the surface layer is very dark gray clay loam that has few to common pockets of very dark grayish brown muck about 8 inches thick. The substratum extends to a depth of about 25 inches but can range from 20 to 40 inches. The upper 7 inches of the substratum is very dark gray clay loam. The lower 10 inches is dark greenish gray sandy clay. Below that is hard limestone bedrock that has few to common solution holes. The upper 15 inches of the soil in the bedrock is very fluid when squeezed in the hand, and the lower 10 inches is slightly fluid.

Included with this soil in mapping are small areas of McKee soils. Also included are a few areas of soils that have limestone bedrock between a depth of 40 and 80 inches and a few areas of soils that have limestone at a depth of less than 20 inches. Also included are soils that have a high content of sand and some small areas of soils that have been affected by drainage. These soils do not behave as fluid when subjected to pressure. The included soils make up less than 20 percent of the map unit.

Riomar soil remains saturated. Soil strength is low. The water content can be as high as 80 percent at field condition. Fluctuating tides overwash the surface layer twice daily. Permeability is very slow to slow, and the available water capacity is very high in the upper 15 inches of the substratum and high in the lower 10 inches. Natural fertility is high for saltwater-tolerant plants. The organic matter content is very high.

The native vegetation consists of red, black, and white mangrove trees, and in some areas, it consists of sea rocket, saltwort, perennial glasswort, seashore saltgrass, and seashore paspalum. The red mangroves, which have an extensive prop root system and shed floating seed pods, are mainly along the river's edge and along ditches where tidal water is deeper. The black and white mangroves, which propagate by sending up pneumatophores or erect extensions of their root systems above the soil surface, are mainly on slightly higher elevations.

Because of tidal flooding and low soil strength, this Riomar soil is not suited to cropland, citrus, improved pasture, or woodland. Drainage of these soils would probably cause them to become so acid that they could not support much plant growth. However, if accessible by an elevated road or levee, this soil is well suited to beekeeping for mangrove honey production.

This soil generally is not used for rangeland. Riomar soil is in the Mangrove Swamps ecological plant community.

This soil is not suited to urban use because of tidal flooding and low soil strength.

This soil is in mangrove swamps, which are unique and biologically productive areas that are very important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds and nurseries. Offshore birds use these areas as rookeries and feeding grounds. Mangrove swamps also serve as protective barriers in estuaries against excessive wave action during tropical storms.

This Riomar soil is in capability subclass VIIIw.

55—Floridana mucky fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 5 to 100 acres. Slopes are concave and are less than 1 percent.

Typically, the surface layer is about 19 inches thick. The upper 14 inches of the surface layer is black mucky fine sand, and the lower 5 inches is very dark gray fine sand. The subsurface layer is grayish brown sand to a depth of 35 inches. The subsoil extends to a depth of about 50 inches. The upper 9 inches of the subsoil is dark grayish brown sandy clay loam, and the lower 6 inches is dark grayish brown sandy loam. The substratum to a depth of 80 inches or more is grayish brown loamy fine sand.

Included with this soil in mapping are small areas of Chobee, Manatee, Riviera, Holopaw, Winder, and Samsula soils. Also included are soils that are similar to Floridana soil but have a muck surface layer that is more than 15 inches thick. The included soils make up less than 20 percent of the map unit.

This soil is ponded for 6 to 9 months during most years. The water table is within 10 inches of the surface for most of the remainder of the year. Permeability is rapid in the surface and subsurface layers and slow to very slow in the subsoil. The available water capacity is medium in the surface layer, subsoil, and substratum and low in the subsurface layer. Natural fertility is medium, and the organic matter content is high.

Natural vegetation consists of sand cordgrass, maidencane, St.-Johnswort, scattered waxmyrtle, and other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

This Floridana soil is not suited to cultivated crops because of ponding. Most areas do not have a suitable drainage outlet, which makes an adequate drainage system difficult to establish. However, even if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil still has poor suitability for many vegetable crops. Important management practices are good seedbed preparation, including bedding of rows, and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suitable for citrus trees. However, citrus trees grow fairly well if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly. A water control system that maintains good drainage to a depth of about 4 feet is needed. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizer are needed.

In its natural state, this soil is not suited to improved pasture grasses. However, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass and improved bahiagrass grow well if properly managed. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

This Floridana soil generally is not used for woodland because of ponding and because a suitable drainage outlet is not available.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. Floridana soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Fill material to raise the level of the land surface is needed for septic tank absorption fields, local roads and streets, and small commercial buildings and for playground use. Sidewalls of shallow excavations should be shored. Mounding may be needed for septic tank absorption fields.

This Floridana soil is in capability subclass VIIw.

56—Pineda fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 4 to 50 acres. Slopes are concave and are less than 1 percent.

Typically, the surface layer is grayish brown fine sand about 2 inches thick. The subsurface layer, to a depth of 11 inches, is light brownish gray fine sand. The subsoil extends to a depth of about 52 inches. The upper part of the subsoil, to a depth of 32 inches, is brownish yellow and light yellowish brown fine sand. The lower part is gray and greenish gray sandy loam that has light olive brown and olive brown mottles. Intrusions of light yellowish brown fine sand extend from the upper part of the subsoil into the sandy loam lower part. The substratum to a depth of 80 inches or more is greenish gray loamy fine sand.

Included with this soil in mapping are small areas of Floridana, Riviera, Malabar, Holopaw, Oldsmar, Wabasso, and Winder soils. The included soils make up less than 15 percent of the map unit.

This Pineda soil is ponded for 6 to 9 months or more each year. The water table is within 10 inches of the surface for 2 to 4 months and at a depth of 10 to 40 inches for most of the remainder of the year. Permeability is rapid in the surface and subsurface layers. It is rapid in the upper part of the subsoil and slow or very slow in the lower part and moderately rapid in the substratum. The available water capacity is very low in the surface and subsurface layers. It is very low in the upper part of the subsoil and moderate in the lower part and very low in the substratum. Natural fertility and the organic matter content are low.

Natural vegetation consists of blue maidencane, broomsedge, St.-Johnswort, pipewort, white bracted sedge, milkwort, scattered waxmyrtle, sand cordgrass, cabbage palm, bluestems, and various other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

This Pineda soil is very poorly suited to cultivated crops. However, it is moderately well suited to vegetable crops if a water control system is installed to protect the soil from ponding and to remove excess surface water rapidly. Good management includes bedding of rows and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer should be applied according to the need of the crop.

Under natural conditions, citrus trees are poorly suited to this soil. A water control system that maintains good drainage to a depth of about 4 feet is needed. Planting trees on beds lowers the effective depth of the water table. A close-growing cover crop sould be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizer are needed.

This soil has fair suitability to pasture and hay crops. Pangolagrass and improved bahiagrass grow well if properly managed. A water control system should be installed to remove excess surface water after heavy rains. Regular applications of fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary before trees can be planted. Equipment limitations and seedling mortality are the main concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth to the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods of high water levels reduce the grazing value of the site. Pineda soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Fill material to raise the level of the land surface is needed for septic tank absorption fields, local roads and streets, and small commercial buildings and for playground use. Sidewalls of shallow excavations should be shored. Mounding may be needed for septic tank absorption fields.

This Pineda soil is in capability subclass VIIw.

57—Holopaw fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 4 to 50 acres. Slopes are concave and are less than 1 percent.

Typically, the surface layer is dark gray fine sand about 8 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 47 inches. The subsoil, to a depth of 65 inches, is dark gray and grayish brown sandy loam that has pockets of grayish brown fine sand. The substratum to a depth of 80 inches or more is olive gray loamy fine sand that has pockets of grayish brown fine sand.

Included with this soil in mapping are small areas of Floridana, Manatee, Malabar, Pineda, and Riviera soils. Also included are soils that are similar to Holopaw soil but have a muck or mucky fine sand surface layer less than 15 inches thick. The included soils make up less than 20 percent of the map unit.

This soil is ponded for 6 to 9 months or more each year. The water table is within 10 inches of the surface for 2 to 4 months and between a depth of 10 and 40 inches for most of the remainder of the year. Permeability is rapid in the surface and subsurface layers and is moderately slow to moderate in the subsoil. The available water capacity is low to very low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. Natural fertility and the organic matter content are low.

Natural vegetation consists of blue maidencane, broomsedge, St.-Johnswort, waxmyrtle, panicums, sand cordgrass, white bracted sedge, pipewort, stiff paspalum, and various other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this Holopaw soil is not suited to cultivated crops. However, even if a complete water control system is installed to protect the soil from ponding and to remove excess water rapidly, this soil still has poor suitability for vegetable crops. Good management practices include crop rotation and use of soil improving crops and crop residue to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crop.

This soil has poor suitability for citrus trees. A water control system that maintains good drainage to a depth of about 4 feet is needed. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop should be planted between tree rows to protect the soil from blowing. Regular applications of fertilizer are needed.

This soil has fair suitability for pasture and hay crops. Pangolagrass and improved bahiagrass grow well if properly managed. A water control system should be installed to remove excess surface water after heavy rains. Regular applications of fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary before trees can be planted. Seedling mortality, plant competition, and equipment limitations are concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. Holopaw soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Fill material to raise the level of the land surface is needed for septic tank absorption fields, local roads and streets, and small commercial buildings and for playground use. Sidewalls of shallow excavations should be shored. Mounding may be needed for septic tank absorption fields.

This Holopaw soil is in capability subclass VIIw.

58—Samsula muck. This soil is nearly level and very poorly drained. It is in depressions, poorly defined drainageways, and freshwater marshes and swamps. The mapped areas range from 3 to 150 acres. Slopes are concave and are less than 2 percent.

Typically, the surface layer is about 38 inches thick. The upper 20 inches of the surface layer is black, well decomposed muck, the next 6 inches is very dark gray muck, and the lower 12 inches is very dark gray sand. The underlying material is gray sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Delray, Floridana, Myakka, and Pompano depressional soils. Also included are soils that are similar to Samsula soil but have a muck surface layer that is less than 15 inches thick or have pockets of muck in the upper part of the mineral layer. The included soils make up less than 20 percent of the map unit.

This soil is ponded for 6 to 9 months during most years. The water table is within 10 inches of the surface for most of the remainder of the year. Permeability is rapid throughout. Internal drainage is slow and is inhibited by the water table. The available water capacity is very high in the organic material and very low in the underlying sand. Natural fertility is medium, and the organic matter content is very high.

Most areas of this soil are in natural vegetation consisting of cypress, red maple, St.-Johnswort, sawgrass, pickerelweed, sedges, maidencane, ferns, and other water-tolerant grasses. Areas of this soil provide cover for deer and excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this Samsula soil is not suited to cultivated crops because of ponding. Most areas do not have a suitable drainage outlet, which makes an adequate drainage system difficult to establish. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil has fair suitability to some vegetable crops. A properly designed and maintained water control system removes the excess water when crops are on the soil and keeps the soil saturated at all other times. Good management practices include seedbed preparation and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suited to citrus trees. It has poor suitability even if intensive management practices, such as bedding of rows, are used and the water control system is adequate.

In its natural state, this soil has poor suitability for improved pasture grasses. However, if a water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

This soil is not suited to pine trees.

This soil generally is not used for rangeland. Samsula soil is in the Cypress Swamp ecological plant community.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures are needed to overcome excessive wetness. Organic materials need to be removed and backfilled with suitable soil material for urban use. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored. Water control measures are needed. Mounding may be needed for septic tank absorption fields.

This Samsula soil is in capability subclass VIIw.

59—Lokosee fine sand. This soil is nearly level and poorly drained. It is in poorly defined drainageways and on low hammocks and low, broad flats adjacent to the flatwoods. The mapped areas range from 20 to 300 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 3 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 10 inches. The subsoil extends to a depth of 80 inches or more. The upper 19 inches of the subsoil is mottled very pale brown and brownish yellow sand, the next 16 inches is strong brown and very pale brown sand. The next 10 inches is dark brown sand, and the next 25 inches is light brownish gray and pale brown sand. Below that is greenish gray sandy clay loam.

Included with this soil in mapping are small areas of Malabar, Holopaw, Pineda, Riviera, Oldsmar, and EauGallie soils. Also included are areas of soils that do not have a light colored subsurface layer or a light colored subsoil between the weakly stained layer and the argillic horizon, areas of soils that have pockets or intrusions of overlying sandy material that extend into the argillic horizon, and some areas of soils that have a calcareous layer below the subsurface layer. The included soils make up less than 15 percent of the map unit.

The water table is within a depth of 10 inches of the surface for 2 to 4 months and between a depth of 10 to 40 inches for more than 6 months. During extended dry seasons, it recedes to a depth of more than 40 inches. The available water capacity is low in the surface and subsurface layers. It is low in the upper part of the subsoil and moderate in the lower part. Permeability is rapid in the surface and subsurface layers. It is rapid in the upper part of the subsoil and slow or very slow in the lower part. Natural fertility and the organic matter content are low.

A large part of the acreage has been cleared and is in improved pasture or citrus. Natural vegetation consists of scattered slash pine, cabbage palm, inkberry, waxmyrtle, scattered sawpalmetto, blue maidencane, pineland threeawn, sand cordgrass, chalky bluestem, creeping bluestem, low panicums, and various weeds and grasses.

This Lokosee soil has poor suitability for cultivated crops. However, it has fair suitability for vegetable crops if a water control system is installed to remove excess water rapidly and to provide for subsurface irrigation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the need of the crop.

This soil has fair suitability for citrus trees if a properly designed water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizer are needed.

This soil has good suitability for pasture and hay crops. Pangolagrass, improved bahiagrasses, and clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer, and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine is the best adapted specie to plant. Water control measures are needed to remove excess surface water. Equipment limitations and seedling mortality are the main concerns in management.

This soil is well suited to desirable range plant production. The dominant forage is creeping bluestem, chalky bluestem, and blue maidencane. Management practices should include deferred grazing and brush control. Lokosee soil is in the Cabbage Palm Flatwoods range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures and fill material are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Mounding may be needed for septic tank absorption fields. The sandy surface layer should be stabilized for recreational uses. Sidewalls of shallow excavations should be shored.

This Lokosee soil is in capability subclass IVw.

60—Pompano fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 5 to 100 acres. Slopes are concave and range from 0 to 1 percent.

Typically, the surface layer is black fine sand about 6 inches thick. The underlying material extends to a depth of 80 inches or more. The upper 4 inches of the underlying material is gray fine sand that has few to common dark gray splotches and streaks, and the lower 70 inches or more is gray fine sand.

Included with this soil in mapping are small areas of Myakka and Manatee soils. Also included are small areas of soils that are similar to Pompano soil but have an organic surface layer up to 10 inches thick and also small areas of soils that have a weakly stained layer of organic material at a depth of more than 20 inches. The included soils make up less than 20 percent of the map unit.

This soil is ponded for 6 to 9 months during most years. The water table is within 10 inches of the surface for most of the remainder of the year. Permeability is rapid throughout. The available water capacity is very low. Natural fertility and the organic matter content are low.

Natural vegetation consists of baldcypress, scattered cabbage palm, red maple, waxmyrtle, Carolina willow, St. Johnswort, maidencane, stiff paspalum, sedges, and other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops because of ponding. Most areas do not have a suitable drainage outlet, which makes an adequate drainage system difficult to establish. Even if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil still has poor suitability for vegetable crops. Good management practices are seedbed preparation, including bedding of rows, and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suited to citrus trees. It has poor suitability even if intensive management practices, such as bedding of rows, are used and the water control system is adequate.

In its natural state, this soil has poor suitability for improved pasture grasses. However, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Controlled grazing is needed.

The potential productivity of this soil for pine trees is moderate. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary before trees can be planted. Equipment limitations and seedling mortality are the main concerns in management.

This soil generally is not used for rangeland. Pompano soil is in the Cypress Swamp ecological plant community.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding. Water control measures are needed to overcome excessive wetness. Fill material to raise the level of the land surface is needed for urban use. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Sidewalls of shallow excavations should be shored. Water control measures are needed. Mounding may be needed for septic tank absorption fields.

This Pompano soil is in capability subclass VIIw.

61—Delray muck. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 5 to 200 acres. Slopes are concave and are less than 2 percent.

Typically, the surface layer is about 21 inches thick. The upper 3 inches of the surface layer is black muck, the next 14 inches is black fine sand, and the lower 4 inches is very dark grayish brown sand. The subsurface layer, to a depth of 45 inches, is very dark grayish brown and grayish brown sand. The subsoil is dark grayish brown sandy clay loam to a depth of 52 inches. The substratum to a depth of 80 inches or more is gray sandy loam.

Included with this soil in mapping are small areas of Floridana, Holopaw, and Oldsmar depressional soils. Also included are soils that are similar to Delray soil but do not have a muck surface layer or do not have pockets of muck throughout the surface layer and also an area of soils that have a muck surface layer that is more than 15 inches thick. The included soils make up less than 20 percent of the map unit.

This soil is ponded for 6 to 9 months during most years. The water table is within 10 inches of the surface for most of the remainder of the year. Permeability is rapid in the surface and subsurface layers and moderate to moderately rapid in the subsoil. The available water capacity is medium in the surface layer and subsoil and low in the subsurface layer. Natural fertility is medium, and the organic matter content is high.

Natural vegetation consists of cypress, pickerelweed, maidencane, arrowhead, sand cordgrass, sedges, rushes, ferns, and other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this Delray soil is not suited to cultivated crops because of ponding. Most areas do not have a suitable drainage outlet, which makes an adequate drainage system difficult to establish. Even if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly, this soil still has poor suitability for many vegetable crops. Good management practices are seedbed preparation, including bedding of rows, and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suited to citrus trees. However, the suitability for citrus trees is fair if intensive management practices and soil improving measures are used and a water control system is installed to remove excess water rapidly. A water control system that maintains good drainage to a depth of about 4 feet is needed. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop should be maintained between tree rows to protect the soil from blowing. Regular applications of fertilizer are needed.

In its natural state, this soil is not suited to improved pasture grasses. However, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine is the best adapted specie to plant. Water control measures are necessary before trees can be planted. Equipment limitations, plant competition, and seedling mortality are the main concerns in management.

This soil is moderately suited to desirable range plant production. The dominant forage is maidencane and cutgrass. Because the depth of the water table fluctuates throughout the year, a natural deferment from grazing occurs. This rest period increases forage production, but these periods during high water levels reduce the grazing value of the site. Delray depressional soil is in the Freshwater Marshes and Ponds range site.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses.

Water control measures are needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material can reduce excessive seepage. Fill material to raise the level of the land surface is needed for septic tank absorption fields, local roads and streets, and small commercial buildings and for playground use. Sidewalls of shallow excavations should be shored. Mounding may be needed for septic tank absorption fields.

This Delray soil is in capability subclass VIIw.

62—Chobee mucky loamy fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas. The mapped areas range from 5 to 100 acres. Slopes are concave and range from 0 to 1 percent.

Typically, the surface layer is 5 inches of black mucky loamy fine sand. The subsoil extends to a depth of about 42 inches. The upper 5 inches of the subsoil is black sandy clay loam, the next 18 inches is very dark gray sandy clay loam that has few medium pockets of loamy sand, and the lower 14 inches is dark gray sandy clay loam that has few grayish brown and very dark gray streaks and splotches. The substratum extends to a depth of 80 inches or more. The upper 8 inches of the substratum is greenish gray sandy loam that has gray and dark gray mottles and streaks along root channels. The lower 30 inches or more is greenish gray loamy sand that has few dark gray streaks along root channels and few light gray shell fragments.

Included with this soil in mapping are small areas of Floridana and Manatee depressional soils. Also included are small areas of soils that are similar to Chobee soil but have an organic surface layer that generally is 2 to 4 inches thick but in a few places it can be up to 10 inches thick. The included soils make up less than 20 percent of the map unit.

This soil is ponded for 6 to 9 months during most years. The water table is within 10 inches of the surface for most of the remainder of the year. Permeability is rapid in the surface layer, moderately slow to very slow in the subsoil, and moderately rapid in the substratum. The available water capacity is high in the surface layer and moderate in the subsoil and substratum. Natural fertility and the organic matter content are high.

Natural vegetation consists of red maple, cabbage palm, scattered cypress, sawgrass, waxmyrtle, Carolina willow, ferns, sedges, pickerelweed, greenbrier, and other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this Chobee soil is not suited to cultivated crops because of ponding. Most areas do not have a suitable drainage outlet, which makes an adequate drainage system difficult to establish. However, if intensive management practices and soil improving measures are used and a water control system is installed to remove excess surface water rapidly, this soil has fair suitability for many vegetable crops. Good management practices are seedbed preparation, including bedding of rows, and crop rotation. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter. Fertilizer and lime should be applied according to the need of the crop.

In the natural state, this soil is not suited to citrus trees. It has poor suitability even if intensive management practices, such as bedding of rows, are used and the water control system is adequate.

In its natural state, this soil has poor suitability for improved pasture grasses. However, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

This soil is not suited to pine trees. The potential productivity is very low for this use.

This soil generally is not used for rangeland. Chobee soil is in the Swamp Hardwoods ecological plant community.

Ponding is a severe limitation to use of this soil for building site development, sanitary facilities, and recreational uses. Water control measures are needed to overcome excessive wetness. Fill material to raise the level of the land surface is needed for many urban uses. Sidewalls of shallow excavations should be shored. Water control measures should be used. Mounding may be needed for septic tank absorption fields.

This Chobee soil is in capability subclass VIIw.

63—Kesson muck. This soil is nearly level and very poorly drained and is frequently flooded. It is in tidal swamps and marshes. This soil formed in thick marine deposits of sand and shell fragments. These swamps and marshes are at or near sea level and are adjacent to the Indian River. Tidal water inundates most of these areas at high tide. Some areas of this soil have been leveled off and are used as mosquito control structures. Individual mapped areas range from 20 to 100 acres. Slopes are less than 1 percent.

Typically, the surface layer is about 6 inches thick. It is dark reddish brown muck that is about 30 percent unrubbed fiber and less than 5 percent rubbed. The underlying material is grayish brown and dark greenish gray fine sand mixed with about 15 to 25 percent sand-size shell fragments to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Pompano, Captiva, and McKee soils. Also included are soils that are similar to Kesson soil but have an organic surface layer 8 to 15 inches thick. The included soils make up less than 15 percent of the map unit.

Under natural conditions, this soil is flooded during normal high tides. Permeability is moderately rapid. The available water capacity is high in the surface layer and low in the underlying materials. Natural fertility is high for saltwater-tolerant plants. The organic matter content is high.

The native vegetation consists of red, black, and white mangroves. In some areas are searocket, saltwort, perennial glasswort, seashore saltgrass, and seashore paspalum.

Because of tidal flooding, Kesson soil is not suited to cropland, citrus, improved pasture, rangeland, or woodland. Kesson soils are in the Mangrove Swamps ecological plant community.

This soil is in mangrove swamps, which are unique and biologically productive areas that are very important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds and nurseries. Birds use these areas as rookeries and feeding grounds. Mangrove swamps also serve as protective barriers in estuaries against excessive wave action during tropical storms.

This soil is not suited to urban use because of tidal flooding.

This Kesson soil is in capability subclass VIIIw.

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 avoid 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 behavior 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 for 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 recreation 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 that is in harmony with nature.

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 crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

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

Approximately 132,000 acres in Indian River County was used for crops and pasture in 1983 *(7)*. Of this total, about 63,000 acres was planted to citrus, mainly oranges and grapefruit. Small acreages of tangelos and tangerines also were grown. Of the total acreage in the county, about 62,000 acres was used for improved pasture. About 7,000 acres was used for various crops, such as field corn, sorghum, soybeans, and rice. Some small areas were planted to sweet corn, cabbage, tomatoes, melons, strawberries, and nursery plants.

The western and northern parts of the county are generally well suited to increased citrus and vegetable production. Approximately 150,000 acres of potentially good cropland is presently used for pasture, native range, and woodland. Conversion of this land to crops would require overcoming serious limitations or hazards, such as wetness, rapid permeability, and low natural fertility. A water control system to remove excess water in wet seasons and also to provide water through subsurface irrigation in dry seasons is needed if citrus and vegetable crops are to be grown. In addition, by implementing the latest crop production technology along with the information provided by this soil survey, food production would be increased on all cropland in the survey area.

Although the potential for increased food production exists in Indian River County, several factors must also be considered in selecting crops and growing sites. Among these factors are the economic conditions, the risk of possible adverse weather conditions, the availability of suitable drainage outlets, the availability of an adequate supply of freshwater for irrigation, and environmental considerations. The environmental considerations include possible pollution of nearby waters and the desirability of planners and developers to use the land for urban use.

While considering the possibilities of increasing food production in the county, knowledge of soils and soil properties is necessary. Some of the major soil properties that should be considered are water and wind erosion, wetness, soil fertility, and tilth.

Soil erosion is mainly a hazard on disturbed soil in areas where development for urban use or farming operations occur. Soil erosion by water during intense storms lowers the productivity of the soil by washing away the more fertile topsoil. It also increases the pollution of streams by sediment, which, as an end result, detracts from the quality of water for municipal use, for recreational uses, and for use as habitat for fish and wildlife. Erosion control practices include the use of a protective surface cover to reduce runoff and increase infiltration by mulching and by temporarily seeding of vegetation.

Wind erosion is a major problem on the sandy soils and on the muck soils in the survey area. Wind erosion reduces soil fertility by removing fine soil particles and organic matter; damages crops and young citrus trees by sandblasting; spreads diseases, insects, and weed seeds; creates health hazards and cleaning problems in urban areas that have been cleared of vegetation; and lowers air quality. Maintaining a vegetative cover and surface mulching minimize soil blowing.

Clearing and disturbing only the minimum area needed for work and improvements, mulching, seeding, and using cover crops reduce soil and wind erosion. Information about erosion control practices for each kind of soil is available from the local office of the Soil Conservation Service.

Soil drainage is a major concern in management on most soils that are presently used for crops and pasture. Under natural conditions, approximately 75 percent of the soils in the county is either poorly drained or very poorly drained. Some soils, such as Floridana, Chobee, and Manatee soils, are naturally so wet that the growing of crops or pasture is generally not feasible without extensive water control systems. However, if a good water control system is installed to remove excess water rapidly, these wet soils are moderately suited to many vegetable crops and improved pasture. In addition, many of the poorly drained soils, such as Myakka, Riviera, and Immokalee soils, have a sandy surface layer and a low available water capacity and are droughty during dry periods. In managing these soils, a water control system is needed to remove excess water in wet periods and provide water through subsurface irrigation in dry periods. The design of the drainage and irrigation system varies according to the kind of soil and to the kinds of crops and pasture that are to be grown on the soil.

Successful citrus production, which is extensively practiced on the poorly drained soils throughout the county, requires intensive management. To maintain the water table at a depth of about 4 feet, a water control system is needed. Also, planting trees on beds is an effective way to lower the water table. Management practices, such as flood irrigation and low volume or drip irrigation, should be used on poorly drained soils during dry periods, and also these practices should be used to protect against frost damage.

Some soils, such as Pepper soils, have a weakly cemented subsoil; and some, such as Winder soils, have a shallow, loamy subsoil. These subsoils act as restricting layers and impede the movement of water through the soil. The wet soils that have a weakly cemented subsoil or a shallow, loamy subsoil often remain wet long after the wet period. A cemented subsoil or other impervious layer can be a severe limitation to soil drainage, which is required for most uses, but it can be used to advantage to maintain a shallow water table, which is required for specific crops.

Organic soils, such as Terra Ceia and Gator soils, need special drainage and irrigation systems to prevent the oxidation and subsidence of these soils. These systems are needed to keep the water table at the highest practical level for the crop, for tilling during the growing season, and for raising the water table to the surface the remainder of the time. Information about a water control system designed for each kind of soil is available from the local office of the Soil Conservation Service.

Soil fertility is naturally low in most of the soils in the county. The dark surface mineral soils, such as Chobee, Delray, Floridana, and Jupiter soils, have more organic matter and more plant nutrients. Organic soils, such as Terra Ceia and Gator soils, require special fertilizers because they are low in copper, selenium, and other trace elements.

Many of the soils in the county have a surface layer that is naturally strongly acid. Applications of lime are required to raise the pH level sufficiently if clover and other crops that need neutral pH are grown on these strongly acid soils. The level of nitrogen, available phosphorus, and potash are naturally low in most of the mineral soils. On all the soils, additions of lime and fertilizer should be based on the results of soil tests, on crop-growth requirements, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth refers to the condition of the soil in relation to plant growth. It is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils with good tilth are granular, porous, and easily cultivated. Most of the mineral soils in the county have a sandy surface layer that is light in color and low in organic matter. Generally, the structure of the surface layer of such soils is weak, or the soils are structureless. If the soil becomes very dry, a slight crust tends to form on the surface, which impedes the rate of infiltration and increases runoff. Regular additions of crop residue and other organic material improve soil structure. Soil improving crops and crop residue should be used to protect the soil from erosion and maintain organic matter.

Pastures in the county are used to produce forage for beef cattle, cow-calf operations, and dairy cattle. The major perennial pasture grass grown in the county consists primarily of improved bahiagrass. A mixture of white clover and improved bahiagrass is also grown in the area. Some farmers overseed rye on bahiagrass pastures in the fall for winter and spring grazing.

Differences in the amount and kind of pasture yields are closely related to the kind of soil. Effective pasture management should include maintaining adequate moisture levels in droughty soils; water control measures to remove excess surface water after heavy rains on soils with a high water table; regular applications of lime and fertilizers; and pasture rotation to prevent overgrazing. Table 5 shows, for each kind of soil, the estimated annual production of forage in animal-unit months for the major forage plants presently grown in the survey area.

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 5. 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 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 insures 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 table 5 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 Soil 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 use as cropland. 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. These levels are defined in the following paragraphs.

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

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 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, IIe. 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.

The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w* or *s*.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Rangeland

Clifford W. Carter and Greg Hendricks, range conservationists, Soil Conservation Service, assisted in preparing this section.

Native grasses, forbs, and browse plants from rangeland are an important resource to livestock producers in Indian River County. This forage is readily available. It is economical and provides important roughage needed by cattle. There are approximately 65,301 acres of rangeland in Indian River County, or about 21 percent of the survey area. Most of this range acreage is in the western one-half and northern one-third of the county.

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 7 shows, for each soil, the range site and the total annual production of vegetation in favorable, average, and unfavorable years. Only those soils that are used as rangeland or are suited to use as rangeland are listed. Potential production refers to the amount of herbage that can be expected to grow on a well managed range site. Yields are expressed in table 7 in terms of pounds of air-dry herbage per acre for range in excellent condition in favorable, average, and unfavorable years. Favorable years are those in which climatic factors, such as rainfall and temperature, are favorable for plant growth. Moisture content in the plants varies as the growing season progresses and is not a measure of productivity. Herbage refers to total vegetation produced and does not reflect forage value or grazing potentials. Explanation of the column headings in table 7 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites 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.

Total 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. Total production 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, but 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 average year, growing conditions are about normal. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. 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. It does not have a specific meaning that pertains to the present plant community in a given use.

The 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, reduction 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.

Range Sites

A range site has the potential to support a native plant community typified by an association of species different from that of other range sites. The differentiation is based upon significant differences in kind of species or total productivity. Each site has significant differences in the kinds and amounts of native plant vegetation it produces, and each requires different management.

The vegetation that originally grew on a range site is called the native plant vegetation. It generally is the most productive and most suitable vegetation for livestock on that particular site, and it maintains itself as long as the environment does not change.

The native plant vegetation consists mainly of three kinds of plants—decreasers, increasers, and invaders. *Decreasers* generally are the most palatable native plants, and they decrease in abundance if the range is under continuous heavy grazing. *Increasers* are plants less palatable to livestock; they increase for a while under continued heavy grazing, but are finally eliminated. *Invaders* are plants native to the site in small amounts, but they have little value for forage. These invaders tend to increase as the range site deteriorates from excessive grazing over a period of years.

Range condition is a measure of the current productivity of the range in relation to its potential. Four condition classes are used to measure range condition. These are—

- Excellent condition—Producing 76 to 100 percent of the potential
- Good condition—Producing 51 to 75 percent of the potential
- Fair condition—Producing 26 to 50 percent of the potential
- Poor condition—Producing 0 to 25 percent of the potential

Only about 15 percent of the natural vegetative communities are in excellent condition for use as range in Indian River County. The amount that is in fair and poor condition is estimated at about 60 percent.

The productivity of the range sites is closely related to the natural drainage of the soil and to the soils' fertility. The wettest soils, such as those in marshes and sloughs, produce the most vegetation. The deep, droughty soils of the sand ridges normally produce the least amount of herbage annually.

All sites tend to be slightly wetter in this county than they are in more northern counties. The wetness has some adverse effects on livestock health and mobility. However, these conditions are offset by the increased grass production, resulting from additional moisture.

Management of the range sites should be planned with the potential productivity in mind. Sites with the highest production potential should be given highest priority if economic considerations are important. Major management considerations revolve around livestock grazing—the length of time that the sites are grazed, the time of the year that they are grazed, and the length of time and the season that the sites are rested. Other management considerations are the grazing pattern of livestock within a pasture that contains more than one range site and the palatability of the dominant plants within the site. Manipulation of a range site often involves mechanical brush control, controlled burning, and especially controlled livestock grazing. Predicting the effects of these practices on range sites is important. Proper management results in maximum sustained production, conservation of the soil and water resources, and improvement of the habitat for many wildlife species.

There are six range sites in Indian River County that are important to the livestock industry. Also in the county are several other sites or ecological plant communities, but they have little livestock use. The most important in terms of acreage are the South Florida Flatwoods and the Slough range sites. A brief description of these six range sites follows.

South Florida Flatwoods—This range site consists of nearly level areas. Scattered to numerous pine trees are common, and sawpalmetto, inkberry and other woody plants also are scattered throughout. This range site produces an abundant quantity of grasses. Creeping bluestem is the dominant grass with significant amounts of indiangrass, chalky bluestem, panicum, and pineland threeawn. As these grasses deteriorate because of uncontrolled livestock grazing and annual burning, sawpalmetto and pineland threeawn increase significantly. Because of their higher palatability, bluestem, panicum, and indiangrass decrease. If the range site is in excellent condition, annual production is approximately 6,000 pounds of air-dry herbage per acre in favorable growth years to 3,000 pounds per acre in unfavorable growth years. The relative percentages of total annual production in excellent condition are approximately 75 percent grasses and grasslike plants, 10 percent forbs, and 15 percent woody plants and trees. Boca, EauGallie, Electra, Immokalee, Myakka, Oldsmar, Pepper, and Wabasso soils are included in this range site.

Slough—This range site consists of open grassland where nearly level areas act as broad natural drainage courses in the flatwoods. The potential plant community is dominated by blue maidencane, chalky bluestem, and toothache grass. These grasses are all readily grazed by livestock. If overgrazing continues for prolonged periods, carpetgrass, pineland threeawn, and sedges replace the better grasses. Average annual production of air-dry plant material from all sources varies from about 8,000 pounds per acre in areas that are in excellent condition in favorable growing years to approximately 4,000 pounds per acre in unfavorable years. If range conditions are excellent, the annual vegetation production is approximately 85 percent grasses and grasslike plants, 15 percent forbs, and a few woody plants and trees. Chobee, Holopaw, Pineda, and Pompano soils are included in this range site.

Freshwater Marshes and Ponds—This range site is an open grassland marsh or pond. It has potential for producing significant amounts of maidencane and cutgrass. The water level fluctuates throughout the year. During periods of high water, there is a natural deferment from livestock grazing. This site is a preferred grazing area, but prolonged overgrazing causes deterioration of the vegetative community. Overgrazing causes pickerelweed to increase, and, in some places, causes sawgrass to increase. Prolonged overgrazing causes buttonbush, willows, and waxmyrtle to increase. If in excellent condition, the fresh marshes and ponds sites are capable of producing in excess of 10,000 pounds of air-dry material per acre in favorable growing years. Production in unfavorable growing years is approximately 5,000 pounds per acre. If the site is in excellent condition, the annual vegetative production is approximately 80 percent grasses and grasslike plants, 15 percent forbs, and 5 percent woody plants and trees. Canova, Delray, Floridana, Floridana depressional, Holopaw depressional, Manatee, Manatee depressional, Myakka depressional, Oldsmar depressional, Pineda depressional, and Riviera depressional soils are included in this range site.

Cabbage Palm Hammocks—This range site is on nearly level, slightly higher "islands" in broad nearly level areas. The areas are generally 1 to 5 acres, and they are scattered throughout the landscape. The site has low potential for producing forage plants because of a dense canopy of cabbage palm trees. These are preferred shading and resting areas for cattle and, as such, are usually severely denuded. Creeping bluestem and beaked panicum are the dominant grasses when the site is in excellent condition. In a deteriorated state, however, carpetgrass and several threeawn species dominate the understory. Because of reduced sunlight, the photosynthectic process is not able to produce adequate plant sugars; therefore, desirable forage plants that grow in shaded areas lose much of their palatability. This plant community is preferred as a resting area and is rarely used as a grazing area. If in excellent condition, the Cabbage Palm Hammocks site is capable of producing 3,500 pounds of air-dry material in favorable growing years. Production in unfavorable years is only about 1,500 pounds per acre. If the site is in excellent condition, the annual production is approximately 55 percent grasses and grasslike plants, 20 percent forbs, and 25 percent woody plants and trees. Winder and Jupiter soils are included in this range site.

Sand Pine Scrub—This range site is on high dunelike sand ridges. It has limited potential for producing native forage plants. This site supports a fairly dense stand of sand pine and a dense, woody understory. Livestock do not use this site if other range sites are available. Principal forage plants are bluestems, indiangrass, and panicum. Numerous legumes and forbs grow in these areas. Average annual production of air-dry plant material from all sources varies from approximately 3,500 pounds per acre in areas that are in excellent condition in favorable growing years to approximately 1,500 pounds per acre in unfavorable growing years. If the range site is in excellent condition, the total annual production is approximately 40 percent grasses and grasslike plants, 20 percent forbs, and 40 percent woody plants and trees. Archbold, Astatula, Jonathan, Orsino, Paola, Pomello, Satellite, and St. Lucie soils are included in this range site.

Cabbage Palm Flatwoods—This range site consists of nearly level areas characterized by cabbage palm and sawpalmetto trees scattered throughout the landscape. This site is a preferred livestock grazing area. It produces a high quality and quantity of forage plants if it is in excellent condition. Creeping, chalky, and south Florida bluestems are the dominant forage grasses along with several desirable panicum species. Pineland threeawn and sawpalmetto increase as the area deteriorates. If the range is in excellent condition, the average annual production of air-dry plant material from all sources is approximately 9,000 pounds per acre in favorable years and approximately 4,500 pounds per acre in unfavorable years. The total annual production is approximately 70 percent grasses and grasslike plants, 15 percent forbs, and 15 percent woody plants and trees. Lokosee, Malabar, and Riviera soils are included in this range site.

Other ecological plant communities in Indian River County and their respective soils that are not placed in a native range site are: South Florida Coastal Strand (Beaches and Canaveral, Captiva, and Palm Beach soils); Cypress Swamp (Samsula soils); Mangrove Swamp (McKee, Riomar, and Kesson soils); Salt Marsh (Perrine Variant soils); and Swamp Hardwoods (Chobee depressional, Gator, Pompano depressional, and Terra Ceia soils). These sites generally provide little forage for livestock and most are not accessible for cattle grazing *(5, 15)*.

Woodland Management and Productivity

Paul Palmiotto, urban forester, Florida Division of Forestry, helped prepare this section.

Forests in Indian River County *(12)* make up about 44,071 acres, or 13.85 percent of the total land area. Of this acreage, 36,925 acres is commercial forest land, and 7,146 acres is unproductive forest land. In the commercial forest areas, there are five main forest types: longleaf-slash, oak-pine, scrub oak-sand hickory, oak-hickory, and oak-gum-cypress.

The *longleaf-slash pine* forest type makes up 15,429 acres. This forest type is commonly on the EauGallie-Oldsmar-Wabasso, Myakka-Immokalee, and EauGallie-Myakka-Riviera soil map units. In Indian River County, the longleaf-slash type is in areas that are 2.5 to 3 miles wide. These areas are west of the Atlantic Coastal Ridge that extends the length of the county and in the western part of Indian River County, west of Blue Cypress Lake. This forest type is characterized by longleaf or slash pines, single or in combination, that makes up a plurality of the stocking. Common associates are laurel oak, live oak, myrtle oak, cabbage palm, redbay, and waxmyrtle.

The *oak-pine* forest type makes up 8,991 acres. This forest type is commonly on EauGallie-Oldsmar-Wabasso and Riviera-Pineda-Wabasso soil map units. In Indian River County the oak-pine forest type is in a broad band around U.S. Interstate Highway 95. In the southern part of the county, the band varies from 3 to 4 miles wide at U.S. Interstate Highway 95, and in the northern part, it varies from 8 to 10 miles wide. The oak-pine forest type is characterized mostly by hardwoods, generally upland oak, but pines make up 25 to 50 percent of the stocking. Common associates include gum, laurel oak, myrtle oak, redbay, and widely scattered slash pine. This forest type grows in conjunction with interspersed poorly defined drainageways or sloughs, which support red maple, coastal plain willow, loblolly-bay, sweetbay, and scattered cypress domes.

The *scrub oak-sand hickory* forest type makes up 5,994 acres. This forest type is commonly on the Astatula-Archbold-St. Lucie and Immokalee-Myakka-Satellite soil map units. In Indian River County, the scrub oak-sand hickory forest type is on the Atlantic Coastal Ridge, which runs north and south and extends the length of the county. This ridge is near the coast, and its western boundary is just west of U.S. Highway 1. Sand pine, turkey oak, sand live oak, and sand hickory are the major species. In the Roseland area, a cedar called *callistris* has been extensively planted and has now become naturalized.

The *oak-hickory* forest type includes forests in which upland oak or hickory, single or in combination, makes up a plurality of the stocking. If pines make up 25 to 50 percent of the stocking, this forest type would be classified as oak-pine. Common associates are sand hickory, scrub oak, laurel oak, sand live oak, Chapman oak, and myrtle oak.

The *oak-gum-cypress* forest type includes bottom land forests in which tupelo, blackgum, sweetgum, oak, or southern cypress, single or in combination, make up a plurality of the stocking. If pines make up 25 to 50 percent of the stand, it would be classified oak-pine. This forest type is commonly on the Floridana-Delray-Holopaw soil map unit. Common associates include baldcypress, red maple, tupelo, elm, willow, loblolly-bay, sweetbay, pond apple, hackberry and water hickory. There are 6,511 acres of this forest type in Indian River County. This forest type is primarily around the creeks leading to Blue Cypress Lake.

Seven major general soil map units in Indian River County support the major forest types and other areas of ecological importance.

The Myakka-Immokalee soil map unit is in the western part of the county, west of Blue Cypress Lake. On these soils are longleaf pine, south Florida slash pine, laurel oak, live oak, cabbage palm, and water oak.

The EauGallie-Oldsmar-Wabasso and Riviera-Pineda-Wabasso soil map units are in a broad band around U.S. Interstate Highway 95 and also between the Atlantic Coastal Ridge and Ten Mile Ridge. These bands vary from 3 to 4 miles wide in the southern part of the county and from 8 to 10 miles wide in the northern part. On these soils are widely scattered south Florida slash pine interspersed with poorly defined drainageways or sloughs that support red maple, coastal plain willow, loblolly-bay, sweetbay, and scattered cypress domes.

The Astatula-Archbold-St. Lucie and Immokalee-Myakka-Satellite soil map units are primarily along the Atlantic Coastal Ridge, which runs north and south and extends the length of the county. This ridge is near the coast, and its western boundary is just west of U.S. Highway 1. Sand pine, turkey oak, sand live oak, and sand hickory are the major trees. In Roseland, a cedar called the *callistris* has been extensively planted and has now become naturalized.

The Canaveral-Captiva-Palm Beach soil map unit is on the barrier island. The dominant vegetation consists of oak-bay-cabbage palm hammocks, including stoppers, strangler fig, gumbo limbo, and other West Indies species. However, the exotic Australian pine and Brazil peppertree are invading species.

The McKee-Quartzipsamments-St. Augustine soil map unit is along the Indian River and in various mosquito impoundment areas. The mangrove swamp plant association is on these soils. Red, white, black, and buttonwood mangroves are the dominant vegetation on these soils, but Australian pine and Brazil peppertree are invading species. Mangrove swamps are of vital importance to the estuarine food chain, and they provide valuable habitat for wildlife.

Timber management in Indian River County consists of natural regeneration on sites burned by wildfire or on sites that have been control burned to increase forage and to reduce excessive "rough," which is a dangerous fire hazard.

There is no market for pulpwood in the county because most woodlands are cleared for urban expansion and the wood is burned or deposited in landfill areas.

Presently, the more productive areas for forest management is in the western part of the county. Timber management is economical and should be encouraged. Improved slash pines and south Florida slash pines, are better suited to planting in this area. More detailed information on woodland management can be obtained from the local offices of the Soil Conservation Service, the State of Florida Division of Forestry, and the Cooperative Extension Service.

Table 8 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 (woodland suitability) 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 important trees. The number 2 indicates high productivity; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil and *s* indicates sandy texture. If a soil has more than one limitation, the priority is as follows: w and s.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in a well-managed woodland. The risk is *slight* if the expected soil loss is small.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. Site index was determined at age 25 years for south Florida slash pine and 50 years for all other species. 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.

Trees to plant are those that are suited to the soils and to commercial wood production.

Additional information on planning windbreaks and screens and on planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service, or from a nursery.

Recreation

The mild climate and wide variety of recreational facilities available throughout Indian River County attracts many people of all interests and ages to the area. With the rapid increase in population, including permanent winter residents and retirees, the need for more open space, outdoor recreation facilities, and cultural attractions will continue to grow. In 1984, approximately 1,400 acres was utilized for park and recreational facilities and for areas for beach access or walkways. As urbanization increases, the knowledge of soil properties can assist in planning and in the selecting of sites for additional recreation areas.

In table 9, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and 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 sewerlines. 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 recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as moderate or severe. *Moderate* means that limitations are somewhat restrictive and can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that one or more soil property is unfavorable and that limitations can be offset by soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

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 gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

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 free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

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. They have moderate slopes and few or no stones or boulders on the surface.

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. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Wildlife has long been an important natural resource of Indian River County. The importance of wildlife dates as far back as 400 years ago when the original inhabitants of this area, the Ais Indians, lived mainly by hunting and fishing. Since that time, habitat for wildlife has diminished greatly with about 63,000 acres being used for citrus production and with other large areas being used for improved pasture or for urban development. Wetlands, which are excellent areas for wildlife habitat, are also being rapidly degraded and lost with the spread of introduced plant species, such as Brazilian peppertree and melaleuca trees.

The most extensive areas of good habitat are in the undeveloped rangeland in the western part of the county and in the natural areas of the St. Johns Marsh. Habitat for wetland wildlife is prevalent in both of these areas and is used by various species of wading birds and by reptiles and amphibians. The main game species in these wetlands are white-tailed deer, wild turkey, bobwhite quail, mourning doves, and feral hogs. Numerous nongame wildlife species, which include songbirds, woodpeckers, owls, raptorial birds, and armadillos, are also present in these areas.

Other areas of minor extent, but that are just as valuable, are the ocean beaches. These beaches are used for nesting by the endangered green and leatherback turtle and by the classified threatened loggerhead turtle. These beach areas also serve as feeding grounds for gulls, sandpipers, and plovers. The barrier island and estuarine habitat areas support such wildlife as raccoons, various birds, and reptiles. The mangrove islands in the Indian River serve as rookery and roosting areas for all types of wading birds and for the endangered brown pelican. These islands and their aquatic proximity serve as nursery and feeding areas for many marine fish and crustaceans.

