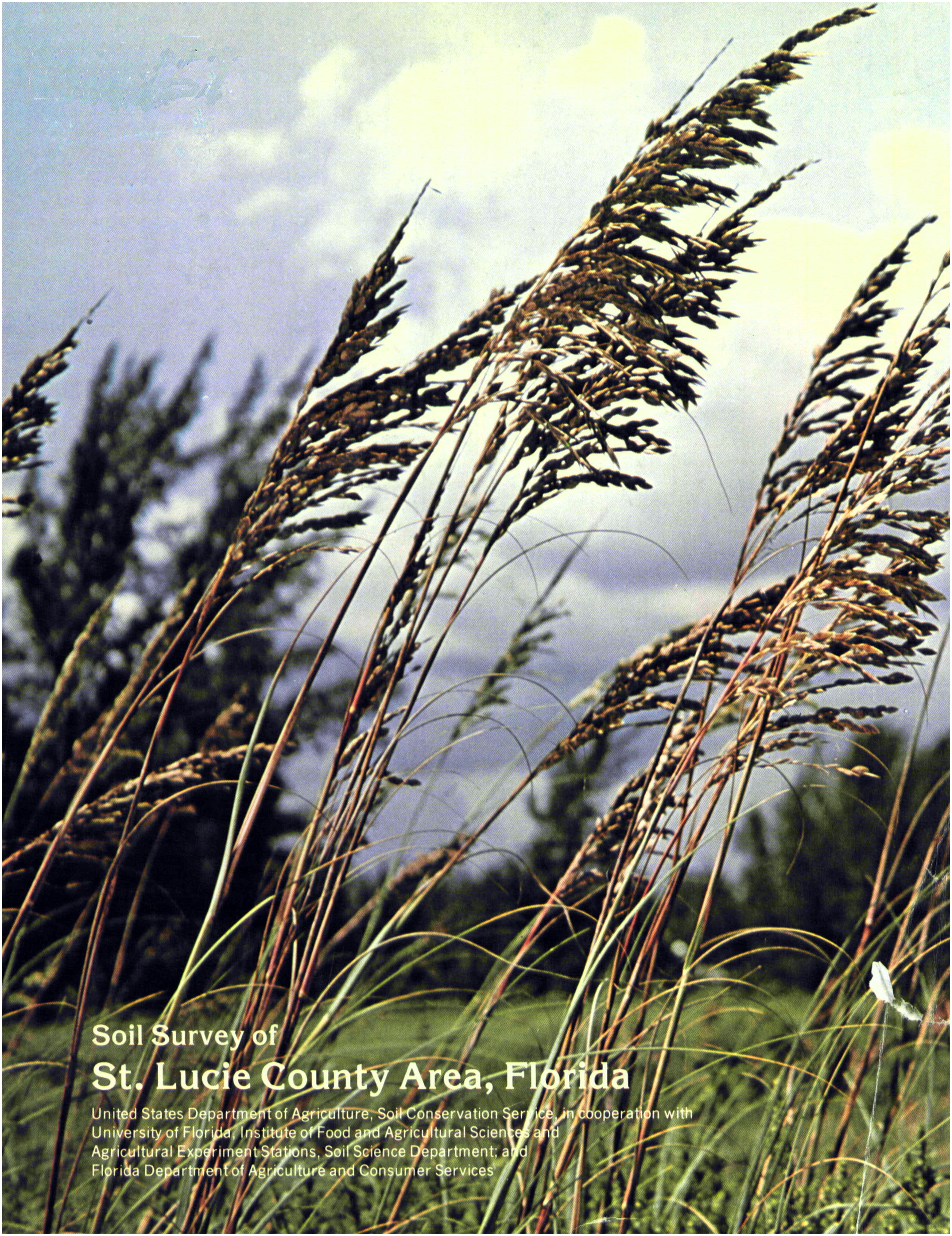
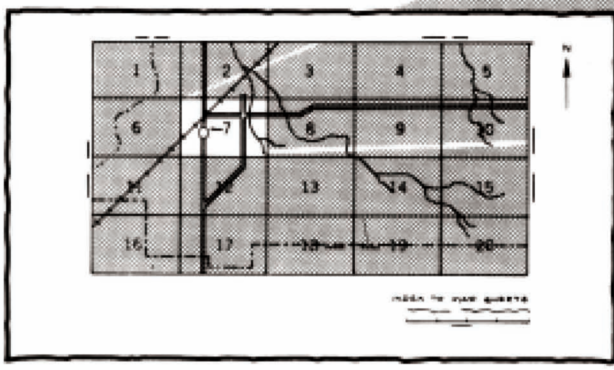