Although land development and human population growth has continually increased during the last few decades, particularly, on the barrier island, there has continually been significant appreciation and recognition of the value of this natural resource by local, State and Federal concerns, as witnessed by the establishment of the First National Wildlife Refuge at Pelican Island in 1903 and by creating the Florida State Recreation Areas at Sebastian Inlet *(5)*. Other indications of concern for preserving habitat and ensuring water quality are shown by the proceedings to adopt a wetlands protection ordinance by the city of Vero Beach. Indian River County does not have a specific wetlands protection ordinance, although protection of about 110,000 acres of wetlands in the county is included in a stormwater management and flood protection ordinance. In addition, the State of Florida and Indian River County are acting to preserve environmentally sensitive coastal areas by participating in a "Save Our Coast" program. This program provides funding to purchase beach property and other coastal tracts.

Endangered or threatened species that habitat the county include the bald eagle, the American alligator, and the West Indian manatee. The bald eagle has only one known active nesting site in this area. A detailed list of endangered species and information on range and habitat can be obtained from the local office of the Soil Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. 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 10, 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, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, cowpeas, sunflowers, and millet.

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, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are pangolagrass, bahiagrass, and white clover.

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, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, partridge pea, and beggarweed.

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, the available water capacity, and wetness. Examples of these plants are oak, red maple, cabbage palm, elderberry, blackberry, huckleberry, grape, sawpalmetto, and briars.

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, cedar, 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, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, maidencane, cattail, 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, surface stoniness, slope, 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. The wildlife attracted to these areas include bobwhite quail, mourning doves, meadowlark, field sparrow, cottontail rabbits, and red fox.

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, thrushes, woodpeckers, squirrels, gray fox, raccoon, bobcats, and deer.

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, gallinules, limpkin, shore birds, alligators, and otters.

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. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the 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 must 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. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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 11 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 are minor and 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 difficult to overcome that special design, significant increases in construction costs, 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 the 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, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 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 bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials 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 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations 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 property or site feature is unfavorable for the intended use and should be corrected by special design, soil reclamation, or planned maintenance before the site can be adapted to the intended use.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *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 60 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 bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, 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.

Table 12 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 bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of 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. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

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 needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type 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 type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

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

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 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 13 gives information about the soils as a source of roadfill, sand, gravel, 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 and gravel. 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 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 or gravel or both. They have at least 5 feet of suitable material, 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 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 the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, 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 or gravel 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 gravel or a layer of sand or gravel 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. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. 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, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal 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 14 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 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 property or site feature is unfavorable for the intended use and should be corrected by special design, soil reclamation, or planned maintenance before the site can be adapted to the intended use.

This table also gives the restrictive features that affect each soil for 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. Excessive slope can affect the storage capacity of the reservoir area.

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 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 stones or boulders, organic matter, or salts or sodium. 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 the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, 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; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, 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, such as salts, sodium, or sulfur. 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 construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, 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.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, saturated hydraulic conductivity, bulk density, and water content. These results are reported in table 19.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, 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 15 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 "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 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 *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

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, SP-SM.

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. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 22.

Rock fragments larger than 3 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 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 16 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. The results of physical, chemical, and mineralogical analyses of representative pedons in Indian River County are given in tables 19, 20, and 21.

Clay as a soil separate, or component, 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, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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 in each major soil layer is stated in inches of water per inch of soil. 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 change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

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. Losses are expressed in tons per acre per year. These 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 0.69. 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 over a sustained period without affecting crop productivity. The rate is expressed 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 and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, 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 of 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 17 gives estimates of various water features and table 18 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils 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 high shrink-swell potential, soils that have a permanent 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.

Dual hydrologic groups, B/D and C/D, are used for certain wet soils that can be artificially drained and where normal drainage practices do not drain the soils well enough to attain Group A level.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depreciation is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *very long* if more than 7 days. The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding 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 absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

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 depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. The water table in 32 pedons, representing 20 soil series, was measured twice a month during the course of the soil survey. The pedons were selected as typical of the series as mapped in the county, and they were as far removed as possible from any source of artificial drainage. The measurements of the water tables for three of the major series are shown in (fig. 14). Additional water table data can be obtained from the local office of the Soil Conservation Service. Precipitation for 1982 and 1983 was above normal. Indicated in table 17 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 highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

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.

The two numbers in the "High water table-Depth" column 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 the water table exists for less than a month.

Table 18 gives the depth and hardness of bedrock and cemented pan, shows expected initial and total subsidence, and gives the risk of corrosion for uncoated steel and concrete.

Depth to bedrock is given in the table if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Cemented pans are cemented or indurated subsurface layers within a depth of 5 feet. Such pans cause difficulty in excavation. A pan that is classified as thin is less than 3 inches thick if continuously indurated, or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence 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. Table 18 shows the expected initial subsidence, which usually is a result of drainage, and annual subsidence, which usually is a result of oxidation.

Not shown in table 18 is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

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

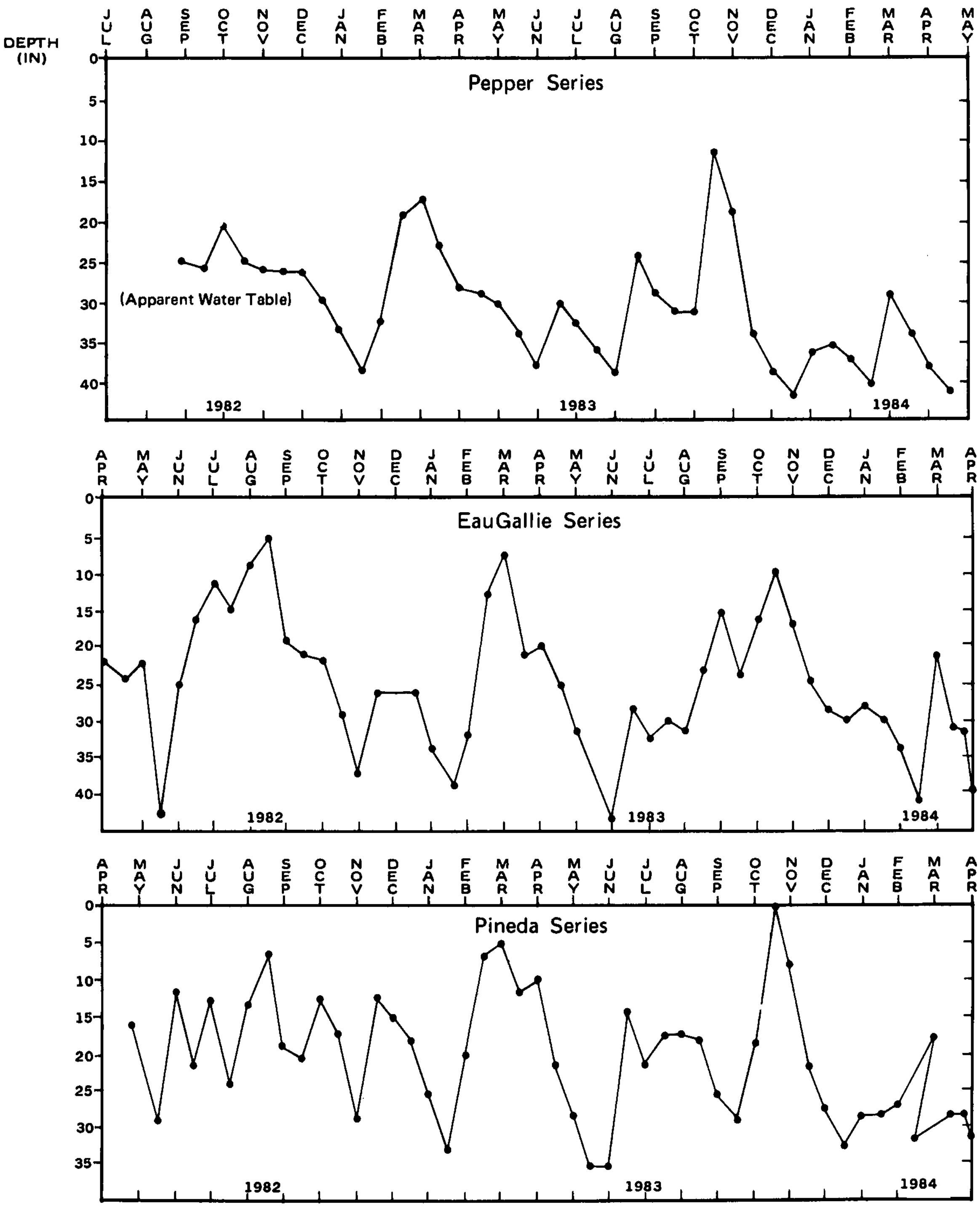


Figure 14.—Variation in depth of water table in the Pepper, EauGallie, and Pineda series.

content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. 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 the amount of sulfates in the saturation extract.

Physical, Chemical, and Mineralogical Analyses of Selected Soils

Dr. Victor W. Carlisle and Dr. Mary E. Collins, professor and assistant professor, respectively, University of Florida, Soil Science Department, prepared this section.

Parameters for physical, chemical, and mineralogical properties of representative pedons sampled in Indian River County are presented in tables 19, 20, and 21. The analyses were conducted and coordinated by the Soil Characterization Laboratory at the University of Florida. Detailed profile descriptions of soils analyzed are given in the section "Soil Series and Their Morphology." Laboratory data and profile information for additional soils in Indian River County, as well as for other counties in Florida, are on file at the Soil Science Department, University of Florida.

Typifying pedons were sampled from pits at carefully selected locations. Samples were air-dried, crushed, and sieved through a 2-millimeter screen. Most analytical methods used are outlined in Soil Survey Investigations Report No. 1 *(16)*.

Particle-size distribution was determined using a modified pipette method with sodium hexametaphosphate dispersion. Hydraulic conductivity and bulk density were determined on undisturbed soil cores. Water retention parameters were obtained from duplicate undisturbed soil cores placed in tempe pressure cells. Weight percentages of water retained at 100 centimeters water (1/10 bar) and 345 centimeters water (1/3 bar) were calculated from volumetric water percentages divided by bulk density. Samples were ovendried, ground to pass a 2-millimeter sieve, and the 15-bar water retention was determined. Organic carbon was determined by a modification of the Walkley-Black wet combustion method.

Extractable bases were obtained by leaching soils with normal ammonium acetate buffered at pH 7.0. Sodium and potassium in the extract were determined by flame emission. Calcium and magnesium were determined by atomic absorption spectrophotometry. Extractable acidity was determined by the barium chloride-triethanolamine method at pH 8.2. Cation exchange capacity was calculated by summation of extractable bases and extractable acidity. Base saturation is the ratio of extractable bases to cation exchange capacity expressed in percent. The pH measurements were made with a glass electrode using a soil-water ratio of 1:1; a 0.01 molar calcium chloride solution in a 1:2 soil-solution ratio; and normal potassium chloride solution in a 1:1 soil-solution ratio.

Electrical conductivity determinations were made with a conductivity bridge on 1:1 soil to water mixtures. Iron and aluminum extractable in sodium dithionite-citrate were determined by atmoic absorption spectrophotometry. Aluminum, carbon, and iron were extracted from probable spodic horizons with 0.1 molar sodium pyrophosphate. Determination of aluminum and iron was by atomic absorption and extracted carbon by the Walkley-Black wet combustion method.

Mineralogy of the clay fraction less than 2 microns was ascertained by X-ray diffraction. Peak heights at 18 angstrom, 14 angstrom, 7.2 angstrom, and 4.31 angstrom positions represent montmorillonite, interstratified expandable vermiculite, 14-angstrom intergrades, kaolinite, and quartz, respectively. Peaks were measured, summed, and normalized to give the percent of soil minerals identified in the X-ray diffractograms. These percentage values do not indicate absolute determined quantities of soil minerals but do imply a relative distribution of minerals in a particular mineral suite. Absolute percentages would require additional knowledge of particle size, crystallinity, unit structure substitution, and matrix problems.

Sands are the dominant particle-size fractions in nearly all horizons of all pedons (table 19). More than 90 percent sand occurred throughout the entire pedon depths of the Archbold, Astatula, Canaveral, Jonathan, Orsino, Palm Beach, Paola and St. Lucie soils. Boca, Canova, Electra, Floridana, Pepper, and Immokalee soils contained more than 90 percent sand to a depth of more than 20 inches.

Archbold, Astatula, Canaveral, Jonathan, Jupiter, Orsino, Palm Beach, Paola and St. Lucie soils contained less than 5 percent clay throughout their profiles. Clay content increased considerably within a depth of 40 inches in the Boca, Canova, and Floridana soils, and it also increased considerably below a depth of 40 inches in the Electra and Pepper soils. Since there is a general tendency for clays to move downward with percolating water, the amount of translocated clay often reveals the state and degree of soil development.

Silt content usually ranged between 0 and 10 percent; however, silt content in excess of 20 percent occurred in some horizons of the Floridana and Perrine Variant soils. Conversely, pedons with less than 2 percent silt in all horizons occurred in the Archbold, Palm Beach, Paola, and St. Lucie soils. In the Astatula, Canaveral, Jonathan, Orsino, and Pepper soils only one or two horizons had more than 2 percent silt.

Fine sands dominated the sand fractions in the Boca, Canaveral, Electra, Jupiter, and Orsino soils. All horizons of Boca, Canaveral, Electra, Jupiter, and Orsino soils contained more than 50 percent very fine and fine sands, and some horizons in the Immokalee soil contained like amounts. Medium sand generally ranged between 20 and 50 percent; however, all horizons of the Archbold, Astatula, Jonathan, Palm Beach, Paola, Pepper, and St. Lucie soils contained more than 50 percent medium sand, and all horizons of the Boca and Orsino soils contained less than 10 percent. Very fine sands commonly ranged between 0 and 10 percent. Coarse sands generally occurred in amounts of less than 15 percent and very coarse sands seldom exceeded 0.5 percent.

Hydraulic conductivity values of 5 centimeters per hour or less were recorded in some horizons of Boca, Canova, Electra, Manatee, and Pepper soils, and high values of 100 centimeters per hour or more were recorded for some horizons of the Astatula, Jonathan, Palm Beach, Paola, Pepper, and St. Lucie soils. Design and function of septic tank absorption fields are affected by such low and high hydraulic conductivity values. Some clay enhanced subsoil horizons occurring in the Boca, Canova, Electra, and Manatee soils had hydraulic conductivity values of less than 1 centimeter per hour. Plant available water capacity can be estimated from bulk density and water content data. Generally, soils that are excessively drained or have sandy textures, such as the Archbold, Astatula, Palm Beach, Paola and St. Lucie soils, contain low amounts of organic matter and retain less plant available water. Also the upper part of the Immokalee, Electra, and Jonathan soils contain low amounts of organic matter. Droughtiness is a common characteristic of these sandy soils, particularly those soils that are moderately well drained, well drained, and excessively drained. A relatively large amount of plant available water is retained in Canova, Manatee, and Perrine Variant soils.

Chemical soil properties (table 20) show that less than 20 milliequivalent per hundred grams of extractable bases are present in most Indian River County soils. All horizons of the Archbold, Astatula, Jonathan, Orsino, and St. Lucie soils contained less than 1 milliequivalent per hundred grams extractable bases. Electra, Immokalee, Paola, and Pepper soils contained only three or less horizons that have extractable bases in excess of 1 milliequivalent per hundred grams and values of less than 15 milliequivalents per hundred grams commonly occurred in most other soils. Canaveral, Canova, Floridana, Gator, Manatee, Palm Beach, and Perrine Variant soils contained horizons that exceeded 15 milliequivalents per hundred grams extractable bases. The mild, humid climate in Indian River County results in depletion of basic soil cations (calcium, magnesium, sodium, and potassium) through leaching.

Calcium was by far the dominant base in all soils with amounts ranging from 0.01 to 77.25 milliequivalents per hundred grams. Magnesium occurred in amounts exceeding 1 milliequivalent per hundred grams in some horizons of the Boca, Canova, Electra, Floridana, Gator, Jupiter, Manatee, Palm Beach, Pepper, and Perrine Variant soils. Much lower but detectable amounts of magnesium occurred in all horizons except one horizon in the Jonathan soil. Sodium generally occurred in amounts of less than 1 milliequivalent per hundred grams. Most Indian River County soils contained very low amounts of potassium with only two horizons of Canova and Perrine Variant soils exceeding 1 milliequivalent per hundred grams. Potassium was nondetectable in one or more horizons of the Archbold, Astatula, Electra, Jonathan, Orsino, Pepper, and St. Lucie soils.

Values for exchange capacity, an indication of plant nutrient capacity, exceeded 20 milliequivalents per hundred grams in the surface horizon of Canova, Gator, Manatee, Palm Beach, and Perrine Variant soils. Cation exchange capacity exceeded 20 milliequivalents per hundred grams in at least one horizon below the surface in the Canova, Electra, Floridana, Gator, Immokalee, Manatee, Pepper, and Perrine Variant soils. Exceptional high exchange capacity of more than 100 milliequivalents per hundred grams was determined in three horizons. Soils that have low cation exchange capacities in the surface horizon, such as the Jonathan series, require only small amounts of lime to significantly alter both the base status and soil reaction in the upper horizons. Generally, soils of low inherent soil fertility are associated with low values for extractable bases and low cation exchange capacities, and fertile soils are associated with high values for extractable bases, high base saturation values, and high cation exchange capacities.

Organic carbon content exceeded 2 percent only in the surface horizon of the Boca, Canova, Floridana, Gator, Jupiter, Manatee, and Perrine Variant soils. The surface and subsurface horizons of the Canova and Gator soils were very high in organic carbon content (more than 30 percent) because of the high amounts of sapric (organic) material. In Spodosols, organic carbon content exceeded 2 percent only in the spodic horizon of the Electra, Immokalee, and Pepper soils. Organic carbon content was less than 1 percent in all horizons of Archbold, Astatula, Orsino, Paola, and St. Lucie soils. Organic carbon content generally decreased rapidly with increased depth except in the Spodosols. These soils have a Bh horizon that contains enhanced amounts of organic carbon. Since organic carbon is directly related to soil nutrient and water retention capacities of sandy soils, management practices that conserve and maintain organic carbon content are highly desirable.

Electrical conductivity values were generally very low, exceeding 0.2 millimhos per centimeter, in one horizon of the Canaveral soil and throughout the Perrine Variant pedon. These data indicate that soluble salt content except in the immediate coastal areas is insufficient to detrimentally affect the growth of salt-sensitive plants.

Soil reaction in water usually ranged between pH 4.0 and 7.0; however, reactions in excess of 8.0 occurred in horizons of the Boca, Canova, Gator, Palm Beach, and Perrine Variant series. With few exceptions, soil reaction was 0.1 to 1.2 pH units lower in calcium chloride and potassium chloride than in water. Maximum plant nutrient availability is usually attained when soil reaction is between pH 6.5 and 7.5; however, under Florida conditions, maintaining soil reaction above pH 6.5 is not economically feasible for most agricultural production purposes.

Sodium pyrophosphate extractable iron did not exceed 0.10 percent in the Bh horizon of Immokalee, Jonathan, and Orsino soils. The ratio of pyrophosphate extractable carbon and aluminum to clay in Electra, Immokalee, Jonathan, and Orsino soils was sufficient to meet the chemical criteria for spodic horizons.

Citrate-dithionite extractable iron in the argillic horizon was generally less than 1 percent. These values in the Bh horizon ranged from 1.22 percent in the Boca soil to no detectable amount in the Jonathan soil.

Aluminum extracted by citrate-dithionite from the Bt horizon ranges from 0.02 percent in the Manatee soil to 0.13 percent in the Electra soil. Amounts of iron and aluminum in Indian River County soils are not sufficient to detrimentally affect phosphorus availability.

Sand fractions of 2 to 0.05 millimeters were siliceous with quartz overwhelmingly dominant in all pedons. Calcite was determined only in the Ckg2 horizon of the Perrine Variant soil. Crystalline mineral components of the clay fraction of less than 0.002 millimeters are reported in table 21 for major horizons of the pedons sampled. The clay mineralogical suite was composed of montmorillonite, a 14-angstrom intergrade, kaolinite, and quartz.

Montmorillonite occurred in all pedons sampled except in the Perrine Variant soil. In most pedons, the clay fraction was dominated by montmorillonite. The 14-angstrom intergrade minerals occurred in all horizons in the Astatula, Boca, Jonathan, Orsino, Palm Beach, and Paola soils but were not present in all horizons of the Electra, Immokalee, Pepper, and St. Lucie pedons. Kaolinite occurred in all soils sampled. Quartz occurred in all soils except in one horizon of the Perrine Variant pedon.

Montmorillonite appears to have been inherited by Indian River County soils and is probably the least stable mineral component in the present environment. Subsoils in Canova, Floridana, and Manatee pedons contain relatively large amounts of montmorillonitic clays that can result in considerable volume change from shrinking when dry and swelling when wet. Clay-sized quartz has primarily resulted from decrements of the silt fraction. Soils dominated by montmorillonite and 14-angstrom intergrades have high cation exchange capacities and retain more plant nutrients than soils dominated by kaolinite or quartz.

Engineering Index Test Data

Table 22 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soils Laboratory, Florida Department of Transportation, Bureau of Materials and Research.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(14)*. 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 on laboratory measurements. Table 23 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten 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 Spodosol.

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 Aquod (*Aqu*, meaning water, plus *od*, from Spodosol).

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; 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 Haplaquods (*Hapl*, meaning minimal horizonation, plus *aquod*, the suborder of the Spodosols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic 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 known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, siliceous, hyperthermic Typic Haplaquods.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other 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 (13)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (14)*. Unless otherwise stated, 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."

Archbold Series

The soils of the Archbold series are hyperthermic, uncoated Typic Quartzipsamments. They are moderately well drained, very rapidly permeable soils that formed in thick deposits of marine or eolian sand. These nearly level to sloping soils are on the Atlantic Coastal Ridge and other elevated knolls on the flatwoods. In most years, the water table is at a depth of 40 to 60 inches for more than 6 months but recedes to a depth of more than 80 inches during droughty periods. The slope ranges from 0 to 5 percent.

Archbold soils are associated with Astatula, Immokalee, Jonathan, Myakka, Orsino, Paola, Pomello, Satellite, and St. Lucie soils. Astatula, Paola, and St. Lucie soils are excessively drained. Jonathan soils are somewhat excessively drained and have an ortstein horizon. Orsino and Pomello soils are moderately well drained and have a spodic horizon. In addition, Orsino soils have a Bh horizon. Immokalee and Myakka soils are poorly drained and have a spodic horizon. Satellite soils are somewhat poorly drained.

Typical pedon of Archbold sand, 0 to 5 percent slopes; in an area on the coastal ridge, about 0.75 mile west of U.S. Highway 1, about 0.5 mile north of Indian River County Road 510; SE1/4NW1/4SE1/4, sec. 29, T. 31 S., R. 39 E.

A—0 to 2 inches; gray (10YR 5/1) sand; single grained; loose; common fine and medium roots; mixture of uncoated sand grains and organic matter, salt-and-pepper appearance; neutral; abrupt smooth boundary.

C1—2 to 38 inches; white (10YR 8/1) sand; single grained; loose; common fine and medium roots; neutral; gradual wavy boundary.

C2—38 to 51 inches; light gray (10YR 7/1) sand; single grained; loose; few fine and medium roots; slightly acid; gradual wavy boundary.

C3—51 to 80 inches; gray (10YR 6/1) sand; single grained; loose; few fine and medium roots; medium acid.

Reaction ranges from extremely acid to medium acid in the A horizon and from strongly acid to slightly acid in the C horizon. Texture is sand or fine sand to a depth of more than 80 inches. About 5 percent or less silt and clay is at a depth of 10 to 40 inches.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1. It has a varying amount of fine black (10YR 2/1) organic matter granules. Thickness is 2 to 5 inches.

The C horizon has hue of 10YR, value of 7, and chroma of 2; or hue of 10YR, value of 7 or 8, and chroma of 1. In some pedons, the C horizon has hue of 10YR, value of 6, and chroma of 1 at a depth of more than 40 inches.

Astatula Series

The soils of the Astatula series are hyperthermic, uncoated Typic Quartzipsamments. They are excessively drained, very rapidly permeable soils that formed in thick deposits of marine or eolian sand. These nearly level to gently sloping soils are on the Atlantic Coastal Ridge. The water table is at a depth of more than 72 inches. The slope ranges from 0 to 5 percent.

Astatula soils are associated with Immokalee, Paola, Pomello, and St. Lucie soils. Immokalee and Pomello soils are more poorly drained than the Astatula soils and have a Bh horizon. Paola soils have a light colored E horizon. St. Lucie soils are gray to light gray.

Typical pedon of Astatula sand, 0 to 5 percent slopes; west of Old Dixie Highway; NE1/4NW1/4NW1/4, sec. 31, T. 33 S., R. 39 E.

A—0 to 4 inches; grayish brown (10YR 5/2) sand; single grained; loose; common fine and very fine, few medium roots; strongly acid; clear smooth boundary.

AC—4 to 5 inches; brown (10YR 5/3) sand; dark brown (10YR 4/3) organic stains around root channels; single grained; loose; many fine and very fine, few coarse and medium roots; strongly acid; clear smooth boundary.

C1—5 to 14 inches; brownish yellow (10YR 6/6) sand; single grained; loose; common fine and medium roots; medium acid; gradual smooth boundary.

C2—14 to 71 inches; brownish yellow (10YR 6/8) sand; dark brown (10YR 4/3) stains around roots; single grained; loose; few fine and medium roots; strongly acid; abrupt smooth boundary.

C3—71 to 80 inches; strong brown (7.5YR 5/8) sand; few medium yellowish red (5YR 4/6) soft iron accumulations; single grained; loose; strongly acid.

Less than 5 percent silt and clay is at a depth of 10 to 40 inches. Reaction is strongly acid or medium acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. This horizon is a mixture of organic matter and uncoated sand grains. Thickness is 3 to 7 inches. Texture is sand or fine sand. The AC horizon, if present, has hue of 10YR, value of 5, and chroma of 3. Thickness is 0 to 2 inches. Texture is sand or fine sand.

The C horizon has hue of 7.5YR, value of 5, and chroma of 8; or hue of 10YR, value of 6, and chroma of 6 to 8. Texture is sand or fine sand.

Boca Series

The soils of the Boca series are loamy, siliceous, hyperthermic Arenic Ochraqualfs. They are poorly drained, moderately permeable soils that formed in moderately thick beds of sandy and loamy marine sediment underlain by a hard, limestone ledge that has numerous fractures and solution holes. These nearly level soils are mostly in the citrus groves, but some are on the flatwoods. In most years, the water table is within a depth of 10 inches of the surface for 2 to 4 months during the rainy season. The slope ranges from 0 to 2 percent.

Boca soils are associated with Jupiter, Myakka, Pineda, Riviera, Wabasso, and Winder soils. Jupiter soils have a mollic epipedon and do not have an argillic horizon. Myakka and Wabasso soils have a Bh horizon and are not underlain by limestone. Pineda, Riviera, and Winder soils have an argillic horizon that does not rest on limestone. In addition, Pineda soils have a Bw horizon.

Typical pedon of Boca fine sand; in a citrus grove, about 1/2 mile east of U.S. Highway 1, on 37th Avenue (across from north entrance of Vero Beach Hospital), 1,000 feet north along Field Road, 100 feet west; SE1/4NE1/4, sec. 23, T. 32 S., R. 39 E.

Ap—0 to 7 inches; dark gray (10YR 4/1) fine sand; single grained; loose; common fine roots; moderately alkaline; clear smooth boundary.

E—7 to 14 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; moderately alkaline; clear smooth boundary.

EB—14 to 20 inches; brown (10YR 4/3) fine sand; single grained; loose; mildly alkaline; abrupt smooth boundary.

Bt—20 to 24 inches; mixed yellowish brown (10YR 5/6, 5/4) fine sandy loam; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; moderately alkaline; abrupt irregular boundary.

R—24 inches; hard fractured, calcareous limestone.

The thickness of the solum and depth to limestone in the dominant part of a pedon range from 22 to 40 inches. In solution holes and fractures, the depth to limestone ranges from 22 to 50 inches or more. Depth to the argillic horizon ranges from 20 to 36 inches in more than half of the pedons.

Reaction ranges from medium acid to moderately alkaline in the A, E and EB horizons and from slightly acid to moderately alkaline in the Bt horizon.

The A or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1. Thickness ranges from 6 to 9 inches. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. Thickness ranges from 7 to 15 inches. The EB horizon has hue of 10YR, value of 5, and chroma of 4; or hue of 10YR, value of 4, and chroma of 3. Thickness is 0 to 15 inches. Texture of the A, Ap, E, and EB horizons is sand or fine sand.

The Bt horizon has hue of 10YR, value of 5, and chroma of 4 to 6; or hue of 2.5Y, value of 6, and chroma of 2 and has mottles of yellowish brown. Texture is sandy loam, fine sandy loam, or sandy clay loam. Thickness is 4 to 12 inches.

The layer of hard limestone has many fractures and solution holes. The bedrock is 6 to 18 inches thick. The upper surface of the bedrock is smooth, and the lower surface is quite irregular. Layers of sand to sandy loam are below the bedrock. Some of these sand to sandy loam layers have a variable content of shell fragments.

The Boca soils are taxadjuncts to the Boca series because the yellowish brown color in the Bt horizon is outside of the defined range for the series. They are similar in use, management, and behavior to the soils of the Boca series.

Canaveral Series

The soils of the Canaveral series are hyperthermic, uncoated Aquic Quartzipsamments. They are somewhat poorly drained to moderately well drained, very rapidly permeable soils that formed in thick deposits of sand and fine shell fragments. These nearly level to gently sloping soils are on low dunelike ridges and on side slopes bordering sloughs and mangrove swamps. In most years the water table is at a depth of 10 to 40 inches for 2 to 6 months. The slope ranges from 0 to 5 percent.

Canaveral soils are associated with Palm Beach, St. Augustine, Quartzipsamments, and Captiva soils. Palm Beach soils are excessively drained. Captiva soils are poorly drained and have a dark colored surface layer. St. Augustine soils are mixed sandy, loamy, and silty soils. These materials resulted from dredging and filling operations. Quartzipsamments are sandy soils. This material resulted from filling and earthmoving operations.

Typical pedon of Canaveral fine sand, 0 to 5 percent slopes; 500 feet west of Florida State Road A1A; SE1/4SE1/4NE1/4, sec. 15, T. 31 S., R. 39 E.

A—0 to 5 inches; dark gray (10YR 4/1) fine sand grading to gray (10YR 5/1) in the lower part; single grained; loose; common fine and medium and coarse roots; about 10 percent sand-size shell fragments; mildly alkaline; strongly effervescent; clear wavy boundary.

C1—5 to 9 inches; light gray (10YR 7/2) fine sand; single grained; loose; 10 percent sand-size shell fragments; common fine and medium, few coarse roots; mildly alkaline; gradual wavy boundary.

C2—9 to 17 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; common medium roots; 10 percent multicolored sand-size shell fragments; neutral; strongly effervescent; gradual smooth boundary.

C3—17 to 49 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few fine and medium roots; 20 percent multicolored sand-size shell fragments; mildly alkaline; strongly effervescent; clear wavy boundary.

C4—49 to 61 inches; light brownish gray (2.5Y 6/2) fine sand; common medium prominent light yellowish brown (10YR 6/4) mottles; single grained; loose; 35 percent multicolored sand-size shell fragments; few shell fragments up to 1 inch in diameter; mildly alkaline; strongly effervescent; clear wavy boundary.

C5—61 to 80 inches; light brownish gray (10YR 6/2) fine sand; few fine prominent light yellowish brown (10YR 6/4) mottles; single grained; loose; 40 percent multicolored sand-size shell fragments; mildly alkaline; strongly effervescent.

Reaction ranges from neutral to moderately alkaline in all horizons to a depth of 80 inches or more. Shell fragments cause these soils to be strongly effervescent with dilute 0.1 normal hydrochloric acid. All horizons are sand or fine sand that is mixed with varying amounts of sand-size shell fragments.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Thickness is 4 to 8 inches. The content of shell fragments ranges from 5 to 10 percent.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4; or hue of 2.5Y, value of 6, and chroma of 2. The C horizon is a mixture of fine sand or sand and multicolored shell fragments. In some pedons, the C horizon is stratified sand and shell fragments. The content of shell fragments ranges from 5 to 60 percent.

Canova Series

The soils of the Canova series are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs. They are very poorly drained, moderately permeable soils that formed in sandy and loamy marine sediment under favorable conditions for the accumulation of organic material. These nearly level soils are in freshwater swamps and marshes. Under natural conditions, the water table is above the surface for most of the year. In drained areas, it is controlled at a depth of 10 to 36 inches or controlled according to the need of the crop. The water table is at or above the surface for short periods after heavy rainfall and during normal periods of high seasonal rainfall. The slope is 0 to 1 percent.

Canova soils are associated with Chobee, Delray, Floridana, Gator, Terra Ceia, Wabasso, and Winder soils. Chobee, Delray, and Floridana soils have a mollic epipedon. Gator and Terra Ceia soils are organic soils. Wabasso soils are poorly drained and have a spodic horizon. Winder soils do not have an organic surface layer and are poorly drained.

Typical pedon of Canova muck; in a pasture, 7.5 miles west of Fellsmere, 3.5 miles west of Indian River County Road 512, 0.9 mile east of Lateral Q Canal, 150 feet west of Mile Canal; Block 21W; NE1/4SE1/4NE1/4, sec. 35, T. 31 S., R. 36 E.

Oap—0 to 6 inches; black (10YR 2/1) muck; about 10 percent fiber, less than 5 percent rubbed; weak medium subangular blocky structure resemblance; friable; common fine roots; dark brown (10YR 4/3) sodium pyrophosphate extract; extremely acid (pH 4.1 in 0.01 molar calcium chloride solution); abrupt wavy boundary.

Oa—6 to 12 inches; very dark brown (10YR 2/2) muck; about 20 percent fiber, 2 percent rubbed; weak medium subangular blocky structure resemblance; friable; common fine roots; dark brown (10YR 4/3) sodium pyrophosphate extract; extremely acid (pH 4.2 in 0.01 molar calcium chloride solution); abrupt smooth boundary.

A—12 to 13 inches; black (10YR 2/1) sand; single grained; loose; common light gray (10YR 7/1) uncoated sand grains; few fine roots; strongly acid; abrupt wavy boundary.

E1—13 to 21 inches; gray (10YR 6/1) sand; single grained; loose; few fine roots; slightly acid; gradual wavy boundary.

E2—21 to 24 inches; grayish brown (10YR 5/2) sand; single grained; loose; few fine roots; slightly acid; abrupt irregular boundary.

Btg1—24 to 34 inches; grayish brown (2.5Y 5/2) sandy clay loam; common fine and medium yellowish brown (10YR 5/6) streaks around roots; weak coarse prismatic structure parting to moderate medium subangular blocky structure; slightly sticky and slightly plastic; common coarse tongues of grayish brown (10YR 5/2) sand around sandy clay loam prisms, 8 to 10 inches apart; common fine and very fine roots; medium acid; gradual wavy boundary.

Btg2—34 to 40 inches; gray (5Y 5/1) sandy clay loam; few coarse distinct very dark grayish brown (10YR 3/2) and common fine distinct yellowish brown (10YR 5/4) streaks along root channels; weak coarse prismatic structure parting to weak medium subangular blocky structure; slightly sticky and slightly plastic; few light gray and yellowish brown calcium carbonate concretions; few fine roots; mildly alkaline; abrupt wavy boundary.

Cgk1—40 to 49 inches; greenish gray (5GY 5/1) sandy clay loam; common fine prominent yellowish brown (10YR 5/6) mottles and common fine distinct light gray (10YR 7/1) calcium carbonate concretions and soft calcium carbonate accumulations; strongly effervescent; weak medium subangular blocky structure; slightly sticky and nonplastic; few very fine roots; moderately alkaline; clear wavy boundary.

Cgk2—49 to 56 inches; greenish gray (5GY 6/1) sandy clay loam; few fine and medium distinct yellowish brown (10YR 5/4) mottles and many fine light gray (10YR 7/2) calcium carbonate concretions; strongly effervescent; weak medium subangular blocky structure; slightly sticky and nonplastic; few very fine roots; moderately alkaline; clear wavy boundary.

Cg—56 to 80 inches; greenish gray (5G 6/1) sandy loam; weak medium subangular blocky structure; slightly sticky and nonplastic; moderately alkaline.

Canova soils are extremely acid to medium acid in the O horizon, strongly acid or medium acid in the A horizon, slightly acid or neutral in the E horizon, medium acid to moderately alkaline in the Btg horizon, and moderately alkaline in the Cgk and the Cg horizons.

The thickness of the organic material ranges from 5 to 15 inches. The Oa horizon has hue of 5YR or 10YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 1 through 3. The fiber content is less than 33 percent unrubbed and less than 5 percent rubbed. Sodium pyrophosphate extract has hue of 10YR, value of 2 through 4, and chroma of 4 or less; or hue of 10YR, value of 5, and chroma of 2 through 8; or hue of 10YR, value of 6, and chroma of 3 through 8; or hue of 10YR, value of 7, and chroma of 4 through 8. Texture is muck.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. If present, this horizon has few or common 10YR 7/1 uncoated sand grains. Texture is sand or fine sand. Thickness ranges from 1 to 6 inches.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Texture is sand or fine sand. Thickness ranges from 6 to 11 inches.

The Btg horizon has hue of 10YR or 5Y, value of 4 or 5, and chroma of 1; or hue of 2.5Y, value of 4 or 5, and chroma of 2; or hue of 5GY, value of 5, and chroma of 1 and has mottles and streaks in shades of yellow and brown. Texture is sandy clay loam or sandy loam. The clay content is 18 to 28 percent. The silt content is less than 15 percent. It has few or common vertical sandy streaks or tongues and none or few calcium carbonate accumulations. Thickness ranges from 7 to 24 inches.

The Cgk and Cg horizons have hue of 5GY, 5Y, or 5G, value of 5 or 6, and chroma of 1. These horizons have mottles and streaks in shades of yellow and brown. Texture is sandy clay loam or sandy loam that has lenses of sand or loamy sand. In the Cgk and Cg horizons are few to many, fine and medium, soft and hard light gray, white, and yellowish brown fragments of carbonatic material and shell fragments.

Captiva Series

The soils of the Captiva series are siliceous, hyperthermic Mollic Psammaquents. They are poorly drained, rapidly permeable soils that formed in thick marine deposits of sand and fine shell fragments. These nearly level soils are in narrow, elongated sloughs between low dunelike ridges and mangrove swamps. In most years, the water table is at a depth of 10 to 40 inches for 6 to 9 months or more and within a depth of 10 inches of the surface for 1 to 3 months. In some years, the soil is flooded for about 1 month. The slope ranges from 0 to 1 percent.

Captiva soils are associated with Canaveral and Kesson soils. Canaveral soils are on higher elevations than Captiva soils and are better drained. Kesson soils are very poorly drained, have a high sulfur content, and are subject to tidal flooding.

Typical pedon of Captiva fine sand; in a brushy area, 3/4 mile south of Indian River County Road 510, 500 feet east of Jungle Trail; NW1/4SW1/4SE1/4, sec. 26, T. 31 S., R. 39 E.

A—0 to 8 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and few medium roots; about 2 percent shell fragments; moderately alkaline; slightly effervescent; clear smooth boundary.

C—8 to 16 inches; grayish brown (10YR 5/2) fine sand; common medium distinct dark grayish brown (10YR 4/2) and few medium distinct yellowish brown (10YR 5/6) mottles; single grained; loose; few fine and medium roots; about 2 percent shell fragments; moderately alkaline; slightly effervescent; gradual smooth boundary.

Cg1—16 to 25 inches; olive gray (5Y 5/2) fine sand; single grained; loose; about 15 percent shell fragments; moderately alkaline; strongly effervescent; clear wavy boundary.

Cg2—25 to 80 inches; greenish gray (5GY 5/1) fine sand; single grained; loose; about 10 percent shell fragments; moderately alkaline; strongly effervescent.

Reaction is moderately alkaline to a depth of 80 inches or more. Shell fragments cause these soils to be slightly effervescent to strongly effervescent with dilute 0.1 normal hydrochloric acid. All horizons are sand or fine sand that is mixed with varying amounts of shell fragments.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. Thickness is 6 to 9 inches. The content of shell fragments ranges from 2 to 20 percent.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3; or hue of 5Y, value of 5 or 6, and chroma of 2; or hue of 5GY, value of 5 or 6, and chroma of 2; or hue of 5GY, value of 5 or 6, and chroma of 1 and has streaks and mottles of dark grayish brown, grayish brown, or yellowish brown. The C horizon is a mixture of fine sand, sand, and shell fragments. In some pedons the C horizon is stratified sand and shell fragments. The content of shell fragments ranges from 5 to 60 percent. The shell fragments that are more than 2 millimeters in size make up less than 35 percent of the horizon.

Chobee Series

The soils of the Chobee series are fine-loamy, siliceous, hyperthermic Typic Argiaquolls. They are very poorly drained, slowly permeable to very slowly permeable soils that formed in thick beds of moderately fine marine sediment. These nearly level soils are in depressional areas, in poorly defined drainageways, and on broad, low flats. Under natural conditions, they are covered with shallow water or have a water table within a depth of 10 inches of the surface for more than 6 months during most years. The slope is dominantly less than 1 percent but ranges to 2 percent.

Chobee soils are associated with Floridana, Manatee, Riviera, Pineda, and Winder soils. Floridana soils have thick sandy surface and albic horizon. Manatee soils are in the coarse loamy family. Riviera and Pineda soils have an argillic horizon at a depth of 20 to 40 inches. In addition, Pineda soils have a Bw horizon. Winder, Riviera, and Pineda soils do not have a mollic epipedon and also have tongues of E horizon extending into the Bt horizon.

Typical pedon of Chobee loamy fine sand; in an area of citrus, 1.75 miles south of Florida State Road 60, 0.5 mile west of Range Line Road; NW1/4SW1/4NE1/4, sec. 13, T. 33 S., R. 38 E.

Ap—0 to 5 inches; black (10YR 2/1) loamy fine sand; weak fine subangular blocky structure; friable; neutral; gradual wavy boundary.

Bt1—5 to 17 inches; black (10YR 2/1) sandy loam; massive, parts to moderate medium subangular blocky structure; slightly sticky and slightly plastic; neutral; clear wavy boundary.

Bt2—17 to 28 inches; very dark gray (10YR 3/1) sandy clay loam; few fine prominent yellowish brown (10YR 5/8) mottles; few fine distinct strong brown (7.5YR 5/6) streaks along old root channels; massive, parts to moderate medium subangular blocky structure; slightly sticky and slightly plastic; slightly acid; gradual wavy boundary.

Bt3—28 to 35 inches; dark grayish brown (10YR 4/2) sandy loam; common fine prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; slightly sticky and slightly plastic; slightly acid; clear wavy boundary.

Bt4—35 to 46 inches; gray (5Y 6/1) sandy loam; common medium distinct dark gray (10YR 4/1) and few fine prominent yellowish brown (10YR 5/8) mottles; medium fine subangular blocky structure; slightly sticky and slightly plastic; slightly acid; gradual smooth boundary.

Cg1—46 to 54 inches; gray (5Y 6/1) loamy fine sand; weak fine subangular blocky structure; slightly sticky; slightly acid; gradual wavy boundary.

Cg2—54 to 80 inches; greenish gray (5GY 5/1) loamy fine sand; massive, parts to weak medium subangular blocky structure; slightly sticky; moderately alkaline.

The thickness of the solum is more than 40 inches.

The A horizon or the Ap horizon has hue of 10YR, value of 2, and chroma of 1; or it is neutral with value of 2. Texture is loamy fine sand or sandy loam. A few pedons have texture of mucky fine sand. Reaction is slightly acid or neutral. Thickness ranges from 4 to 15 inches.

The Bt horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or hue of 10YR, value of 4, and chroma of 2; or hue of 2.5Y, value of 3 or 4, and chroma of 1; or hue of 5Y, value of 6, and chroma of 1 and can have yellowish brown or strong brown mottles. Texture is sandy loam or sandy clay loam. The clay content of the control section ranges from 18 to 35 percent. Reaction ranges from slightly acid to moderately alkaline. The total thickness ranges from 30 to 50 inches.

The Cg horizon has hue of 5Y or 5GY, value of 5 or 6, and chroma of 1. This horizon can have mottles. Texture is loamy sand, loamy fine sand, or sandy loam. In some pedons, this horizon is a mixture of loamy sand and shell fragments. Also, some pedons have concretions or splotches of calcium carbonates. Reaction ranges from neutral to moderately alkaline. This horizon can be calcareous.

Delray Series

The soils of the Delray series are loamy, siliceous, hyperthermic Grossarenic Argiaquolls. They are very poorly drained soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are in depressions and in poorly defined drainageways. The Delray soils are rapidly permeable in the A and E horizons and moderately permeable to moderately rapidly permeable in the Bt horizon. In most years, the water table is above the surface for 2 to 6 months and is within a depth of 10 inches for 6 to 9 months. The slope is less than 2 percent.

Delray soils are associated with Canova, Floridana, Gator, Holopaw, and Malabar soils. Canova soils have a thin layer of organic material underlain by a Bt horizon within a depth of 20 inches of the surface. Floridana soils have a Bt horizon at a depth of 20 to 40 inches. Gator soils are organic. Holopaw and Malabar soils are poorly drained and do not have a mollic epipedon. In addition, Malabar soils have a Bw horizon.

Typical pedon of Delray muck; in a partially cleared depressional area; SE1/2SE1/4NW1/4, sec. 24, T. 31 S., R. 35 E.

Oa—0 to 3 inches; black (5YR 2/1) muck; weak fine subangular blocky structure resemblance; very friable; about 55 percent fiber unrubbed, 5 percent rubbed; common fine roots; dark brown (10YR 4/3) sodium pyrophosphate extract; slightly acid; clear smooth boundary.

A1—3 to 17 inches; black (10YR 2/1) fine sand; high organic matter content; few coarse distinct grayish brown streaks and splotches; weak medium granular structure; friable; common fine roots; slightly acid; gradual wavy boundary.

A2—17 to 21 inches; very dark grayish brown (10YR 3/2) sand; few medium faint very dark gray splotches; single grained; loose; few fine roots; very slightly acid; clear wavy boundary.

E1—21 to 38 inches; grayish brown (10YR 5/2) sand; single grained; loose; very slightly acid; clear wavy boundary.

E2—38 to 45 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; neutral; abrupt wavy boundary.

Btg1—45 to 52 inches; dark grayish brown (10YR 4/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; slightly sticky and nonplastic; few fine roots; mildly alkaline; clear smooth boundary.

BCg—52 to 80 inches; gray (5Y 6/1) sandy loam; few medium distinct light yellowish brown (2.5Y 6/4) and light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; slightly sticky and nonplastic; few fine roots; mildly alkaline.

The thickness of the solum is more than 50 inches. Reaction ranges from medium acid to slightly acid in the Oa and A horizons and slightly acid to mildly alkaline in the E, Btg, BCg horizons and, if present, in the Cg horizon.

The Oa horizon has hue of 10YR or 5YR, value of 2, and chroma of 1; or it is neutral with value of 2. Organic fiber content ranges from about 15 to 60 percent unrubbed and less than 10 percent rubbed. Thickness ranges from 0 to 6 inches.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral with value of 2 and can have few medium very dark gray, dark gray, or grayish brown sand splotches or pockets. Texture is sand, fine sand, mucky loamy fine sand, or mucky fine sand. Organic matter content ranges from about 2 to 18 percent. Thickness ranges from 14 to 20 inches.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 2. This horizon can have very dark gray or dark gray splotches or thin streaks along root channels. Texture is sand or fine sand. Thickness ranges from 20 to 39 inches.

The Btg horizon has hue of 5GY or 5Y, value of 5 or 6, and chroma of 2; or hue of 10YR, value of 4, and chroma of 2. This horizon can have mottles in shades of gray, yellow, or brown. Texture is sandy loam, fine sandy loam, or sandy clay loam. Thickness ranges from 7 to 28 inches. The BCg horizon has hue of 5Y or 5GY, value of 5 or 6, and chroma of 1. This horizon can have light olive brown or olive yellow mottles. Texture is sandy loam or loamy sand.

In some pedons, a Cg horizon, if present, has hue of 5Y or 5GY, value of 5 or 6, and chroma of 1. The Cg horizon also, has pockets of marl or shell and calcium carbonate fragments. Texture is fine sandy loam or loamy fine sand.

EauGallie Series

The soils of the EauGallie series are sandy, siliceous, hyperthermic Alfic Haplaquods. They are poorly drained, moderately permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are on broad flatwoods. In wet seasons, the water table is within a depth of 10 inches of the surface for 2 to 4 months. In most years, the water table is at a depth of 48 inches for more than 6 months. The slope ranges from 0 to 2 percent.

EauGallie soils are associated with Myakka, Oldsmar, Pepper, Wabasso, and Winder soils. Myakka soils do not have an argillic horizon. Oldsmar soils have a Bh horizon that is deeper than the Bh horizon in the EauGallie soils. Pepper soils have an ortstein horizon. Wabasso soils have a Bt horizon at a shallower depth than the Bt horizon in the EauGallie soils. Winder soils do not have a Bh horizon.

Typical pedon of EauGallie fine sand; on the flatwoods, 1/2 mile north of Florida State Road 60, east of U.S. Interstate Highway 95, 1/4 mile east on Old Subdivision Road; NW1/4NE1/4, sec. 3, T. 33 S., R. 38 E.

Ap—0 to 5 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; very strongly acid; clear wavy boundary.

A—5 to 15 inches; dark gray (10YR 4/1) fine sand; single grained; loose; very strongly acid; clear smooth boundary.

E—15 to 26 inches; gray (10YR 5/1) fine sand; single grained; loose; very strongly acid; abrupt wavy boundary.

Bh1—26 to 30 inches; black (10YR 2/1) fine sand; moderate fine subangular blocky structure; friable; very strongly acid; clear smooth boundary.

Bh2—30 to 34 inches; very dark gray (10YR 3/1) fine sand; weak fine subangular blocky structure; friable; very strongly acid; clear smooth boundary.

Bh3—34 to 37 inches; dark reddish brown (5YR 3/2) fine sand; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

Bh4—37 to 42 inches; dark brown (10YR 3/3) fine sand; single grained; loose; strongly acid; clear smooth boundary.

BE—42 to 47 inches; brown (10YR 5/3) fine sand; single grained; loose; strongly acid; abrupt wavy boundary.

Btg1—47 to 54 inches; grayish brown (2.5Y 5/2) sandy loam; few medium distinct dark brown (7.5YR 4/4) streaks and common medium brown (10YR 5/3) mottles; weak medium subangular blocky structure; slightly sticky and slightly plastic; medium acid; clear wavy boundary.

Btg2—54 to 62 inches; gray (5Y 6/1) sandy loam; weak fine subangular blocky structure; very friable; medium acid; clear smooth boundary.

Cg—62 to 80 inches; light brownish gray (10YR 6/2) loamy fine sand; single grained; loose; medium acid.

The thickness of the solum is more than 50 inches. Depth to the spodic horizon ranges from 15 to 30 inches, and depth to the argillic horizon ranges from 40 to 80 inches. The A, E, and Bh horizons are sand or fine sand.

The A horizon, if rubbed, has hue of 10YR, value of 2 to 4, and chroma of 1. If value is less than 3.5, thickness is less than 10 inches. Unrubbed colors often have a salt-and-pepper appearance. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2; or it has hue of 10YR, value of 5, and chroma of 1. The total thickness of the A and E horizons is less than 30 inches. Reaction ranges from very strongly acid to moderately alkaline in areas where the surface layer has been limed.

The Bh horizon has hue of 5YR, value of 2 or 3, and chroma of 1 or 2; or hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The sand grains are well coated with organic matter. The thickness of the Bh horizon ranges from 3 to 36 inches. Reaction ranges from very strongly acid to slightly acid. The BE horizon, if present, has hue of 10YR, value of 4 or 5, and chroma of 3. The thickness of the BE horizon ranges from 0 to 17 inches. Texture is fine sand. In some pedons an E' horizon is present, and it has hue of 10YR, value of 5 or 6, and chroma of 2. Texture is sand or fine sand. The thickness of the E' horizon ranges from 0 to 11 inches. The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 3; or hue of 10YR, value of 5, and chroma of 2; or hue of 2.5Y, value of 5, and chroma of 2; or hue of 5Y, value of 5 or 6, and chroma of 1; or hue of 5Y, value of 5, and chroma of 2. Few or common, fine or medium brown yellowish brown, or brownish yellow mottles can be present throughout. Texture is sandy loam or sandy clay loam. The thickness of the Btg horizon ranges from about 6 to 20 inches. Reaction ranges from strongly acid to slightly acid.

The Cg horizon has hue of 10YR or 5Y, value of 6, and chroma of 1 or 2. Texture is sand or loamy fine sand. In some pedons, the C horizon can have up to 16 percent light gray shell fragments that are about 1 centimeter in size. Reaction ranges from medium acid to mildly alkaline.

Electra Series

The soils of the Electra series are sandy, siliceous, hyperthermic Arenic Ultic Haplohumods. They are deep, somewhat poorly drained, slowly permeable or very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level to gently sloping soils are on knolls on the flatwoods and in adjacent drainageways. The water table is at a depth of 25 to 40 inches for 4 consecutive months during most years and recedes to a depth or more than 40 inches during drier periods. The slope ranges from 0 to 5 percent.

Electra soils are associated with Immokalee, Oldsmar, and Orsino soils. Immokalee and Oldsmar soils are poorly drained. In addition, Immokalee soils do not have an argillic horizon, and Oldsmar soils are less acid than Electra soils. Orsino soils are moderately well drained and do not have an argillic horizon.

Typical pedon of Electra sand, 0 to 5 percent slopes; in an area adjacent to the south prong of Sebastian Creek; NW1/4NW1/4SW1/4, sec. 23, T. 31 S., R. 38 E.

A—0 to 5 inches; dark gray (10YR 4/1) sand; single grained; loose; common fine and few medium roots; very strongly acid; clear smooth boundary.

E—5 to 30 inches; light gray (10YR 7/1) sand; single grained; loose; common medium and many fine roots; very strongly acid; abrupt wavy boundary.

Bh1—30 to 33 inches; dark reddish brown (5YR 3/2) sand; weak medium subangular blocky structure; weakly cemented in less than 50 percent of the horizon; friable; sand grains well coated with organic matter; few fine and common medium roots; extremely acid; gradual wavy boundary.

Bh2—33 to 36 inches; dark reddish brown (5YR 3/3) loamy sand; few medium yellowish red (5YR 4/6) moderately cemented nodules 1/2 inch in diameter; moderate medium subangular blocky structure; weakly cemented in less than 50 percent of the horizon; friable; sand grains well coated with organic matter; few fine roots; extremely acid; clear wavy boundary.

BE—36 to 47 inches; brown (7.5YR 4/4) sand; weak fine subangular blocky structure; very friable; few fine and medium roots; extremely acid; abrupt wavy boundary.

Btg1—47 to 59 inches; light brownish gray (10YR 6/2) sandy loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; slightly sticky when wet and nonplastic; few fine and medium roots; sand grains coated and bridged with clay; extremely acid; gradual smooth boundary.

Btg2—59 to 80 inches; light brownish gray (10YR 6/2) sandy loam; few fine prominent strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; slightly sticky and nonplastic; strongly acid.

The thickness of the solum is more than 80 inches. Depth to the spodic horizon is about 30 inches, and depth to the argillic horizon is more than 40 inches. Reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 4, and chroma of 1. Thickness ranges from 2 to 5 inches. The E horizon has hue of 10YR, value of 7, and chroma of 1; or hue of 10YR, value of 6, and chroma of 2 and can have dark brown streaks or mottles. Texture of the A and E horizon is sand or fine sand. The total thickness of the A and E horizons ranges from 30 to 37 inches.

The Bh horizon has hue of 10YR, value of 3, and chroma of 1; or hue of 5YR, value of 3, and chroma of 2 or 3; or it is neutral, with value of 2, and chroma of 0. Texture is sand, fine sand, or loamy sand. Thickness of the Bh horizon ranges from 6 to 17 inches. In some pedons is a BE horizon that has hue of 7.5YR, value of

4, and chroma of 4; or hue of 10YR, value of 5, and chroma of 4. In addition, some pedons have an E' horizon of sand or fine sand that has hue of 10YR, value of 6, and chroma of 3. This E' horizon has dark yellowish brown and yellowish brown mottles. The Btg horizon has hue of 10YR, value of 6, and chroma of 2 or 3; or hue of 10YR, value of 5, and chroma of 4 and can have brownish yellow or olive brown mottles or very dark brown stains along old root channels. Texture is sandy loam or fine sandy loam.

Floridana Series

The soils of the Floridana series are loamy, siliceous, hyperthermic Arenic Argiaquolls. They are very poorly drained, slowly permeable to very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are in depressions, in poorly defined drainageways, and on broad, low flats. The water table is above the surface for short periods after heavy rainfall or within a depth of 10 inches for more than 6 months during most years. It is at a depth of 10 to 30 inches for short periods during dry seasons. Depressional areas are ponded for 6 months or more. The slope is less than 2 percent.

Floridana soils are associated with Chobee, Manatee, Oldsmar, Wabasso, Riviera, and Winder soils. Chobee and Manatee soils have a Bt horizon at a depth of less than 20 inches. The remaining associated soils do not have a mollic epipedon and are poorly drained. In addition, Oldsmar and Wabasso soils have a spodic horizon, and Winder soils have a Bt horizon at a depth of less than 20 inches.

Typical pedon of Floridana sand; in an area of citrus; NW1/4SW1/4NW1/4, sec. 7, T. 31 S., R. 37 E.

Ap—0 to 5 inches; black (10YR 2/1) sand, very dark grayish brown (10YR 3/2) dry; moderate medium granular structure; friable; few very fine, common fine and medium roots; neutral; gradual wavy boundary.

A—5 to 14 inches; black (10YR 2/1) sand, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; few very fine, common fine and medium roots; neutral; clear wavy boundary.

E—14 to 20 inches; light brownish gray (10YR 6/2) sand; single grained; loose; common fine, few medium roots; slightly acid; abrupt wavy boundary.

Btg1—20 to 30 inches; gray (10YR 5/1) sandy clay loam; common fine and medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; slightly sticky and slightly plastic; few fine and medium pockets and streaks of black (N 2/0) along old root channels; slightly acid; gradual irregular boundary.

Btg2—30 to 34 inches; gray (10YR 5/1) sandy clay loam; many fine and medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; slightly sticky and slightly plastic; few fine and medium black (N 2/0) pockets and streaks along old root channels; mildly alkaline; clear irregular boundary.

BCg—34 to 37 inches; gray (5Y 6/1) sandy clay loam; many fine and medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; many fine and medium white (10YR 8/1) pockets of soft calcium carbonate; strongly effervescent; mildly alkaline; gradual irregular boundary.

Cgk1—37 to 53 inches; gray (10YR 6/1) sandy loam; few medium distinct gray (10YR 4/1) and few fine prominent yellowish brown (10YR 5/8) streaks; weak medium subangular blocky structure; slightly sticky and nonplastic; common fine white (10YR 8/1) calcium carbonate masses; strongly effervescent; moderately alkaline; clear wavy boundary.

Cgk2—53 to 68 inches; dark gray (10YR 4/1) sandy loam; common coarse distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; slightly sticky and nonplastic; common white (10YR 8/1) calcium carbonate concretions 1/8 to 1 inch in diameter; strongly effervescent; moderately alkaline; clear wavy boundary.

Cgk3—68 to 80 inches; light gray (10YR 6/1) sandy clay loam; few fine distinct yellowish brown (10YR 5/6) and few fine distinct greenish gray (5GY 6/1) mottles; weak fine subangular blocky structure; nonsticky and slightly plastic; slightly effervescent; mildly alkaline.

The thickness of the solum is more than 35 inches. Reaction ranges from very strongly acid to neutral in the A and Ap horizons and from slightly acid to moderately alkaline throughout the rest of the pedon.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral with value of 2. Texture is sand, fine sand, or mucky fine sand. Thickness ranges from 12 to 21 inches.

The E horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Texture is sand or fine sand. Thickness ranges from 6 to 10 inches.

The Btg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2; or hue of 5Y, value of 5, and chroma of 1 or 2 and can have mottles of gray, yellow, and brown. Texture is sandy loam or sandy clay loam. Some pedons have pockets of loamy fine sand or calcium carbonate fragments and nodules 1 millimeter to 4 millimeters in size. Thickness ranges from 10 to 20 inches. The BCg horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2. This horizon can have mottles of gray, yellow, and brown. Texture is sandy loam, fine sandy loam, or sandy clay loam. Some pedons have pockets of loamy fine sand, calcium carbonate fragments, and nodules that are 1 millimeter to 3 millimeters in size, or accumulations of soft marly material. Thickness ranges from 3 to 28 inches.

The Cgk horizon has hue of 10YR, 5Y, or 5GY, value of 4 to 6, and chroma of 1. Texture is loamy sand, sandy loam, or sandy clay loam. This horizon can have pockets of marl or shell and calcium carbonate fragments.

Gator Series

The soils of the Gator series are loamy, siliceous, euic, hyperthermic Terric Medisaprists. They are very poorly drained, moderately slowly permeable soils that formed in moderately thick beds of hydrophytic plant remains underlain by beds of loamy and sandy marine sediment. These nearly level soils are in freshwater swamps and marshes. Under natural conditions, the water table is above the surface for most of the year except during extended dry periods. In drained areas, the water table is controlled at a depth of 10 to 36 inches or controlled according to the need of the crop. The water table is at or above the surface for short periods after heavy rainfall and during normal periods of high seasonal rainfall. The slope is 0 to 1 percent.

Gator soils are associated with Terra Ceia, Canova, Delray, and Floridana soils. Terra Ceia soils have organic layers that are more than 51 inches thick. Canova, Delray, and Floridana soils are mineral soils. In addition, Canova soils have a thin surface layer of organic material and an argillic horizon within a depth of 20 inches of the surface. Floridana and Delray soils have a mollic epipedon. In addition, Floridana soils have an argillic horizon at a depth of 20 to 40 inches, and Delray soils have an argillic horizon at a depth of 40 to 80 inches.

Typical pedon of Gator muck (fig. 15); in a pasture, 8.5 miles west of Fellsmere, 0.5 mile west of Lateral Q Canal, 0.15 mile north of Ditch 13; Block 13 J; NW1/4NW1/4NE1/4, sec. 22, T. 31 S., R. 36 E.

Figure 15.—Profile of Gator muck underlain by sandy clay and sandy clay loam material. This soil is well suited to improved grasses.

Oap—0 to 6 inches; very dark brown (10YR 2/2) muck; about 10 percent fiber unrubbed, less than 5 percent rubbed; weak fine subangular blocky structure; very friable; common fine and very fine roots; light yellowish brown (10YR 6/4) sodium pyrophosphate extract; slightly acid (pH 5.3 in 0.01 molar calcium chloride solution); clear smooth boundary.

Oa—6 to 26 inches; very dark brown (10YR 2/2) muck; few common dark brown (10YR 3/3) streaks; about 40 percent fiber unrubbed, 5 percent rubbed; moderate medium subangular blocky structure; friable; many fine and very fine roots; brown (10YR 5/3) sodium pyrophosphate extract; slightly acid (pH 4.4 in 0.01 molar calcium chloride solution); abrupt smooth boundary.

Cg1—26 to 30 inches; very dark gray (10YR 3/1) sandy clay loam; weak fine subangular blocky structure; slightly sticky and slightly plastic; many fine and very fine roots; few fine dark gray stains along root channels; very strongly acid after drying; abrupt smooth boundary.

Cg2—30 to 44 inches; dark gray (10YR 4/1) sandy clay loam; moderate medium subangular blocky structure; common (nonintersecting) pressure faces on peds; slightly sticky and plastic; common fine roots; medium acid after drying; gradual wavy boundary.

Cg3—44 to 49 inches; dark gray (N 4/0) sandy clay loam; moderate medium subangular blocky structure; slightly sticky and slightly plastic; few fine roots; neutral; clear wavy boundary.

Cg4—49 to 54 inches; greenish gray (5GY 5/1) sandy clay loam; moderate medium subangular blocky structure; slightly sticky and slightly plastic; common fine and medium distinct yellowish brown (10YR 5/4) stains; few fine and medium light gray (10YR 7/1) calcium carbonate accumulations; slightly effervescent; mildly alkaline; gradual wavy boundary.

Cg5—54 to 62 inches; greenish gray (5GY 5/1) sandy clay loam; moderate fine subangular blocky structure; slightly sticky and nonplastic; common medium distinct yellowish brown (10YR 5/4) mottles; common coarse light gray (5Y 7/1) calcium carbonate accumulations; strongly effervescent; few fine roots; moderately alkaline; clear wavy boundary.

Cg6—62 to 80 inches; greenish gray (5GY 5/1) sandy clay loam; weak fine subangular blocky structure; nonsticky and nonplastic; common medium distinct dark gray (5Y 4/1) streaks along old root channels; common medium prominent yellowish brown (10YR 5/8) sandy loam stains and splotches; slightly effervescent; moderately alkaline.

The thickness of organic material and depth to mineral material are less than 51 inches and commonly range from 22 to 46 inches. Soil reaction is slightly acid to mildly alkaline by the Hellige-Truog method in the Oap and Oa horizons. After drying, it is very strongly acid to moderately alkaline in the Cg1, Cg2, and Cg3 horizons and is neutral to moderately alkaline in the Cg4, and Cg5 horizons and in the Cg6 horizon, if present.

The Oa or Oap horizon has hue of 10YR, 5YR, or N, value of 2, and chroma of 2 or less; or hue of 5YR, value of 2 or 3, and chroma of 2 or less. Sodium pyrophosphate extract colors have hue of 10YR, value of 2 through 4, and chroma of 4 or less; or hue of 10YR, value of 5, and chroma of 2 through 4; or hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The Cg1, Cg2, and Cg3 horizons have hue of 10YR, value of 2 through 4, and chroma of 1; or hue of 10YR, value of 2, and chroma of 2; or they are neutral with value of 2 through 4 and can have mottles and streaks in shades of brown or gray. Texture is sandy loam, sandy clay loam, or sandy clay. Clay content is 18 to 40 percent. If the clay content in these horizons is more than 35 percent, the weighted average particle size of the mineral layer in the control section still qualifies for a loamy family.

The Cg4, Cg5, and Cg6 horizons have hue of 5GY or 5Y, value of 5, and chroma of 1 and can have light olive brown, olive brown, and olive yellow mottles and streaks. Texture is sandy clay loam or sandy loam that has lenses of sand and loamy sand. Few to common, fine and medium, soft and hard light gray fragments of carbonatic material are in this horizon. In some pedons, the Cg6 horizon is loamy sand.

Holopaw Series

The soils of the Holopaw series are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs. They are poorly drained, moderately slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are on broad low flats, in poorly defined drainageways, and in depressional areas. The water table is within a depth of 10 inches of the surface for 2 to 6 months each year. The depressional areas are ponded for 6 to 9 months or more. The slope ranges from 0 to 2 percent.

Holopaw soils are associated with EauGallie, Malabar, Oldsmar, Pineda, Riviera, and Wabasso soils. EauGallie, Oldsmar, and Wabasso soils have a spodic horizon. Malabar soils have a Bw horizon. Pineda and Riviera soils have an argillic horizon at a depth of 20 to 40 inches. In addition Pineda soils have a Bw horizon.

Typical pedon of Holopaw fine sand; in a broad, low flat planted to slash pine, about 1.25 miles south of Indian River County Road 512; NE1/4NW1/4NW1/4, sec. 26, T. 31 S., R. 37 E.

Ap—0 to 5 inches; very dark gray (10YR 3/1) fine sand; mixture of organic matter and light gray sand grains, salt-and-pepper appearance when dry; weak fine granular structure; very friable; common fine roots; slightly acid; gradual wavy boundary.

A—5 to 12 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; few medium and fine roots; slightly acid; clear smooth boundary.

E1—12 to 30 inches; pale brown (10YR 6/3) fine sand; single grained; loose; few medium roots; slightly acid; clear smooth boundary.

E2—30 to 45 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; slightly acid; abrupt wavy boundary.

Btg—45 to 62 inches; grayish brown (10YR 5/2) sandy loam; few fine faint yellowish brown mottles; moderate medium subangular blocky structure; slightly sticky and slightly plastic; common pockets of brown (10YR 5/3) fine sand; neutral; gradual wavy boundary.

Cg—62 to 80 inches; olive gray (5Y 5/2) loamy fine sand; weak fine subangular blocky structure; nonsticky and nonplastic; few pockets of brown (10YR 5/3) fine sand; neutral.

The thickness of the solum ranges from 50 to 80 inches or more. Reaction is slightly acid or neutral in the surface and subsurface layers and is slightly acid to moderately alkaline in the subsoil and substratum.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 2 or less. Thickness ranges from 2 to 13 inches, but if value is 3 or less, the thickness is less than 7 inches.

The E horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or less. This part of the E horizon can have yellowish brown mottles; or the E horizon has hue of 10YR, value of 6, and chroma of 3. Texture of the A and E horizons is sand or fine sand. The total thickness is more than 40 inches.

The Btg horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 or less and has mottles in shades of brown and yellow. Texture is sandy loam, fine sandy loam, or sandy clay loam. Many pedons have pockets and lenses of sand or fine sand. Thickness ranges from 12 to 20 inches. The BCg horizon, if present, has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 or less. Texture is sandy loam or fine sandy loam. Some pedons do not have a BCg horizon.

The Cg horizon has hue of 10YR or 5Y, value of 5, and chroma of 2 or less. Texture is sand, fine sand, loamy fine sand, or loamy sand.

Immokalee Series

The soils of the Immokalee series are sandy, siliceous, hyperthermic Arenic Haplaquods. They are poorly drained, moderately permeable soils that formed in beds of sandy marine sediment. These nearly level soils are on broad flatwoods. In most years, the water table is within a depth of 10 inches of the surface for 1 to 3 months and at a depth of 10 to 40 inches for 6 to 9 months. The slope ranges from 0 to 2 percent.

Immokalee soils are associated with Astatula, Myakka, Oldsmar, Pomello, Pompano, and Satellite soils. Astatula soils do not have a Bh horizon within a depth of 30 inches of the surface and are excessively drained. Myakka soils have a Bh horizon at a depth of 20 to 30 inches. Pomello soils are better drained than Immoaklee soils. Oldsmar soils have an argillic horizon at a depth of more than 40 inches. Pompano soils do not have a Bh horizon. Satellite soils do not have a Bh horizon and are somewhat poorly drained.

Typical pedon of Immokalee fine sand; on the flatwoods, 20 feet east of Indian River County Road 505, about 500 feet north of entrance to MacDonald State Campground; SW1/4, sec. 22, T. 31 S., R. 38 E.

A—0 to 5 inches; very dark gray (10YR 3/1) fine sand; mixture of organic matter and light gray sand grains, salt-and-pepper appearance when dry; weak fine granular structure; very friable; many fine and few medium roots; very strongly acid; clear smooth boundary.

E—5 to 35 inches; light gray (10YR 7/1) fine sand; single grained; loose; common medium and few fine roots; very strongly acid; abrupt wavy boundary.

Bh—35 to 55 inches; very dark gray (5YR 3/1) fine sand; single grained; loose; sand grains well coated with organic matter; few fine roots; very strongly acid; clear wavy boundary.

BC—55 to 80 inches; brown (10YR 5/3) fine sand; weak fine subangular blocky structure; very friable; strongly acid.

Depth to the spodic horizon ranges from 33 to 50 inches. Texture is sand or fine sand throughout. Reaction ranges from very strongly acid to medium acid. In some pedons that have shell fragments at a depth of 50 inches or more, the reaction is mildly alkaline.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 10YR, value of 4, and chroma of 1. Unrubbed colors often have a salt-and-pepper appearance. Thickness ranges from 2 to 9 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1; or hue of 10YR, value of 5, and chroma of 2. In some pedons, a transitional horizon 1/2 inch to 2 inches thick is between the base of the E horizon and the Bh horizon. Thickness ranges from 25 to 41 inches. In addition, some pedons have a dense mat of partially decomposed medium and fine roots underlain by the Bh horizon.

The Bh horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1; or hue of 10YR or 5YR, value of 3, and chroma of 2. Some pedons have very dark grayish brown streaks or fragments of weakly cemented spodic bodies. Some pedons also can be weakly cemented in less than 50 percent of any subhorizon. Thickness ranges from 12 to 28 inches. Some pedons have an E' and Bh' horizon below the Bh horizon. The E' and Bh' horizons have hue of 10YR, value of 5 to 8, and chroma of 1; or hue of 10YR, value of 5, and chroma of 2; or hue of 10YR or 5YR, value of 2 or 3, and chroma of 1; or hue of 10YR or 5YR, value of 3, and chroma of 2. The BC horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. Some pedons have a BC&Bh horizon. The Bh part of the BC&Bh horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1; or hue of 10YR or 5YR, value of 3, and chroma of 2.

The C horizon, if present, has hue of 10YR, value of 4 or 5, and chroma of 2.

Jonathan Series

The soils of the Jonathan series are sandy, siliceous, hyperthermic, ortstein Typic Haplohumods. They are somewhat excessively drained, slowly permeable to very slowly permeable soils that formed in thick beds of sandy marine sediment. These nearly level to gently sloping soils are on the Atlantic Coastal Ridge and on slightly elevated knolls on the flatwoods. The water table is at a depth of 40 to 60 inches for 1 to 4 months during periods of extremely high precipitation. It is below 60 inches for most of the remainder of the year. The slope ranges from 0 to 5 percent.

Jonathan soils are associated with Immokalee, Myakka, Pomello, Satellite, and St. Lucie soils. These associated soils do not have an ortstein layer. In addition, Immokalee and Myakka soils are poorly drained. Pomello soils have a spodic horizon within a depth of 50 inches of the surface and are moderately well drained. Satellite and St. Lucie soils do not have a spodic horizon. St. Lucie soils are excessively drained, and Satellite soils are somewhat poorly drained.

Typical pedon of Jonathan sand, 0 to 5 percent slopes; on the undisturbed flatwoods, about 1/4 mile west of railroad crossing, 0.45 mile south of South Gifford Road, 1/2 mile south of power substation; SW1/4SE1/4SW1/4, sec. 26, T. 32 S., R. 39 E.

A—0 to 3 inches; dark gray (10YR 4/1) sand; single grained; loose; many fine and very fine roots; strongly acid; clear smooth boundary.

E1—3 to 75 inches; white (10YR 8/1) sand; single grained; loose; many fine and medium and few coarse roots that decrease in number; medium acid; abrupt wavy boundary.

Bhm—75 to 80 inches; dark reddish brown (5YR 3/2) sand; thin 1 centimeter black (5YR 2/1) surface layer; strong medium subangular blocky structure; 60 to 75 percent strongly cemented; firm or very firm; very strongly acid.

The thickness of the solum is more than 80 inches. Depth to the spodic horizon is more than 50 inches. Texture is sand or fine sand throughout. Reaction ranges from very strongly acid to medium acid in the A and E horizons and extremely acid to very strongly acid in the Bh horizon.

The A horizon has hue of 10YR, value of 4 through 7, and chroma of 1. Thickness ranges from 1 to 6 inches. The E horizon has hue of 10YR, value of 7 or 8, and chroma of 1. This horizon has stains and streaks of darker colors in old root channels. The total thickness of the A and E horizons is more than 50 inches.

In some pedons, a transitional layer is present between the E and Bh horizons. It has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. In addition, a dense mat of partially decomposed fine and medium roots is underlain by the Bh horizon in some pedons.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 2 or 3. Cementation is variable in most pedons, but more than half of the Bh horizon in each pedon is weakly to strongly cemented. In some pedons, this horizon has pockets of E horizon material.

In a few pedons, a C horizon is at a depth of 80 inches. It has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. Texture is sand or fine sand.

Jupiter Series

The soils of the Jupiter series are sandy, siliceous, hyperthermic Lithic Haplaquolls. They are poorly drained, rapidly permeable soils that formed in thin beds of sandy marine sediment underlain by fractured limestone bedrock. These nearly level soils are on low flats and hammocks. They are saturated during the wet periods. The slope ranges from 0 to 2 percent.

Jupiter soils are associated with Boca, Chobee, Floridana, Manatee, Wabasso, and Winder soils. Chobee, Floridana, Manatee, Wabasso, and Winder soils are not underlain by limestone and have an argillic horizon. Boca, Wabasso, and Winder soils do not have a mollic epipedon. In addition, Boca soils are underlain by limestone at a depth of 22 to 40 inches. Also, Boca soils have an argillic horizon.

Typical pedon of Jupiter fine sand; on a low hammock, about 1-1/4 mile north of the St. Lucie-Indian River County line; NE1/4SW1/4SE1/4, sec. 28, T. 33 S., R. 39 E.

A1—0 to 5 inches; black (10YR 2/1) fine sand, very dark gray (10YR 3/1) dry; weak fine granular structure; very friable; many fine and common medium roots; many fine interstitial pores; common dark grayish brown (10YR 4/2) uncoated sand grains; slightly acid; clear wavy boundary.

A2—5 to 12 inches; black (10YR 2/1) fine sand, very dark brown (10YR 2/2) dry; single grained; loose; common fine and few coarse roots; slightly acid; abrupt irregular boundary.

2R—12 inches; hard fractured limestone bedrock; fractures 1 inch to 4 inches wide, filled with A2 material, mixed with carbonatic material in places; smooth to wavy rock surface, underside irregular and broken.

Depth to limestone ranges from 10 to 20 inches in the main part of each pedon but is at a depth of more than 20 inches where fractures occur. Reaction ranges from slightly acid to moderately alkaline throughout.

The Ap or A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral with value of 2. Uncrushed colors have a salt-and-pepper appearance. Texture is sand or fine sand. Thickness ranges from 7 to 20 inches.

In some pedons, a C horizon is between the A horizon and the limestone. The C horizon has hue of 10YR, value of 4, and chroma of 2; or hue of 10YR, value of 5 through 7, and chroma of 1 or 2. Texture is sand or fine sand. Thickness ranges from 0 to 6 inches. Also in some pedons, a thin, discontinuous layer of soft weathered limestone is on the surface of the bedrock.

The 2R horizon is limestone bedrock that has many fractures and a few solution holes. The limestone is 10 to 24 inches or more thick. Solution holes contain light gray to yellowish brown sand, sandy loam, marl, or mixed loamy sand and marl material.

Kesson Series

The soils of the Kesson series are siliceous, hyperthermic Typic Psammaquents. They are deep, very poorly drained, moderately rapidly permeable soils that formed in thick marine deposits of sand and shell fragments. These nearly level soils are in tidal swamps and marshes. These swamps and marshes are adjacent to the Indian River. Under natural conditions, this soil is flooded during normal high tides. The slope is less than 1 percent.

Kesson soils are associated with Captiva, McKee, Pompano, Canaveral, and Palm Beach soils. Palm Beach soils are excessively drained. Canaveral soils are somewhat poorly drained to moderately well drained. Pompano and Captiva soils are poorly drained. In addition, Captiva, Pompano, Canaveral, and Palm Beach soils do not have a muck surface. McKee soils are clay loam in texture to a depth of 60 inches or more and are very fluid when squeezed in the hand.

Typical pedon of Kesson muck; 1,000 feet west of Florida State Road A1A; NE1/4SW1/4, sec. 20, T. 30 S., R. 369 E.

Oa—0 to 6 inches; dark reddish brown (5YR 3/2) muck; weak medium subangular blocky structure resemblance; friable; about 30 percent fiber unrubbed, less than 5 percent rubbed; many very fine roots; strongly alkaline; abrupt smooth boundary.

C1—6 to 30 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many very fine and fine roots; few fine and medium pockets of dark reddish brown muck; about 15 percent shell fragments; strongly alkaline; calcareous; gradual irregular boundary.

C2—30 to 38 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few very fine and fine roots; common fine and medium very dark grayish brown (10YR 3/2) streaks; about 20 percent shell fragments; moderately alkaline; calcareous; clear smooth boundary.

Cg—38 to 80 inches; dark greenish gray (5GY 4/1) fine sand; single grained; loose; few very fine roots; about 25 percent shell fragments; few shell fragments 3 to 30 millimeters in diameter; calcareous; moderately alkaline.

Reaction ranges from mildly alkaline to strongly alkaline, and the soil is calcareous. It does not become extremely acid when dry. Below the Oa horizon, the texture is sand or fine sand.

The Oa horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2. Thickness of the Oa horizon is 0 to 7 inches. The fiber content ranges from 30 to 40 percent unrubbed and is less than 10 percent rubbed. An A horizon can be present in some pedons.

The C horizon has hue of 10YR, value of 2 to 5, and chroma of 2 or 3. This horizon can have a few, fine and medium pockets of dark reddish brown or black muck. Thickness ranges from 4 to 40 inches. The content of shell fragments ranges from 5 to 20 percent. The Cg horizon has hue of 10YR, 5Y, or 5GY, value of 4 to 6, and chroma of 1 or 2; or hue of 5GY or 5G, value of 4, and chroma of 1. The content of shell fragments ranges from 3 to 30 percent.

Lokosee Series

The soils of the Lokosee series are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs. They are poorly drained, slowly or very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are on low hammocks, on broad low flats that are adjacent to the flatwoods, and in poorly defined drainageways. In most years, the water table is within a depth of 10 inches of the surface for 2 to 4 months and at a depth of 10 to 40 inches for more than 6 months. During extended dry periods, it recedes to a depth of more than 40 inches. The slope ranges from 0 to 2 percent.

Lokosee soils are associated with Holopaw, Pineda, Riviera, Oldsmar, and EauGallie soils. Pineda and Riviera soils have an argillic horizon at a depth of 20 to 40 inches. Holopaw and Riviera soils do not have a high chroma Bw horizon. Oldsmar and EauGallie soils have a spodic horizon.

Typical pedon of Lokosee fine sand; in a poorly defined drainageway in Vero Lake Estates; SW1/4NW1/4SW1/4, sec. 34, T. 31 S., R. 38 E.

A—0 to 3 inches; black (10YR 2/1) fine sand; single grained; loose; many fine and medium roots; very strongly acid; clear smooth boundary.

E—3 to 10 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; common fine and medium roots; slightly acid; gradual smooth boundary.

Bw1—10 to 19 inches; mottled very pale brown (10YR 7/4) and brownish yellow (10YR 6/6) sand; single grained; loose; few fine and medium roots; neutral; clear smooth boundary.

Bw2—19 to 30 inches; strong brown (7.5YR 5/8) sand; common medium and coarse prominent very pale brown (10YR 7/4) mottles; single grained; loose; neutral; clear smooth boundary.

Bw3—30 to 35 inches; very pale brown (10YR 7/4) sand; many coarse distinct brownish yellow (10YR 6/6) mottles; single grained; loose; neutral; clear smooth boundary.

Bh—35 to 45 inches; dark brown (10YR 4/3) sand; single grained; loose; slightly acid; clear smooth boundary.

E'1—45 to 50 inches; light brownish gray (10YR 6/2) sand; few fine faint dark grayish brown mottles; single grained; loose; slightly acid; gradual smooth boundary.

E'2—50 to 70 inches; pale brown (10YR 6/3) sand; common medium prominent greenish gray (5GY 5/1) sandy loam pockets; single grained; loose; neutral; abrupt irregular boundary.

Btg—70 to 80 inches; greenish gray (5GY 5/1) sandy clay loam; common fine prominent very dark grayish brown (10YR 3/2) streaks; weak medium subangular blocky structure; very friable; slightly sticky and nonplastic; moderately alkaline.

The thickness of the solum ranges from 46 to 80 inches or more. The combined thickness of the A, E, Bw, and Bh horizons is more than 40 inches. Reaction in the A horizon ranges from very strongly acid to slightly acid. Reaction in the underlying horizons ranges from slightly acid to moderately alkaline.

The A or Ap horizon has hue of 10YR, value of 2 through 4, and chroma of 1 or 2. Thickness ranges from 3 to 7 inches. If the value is 3 or less, the A horizon is less than 6 inches thick. Texture is sand or fine sand.

The E and E' horizons have hue of 10YR, value of 5 to 7, and chroma of 2 or 3. Texture is sand or fine sand.

The Bw horizon has hue of 10YR, value of 6 or 7, chroma of 4 through 8; or hue of 7.5YR, value of 5 to 7, and chroma of 6 to 8. Thickness of the Bw horizon ranges from 16 to 25 inches. Texture is sand or fine sand. The Bh horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Thickness ranges from 4 to 20 inches. Texture is sand or fine sand. The Btg horizon has hue of 10YR, value of 4 through 6, and chroma of 1 or 2; or hue of 2.5Y or 5GY, value of 5, and chroma of 1 or 2 and can have very dark grayish brown or yellowish brown streaks and mottles. Texture is sandy loam, fine sandy loam, or sandy clay loam. In some pedons, this horizon has few, fine to coarse streaks or pockets of coarser material.

The Cg horizon, if present, has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or hue of 5Y, value of 6, and chroma of 1. Texture is sand, fine sand, or loamy fine sand.

Malabar Series

The soils of the Malabar series are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs. They are poorly drained, slowly permeable to very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are in low, narrow to broad sloughs, on flats, and in poorly defined drainageways. The water table is at a depth of less than 10 inches of the surface for 2 to 6 months each year and at a depth of 10 to 40 inches for most of the remainder of the year. The slope ranges from 0 to 2 percent.

Malabar soils are associated with EauGallie, Floridana, Oldsmar, Pineda, Riviera, and Wabasso soils. EauGallie, Oldsmar, and Wabasso soils have a spodic horizon. Floridana soils have a mollic epipedon and are very poorly drained. Pineda soils have an argillic horizon at a depth of 20 to 40 inches. Riviera soils do not have a high chroma Bw horizon.

Typical pedon of Malabar fine sand; on a low, broad flat, about 0.2 mile south of Oslo Road, 0.3 mile west of 33rd Avenue; NE1/4SW1/4NW1/4, sec. 27, T. 33 S., R. 39 E.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) fine sand; mixture of organic matter and light gray sand grains, salt-and-pepper appearance when dry; weak fine granular structure; very friable; many fine and few medium roots; slightly acid; gradual smooth boundary.

E1—3 to 10 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; common fine and few medium roots; medium acid; gradual wavy boundary.

E2—10 to 17 inches; light yellowish brown (10YR 6/4) fine sand; few fine distinct brownish yellow (10YR 6/8) mottles; single grained; loose; few fine roots; slightly acid; clear smooth boundary.

Bw1—17 to 34 inches; brownish yellow (10YR 6/8) fine sand; single grained; loose; few fine and medium roots; neutral; clear smooth boundary.

Bw2—34 to 41 inches; reddish yellow (7.5YR 7/6) fine sand; single grained; loose; neutral; abrupt wavy boundary.

Btg1—41 to 46 inches; dark grayish brown (10YR 4/2) sandy clay loam; few fine distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; slightly sticky and nonplastic; neutral; gradual wavy boundary.

Btg2—46 to 55 inches; gray (10YR 5/1) sandy loam; few fine faint light brownish gray mottles; weak medium subangular blocky structure; slightly sticky and nonplastic; moderately alkaline; gradual wavy boundary.

BCg—55 to 65 inches; gray (10YR 6/1) sandy loam; weak fine subangular blocky structure; slightly sticky and nonplastic; moderately alkaline; gradual wavy boundary.

Cg—65 to 80 inches; gray (5Y 6/1) loamy sand; weak fine subangular blocky structure; nonsticky and nonplastic; moderately alkaline.

The thickness of the solum ranges from 46 to 80 inches or more. Reaction ranges from medium acid to slightly acid in the surface and subsurface layers and from slightly acid to moderately alkaline in the subsoil and substratum.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Thickness ranges from 2 to 4 inches.

The E horizon has hue of 10YR, value of 6, chroma of 2 to 4; or hue of 10YR, value of 7, and chroma of 2 and can have brownish yellow, grayish brown, or dark grayish brown mottles or stains. Texture of the A and E horizons is sand or fine sand. Total thickness of the E horizon ranges from 9 to 14 inches.

The Bw horizon has hue of 10YR, value of 5 or 7, and chroma of 4 to 8; or hue of 10YR, value of 6, and chroma of 3 to 8; or hue of 7.5YR, value of 7, and chroma of 6. Texture is sand or fine sand. Thickness ranges from 24 to 37 inches. The Btg and BCg horizons have hue of 10YR, value of 4 to 7, and chroma of 1 or 2; or hue of 5Y, value of 5 or 6, and chroma of 1 or 2 and can have mottles of dark yellowish brown, yellow, light olive brown, or light brownish gray. Texture is sandy loam, fine sandy loam, or sandy clay loam. A few intrusions of a coarser-textured material from overlying horizons are in the Btg horizon in many pedons. The BCg horizon can also have loamy fine sandy texture. The total thickness ranges from 12 to 24 inches or more.

The Cg horizon has hue of 5Y, value of 5 or 6, chroma of 1. It is sand, fine sand, or loamy sand.

Manatee Series

The soils of the Manatee series are coarse-loamy, siliceous, hyperthermic Typic Argiaquolls. They are very poorly drained, moderately permeable soils that formed in sandy and loamy marine sediment. These nearly level soils are in depressions, in poorly defined drainageways, and on broad, low flats. Under natural conditions, the Manatee soils are covered with shallow water, or they have a water table within a depth of 10 inches of the surface for more than 6 months of most years. Runoff is slow. The slope is dominantly less than 1 percent but ranges to 2 percent.

Manatee soils are associated with Chobee, EauGallie, Floridana, Jupiter, Pineda, Riviera, Wabasso, and Winder soils. Chobee soils are in the fine-loamy family. Floridana soils have a thick sandy surface layer and an albic horizon. EauGallie, Jupiter, and Wabasso soils are poorly drained and are in slightly higher positions on the landscape than Manatee soils. In addition, EauGallie and Wabasso soils have a spodic horizon, and Jupiter soils are underlain by limestone at a depth of less than 20 inches. Pineda and Riviera soils are poorly drained and have an argillic horizon at a depth of 20 to 40 inches. In addition, Pineda soils have a Bw horizon. Winder soils are poorly drained. They do not have a mollic epipedon and have tongues of E horizon extending into the Bt horizon.

Typical pedon of Manatee loamy fine sand; in a former area of citrus, 0.2 mile south of Florida State Road 60 and Kings Highway intersection; SE1/4NE1/2SE1/4, sec. 5, T. 33 S., R. 39 E.

Ap—0 to 6 inches; black (10YR 2/1) loamy fine sand, very dark gray (10YR 3/1) dry; weak fine granular structure; very friable; common fine and few medium roots; mildly alkaline; gradual wavy boundary.

A—6 to 12 inches; black (10YR 2/1) loamy fine sand; weak fine subangular blocky structure; slightly sticky and slightly plastic; common fine roots; mildly alkaline; gradual wavy boundary.

Bt—12 to 22 inches; very dark gray (10YR 3/1) fine sandy loam; moderate fine subangular blocky structure; slightly sticky and slightly plastic; few fine and medium roots; moderately alkaline; gradual wavy boundary.

Btg—22 to 31 inches; dark gray (10YR 4/1) sandy loam; few fine faint dark brown mottles; moderate fine subangular blocky structure; slightly sticky and slightly plastic; few fine roots; moderately alkaline; gradual smooth boundary.

BCg—31 to 39 inches; dark grayish brown (10YR 4/2) loamy fine sand; few fine faint yellowish brown and common fine distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; slightly sticky and slightly plastic; few fine roots; moderately alkaline; clear wavy boundary.

Cg1—39 to 51 inches; light brownish gray (2.5Y 6/2) loamy fine sand; few fine faint light yellowish brown and few fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; slightly sticky and slightly plastic; moderately alkaline; clear smooth boundary.

Cg2—51 to 80 inches; light gray (5Y 7/1) loamy fine sand and shell fragments; massive; slightly sticky and slightly plastic; moderately alkaline.

Reaction is medium acid to mildly alkaline in the A horizon and mildly alkaline to moderately alkaline in the B and C horizons.

The Ap and A horizons have hue of 10YR, value of 2, and chroma of 1. These horizons are loamy fine sand and fine sand. Thickness ranges from 10 to 12 inches.

The Bt horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or hue of 10YR, value of 4, and chroma of 2; or it is neutral with value of 2. The Bt horizon has mottles of brown and grayish brown. This horizon is loamy fine sand, fine sandy loam, and sandy loam. Thickness ranges from 3 to 13 inches. The Btg horizon has hue of 10YR or 5Y, value of 4 through 7, and chroma of 1. Texture is fine sandy loam, sandy loam, or sandy clay loam. Some pedons have small pockets or streaks of fine sand or loamy fine sand. Thickness ranges from 9 to 29 inches.

The BC horizon, if present, has hue of 10YR, value of 4, and chroma of 1 or 2; or hue of 2.5Y, value of 6, and chroma of 2 and can have yellowish brown, light yellowish brown, or brownish yellow mottles. This horizon is loamy fine sand or sandy loam. Thickness ranges from 0 to 14 inches.

The Cg horizon has hue of 5GY or 5Y, value of 5 or 6, and chroma of 1; or hue of 5Y, value of 7, and chroma of 1; or hue of 2.5Y, value of 6, and chroma of 2 and can have dark grayish brown or yellowish brown mottles. Texture is fine sand, loamy fine sand, and sandy loam. Shell fragments are in some pedons.

McKee Series

The soils of the McKee series are fine, montmorillonitic, nonacid, hyperthermic Typic Hydraquents. They are very poorly drained, very slowly permeable soils that formed in loamy or clayey tidal deposits. These level soils are on mangrove islands and in swamps that are at or near sea level. Under natural conditions, these soils remain saturated, and most areas are inundated twice daily by fluctuating tides. Many areas in the county have been leveed and are used as mosquito control structures. The slope is less than 1 percent.

McKee soils are associated with Kesson, Quartzipsamments, St. Augustine, and Riomar soils. Kesson soils formed in thick marine deposits of sand and shell fragments. Quartzipsamments are moderately well drained to somewhat poorly drained, and St. Augustine soils are somewhat poorly drained. These soils were formed by dredging and filling operations, and this dredge and fill material was spread over the surface of former tidal areas and mangrove islands along the Intracoastal Waterway. In addition, Quartzipsamments soils consist of mixed sand and shell material, and St. Augustine soils consist of a mixture of sand, shell fragments, loamy and silty sediment, and a few fragments of organic material. Riomar soils are underlain by limestone at a depth of 20 to 40 inches.

Typical pedon of McKee mucky clay loam; in a mangrove swamp, about 1.1 miles east of U.S. Highway 1 and South Gifford Road intersection, 1/4 mile west of Indian River, 40 feet north of mosquito impoundment road; SW1/4SE1/4NE1/4, sec. 25, T. 32 S., R. 39 E.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) mucky clay loam; massive; nonsticky; very fluid, flows easily between fingers when squeezed, leaves little or no residue in hand; few to common fragments of partly decomposed wood; about 20 percent organic matter; strongly saline; moderately alkaline; abrupt wavy boundary.

Cg1—1 to 15 inches; very dark gray (10YR 3/1) clay loam; massive; nonsticky; very fluid, flows easily between fingers when squeezed; about 5 percent organic matter; many fine and medium roots that decrease with depth; strongly saline; moderately alkaline; clear smooth boundary.