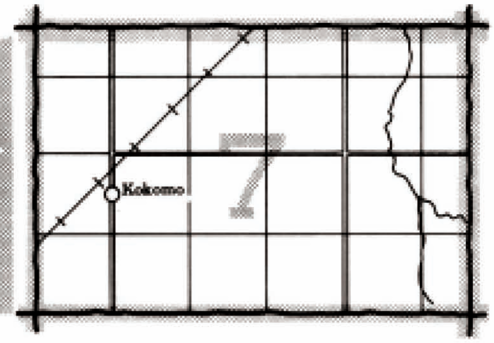
Soil Survey of
St. Lucie County Area, Florida

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

HOW TO USE

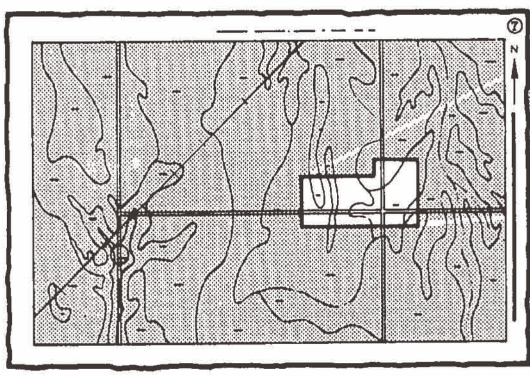
1. Locate your area of interest on the "Index to Map Sheets"

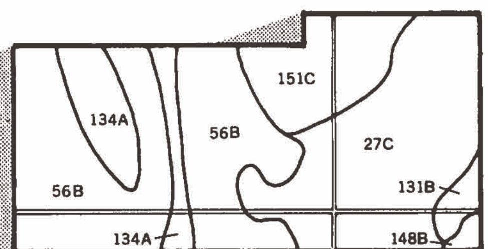




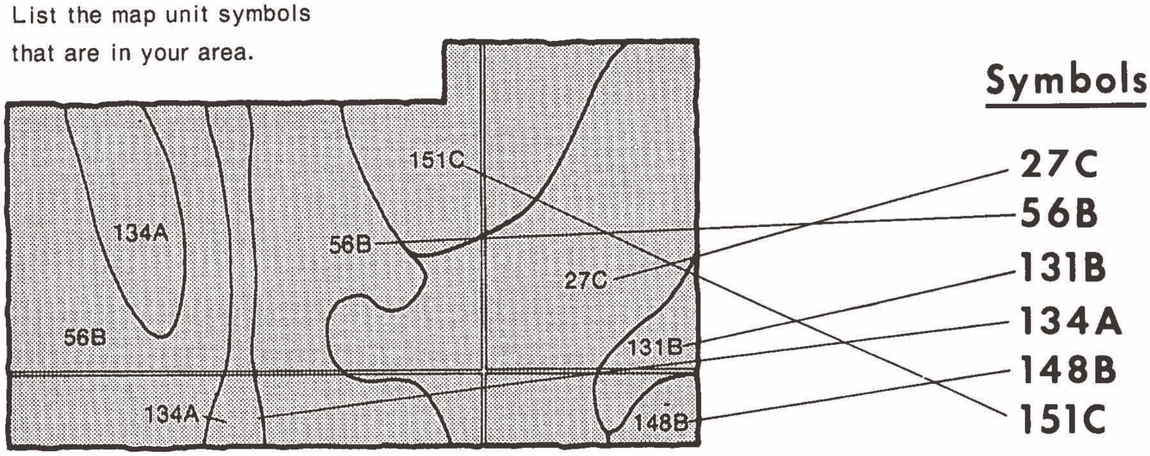
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



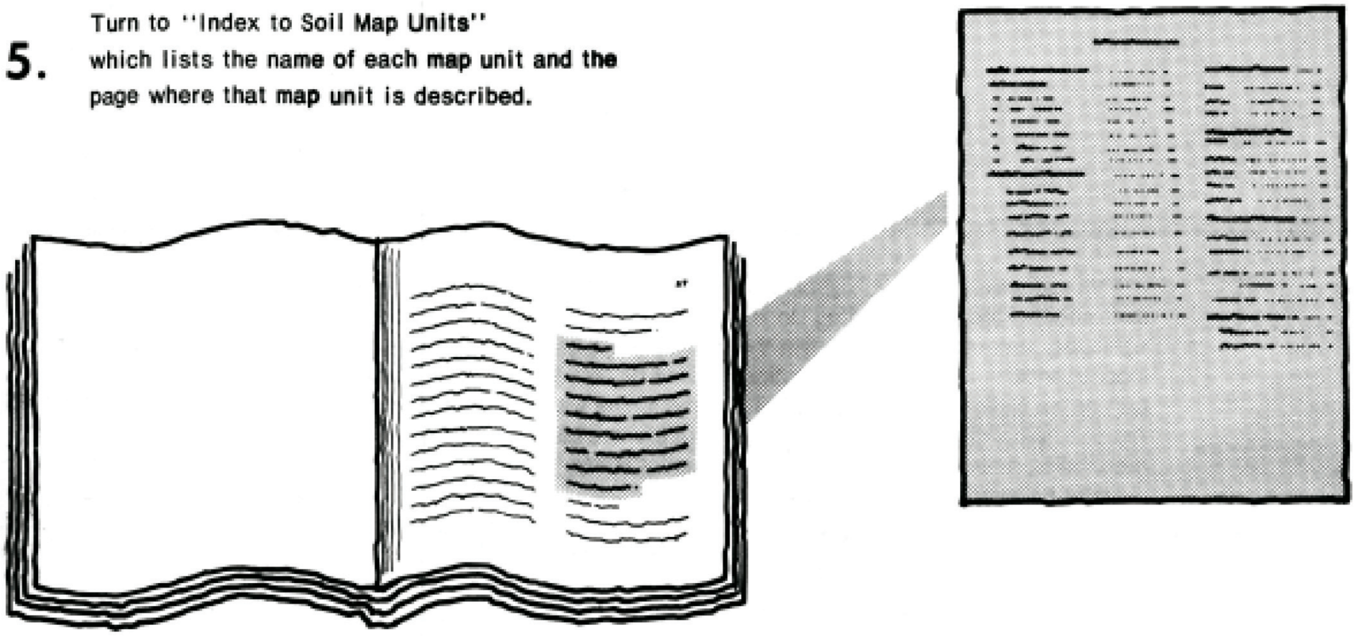


4. List the map unit symbols that are in your area.

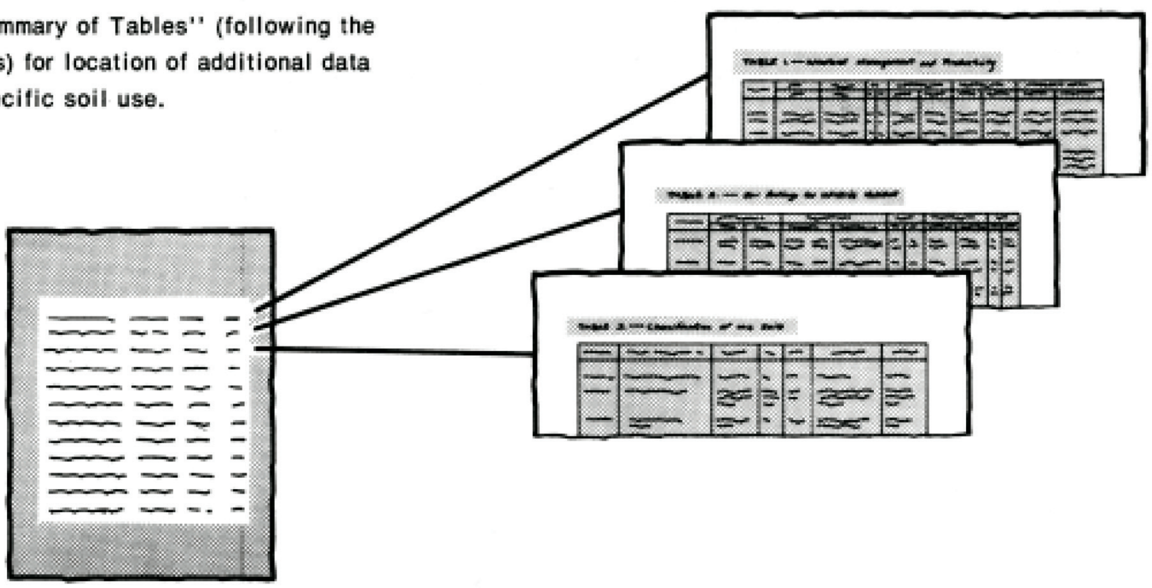


THIS SOIL SURVEY

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 performed in the period 1973-77. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1977.

This survey was made cooperatively by the Soil Conservation Service and the University of Florida, Institute of Food and Agricultural Sciences and Agricultural Experiment Stations, Soil Science Department, and Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the St. Lucie Soil and Water Conservation District. The St. Lucie County Board of Commissioners contributed financially to accelerate the completion of fieldwork for the soil 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.

Cover: Native grass sea oats (Uniola panicula'ta) on Canaveral fine sand, 0 to 5 percent slopes. This vegetation provides excellent dune stabilization along the Atlantic Ocean coastal line in St. Lucie County.

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Issued March 1980

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Summary of tables

Summary of tables—Continued

Foreword

This soil survey contains information that can be used in land-planning programs in St. Lucie County Area, 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 rock. 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.

William E. Austin

William E. Austin
State Conservationist
Soil Conservation Service

Location of St. Lucie County Area in Florida.

Soil Survey of St. Lucie County Area, Florida

United States Department of Agriculture
Soil Conservation Service
in cooperation with

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

By Frank C. Watts and Daniel L. Stankey
Soil Conservation Service

Others participating in the field survey were
Michael J. Jones and Robert H. Lisante, Soil Conservation Service

ST. LUCIE COUNTY AREA is in the southeastern part of peninsular Florida. It is bordered on the north by Indian River County, on the west by Okeechobee County, on the south by Martin County, and on the east by the Atlantic Ocean. This survey joins the published survey of Okeechobee County, Florida and the currently progressive survey of Martin County, Florida.