Cg2—15 to 40 inches; grayish green (5G 4/2) sandy clay; massive; slightly sticky; very fluid, flows easily between fingers when squeezed; few fine and medium roots; strongly saline; moderately alkaline; gradual smooth boundary.

Cg3—40 to 60 inches; dark greenish gray (5GY 4/1) sandy clay; massive; slightly sticky; very fluid, flows easily between fingers when squeezed; few fine and medium roots; strongly saline; moderately alkaline; gradual smooth boundary.

Cg4—60 to 80 inches; dark gray (5Y 4/1) sandy loam; massive; slightly sticky; very fluid to slightly fluid, flows with some difficulty between fingers when squeezed; moderately saline; moderately alkaline.

This soil has *n* value of more than 1 in all mineral horizons to a depth of 40 inches or more and *n* value ranging from more than 0.7 to 1 at a depth of more than 40 inches. Soil salinity is more than 16 millimhos per centimeter to a depth of 60 inches and ranges from 8 to 16 millimhos per centimeter to a depth of 60 inches. Reaction ranges from neutral to moderately alkaline throughout. Some areas of soils have a high amount of sulfide that becomes extremely acid after prolonged exposure to air. The mineral layers in the 10- to 40-inches control section are about 35 to 59 percent clay content. A few pedons have an organic surface layer that is 1 inch to 4 inches thick. Some pedons are underlain by limestone at a depth of more than 40 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or less; or hue of 5YR, value of 2, and chroma of 2 or less; or hue of 5Y, value of 4 or 5, and chroma of 1; or it is neutral with value of 4 or less. Texture is clay, clay loam, sandy clay, mucky clay loam, or silty clay. Few to common fragments of partly decomposed wood and leaves are in this horizon. Thickness ranges from 0 to 3 inches.

The Cg horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or hue of 5Y, 5GY, 5G, or 5BG, value of 4 through 6, and chroma of 1; or it is neutral with value of 4 or less. Texture is clay, clay loam, sandy clay, or silty clay to a depth of 40 inches or more. Below that are textures of sandy clay loam, sandy loam, and fine sandy loam. Some pedons have a 2Cg horizon that has texture of fine sand, sand, or sand mixed with shell fragments at a depth of more than 60 inches.

The combined thickness of the A and Cg horizons is more than 40 inches.

Myakka Series

The soils of the Myakka series are sandy, siliceous, hyperthermic Aeric Haplaquods. They are poorly drained, moderately permeable to moderately rapidly permeable soils that formed in beds of sandy marine sediment. These nearly level soils are on broad flatwoods and in depressions. In most years, the water table is within a depth of 10 inches of the surface for 1 to 3 months and at a depth of 10 to 40 inches for 6 to 9 months. Depressional areas are ponded for 6 months or more each year. The slope ranges from 0 to 2 percent.

Myakka soils are associated with EauGallie, Immokalee, Jonathan, Oldsmar, Pepper, Pomello, and Archbold soils. EauGallie and Pepper soils have an argillic horizon below the Bh horizon. In addition, Pepper soils have an ortstein horizon. Jonathan soils have an ortstein horizon and are better drained than the Myakka soils. Immokalee and Pomello soils have a Bh horizon that is deeper than the Bh horizon in the Myakka soils. In addition, Pomello soils are better drained than the Myakka soils. Oldsmar soils have a Bh horizon at a depth of more than 30 inches and have an argillic horizon at a depth of more than 40 inches. Archbold soils do not have a Bh horizon and are moderately well drained.

Typical pedon of Myakka fine sand; on the flatwoods, 1/4 mile east of intersection of Kings Highway and North Winter Beach Road, 100 feet north of North Winter Beach Road; SW1/4SE1/4SW1/4, sec. 4, T. 32 S., R. 39 E.

A—0 to 5 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine and common medium roots; slightly acid; clear smooth boundary.

E1—5 to 20 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; common medium and few fine roots; medium acid; gradual smooth boundary.

E2—20 to 28 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; common medium roots; medium acid; abrupt wavy boundary.

Bh1—28 to 31 inches; black (10YR 2/1) fine sand; weak fine subangular blocky structure; friable; dense mat of partially decomposed fine and medium roots in the upper part; sand grains well coated with organic matter; strongly acid; clear wavy boundary.

Bh2—31 to 39 inches; dark reddish brown (5YR 3/3) fine sand; weak fine subangular blocky structure; friable; few fine distinct very dark gray (5YR 3/1) streaks; medium acid; clear smooth boundary.

Bh3—39 to 50 inches; black (5YR 2/1) fine sand; weak fine subangular blocky structure; friable; sand grains well coated with organic matter; medium acid; clear smooth boundary.

Bh4—50 to 58 inches; black (10YR 2/1) fine sand; weak fine subangular blocky structure; friable; less than 50 percent weakly cemented; sand grains well coated with organic matter; medium acid; clear smooth boundary.

Bh/BC—58 to 68 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; medium acid; clear smooth boundary.

BC—68 to 80 inches; dark brown (10YR 3/3) fine sand; single grained; loose; medium acid.

The thickness of the solum is more than 60 inches. Depth to the spodic horizon ranges from 16 to 29 inches. The texture is sand or fine sand. Reaction ranges from extremely acid to slightly acid. In some pedons that have shell fragments at a depth of 50 inches or more, reaction ranges from neutral to moderately alkaline.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. Unrubbed colors often have a salt-and-pepper appearance. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1; or hue of 10YR, value of 5 or 6, and chroma of 2. The total thickness of the A and E horizons is less than 30 inches.

The Bh horizon has hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 to 3; or it is neutral with value of 2. Some pedons have very dark gray streaks or fragments of weakly cemented spodic bodies. In addition, some pedons have a dense mat of partially decomposed medium and fine roots overlying the Bh horizon and also can be weakly cemented in less than 50 percent of any subhorizon. The thickness of the Bh horizon ranges from 9 to 30 inches. The BC horizon and the BC part of the Bh/BC horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The Bh part has hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 to 3.

Some pedons have an E' and B'h horizon below the Bh horizon. Colors are similar to those of the E horizon and the Bh horizon.

The C horizon, if present, has hue of 10YR, value of 5, chroma of 1 or 2.

Oldsmar Series

The soils of the Oldsmar series are sandy, siliceous, hyperthermic Alfic Arenic Haplaquods. They are poorly drained, slowly permeable soils that formed in sandy and loamy marine sediment. These nearly level soils are on broad flatwoods and in depressional areas on the flatwoods. In most years, the water table is at a depth of 10 to 40 inches for more than 6 months and at a depth of less than 10 inches for 1 to 2 months. The slope ranges from 0 to 2 percent.

Oldsmar soils are associated with EauGallie, Holopaw, Lokosee, Malabar, Pineda, Riviera, and Wabasso soils. Holopaw, Lokosee, Malabar, Pineda, and Riviera soils do not have a Bh horizon. Lokosee, Malabar, and Pineda soils have a Bw horizon. Pineda and Riviera soils have an argillic horizon within a depth of 20 to 40 inches of the surface. EauGallie soils have a spodic horizon within a depth of 30 inches. Wabasso soils have an argillic horizon within a depth of 40 inches.

Typical pedon of Oldsmar fine sand; on the flatwoods, about 0.3 mile east of U.S. Interstate Highway 95, 150 feet north of Indian River-St. Lucie County line; SE1/4SW1/4SW1/4, sec. 31, T. 33 S., R. 39 E.

A—0 to 5 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine and few medium roots; strongly acid; clear smooth boundary.

E—5 to 32 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few medium and fine roots; medium acid; abrupt wavy boundary.

Bh1—32 to 35 inches; black (5YR 2/1) fine sand; weak fine subangular blocky structure; friable; few fine roots; sand grains well coated with organic matter; slightly acid; clear wavy boundary.

Bh2—35 to 43 inches; dark reddish brown (5YR 3/2) fine sand; weak fine subangular blocky structure; friable; sand grains well coated with organic matter; very slightly acid; abrupt wavy boundary.

Bh3—43 to 50 inches; dark brown (10YR 3/3) fine sand; single grained; loose; few very dark gray (10YR 3/1) streaks and pockets; slightly acid; abrupt wavy boundary.

Btg—50 to 62 inches; grayish brown (2.5Y 5/2) sandy loam; weak medium subangular blocky structure; slightly sticky and slightly plastic; sand grains coated and bridged with clay; slightly acid; gradual smooth boundary.

Cg—62 to 80 inches; light brownish gray (10YR 6/2) loamy fine sand; massive; slightly sticky; slightly acid.

The thickness of the solum is more than 60 inches. Depth to the spodic horizon ranges from 32 to 35 inches, and depth to the argillic horizon ranges from 42 to 50 inches. The A, E, and Bh horizons are sand or fine sand.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or hue of 10YR, value of 3, and chroma of 2. Unrubbed colors often have a salt-and-pepper appearance. The E horizon has hue of 10YR, value of 5 or 7, and chroma of 1; or hue of 10YR, value of 6, and chroma of 2. The total thickness of the A and E horizons is more than 30 inches. Reaction ranges from strongly acid to neutral or from strongly acid to moderately alkaline if the surface has been limed. Some pedons have a dense mat of partially decomposed medium and fine roots underlain by a Bh horizon.

The Bh horizon has hue of 5YR, value of 2, and chroma of 1; or hue of 5YR, value of 3, and chroma of 2; or hue of 10YR, value of 2, and chroma of 1. Hue of 10YR, value of 3 or 4, and chroma of 3 are at a lower depth as a transitional horizon. The Bh horizon can be weakly cemented in less than 50 percent of each pedon. Thickness ranges from 5 to 18 inches. Reaction is medium acid or slightly acid. The Btg horizon has hue of 2.5Y, 5Y, or 10YR, value of 5 or 6, and chroma of 2; or hue of 2.5Y, 5Y, or 10YR, value of 4, and chroma of 1; or hue of 5GY, value of 1, and chroma of 6 and can have dark grayish brown mottles. Texture is fine sandy loam, sandy loam, or sandy clay loam. Depth to the Btg horizon ranges from 42 to 50 inches. In some pedons, the Btg horizon is underlain by loamy fine sand or loamy sand and shell fragments.

The Cg horizon is at a depth of more than 50 inches. Reaction ranges from slightly acid to moderately alkaline.

Orsino Series

The soils of the Orsino series are hyperthermic, uncoated Spodic Quartzipsamments. They are moderately well drained, very rapidly permeable soils that formed in sandy marine and eolian deposits. These nearly level to gently sloping soils are on slightly elevated ridges and knolls that are adjacent to streams and drainageways. A water table is at a depth of 40 to 60 inches for 6 months or more during most years. The slope ranges from 0 to 5 percent.

Orsino soils are associated with Immokalee, Satellite, and St. Lucie soils. Immokalee soils have a spodic horizon and are poorly drained. Satellite and St. Lucie soils do not have a B horizon within a depth of 80 inches. In addition, Satellite soils are somewhat poorly drained and St. Lucie soils are excessively drained.

Typical pedon of Orsino fine sand, 0 to 5 percent slopes; in a wooded area, about 400 feet west of Indian River County Road 505, in the MacDonald State Campground; NE1/4NE1/4SW1/4, sec. 22, T. 31 S., R. 38 E.

A—0 to 2 inches; gray (10YR 5/1) fine sand; single grained; loose; many fine and medium and few coarse roots; very strongly acid; clear wavy boundary.

E—2 to 23 inches; white (10YR 8/1) fine sand; single grained; loose; common fine and medium and few coarse roots; very strongly acid; abrupt irregular boundary.

Bw1&Bh—23 to 26 inches; dark reddish brown (5YR 3/2) fine sand in discontinuous lenses 1 centimeter to 5 centimeters thick, separated by brown (7.5YR 4/4) fine sand; single grained; loose; few fine and coarse and common medium roots; very strongly acid; clear irregular boundary.

Bw2&Bh—26 to 43 inches; brown (7.5YR 4/4) fine sand; common coarse prominent dark reddish brown (5YR 3/2) discontinuous lenses 1 centimeter to 3 centimeters thick; single grained; loose; many fine and medium and few coarse roots; very strongly acid; gradual wavy boundary.

BC—43 to 62 inches; very pale brown (10YR 7/3) fine sand; few medium distinct brownish yellow (10YR 6/6) streaks; single grained; loose; few fine and medium roots; very strongly acid; gradual irregular boundary.

C—62 to 80 inches; light gray (10YR 7/2) fine sand; few fine and medium 1 centimeter to 3 centimeters in diameter prominent black (10YR 2/1) spodic bodies, firm to weakly cemented; single grained; loose; few fine and medium roots; strongly acid.

Reaction ranges from very strongly acid to medium acid throughout. Texture is sand or fine sand to a depth of 80 inches or more. The content of silt and clay is less than 5 percent in the 10- to 40-inch control section.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1. Thickness is less than 5 inches.

The E horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. Thickness ranges from about 14 to 32 inches.

In the Bw&Bh horizon, the Bw part has hue of 10YR, value of 5, and chroma of 4 to 8; or hue of 10YR, value of 6, and chroma of 3 to 6; or hue of 7.5YR, value of 4, and chroma of 4. Light gray or white tongues of the E horizon extend into the Bw&Bh horizon. In some pedons, thin discontinuous layers or lenses of the Bh horizon are at the place of contact between the E horizon and the Bw&Bh horizon. These layers and the Bh part of the Bw&Bh horizon have hue of 10YR, value of 2 or 3, and chroma of 2; or hue of 5YR, value of 3, and chroma of 2 to 4; or hue of 10YR, value of 4, and chroma of 3. The Bh horizon also occurs as weakly cemented to noncemented bodies or splotches. The Bw&Bh horizon ranges from about 14 to 30 inches. The BC horizon, if present, has hue of 10YR, value of 5, and chroma of 4 to 8; or hue of 10YR, value of 6, and chroma of 3 to 6; or hue of 7.5YR, value of 4, and chroma of 4; or hue of 10YR, value of 6 or 7, and chroma of 3 or 4; or hue of 10YR, value of 8, and chroma of 1 to 4 and can have yellowish brown, brownish yellow, or yellow stains or mottles. Thickness of the BC horizon ranges from 0 to more than 27 inches.

The C horizon, if present, has hue of 10YR, value of 6 or 7, and chroma of 3 or 4; or hue of 10YR, value of 8, and chroma of 1 to 4.

Palm Beach Series

The soils of the Palm Beach series are hyperthermic, uncoated Typic Quartzipsamments. They are well drained to excessively drained, very rapidly permeable, droughty soils that formed in thick beds of marine sand and shell fragments. These nearly level to gently sloping soils are on dunelike ridges that are parallel to the coast. The slope ranges from 0 to 5 percent.

Palm Beach soils are associated with Canaveral and St. Augustine soils. Canaveral soils are more poorly drained and are in lower positions on the landscape than Palm Beach soils. The somewhat poorly drained St. Augustine soils were formed by dredging and filling operations. These soils consist of mixed mineral materials and shell fragments.

Typical pedon of Palm Beach sand, 0 to 5 percent slopes; in an area of dense, subtropical hardwoods and shrubs, about 0.1 mile north of Jungle Trail, 75 feet east of Florida State Highway A1A; NE1/4NE1/4, sec. 1, T. 32 S., R. 40 E.

A—0 to 4 inches; very dark gray (10YR 3/1) sand; single grained; loose; common fine and medium roots; about 10 percent sand-size shell fragments; moderately alkaline; strongly effervescent; abrupt smooth boundary.

C1—4 to 20 inches; grayish brown (10YR 5/2) sand; single grained; loose; few fine roots; about 40 percent sand-size shell fragments; moderately alkaline; strongly effervescent; clear smooth boundary.

C2—20 to 65 inches; pale brown (10YR 6/3) sand; single grained; loose; about 30 percent sand-size shell fragments; moderately alkaline; strongly effervescent; clear smooth boundary.

C3—65 to 80 inches; very pale brown (10YR 7/3) sand; single grained; loose; about 50 percent sand-size shell fragments; moderately alkaline; strongly effervescent.

All horizons have weak to strong effervescence when mixed with dilute hydrochloric acid. Reaction is moderately alkaline throughout. Texture is sand or fine sand.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. Sand-size shell fragments make up 5 to 20 percent, by volume, of the A horizon. Thickness ranges from 2 to 10 inches.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 3. In most pedons, the C horizon is made up of stratified layers of fine sand and shells or shell fragments. Mostly, sand-size shell fragments range from 5 to more than 50 percent. These fragments are 1 centimeter or more in diameter.

Paola Series

The soils of the Paola series are hyperthermic, uncoated Spodic Quartzipsamments. They are excessively drained, very rapidly permeable soils that formed in thick deposits of marine or eolian sand. These nearly level to gently sloping soils are on the Atlantic Coastal Ridge. The water table is at a depth of more than 72 inches. The slope ranges from 0 to 5 percent.

Paola soils are associated with Archbold, Astatula, Pomello, Satellite, and St. Lucie soils. Astatula soils do not have an E horizon. Satellite, St. Lucie, and Archbold soils do not have a B horizon. In addition, Satellite soils are somewhat poorly drained, and Archbold soils are moderately well drained. Pomello soils have a spodic horizon and are moderately well drained.

Typical pedon of Paola sand, 0 to 5 percent slopes; 300 feet west of Old Dixie Highway; SE1/4SW1/4, sec. 30, T. 33 S., R. 40 E.

A—0 to 2 inches; dark gray (10YR 4/1) sand; single grained; loose; many very fine and fine, common and few coarse roots; slightly acid; clear wavy boundary.

E—2 to 9 inches; grayish brown (10YR 5/2) sand; single grained; loose; common medium, few fine and coarse roots; medium acid; clear wavy boundary.

B/E—9 to 12 inches; yellowish brown (10YR 5/4) sand; single grained; loose; many medium, few fine and coarse roots; strongly acid; gradual wavy boundary.

Bw—12 to 80 inches; strong brown (7.5YR 5/8) sand; single grained; loose; many fine and medium and few coarse roots to a depth of 42 inches that decrease with depth; very strongly acid.

Reaction is very strongly acid to slightly acid throughout. Texture is sand to a depth of more than 80 inches.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1. It is 2 to 5 inches thick. The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1; or hue of 10YR, value of 5, and chroma of 2. The total thickness of the A and E horizons ranges from about 8 to 23 inches.

In the B/E horizon, the B part has hue 10YR, value of 5 to 7, and chroma of 4 to 8; or hue of 7.5YR, value of 5, and chroma of 8. Some pedons have weakly cemented, dark yellowish brown sandy concretions. The Bw horizon generally extends to a depth of more than 80 inches. This horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8; or hue of 7.5YR, value of 5, and chroma of 8.

Pepper Series

The soils of the Pepper series are sandy, siliceous, hyperthermic, ortstein Alfic Haplaquods. They are poorly drained, slowly permeable or very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are on broad flatwoods. In most years, the water table is within a depth of 10 inches of the surface for 2 to 4 months in wet periods and within a depth of about 40 inches for more than 6 months. The slope ranges from 0 to 2 percent.

Pepper soils are associated with EauGallie, Floridana, Malabar, Myakka, Riviera, Oldsmar, Wabasso, and Winder soils. EauGallie, Myakka, Oldsmar, and Wabasso soils do not have an ortstein horizon. In addition, Myakka soils do not have an argillic horizon, and Oldsmar soils have a spodic horizon at a depth of more than 30 inches. Floridana, Malabar, Riviera, and Winder soils do not have a spodic horizon. In addition, Floridana soils have a mollic epipedon and are very poorly drained, and Malabar soils have a high chroma Bw horizon.

Typical pedon of Pepper sand; on the flatwoods, 100 feet west of Indian River County Road 609, 0.5 mile north of Oslo Road; NE1/4NE1/4SE1/4, sec. 23, T. 33 S., R. 38 E.

A1—0 to 2 inches; very dark gray (10YR 3/1) sand; weak fine granular structure; very friable; many very fine and common medium and few coarse roots; very strongly acid; abrupt smooth boundary.

A2—2 to 8 inches; dark gray (10YR 4/1) sand; single grained; loose; many very fine, common medium and few coarse roots; very strongly acid; clear wavy boundary.

E—8 to 22 inches; gray (10YR 5/1) sand; single grained; loose; common very fine and fine roots; very strongly acid; abrupt wavy boundary.

Bh—22 to 27 inches; black (10YR 2/1) sand; moderate fine subangular blocky structure; friable; many fine decomposed roots; sand grains well coated with organic matter; extremely acid; clear wavy boundary.

Bhm—27 to 32 inches; black (10YR 2/1) sand; massive; firm; strongly cemented; many fine decomposed roots; sand grains well coated with organic matter; extremely acid; clear wavy boundary.

Bh'—32 to 39 inches; dark brown (10YR 3/3) sand, weak fine subangular blocky structure; very friable; very strongly acid; clear wavy boundary.

BE—39 to 47 inches; dark grayish brown (10YR 4/2) sand; weak fine subangular blocky structure; very friable; very strongly acid; abrupt wavy boundary.

Btg—47 to 60 inches; grayish brown (10YR 5/2) sandy loam; weak medium subangular blocky structure; few fine faint dark grayish brown streaks; slightly sticky and nonplastic; strongly acid.

The thickness of the solum is more than 50 inches. Depth to the spodic horizon ranges from 22 to 28 inches, and the depth to the argillic horizon ranges from 42 to 70 inches.

The A horizon has rubbed hue of 10YR, value of 2 to 4, and chroma of 1. Unrubbed colors often have a salt-and-pepper appearance. Thickness ranges from 6 to 8 inches. Texture is sand or fine sand. Reaction ranges from very strongly acid to medium acid. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Reaction ranges from very strongly acid except where the surface layer has been limed. Texture is sand or fine sand. The total thickness of the A and E horizons is less than 30 inches. Some pedons have a dense mat of partially decomposed medium and fine roots that is underlain by the Bh horizon.

The Bh horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 to 3; or it is neutral with value of 2. Reaction ranges from extremely acid to slightly acid. Texture is sand or fine sand. Sand grains are well coated with organic matter.

The Bhm horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 to 3; or it is neutral with value of 2. In more than half of each pedon, this weakly cemented subhorizon is 1 inch or more thick. Consistence is very firm in weakly cemented parts of the Bhm horizon to very friable in the parts that are not cemented. Sand grains are well coated with organic matter. Texture is sand or fine sand. Reaction ranges from extremely acid to slightly acid.

The Bh' horizon has hue of 10YR, value of 3, and chroma of 3; or hue of 10YR, value of 4, and chroma of 2. Reaction ranges from extremely acid to slightly acid. Texture is fine sand. Thickness ranges from 1 to 4 inches.

Some pedons have a BE horizon between the Bh' and Btg horizons. If present, it has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Texture is fine sand. Thickness ranges from 1 to 8 inches. Reaction is strongly acid or very strongly acid.

The Btg horizon has hue of 10YR, value of 4 or 5, and chroma of 2; or hue of 5Y, value of 5 or 6, and chroma of 2; or hue of 2.5Y, value of 6, and chroma of 2 and can have dark brown and olive brown mottles or streaks. Texture is sandy loam, fine sandy loam, or sandy clay loam. Thickness ranges from about 8 to 20 inches. Reaction ranges from strongly acid to mildly alkaline.

The Cg horizon, if present, has hue of 5Y or 2.5Y, value of 6, and chroma of 2; or hue of 5Y, value of 5, and chroma of 1. Texture is loamy sand or loamy fine sand. Reaction ranges from slightly acid to mildly alkaline.

Perrine Variant

The soils of the Perrine Variant are fine-loamy, carbonatic, hyperthermic Typic Fluvaquents. They are poorly drained, moderately slowly permeable to moderately permeable soils that formed in calcareous, sandy and loamy sediment of marine or freshwater origin. These nearly level soils are on narrow to broad, elongated, low flats. Under natural conditions, the water table is within 10 inches of the surface about 30 to 50 percent of the time for more than 6 months in most years. In some places, the water table fluctuates with the tide. The slope is less than 1 percent.

Perrine Variant soils are associated with Chobee and Boca soils. Chobee soils are very poorly drained and have a Bt horizon at a depth of less than 20 inches. These soils are not underlain by limestone. Boca soils have an argillic horizon.

Typical pedon of Perrine Variant fine sandy loam; in an area cleared for citrus, 1-1/2 miles east of U.S. Highway 1, about 500 feet north of North Winter Beach Road; SW1/4SW1/4SW1/4, sec. 2, T. 32 S., R. 39 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) fine sandy loam; weak fine subangular blocky structure; very friable; common fine and medium roots; neutral; clear smooth boundary.

Cgk1—6 to 20 inches; gray (10YR 5/1) sandy clay loam; weak fine subangular blocky structure; friable; common fine and medium roots; dark yellowish brown stains along old root channels; few fine shell fragments; strongly effervescent, moderately alkaline; gradual irregular boundary.

Cgk2—20 to 24 inches; gray (10YR 5/1) sandy clay loam; weak fine subangular blocky structure; slightly sticky; common fine shell fragments and small white to light brownish gray carbonate nodules and limestone pieces; few medium roots; strongly effervescent, moderately alkaline; abrupt irregular boundary.

R—24 to 36 inches; hard continuous ledge of light brownish gray limestone.

Thickness and depth to weathered limestone bedrock range from 20 to 40 inches. Reaction is neutral to moderately alkaline in the A or Ap horizon and moderately alkaline in the Cgk horizon.

The A or Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2. A thin layer of organic material covers the A horizon in some pedons. The total thickness of the A or Ap horizon ranges from 5 to 9 inches. The A horizon has none to strong effervescence in 0.1 normal hydrochloric acid. Texture is fine sandy loam. In some farming areas, sand and loamy fine sand fill has been added to the surface.

The Cgk horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2 and can have dark brown or dark yellowish brown stains along root channels. Texture is loam or sandy clay loam. The Cgk horizon is strongly effervescent in 0.1 normal hydrochloric acid. Few to common fine shell fragments and small white carbonate nodules are present in some pedons. Thickness ranges from 14 to 19 inches.

The R horizon is a hard continuous ledge of light brownish gray to brownish yellow limestone. The surface is smooth to wavy. Solution holes are few and extend 1 foot to 2 feet into the limestone. They are filled with sand, silt loam, loam, or soft carbonatic material. Some pedons have a few inches of limestone fragments in a matrix of almost liquid carbonates underlain by a rock surface.

Pineda Series

The soils of the Pineda series are loamy, siliceous, hyperthermic Arenic Glossaqualfs. They are deep, poorly drained, slowly permeable to very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are on low hammocks and in broad, poorly defined sloughs. In most years, the water table is within a depth of 10 inches of the surface for 1 to 6 months and at a depth of 10 to 40 inches for more than 6 months. It recedes to a depth of more than 40 inches during extended dry periods. The slope ranges from 0 to 2 percent.

Pineda soils are associated with EauGallie, Jupiter, Riviera, Wabasso, and Winder soils. EauGallie and Wabasso soils have a spodic horizon. In Jupiter soils, limestone is at a depth of about 20 inches. Riviera and Winder soils do not have a Bw horizon. In addition, Winder soils have an argillic horizon at a depth of about 20 inches.

Typical pedon of Pineda fine sand; in a grove, about 3 miles west of Vero Beach; NW1/4NW1/4SW1/4, sec. 6, T. 33 S., R. 40 E.

Ap—0 to 4 inches; black (10YR 3/1) fine sand; single grained; loose; few medium and many fine roots; slightly acid; clear wavy boundary.

E—4 to 9 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; slightly acid; clear smooth boundary.

Bw1—9 to 17 inches; yellow (10YR 7/6) fine sand; few medium distinct brownish yellow (10YR 6/8) mottles; single grained; loose; slightly acid; gradual smooth boundary.

Bw2—17 to 23 inches; yellow (10YR 7/8) fine sand; few medium distinct brownish yellow (10YR 6/8) mottles; single grained; loose; slightly acid; abrupt irregular boundary.

Btg1—23 to 27 inches; gray (10YR 5/1) sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; sand grains coated and bridged with clay; few large yellowish brown (10YR 5/4) loamy fine sand tongues and pockets; slightly acid; clear wavy boundary.

Btg2—27 to 31 inches; gray (5Y 5/1) sandy loam; few fine distinct dark brown (10YR 4/3) and light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; neutral; gradual smooth boundary.

BCg—31 to 40 inches; greenish gray (5GY 5/1) sandy loam; few medium distinct light olive brown (2.5Y 5/6) and few fine faint olive yellow mottles; weak moderate subangular blocky structure; moderately alkaline; clear smooth boundary.

Cg1—40 to 52 inches; greenish gray (5GY 5/1) loamy sand; few fine distinct light olive brown (2.5Y 5/4) mottles; weak fine subangular blocky structure; moderately alkaline; clear smooth boundary.

Cg2—52 to 80 inches; greenish gray (5GY 6/1) loamy sand; 3 percent shell fragments; massive; neutral.

The thickness of the solum is 40 to 80 inches. The combined thickness of the A and Bw horizons is 20 to 40 inches. The A and B horizons range from strongly acid to mildly alkaline. The C horizon is slightly acid to moderately alkaline.

The A or Ap horizon has hue of 10YR, value of 2 through 4, and chroma of 1; or hue of 10YR, value of 5, and chroma of 2. Thickness ranges from 2 to 9 inches. Texture is sand or fine sand.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2. Thickness ranges from 5 to 9 inches. Texture is sand or fine sand.

The Bw horizon has hue of 10YR, value of 5 to 7, and chroma of 6 to 8. The E' horizon has hue of 10YR, value of 6 to 8, and chroma of 3 or 4. Thickness of the Bw horizon ranges from 4 to 16 inches. Texture is sand or fine sand. In some pedons, a thin discontinuous dark brown to black Bh horizon is at the base of the Bw horizon. The Btg horizon is sandy loam or sandy clay loam. Tongues of a coarser material extend into this horizon from the horizons above. This material has hue of 10YR, value of 6 to 8, and chroma of 3 or 4. Texture is sand or fine sand. The Btg horizon has hue of 10YR, 5Y, or 5BG, value of 5, and chroma of 1; or hue of 5Y, value of 4, and chroma of 1; or hue of 2.5Y, value of 4, and chroma of 2. Mottles are yellowish brown, olive, or olive yellow. The BCg horizon, if present, has hue of 5GY or 2.5Y, value of 5, and chroma of 1 or 2. Texture ranges from sandy loam to sandy clay loam. Thickness ranges from 13 to 27 inches.

The Cg horizon has hue of 5Y, 5GY, or 5BG, value of 5, and chroma of 1 or 2; or hue of 5GY, value of 6, and chroma of 1. Texture ranges from loamy fine sand to sandy clay loam. The Cg horizon consists of few to many sand-size shell fragments.

Pomello Series

The soils of the Pomello series are sandy, siliceous, hyperthermic Arenic Haplohumods. They are moderately well drained, moderately rapidly permeable soils that formed in thick beds of sandy marine sediment. These nearly level to gently sloping soils are on low ridges and knolls on the flatwoods. The water table is at a depth of 24 to 40 inches for about 1 to 4 months during wet periods and at a depth of 40 to 60 inches during drier periods. The slope ranges from 0 to 5 percent.

Pomello soils are associated with Astatula, Immokalee, Myakka, Satellite, and Archbold soils. Immokalee and Myakka soils are poorly drained. Astatula, Satellite, and Archbold soils do not have a spodic horizon. In addition, Astatula soils are excessively drained, and Satellite soils are somewhat poorly drained.

Typical pedon of Pomello sand, 0 to 5 percent slopes; on a low knoll on the flatwoods; NW1/4NW1/4SE1/4, sec. 7, T. 31 S., R. 39 E.

A—0 to 2 inches; gray (10YR 5/1) sand, when rubbed, mixture of organic matter and light gray sand, salt-and-pepper appearance when dry; weak fine granular structure; very friable; few fine and medium roots; strongly acid; clear smooth boundary.

E1—2 to 20 inches; white (10YR 8/1) sand; single grained; loose; few fine and medium roots; few grayish brown streaks along root channels; medium acid; gradual smooth boundary.

E2—20 to 61 inches; light gray (10YR 7/1) sand; single grained; loose; few roots; few thin dark grayish brown streaks along old root channels; medium acid; abrupt wavy boundary.

Bh1—61 to 65 inches; dark reddish brown (5YR 2/2) sand; weak fine subangular blocky structure; friable; thin decomposed extending root mat on surface; few fine roots; strongly acid; gradual smooth boundary.

Bh2—65 to 72 inches; black (N 2/0) sand; weak medium subangular blocky structure; friable; few dark reddish brown splotches; strongly acid; gradual smooth boundary.

Bh3—72 to 80 inches; very dark gray (5YR 3/1) sand; weak fine subangular blocky structure; very friable; medium acid.

Depth to the spodic horizon ranges from 33 to 65 inches but is predominantly at a depth of more than 50 inches. The texture is sand or fine sand throughout. Reaction ranges from very strongly acid to medium acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1. Unrubbed colors often have a salt-and-pepper appearance. Thickness ranges from 1 to 6 inches.

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1; or hue of 10YR, value of 7, and chroma of 2 and can have dark gray streaks along root channels. The total thickness of the A and E horizons is more than 30 inches.

The Bh horizon has hue of 5YR, value of 2 or 3, and chroma of 1 to 3; or hue of 10YR, value of 2, and chroma of 1 or 2; or it is neutral with value of 2; or has hue of 7.5YR, value of 3, and chroma of 2. Some pedons have weakly cemented fragments of Bh bodies. These fragments make up less than half of the Bh horizon or have a thin mat of decomposed roots on the surface. The BC horizon, if present, has hue of 10YR, value of 3 or 4, and chroma of 3; or hue of 7.5YR, value of 4, and chroma of 2.

The C horizon, if present, has hue of 10YR, value of 5 or 6, and chroma of 1; or hue of 10YR, value of 5, and chroma of 2.

The Pomello soils are taxadjuncts to the Pomello series because depth to the Bh horizon is outside the defined range for the series than is typical. These soils are similar in use, management, and behavior to the soils of the Pomello series.

Pompano Series

The soils of the Pompano series are siliceous, hyperthermic Typic Psammaquents. They are poorly drained, rapidly permeable soils that formed in thick deposits of sandy marine sediment. These nearly level soils are in sloughs and poorly defined drainageways. The water table is within a depth of 10 inches of the surface for 2 to 6 months each year. During the drier periods, it is within a depth of about 30 inches for more than 9 months each year. Some areas are occasionally flooded for 2 to 7 days in some years. The slope ranges from 0 to 2 percent.

Pompano soils are associated with Immokalee, Myakka, Satellite, and Orsino soils. Immokalee and Myakka soils have a spodic horizon. Satellite soils are somewhat poorly drained. Orsino soils are moderately well drained and have stains of organic matter.

Typical pedon of Pompano fine sand; in a slough; SW1/4NE1/4, sec. 8, T. 32 S., R. 38 E.

A1—0 to 3 inches; very dark gray (10YR 3/1) fine sand; mixture of organic matter and light gray sand, salt-and-pepper appearance when dry; single grained; loose; many fine and common medium roots; very strongly acid; gradual wavy boundary.

A2—3 to 16 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; common fine and few medium roots; very strongly acid; clear smooth boundary.

C1—16 to 60 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few medium roots; very strongly acid; clear smooth boundary.

C2—60 to 80 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; strongly acid.

Reaction ranges from very strongly acid to mildly alkaline throughout. Texture is sand or fine sand to a depth of 80 inches or more.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. Unrubbed colors often have a salt-and-pepper appearance. Thickness ranges from 3 to 6 inches. The A2 horizon has hue of 10YR, value of 4 or 5, and chroma of 2. Thickness ranges from 0 to 13 inches.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or less. This horizon can have pale brown, brownish yellow, or brown mottles and streaks.

Riomar Series

The soils of the Riomár series are fine, montmorillonitic, nonacid, hyperthermic Typic Hydraquents. They are very poorly drained, very slowly permeable soils that formed in loamy or clayey tidal deposits. These nearly level soils are on mangrove islands and in swamps that are at or near sea level. Under natural conditions, these soils remain saturated, and most areas are inundated twice daily by fluctuating tides. Many areas in the county have been leveed and are used as mosquito control structures. The slope is less than 1 percent.

Riomar soils are associated with Kesson, McKee, Quartzipsamments, and St. Augustine soils. Kesson soils formed in thick marine deposits of sand and shell fragments. Quartzipsamments soils are moderately well drained to somewhat poorly drained, and St. Augustine soils are somewhat poorly drained. These soils were formed by dredging and filling operations. These dredge and fill materials were spread over the surface of former tidal areas and mangrove islands along the Intracoastal Waterway. Quartzipsamments soils consist of mixed sand and shell fragments. St. Augustine soils consist of a mixture of sand, shell fragments, loamy and silty sediment, and a few fragments of organic material. McKee soils are not underlain by limestone within a depth of 40 inches of the surface.

Typical pedon of Riomar clay loam; in a mangrove swamp; just north of North Winder Beach Road and Levee Road intersection, 250 feet west of Indian River; NE1/4SE1/4SW1/4SW1/4, sec. 2, T. 32 S., R. 39 E.

A—0 to 8 inches; very dark gray (5Y 3/1) clay loam; massive; nonsticky; very fluid, flows easily between fingers when squeezed, leaves little or no residue in hand; few to common fragments of partly decomposed wood; strongly saline; moderately alkaline; abrupt wavy boundary.

Cg1—8 to 15 inches; very dark gray (5Y 3/1) clay loam; massive; nonsticky; very fluid, flows easily between fingers when squeezed; about 5 percent organic matter; many fine and medium roots that decrease with depth; strongly saline; moderately alkaline; clear smooth boundary.

Cg2—15 to 25 inches; dark grayish green (5G 4/1) sandy clay; massive; slightly sticky; very fluid, flows easily between fingers when squeezed; few fine and medium roots; strongly saline; moderately alkaline; abrupt smooth boundary.

R—25 inches; hard limestone bedrock.

This soil has *n* value of more than 1 in all mineral horizons. Soil salinity is more than 16 millimhos per centimeter. Reaction ranges from neutral to moderately alkaline throughout. Some areas of soils contain a high amount of sulfide that becomes extremely acid after prolonged exposure to air. A few pedons have an organic surface layer that is 1 to 4 inches thick.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or less; or hue of 5YR, value of 2, and chroma of 2 or less; or hue of 5Y, value of 3 to 5, and chroma of 1; or it is neutral with value of 4 or less. Texture is clay, clay loam, mucky clay loam, or silty clay. Few to common fragments of partly decomposed wood and leaves are in this horizon. Thickness ranges from 5 to 10 inches.

The Cg horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 5Y, 5GY, 5BG, or 5G, value of 3 through 6, and chroma of 1; or it is neutral with value of 4 or less. Texture is clay, clay loam, or sandy clay.

Riviera Series

The soils of the Riviera series are loamy, siliceous, hyperthermic Arenic Glossaqualfs. They are poorly drained, slowly permeable to very slowly permeable soils that formed in beds of sandy and loamy marine sediment. These nearly level soils are on low hammocks, in poorly defined drainageways, on broad, low flats, and in depressional areas. The water table is within a depth of 10 inches of the surface for 1 to 6 months and at a depth of 10 to 40 inches for more than 6 months in most years. It recedes to a depth of more than 40 inches during extended dry periods. The depressional areas are ponded for 6 to 9 months or more each year. The slope ranges from 0 to 2 percent.

Riviera soils are associated with Chobee, Floridana, Holopaw, Manatee, Oldsmar, Pineda, Wabasso, and Winder soils. Oldsmar and Wabasso soils have a spodic horizon. Pineda soils have a Bw horizon. Chobee, Floridana, and Manatee soils have a mollic epipedon and are very poorly drained. Holopaw soils have an argillic horizon at a depth of more than 40 inches. Winder soils have an argillic horizon at a depth of less than 20 inches.

Typical pedon of Riviera fine sand; on a broad, low flat, about 0.5 mile west of Kings Highway and Citrus Road intersection; SE1/4SE1/4NE1/4, sec. 17, T. 33 S., R. 39 E.

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

E1—3 to 14 inches; light gray (10YR 7/2) fine sand; single grained; loose; few medium and fine roots; slightly acid; gradual smooth boundary.

E2—14 to 26 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few medium roots; slightly acid; abrupt irregular boundary.

Btg/E—26 to 31 inches; gray (5Y 5/1) sandy loam; few coarse prominent yellowish brown (10YR 5/6) mottles; few fine tongues and pockets of grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) fine sand extending from the E horizon; moderate medium subangular blocky structure; friable, slightly sticky; sand grains coated and bridged with clay; slightly acid; clear wavy boundary.

Btg—31 to 40 inches; gray (5Y 6/1) sandy loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; slightly sticky; sand grains coated and bridged with clay; slightly acid; gradual wavy boundary.

Cg1—40 to 52 inches; gray (5Y 5/1) loamy fine sand; few medium pockets of light brownish gray (10YR 6/2) fine sand; weak fine subangular blocky structure; very friable, slightly sticky; mildly alkaline; gradual wavy boundary.

Cg2—52 to 80 inches; greenish gray (5GY 6/1) loamy fine sand; weak fine subangular blocky structure; very friable; slightly sticky; moderately alkaline.

The thickness of the solum is 40 to 80 inches. The combined thickness of the A and E horizons is 20 to 40 inches. Reaction is slightly acid or neutral in the A and Ap horizons and ranges from slightly acid to moderately alkaline in all of the other horizons.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Thickness ranges from 3 to 9 inches. The texture is sand or fine sand.

The E horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2; or hue of 10YR, value of 5, and chroma of 1. Thickness ranges from 15 to 29 inches. The texture is sand or fine sand.

The Btg/E horizon has hue of 10YR, value of 4, and chroma of 2; or hue of 10YR, value of 6 or 7, and chroma of 1; or hue of 5Y, value of 5, and chroma of 1 and can have few to common yellowish brown mottles. The texture of the B part is sandy loam or sandy clay loam. Tongues or vertical intrusions of sand or fine sand from the E horizon extend into the B part of this horizon. In some places, small fragments or nodules of iron, cemented sandstone, or calcareous material are in the Btg/E horizon. Thickness ranges from 5 to 19 inches.

The Btg horizon has hue of 10YR, value of 3 to 7, and chroma of 1 or 2; hue of 5Y, value of 5 or 6, and chroma of 1; or hue of 5GY or 5BG, value of 5, and chroma of 1 and can have yellowish brown, light olive brown, or dark grayish brown mottles. The texture is sandy loam, fine sandy loam, or sandy clay loam. In some places, small fragments or nodules of iron, cemented sandstone, or calcareous material are present in the Btg horizon. Thickness ranges from 4 to 12 inches.

Some pedons have a BCg horizon that has hue of 5GY, value of 5, and chroma of 1. The texture is loamy sand or sandy loam. Thickness ranges from 0 to 9 inches.

The Cg horizon has hue of 5Y or 5GY, value of 5 or 6, and chroma of 1; or hue of 10YR, value of 6 or 7, and chroma of 1. The texture ranges from loamy fine sand to a mixture of sand and shell fragments or to a mixture of loamy sand with shell fragments and calcium carbonate nodules.

Samsula Series

The soils of the Samsula series are sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists. They are very poorly drained, rapidly permeable soils that formed in moderately thick beds of hydrophytic nonwoody plant residue. These nearly level soils are in small depressions, poorly defined drainageways, and freshwater marshes and swamps. The water table is at or above the surface except during extended dry periods. The slope is less than 2 percent.

Samsula soils are associated with Delray, Floridana, Manatee, Myakka, and Pompano soils. Delray, Floridana, and Manatee soils have a mollic epipedon and an argillic horizon. Myakka and Pompano soils are sandy mineral soils and are poorly drained. In addition, Myakka soils have a spodic horizon.

Typical pedon of Samsula muck; in a depressional area, about 1/2 mile south of the entrance to Rollins Blue Cypress Ranch, north of Yee Haw Junction; NE1/4NW1/4NW1/4, sec. 32, T. 31 S., R. 35 E.

Oa1—0 to 20 inches; black (10YR 2/1) muck; about 20 percent fiber, less than 5 percent rubbed; weak medium subangular blocky structure resemblance; friable; common fine and very fine roots, few medium roots; dark brown (10YR 4/3) sodium pyrophosphate extract; very strongly acid by Hellige-Truog method; gradual smooth boundary.

Oa2—20 to 26 inches; very dark gray (10YR 3/1) muck; about 10 percent fiber, less than 5 percent rubbed; weak medium granular structure; friable; few fine and medium roots; about 20 percent mineral material; brown (10YR 5/3) sodium pyrophosphate extract; very strongly acid by Hellige-Truog method; gradual wavy boundary.

2A—26 to 38 inches; very dark gray (10YR 3/1) sand; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.

2Cg—38 to 80 inches; gray (10YR 5/1) sand; single grained; loose; very strongly acid.

The thickness of the organic material ranges from 16 to 35 inches. Reaction of the organic material ranges from 4 to 5.5 by the Hellige-Truog method. The underlying mineral material is very strongly acid or medium acid.

The Oa horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 5YR, value of 2, and chroma of 1. The fiber content is less than 33 percent unrubbed and less than 5 percent rubbed. Sodium pyrophosphate extract has hue of 10YR, value of 2 through 4, and chroma of 4 or less; or hue of 10YR, value of 5, and chroma of 2 through 8; or hue of 10YR, value of 6, and chroma of 3 through 8; or hue of 10YR, value of 7, and chroma of 4 through 8. The 2A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Texture is sand or fine sand. Thickness ranges from 6 to 18 inches.

The 2Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 1. Texture is sand or fine sand.

Satellite Series

The soils of the Satellite series are hyperthermic, uncoated Aquic Quartzipsamments. They are somewhat poorly drained, very rapidly permeable soils that formed in thick beds of sandy marine sediment. These nearly level soils are on low knolls and ridges on the flatwoods. The water table is at a depth of 18 to 40 inches for 2 to 6 months and at a depth of 40 to 72 inches for 6 months or more in most years. The slope ranges from 0 to 2 percent.

Satellite soils are associated with Immokalee, Myakka, Orsino, Pomello, and Pompano soils. Immokalee, Myakka, and Pomello soils have spodic horizons. In addition, Immokalee and Myakka soils are poorly drained, and Pomello soils are moderately well drained. Pompano soils are in lower positions on the landscape than Satellite soils and are poorly drained. Orsino soils are better drained than the Satellite soils.

Typical pedon of Satellite fine sand; in a wooded area adjacent to a power line north of Indian River County Road 512; SW1/4NW1/4SE1/4, sec. 19, T. 31 S., R. 38 E.

A—0 to 4 inches; dark gray (10YR 4/1) fine sand; mixture of organic matter and light gray sand grains, salt-and-pepper appearance when dry; single grained; loose; common very fine and medium roots; strongly acid; clear wavy boundary.

C1—4 to 35 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; common fine medium and few coarse roots; slightly acid; gradual wavy boundary.

C2—35 to 60 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few medium and coarse roots; slightly acid; gradual smooth boundary.

C3—60 to 80 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; slightly acid.

Reaction ranges from very strongly acid to mildly alkaline throughout. Texture is sand or fine sand.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1. Unrubbed colors often have a salt-and-pepper appearance. Thickness ranges from 2 to 7 inches.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or hue of 10YR, value of 4, and chroma of 2 and may have mottles or streaks of pale brown, dark grayish brown, or grayish brown.

St. Augustine Series

The soils of the St. Augustine series are sandy, siliceous, hyperthermic Udalfic Arents. These nearly level soils are adjacent to the Indian River. They are somewhat poorly drained, moderately rapidly permeable to rapidly permeable soils that were formed by dredging and filling operations. The dredge and fill material was spread over the surface of former tidal areas. The original soils in these tidal areas are very poorly drained. The fill material consists of a mixture of sand, shell fragments, loamy and silty sediment, and a few fragments of organic material. The water table is at a depth of 20 to 40 inches for 2 to 6 months in most years. It is at a depth of less than 20 inches during periods of high rainfall. In some areas, the water table is still partially influenced by daily tides. These soils are subject to flooding for very brief periods during the hurricane season. The slope is 0 to 2 percent.

St. Augustine soils are associated with Canaveral, Captiva, Quartzipsamments, and McKee soils. Canaveral and Captiva soils are sandy mineral soils that consist of layers of stratified sand and shell fragments. In addition, Captiva soils are poorly drained and have a mollic epipedon. Quartzipsamments soils were formed by filling and earthmoving operations and do not have fragments of fine textured material. McKee soils are very poorly drained. They are in mangrove islands and swamps and have a clayey mineral horizon.

Typical pedon of St. Augustine sand; in an area designated for urban development, 0.2 mile north of Florida State Road 656; SW1/4, sec. 5, T. 33 S., R. 40 E.

C1—0 to 30 inches; light brownish gray (10YR 6/2) sand; few medium distinct yellowish brown (10YR 5/6) streaks; single grained; loose; about 30 percent, by volume, multicolored shell fragments 1 millimeter or less; moderately alkaline; abrupt wavy boundary.

C2—30 to 45 inches; mixed grayish brown (10YR 5/2) sand and dark gray (5Y 4/1) silty clay loam, common medium distinct fragments of olive gray (5Y 4/2) loamy sand; massive; friable; about 55 percent shell fragments less than 3 millimeters; few fragments of very dark grayish brown muck; moderately alkaline; clear smooth boundary.

Cg—45 to 80 inches; mixed greenish gray (5GY 5/1) sand and gray (N 5/0) lenses of loamy sand; massive; friable; moderately alkaline.

St. Augustine soils are moderately alkaline throughout. The thickness of the fill material ranges from 40 to 80 inches or more. The content of shell fragments ranges from less than 5 percent to 70 percent. Weighted average of shell content that is 2 millimeters or larger in the control section is less than 20 percent. Shell fragments are stratified in some pedons. Depth to the loamy or clayey bodies is less than 40 inches.

The C1 horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2 and can have mottles in shades of gray, brown, and yellow. Texture is sand or fine sand. Fragments of shells or lenses of loamy material can be mixed with the sand or fine sand. Thickness ranges from 6 to 30 inches. The C2 horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2 and can have mottles in shades of gray, brown, and yellow. Texture is sand, fine sand, or loamy sand. Silty clay loam, clay loam, or sandy clay loam bodies that range from few to common are always in some part of this horizon. They have hue of 5GY or 5Y, value of 4 or 5, and chroma of 1 or 2. Shell fragments and fragments of histic material are few to common. Thickness ranges from 10 to 30 inches. The Cg horizon has hue of 5Y, 5GY, or 5BG, value of 4 to 6, and chroma of 1; or it is neutral with value of 5. Texture is sand, fine sand, or loamy sand. This horizon can have lenses of silty clay loam, clay loam, or sandy clay loam. Few to many shell fragments that are less than 3 millimeters in size are in this horizon.

Some pedons have a 2C organic horizon at a depth of more than 40 inches.

St. Lucie Series

The soils of the St. Lucie series are hyperthermic, uncoated Typic Quartzipsamments. They are excessively drained, very rapidly permeable soils that formed in thick deposits of marine or eolian sand. These nearly level to sloping soils are on the Atlantic Coastal Ridge and other elevated knolls on the flatwoods. The water table is at a depth of more than 72 inches. The slope ranges from 0 to 8 percent.

St. Lucie soils are associated with Astatula, Paola, Pomello, Satellite, and Archbold soils. Astatula soils do not have an E horizon, and they have a brownish yellow C horizon. Paola soils have an E and B/E horizon. Pomello soils have a Bh horizon and are moderately well drained. Satellite and Archbold soils are more poorly drained than St. Lucie soils.

Typical pedon of St. Lucie sand, 0 to 8 percent slopes; west of U.S. Highway 1; SE1/4SW1/4SW1/4, sec. 31, T. 33 S., R. 40 E.

A—0 to 3 inches; gray (10YR 5/1) rubbed sand; single grained; loose; many fine and medium roots; mixture of uncoated sand grains and fine organic matter granules unrubbed; very strongly acid; clear smooth boundary.

C—3 to 80 inches; white (10YR 8/1) sand; single grained; loose; few fine, common medium and few coarse roots decreasing with depth; few medium dark brown (7.5YR 3/2, 4/2) stains around root channels; medium acid.

Reaction is very strongly acid to slightly acid. The pedon is fine sand or sand to a depth of 80 inches. It does not have a subsurface diagnostic horizon within a depth of 80 inches.

The A horizon is a mixture of uncoated quartz sand grains and black organic matter granules. It has rubbed hue of 10YR, value of 5 or 6, and chroma of 1. The thickness of the A horizon ranges from 2 to 4 inches.

The C horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2.

Terra Ceia Series

The soils of the Terra Ceia series are euic, hyperthermic Typic Medisaprists. They are deep, very poorly drained, rapidly permeable, organic soils that formed in thick deposits of hydrophytic plant residue. These nearly level soils are in freshwater marshes. Under natural conditions, the water table is at or above the surface except during extended dry periods. Runoff is slow. Slope is less than 1 percent.

Terra Ceia soils are associated with Gator and Canova soils. Gator soils have less than 51 inches of organic material that is underlain by sandy or clayey material. Canova soils are mineral soils.

Typical pedon of Terra Ceia muck; in an area of the St. Johns Marsh, about 1/2 mile south of Ditch 13; SW1/4SW1/4NE1/4, sec. 28, T. 31 S., R. 36 E.

Oa1—0 to 38 inches; black (10YR 2/1) muck; weak medium subangular blocky structure; friable; about 10 percent fiber unrubbed, 1 percent rubbed; few fine roots; dark brown (10YR 4/3) sodium pyrophosphate extract; slightly acid (pH 4.7 in 0.01 molar calcium chloride solution); gradual wavy boundary.

Oa2—38 to 60 inches; very dark grayish brown (10YR 3/2) muck; weak medium subangular blocky structure; friable; about 45 percent fiber unrubbed, 5 percent rubbed; brown (10YR 5/3) sodium pyrophosphate extract; slightly acid (pH 4.5 in 0.01 molar calcium chloride solution).

The thickness of the organic material and the depth to mineral material are more than 51 inches and commonly are 60 inches or more. Reaction ranges from slightly acid to moderately alkaline by the Hellige-Truog method or 4.5 or more in 0.01 molar calcium chloride.

The Oap horizon, if present, has hue of 10YR, value of 2, and chroma of 1; or it is neutral and has value of 2. Fiber content is less than 15 percent unrubbed.

Thickness depends on the depth of plowing but commonly ranges from 9 to 12 inches thick. The Oa horizon has hue of 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 2; or hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2. Fiber content is less than 33 percent unrubbed, or more than 33 percent unrubbed if fiber content is less than 16 percent of its volume after rubbing. Sodium pyrophosphate extract of all organic horizons have hue of 10YR, value of 2 to 4, and chroma of 4 or less; or hue of 10YR, value of 5, and chroma of 2 to 6; or hue of 10YR, value of 6, and chroma of 3 to 6; or hue of 10YR, value of 7, and chroma of 4 to 6. Mineral content at a depth of 20 to 52 inches ranges from about 5 to 10 percent. The underlying materials are sandy, loamy or clayey.

Wabasso Series

The soils of the Wabasso series are sandy, siliceous, hyperthermic Alfic Haplaquods. They are poorly drained, slowly permeable or very slowly permeable soils that formed in sandy and loamy marine sediment. These nearly level soils are on broad flatwoods. In most years, the water table is at a depth of 10 to 40 inches for more than 6 months and at a depth of less than 10 inches of the surface for 1 to 2 months. The slope ranges from 0 to 2 percent.

Wabasso soils are associated with Boca, EauGallie, Myakka, Oldsmar, Riviera, and Winder soils. Boca, Riviera, and Winder soils do not have a Bh horizon. In addition, Boca soils are underlain by limestone within a depth of 40 inches of the surface. EauGallie and Oldsmar soils have a Bt horizon at a depth of more than 40 inches. Myakka soils do not have a Bt horizon.

Typical pedon of Wabasso fine sand; on the flatwoods, 0.3 mile north of Florida State Road 60 in the Paradise Park subdivision; SE1/4NW1/4NE1/4, sec. 2, T. 33 S., R. 38 E.

A—0 to 7 inches; very dark gray (10YR 3/1) fine sand; weak, fine granular structure; very friable; many fine and medium roots; strongly acid; gradual wavy boundary.

E—7 to 24 inches; gray (10YR 7/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bh1—24 to 27 inches; black (10YR 2/1) fine sand; weak fine subangular blocky structure; friable; common fine and medium roots; sand grains well coated with colloidal organic matter; medium acid; gradual smooth boundary.

Bh2—27 to 32 inches; black (10YR 2/1) fine sand; weak medium subangular blocky structure; friable; few fine and medium roots; sand grains well coated with colloidal organic matter; medium acid; clear smooth boundary.

Bh3—32 to 35 inches; very dark gray (10YR 3/1) fine sand; weak fine subangular blocky structure; friable; few fine and medium roots; medium acid; abrupt smooth boundary.

Bt1—35 to 41 inches; dark brown (10YR 3/3) sandy loam; few fine distinct very dark gray (10YR 3/1) streaks; moderate medium subangular blocky structure; slightly sticky and slightly plastic; few fine and medium roots; medium acid; gradual wavy boundary.

Bt2—41 to 48 inches; brown (10YR 4/3) fine sandy loam; weak medium subangular blocky structure; slightly sticky and slightly plastic; few fine and medium roots; medium acid; gradual wavy boundary.

C1—48 to 62 inches; brown (10YR 5/3) loamy fine sand; weak fine subangular blocky structure; slightly sticky; few fine roots; neutral; clear wavy boundary.

C2—62 to 80 inches; brown (7.5YR 5/2) loamy fine sand; weak fine subangular blocky structure; slightly sticky; few fine roots; neutral.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. Thickness ranges from 5 to 8 inches, but if value is less than 3.5, the thickness is less than 8 inches. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1; or hue of 10YR, value of 6, and chroma of 2. Thickness ranges from 14 to 22 inches. Reaction ranges from very strongly acid to medium acid. Texture is sand or fine sand. The total thickness of the A and E horizons is less than 30 inches. Some pedons have a mat of fine and medium roots underlain by the Bh horizon.

The Bh horizon has hue of 5YR, value of 2 or 3, and chroma of 1; or hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 10YR, value of 3, and chroma of 3. Sand grains are coated with organic matter. Texture is sand or fine sand, and moist consistency ranges from loose to firm. Thickness ranges from 5 to 12 inches. Reaction ranges from very strongly acid to slightly acid. The Bt horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3; or hue of 5Y, value of 4 to 6, and chroma of 1 or 2; or hue of 2.5Y, value of 4 or 5, and chroma of 2; or hue of 2.5Y, value of 6, and chroma of 1. This horizon can have few or common, fine or medium light olive brown or yellowish brown mottles and very dark gray or black streaks and pockets. Texture is fine sandy loam, sandy loam, or sandy clay loam. Reaction ranges from medium acid to moderately alkaline. The Bt horizon is 13 to 22 inches thick.

The C horizon has hue of 5Y, value of 5 or 6, and chroma of 2; or hue of 5Y, value of 6, and chroma of 3; or hue of 5GY, value of 6, and chroma of 1; or hue of 10YR, value of 4 or 5, and chroma of 3; or hue of 10YR, value of 6, and chroma of 1 to 3; or hue of 7.5YR, value of 5, and chroma of 2. Texture is sand, loamy sand, loamy fine sand, a mixture of sand or loamy sand and shell fragments, or a mixture of sand or loamy sand that consists dominantly of shell fragments. Thickness is more than 15 inches. Reaction ranges from neutral to moderately alkaline.

Winder Series

The soils of the Winder series are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs. They are deep, poorly drained, very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are in poorly defined drainageways, and on hammocks. In most years, under natural conditions, the water table is at a depth of 0 to 10 inches for 2 to 4 months and at a depth of 10 to 40 inches for about 4 to 6 months or more. The slope is 0 to 2 percent.

Winder soils are associated with Chobee, Jupiter, Manatee, Pineda, Riviera and Wabasso soils. Chobee, Jupiter, and Manatee soils have a mollic epipedon. In addition, Jupiter soil is underlain by limestone within a depth of 20 inches of the surface, and Chobee and Manatee soils are very poorly drained. Pineda and Riviera soils have an argillic horizon at a depth of 20 to 40 inches. Wabasso soils have a spodic horizon.

Typical pedon of Winder fine sand; in a poorly defined drainageway; NW1/4NW1/4NW1/4, sec. 31, T. 33 S., R. 38 E.

A—0 to 7 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; common fine and few medium roots; very slightly acid; clear smooth boundary.

E—7 to 17 inches; grayish brown (10YR 5/2) fine sand; many fine distinct dark gray (10YR 4/1) splotches; single grained; loose; few fine and medium and coarse roots; slightly acid; gradual irregular boundary.

B/E—17 to 23 inches; grayish brown (10YR 5/2) sandy loam; common medium prominent yellowish brown (10YR 5/8) mottles; common grayish brown (10YR 5/2) loamy sand intrusions; weak medium subangular blocky structure; slightly sticky and nonplastic; mildly alkaline; gradual wavy boundary.

Btg1—23 to 34 inches; gray (5Y 6/1) sandy loam; few medium prominent yellowish brown (10YR 5/8) and few coarse distinct yellow (10YR 7/6) mottles; weak medium subangular blocky structure; slightly sticky and nonplastic; moderately alkaline; clear wavy boundary.

Btg2—34 to 48 inches; gray (10YR 6/1) sandy loam; few and common fine and medium distinct yellowish brown (10YR 5/6) and common medium distinct light olive brown (2.5Y 5/4) mottles; weak fine subangular blocky structure; slightly sticky and nonplastic; moderately alkaline; gradual smooth boundary.

BCg—48 to 65 inches; gray (5Y 6/1) sandy loam; few fine distinct light olive brown (2.5Y 5/4) mottles; weak fine subangular blocky structure; slightly sticky and nonplastic; moderately alkaline; gradual smooth boundary.

2Cg—65 to 80 inches; greenish gray (5GY 6/1) loamy sand and shell fragments; massive; parting to weak fine subangular blocky structure; few light greenish gray soft calcium carbonate masses; slightly sticky and nonplastic; moderately alkaline.

Reaction ranges from medium acid to moderately alkaline in the A, E, and B horizons. The C horizon is very slightly acid to moderately alkaline.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1. Texture is fine sand or loamy fine sand. Thickness ranges from 2 to 7 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or hue of 10YR, value of 4, and chroma of 1. Texture is fine sand or loamy fine sand. Thickness ranges from 7 to 10 inches. The combined thickness of the A and E horizons is less than 20 inches.

The B/E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. Texture of the B part of the B/E horizon is sandy loam or sandy clay loam. The texture of the E part is fine sand, loamy sand, or loamy fine sand. Thickness ranges from 5 to 8 inches. The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1; or hue of 5Y or 5GY, value of 5 or 6, and chroma of 1; or it is neutral with value of 6 and has mottles of brown, yellow, or gray. Texture is sandy loam or sandy clay loam. In some pedons, this horizon has a small accumulation of light gray or white calcareous material throughout. Thickness ranges from 24 to 28 inches. Some pedons have a BC horizon that has hue of 10YR, value of 4 to 6, and chroma of 1; or hue of 5Y or 5GY, value of 5 or 6, and chroma of 1; or it is neutral with value of 6 and has mottles of brown, yellow, or gray. Texture is sandy loam or sandy clay loam.

The 2Cg horizon has hue of 5Y or 5GY, value of 5 or 6, and chroma of 1. Texture is loamy sand and sandy clay loam, or it is a mixture of loamy fine sand and shell fragments. Accumulations of soft calcium carbonate and concretions in some pedons are mixed with loamy sand.

Formation of the Soils

In this section, the factors of geology and processes of soil formation are described and related to the soils in the survey area.

Factors of Soil Formation

Soil is produced by forces of weathering acting on the parent material that has been deposited or accumulated by geologic agencies. The kind of soil that forms depends on five major factors. These factors are—

- the type of parent material
- the climate under which the soil material has existed since accumulation
- the plant and animal life in and on the soil
- the relief, or lay of the land
- the length of time the forces of soil formation have acted on the soil material.

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. The effect of the parent material is modified greatly in some places by the effects of climate, relief, and plants and animals in and on the soil. As a soil forms, it is influenced by one or more of the five factors, but in some places one factor has a predominant effect. A modification or variation in any of these factors results in a different kind of soil.

Parent Material

Parent material is the unconsolidated mass from which a soil is formed. It determines the limits of the chemical and mineralogical composition of the soil.

The parent material of most of the soils of Indian River County is unconsolidated marine sediment of the Pleistocene and Recent geological ages. The thickness of the Pleistocene material is less than 20 feet in the western part of the county grading to 100 feet in the eastern part. Most of this material consists of undifferentiated sediment, including sands, clays, shell beds, and thin limestone units. In addition, these undifferentiated sediments are overlain by windblown sands and sea-deposited sandy and shelly material in a narrow band along the present coastline. Organic matter accumulations of Recent times and in varying amounts also serve as the parent material for some soils of Indian River County.

Myakka and Immokalee soils are representative of soils that formed in thick beds of loose sand in which the transfer of organic matter and reduced iron occurred and formed a spodic horizon. EauGallie, Oldsmar, and Wabasso soils formed an argillic horizon by translocation of clayey material in stratified sediment. Astatula, Paola, and St. Lucie soils formed in Recent windblown quartz sand on the Atlantic Coastal Ridge. Canaveral, Captiva, and Palm Beach soils formed in sand and shell material of Recent sea deposits on the barrier island. Gator and Terra Ceia soils formed in Recent accumulations of organic material in low wet places.

Climate

Indian River County has a humid-subtropical climate. Extreme temperatures are moderated by the Atlantic Ocean and the Indian River; however, these bodies of water contribute to the high humidity of the area. The average rainfall is about 55 inches a year. In summer, the climate is uniform throughout the county.

Few differences among the soils are caused by the climate; however, the climate aids in rapid decomposition of organic matter, and it also hastens chemical reactions in the soil. The heavy rainfall leaches the soils of most plant nutrients and produces a strongly acid condition in many of the sandy soils. Rain also carries the less soluble fine particles downward. Consequently, many of the soils acted upon by these climatic conditions are sandy, have low organic matter content, 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 survey area. Animals, insects, bacteria, and fungi have been important agents. Plants and animals furnish organic matter, nitrogen, and plant nutrients to the soils and cause differences in soil structure and porosity. In places, tree roots and crayfish have penetrated the loamy subsoil and mixed the sandy surface layer with the subsoil.

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 some small animals inhabit the soil, alter its chemical composition, and mix it with other soil material. The native vegetation in the survey area has affected soil formation more than other living organisms.

Man has influenced the formation of soils by clearing the forests, cultivating the soils, draining wet areas, and introducing different kinds of plants. The complex of living organisms that affect soil formation has been drastically changed as a result of man's activities. Except for loss of organic matter and minor erosion in places, few results of man's activities are yet apparent.

Relief

Relief has affected the formation of soils in Indian River County mainly through its influence on soil-water relationships. Other factors of soil formation generally associated with relief, such as erosion, temperature, and plant cover, are of minor importance.

Three general areas—flatwoods, swamps and marshes, and the coastal ridges—are in the survey area. Among these general areas are differences in soils that are directly related to relief.

The soils on the flatwoods have a high water table and are periodically wet to the surface. Therefore, these soils are not as highly leached as those of the coastal ridges. The soils in the swamps and marshes are covered with water for long periods; in many places, they have high organic matter content. The soils on the coastal ridges are at a higher elevation than those on the flatwoods and in swamps and marshes. The deep, sandy soils on the ridges are mostly excessively drained and are not influenced by ground water. These soils are more subject to erosion than soils in other parts of the county.

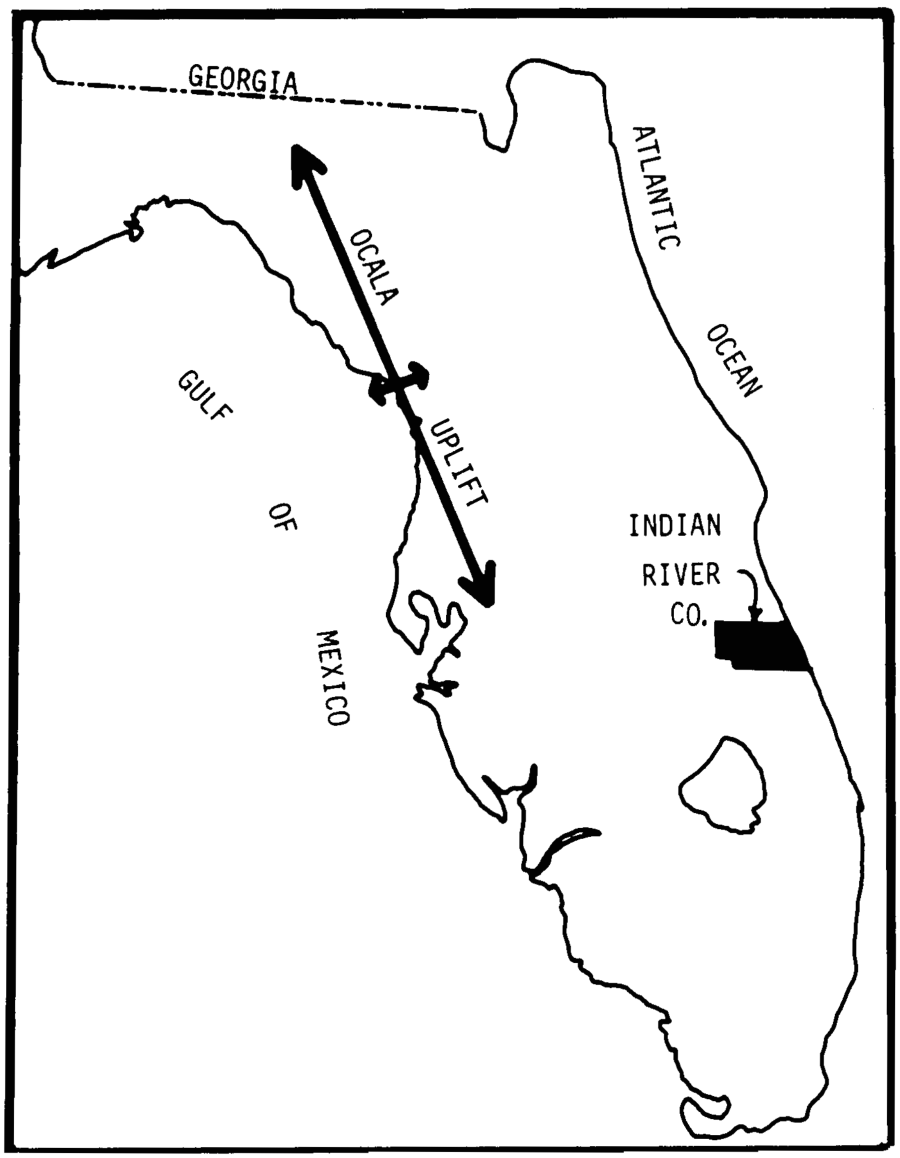


Figure 16.—Location map of Indian River County and Ocala Uplift.

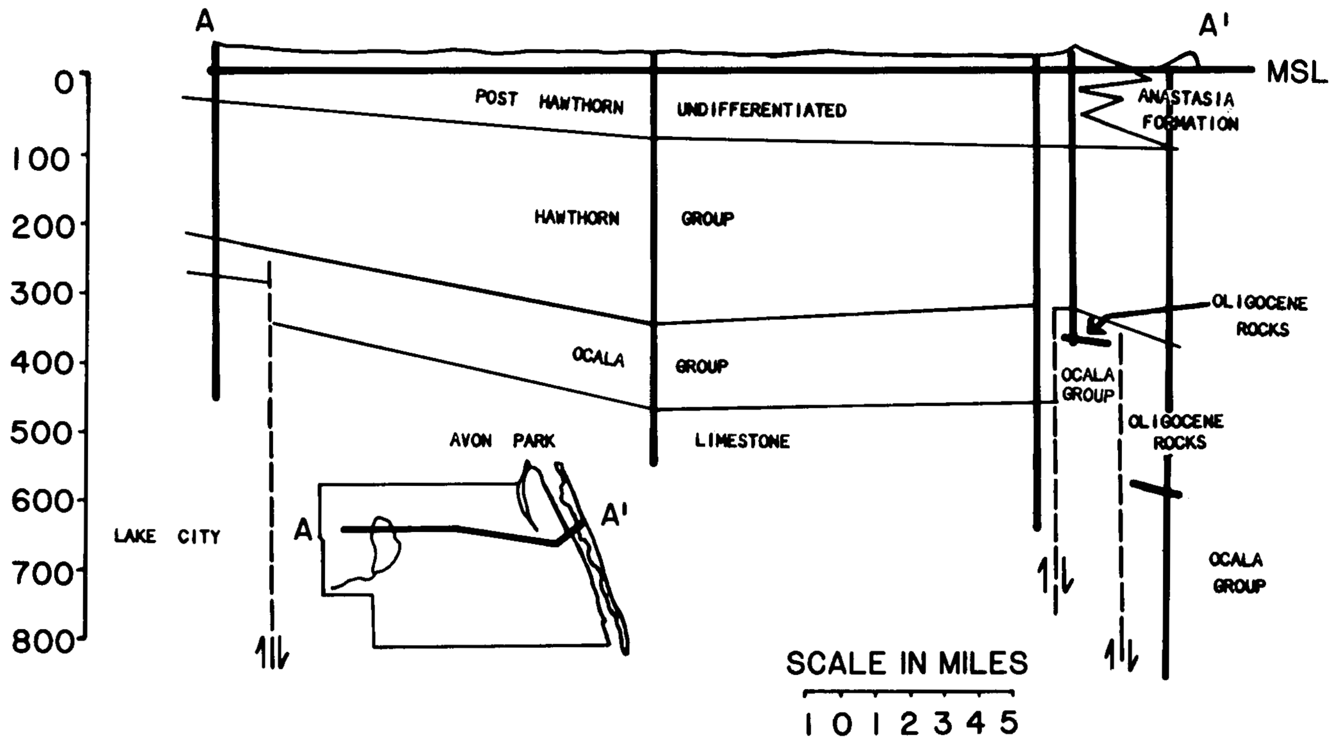


Figure 17.—West to east cross section of the stratigraphy of Indian River County.

Time

Time is an important factor in soil formation. The physical and chemical changes brought about by climate, living organisms, and relief are slow. The length of time needed to convert raw geological material into soil varies according to the nature of the geological material and the interaction of the other factors. Some basic minerals from which soils are formed weather fairly rapidly; other minerals are chemically inert and show little change over long periods. The translocation of fine particles within the soil to form the various horizons is variable under different conditions, but the processes always take a relatively long time.

In Indian River County, the dominant geological materials are inactive. The sands are almost pure quartz and are highly resistant to weathering. The finer textured silt and clay are the product of earlier weathering.

In terms of geological time, relatively little time has elapsed since the material in which the soil in the county has developed was laid down or emerged from the sea. The loamy and clayey horizon formed in place through processes of clay translocation.

Processes of Soil Formation

Soil morphology refers to the process involved in the formation of the soil horizon or soil horizon differentiation. The differentiation of horizons in soils in Indian River 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 are involved.

Some organic matter has accumulated in the upper layers of most of the soils to form an A horizon. The quantity of organic matter is small in some of the soils but fairly large in others.

Carbonates and salts have been leached in all of the soils. The effects of leaching have been indirect in that the leaching permitted the subsequent translocation of silicate clay material in some soils. Most of the soils in the county are leached to varying degrees.

The process of chemical reduction, or gleying, is evident in many of the soils in Indian River County except for the excessively drained soils. Gleying is caused by wetness. Gray matrix color in the B horizon of many soils and grayish mottles in other soils indicate the reduction of iron. In some sandy soils, however, gray color is that of the sand grains. Some horizons contain reddish brown mottles and concretions, which indicate the segregation of iron and fluctuating water table.

The translocation of silicate clay, colloidal organic matter, and iron oxides has contributed to horizon development in many of the soils in the county. Movement of clay, organic matter, or iron is evident in many of the soils that have a light colored, leached E horizon, that have a Bt or Bh horizon in which sand grains are bridged and coated with clay or colloidal organic matter, or that have a few patchy clay films on ped faces and in root channels. Compared with the other processes involved in soil formation, the translocation of silicate clay may be of minor importance in the formation of an horizon in the soils of Indian River County.

Geology

Thomas M. Scott, Florida Geological Survey, Bureau of Geology, Department of Natural Resources, helped prepare this section.

Indian River County is located in east-central Florida southeast of the crest of the Ocala Uplift (fig. 16). It is underlain by a thick sequence (nearly 10,000 feet) of sedimentary rocks (carbonates, sands, and clays) overlying a basement complex of igneous and metamorphic rocks. These rocks range in age from approximately 90 million years old for the basement rocks to recent sediment at the surface.

The upper 1,000 feet of sediments in Indian River County is limestone, dolomite, sand, clay, and shell beds ranging in age (52 million years) from middle Eocene to recent. The sediments of the middle Eocene age (52 million years) through the lower Oligocene age (25 million years) are porous carbonates that make up the Floridan aquifer. The overlying sediments are predominantly clastics (sand and clay) ranging in age from 25 million years (Miocene age) to the recent sediments found along the present coastline. This section of younger sediments contains the shallow aquifer that is of great importance to the county *(6)*.

The deepest formation to be discussed is the middle Eocene age Avon Park Limestone. This unit consists of cream to tan and brown colored limestone and dolomite. The Avon Park Limestone may be 250 feet thick. It yields water from porous zones in some areas of the county *(6)*. Water from this formation is typically high in chloride concentration and is used for irrigation only.

Immediately overlying the Avon Park Limestone is the Ocala Group of limestone. The upper Eocene age Ocala Group includes three formations, the Inglis, Williston, and Crystal River *(9)*. The entire group is composed of limestone. The Williston and Inglis formations are tan to white, granular, porous limestone. The Crystal River Formation consists of white, granular to pasty, porous to massive limestone. The Ocala Group varies from 50 feet thick to a maximum thickness of 225 feet. These units yield poor quality water that is high in chlorides and is used primarily for irrigation.

In part of the county, the Ocala Group is overlain by undifferentiated rocks of possible Oligocene age (36 to 25 million years). These sediments are gray to cream colored, clayey, often sandy, muddy limestone. This unit yields poor quality water and a poor quantity of water. The Oligocene age rocks only occur in the easternmost part of the county. This unit is up to 200 feet thick.

The Hawthorn Group of Miocene age (25 to 13 million years) and early Pliocene age (24 to 3 million years) overlies the Oligocene sediments where they occur. The Hawthorn Group lies on the Ocala Group where the Oligocene rocks are absent. The contact of the Ocala and Hawthorn groups is an unconformity that represents 11 to 12 million years of missing sediments. The Hawthorn Group consists of interbedded limestone, dolomite, sand, and clay. These sediments contain minor amounts of phosphate (generally 1 to 5 percent). The Hawthorn Group is up to about 250 feet thick in Indian River County. Very little water is produced from the Hawthorn sediments.

The Hawthorn Group is overlain by the undifferentiated post-Hawthorn sediments throughout most of the county. However, along the coast, the Anastasia Formation of Pleistocene age (1.6 to .01 million years) overlies the Hawthorn Group. The undifferentiated sediments include sand, clay, shell beds, and thin limestone units that have been variously assigned to the Tamiami Formation, Caloosahatchee Formation, and/or the Fort Thompson Formation. Currently, the formational assignment is in doubt, and these sediments are referred to the undifferentiated category. These sediments range in age from early Pliocene through Pleistocene (3 to .01 million years). This unit underlies most of Indian River County. The undifferentiated unit can provide moderate amounts of water in areas where it is permeable.

The Anastasia Formation occurs only in a band along the present coastline. This unit generally does not extend more than 5 miles inland. The Anastasia Formation is composed of quartz sand and shell material. The Anastasia Formation is best known for its more lithified shell beds, called coquina, that were extensively used as a building and facing material along the east coast of Florida. The induration of the sediments in this unit varies considerably from completely unlithified to well indurated. This unit represents an ancient beach deposit and can provide moderate amounts of water to shallow wells.

Several early authors have suggested the presence of faults in Indian River County *(3, 20)*. One proposal was that a fault existed in the western part of the county where this formed the boundary of the Osceola Low *(20)*. Another proposal was that this same fault was projected into this area from Brevard County. Additionally, it was attributed that the existence of Oligocene rocks in the eastern part of the county was because of faulting *(3)*.

Today, there still is some question as to the actual existence of faults in Indian River County. The present data base is such that the stratigraphy can be interpreted without using faults. If the faults do exist they are quite old. They do not appear to cut the sediments of the Hawthorn group and, as a result, have not been active for at least 26 million years.

The stratigraphy of the county (figs. 17 and 18) is presented with the faults. The faults are dashed to indicate the uncertainty about their existence. Arrows along the faults indicate direction of movement.

Surface outcrops in Indian River County occur along many canals and some of the beach areas. The outcrops in the county expose only the Anastasia Formation and the undifferentiated post-Hawthorn sediments.

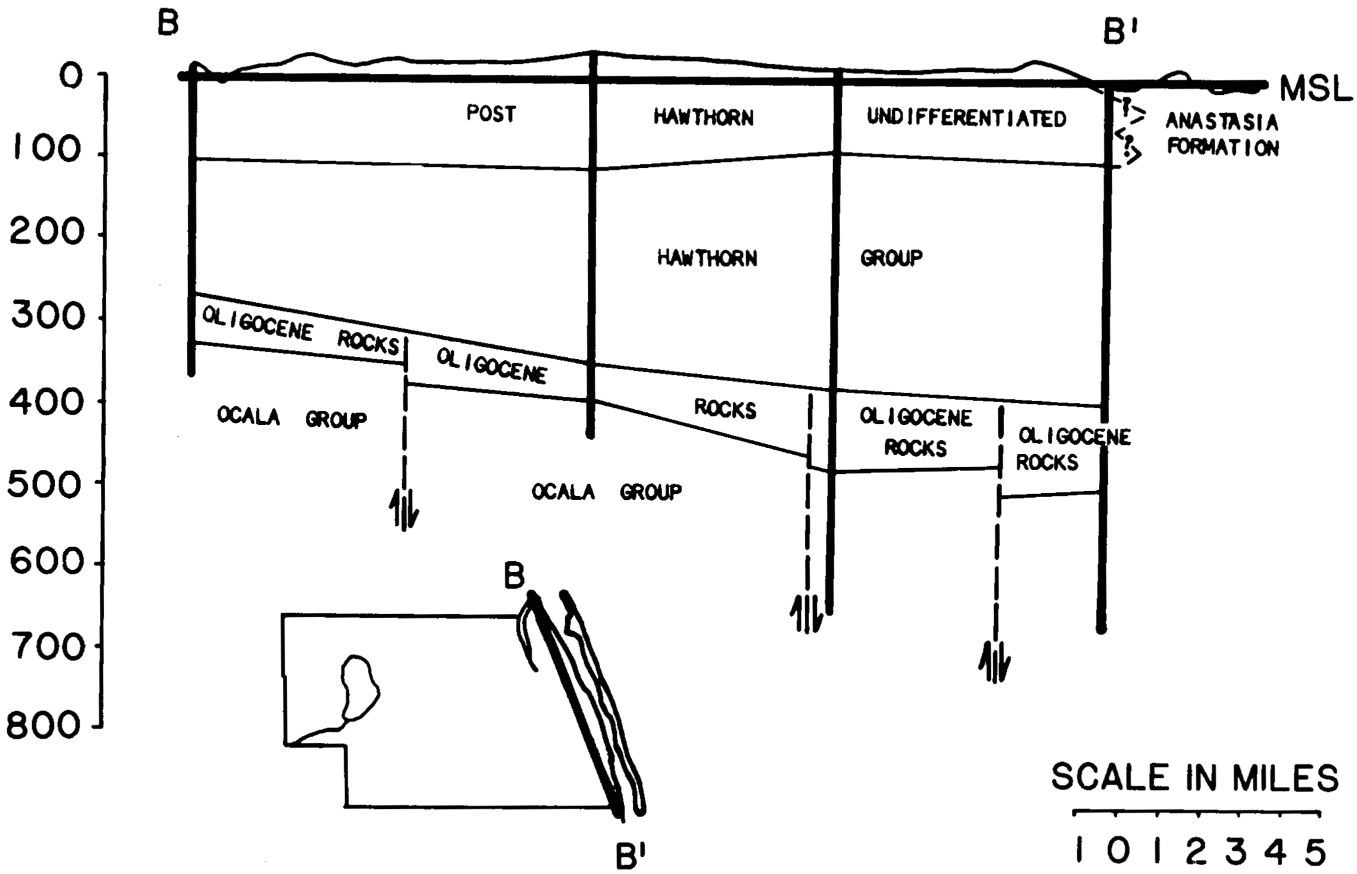


Figure 18.—North to south cross section of the stratigraphy of Indian River County.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Absorption field. The area into which a subsurface system of tile or perforated pipe distributes effluent from a septic tank into natural soil.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium.

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.

Alkali (sodic) soil. Soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

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—

	Inches
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, K), expressed as a percentage of the total cation-exchange capacity.

Bedding. A partial method of controlling excess water for the growth of citrus and other crops by using regularly spaced shallow ditches and beds.

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.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

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.

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 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.

Climax vegetation. 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 fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Complex, soil. A map unit of two or more kinds of soil 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 are somewhat similar in all areas.

Compressible (in tables). The volume of soft soil decreases excessively under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

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.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

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.

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 grazingland for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Ecological plant community. A grouping of similar soils, plants, and animals. This concept is used to recognize and study the interaction of groups of living organisms with their environment. Soils that have a designated ecological plant community are not generally used for rangeland because of their proximity to urban areas, although they support native vegetation; they are precluded because of unpalatable vegetation; or access to the community is prohibited by a high water table or other barrier. Recognized ecological plant communities are:

Cypress swamp.—This community occurs in depressions and poorly defined drainageways. Pond cypress is the dominant tree, along with red maple, willow, maidencane, and other water-tolerant plants. The water table is at or above the surface most of the year.

Mangrove swamps.—This community occurs along saltwater shorelines and on islands within the intracoastal waterway. The predominant vegetation occurs as a thicket of fleshy leaved, woody plants containing red, black, or white mangrove, depending on the elevation and tidal influx.

Salt marsh.—This community occurs as an open expanse of grasses, sedges, rushes, and other low growing salt-tolerant plants; or as a matrix of interconnected, manmade (mosquito ditches) or shallow natural channels surrounded by mangroves, Brazilian peppertree, and scattered cabbage palm, influenced by tidal flux.

South Florida coastal strand.—This community occurs on nearly level to sloping soils adjacent to the Atlantic Ocean. It has vegetation that is adapted to, as well as influenced by the salt and air water environment. The predominant vegetation is sawpalmetto, seagrape, and sea-oats.

Swamp hardwoods.—This community occurs as a dense stand of primarily deciduous trees (red maple, redbay cypress) interspersed with woody shrubs (willow), and other water-tolerant plants. These areas are subject to periodic ponding.

Effervescence. As used in this survey, the bubbling of carbon dioxide when dilute hydrochloric acid is applied to calcium carbonates.

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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

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 the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil restrict the growth of most plants.

Excess sulfur (in tables). An excessive amount of sulfur is in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fast intake (in tables). The movement of water into the soil is rapid.

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.

Fill. Material used to raise the surface level of the land to a desired level.

Fine textured soil. Sandy clay, silty clay, and clay.

Flatwoods. Broad, nearly level, low ridges of poorly drained, dominantly sandy soils that have a characteristic vegetation of open pine forest and an understory of sawpalmetto and pineland threeawn.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant that is not a grass or a sedge.

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 and mottles.

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 up to 3 inches (2 millimeters to 7.5 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 (geology). Water filling all the unblocked pores of underlying material below the water table.

Hammock. A densely wooded area, slightly elevated above adjacent areas that has characteristic natural vegetation of cabbage palm, oaks, and pine with an understory of sawpalmetto, shrubs, and grasses.

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 and the more decomposed sapric material.

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 upper case letter represents the major horizons. Numbers or lower case 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 at the surface of a mineral soil.

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 O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

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 A or B horizon. 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, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but 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-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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.

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 plants that are the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

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

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops so that it flows in only one direction.
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.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Land shaping. Rearrangement of soil materials by cutting and filling to form a more suitable site for the intended use.

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 strength. The soil is not strong enough to support loads.

Marl. An unconsolidated mineral deposited in marine or fresh water. It consists chiefly of silt- and clay-size particles of calcium carbonate.

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. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

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.

Mosquito impoundment. Areas of tidal marsh or tidal swamp, which are diked to maintain a certain water level to prevent breeding of mosquitos. Water control structures can be used and altered to allow fish movement in and out of the marshes.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are 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).

Mounding. Filling the area for the absorption field with suitable soil material to the level above the water table needed to meet local and state requirements.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

No water (in tables). Too deep to ground water.

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.

Open space. A relatively undeveloped green or wooded area provided mainly within an urban area to minimize feelings of congested living.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Ortstein. The B horizon in a spodosol that is cemented by organic matter, by accumulated sesquioxides, or by both.

Parent material. The unconsolidated organic and mineral material in which soil forms.

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 to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 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. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed 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.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

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.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

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.

Rangeland. Land on which the potential natural 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 condition. The present composition of the plant community on a range site in relation to the potential natural 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.

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 the 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 degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly 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

Relief. The elevations or inequalities of a land surface, considered collectively.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

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). There is a 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.

Salty water (in tables.) Water is too salty for consumption by livestock.

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.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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.

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 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

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.

Slow intake (in tables). The slow movement of water into the soil.

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 improving crops. A cover crop that adds nitrogen and other nutrients to the soil during fallow rotation.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
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 underlying material. The living roots and plant and animal activities are largely confined to the solum.

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).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content 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."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

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 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, such as zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). There is a risk of caving or sloughing on banks of fill material.

Water control. Regulating the water table as needed by means of canals, ditches, tile, pumping, or any other appropriate method.

Water table. The upper limit of the soil that is wholly saturated with water.

Water table, apparent.—A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, perched.—A water table standing above an unsaturated zone. In places an upper or perched water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of course 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. This contrasts with poorly graded soil.

Wetness. (in tables). Soil that is wet during the intended period of use.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Based on data recorded at Vero Beach, Florida]

Month	Temperature					Precipitation		
	Normal monthly mean	Normal daily maximum	Normal daily minimum	Mean number of days with temperatures of-- 90 °F or higher	Mean number of days with temperatures of-- 32 °F or lower	Normal total	Mean number of days with rainfall of-- 0.10 inch or more	Mean number of days with rainfall of-- 0.50 inch or more
	°F	°F	°F	°F	°F	In		
January----	61.4	70.0	46.0	0	4	1.92	2	1
February---	69.1	71.0	48.0	0	0	2.16	8	3
March------	70.2	79.0	54.0	0	0	1.74	6	5
April------	73.7	82.0	51.0	2	0	2.05	9	4
May--------	74.4	83.0	66.0	0	0	5.58	11	4
June-------	80.5	88.0	70.0	14	0	5.58	11	6
July-------	81.6	91.0	71.0	25	0	3.81	13	8
August-----	81.7	91.0	72.0	19	0	6.68	13	5
September--	80.1	89.0	72.0	18	0	8.31	17	7
October----	74.9	85.0	64.0	2	0	2.24	6	3
November---	71.9	85.0	60.0	0	0	3.51	8	5
December---	67.5	80.0	53.0	0	0	3.78	8	1
Total----	79.9	74.0	53.0	80	4	55.00	112	52

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Based on data recorded at Vero Beach, Florida]

Freeze threshold temperature	Mean date of last spring occurrence	Mean date of first fall occurence	Mean number of days between dates	Years of record spring	Number of occurences in spring	Years of record fall	Number of occurrences in fall
32 °F----	January 18, 1982 (32 °F)	January 15, 1982 (30 °F)	(*)	17	(*)	17	(*)
28 °F----	January 12, 1982 (25 °F)	December 25, 1983 (24 °F)	(*)	17	(*)	17	(*)

*When the frequency of occurrence in either spring or fall is 1 year and in 10 or less, mean dates are not given.