The survey area, which does not include all of St. Lucie County, covers 367,550 acres or about 575 square miles. The area not surveyed, however, is included in the aerial photographs which are the basis for the detailed soil maps at the back of this publication. The survey area includes 861 acres of water in bodies of less than 40 acres. Also included within the county boundary is about 20,280 acres of salt water in the Indian River.

The survey area is about 24 miles long. It is about 21 miles wide at the narrowest part and 29 miles wide at the widest part. Fort Pierce, the county seat, is in the eastern part of the survey area.

Tourism is the largest single nonagricultural industry in the survey area. The mild winter temperatures and many miles of inland water and beaches bring many tourists to the survey area annually.

General nature of the survey area

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

Climate

St. Lucie County Area has long, warm and humid summers and mild winters. The moderating influence of the Atlantic Ocean on maximum temperatures in summer and minimum temperatures in winter is strong along the immediate coast, but it diminishes a few miles inland. Because of the moderation of winter temperatures, the coastal area has a tropical climate. However, between Fort Pierce and the city of Vero Beach to the north, the climate of the coastal area changes to humid subtropical and is similar to the climate of the rest of the survey area.

Rainfall is unevenly distributed during the year. About 62 percent occurs from June through October and about 21 percent in March, April, and May. The remainder occurs from November through February. The start of the rainy season varies considerably from year to year. In some years, it begins as early as May and in other years late in June. Late October generally marks the end of the wet season.

The moist, unstable air in the survey area 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. Daylong rains are rare and almost always are associated with a tropical storm. Winter and spring rains are not generally so intense as summer thunderstorms. Summarized climatic data (*14, 15*), based on records collected at Fort Pierce, are shown in table 1.

Tropical storms can affect the area any time from late May through mid-November. Although hail falls occasionally in thunderstorms, it is generally small and seldom causes much damage. Snow is almost unknown in St. Lucie County Area.

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 are generally of shorter duration than those in fall, but tend to be more serious because temperatures are higher and the need for moisture is greater in April and May.

Cold continental air must travel over water or flow down the Florida Peninsula before reaching St. Lucie County Area. For this reason, cold air is modified. The coldest weather and infrequent frosts occur the second or third night after the arrival of cold air, when heat is lost through radiation. There are freezing temperatures of 32 degrees F as often as 1 year out of 10, but temperatures of 28 degrees F or less are more rare. An important citrus and vegetable growing industry has been established because of the nearly frost-free winters. Freeze data shown in table 2 were taken at Fort Pierce (*15*) and are representative for the area.

Summer temperatures are tempered by the ocean breeze, and by the frequent formation of cumulus clouds which partly shade the land without completely obscuring the sun. Temperatures of 88 degrees F or higher have occurred in all months of the year, and a temperature of as high as 101 degrees F has occurred in the past. August is the warmest month and the average maximum temperature is almost 90 degrees F. This temperature is common in August.

Flying weather is generally very good in St. Lucie County, and "instrument" weather occurs only rarely. Because the air is clean and has no taint of industrial smoke, there is almost no fog. In winter and spring, an average of one morning a month has heavy fog; in summer and fall, heavy fog rarely occurs.

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

History and development

Four hundred years ago the Ais, or Indian River Indians, lived in present day St. Lucie County (*16*). These inhabitants were later named the Seminole Indians. The area became Spanish Territory, and in 1565 a fort was established at the north end of Jupiter Inlet. The fort, and later the St. Lucie River, were named for the patron saint, Santa Lucia of Podera. Transportation was by boat and steamer.

In 1820 the area was ceded to the United States, and in 1838 Lieutenant Colonel Benjamin K. Pierce established a fort 4 miles south of the Indian River Inlet and 1 1/2 miles south of the present day city of Fort Pierce. In 1842, Congress passed the Armed Occupation Act, and thousands of acres of public land were opened to settlement. Many pioneers from Alabama, Georgia, South Carolina, and North Carolina soon settled along the Indian River.

In 1844, one year before Florida became a State, Santa Lucia County was formed from Mosquito County. It was bordered on the north by Cape Canaveral, on the south by Lake Worth, and on the west by the Kissimmee River. It became popularly known as St. Lucie County.

Fort Capron, the present location of the village of St. Lucie, was established in 1850. There was a military trail from Fort Capron to Fort Brooke, the site of present day Tampa.

The name of St. Lucie County was changed to Brevard County in 1855. Susanna, south of Fort Pierce, became the county seat. The city of Fort Pierce was first settled in 1868 and was incorporated in 1901.

The communities of Viking, Indrio, Edgartown, Canton, and St. Lucie north of Fort Pierce; and of Ankona, Eden, Elred, and Waveland south of Fort Pierce were settled along the Indian River. The community of White City was organized in 1893.

St. Lucie County was formed in 1905. It was bordered on the north by the Sebastian River, on the south by the St. Lucie River, and on the west by Osceola County. Okeechobee County was formed in 1917 from this area, and Martin and Indian River Counties were formed in 1925.

The Flagler Railway was built through the area in 1894. It provided goods and services and aided in settlement. In 1920, St. Lucie County had a population of 7,886 and in 1935, of 9,044.

In 1921 the Fort Pierce Inlet was dug and construction of a port began. Ships entered the inlet to the port in 1930. In 1935, this work became a Federal Project and the channel was deepened to almost 27 feet. The city of Port St. Lucie, 7 miles south of Fort Pierce, was incorporated in 1961.

In 1976 St. Lucie County had a population of about 73,000. The population of Fort Pierce was about 33,000 and the population of Port St. Lucie was 5,000.

Physiography, relief, and drainage

St. Lucie County Area can be divided into three major physiographic regions—the Eastern Valley, the Osceola Plain, and the Atlantic Coastal Ridge. The Green Ridge and the southern end of Ten Mile Ridge are minor geographic areas within the Eastern Valley (*17*).