TABLE 3.--SOIL RATINGS AND LIMITATIONS FOR SELECTED USES, BY GENERAL SOIL MAP UNIT

[The overall rating for the soil unit is based on the rating for the most dominant soil or soils]

Map unit symbol, map unit name, and component soils	Percent of survey area	Percent of map unit	Soil suitability for--		Potential productivity and limitations for--	Degree and kind of limitations for--		
			Cropland	Pasture	Pine trees	Sanitary facilities *	Building sites **	Recreation areas
1. Astatula-Archbold-St. Lucie:	1.8	---	Very poor---	Poor-------	Low-------------------	Severe---------	Slight---------	Severe.
Astatula-----------	---	27	Very poor: droughty, very low fertility.	Poor: droughty, very low, fertility.	Low: equipment limitations, seedling mortality.	Severe: seepage, too sandy.	Slight---------	Severe: too sandy.
Archbold-----------	---	14	Poor: droughty, very low fertility.	Fair-------	Low: equipment limitations, seedling mortality.	Severe: wetness, seepage, too sandy.	Slight---------	Severe: too sandy.
St. Lucie----------	---	14	Not suited: droughty, very low fertility.	Very poor: droughty, very low fertility.	Very low: seedling mortality, equipment limitations.	Severe: poor filter, too sandy, seepage.	Slight---------	Severe: too sandy.
Minor soils--------	---	45	---	---	---	---	---	---
2. Canaveral-Captiva-Palm Beach:	2.0	---	Very poor---	Poor-------	Moderate-------------	Severe---------	Severe---------	Severe.
Canaveral----------	---	40	Very poor: droughty, very low fertility.	Poor: droughty, very low fertility.	Moderate: seedling mortality, equipment limitations.	Severe: wetness, seepage, too sandy.	Severe: wetness.	Severe: wetness, too sandy.
Captiva------------	---	27	Poor: wetness.	Fair: wetness.	Moderate: seedling mortality, equipment limitations.	Severe: wetness, seepage, too sandy.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy.
Palm Beach---------	---	25	Not suited: droughty, very low fertility.	Not suited: droughty, very low fertility.	Very low: seedling mortality, equipment limitations.	Severe: poor filter, seepage, too sandy.	Slight---------	Severe: too sandy.
Minor soils	---	8	---	---	---	---	---	---

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit symbol, map unit name, and component soils	Percent of survey area	Percent of map unit	Soil suitability for--		Potential productivity and limitations for--	Degree and kind of limitations for--		
			Cropland	Pasture	Pine trees	Sanitary facilities *	Building sites **	Recreation areas
3. McKee-Quartzipsamments-St. Augustine:	2.3	---	Not suited	Not suited	Not suited	Severe	Severe	Severe.
McKee	---	58	Not suited	Not suited	Not suited	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness, subsides.	Severe: flooding, too clayey, excess salt.
Quartzipsamments	---	21	Not suited	Not suited	Not sutied	Severe: wetness, seepage.	Severe: cutbanks cave, wetness.	Severe: too sandy.
St. Augustine	---	15	Not suited	Not suited	Not suited	Severe: wetness, poor filter, seepage.	Severe: cutbanks cave, flooding.	Severe: flooding, too sandy.
Minor soils	---	6	---	---	---	---	---	---
4. Immokalee-Myakka-Satellite:	4.9	---	Fair	Good	Moderate	Severe	Severe	Severe.
Immokalee	---	33	Fair: wetness, low fertility, droughty.	Good: wetness.	Moderate: equipment limitations, seedling mortality.	Severe: wetness, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy.
Myakka	---	31	Fair: wetness, low fertility, droughty.	Good: wetness.	Moderate: equipment limitations, seedling mortality.	Severe: wetness, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy.
Satellite	---	14	Poor: droughty, low fertility.	Fair: droughty, low fertility.	Moderate: seedling mortality, equipment limitations.	Severe: seepage, wetness, poor filter.	Severe: cutbanks cave, wetness.	Severe: too sandy, wetness.
Minor soils	---	22	---	---	---	---	---	---

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit symbol, map unit name, and component soils	Percent of survey area	Percent of map unit	Soil suitability for--		Potential productivity and limitations for--	Degree and kind of limitations for--		
			Cropland	Pasture	Pine trees	Sanitary facilities *	Building sites **	Recreation areas
5. EauGallie-Oldsmar-Wabasso:	14.2	---	Fair--------	Good-------	Moderately high-------	Severe---------	Severe--------	Severe.
EauGallie----------	---	44	Fair: wetness, low fertility.	Good: wetness.	Moderately high: equipment limitations, seedling mortality, plant competition.	Severe: wetness, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy.
Oldsmar------------	---	18	Fair: wetness, low fertility, droughty.	Good: wetness.	Moderately high: seedling mortality, equipment limitations.	Severe: wetness, too sandy.	Severe: wetness, cutbanks cave.	Severe: too sandy, wetness.
Wabasso------------	---	9	Fair: wetness, low fertility.	Good: wetness.	Moderately high: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly, too sandy.
Minor soils--------	---	29	---	---	---	---	---	---
6. Myakka-Immokalee:	9.5	---	Fair--------	Good-------	Moderate-------------	Severe---------	Severe--------	Severe.
Myakka-------------	---	51	Fair: wetness, low fertility.	Good: wetness.	Moderate: equipment limitations, seedling mortality.	Severe: wetness, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy
Immokalee----------	---	31	Fair: wetness, low fertility.	Good: wetness.	Moderate: equipment limitations, seedling mortality.	Severe: wetness, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy
Minor soils--------	---	18	---	---	---	---	---	---

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit symbol, map unit name, and component soils	Percent of survey area	Percent of map unit	Soil suitability for--		Potential productivity and limitations for--	Degree and kind of limitations for--		
			Cropland	Pasture	Pine trees	Sanitary facilities *	Building sites **	Recreation areas
7. EauGallie-Myakka-Riviera:	1.1	---	Fair	Good	Moderately high	Severe	Severe	Severe.
EauGallie	---	24	Fair: wetness, low fertility, droughty.	Good: wetness.	Moderately high: equipment limitations, seedling mortality, plant competition.	Severe: wetness, seepage, too sandy.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy.
Myakka	---	3	Fair: wetness, low fertility, droughtiness.	Good: wetness.	Moderate: equipment limitations, seedling mortality.	Severe: wetness, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy.
Riviera	---	14	Fair: wetness, low fertility.	Good: wetness.	Moderately high: equipment limitations, seedling mortality.	Severe: wetness, seepage, percs slowly.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy, percs slowly.
Minor soils	---	39	---	---	---	---	---	---
8. Riviera-Pineda-Wabasso:	24.6	---	Fair	Good	Moderately high	Severe	Severe	Severe.
Riviera	---	33	Fair: wetness, low fertility.	Good: wetness.	Moderately high: equipment limitations, seedling mortality.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.
Pineda	---	29	Fair: wetness, low fertility.	Good: wetness.	Moderately high: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, percs slowly, too sandy.
Wabasso	---	24	Fair: wetness, low fertility.	Good: wetness.	Moderately high: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly.
Minor soils	---	14	---	---	---	---	---	---

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit symbol, map unit name, and component soils	Percent of survey area	Percent of map unit	Soil suitability for-- Cropland	Soil suitability for-- Pasture	Potential productivity and limitations for-- Pine trees	Degree and kind of limitations for-- Sanitary facilities *	Degree and kind of limitations for-- Building sites **	Degree and kind of limitations for-- Recreation areas
9. Winder-Riviera-Manatee:	11.5	---	Fair	Good	High	Severe	Severe	Severe.
Winder	---	54	Fair: wetness, low fertility.	Good: wetness.	High: equipment limitations, seedling mortality, plant competition.	Severe: percs slowly, wetness, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy, percs slowly.
Riviera	---	22	Fair: wetness, low fertility.	Good: wetness.	Moderately high: equipment limitations, seedling mortality.	Severe: wetness, seepage, percs slowly.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy, percs slowly.
Manatee	---	8	Good: wetness.	Good: wetness.	High: equipment limitations, seedling mortality, plant competition.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness.
Minor soils	---	16	---	---	---	---	---	---
10. Boca-Wabasso-Riviera:	1.3	---	Fair	Fair	High	Severe	Severe	Severe.
Boca	---	34	Fair: wetness, low fertility.	Fair: wetness.	High: equipment limitations, seedling mortality.	Severe: depth to rock, wetness.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy.
Wabasso	---	13	Fair: wetness, low fertility.	Good: wetness.	Moderately high: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly.
Riviera	---	10	Fair: wetness, low fertility.	Good: wetness.	Moderately high: equipment limitations, seedling mortality.	Severe: wetness, seepage, percs slowly.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy, percs slowly.
Minor soils	---	43	---	---	---	---	---	---

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit symbol, map unit name, and component soils	Percent of survey area	Percent of map unit	Soil suitability for--		Potential productivity and limitations for--	Degree and kind of limitations for--		
			Cropland	Pasture	Pine trees	Sanitary facilities *	Building sites **	Recreation areas
11. Myakka-Holopaw-Pompano:	5.0	---	Fair	Good	Moderate	Severe	Severe	Severe.
Myakka	---	19	Fair: wetness, low fertility.	Good: wetness.	Moderate: equipment limitations, seedling mortality.	Severe: wetness, seepage.	Severe: wetness, cutbanks cave.	Severe: wetness, too sandy.
Holopaw	---	19	Fair: wetness, low fertility, droughtiness.	Good: wetness.	Moderately high: equipment limitations, seedling mortality.	Severe: wetness, poor filter, seepage.	Severe: cutbanks cave, wetness.	Severe: wetness, too sandy.
Pompano	---	19	Fair: wetness, low fertility, droughtiness.	Good: wetness.	Moderate: equipment limitations, seedling mortality.	Severe: wetness, poor filter, seepage.	Severe: cutbanks cave, wetness.	Severe: wetness, too sandy.
Minor soils	---	43	---	---	---	---	---	---
12. Terra Ceia-Gator-Canova:	19.0	---	Good	Good	Not suited	Severe	Severe	Severe.
Terra Ceia	---	58	Good: ponding.	Good: ponding.	Not suited	Severe: ponding, poor filter, excess humus.	Severe: excess humus, ponding, low strength.	Severe: ponding, excess humus.
Gator	---	21	Good: ponding.	Good: ponding.	Not suited	Severe: ponding, excess humus, seepage.	Severe	Severe: ponding, excess humus.
Canova	---	18	Fair: ponding.	Good: ponding.	High: equipment limitations, seedling mortality.	Severe: ponding, seepage, excess humus.	Severe: ponding.	Severe: ponding, excess humus.
Minor soils	---	3	---	---	---	---	---	---

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit symbol, map unit name, and component soils	Percent of survey area	Percent of map unit	Soil suitability for--		Potential productivity and limitations for--	Degree and kind of limitations for--		
			Cropland	Pasture	Pine trees	Sanitary facilities *	Building sites **	Recreation areas
13. Floridana-Delray-Holopaw:	2.8	---	Poor	Fair	Moderately high	Severe	Severe	Severe.
Floridana	---	25	Poor: ponding, wetness.	Fair: wetness.	Moderately high: equipment limitations, seedling mortality.	Severe: ponding, percs slowly, seepage.	Severe: cutbanks cave, ponding.	Severe: ponding, percs slowly.
Delray	---	25	Poor: ponding, wetness.	Fair: wetness.	Moderately high: equipment limitations, seedling mortality.	Severe: ponding, seepage.	Severe: ponding, cutbanks cave.	Severe: ponding.
Holopaw	---	15	Fair: wetness, low fertility, droughtiness.	Good: wetness.	Moderately high: equipment limitations, seedling mortality.	Severe: wetness, poor filter, seepage.	Severe: cutbanks cave, wetness.	Severe: wetness, too sandy.
Minor soils	---	35	---	---	---	---	---	---

* Ratings apply to septic tank absorption fields and trench sanitary landfills.
** Ratings apply to dwellings without basements, small commercial buildings, and local roads and streets.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Canaveral fine sand, 0 to 5 percent slopes	2,533	0.7
2	Chobee loamy fine sand	2,024	0.6
3	EauGallie fine sand	21,974	6.4
4	Immokalee fine sand	16,494	4.8
5	Myakka fine sand	20,917	6.1
6	Oldsmar fine sand	11,342	3.3
7	Palm Beach sand, 0 to 5 percent slopes	1,599	0.5
8	Paola sand, 0 to 5 percent slopes	283	0.1
9	Pepper sand	1,004	0.3
10	Riviera fine sand	30,858	8.9
11	St. Lucie sand, 0 to 8 percent slopes	865	0.3
12	Archbold sand, 0 to 5 percent slopes	815	0.2
13	Wabasso fine sand	23,971	6.9
14	Winder fine sand	20,616	6.0
15	Manatee loamy fine sand	3,028	0.9
16	Pineda fine sand	22,004	6.4
17	Quartzipsamments, 0 to 5 percent slopes	2,558	0.7
18	Captiva fine sand	1,739	0.5
20	Beaches	487	0.1
21	Pomello sand, 0 to 5 percent slopes	2,710	0.8
22	Urban land	775	0.2
23	Arents,0 to 5 percent slopes	2,188	0.6
24	Floridana sand	2,660	0.8
25	St. Augustine sand	724	0.2
26	St. Augustine fine sand, organic substratum	437	0.1
27	Boca-Urban land complex	287	0.1
28	EauGallie-Urban land complex	1,357	0.4
29	Immokalee-Urban land complex	454	0.1
31	Jupiter fine sand	1,001	0.3
32	Jonathan sand, 0 to 5 percent slopes	206	0.1
33	Astatula sand, 0 to 5 percent slopes	1,596	0.5
34	Satellite fine sand	2,451	0.7
35	McKee mucky clay loam	3,773	1.1
36	Boca fine sand	1,626	0.5
39	Malabar fine sand	4,032	1.2
40	Gator muck	12,767	3.7
41	Canova muck	11,156	3.2
42	Terra Ceia muck	35,487	10.3
44	Perrine Variant loamy fine sand	285	0.1
45	Myakka fine sand, depressional	5,134	1.5
46	Orsino fine sand, 0 to 5 percent slopes	408	0.1
47	Holopaw fine sand	5,718	1.7
48	Electra sand, 0 to 5 percent slopes	769	0.2
49	Pompano fine sand	2,936	0.9
50	Pits	50	*
51	Riviera fine sand, depressional	8,364	2.4
52	Oldsmar fine sand, depressional	841	0.2
53	Manatee mucky loamy fine sand, depressional	1,912	0.6
54	Riomar clay loam	515	0.1
55	Floridana mucky fine sand, depressional	3,502	1.0
56	Pineda fine sand, depressional	4,312	1.2
57	Holopaw fine sand, depressional	3,192	0.9
58	Samsula muck	2,396	0.7
59	Lokosee fine sand	407	0.1
60	Pompano fine sand, depressional	2,754	0.8
61	Delray muck	3,119	0.9
62	Chobee mucky loamy fine sand, depressional	410	0.1
63	Kesson muck	324	0.1
	Water	27,264	7.9
	Total	345,410	100.0

* Less than 0.1 percent.

TABLE 5.--LAND CAPABILITY 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]

Map symbol and soil name	Land capability	Oranges	Grapefruit	Corn	Tomatoes	Bahiagrass	Grass-clover	Pangola-grass
		Box	Box	Bu	Ton	AUM*	AUM*	AUM*
1---------------- Canaveral	VIs	400	525	---	---	---	---	---
2---------------- Chobee	IIIw	425	500	---	6.0	---	15.0	13.0
3---------------- EauGallie	IVw	375	575	---	8.0	8.0	12.0	10.0
4---------------- Immokalee	IVw	350	550	---	15.0	---	---	8.0
5---------------- Myakka	IVw	350	550	---	15.0	9.0	---	9.0
6---------------- Oldsmar	IVw	325	575	---	8.0	---	---	10.0
7---------------- Palm Beach	VIIs	---	---	---	---	---	---	---
8---------------- Paola	VIs	250	300	---	---	---	---	---
9---------------- Pepper	IVw	350	450	---	13.0	10.0	12.0	9.0
10--------------- Riviera	IIIw	425	575	---	---	---	12.0	10.0
11--------------- St. Lucie	VIIs	---	---	---	---	---	---	---
12--------------- Archbold	VIs	400	525	---	---	5.5	---	---
13--------------- Wabasso	IIIw	400	600	---	13.0	---	12.0	10.0
14--------------- Winder	IIIw	250	425	---	8.0	9.0	12.0	10.0
15--------------- Manatee	IIIw	425	500	---	8.0	---	14.0	10.0
16--------------- Pineda	IIIw	425	575	---	13.0	---	12.0	10.0
17.** Quartzipsamments								
18--------------- Captiva	IVw	300	400	---	---	8.0	10.0	---
20.** Beaches								

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Oranges	Grapefruit	Corn	Tomatoes	Bahiagrass	Grass-clover	Pangola-grass
		Box	Box	Bu	Ton	AUM*	AUM*	AUM*
21---------------- Pomello	VIs	250	400	---	---	---	---	---
22.** Urban land								
23.** Arents								
24---------------- Floridana	IIIw	---	---	---	14.0	---	13.0	10.0
25, 26----------- St. Augustine	VIIs	---	---	---	---	---	---	---
27---------------- Boca-Urban land	---	---	---	---	---	---	---	---
28---------------- EauGallie- Urban land	---	---	---	---	---	---	---	---
29---------------- Immokalee- Urban land	---	---	---	---	---	---	---	---
31---------------- Jupiter	IVw	375	500	---	16.0	---	---	---
32---------------- Jonathan	VIs	---	---	---	---	3.0	---	---
33---------------- Astatula	VIs	350	400	---	---	3.0	---	---
34---------------- Satellite	VIs	---	---	---	---	5.0	---	---
35---------------- McKee	VIIIw	---	---	---	---	---	---	---
36---------------- Boca	IIIw	350	525	---	16.0	---	---	9.0
39---------------- Malabar	IVw	325	575	---	13.0	---	12.0	10.0
40---------------- Gator	IIIw	---	---	170	---	14.0	---	13.0
41---------------- Canova	IIIw	---	---	---	6.0	14.0	---	15.0
42---------------- Terra Ceia	IIIw	---	---	170	---	14.0	---	12.0
44---------------- Perrine Variant	IIIw	300	350	---	8.0	---	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Oranges	Grapefruit	Corn	Tomatoes	Bahiagrass	Grass-clover	Pangolagrass
		Box	Box	Bu	Ton	AUM*	AUM*	AUM*
45---------------Myakka	VIIw	---	---	---	---	---	---	---
46---------------Orsino	IVs	350	450	---	---	5.0	---	---
47---------------Holopaw	IVw	375	575	---	7.0	8.0	10.0	10.0
48---------------Electra	VIs	---	---	---	---	6.0	---	---
49---------------Pompano	IVw	300	400	---	13.0	8.0	10.0	10.0
50.** Pits								
51---------------Riviera	VIIw	---	---	---	---	---	---	---
52---------------Oldsmar	VIIw	---	---	---	---	---	---	---
53---------------Manatee	VIIw	---	---	---	---	---	---	---
54---------------Riomar	VIIIw	---	---	---	---	---	---	---
55---------------Floridana	VIIw	---	---	---	---	---	---	---
56---------------Pineda	VIIw	---	---	---	---	---	---	---
57---------------Holopaw	VIIw	---	---	---	---	---	---	---
58---------------Samsula	VIIw	---	---	---	---	---	---	---
59---------------Lokosee	IVw	375	400	---	8.0	---	12.0	10.0
60---------------Pompano	VIIw	---	---	---	---	---	---	---
61---------------Delray	VIIw	---	---	---	---	---	---	---
62---------------Chobee	VIIw	---	---	---	---	---	---	---
63---------------Kesson	VIIIw	---	---	---	---	---	---	---

* 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.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	---	---	---	---	---
II	---	---	---	---	---
III	166,482	---	166,482	---	---
IV	87,972	---	87,564	408	---
V	---	---	---	---	---
VI	11,363	---	---	11,363	---
VII	39,561	---	35,936	3,625	---
VIII	4,612	---	4,612	---	---

TABLE 7.--RANGELAND PRODUCTIVITY

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Map symbol and soil name	Range site	Potential annual production for kind of growing season (dry weight)		
		Favorable Lb/acre	Average Lb/acre	Unfavorable Lb/acre
2 Chobee	Slough	8,000	6,000	4,000
3 EauGallie	South Florida Flatwoods	6,000	4,500	3,000
4 Immokalee	South Florida Flatwoods	6,000	4,500	3,000
5 Myakka	South Florida Flatwoods	6,000	4,500	3,000
6 Oldsmar	South Florida Flatwoods	6,000	4,500	3,000
8 Paola	Sand Pine Scrub	3,500	2,500	1,500
9 Pepper	South Florida Flatwoods	6,000	4,500	3,000
10 Riviera	Cabbage Palm Flatwoods	9,000	6,500	4,500
11 St. Lucie	Sand Pine Scrub	3,500	2,500	1,500
12 Archbold	Sand Pine Scrub	3,500	2,500	1,500
13 Wabasso	South Florida Flatwoods	6,000	4,500	3,000
14 Winder	Cabbage Palm Hammocks	3,500	2,500	1,500
15 Manatee	Freshwater Marshes And Ponds	10,000	8,500	5,000
16 Pineda	Slough	8,000	6,000	4,000
21 Pomello	Sand Pine Scrub	3,500	2,500	1,500
24 Floridana	Freshwater Marshes And Ponds	10,000	8,500	5,000
31 Jupiter	Cabbage Palm Hammocks	3,500	2,500	1,500
32 Jonathan	Sand Pine Scrub	3,500	2,500	1,500
33 Astatula	Sand Pine Scrub	3,500	2,500	1,500
34 Satellite	Sand Pine Scrub	3,500	2,500	1,500

TABLE 7.--RANGELAND PRODUCTIVITY--Continued

Map symbol and soil name	Range site	Potential annual production for kind of growing season (dry weight)		
		Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
36 Boca	South Florida Flatwoods	6,000	4,500	3,000
39 Malabar	Cabbage Palm Flatwoods	9,000	6,500	4,500
41 Canova	Freshwater Marshes And Ponds	10,000	8,500	5,000
45 Myakka	Freshwater Marshes And Ponds	10,000	8,500	5,000
46 Orsino	Sand Pine Scrub	3,500	2,500	1,500
47 Holopaw	Slough	8,000	6,000	4,000
48 Electra	South Florida Flatwoods	6,000	4,500	3,000
49 Pompano	Slough	8,000	6,000	4,000
51 Riviera	Freshwater Marshes And Ponds	10,000	8,500	5,000
52 Oldsmar	Freshwater Marshes And Ponds	10,000	8,500	5,000
53 Manatee	Freshwater Marshes And Ponds	10,000	8,500	5,000
55 Floridana	Freshwater Marshes And Ponds	10,000	8,500	5,000
56 Pineda	Freshwater Marshes And Ponds	10,000	8,500	5,000
57 Holopaw	Freshwater Marshes And Ponds	10,000	8,500	5,000
59 Lokosee	Cabbage Palm Flatwoods	9,000	6,500	4,500
61 Delray	Freshwater Marshes And Ponds	10,000	8,500	4,500

TABLE 8.--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]

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
1 Canaveral	4s	Slight	Severe	Severe	Slight	Moderate	Sand pine Slash pine South Florida slash pine	70 70 35	Slash pine, South Florida slash pine.
2 Chobee	2w	Slight	Severe	Moderate	Slight	Severe	Slash pine Longleaf pine South Florida slash pine	90 70 55	Slash pine, South Florida slash pine.
3 EauGallie	3w	Slight	Moderate	Moderate	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine	80 70 45	Slash pine, South Florida slash pine.
4 Immokalee	4w	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine Longleaf pine South Florida slash pine	70 65 35	Slash pine, South Florida slash pine.
5 Myakka	4w	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine Longleaf pine South Florida slash pine	70 60 35	Slash pine, South Florida slash pine.
6 Oldsmar	3w	Slight	Moderate	Moderate	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine	80 65 45	Slash pine, South Florida slash pine.
8 Paola	5s	Slight	Moderate	Severe	Slight	Slight	Sand pine Sand live oak	50 ---	Sand pine.
9 Pepper	3w	Slight	Moderate	Moderate	Slight	Moderate	Slash pine Longleaf pine	80 65	Slash pine.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	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	Trees to plant
10: Riviera	3w	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine Longleaf pine	80 70	Slash pine.
11: St. Lucie	5s	Slight	Severe	Moderate	Slight	Slight	Sand pine Sand live oak	60 ---	Sand pine.
12: Archbold	5s	Slight	Severe	Moderate	Slight	Slight	Sand pine South Florida slash pine	60 35	Sand pine.
13: Wabasso	3w	Slight	Moderate	Moderate	Slight	Moderate	Slash pine South Florida slash pine	80 45	Slash pine, South Florida slash pine.
14: Winder	2w	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine South Florida slash pine	90 55	Slash pine, South Florida slash pine.
15: Manatee	2w	Slight	Severe	Severe	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine Red maple	90 75 68 ---	Slash pine.
16: Pineda	3w	Slight	Moderate	Severe	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine Cabbage palm	80 70 45 ---	Slash pine.
18: Captiva	4w	Slight	Severe	Severe	Slight	Moderate	South Florida slash pine	35	South Florida slash pine.
21: Pomello	4s	Slight	Moderate	Severe	Moderate	Moderate	Slash pine Longleaf pine Sand pine South Florida slash pine	70 60 60 35	Sand pine, slash pine, South Florida slash pine.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
24----------------- Floridana	3w	Slight	Severe	Severe	Slight	Moderate	Slash pine----------	90	Slash pine, South Florida slash pine.
							Longleaf pine-------	75	
							South Florida slash pine --------------	55	
							Cabbage palm--------	---	
27:*									
Boca--------------	2w	Slight	Moderate	Moderate	Slight	Moderate	South Florida slash pine --------------	55	South Florida slash pine.
Urban land.									
28:*									
EauGallie---------	3w	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	Slash pine, South Florida slash pine.
							Longleaf pine-------	70	
							South Florida slash pine --------------	45	
Urban land.									
29:*									
Immokalee---------	4w	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine----------	70	Slash pine, South Florida slash pine.
							Longleaf pine-------	65	
							South Florida slash pine --------------	35	
Urban land.									
31----------------- Jupiter	4w	Slight	Severe	Moderate	Moderate	Moderate	South Florida slash pine --------------	35	South Florida slash pine.
32----------------- Jonathan	5s	Slight	Moderate	Severe	Slight	Slight	Sand pine-----------	45	Sand pine.
33----------------- Astatula	5s	Slight	Severe	Moderate	Slight	Slight	Sand pine-----------	60	Sand pine.
							Turkey oak----------	---	
							Bluejack oak--------	---	
							Blackjack oak-------	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
34. Satellite	4s	Slight	Moderate	Severe	Slight	Moderate	Slash pine	70	Slash pine, sand pine, South Florida slash pine.
							Longleaf pine	60	
							Sand pine	65	
							South Florida slash pine	35	
							Sand live oak	---	
35. McKee	---	---	---	---	---	---	American mangrove	---	
36. Boca	2w	Slight	Moderate	Moderate	Slight	Moderate	South Florida slash pine	55	South Florida slash pine.
39. Malabar	3w	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	Slash pine, South Florida slash pine.
							Longleaf pine	70	
							South Florida slash pine	45	
41. Canova	2w	Slight	Severe	Moderate	Slight	Moderate	Slash pine	90	Slash pine.
							Longleaf pine	75	
45. Myakka	4w	Slight	Severe	Severe	Severe	Severe	Pond pine	60	South Florida slash pine.
46. Orsino	4s	Slight	Moderate	Severe	Slight	Moderate	Slash pine	70	Slash pine, sand pine, South Florida slash pine.
							Longleaf pine	60	
							Sand pine	70	
							South Florida slash pine	35	
							Sand live oak	---	
							Turkey oak	---	
47. Holopaw	3w	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	Slash pine, South Florida slash pine.
							Longleaf pine	70	
							South Florida slash pine	45	
							Cabbage palm	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
48----------------- Electra	4s	Slight	Moderate	Severe	Slight	Slight	Slash pine---------- Sand pine----------- Longleaf pine------- South Florida slash pine -------------	70 65 65 35	Slash pine, sand pine, South Florida slash pine.
49----------------- Pompano	4w	Slight	Severe	Severe	Slight	Moderate	Slash pine---------- South Florida slash pine -------------	70 45	Slash pine, South Florida slash pine.
51----------------- Riviera	4w	Slight	Severe	Severe	Severe	Severe	Pond pine-----------	60	
52----------------- Oldsmar	4w	Slight	Severe	Severe	Slight	Severe	Pond pine-----------	60	
53----------------- Manatee	2w	Slight	Severe	Severe	Slight	Moderate	Pond pine-----------	65	
54----------------- Riomar	---	---------	------------	--------	--------	------------	American mangrove---	---	
55----------------- Floridana	3w	Slight	Severe	Severe	Slight	Severe	Pond pine----------- Cypress-------------	65 ---	Pond pine, South Florida slash pine, slash pine.
56----------------- Pineda	4w	Slight	Severe	Severe	Severe	Severe	Pond pine-----------	60	
57----------------- Holopaw	3w	Slight	Moderate	Severe	Slight	Severe	Pond pine-----------	60	South Florida slash pine, slash pine.
59----------------- Lokosee	3w	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine------- Water oak----------- Live oak------------ South Florida slash pine -------------	80 70 --- --- 45	Slash pine, South Florida slash pine.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
60----------------- Pompano	4w	Slight	Severe	Severe	Severe	Severe	Pond pine-----------	60	
61----------------- Delray	3w	Slight	Severe	Severe	Slight	Severe	Pond pine-----------	65	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

[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 rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1 Canaveral	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
2 Chobee	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
3 EauGallie	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
4 Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
5 Myakka	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
6 Oldsmar	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
7 Palm Beach	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
8 Paola	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
9 Pepper	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, cemented pan.	Severe: wetness, too sandy.	Severe: wetness, thin layer.
10 Riviera	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
11 St. Lucie	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
12 Archbold	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
13 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.
14 Winder	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
15-------------------- Manatee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
16-------------------- 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, droughty.
17*------------------- Quartzipsamments	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
18-------------------- Captiva	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
20.* Beaches					
21-------------------- Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
22.* Urban land					
23*------------------- Arents	Severe: too sandy.	Severe: too sandy.	Moderate: slope, wetness.	Severe: too sandy.	Severe: droughty.
24-------------------- Floridana	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
25-------------------- St. Augustine	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
26-------------------- St. Augustine	Severe: flooding, too sandy, excess salt.	Severe: too sandy, excess salt.	Severe: too sandy, excess salt.	Severe: too sandy.	Severe: excess salt.
27:*					
Boca-----------------	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Urban land.					
28:*					
EauGallie------------	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Urban land.					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
29:*					
Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Urban land.					
31 Jupiter	Severe: wetness, too sandy, depth to rock.	Severe: wetness, too sandy, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: wetness, too sandy.	Severe: wetness, thin layer.
32 Jonathan	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
33 Astatula	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
34 Satellite	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
35 McKee	Severe: flooding, wetness, excess salt.	Severe: wetness, too clayey, excess salt.	Severe: flooding, wetness, excess salt.	Severe: wetness, too clayey.	Severe: excess salt, wetness, flooding.
36 Boca	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
39 Malabar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
40 Gator	Severe: ponding, percs slowly, excess humus.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, percs slowly.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
41 Canova	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
42 Terra Ceia	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
44 Perrine Variant	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, thin layer.
45 Myakka	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
46 Orsino	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
47 Holopaw	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
48 Electra	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
49 Pompano	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
50.* Pits					
51 Riviera	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
52 Oldsmar	Severe: ponding, too sandy, percs slowly.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding, droughty.
53 Manatee	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
54 Riomar	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess salt, percs slowly.	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, excess humus.	Severe: flooding, wetness, excess salt.
55 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.
56 Pineda	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
57 Holopaw	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
58 Samsula	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
59 Lokosee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
60 Pompano	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
61-------------------- Delray	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
62-------------------- Chobee	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
63-------------------- Kesson	Severe: flooding, wetness.	Severe: wetness, excess salt.	Severe: wetness, flooding.	Severe: wetness.	Severe: excess salt, flooding, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	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
1------------------ Canaveral	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
2------------------ Chobee	Poor	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good.
3------------------ EauGallie	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
4------------------ Immokalee	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
5------------------ Myakka	Poor	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor.
6------------------ Oldsmar	Poor	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Poor.
7------------------ Palm Beach	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
8------------------ Paola	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
9------------------ Pepper	Poor	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Poor.
10----------------- Riviera	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair.
11----------------- St. Lucie	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
12----------------- Archbold	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
13----------------- Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.
14----------------- Winder	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
15----------------- Manatee	Poor	Poor	Fair	Poor	Fair	Good	Good	Poor	Poor	Good.
16----------------- Pineda	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
17.* Quartzipsamments										
18----------------- Captiva	Poor	Fair	Fair	Fair	Poor	Good	Good	Poor	Fair	Good.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	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
20.* Beaches										
21----------------- Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
22.* Urban land										
23.* Arents										
24----------------- Floridana	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
25, 26------------- St. Augustine	Very poor.	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor.
27:* Boca--------------	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
Urban land.										
28:* EauGallie---------	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
Urban land.										
29:* Immokalee---------	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
Urban land.										
31----------------- Jupiter	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor	Fair.
32----------------- Jonathan	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
33----------------- Astatula	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
34----------------- Satellite	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
35----------------- McKee	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Fair.
36----------------- Boca	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
39----------------- Malabar	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
40----------------- Gator	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good	Good	Very poor.	Very poor.	Good.
41----------------- Canova	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat element: 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
42: Terra Ceia	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
44: Perrine Variant	Poor	Fair	Fair	Very poor.	Very poor.	Good	Good	Poor	Very poor.	Good.
45: Myakka	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
46: Orsino	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
47: Holopaw	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
48: Electra	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
49: Pompano	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
50.*: Pits										
51: Riviera	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
52: Oldsmar	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
53: Manatee	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
54: Riomar	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Fair.
55: Floridana	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
56: Pineda	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
57: Holopaw	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
58: Samsula	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.
59: Lokosee	Poor	Fair	Fair	Fair	Fair	Poor	Poor	---	Fair	Poor.
60: Pompano	Very poor.	Very poor.	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
61: Delray	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
62: Chobee	Poor	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	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
63 Kesson	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1----------------- Canaveral	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
2----------------- Chobee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3----------------- EauGallie	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
4----------------- Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
5----------------- Myakka	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
6----------------- Oldsmar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
7----------------- Palm Beach	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
8----------------- Paola	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
9----------------- Pepper	Severe: cemented pan, cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, cemented pan.	Severe: wetness.	Severe: wetness.	Severe: wetness, thin layer.
10---------------- Riviera	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
11---------------- St. Lucie	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
12---------------- Archbold	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
13---------------- Wabasso	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
14---------------- Winder	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
15---------------- Manatee	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
16 Pineda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
17.* Quartzipsamments						
18 Captiva	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
20.* Beaches						
21 Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
22.* Urban land						
23.* Arents						
24 Floridana	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
25 St. Augustine	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: droughty.
26 St. Augustine	Severe: cutbanks cave, excess humus, wetness.	Severe: flooding.	Severe: flooding, wetness, low strength.	Severe: flooding.	Moderate: wetness, flooding.	Severe: excess salt.
27:*						
Boca	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Urban land.						
28:*						
EauGallie	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Urban land.						
29:*						
Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Urban land.						

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
31---------------- Jupiter	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness.	Severe: wetness, thin layer.
32---------------- Jonathan	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
33---------------- Astatula	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
34---------------- Satellite	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
35---------------- McKee	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: excess salt, wetness, flooding.
36---------------- Boca	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
39---------------- Malabar	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
40---------------- Gator	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
41---------------- Canova	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
42---------------- Terra Ceia	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, excess humus.
44---------------- Perrine Variant	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, thin layer.
45---------------- Myakka	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
46---------------- Orsino	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
47---------------- Holopaw	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
48---------------- Electra	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
49: Pompano	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
50.* Pits						
51: Riviera	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
52: Oldsmar	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
53: Manatee	Severe: ponding, cutbanks cave.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
54: Riomar	Severe: depth to rock, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, depth to rock.	Severe: flooding, wetness, shrink-swell.	Severe: depth to rock, low strength, wetness.	Severe: flooding, wetness, excess salt.
55: Floridana	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
56: Pineda	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
57: Holopaw	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
58: Samsula	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
59: Lokosee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
60: Pompano	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
61: Delray	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
62: Chobee	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
63---------------- Kesson	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, flooding, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," 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]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1------------------ Canaveral	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
2------------------ Chobee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
3------------------ EauGallie	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
4------------------ Immokalee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
5------------------ Myakka	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
6------------------ Oldsmar	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
7*----------------- Palm Beach	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
8*----------------- Paola	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
9------------------ Pepper	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, cemented pan, wetness.	Severe: wetness, too sandy.	Severe: cemented pan, seepage, wetness.	Poor: area reclaim, seepage, too sandy.
10----------------- Riviera	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
11*---------------- St. Lucie	Slight-----------	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
12*---------------- Archbold	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13 Wabasso	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: seepage, too sandy, wetness.
14 Winder	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness, thin layer.
15 Manatee	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
16 Pineda	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
17.** Quartzipsamments					
18 Captiva	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
20.** Beaches					
21 Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
22.** Urban land					
23.** Arents					
24 Floridana	Severe: wetness, percs slowly.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness, seepage.	Poor: wetness.
25 St. Augustine	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
26 St. Augustine	Severe: wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
27:**					
Boca	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: area reclaim, seepage, too sandy.	Poor: seepage, too sandy, wetness.
Urban land.					
28:**					
EauGallie	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
Urban land.					
29:**					
Immokalee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Urban land.					
31 Jupiter	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: area reclaim, seepage, too sandy.
32 Jonathan	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
33* Astatula	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
34 Satellite	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
35 McKee	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, excess salt.	Severe: flooding, wetness.	Poor: wetness, excess salt, hard to pack.
36 Boca	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: area reclaim, seepage, too sandy.	Poor: seepage, too sandy, wetness.
39 Malabar	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
40----------------- Gator	Severe: ponding, percs slowly, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
41----------------- Canova	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, seepage.	Severe: seepage, ponding.	Poor: ponding.
42----------------- Terra Ceia	Severe: ponding, poor filter.	Severe: seepage, excess humus.	Severe: ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
44----------------- Perrine Variant	Severe: depth to rock, ponding.	Severe: depth to rock, ponding.	Severe: depth to rock, ponding.	Severe: depth to rock, ponding.	Poor: area reclaim, ponding.
45----------------- Myakka	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
46*---------------- Orsino	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
47----------------- Holopaw	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
48----------------- Electra	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
49----------------- Pompano	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
50.** Pits					
51----------------- Riviera	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
52----------------- Oldsmar	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
53----------------- Manatee	Severe: ponding.	Severe: seepage, ponding.	Severe: ponding.	Severe: seepage, ponding.	Poor: ponding.

See footnotes at end of table.

TABLE 12--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
54------------------ Riomar	Severe: flooding, depth to rock, wetness.	Severe: depth to rock, flooding, wetness.	Severe: flooding, depth to rock, wetness.	Severe: flooding, wetness, depth to rock.	Poor: hard to pack, too clayey, wetness.
55------------------ Floridana	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: ponding.	Severe: ponding, seepage.	Poor: ponding.
56------------------ Pineda	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
57------------------ Holopaw	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
58------------------ Samsula	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
59------------------ Lokosee	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
60------------------ Pompano	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
61------------------ Delray	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
62------------------ Chobee	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, ponding.
63------------------ Kesson	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

* There may be a hazard of contamination of ground water in areas that have a large number of septic tank absorption fields because of inadequate filtration of the effluent.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "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]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1 Canaveral	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
2 Chobee	Poor: wetness.	Improbable: excess fines.	Improbable: too sandy.	Poor: wetness.
3 EauGallie	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
4 Immokalee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
5 Myakka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
6 Oldsmar	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
7 Palm Beach	Good	Probable	Improbable: too sandy.	Poor: too sandy.
8 Paola	Good	Probable	Improbable: too sandy.	Poor: too sandy.
9 Pepper	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, too sandy, wetness.
10 Riviera	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.
11 St. Lucie	Good	Probable	Improbable: too sandy.	Poor: too sandy.
12 Archbold	Good	Probable	Improbable: too sandy.	Poor: too sandy.
13 Wabasso	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
14 Winder	Poor: wetness.	Probable	Probable	Poor: too sandy, wetness.
15 Manatee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
16------------------- Pineda	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
17------------------- Quartzipsamments	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
18------------------- Captiva	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
20.* Beaches				
21------------------- Pomello	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
22.* Urban land				
23------------------- Arents	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
24------------------- Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
25------------------- St. Augustine	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
26------------------- St. Augustine	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, excess salt.
27:*				
Boca-----------------	Poor: thin layer, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
Urban land.				
28:*				
EauGallie------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
Urban land.				
29:*				
Immokalee------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
Urban land.				
31------------------- Jupiter	Poor: area reclaim, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, too sandy, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
32 Jonathan	Good	Probable	Improbable: too sandy.	Poor: too sandy.
33 Astatula	Good	Probable	Improbable: too sandy.	Poor: too sandy.
34 Satellite	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
35 McKee	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey, excess salt.
36 Boca	Poor: thin layer, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
39 Malabar	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
40 Gator	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
41 Canova	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
42 Terra Ceia	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
44 Perrine Variant	Poor: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
45 Myakka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
46 Orsino	Good	Probable	Improbable: too sandy.	Poor: too sandy.
47 Holopaw	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
48 Electra	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
49 Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
50.* Pits				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
51------------------- Riviera	Poor: wetness.	Probable-------------	Improbable: excess fines.	Poor: too sandy, wetness.
52------------------- Oldsmar	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
53------------------- Manatee	Poor: ponding.	Improbable: excess fines.	Improbable: excess fines.	Poor: ponding.
54------------------- Riomar	Poor: area reclaim, low strength, wetness.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: thin layer, excess salt, wetness.
55------------------- Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
56------------------- Pineda	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
57------------------- Holopaw	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
58------------------- Samsula	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: excess humus, wetness.
59------------------- Lokosee	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
60------------------- Pompano	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
61------------------- Delray	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: wetness.
62------------------- Chobee	Poor: wetness.	Improbable: excess fines.	Improbable: too sandy.	Poor: wetness.
63------------------- Kesson	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: excess salt, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[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 evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
1: Canaveral	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
2: Chobee	Slight	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, fast intake, soil blowing.	Wetness, rooting depth, percs slowly.
3: EauGallie	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, droughty.
4: Immokalee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
5: Myakka	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
6: Oldsmar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
7: Palm Beach	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
8: Paola	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
9: Pepper	Severe: seepage, cemented pan.	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, cemented pan, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, cemented pan.
10: Riviera	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Wetness, percs slowly.	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
11: St. Lucie	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
12: Archbold	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
13---------------- Wabasso	Severe: seepage.	Severe: seepage, wetness.	Severe: slow refill.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
14---------------- Winder	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
15---------------- Manatee	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Favorable------	Wetness, fast intake, soil blowing.	Wetness.
16---------------- Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
17.* Quartzipsamments						
18---------------- Captiva	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty, rooting depth.
20.* Beaches						
21---------------- Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
22.* Urban land						
23.* Arents						
24---------------- Floridana	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, fast intake, soil blowing.	Wetness, percs slowly.
25---------------- St. Augustine	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
26---------------- St. Augustine	Severe: seepage.	Severe: seepage, piping, excess salt.	Severe: salty water, cutbanks cave.	Cutbanks cave, excess salt.	Wetness, droughty, fast intake.	Excess salt, droughty.
27:*						
Boca-------------	Severe: seepage.	Severe: seepage, piping, wetness.	Moderate: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
27:* Urban land.						
28:* EauGallie	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, droughty.
Urban land.						
29:* Immokalee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
Urban land.						
31 Jupiter	Severe: depth to rock.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
32 Jonathan	Severe: seepage.	Severe: seepage, piping.	Severe: slow refill, cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
33 Astatula	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
34 Satellite	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
35 McKee	Slight	Severe: hard to pack, wetness, excess salt.	Severe: salty water.	Flooding, subsides, excess salt.	Wetness, flooding, excess salt.	Wetness, excess salt.
36 Boca	Severe: seepage.	Severe: seepage, piping, wetness.	Moderate: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
39 Malabar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
40 Gator	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
41 Canova	Severe: seepage.	Severe: ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing, droughty.	Wetness, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
42 Terra Ceia	Severe: seepage.	Severe: excess humus, ponding.	Slight	Ponding, subsides.	Ponding, soil blowing.	Wetness.
44 Perrine Variant	Moderate: depth to rock.	Severe: thin layer, ponding.	Severe: depth to rock.	Ponding, depth to rock.	Ponding, depth to rock.	Wetness, depth to rock.
45 Myakka	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
46 Orsino	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
47 Holopaw	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
48 Electra	Severe: seepage.	Severe: seepage, piping.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
49 Pompano	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
50.* Pits						
51 Riviera	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, percs slowly.	Ponding, droughty, fast intake.	Wetness, droughty, percs slowly.
52 Oldsmar	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty, percs slowly.
53 Manatee	Moderate: seepage.	Severe: ponding, seepage, piping.	Severe: cutbanks cave.	Ponding	Ponding, fast intake, soil blowing.	Wetness.
54 Riomar	Moderate: depth to rock.	Severe: thin layer, wetness, excess salt.	Severe: salty water, depth to rock, slow refill.	Percs slowly, depth to rock, flooding.	Wetness, percs slowly, depth to rock.	Wetness, excess salt, depth to rock.
55 Floridana	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, fast intake, soil blowing.	Wetness, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	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
56: Pineda	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, percs slowly, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty, percs slowly.
57: Holopaw	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
58: Samsula	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Wetness.
59: Lokosee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
60: Pompano	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
61: Delray	Severe: seepage.	Severe: seepage, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding	Wetness.
62: Chobee	Moderate: seepage.	Severe: ponding, piping, seepage.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, fast intake, soil blowing.	Wetness, percs slowly.
63: Kesson	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: salty water, cutbanks cave.	Flooding, cutbanks cave, excess salt.	Wetness, excess salt.	Wetness, excess salt, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
1---------------- Canaveral	0-6	Fine sand--------	SP	A-3	100	100	90-100	1-4	---	NP
	6-80	Fine sand, sand, coarse sand.	SP	A-3	70-100	70-95	65-90	1-3	---	NP
2---------------- Chobee	0-5	Loamy fine sand, sandy loam.	SM-SC, SC, SM	A-2-4	100	100	80-99	13-25	<40	NP-20
	5-46	Sandy clay loam	SC	A-2-6, A-2-7, A-6, A-7	100	100	85-99	25-45	35-45	20-25
	46-80	Loamy sand, fine sand, sandy clay loam.	SP-SM, SM, SC, SM-SC	A-2-4, A-2-6, A-6, A-7	100	100	80-99	12-45	<45	NP-25
3---------------- EauGallie	0-5	Fine sand--------	SP, SP-SM	A-3	100	100	80-98	2-5	---	NP
	5-26	Sand, fine sand	SP-SM, SM	A-3, A-2-4	100	100	80-98	5-20	---	NP
	26-47	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-98	2-12	---	NP
	47-62	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	100	80-98	20-35	<40	NP-20
	62-80	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	100	100	80-98	5-25	---	NP
4---------------- Immokalee	0-5	Fine sand--------	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
	5-35	Fine sand, sand	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
	35-55	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	70-100	5-21	---	NP
	55-80	Fine sand, sand	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
5---------------- Myakka	0-28	Fine sand--------	SP, SP-SM	A-3	100	100	85-100	2-10	---	NP
	28-58	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	100	100	85-100	5-20	---	NP
	58-80	Sand, fine sand	SP, SP-SM	A-3	100	100	85-100	2-8	---	NP
6---------------- Oldsmar	0-32	Fine sand--------	SP, SP-SM	A-3	100	100	80-100	2-10	---	NP
	32-50	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3	100	100	80-100	5-20	---	NP
	50-62	Fine sandy loam, sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	85-100	20-35	20-35	5-15
7---------------- Palm Beach	0-80	Sand, fine sand	SP-SM, SP, SW	A-1-b, A-3, A-2-4	100	90-100	15-90	1-5	---	NP
8---------------- Paola	0-12	Sand-------------	SP	A-3	100	100	85-100	1-2	---	NP
	12-80	Sand, fine sand	SP	A-3	100	100	80-100	1-4	---	NP
9---------------- Pepper	0-8	Sand-------------	SP, SP-SM	A-3	100	100	85-95	2-10	---	NP
	8-22	Sand, fine sand	SP, SP-SM	A-3	100	100	85-95	2-10	---	NP
	22-39	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	100	100	85-95	5-25	---	NP
	39-47	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	100	100	85-95	5-20	---	NP
	47-60	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	100	100	85-100	20-35	<28	NP-7

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
10-------------- Riviera	0-26	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	80-100	4-12	---	NP
	26-31	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	100	100	80-100	15-35	<35	NP-15
	31-40	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	80-100	20-35	20-40	4-20
	40-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	60-80	50-75	40-70	3-10	---	NP
11-------------- St. Lucie	0-80	Sand-------------	SP	A-3	100	100	70-95	1-4	---	NP
12-------------- Archbold	0-4	Sand-------------	SP	A-3	100	100	89-99	1-3	---	NP
	4-80	Sand, fine sand	SP, SP-SM	A-3	100	100	89-99	1-6	---	NP
13-------------- Wabasso	0-24	Fine sand--------	SP, SP-SM	A-3	100	100	95-100	2-10	---	NP
	24-35	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	100	100	95-100	5-20	---	NP
	35-48	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	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	100	100	95-100	5-20	---	NP
14-------------- Winder	0-17	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	80-100	2-12	---	NP
	17-23	Loamy sand, sandy loam, fine sandy loam.	SM	A-2-4	100	100	80-100	15-25	<35	NP-10
	23-34	Sandy clay loam	SC	A-2-4, A-2-6	100	100	80-100	18-35	20-40	9-26
	34-65	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	60-80	50-75	40-70	15-35	<35	NP-20
	65-80	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	60-80	50-75	40-70	3-20	<35	NP-10
15-------------- Manatee	0-12	Loamy fine sand	SP-SM, SM	A-3, A-2-4	100	100	85-100	8-15	---	NP
	12-31	Fine sandy loam, sandy loam.	SM-SC, SC	A-2-4	100	100	90-100	18-30	<30	4-10
	31-39	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2-4	95-100	90-100	85-100	13-30	<30	NP-10
	39-80	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2-4	60-100	50-100	50-100	13-30	<30	NP-10
16-------------- Pineda	0-23	Fine sand--------	SP, SP-SM	A-3	100	100	80-95	2-5	---	NP
	23-40	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	100	100	80-95	15-35	20-30	4-12
	40-80	Sand, loamy sand, fine sand.	SP-SM, SM	A-3, A-2-4	100	100	80-95	4-15	---	NP
17*------------- Quartzipsamments	0-80	Fine sand--------	SP, SP-SM	A-3	100	100	85-100	2-10	---	NP
18-------------- Captiva	0-8	Fine sand--------	SP-SM, SM	A-3, A-2-4	100	80-90	80-90	5-15	---	NP
	8-16	Sand, fine sand	SP, SP-SM	A-3	100	85-95	85-95	2-10	---	NP
	16-80	Coarse sand, sand, fine sand.	SP	A-3	100	80-90	75-85	1-4	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
20.* Beaches										
21---------------- Pomello	0-61	Fine sand--------	SP, SP-SM	A-3	100	100	60-100	1-8	---	NP
	61-72	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	100	100	60-100	6-15	---	NP
	72-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	100	100	60-100	4-10	---	NP
22.* Urban land										
23.* Arents										
24---------------- Floridana	0-14	Sand-------------	SP-SM, SM	A-3, A-2-4	100	100	80-90	5-25	---	NP
	14-20	Fine sand, sand	SP, SP-SM	A-3	100	100	80-90	2-10	---	NP
	20-37	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	85-95	20-40	20-40	7-26
	37-80	Sandy clay loam, sandy loam, loamy sand.	SM, SM-SC, SC	A-2-4	100	95-100	85-95	11-35	<40	NP-20
25---------------- St. Augustine	0-30	Sand-------------	SP, SP-SM	A-3	85-95	80-95	80-90	2-5	---	NP
	30-45	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	85-95	80-95	80-90	5-15	---	NP
26---------------- St. Augustine	0-40	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	80-95	2-12	---	NP
	40-60	Muck-------------	PT	---	---	---	---	---	---	---
	60-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	85-95	80-95	80-90	5-15	---	NP
27:*										
Boca------------	0-17	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	80-99	2-12	---	NP
	17-24	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-99	2-12	---	NP
	24-30	Sandy loam, sandy clay loam, fine sandy loam.	SC	A-2-4, A-6, A-2-6	100	100	80-99	17-40	16-37	5-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---
Urban land.										
28:*										
EauGallie--------	0-23	Fine sand--------	SP, SP-SM	A-3	100	100	80-98	2-5	---	NP
	23-36	Sand, fine sand	SP-SM, SM	A-3, A-2-4	100	100	80-98	5-20	---	NP
	36-68	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-98	2-12	---	NP
	68-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	100	80-98	20-35	<40	NP-20
Urban land.										
29:*										
Immokalee--------	0-7	Fine sand--------	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
	7-42	Fine sand, sand	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
	42-58	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	70-100	5-21	---	NP
	58-80	Fine sand, sand	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
Urban land.										

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
31-------------- Jupiter	0-5	Fine sand--------	SP-SM	A-3, A-2-4	100	100	85-95	5-12	---	NP
	5-11	Sand, fine sand	SP, SP-SM	A-3	100	100	85-95	2-5	---	NP
	11	Weathered bedrock	---	---	---	---	---	---	---	---
32-------------- Jonathan	0-3	Sand-------------	SP	A-3	100	100	70-100	1-4	---	NP
	3-75	Fine sand, sand	SP	A-3	100	100	70-100	1-4	---	NP
	75-80	Fine sand, sand, loamy sand.	SP-SM, SM	A-3, A-2-4	100	100	70-100	5-15	---	NP
33-------------- Astatula	0-4	Sand-------------	SP, SP-SM	A-3	100	100	75-99	1-7	---	NP
	4-80	Sand, fine sand	SP, SP-SM	A-3	100	100	75-99	1-7	---	NP
34-------------- Satellite	0-4	Fine sand--------	SP	A-3	100	100	60-95	1-4	---	NP
	4-80	Coarse sand, sand, fine sand.	SP	A-3	100	100	60-95	1-4	---	NP
35-------------- McKee	0-1	Mucky clay loam	CH	A-7	100	100	95-100	70-85	65-80	45-55
	1-60	Clay, clay loam, sandy clay.	CH	A-7	100	100	90-100	60-85	51-80	29-50
	60-80	Fine sand, loamy fine sand, sandy loam.	SM	A-2-4, A-4	100	90-100	75-90	15-40	---	NP
36-------------- Boca	0-6	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	80-99	2-12	---	NP
	6-20	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-99	2-12	---	NP
	20-30	Sandy loam, sandy clay loam, fine sandy loam.	SC	A-2-4, A-6, A-2-6	100	100	80-99	17-40	16-37	5-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---
39-------------- Malabar	0-17	Fine sand--------	SP, SP-SM	A-3	100	100	80-90	2-10	---	NP
	17-41	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-90	3-12	---	NP
	41-65	Sandy clay loam, fine sandy loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	100	100	80-90	22-40	20-40	4-15
	65-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	100	100	80-90	5-20	---	NP
40-------------- Gator	0-26	Muck-------------	PT	A-8	---	---	---	---	---	---
	26-80	Loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	95-100	80-99	25-46	20-40	4-28
41-------------- Canova	0-12	Muck-------------	PT	---	---	---	---	---	---	---
	12-24	Sand, fine sand	SP, SP-SM	A-3	100	100	75-100	3-10	---	NP
	24-34	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	75-95	15-35	20-40	7-25
	34-80	Sandy clay loam, sandy loam.	SC	A-2-4, A-2-6	100	100	75-95	18-35	20-40	9-26

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
42---------------Terra Ceia	0-60	Muck	PT	A-8	---	---	---	---	---	---
	60-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	100	100	80-90	2-12	---	NP
44---------------Perrine Variant	0-6	Fine sandy loam	SM-SC, SC	A-4	95-100	80-100	75-95	20-40	20-30	4-10
	6-24	Sandy clay loam, loam.	CL	A-4, A-6	95-100	80-100	75-95	51-70	24-40	8-20
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---
45---------------Myakka	0-17	Fine sand	SP, SP-SM	A-3	100	100	85-100	2-10	---	NP
	17-65	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	100	100	85-100	5-20	---	NP
	65-80	Sand, fine sand	SP, SP-SM	A-3	100	100	85-100	2-8	---	NP
46---------------Orsino	0-29	Fine sand	SP	A-3	100	100	85-95	1-3	---	NP
	29-80	Sand, fine sand	SP, SP-SM	A-3	100	100	85-100	2-10	---	NP
47---------------Holopaw	0-45	Fine sand	SP, SP-SM	A-3	100	95-100	70-95	2-10	---	NP
	45-62	Sandy loam, sandy clay loam, fine sandy loam.	SM, SM-SC	A-2-4	100	95-100	70-99	15-30	<25	NP-7
	62-80	Loamy sand, loamy fine sand, fine sand.	SM	A-2-4	100	95-100	70-99	11-20	---	NP
48---------------Electra	0-5	Sand	SP, SP-SM	A-3	100	95-100	75-99	3-10	---	NP
	5-30	Sand, fine sand	SP, SP-SM	A-3	100	95-100	75-99	3-10	---	NP
	30-47	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	100	100	80-99	8-15	---	NP
	47-80	Sandy clay loam, sandy clay, fine sandy loam.	SC, SM-SC	A-2, A-4, A-6	100	100	80-99	20-45	20-40	4-20
49---------------Pompano	0-80	Fine sand	SP, SP-SM	A-3, A-2-4	100	100	75-100	1-12	---	NP
50.* Pits										
51---------------Riviera	0-26	Fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-100	4-12	---	NP
	26-29	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	100	100	80-100	15-35	<35	NP-15
	29-45	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	80-100	20-35	20-40	4-20
	45-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	60-80	50-75	40-70	3-10	---	NP
52---------------Oldsmar	0-35	Fine sand	SP, SP-SM	A-3	100	100	80-100	2-10	---	NP
	35-52	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	100	100	80-100	5-20	---	NP
	52-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	85-100	20-35	20-35	5-15

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
53---------------- Manatee	0-8	Mucky loamy fine sand.	SP-SM, SM	A-3, A-2-4	100	100	85-100	8-15	---	NP
	8-24	Fine sandy loam, sandy loam.	SM-SC, SC, SM	A-2-4	100	100	90-100	18-30	<30	NP-10
	24-42	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2-4	95-100	90-100	85-100	13-30	<30	NP-10
	42-80	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2-4	60-100	50-100	50-100	13-30	<30	NP-10
54---------------- Riomar	0-8	Clay loam--------	CH, CL	A-7	100	100	95-100	70-85	43-56	23-33
	8-15	Clay loam, clay	CL	A-7	100	100	90-100	60-85	43-56	23-33
	15-25	Sandy clay, clay loam.	CH	A-7	100	100	90-100	60-85	51-71	29-45
	25	Weathered bedrock	---	---	---	---	---	---	---	---
55---------------- Floridana	0-19	Mucky fine sand	SP-SM, SM	A-3, A-2-4	100	100	80-90	5-25	---	NP
	19-35	Sand, fine sand	SP, SP-SM	A-3	100	100	80-90	2-10	---	NP
	35-50	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	85-95	20-40	20-40	7-26
	50-80	Loamy fine sand	SP-SM, SM	A-3, A-2-4	100	100	85-95	5-15	---	NP
56---------------- Pineda	0-32	Fine sand--------	SP, SP-SM	A-3	100	100	80-95	2-5	---	NP
	32-52	Sandy loam, fine sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2-4, A-2-6	100	100	80-95	15-35	20-30	4-12
	52-80	Sand, loamy sand	SP-SM, SM	A-3, A-2-4	100	100	80-95	5-15	---	NP
57---------------- Holopaw	0-47	Fine sand--------	SP, SP-SM	A-3	100	95-100	70-95	2-10	---	NP
	47-65	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	100	95-100	70-95	15-30	<25	NP-7
	65-80	Loamy sand, loamy fine sand, fine sand.	SM	A-2-4	100	95-100	70-95	11-20	---	NP
58---------------- Samsula	0-26	Muck-------------	PT	---	---	---	---	---	---	---
	26-80	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	100	100	80-100	2-20	---	NP
59---------------- Lokosee	0-10	Fine sand--------	SP, SP-SM	A-3	100	100	85-100	2-10	---	NP
	10-35	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	3-12	---	NP
	35-45	Sand, fine sand	SP-SM, SM	A-3, A-2-4	100	100	85-100	5-20	---	NP
	45-70	Sand, fine sand	SP, SP-SM	A-3	100	100	85-100	2-10	---	NP
	70-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	100	85-100	20-35	<35	NP-14
60---------------- Pompano	0-80	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	75-100	1-12	---	NP
61---------------- Delray	0-3	Muck-------------	PT	---	---	---	---	---	---	---
	3-21	Sand, loamy sand, fine sand.	SP-SM, SM, SM-SC	A-2-4, A-3	100	100	95-100	5-20	<20	NP-5
	21-45	Fine sand, sand	SP-SM	A-3, A-2-4	100	100	95-100	5-12	---	NP
	45-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	100	95-100	20-35	<40	NP-15

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
62----------------- Chobee	0-5	Mucky loamy fine sand.	SP-SM, SM	A-3, A-2-4	100	100	95-100	5-20	<40	NP-10
	5-50	Sandy loam, fine sandy loam, sandy clay loam.	SP-SM, SM, SC, SM-SC	A-2-4, A-2-6, A-6, A-7	100	100	85-99	12-45	<45	NP-25
	50-80	Fine sand, loamy sand.	SP-SM, SM	A-2-4	100	100	80-99	12-25	<40	NP-10
63----------------- Kesson	0-6	Muck-------------	PT	---	---	---	---	---	---	NP
	6-30	Sand, fine sand	SP, SP-SM	A-3	90-100	90-100	90-100	2-10	---	NP
	30-38	Sand, fine sand	SP, SP-SM	A-3	70-100	65-95	60-95	2-10	---	NP
	38-80	Sand, fine sand	SP, SP-SM	A-3	90-100	90-100	90-100	2-10	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. 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]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	Mmhos/cm					Pct
1--------------- Canaveral	0-6	<2	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Low--------	0.10	5	2	<1
	6-80	<2	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Low--------	0.10			
2--------------- Chobee	0-5	7-15	1.45-1.50	2.0-6.0	0.10-0.15	6.1-7.3	<2	Low--------	0.10	5	2	2-7
	5-46	20-35	1.55-1.75	<0.2	0.12-0.17	7.4-8.4	<2	Moderate	0.32			
	46-80	7-20	1.60-1.75	0.2-6.0	0.06-0.10	7.4-8.4	<2	Low--------	0.20			
3--------------- EauGallie	0-5	<5	1.25-1.50	6.0-20	0.02-0.07	4.5-6.0	<2	Low--------	0.10	5	2	2-8
	5-26	1-8	1.45-1.60	0.6-6.0	0.15-0.25	4.5-6.5	<2	Low--------	0.15			
	26-47	1-5	1.45-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
	47-62	13-31	1.55-1.70	0.06-2.0	0.10-0.20	4.5-7.8	<2	Low--------	0.20			
	62-80	1-13	1.45-1.55	0.6-6.0	0.05-0.15	4.5-7.8	<2	Low--------	0.15			
4--------------- Immokalee	0-5	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
	5-35	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
	35-55	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low--------	0.15			
	55-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
5--------------- Myakka	0-28	<2	1.35-1.55	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.10	5	2	<2
	28-58	1-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	<2	Low--------	0.15			
	58-80	<2	1.48-1.70	6.0-20	0.02-0.10	3.6-6.5	<2	Low--------	0.10			
6--------------- Oldsmar	0-32	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-7.3	<2	Low--------	0.10	5	2	1-2
	32-50	2-8	1.42-1.59	0.2-6.0	0.10-0.15	3.6-7.3	<2	Low--------	0.15			
	50-62	15-30	1.60-1.69	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.24			
7--------------- Palm Beach	0-80	<2	1.25-1.50	>20	0.02-0.05	7.4-8.4	<2	Low--------	0.10	5	1	.5-1
8--------------- Paola	0-12	<2	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Low--------	0.10	5	1	<.5
	12-80	<3	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Low--------	0.10			
9--------------- Pepper	0-8	<2	1.32-1.44	6.0-20	0.05-0.10	3.6-6.0	<2	Low--------	0.10	5	2	1-4
	8-22	<2	1.43-1.57	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
	22-39	4-13	1.47-1.59	<0.2	0.10-0.15	3.6-6.5	<2	Low--------	0.20			
	39-47	2-8	1.47-1.59	0.2-2.0	0.05-0.10	3.6-6.5	<2	Low--------	0.15			
	47-60	10-30	1.49-1.70	<0.6	0.10-0.15	5.6-7.8	<2	Low--------	0.24			
10-------------- Riviera	0-26	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
	26-31	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low--------	0.24			
	31-40	15-25	1.50-1.70	<0.2	0.12-0.15	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			
11-------------- St. Lucie	0-80	<2	1.50-1.60	>20	0.02-0.05	3.6-7.3	<2	Low--------	0.10	5	1	<1
12-------------- Archbold	0-4	0-1	1.50-1.60	>20	0.03-0.05	3.6-5.5	<2	Low--------	0.10	5	1	.5-1
	4-80	0-1	1.50-1.60	>20	0.02-0.03	3.6-5.5	<2	Low--------	0.10			
13-------------- Wabasso	0-24	<5	1.25-1.55	6.0-20	0.02-0.05	4.5-6.5	<2	Low--------	0.10	5	2	1-4
	24-35	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low--------	0.15			
	35-48	12-30	1.60-1.80	<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			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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--------------- Winder	0-17	1-6	1.40-1.65	6.0-20	0.03-0.08	5.6-7.8	<2	Low--------	0.10	5	2	.1-2
	17-23	10-18	1.45-1.65	0.2-0.6	0.06-0.10	6.1-7.8	<2	Low--------	0.20			
	23-34	20-30	1.60-1.70	<0.2	0.10-0.15	6.6-8.4	<2	Low--------	0.24			
	34-65	15-30	1.50-1.70	<0.2	0.06-0.12	7.4-8.4	<2	Low--------	0.24			
	65-80	6-13	1.40-1.65	6.0-20	0.03-0.10	7.4-8.4	<2	Low--------	0.15			
15--------------- Manatee	0-12	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
	12-31	10-20	1.50-1.65	0.6-2.0	0.10-0.15	6.6-7.8	<2	Low--------	0.24			
	31-39	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low--------	0.24			
	39-80	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low--------	0.24			
16--------------- Pineda	0-23	1-8	1.30-1.60	6.0-20	0.02-0.05	4.5-7.3	<2	Low--------	0.10	5	2	.5-6
	23-40	10-25	1.50-1.70	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	40-80	3-12	1.45-1.60	2.0-6.0	0.02-0.05	5.6-8.4	<2	Low--------	0.10			
17--------------- Quartzipsamments	0-80	1-3	1.50-1.65	6.0-20	0.03-0.05	4.5-7.3	<2	Low--------	0.10	5	2	<.5
18--------------- Captiva	0-8	1-3	1.30-1.55	6.0-20	0.10-0.15	7.4-7.8	<2	Low--------	0.10	5	2	---
	8-16	1-3	1.45-1.65	>20	0.05-0.10	7.9-8.4	<2	Low--------	0.10			
	16-80	1-3	1.50-1.65	>20	0.05-0.10	7.9-8.4	<2	Low--------	0.10			
20.* Beaches												
21--------------- Pomello	0-61	<2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	Low--------	0.10	5	1	<1
	61-72	<2	1.45-1.60	2.0-6.0	0.10-0.30	4.5-6.0	<2	Low--------	0.15			
	72-80	<2	1.35-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	Low--------	0.10			
22.* Urban land												
23--------------- Arents	0-50	1-10	1.35-1.55	6.0-20	0.02-0.08	6.6-8.4	<2	Low--------	0.10	5	2	<.5
	50-72	1-10	1.35-1.55	6.0-20	0.02-0.08	5.6-8.4	<2	Low--------	0.10			
	72-80	1-10	1.35-1.55	6.0-20	0.02-0.08	5.6-6.5	<2	Low--------	0.10			
24--------------- Floridana	0-14	3-10	1.40-1.49	6.0-20	0.10-0.20	4.5-8.4	<2	Low--------	0.10	5	2	6-15
	14-20	1-7	1.52-1.58	6.0-20	0.05-0.10	4.5-8.4	<2	Low--------	0.10			
	20-37	15-30	1.60-1.69	<0.2	0.10-0.20	4.5-8.4	<2	Low--------	0.24			
25--------------- St. Augustine	0-30	0-2	1.30-1.40	6.0-20	0.02-0.05	6.1-8.4	<2	Low--------	0.10	5	2	1-3
	30-45	4-12	1.40-1.55	2.0-20	0.05-0.10	6.1-8.4	<2	Low--------	0.15			
26--------------- St. Augustine	0-27	2-5	1.35-1.45	6.0-20	0.05-0.10	7.4-8.4	8-16	Low--------	0.10	5	2	1-3
	27-30	---	0.25-0.35	6.0-20	0.15-0.20	3.6-6.5	>16	Low--------	----			
27:*												
Boca------------	0-17	<2	1.30-1.55	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.10	5	2	1-3
	17-24	<2	1.50-1.60	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.17			
	24-30	14-30	1.55-1.65	0.6-2.0	0.10-0.15	5.1-8.4	<2	Low--------	0.20			
	30	---	---	---	---	---	---	-----------	----			
Urban land.												

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
28:*												
EauGallie-------	0-23	<5	1.25-1.50	6.0-20	0.02-0.07	4.5-6.0	<2	Low--------	0.10	5	2	2-8
	23-36	1-8	1.45-1.60	0.6-6.0	0.15-0.25	4.5-6.5	<2	Low--------	0.15			
	36-68	1-5	1.45-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
	68-80	13-31	1.55-1.70	0.06-2.0	0.10-0.20	4.5-7.8	<2	Low--------	0.20			
Urban land.												
29:*												
Immokalee-------	0-7	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
	7-42	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
	42-58	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low--------	0.15			
	58-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
Urban land.												
31--------------- Jupiter	0-5	2-8	1.35-1.50	6.0-20	0.12-0.18	6.1-8.4	<2	Low--------	0.10	2	2	1-3
	5-11	1-3	1.50-1.65	6.0-20	0.02-0.08	6.1-8.4	<2	Low--------	0.17			
	11	---	---	---	---	---	---	-----------	----			
32--------------- Jonathan	0-3	<0-3	1.30-1.55	6.0-20	0.05-0.08	4.5-5.5	<2	Low--------	0.10	5	2	1-2
	3-75	<0-3	1.40-1.70	6.0-20	0.01-0.05	5.1-6.0	<2	Low--------	0.24			
	75-80	1-8	1.55-1.75	<0.2	0.10-0.15	3.6-5.0	<2	Low--------	0.28			
33--------------- Astatula	0-4	1-3	1.25-1.50	>20	0.04-0.10	4.5-6.5	<2	Low--------	0.10	5	2	.5-2
	4-80	1-3	1.45-1.60	>20	0.02-0.05	4.5-6.5	<2	Low--------	0.10			
34--------------- Satellite	0-4	1-3	1.10-1.45	>20	0.02-0.10	4.5-7.8	<2	Low--------	0.10	5	2	.5-2
	4-80	.5-2	1.35-1.55	>20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
35--------------- McKee	0-1	50-65	0.15-0.50	<0.2	0.12-0.20	6.1-8.4	>16	High-------	0.17	3	2	10-25
	1-60	35-65	0.25-0.60	0.2-0.6	0.12-0.20	6.6-8.4	>16	High-------	0.17			
	60-80	3-10	1.25-1.50	>2.0	0.05-0.10	6.6-8.4	>16	Low--------	0.10			
36--------------- Boca	0-6	<2	1.30-1.55	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.10	5	2	1-3
	6-20	<2	1.50-1.60	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.17			
	20-30	14-30	1.55-1.65	0.6-2.0	0.10-0.15	5.1-8.4	<2	Low--------	0.20			
	30	---	---	---	---	---	---	-----------	----			
39--------------- Malabar	0-17	<4	1.20-1.55	6.0-20	0.03-0.08	5.1-8.4	<2	Low--------	0.10	5	2	1-2
	17-41	1-5	1.50-1.75	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.10			
	41-65	10-25	1.60-1.70	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	65-80	1-8	1.50-1.70	2.0-20	0.05-0.08	5.1-8.4	<2	Low--------	0.15			
40--------------- Gator	0-26	0-1	0.10-0.30	6.0-20	0.30-0.40	<4.-5.0	<2	Low--------	----	---	2	55-85
	26-80	13-20	1.60-1.70	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.32			
41--------------- Canova	0-12	---	0.20-0.40	6.0-20	0.10-0.20	4.5-6.5	<2	Low--------	0.10	5	2	35-75
	12-24	1-6	1.35-1.50	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.10			
	24-34	15-25	1.60-1.70	0.6-6.0	0.10-0.15	5.6-8.4	<2	Low--------	0.28			
	34-80	20-30	1.60-1.70	0.6-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.28			
42--------------- Terra Ceia	0-60	---	0.15-0.35	6.0-20	0.30-0.50	4.5-8.4	<2	Low--------	----	2	2	>60
	60-80	2-10	1.35-1.50	6.0-20	0.02-0.08	4.5-8.4	<2	Low--------	----			
44--------------- Perrine Variant	0-6	10-18	0.90-1.20	0.6-2.0	0.15-0.20	7.9-8.4	<2	Low--------	0.32	2	4L	2-5
	6-24	18-30	1.50-1.65	0.6-2.0	0.15-0.20	7.9-8.4	<2	Low--------	0.32			
	24	---	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
45---------------- Myakka	0-17	<2	1.36-1.44	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.10	5	2	1-2
	17-65	2-8	1.47-1.59	0.6-6.0	0.10-0.15	3.6-6.5	<2	Low--------	0.15			
	65-80	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.10			
46---------------- Orsino	0-29	<1	1.35-1.55	>20	0.02-0.08	3.6-6.0	<2	Low--------	0.10	5	2	<1
	29-80	<2	1.35-1.55	>20	0.02-0.08	3.6-6.0	<2	Low--------	0.10			
47---------------- Holopaw	0-45	1-7	1.35-1.60	6.0-20	0.07-0.10	5.1-7.3	<2	Low--------	0.10	5	2	1-4
	45-62	13-28	1.60-1.70	0.2-2.0	0.15-0.20	5.1-8.4	<2	Low--------	0.20			
	62-80	7-13	1.50-1.60	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.15			
48---------------- Electra	0-5	1-6	1.40-1.55	6.0-20	0.05-0.10	3.6-6.5	<2	Low--------	0.10	5	1	1-2
	5-30	1-6	1.45-1.70	6.0-20	0.02-0.07	3.6-6.5	<2	Low--------	0.10			
	30-47	1-6	1.50-1.70	0.6-2.0	0.10-0.15	3.6-5.5	<2	Low--------	0.15			
	47-80	18-38	1.60-1.75	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.32			
49---------------- Pompano	0-80	<5	1.30-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10	5	2	1-5
50.* Pits												
51---------------- Riviera	0-26	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
	26-29	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low--------	0.24			
	29-45	15-25	1.50-1.70	<0.2	0.12-0.15	6.1-8.4	<2	Low--------	0.24			
	45-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	Low--------	0.15			
52---------------- Oldsmar	0-35	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-7.3	<2	Low--------	0.10	5	2	1-2
	35-52	2-8	1.42-1.59	0.2-6.0	0.10-0.15	3.6-7.3	<2	Low--------	0.15			
	52-80	15-30	1.60-1.69	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.24			
53---------------- Manatee	0-8	2-8	1.00-1.20	2.0-6.0	0.15-0.25	5.6-7.8	<2	Low--------	0.10	5	2	15-30
	8-24	10-20	1.50-1.65	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low--------	0.24			
	24-42	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low--------	0.24			
	42-80	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low--------	0.24			
54---------------- Riomar	0-8	30-65	0.15-0.50	<0.06	0.17-0.19	6.1-8.4	>16	High-------	0.17	3	2	10-25
	8-15	35-65	0.25-0.60	<0.06	0.16-0.18	6.6-8.4	>16	High-------	0.17			
	15-25	35-65	0.50-0.80	0.06-0.2	0.16-0.18	6.6-8.4	>16	High-------	0.24			
	25	---	---	---	---	---	---	----------	----			
55---------------- Floridana	0-19	3-10	1.40-1.49	6.0-20	0.10-0.20	4.5-8.4	<2	Low--------	0.10	5	2	6-15
	19-35	1-7	1.52-1.53	6.0-20	0.05-0.10	4.5-8.4	<2	Low--------	0.10			
	35-50	15-30	1.60-1.69	<0.2	0.10-0.20	4.5-8.4	<2	Low--------	0.24			
	50-80	3-10	1.55-1.70	6.0-20	0.05-0.07	4.5-8.4	<2	Low--------	0.10			
56---------------- Pineda	0-32	1-8	1.30-1.60	6.0-20	0.02-0.05	4.5-7.3	<2	Low--------	0.10	5	2	.5-6
	32-52	10-25	1.50-1.70	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	52-80	3-12	1.45-1.60	2.0-6.0	0.02-0.05	5.6-8.4	<2	Low--------	0.10			
57---------------- Holopaw	0-47	1-7	1.35-1.60	6.0-20	0.03-0.10	5.1-7.3	<2	Low--------	0.10	5	2	1-4
	47-65	13-28	1.60-1.70	0.2-2.0	0.10-0.20	5.1-8.4	<2	Low--------	0.20			
	65-80	7-13	1.50-1.60	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.15			
58---------------- Samsula	0-26	---	0.25-0.50	6.0-20	0.20-0.25	4.5-5.5	<2	Low--------	----	2	2	>20
	26-80	1-14	1.35-1.55	6.0-20	0.02-0.05	3.6-5.5	<2	Low--------	0.17			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
59--------------- Lokosee	0-10	<4	1.20-1.55	6.0-20	0.02-0.08	4.5-7.3	<2	Low--------	0.10	5	2	1-3
	10-35	1-5	1.45-1.55	6.0-20	0.05-0.10	5.6-8.4	<2	Low--------	0.10			
	35-45	2-8	1.60-1.80	0.6-6.0	0.05-0.10	5.6-8.4	<2	Low--------	0.15			
	45-70	1-5	1.55-1.80	6.0-20	0.02-0.08	6.1-8.4	<2	Low--------	0.10			
	70-80	18-30	1.60-1.80	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.24			
60--------------- Pompano	0-80	<5	1.30-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10	5	2	1-5
61--------------- Delray	0-3	---	0.15-0.35	6.0-20	0.30-0.50	5.6-7.3	<2	Low--------	0.10	5	2	25-35
	3-21	3-13	1.35-1.45	6.0-20	0.10-0.15	5.6-7.3	<2	Low--------	0.10			
	21-45	1-7	1.50-1.65	6.0-20	0.05-0.08	6.1-7.3	<2	Low--------	0.10			
	45-80	13-30	1.45-1.60	0.6-6.0	0.10-0.15	6.6-7.8	<2	Low--------	0.24			
62--------------- Chobee	0-5	2-8	1.25-1.45	6.0-20	0.15-0.25	5.1-6.5	<2	Low--------	0.10	2	2	6-12
	5-50	10-30	1.40-1.45	<0.2	0.12-0.17	5.6-8.4	<2	Low--------	0.15			
	50-80	0-15	1.45-1.50	2.0-6.0	0.10-0.15	5.6-7.8	<2	Low--------	0.15			
63--------------- Kesson	0-6	---	0.15-0.35	6.0-20	0.30-0.50	7.4-9.0	>16	Low--------	0.10	5	2	25-35
	6-30	1-4	1.50-1.65	2.0-20	0.05-0.10	7.4-9.0	>16	Low--------	0.10			
	30-38	1-4	1.55-1.70	2.0-20	0.05-0.15	7.4-9.0	>16	Low--------	0.10			
	38-80	2-8	1.45-1.65	2.0-20	0.05-0.15	7.4-9.0	>16	Low--------	0.10			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
1----------------------- Canaveral	C	None------------	---	---	1.0-3.0	Apparent	Jun-Nov
2----------------------- Chobee	B/D	None------------	---	---	0-1.0	Apparent	Jun-Feb
3----------------------- EauGallie	B/D	None------------	---	---	0-1.0	Apparent	Jun-Oct
4----------------------- Immokalee	B/D	None------------	---	---	0-1.0	Apparent	Jun-Nov
5----------------------- Myakka	B/D	None------------	---	---	0-1.0	Apparent	Jun-Nov
6----------------------- Oldsmar	B/D	None------------	---	---	0-1.0	Apparent	Jun-Feb
7----------------------- Palm Beach	A	None------------	---	---	>6.0	---	---
8----------------------- Paola	A	None------------	---	---	>6.0	---	---
9----------------------- Pepper	D	None------------	---	---	0-1.0	Perched	Jun-Oct
10---------------------- Riviera	C/D	None------------	---	---	0-1.0	Apparent	Jun-Dec
11---------------------- St. Lucie	A	None------------	---	---	>6.0	---	---
12---------------------- Archbold	A	None------------	---	---	3.5-6.0	Apparent	Jun-Nov
13---------------------- Wabasso	B/D	None------------	---	---	0-1.0	Apparent	Jun-Oct
14---------------------- Winder	B/D	None------------	---	---	0-1.0	Apparent	Jun-Dec
15---------------------- Manatee	B/D	None------------	---	---	0-1.0	Apparent	Jun-Feb
16---------------------- Pineda	B/D	Rare------------	---	---	0-1.0	Apparent	Jun-Nov
17.* Quartzipsamments							
18---------------------- Captiva	B/D	None------------	---	---	0-0.5	Apparent	Jun-Oct

See footnotes at end of table.

TABLE 17.--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
20.* Beaches							
21------ Pomello	C	None------	---	---	2.0-3.5	Apparent	Jul-Nov
22.* Urban land							
23.* Arents							
24------ Floridana	B/D	None------	---	---	0-1.0	Apparent	Jun-Feb
25------ St. Augustine	C	Rare------	---	---	1.5-3.0	Apparent	Jul-Oct
26------ St. Augustine	B	Rare------	---	---	2.0-3.0	Apparent	Jun-Oct
27:*							
Boca------	B/D	None------	---	---	0-1.0	Apparent	Jun-Feb
Urban land.							
28:*							
EauGallie------	B/D	None------	---	---	0-1.0	Apparent	Jun-Oct
Urban land.							
29:*							
Immokalee------	B/D	None------	---	---	0-1.0	Apparent	Jun-Nov
Urban land.							
31------ Jupiter	B/D	None------	---	---	0-1.0	Apparent	Jun-Nov
32------ Jonathan	B	None------	---	---	3.0-5.0	Apparent	Jun-Oct
33------ Astatula	A	None------	---	---	>6.0	---	---
34------ Satellite	C	None------	---	---	1.0-3.5	Apparent	Jun-Nov
35**------ McKee	D	Frequent------	Very long------	Jan-Dec	+2-0	Apparent	Jan-Dec
36------ Boca	B/D	None------	---	---	0-1.0	Apparent	Jun-Feb
39------ Malabar	B/D	None------	---	---	0-1.0	Apparent	Jun-Nov
40**------ Gator	D	None------	---	---	+2-1.0	Apparent	Jun-Dec

See footnotes at end of table.

TABLE 17.--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
41**: Canova	B/D	None	---	---	+2.-0	Apparent	Jan-Dec
42**: Terra Ceia	B/D	None	---	---	+1-1.0	Apparent	Jan-Dec
44**: Perrine Variant	D	None	---	---	+1-1.0	Apparent	Jun-Nov
45**: Myakka	D	None	---	---	+2-1.0	Apparent	Jun-Feb
46: Orsino	A	None	---	---	3.5-5.0	Apparent	Jun-Dec
47: Holopaw	B/D	None	---	---	0-1.0	Apparent	Jun-Nov
48: Electra	C	None	---	---	2.0-3.5	Apparent	Jul-Oct
49: Pompano	B/D	None	---	---	0-1.0	Apparent	Jun-Nov
50.* Pits							
51**: Riviera	D	None	---	---	+2-1.0	Apparent	Jun-Dec
52**: Oldsmar	D	None	---	---	+2-1.0	Apparent	Jun-Feb
53**: Manatee	D	None	---	---	+2.-1.0	Apparent	Jun-Feb
54**: Riomar	D	Frequent	Very long	Jan-Dec	+2-0	Apparent	Jan-Dec
55**: Floridana	D	None	---	---	+2-1.0	Apparent	Jun-Feb
56**: Pineda	D	None	---	---	+2-1.0	Apparent	Jun-Dec
57**: Holopaw	D	None	---	---	+2-1.0	Apparent	Jun-Apr
58**: Samsula	B/D	None	---	---	+2-1.0	Apparent	Jan-Dec
59: Lokosee	B/D	None	---	---	0-1.0	Apparent	Jul-Nov
60**: Pompano	D	None	---	---	+2-1.0	Apparent	Jun-Feb
61**: Delray	D	None	---	---	+2-1.0	Apparent	Jun-Dec

See footnotes at end of table.

TABLE 17.--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
62**: Chobee	D	None	---	---	+2.-1.0	Apparent	Jun-Dec
63: Kesson	D	Frequent	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec

* See description of the map unit for composition and behavior characteristics of the map unit.

** In the "High water table--Depth" column, a plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

TABLE 18.--SOIL FEATURES

[The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Bedrock		Cemented pan		Subsidence		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
	In		In		In	In		
1----------------------- Canaveral	>60	---	---	---	---	---	Moderate--------	Low.
2----------------------- Chobee	>60	---	---	---	---	---	Moderate--------	Low.
3----------------------- EauGallie	>60	---	---	---	---	---	High------------	Moderate.
4----------------------- Immokalee	>60	---	---	---	---	---	High------------	High.
5----------------------- Myakka	>60	---	---	---	---	---	High------------	High.
6----------------------- Oldsmar	>60	---	---	---	---	---	Moderate--------	High.
7----------------------- Palm Beach	>60	---	---	---	---	---	Low-------------	Low.
8----------------------- Paola	>60	---	---	---	---	---	Low-------------	High.
9----------------------- Pepper	>60	---	15-30	Thin	---	---	High------------	Moderate.
10---------------------- Riviera	>60	---	---	---	---	---	High------------	High.
11---------------------- St. Lucie	>60	---	---	---	---	---	Low-------------	Moderate.
12---------------------- Archbold	>60	---	---	---	---	---	Low-------------	Moderate.
13---------------------- Wabasso	>60	---	---	---	---	---	Moderate--------	High.
14---------------------- Winder	>60	---	---	---	---	---	High------------	Low.
15---------------------- Manatee	>60	---	---	---	---	---	High------------	Low.
16---------------------- Pineda	>60	---	---	---	---	---	High------------	Low.
17.* Quartzipsamments								
18---------------------- Captiva	>60	---	---	---	---	---	Low-------------	Low.
20.* Beaches								

See footnote at end of table.

TABLE 18.--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Cemented pan		Subsidence		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
	In		In		In	In		
21----------------------- Pomello	>60	---	---	---	---	---	Low------------	High.
22.* Urban land								
23.* Arents								
24----------------------- Floridana	>60	---	---	---	---	---	Moderate-------	Low.
25----------------------- St. Augustine	>60	---	---	---	---	---	High-----------	High.
26----------------------- St. Augustine	>60	---	---	---	---	---	High-----------	Moderate.
27:* Boca-------------------	24-40	Soft	---	---	---	---	High-----------	Moderate.
Urban land.								
28:* EauGallie--------------	>60	---	---	---	---	---	High-----------	Moderate.
Urban land.								
29:* Immokalee--------------	>60	---	---	---	---	---	High-----------	High.
Urban land.								
31----------------------- Jupiter	8-20	Soft	---	---	---	---	High-----------	Low.
32----------------------- Jonathan	>60	---	50-75	Thin	---	---	Low------------	High.
33----------------------- Astatula	>60	---	---	---	---	---	Low------------	High.
34----------------------- Satellite	>60	---	---	---	---	---	Low------------	Moderate.
35----------------------- McKee	>60	---	---	---	12-48	12-48	High-----------	High.
36----------------------- Boca	24-40	Soft	---	---	---	---	High-----------	Moderate.
39----------------------- Malabar	>60	---	---	---	---	---	High-----------	Low.
40----------------------- Gator	>60	---	---	---	2-6	20-23	High-----------	High.
41----------------------- Canova	>60	---	---	---	3-6	8-12	High-----------	Low.

See footnote at end of table.

TABLE 18.--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Cemented pan		Subsidence		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
	In		In		In	In		
42----------------------- Terra Ceia	>60	---	---	---	16-20	50-60	Moderate--------	Moderate.
44----------------------- Perrine Variant	7-20	Soft	---	---	---	---	High------------	Low.
45----------------------- Myakka	>60	---	---	---	---	---	High------------	High.
46----------------------- Orsino	>60	---	---	---	---	---	Low-------------	Moderate.
47----------------------- Holopaw	>60	---	---	---	---	---	High------------	Moderate.
48----------------------- Electra	>60	---	---	---	---	---	Low-------------	High.
49----------------------- Pompano	>60	---	---	---	---	---	High------------	Moderate.
50.* Pits								
51----------------------- Riviera	>60	---	---	---	---	---	High------------	High.
52----------------------- Oldsmar	>60	---	---	---	---	---	Moderate--------	High.
53----------------------- Manatee	>60	---	---	---	---	---	High------------	Low.
54----------------------- Riomar	20-40	Hard	---	---	12-48	12-48	High------------	High.
55----------------------- Floridana	>60	---	---	---	---	---	Moderate--------	Low.
56----------------------- Pineda	>60	---	---	---	---	---	High------------	Low.
57----------------------- Holopaw	>60	---	---	---	---	---	High------------	Moderate.
58----------------------- Samsula	>60	---	---	---	16-20	30-36	High------------	High.
59----------------------- Lokosee	>60	---	---	---	---	---	High------------	Low.
60----------------------- Pompano	>60	---	---	---	---	---	High------------	Moderate.
61----------------------- Delray	>60	---	---	---	---	---	Moderate--------	Low.
62----------------------- Chobee	>60	---	---	---	---	---	High------------	High.

See footnote at end of table.

TABLE 18.--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Cemented pan		Subsidence		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
	In		In		In	In		
63----------------------- Kesson	>60	---	---	---	---	---	High-----------	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--PHYSICAL ANALYSIS OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2.0-1.0)	Sand: Coarse (1.0-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand: Total (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	In		Mm	Mm	Mm	Mm	Mm	Mm	Mm	Mm	Cm/hr	G/cc	Pct (wt)	Pct (wt)	Pct (wt)
Archbold:															
S82FL-061-006-1	0- 2	A	0.0	4.6	65.5	28.2	1.0	99.3	0.3	0.4	---	---	---	---	---
S82FL-061-006-2	2-18	C1	0.0	5.3	61.9	31.3	1.0	99.5	0.0	0.5	80.2	1.53	3.8	1.9	0.9
S82FL-061-006-3	18-38	C1	0.0	5.5	57.6	35.0	1.2	99.3	0.1	0.6	63.7	1.56	2.7	2.0	0.9
S82FL-061-006-4	38-51	C2	0.0	4.5	53.4	40.2	1.3	99.4	0.0	0.6	80.8	1.55	3.0	2.7	0.9
S82FL-061-006-5	51-80	C3	0.1	8.5	61.7	28.0	1.0	99.3	0.0	0.7	60.5	1.58	2.6	2.3	0.7
Astatula:															
S82FL-061-015-1	0- 4	A	0.0	7.3	70.2	21.1	0.8	99.4	0.0	0.6	105.4	1.38	2.6	1.7	0.4
S82FL-061-015-2	4- 5	A1C	0.0	5.4	68.4	24.1	0.9	98.8	0.1	1.1	---	---	---	---	---
S82FL-061-015-3	5-14	C1	0.0	5.4	69.0	23.4	0.8	98.6	0.3	1.1	143.5	1.47	2.3	1.6	0.3
S82FL-061-015-4	14-44	C2	0.0	6.9	66.5	24.4	0.9	98.7	0.3	1.0	---	---	---	---	---
S82FL-061-015-5	44-71	C2	0.1	8.7	64.0	25.1	0.6	98.5	0.2	1.3	---	---	---	---	---
S82FL-061-015-6	71-80	C3	0.1	7.6	59.9	28.5	0.9	97.0	2.2	0.8	---	---	---	---	---
Boca:															
S82FL-061-002-1	0- 7	Ap	0.2	1.6	5.8	70.4	14.7	92.7	3.8	3.5	22.6	1.09	20.3	14.8	6.5
S82FL-061-002-2	7-14	E	0.2	2.0	7.1	73.0	13.1	95.4	2.8	1.8	11.2	1.53	7.3	3.7	0.7
S82FL-061-002-3	14-20	Bw	0.7	3.1	7.9	68.5	13.1	93.3	2.7	4.0	8.5	1.41	11.3	7.1	1.8
S82FL-061-002-4	20-24	Bt	2.8	3.4	6.1	57.3	12.4	82.0	3.1	14.9	0.8	1.48	21.0	17.8	6.9
Canaveral:															
S82FL-061-008-1	0- 5	A	0.0	0.4	23.2	67.9	3.8	97.3	0.0	2.7	24.3	1.35	9.8	7.0	2.3
S82FL-061-008-2	5- 9	C1	0.0	0.5	20.6	73.0	4.6	98.3	0.0	1.7	27.6	1.52	5.2	4.3	1.2
S82FL-061-008-3	9-17	C2	0.0	0.3	18.4	73.8	4.9	97.4	0.4	2.2	35.5	1.42	5.3	4.0	0.6
S82FL-061-008-4	17-34	C3	0.0	0.7	18.5	74.8	4.0	98.0	0.6	1.4	50.6	1.39	5.6	4.4	1.3
S82FL-061-008-5	34-49	C3	0.0	1.3	18.0	73.0	5.4	98.4	0.0	1.6	48.0	1.46	4.6	3.8	1.0
S82FL-061-008-6	49-61	C4	0.0	0.8	17.1	73.3	5.1	96.4	2.1	1.5	20.7	1.42	9.0	6.7	2.0
S82FL-061-008-7	61-80	C5	0.2	4.1	24.7	52.2	9.4	90.6	8.0	1.4	30.9	1.38	8.3	6.1	1.2
Canova:															
S82FL-061-011-1	0- 6	Oap	---	---	---	---	---	---	---	---	11.0	0.40	139.3	115.7	37.2
S82FL-061-011-2	6-12	Oa	---	---	---	---	---	---	---	---	69.7	0.40	148.8	110.0	26.9
S82FL-061-011-3	12-13	A	0.2	13.8	66.2	18.2	0.5	98.9	0.0	1.1	---	---	---	---	---
S82FL-061-011-4	13-21	E1	0.2	14.6	62.0	20.0	1.7	98.5	0.4	1.1	68.4	1.54	3.5	2.6	0.3
S82FL-061-011-5	21-24	E2	0.2	13.1	61.4	20.7	1.6	97.0	1.4	1.6	31.6	1.62	3.9	2.7	0.2
S82FL-061-011-6	24-34	Btg1	0.1	9.0	42.1	14.4	1.2	66.8	5.2	28.0	0.1	1.62	20.4	18.6	9.5
S82FL-061-011-7	34-40	Btg2	0.2	10.1	44.4	14.1	1.1	69.9	4.7	25.4	10.0	1.71	17.9	15.4	8.1
S82FL-061-011-8	40-49	Cgk1	0.4	10.5	41.3	13.6	1.3	67.1	9.5	23.4	11.2	1.78	13.6	11.8	5.4
S82FL-061-011-9	49-56	Cgk2	0.9	7.4	35.7	17.6	2.1	63.7	13.8	22.5	0.0	1.84	14.5	12.5	6.0
S82FL-061-011-10	56-80	Cg	0.6	9.3	42.8	21.8	1.7	76.2	5.8	18.0	0.2	1.82	13.8	11.1	5.6

TABLE 19.--PHYSICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2.0-1.0)	Sand: Coarse (1.0-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand: Total (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	In		Mm	Mm	Mm	Mm	Mm	Mm	Mm	Mm	Cm/hr	G/cc	Pct (wt)	Pct (wt)	Pct (wt)
Electra:															
S82FL-061-007-1	0- 5	A	0.0	3.2	33.6	47.4	13.6	97.8	1.1	1.1	24.3	1.49	5.7	3.6	1.3
S82FL-061-007-2	5-17	E1	0.1	3.5	30.2	47.0	17.1	97.9	1.5	0.6	17.1	1.56	4.4	3.1	0.9
S82FL-061-007-3	17-30	E2	0.1	4.5	28.2	48.5	16.5	97.8	1.5	0.7	16.8	1.54	3.9	2.1	0.8
S82FL-061-007-4	30-33	Bh1	0.1	4.0	25.6	44.1	15.5	89.3	5.4	5.3	22.6	1.28	17.8	14.5	4.0
S82FL-061-007-5	33-36	Bh2	0.0	3.6	23.4	43.0	16.8	86.8	6.4	6.8	4.5	1.30	24.9	20.8	6.5
S82FL-061-007-6	36-47	EB	0.0	3.4	23.2	44.0	18.8	89.4	6.9	3.7	10.7	1.52	8.9	6.1	1.6
S82FL-061-007-7	47-59	Btg1	0.0	4.0	27.2	38.8	10.0	80.0	2.8	17.2	0.3	1.63	19.4	17.1	7.2
S82FL-061-007-8	59-72	Btg2	0.1	4.4	28.8	38.4	7.7	79.4	2.7	17.9	0.5	1.66	16.5	14.1	5.8
Floridana:															
S83FL-061-017-1	0- 5	Ap	0.3	10.5	47.5	29.5	4.3	92.1	2.1	5.8	---	---	---	---	---
S83FL-061-017-2	5-14	A	0.2	10.2	47.7	31.0	4.5	93.1	2.3	4.1	---	---	---	---	---
S83FL-061-017-3	14-20	E	0.3	14.4	51.4	28.0	3.9	98.0	1.4	0.6	---	---	---	---	---
S83FL-061-017-4	20-30	Btg1	0.2	8.2	35.8	22.7	3.4	70.3	5.5	24.2	---	---	---	---	---
S83FL-061-017-5	30-34	Btg2	0.2	7.6	35.0	23.1	3.7	69.6	6.9	23.5	---	---	---	---	---
S83FL-061-017-6	34-37	BCg	1.8	7.4	26.2	18.0	3.2	56.6	22.4	21.0	---	---	---	---	---
S83FL-061-017-7	37-53	Cgk1	1.0	7.6	27.6	20.0	3.8	60.0	21.0	19.0	---	---	---	---	---
S83FL-061-017-8	53-68	Cgk2	5.4	10.0	24.4	19.6	5.2	64.6	15.4	20.0	---	---	---	---	---
S83FL-061-017-9	68-80	Cgk3	0.6	5.6	26.6	31.4	7.6	71.8	7.2	21.0	---	---	---	---	---
Gator:															
S83FL-061-016-1	0- 6	Oap	---	---	---	---	---	---	---	---	---	---	---	---	---
S83FL-061-016-2	6-26	Oa	---	---	---	---	---	---	---	---	---	---	---	---	---
S83FL-061-016-3	26-30	Cg1	0.2	6.6	28.6	23.1	8.5	67.0	11.5	21.5	---	---	---	---	---
S83FL-061-016-4	30-44	Cg2	0.0	5.0	23.0	17.2	5.4	50.6	16.2	33.2	---	---	---	---	---
S83FL-061-016-5	44-49	Cg3	0.0	5.4	22.6	17.0	5.6	50.6	14.4	35.0	---	---	---	---	---
S83FL-061-016-6	49-54	Cg4	0.2	5.2	23.2	17.4	5.6	51.6	15.0	33.4	---	---	---	---	---
S83FL-061-016-7	54-62	Cg5	0.7	7.1	25.4	17.9	5.1	56.2	19.6	24.2	---	---	---	---	---
S83FL-061-016-8	62-80	Cg6	0.7	7.9	31.7	22.9	7.2	70.4	9.4	20.2	---	---	---	---	---
Immokalee:															
S82FL-061-003-1	0- 8	Ap	0.0	3.8	48.2	40.1	4.6	96.6	1.7	1.7	30.3	1.39	7.8	4.8	1.5
S82FL-061-003-2	8-13	E1	0.0	3.0	49.5	39.8	5.3	97.6	1.5	0.8	41.4	1.17	9.6	7.5	1.7
S82FL-061-003-3	13-33	E2	0.0	3.1	47.8	41.3	5.9	98.1	1.0	0.9	25.6	1.47	3.9	2.6	0.6
S82FL-061-003-4	33-36	Bh1	0.0	3.5	42.3	38.5	4.1	88.4	7.1	4.5	26.3	1.21	19.5	15.0	2.3
S82FL-061-003-5	36-41	Bh1	0.0	2.9	40.2	41.1	5.3	89.5	5.5	5.0	21.6	1.32	16.9	12.8	2.4
S82FL-061-003-6	41-47	Bh3	0.0	3.3	40.4	42.5	5.8	92.0	3.5	4.5	11.0	1.45	13.7	10.6	2.7
S82FL-061-003-7	47-64	BC	0.0	3.5	42.0	45.0	5.4	95.9	2.2	1.9	27.9	1.52	5.9	4.2	0.9
S82FL-061-003-8	64-72	Bhb	0.0	3.2	41.3	46.5	4.6	95.6	2.9	1.5	9.2	1.55	8.9	6.5	1.1
S82FL-061-003-9	72-80	C	0.0	3.1	40.6	44.0	4.3	92.0	2.5	5.5	8.0	1.62	6.8	4.2	0.9

TABLE 19.--PHYSICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2.0-1.0)	Sand: Coarse (1.0-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand: Total (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	In		Mm	Mm	Mm	Mm	Mm	Mm	Mm	Mm	Cm/hr	G/cc	Pct (wt)	Pct (wt)	Pct (wt)
Jonathan:															
S83FL-061-019-1	0- 3	A	0.1	15.1	65.1	17.4	1.3	99.0	0.8	0.2	---	---	---	---	---
S83FL-061-019-2	3-26	E	0.2	16.0	61.9	19.5	1.5	99.1	0.2	0.7	---	---	---	---	---
S83FL-061-019-3	26-51	E	0.3	17.4	57.3	22.3	1.9	99.2	0.4	0.4	---	---	---	---	---
S83FL-061-019-4	51-75	E	0.8	18.6	56.3	22.1	1.2	99.0	0.1	0.9	---	---	---	---	---
S83FL-061-019-5	75-80	Bhm	0.1	12.7	56.7	23.5	0.4	93.4	3.3	3.3	---	---	---	---	---
Jupiter:															
S82FL-061-009-1	0- 5	A1	0.0	1.2	28.4	52.6	12.8	95.0	4.9	0.1	---	---	---	---	---
S82FL-061-009-2	5-12	A2	0.0	1.6	28.3	52.2	12.4	94.5	2.4	3.1	---	---	---	---	---
Manatee:															
S82FL-061-005-1	0- 3	Ap	0.1	4.2	42.3	32.0	6.6	85.2	5.0	9.8	12.2	1.21	24.0	18.5	7.9
S82FL-061-005-2	3- 8	A	0.0	3.9	42.7	31.2	6.1	83.9	8.5	7.6	6.0	1.44	17.5	13.4	5.2
S82FL-061-005-3	8-16	BA	0.0	3.1	39.3	32.5	7.2	82.1	7.5	10.4	1.9	1.46	16.4	14.1	5.7
S82FL-061-005-4	16-30	Bt	0.0	3.4	37.5	30.1	6.9	77.9	10.4	11.7	0.0	1.61	16.5	14.2	5.1
S82FL-061-005-5	30-42	Btg1	0.0	3.6	38.9	31.1	6.9	80.5	4.3	15.2	0.0	1.60	18.1	15.7	5.7
S82FL-061-005-6	42-54	Btg2	0.0	4.2	42.8	29.4	5.0	81.4	5.6	13.0	0.1	1.57	16.2	13.6	5.4
S82FL-061-005-7	54-74	Cg	2.8	11.2	46.4	25.2	2.8	88.4	4.6	7.0	---	---	---	---	---
Orsino:															
S83FL-061-020-1	0- 2	A	0.0	0.3	8.5	72.4	16.1	97.3	2.3	0.4	---	---	---	---	---
S83FL-061-020-2	2-23	E	0.0	0.3	8.0	73.7	15.4	97.4	1.3	1.3	---	---	---	---	---
S83FL-061-020-3	23-26	Bw1&Bh	0.0	0.3	7.3	71.8	15.1	94.5	1.8	3.7	---	---	---	---	---
S83FL-061-020-4	26-43	Bw2&Bh	0.0	0.3	7.4	72.7	15.1	95.5	1.8	2.7	---	---	---	---	---
S83FL-061-020-5	43-62	BC	0.0	0.3	6.6	74.4	15.2	96.5	1.0	2.5	---	---	---	---	---
S83FL-061-020-6	62-80	C	0.0	0.2	5.5	71.4	15.3	92.4	3.6	4.0	---	---	---	---	---
Palm Beach:															
S83FL-061-020-1	0- 6	A	0.5	10.2	64.9	21.3	0.5	97.4	0.9	1.7	---	---	---	---	---
S83FL-061-020-2	6-18	C1	0.2	10.8	63.6	22.8	0.5	97.9	0.7	1.4	---	---	---	---	---
S83FL-061-020-3	18-49	C2	0.1	3.1	61.3	33.8	0.4	98.7	0.3	1.0	---	---	---	---	---
S83FL-061-020-4	49-80	C2	0.1	3.6	65.8	29.1	0.3	98.9	0.2	0.9	---	---	---	---	---
Paola:															
S82FL-061-013-1	0- 2	A	0.1	9.2	73.6	16.3	0.3	99.5	0.0	0.5	67.1	1.39	7.9	5.3	2.1
S82FL-061-013-2	2- 9	E	0.0	8.2	69.8	19.8	0.6	98.4	0.6	1.0	94.7	1.42	4.2	2.8	1.0
S82FL-061-013-3	9-12	B/E	0.0	8.2	69.7	20.2	0.7	98.8	0.2	1.0	101.3	1.62	2.4	1.5	0.3
S82FL-061-013-4	12-36	Bw	0.0	8.3	68.2	20.6	0.6	97.7	0.5	1.8	146.0	1.56	2.5	1.5	0.5
S82FL-061-013-5	36-58	Bw	0.0	7.8	61.2	27.2	1.0	97.2	0.4	2.4	130.1	1.48	1.9	1.2	0.4
S82FL-061-013-6	58-80	Bw	0.1	9.3	60.1	27.0	1.1	97.6	0.5	1.9	128.5	1.52	2.0	1.1	0.3

TABLE 19.--PHYSICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2.0-1.0)	Sand: Coarse (1.0-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand: Total (2.0-0.05)	Silt: Silt (0.05-0.002)	Clay: Clay (<0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	In		Mm	Mm	Mm	Mm	Mm	Mm	Mm	Mm	Cm/hr	G/cc	-----Pct (wt)	-----	-----
Pepper:															
S82FL-061-010-1	0- 2	A1	0.1	19.4	66.5	12.8	0.6	99.4	0.1	0.5	128.0	1.31	5.2	4.1	1.5
S82FL-061-010-2	2- 8	A2	0.2	13.5	69.0	15.1	0.9	98.7	0.5	0.8	105.0	1.50	3.6	2.8	0.9
S82FL-061-010-3	8-22	E	0.3	13.5	64.3	19.1	1.8	99.0	0.1	0.9	93.3	1.59	3.8	3.3	0.6
S82FL-061-010-4	22-27	Bh	0.5	13.7	59.1	18.4	1.6	93.3	2.9	3.8	2.0	0.94	46.2	38.0	9.1
S82FL-061-010-5	27-32	Bhm	0.3	13.1	60.0	20.0	1.7	95.1	1.2	3.7	2.5	1.44	17.0	14.1	3.4
S82FL-061-010-6	32-39	B'h	0.4	11.3	58.5	20.3	1.9	92.4	1.8	5.8	---	---	---	---	---
S82FL-061-010-7	39-47	BE	0.5	14.2	60.2	18.1	1.8	94.8	1.9	3.3	---	---	---	---	---
S82FL-061-010-8	47-60	Btg	0.5	13.3	53.8	13.9	1.1	82.6	2.1	15.3	---	---	---	---	---
Perrine Variant:															
S82FL-061-001-1	0- 6	Ap	1.1	6.5	19.6	35.6	8.9	71.7	13.2	15.1	6.8	0.89	38.2	31.0	13.0
S82FL-061-001-2	6-20	Ckg1	2.1	5.9	10.9	21.7	7.7	48.3	26.6	25.1	4.3	1.26	26.1	22.8	15.5
S82FL-061-001-3	20-24	Ckg2	6.2	8.6	11.1	19.9	8.4	54.2	21.0	24.9	2.6	1.36	24.0	21.2	10.4
St. Lucie:															
S82FL-061-014-1	0- 3	A	0.0	8.3	67.8	22.7	1.0	99.8	0.0	0.2	69.0	1.55	3.4	2.6	1.5
S82FL-061-014-2	3-30	C	0.0	8.9	66.6	22.9	1.1	99.5	0.1	0.4	101.0	1.63	2.2	1.9	0.8
S82FL-061-014-3	30-56	C	0.1	16.1	63.8	18.2	1.0	99.2	0.1	0.7	124.5	1.52	2.3	1.9	0.6
S82FL-061-014-4	56-80	C	0.3	23.3	60.5	14.7	0.7	99.5	0.0	0.5	125.3	1.58	1.6	1.2	0.3

TABLE 20.--CHEMICAL ANALYSES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	$CaCl_2$ 0.1M (1:2)	KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
	In		----Milliequivalents/100 grams of soil---							Pct	Pct	Mmho/cm				Pct	Pct	Pct	Pct	Pct
Archbold:																				
S82FL-061-006-1	0- 2	A	---	0.06	0.01	0.01	0.08	---	---	---	0.37	0.02	---	---	---	---	---	---	---	---
S82FL-061-006-2	2-18	C1	---	0.01	0.01	0.00	0.02	0.35	0.48	27	0.12	0.01	---	---	---	---	---	---	---	---
S82FL-061-006-3	18-38	C1	0.04	0.01	0.01	0.00	0.06	0.32	0.38	16	0.07	0.01	6.5	5.8	5.6	---	---	---	---	---
S82FL-061-006-4	38-51	C2	0.04	0.01	0.01	0.00	0.06	0.22	0.28	21	0.09	0.01	6.1	5.4	4.8	---	---	---	---	---
S82FL-061-006-5	51-80	C3	0.05	0.01	0.01	0.00	0.07	0.75	0.82	9	0.08	0.01	5.8	4.8	4.3	---	---	---	---	---
Astatula:																				
S82FL-061-015-1	0- 4	A	0.19	0.06	0.02	0.01	0.28	---	---	---	0.45	0.02	5.4	4.4	4.0	---	---	---	---	---
S82FL-061-015-2	4- 5	A/C	0.06	0.02	0.02	0.01	0.11	---	---	---	0.36	0.02	5.2	4.4	4.1	---	---	---	---	---
S82FL-061-015-3	5-14	C1	0.03	0.02	0.01	0.01	0.07	---	---	---	0.27	0.01	5.8	5.0	4.7	---	---	---	0.02	0.24
S82FL-061-015-4	14-44	C2	0.01	0.01	0.01	0.00	0.03	---	---	---	0.12	0.01	5.5	5.2	5.0	---	---	---	0.04	0.27
S82FL-061-015-5	44-71	C2	0.02	0.01	0.01	0.00	0.04	---	---	---	0.09	0.02	5.1	5.0	4.9	---	---	---	0.05	0.34
S82FL-061-015-6	71-80	C3	0.03	0.02	0.01	0.01	0.07	---	---	---	0.14	0.02	5.1	5.0	5.0	---	---	---	0.11	0.38
Boca:																				
S82FL-061-002-1	0- 7	Ap	9.07	1.97	0.06	0.23	11.33	3.33	14.66	77	2.31	0.15	7.9	6.9	8.1	---	---	---	---	---
S82FL-061-002-2	7-14	E	1.50	0.37	0.03	0.05	1.95	0.76	2.71	72	0.56	0.07	7.9	7.0	8.3	---	---	---	---	---
S82FL-061-002-3	14-20	Bw	2.90	1.07	0.12	0.24	4.33	1.79	6.12	71	0.68	0.07	7.8	6.9	8.2	---	---	---	---	---
S82FL-061-002-4	20-24	Bt	8.62	3.91	0.64	0.59	13.76	2.73	16.49	83	0.68	0.12	8.0	7.1	7.9	---	---	---	0.12	1.22
Canaveral:																				
S82FL-061-008-1	0- 5	A	6.90	0.82	0.12	0.10	7.94	4.05	11.88	66	1.69	0.09	---	---	---	---	---	---	---	---
S82FL-061-008-2	5- 9	C1	1.02	0.17	0.04	0.03	1.26	1.55	2.81	45	0.30	0.03	---	---	---	---	---	---	---	---
S82FL-061-008-3	9-17	C2	5.82	0.21	0.14	0.05	6.22	1.98	8.20	76	0.42	0.09	---	---	---	---	---	---	---	---
S82FL-061-008-4	17-34	C3	11.05	0.14	0.09	0.01	11.29	0.00	11.29	100	0.18	0.08	7.2	5.8	6.5	---	---	---	---	---
S82FL-061-008-5	34-49	C3	12.07	0.14	0.10	0.01	12.32	0.00	12.32	100	0.15	0.10	7.4	6.3	7.4	---	---	---	---	---
S82FL-061-008-6	49-61	C4	18.00	0.47	0.27	0.01	18.75	0.00	18.75	100	0.10	0.14	7.6	6.5	8.2	---	---	---	---	---
S82FL-061-008-7	61-80	C5	15.94	0.58	1.27	0.01	17.80	0.00	17.80	100	0.04	0.65	7.6	6.5	8.5	---	---	---	---	---
Canova:																				
S82FL-061-011-1	0- 6	Oap	28.75	5.76	0.59	1.38	36.48	97.20	133.68	27	50.03	0.08	4.4	4.1	3.9	---	---	---	---	---
S82FL-061-011-2	6-12	Oa	23.50	1.48	0.63	0.41	26.02	73.93	99.95	26	31.49	0.08	4.6	4.2	4.1	---	---	---	---	---
S82FL-061-011-3	12-13	A	4.95	0.22	0.12	0.05	5.34	7.10	12.44	43	3.08	0.07	5.1	4.5	4.5	---	---	---	---	---
S82FL-061-011-4	13-21	E1	0.64	0.03	0.03	0.01	0.71	0.00	0.71	100	0.34	0.06	6.2	5.6	5.6	---	---	---	---	---
S82FL-061-011-5	21-24	E2	0.90	0.06	0.04	0.01	1.01	0.00	1.01	100	0.18	0.06	6.5	6.1	6.0	---	---	---	---	---
S82FL-061-011-6	24-34	Btg1	13.52	1.56	0.29	0.13	0.42	4.75	5.17	---	0.54	0.07	5.8	5.4	4.9	---	---	---	0.04	0.16
S82FL-061-011-7	34-40	Btg2	25.50	1.44	0.25	0.07	27.26	3.23	30.49	89	0.21	0.09	7.7	7.2	7.1	---	---	---	0.04	0.23
S82FL-061-011-8	40-49	Cgk1	28.00	1.32	0.25	0.11	29.68	2.46	32.14	92	0.22	0.10	7.8	7.4	7.4	---	---	---	---	---
S82FL-061-011-9	49-56	Cgk2	30.00	1.15	0.18	0.11	31.44	2.29	33.73	93	0.18	0.08	8.1	7.7	7.6	---	---	---	---	---
S82FL-061-011-10	56-80	Cg	22.75	1.07	0.13	0.06	24.01	1.26	25.27	95	0.12	0.08	8.3	7.6	7.6	---	---	---	---	---

See footnote at end of table.

TABLE 20.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	$CaCl_2$ 0.1M (1:2)	KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
	In		----Milliequivalents/100 grams of soil---							Pct	Pct	Mmho/cm				Pct	Pct	Pct	Pct	Pct
Electra:																				
S82FL-061-007-1	0- 5	A	0.26	0.11	0.03	0.01	0.41	3.40	3.81	11	0.57	0.02	4.6	3.7	3.4	---	---	---	---	---
S82FL-061-007-2	5-17	E1	0.04	0.02	0.01	0.00	0.07	0.86	0.93	8	0.07	0.01	4.6	4.1	4.0	---	---	---	---	---
S82FL-061-007-3	17-30	E2	0.04	0.01	0.01	0.00	0.06	0.74	0.80	8	0.05	0.01	4.7	4.4	4.4	---	---	---	---	---
S82FL-061-007-4	30-33	Bh1	0.31	0.16	0.07	0.02	0.56	11.36	11.92	5	1.63	0.03	4.1	3.8	3.8	0.67	0.01	0.13	0.08	0.02
S82FL-061-007-5	33-36	Bh2	0.23	0.10	0.16	0.02	0.51	29.04	29.55	2	2.43	0.06	4.2	4.0	4.0	1.68	0.12	0.55	0.64	0.19
S82FL-061-007-6	36-47	EB	0.06	0.02	0.03	0.00	0.11	7.54	7.65	1	0.49	0.02	4.2	4.2	4.3	---	---	---	---	---
S82FL-061-007-7	47-59	Btg1	0.42	0.82	0.14	0.05	1.43	9.09	10.52	14	0.15	0.03	4.1	3.8	4.0	---	---	---	0.13	0.81
S82FL-061-007-8	59-72	Btg2	0.54	1.19	0.15	0.07	1.95	9.48	11.43	7	0.12	0.03	---	3.9	3.9	---	---	---	0.09	0.30
Floridana:																				
S83FL-061-017-1	0- 5	Ap	14.75	1.28	0.05	0.36	16.44	3.17	19.61	84	2.16	0.02	7.1	6.9	7.1	---	---	---	---	---
S83FL-061-017-2	5-14	A	10.00	0.99	0.04	0.22	11.25	3.98	15.23	74	1.72	0.05	6.6	6.5	6.8	---	---	---	---	---
S83FL-061-017-3	14-20	E	0.37	0.07	0.00	0.02	0.46	0.52	0.98	47	0.15	0.01	6.5	6.2	6.6	---	---	---	---	---
S83FL-061-017-4	20-30	Btg1	19.75	1.89	0.32	0.18	22.14	5.69	27.83	80	0.23	0.09	6.2	6.1	5.9	---	---	---	0.04	0.11
S83FL-061-017-5	30-34	Btg2	28.00	1.44	0.31	0.11	29.86	4.50	34.36	87	0.16	0.11	7.5	7.4	7.5	---	---	---	0.04	0.09
S83FL-061-017-6	34-37	BCg	45.00	0.99	0.26	0.09	46.34	3.61	49.95	93	0.12	0.11	7.8	7.7	7.8	---	---	---	---	---
S83FL-061-017-7	37-53	Cgk1	44.00	0.90	0.24	0.09	45.23	3.28	48.51	93	0.08	0.11	7.9	7.8	7.9	---	---	---	---	---
S83FL-061-017-8	53-68	Cgk2	36.00	1.07	0.21	0.07	37.35	3.49	40.84	91	0.02	0.09	7.9	7.8	7.9	---	---	---	---	---
S83FL-061-017-9	68-80	Cgk3	36.00	2.02	0.19	0.14	38.35	5.41	43.76	88	0.03	0.05	7.7	7.6	7.6	---	---	---	---	---
Gator:																				
S83FL-061-016-1	0- 6	Oap	77.25	8.44	0.60	0.54	86.83	40.06	126.88	68	45.38	0.02	5.8	5.3	5.2	---	---	---	---	---
S83FL-061-016-2	6-26	Oa	70.50	7.82	1.16	0.27	79.75	75.63	155.38	51	50.78	0.05	4.7	4.4	4.3	---	---	---	---	---
S83FL-061-016-3	26-30	Cg1	20.00	0.82	0.35	0.14	21.31	12.86	34.17	62	2.11	0.16	---	---	---	---	---	---	---	---
S83FL-061-016-4	30-44	Cg2	27.00	2.06	0.53	0.30	29.89	11.91	41.80	72	0.41	0.11	---	---	---	---	---	---	---	---
S83FL-061-016-5	44-49	Cg3	35.75	2.06	0.52	0.34	38.67	9.27	47.94	81	0.33	0.09	7.0	7.1	6.9	---	---	---	---	---
S83FL-061-016-6	49-54	Cg4	34.25	2.06	0.51	0.32	37.14	7.76	44.90	83	0.27	0.06	7.6	7.4	7.4	---	---	---	---	---
S83FL-061-016-7	54-62	Cg5	42.50	1.23	0.39	0.22	44.34	4.60	48.94	91	0.19	0.04	7.9	7.7	7.7	---	---	---	---	---
S83FL-061-016-8	62-80	Cg6	33.75	1.03	0.47	0.18	35.43	3.81	39.24	90	0.12	0.06	8.1	7.5	7.8	---	---	---	---	---
Immokalee:																				
S82FL-061-003-1	0- 8	Ap	1.01	0.34	0.04	0.12	1.51	6.73	8.24	18	1.40	0.03	6.0	5.0	5.3	---	---	---	---	---
S82FL-061-003-2	8-13	E1	0.16	0.10	0.02	0.03	0.39	2.18	2.49	12	0.43	0.03	5.8	4.1	4.7	---	---	---	---	---
S82FL-061-003-3	13-33	E2	0.14	0.03	0.01	0.01	0.19	0.99	1.18	16	0.22	0.02	5.8	4.3	5.1	---	---	---	---	---
S82FL-061-003-4	33-36	Bh1	0.41	0.22	0.10	0.11	0.84	20.70	21.54	4	4.89	0.07	4.3	3.1	3.4	1.50	0.00	0.15	0.09	0.02
S82FL-061-003-5	36-41	Bh2	0.21	0.13	0.04	0.08	0.46	22.00	22.46	2	2.90	0.07	4.1	2.2	3.4	2.43	0.00	0.22	0.13	0.01
S82FL-061-003-6	41-47	Bh3	0.17	0.11	0.06	0.04	0.38	21.67	22.05	2	1.58	0.04	4.3	3.3	3.5	1.60	0.01	0.20	0.17	0.02
S82FL-061-003-7	47-64	BC	0.05	0.02	0.03	0.02	0.12	9.51	9.67	1	1.07	0.03	4.5	3.9	4.1	---	---	---	---	---
S82FL-061-003-8	64-72	Bhb	0.04	0.01	0.02	0.01	0.08	6.59	6.67	1	0.59	0.03	4.5	4.2	4.5	0.11	0.01	0.12	0.10	0.01
S82FL-061-003-9	72-80	C	0.06	0.05	0.03	0.03	0.17	5.50	5.67	3	0.32	0.06	4.3	4.0	4.4	---	---	---	---	---

See footnote at end of table.

TABLE 20.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum	Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	pH: $CaCl_2$ 0.1M (1:2)	pH: KCl 1N (1:1)	Pyrophosphate extractable: C	Pyrophosphate extractable: Fe	Pyrophosphate extractable: Al	Citrate dithionite extractable: Al	Citrate dithionite extractable: Fe
	In		----Milliequivalents/100 grams of soil---							Pct	Pct	Mmho/cm				Pct	Pct	Pct	Pct	Pct
Jonathan:																				
S83FL-061-019-1	0- 3	A	0.33	0.05	0.00	0.00	0.38	2.03	2.41	16	0.34	0.00	5.1	4.4	4.5	---	---	---	---	---
S83FL-061-019-2	3-26	E	0.05	0.01	0.00	0.00	0.06	0.45	0.51	12	0.01	0.00	5.7	5.3	5.6	---	---	---	---	---
S83FL-061-019-3	26-51	E	0.04	0.01	0.00	0.00	0.05	0.57	0.62	8	0.02	0.00	5.7	5.3	5.2	---	---	---	---	---
S83FL-061-019-4	51-75	E	0.01	0.00	0.00	0.00	0.01	0.60	0.61	2	0.02	0.00	5.5	5.3	5.1	---	---	---	---	---
S83FL-061-019-5	75-80	Bhm	0.14	0.03	0.03	0.00	0.20	17.36	17.56	1	1.64	0.00	4.7	4.4	4.3	1.44	0.06	0.19	0.03	0.00
Jupiter:																				
S82FL-061-009-1	0- 5	A1	8.37	1.36	0.05	0.24	10.02	8.25	18.27	55	3.53	0.06	---	4.5	4.4	---	---	---	---	---
S82FL-061-009-2	5-12	A2	7.12	1.07	0.05	0.08	8.32	3.20	11.52	72	1.84	0.06	6.2	5.4	5.5	---	---	---	---	---
Manatee:																				
S82FL-061-005-1	0- 3	Ap	13.00	2.06	0.08	0.29	15.43	6.89	22.32	69	2.84	0.07	6.5	6.1	6.1	---	---	---	---	---
S82FL-061-005-2	3- 8	A	9.35	1.36	0.10	0.17	10.98	11.19	22.17	50	2.40	0.05	5.7	5.5	5.2	---	---	---	---	---
S82FL-061-005-3	8-16	BA	7.62	1.77	0.13	0.04	9.56	7.96	17.52	55	1.29	0.03	5.4	4.7	4.7	---	---	---	0.03	0.03
S82FL-061-005-4	16-30	Bt	8.85	3.50	0.24	0.03	12.62	6.12	18.74	67	1.06	0.04	5.5	5.0	5.1	---	---	---	0.02	0.04
S82FL-061-005-5	30-42	Btg1	9.15	3.95	0.52	0.07	13.69	4.38	18.07	76	0.42	0.09	6.2	5.7	5.7	---	---	---	0.02	0.11
S82FL-061-005-6	42-54	Btg2	18.50	3.09	0.39	0.09	22.07	3.34	25.41	87	0.13	0.13	6.8	6.2	6.5	---	---	---	---	---
S82FL-061-005-7	54-74	Cg	17.75	1.32	0.23	0.05	19.35	1.42	20.77	93	0.19	0.12	7.5	6.5	6.9	---	---	---	---	---
Orsino:																				
S83FL-061-018-1	0- 2	A	0.15	0.14	0.08	0.04	0.41	4.87	5.28	8	0.86	0.01	4.2	3.6	3.4	---	---	---	---	---
S83FL-061-018-2	2-23	E	0.03	0.02	0.01	0.00	0.06	1.83	1.89	3	0.15	0.00	4.9	4.0	3.9	---	---	---	---	---
S83FL-061-018-3	23-26	Bw1&Bh	0.11	0.09	0.06	0.01	0.27	5.55	5.82	5	0.35	0.00	4.8	4.3	4.4	0.49	0.09	0.06	0.03	0.02
S83FL-061-018-4	26-43	Bw2&Bh	0.06	0.06	0.05	0.01	0.18	4.33	4.51	4	0.21	0.01	4.8	4.5	4.6	0.91	0.07	0.06	0.04	0.01
S83FL-061-018-5	43-62	BC	0.03	0.02	0.00	0.00	0.05	1.95	2.00	3	0.08	0.00	4.8	4.6	4.8	---	---	---	---	---
S83FL-061-018-6	62-80	C	0.09	0.04	0.03	0.01	0.17	4.14	4.31	4	0.10	0.00	4.7	4.5	4.7	---	---	---	---	---
Palm Beach:*																				
S83FL-061-020-1	0- 6	A	21.25	1.44	0.26	0.05	23.00	1.40	24.40	94	1.36	0.02	7.4	7.2	7.5	---	---	---	---	---
S83FL-061-020-2	6-18	C1	15.50	0.27	0.17	0.01	15.95	0.18	16.13	99	0.31	0.01	8.3	7.6	8.5	---	---	---	---	---
S83FL-061-020-3	18-49	C2	12.50	0.22	0.13	0.01	12.86	0.00	12.86	100	0.09	0.07	8.7	7.8	9.0	---	---	---	---	---
S83FL-061-020-4	49-80	C2	11.75	0.18	0.14	0.01	12.08	0.00	12.08	100	0.08	0.08	8.8	7.8	9.1	---	---	---	---	---
Paola:																				
S82FL-061-013-1	0- 2	A	1.32	0.34	0.04	0.02	1.72	1.11	2.83	61	0.96	0.05	6.2	5.6	5.8	---	---	---	---	---
S82FL-061-013-2	2- 9	E	0.36	0.13	0.03	0.01	0.53	0.25	0.78	68	0.50	0.05	5.7	4.5	4.3	---	---	---	---	---
S82FL-061-013-3	9-12	B/E	0.13	0.04	0.03	0.01	0.21	---	---	---	0.28	0.05	5.1	4.3	4.0	---	---	---	---	---
S82FL-061-013-4	12-36	Bw	0.04	0.03	0.04	0.01	0.12	0.34	0.46	26	0.17	0.05	5.0	4.4	4.1	---	---	---	---	---
S82FL-061-013-5	36-58	Bw	0.03	0.02	0.03	0.01	0.09	0.03	0.12	75	0.10	0.05	4.8	4.4	4.3	---	---	---	---	---
S82FL-061-013-6	58-80	Bw	0.06	0.04	0.03	0.01	0.14	0.01	0.15	7	0.06	0.05	4.7	4.4	4.3	---	---	---	---	---

See footnote at end of table.

TABLE 20.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH H_2O (1:1)	pH $CaCl_2$ 0.1M (1:2)	pH KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
	In		----Milliequivalents/100 grams of soil---							Pct	Pct	Mmho/cm				Pct	Pct	Pct	Pct	Pct
Pepper:																				
S82FL-061-010-1	0- 2	A1	0.55	0.20	0.02	0.02	0.79	2.77	3.56	22	1.20	0.03	4.7	3.7	3.3	---	---	---	---	---
S82FL-061-010-2	2- 8	A2	0.18	0.06	0.02	0.01	0.27	0.66	0.93	29	0.52	0.02	4.9	3.7	3.5	---	---	---	---	---
S82FL-061-010-3	8-22	E	0.06	0.02	0.01	0.00	0.09	0.12	0.21	43	0.18	0.03	4.9	4.1	3.8	---	---	---	---	---
S82FL-061-010-4	22-27	Bh	0.39	2.10	0.32	0.01	2.82	41.96	44.78	6	7.28	0.07	4.0	3.3	3.1	4.53	0.12	0.19	0.16	0.15
S82FL-061-010-5	27-32	Bhm	0.24	1.19	0.24	0.00	1.67	31.59	33.26	5	4.94	0.07	4.0	3.5	3.4	2.96	0.04	0.21	0.16	0.13
S82FL-061-010-6	32-39	B'h	0.08	0.16	0.05	0.00	0.29	8.51	8.80	3	0.91	0.05	4.8	4.2	4.1	0.65	0.04	0.24	0.13	0.15
S82FL-061-010-7	39-47	BE	0.09	0.13	0.03	0.00	0.25	1.96	2.21	11	0.42	0.04	5.0	4.4	4.2	---	---	---	---	---
S82FL-061-010-8	47-60	Btg	0.47	2.02	0.16	0.05	2.70	3.80	6.50	42	0.25	0.04	5.1	4.1	3.9	---	---	---	---	---
Perrine Variant:																				
S82FL-061-001-1	0- 6	Ap	33.50	5.76	0.30	1.37	40.93	4.31	45.24	90	5.68	0.32	7.2	6.5	6.4	---	---	---	---	---
S82FL-061-001-2	6-20	Ckg1	25.75	2.43	1.41	0.19	29.78	1.38	31.16	96	2.32	0.55	8.0	7.1	7.6	---	---	---	---	---
S82FL-061-001-3	20-24	Ckg2	27.00	1.36	1.61	0.12	30.09	1.50	31.59	95	1.00	0.55	8.3	7.3	8.1	---	---	---	---	---
St. Lucie:																				
S82FL-061-014-1	0- 3	A	0.41	0.13	0.02	0.02	0.58	---	---	---	0.89	0.05	4.9	3.8	3.5	---	---	---	---	---
S82FL-061-014-2	3-30	C	0.02	0.02	0.01	0.01	0.06	---	---	---	0.08	0.01	5.8	4.6	4.4	---	---	---	---	---
S82FL-061-014-3	30-56	C	0.02	0.01	0.00	0.00	0.03	---	---	---	0.03	0.01	5.9	5.0	4.6	---	---	---	---	---
S82FL-061-014-4	56-80	C	0.02	0.02	0.01	0.00	0.05	---	---	---	0.06	0.01	6.1	5.4	4.9	---	---	---	---	---

* Palm Beach data reflects effects of saltspray becaue of proxmity to ocean.

TABLE 21.--CLAY MINERALOGY OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Clay minerals			
			Montmorillonite	14 angstrom intergrade	Kaolinite	Quartz
	In		Pct	Pct	Pct	Pct
Archbold:						
S82FL-061-006-1	0- 2	A	68	---	13	19
S82FL-061-006-3	18-38	C1	---	---	10	90
S82FL-061-006-5	51-80	C3	---	---	---	100
Astatula:						
S82FL-061-015-1 1/	0- 4	A	48	22	7	23
S82FL-061-015-4 1/	14-44	C2	18	33	6	43
S82FL-061-015-6 1/	71-80	C3	42	21	7	30
Boca:						
S82FL-061-002-1	0- 7	Ap	40	17	8	35
S82FL-061-002-3	14-20	Bw	36	32	13	19
S82FL-061-002-4	20-24	Bt	50	25	14	11
Canaveral:						
S82FL-061-008-1	0- 5	A	75	---	10	15
S82FL-061-008-4	17-34	C3	82	---	7	11
S82FL-061-008-7	61-80	C5	87	---	6	7
Canova:						
S82FL-061-011-6	24-34	Btg1	70	---	21	9
S82FL-061-011-10	56-80	Cg	88	---	7	5
Electra:						
S82FL-061-007-1	0- 5	A	35	---	12	53
S82FL-061-007-4	30-33	Bh1	15	23	21	41
S82FL-061-007-8	59-72	Btg2	54	---	29	17
Immokalee:						
S82FL-061-003-1	0- 8	Ap	14	17	9	60
S82FL-061-003-4	33-36	Bh1	36	---	11	53
S82FL-061-003-9	72-80	C	40	9	39	12
Manatee:						
S82FL-061-005-1	0- 3	Ap	86	---	6	8
S82FL-061-005-3	8-16	BA	91	---	5	4
S82FL-061-005-5	30-42	Btg1	86	---	6	8
S82FL-061-005-7	54-74	Cg	93	---	4	3
Paola:						
S82FL-061-013-1 2/	0- 2	A	32	36	16	16
S82FL-061-013-4 2/	12-36	Bw	22	56	15	7
S82FL-061-013-6	58-80	Bw	29	52	9	10
Pepper:						
S82FL-061-010-1	0- 2	A1	---	---	20	80
S82FL-061-010-4 1/	22-27	Bh	---	11	15	74
S82FL-061-010-8	47-60	Btg	29	12	51	8
Perrine Variant:						
S82FL-061-001-1 3/	0- 6	Ap	---	---	35	61
S82FL-061-001-3 4/	20-24	Ckg2	---	---	---	---

See footnotes at end of table.

TABLE 21.--CLAY MINERALOGY OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Clay minerals			
			Montmorillonite	14 angstrom intergrade	Kaolinite	Quartz
	In		Pct	Pct	Pct	Pct
St. Lucie:						
S82FL-061-014-1 1/	0- 3	A	37	15	9	39
S82FL-061-014-4	56-80	C	---	---	---	100

1/ Detectable amounts of feldspars present.
2/ Detectable amounts of dolomite present.
3/ 4 percent chlorite mineral.
4/ 100 percent chlorite mineral.

TABLE 22.--ENGINEERING INDEX TEST DATA

[Tests performed by the Florida Department of Transportation (FDOT) in cooperation with the U.S. Bureau of Public Roads, in accordance with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO). See the section "Soil Series and Their Morphology" for location of pedon sampled. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	FDOT report number	Classification		Mechanical analysis[1]								Liquid limit	Plasticity index	Moisture density[3]	
				Percentage smaller than--				Percentage smaller than--							
		AASHTO[2]	Unified (Estimated)	No. 4	No. 10	No. 40	No. 200	.05 mm	.02 mm	.005 mm	.002 mm			Maximum dry density	Optimum moisture
												Pct		Lb/ft[3]	Pct
Archbold sand: 4/ (S82FL-061-006-2,3)	5														
C1 -- 2-38		A-3(00)	SP-SM	100	100	87	6	0	0	0	0	NP	NP	100.1	15.4
Astatula sand: 4/ (S82FL-061-015-5)	16														
C2 -- 14-71		A-3(00)	SP	100	100	83	2	2	2	0	0	NP	NP	103.8	13.9
Canaveral fine sand: 4/	8														
(S82FL-061-008-4) C3 -- 17-49		A-3(00)	SP	100	100	98	3	2	0	0	0	NP	NP	99.7	15.6
Canova muck: 4/ (S82FL-061-011-4,5)	9, 10, 11														
E1, E2 -- 13-24		A-3 (00)	SP	100	100	75	3	3	2	1	1	NP	NP	104.5	12.2
Btg1 -- 24-34		A-2-6	SC	100	100	81	29	28	26	25	24	40	25	108.1	12.6
Cgk1, Cgk2 -- 40-56		A-2-6	SC	100	87	70	29	27	25	19	16	30	18	118.3	13.1
Electra sand: 4/ (S82FL-061-007-4,5)	6, 7														
Bh1, Bh2 -- 30-36		A-2-4 (00)	SM	100	100	92	14	12	6	3	3	NP	NP	98.0	17.2
Floridana fine sand: 4/	19														
(S83FL-061-017-4) Btg1 -- 20-30		A-2-6	SC	100	100	85	29	29	27	25	25	40	26	113.8	12.7
Gator muck: 4/ (S83FL-061-016-4)	17, 18														
Cg2 -- 30-44		A-6	SC	100	95	84	46	45	42	31	26	38	27	111.8	15.6

See footnotes at end of table.

TABLE 22.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	FDOT report number	Classification: AASHTO[2]	Classification: Unified (Estimated)	Mechanical analysis[1]: Percentage smaller than-- No. 4	No. 10	No. 40	No. 200	Percentage smaller than-- .05 mm	.02 mm	.005 mm	.002 mm	Liquid limit	Plasticity index	Moisture density[3]: Maximum dry density	Optimum moisture
												Pct		Lb/ft[3]	Pct
Immokalee sand: 5/ (S82FL-061-003-2,3,4,5,6)	2, 3														
E1, E2 -- 8-33		A-3(00)	SP	100	100	90	3	3	2	1	1	NP	NP	102.1	13.4
Bh1, Bh2, Bh3 -- 33-47		A-3(00)	SP-SM	100	100	93	9	7	5	2	1	NP	NP	101.6	14.5
Jonathan sand: 4/ (S83FL-061-019-1,2,3,4)	21														
E -- 3-75		A-3(00)	SP	100	100	72	1	0	0	0	0	NP	NP	102.4	15.1
Manatee loamy sand: 6/ (S82FL-061-005-4)	4														
Bt -- 16-30		A-2-4	SM-SC	100	100	92	20	19	16	13	12	23	6	106.7	8.0
Orsino fine sand: 4/ (S83FL-061-018-3,4)	20														
Bw1&Bh, Bw2&Bh -- 23-43		A-3(00)	SP-SM	100	100	99	9	6	4	2	1	NP	NP	102.6	14.6
Palm Beach fine sand: 7/ (S83FL-061-020-3,4)	22														
C2 -- 18-80		A-3(00)	SP	100	100	87	2	2	2	1	1	NP	NP	101.4	16.3
Paola sand: (S82FL-061-013-4,5,6)	14														
Bw -- 12-80		A-3(00)	SP	100	100	82	3	2	1	0	0	NP	NP	105.5	13.0

See footnotes at end of table.

TABLE 22.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	FDOT report number	Classification		Mechanical analysis[1]								Liquid limit	Plasticity index	Moisture density[3]	
				Percentage smaller than--				Percentage smaller than--							
		AASHTO[2]	Unified (Estimated)	No. 4	No. 10	No. 40	No. 200	.05 mm	.02 mm	.005 mm	.002 mm			Maximum dry density	Optimum moisture
												Pct		Lb/ft^3	Pct
Perrine Variant fine sandy loam: 8/ (S82FL-061-001-1,2, 3)	1														
Ckg1, Ckg2 -- 6-24		A-2-6	SC	100	91	68	29	28	26	19	14	35	15	108.2	16.5
St. Lucie sand: 4/ (S82FL-061-014-2,3,4)	15														
C -- 3-80		A-3(00)	SP	100	100	73	1	0	0	0	0	NP	NP	102.4	14.5

1/ Mechanical analyses according to AASHTO designation T88-78. Results by this procedure differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-sized fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from the calculations of grain-sized fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

2/ Based on AASHTO Designation H145-73.

3/ Based on AASHTO Designation T99-74.

4/ Typical pedon - See section "Soil Series and Their Morphology" for location of pedons.

5/ Type location: Indian River County, Florida; northwest corner of the intersection of 74th Court and 25th Street SW south of Vero Beach; SE1/4 sec. 36, T. 33 S., R. 39 E.

6/ Type location: Indian River County, Florida; 1/4 mile south of S.R. 60 on Kings Highway; 256 feet west along field road just north of citrus trees, then 100 feet north into a field; SE1/4NE1/4SE1/4 sec. 5, T. 33 S., R. 39 E. This soil is a taxadjunct since the permeability is too slow.

7/ Type location: Indian River County, Florida; 0.7 mile south of Wabasso Beach Park, 300 feet east of S.R. A1A, 100 feet north of trail; NE1/4NW1/4SE1/4 sec. 25, T. 31 S., R. 39 E.

8/ This soil is a taxadjunct to the Perrine series because it contains more sand than allowed in the official series.

TABLE 23.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Archbold	Hyperthermic, uncoated Typic Quartzipsamments
Arents	Arents
Astatula	Hyperthermic, uncoated Typic Quartzipsamments
*Boca	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Canaveral	Hyperthermic, uncoated Aquic Quartzipsamments
Canova	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs
Captiva	Siliceous, hyperthermic Mollic Psammaquents
Chobee	Fine-loamy, siliceous, hyperthermic Typic Argiaquolls
Delray	Loamy, siliceous, hyperthermic Grossarenic Argiaquolls
EauGallie	Sandy, siliceous, hyperthermic Alfic Haplaquods
Electra	Sandy, siliceous, hyperthermic Arenic Ultic Haplohumods
Floridana	Loamy, siliceous, hyperthermic Arenic Argiaquolls
Gator	Loamy, siliceous, euic, hyperthermic Terric Medisaprists
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Immokalee	Sandy, siliceous, hyperthermic Arenic Haplaquods
Jonathan	Sandy, siliceous, hyperthermic, ortstein Typic Haplohumods
Jupiter	Sandy, siliceous, hyperthermic Lithic Haplaquolls
Kesson	Siliceous, hyperthermic Typic Psammaquents
Lokosee	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Malabar	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Manatee	Coarse-loamy, siliceous, hyperthermic Typic Argiaquolls
McKee	Fine, montmorillonitic, nonacid, hyperthermic Typic Hydraquents
Myakka	Sandy, siliceous, hyperthermic Aeric Haplaquods
Oldsmar	Sandy, siliceous, hyperthermic Alfic Arenic Haplaquods
Orsino	Hyperthermic, uncoated Spodic Quartzipsamments
Palm Beach	Hyperthermic, uncoated Typic Quartzipsamments
Paola	Hyperthermic, uncoated Spodic Quartzipsamments
Pepper	Sandy, siliceous, hyperthermic, ortstein Alfic Haplaquods
Perrine Variant	Fine-loamy, carbonatic, hyperthermic Typic Fluvaquents
Pineda	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
*Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods
Pompano	Siliceous, hyperthermic Typic Psammaquents
Quartzipsamments	Quartzipsamments
Riomar	Fine, montmorillonitic, nonacid, hyperthermic Typic Hydraquents
Riviera	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Samsula	Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists
Satellite	Hyperthermic, uncoated Aquic Quartzipsamments
St. Augustine	Sandy, siliceous, hyperthermic Udalfic Arents
St. Lucie	Hyperthermic, uncoated Typic Quartzipsamments
Terra Ceia	Euic, hyperthermic Typic Medisaprists
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods
Winder	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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NRCS Accessibility Statement

Our records indicate that you have received a copy of the Soil Survey of Indian River County. Some of the data in Table 1 on page 134 is suspect. This supplemental table provides more accurate data.

SUPPLEMENTAL TABLE 1.--TEMPERATURE AND PRECIPITATION

Month	Temperature					Precipitation		
				Mean number of days with temperatures of --			Mean number of days With rainfall of--	
	Normal Monthly mean	Normal daily maximum	Normal daily Minimum	90°F or higher	32 °F or lower	Normal Total	0.10 inch or more	0.50 inch or more
	°F	*°F*	*°F*			*In*		
Jan.	61.9	72.2	51.6			2.43		
Feb.	62.5	72.8	52.2			2.86		
March	67.2	77.3	57.1			3.05		
April	71.7	81.2	62.2			2.59		
May	76.2	85.2	67.0			4.39		
June	79.4	87.9	70.9			6.52		
July	81.1	89.7	72.4			5.76		
Aug.	81.4	89.9	72.9			5.39		
Sept.	80.2	87.9	72.4			7.96		
Oct.	75.2	83.3	67.1			5.94		
Nov.	68.9	77.9	59.8			2.55		
Dec.	63.4	72.4	53.3			1.97		
Total	72.4	81.5	63.2			51.41		

REFERENCE

Climatography of the United States No. 81 (Florida)
Monthly Normal Temperature, Precipitation, and Heating and Cooling Degree Days 1951-80,
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National Climatic Center, Asheville, N.C. Sept. 1982