The Eastern Valley lies between the Atlantic Coastal Ridge to the east and the Osceola Plain to the southwest. It is by far the largest physiographic region and extends the entire length of the survey area. Elevation ranges from about 15 to 30 feet above sea level. These ridges are low, narrow, and long. Allapattah Flats lies to the west of Green Ridge, and St. Johns River Marsh lies to the west of Ten Mile Ridge. These areas are mostly covered with marsh grasses, scattered cabbage palm hammocks, and clusters of cypress trees. The soils generally have a sandy surface layer and a loamy subsoil; however, organic soil is common in the Allapattah Flats. Native vegetation in the major part of the Eastern Valley and in Ten Mile Ridge and Green Ridge is mostly pine trees, sawpalmetto, and pineland threeawn. Most of the soils in these areas have a sandy surface layer and a weakly cemented subsoil. Much of the Eastern Valley is used for range or has been planted to citrus or improved pasture grasses.

The Osceola Plain is in the southwestern part of the survey area. Elevation ranges from about 30 feet to as much as 60 feet above sea level. There are a few areas of broad grassy sloughs, depressions, and poorly defined drainageways. Generally, the soils are nearly level, wet, and sandy. The sandy subsoil has organic matter and is weakly cemented. Vegetation consists mostly of flatwoods pine and sawpalmetto. Large areas of this region are used for range and improved pasture grasses.

The Atlantic Coastal Ridge is bordered on the west by the Eastern Valley and on the east by the Atlantic Ocean. It consists of relic beach ridges formed by wind and wave action along the shore. The Indian River separates the present day Barrier Islands from the mainland. The part of the Atlantic Coastal Ridge on the mainland is an elongated ridge that extends the entire length of the county. It is 1/4 to 1/2 mile wide. Elevation ranges from sea level to as much as 60 feet, the highest elevation in the county. Vegetation is cabbage palm, sand pine, sawpalmetto, scrub oak, rosemary, and shrubs. The main ridge on the Barrier Islands ranges from a few hundred feet to three-fourths of a mile wide. This ridge consists of beach, primary dune, trough, inland dune, and the back dune next to the bay. Elevation ranges from sea level along the shore to 17 feet along the crest of the dune ridges. Vegetation is most commonly sea oats, sawpalmetto, sea grape, cocoa plum, waxmyrtle, lantana, and bay cedar.

Most of St. Lucie County Area is drained through intermittent streams, creeks, rivers, closed depressions, and grassy sloughs. Ten Mile Creek, which is the headwaters of the North Fork of the St. Lucie River, drains the northern part of Allapattah Flats around the northern end of Green Ridge. Five Mile Creek drains the area between the Atlantic Coastal Ridge and Ten Mile Ridge and flows into the North Fork of the St. Lucie River.

Water resources

Water is used for municipal, industrial, and agricultural purposes in St. Lucie County Area. In most of the survey area, water is adequate for domestic use, irrigation of crops, and the watering of livestock late in spring, in summer, and early in autumn. However, in most winter seasons, there is a shortage of water because of low rainfall.

The development of land for agricultural use in much of the survey area has decreased the supply of water from surface and ground water storage and has greatly increased the need for irrigation. The canal network of the Central and Southern Florida Flood Control, Fort Pierce Farms Drainage, and North St. Lucie Drainage District is the major water control system (*3*). Water is replenished by rainfall and ground water inflow. Irrigation water is supplemented by artesian water from deep wells.

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. Ground water is derived almost entirely from local precipitation.

Two major aquifers underlie St. Lucie County, the deep artesian Florida aquifer and the shallow, nonartesian aquifer (*6, 9*). They are separated by a layer of slowly permeable clay and sand. The quality of nonartesian water generally is superior to that of artesian water. The nonartesian water in the Atlantic Coastal Ridge is the source of supply for municipalities, hundreds of privately owned wells, and sometimes is used for irrigation. The Florida artesian aquifer has a chloride content that ranges from 300 to 1,884 milligrams per liter. This water is generally unsuitable for public drinking and is of questionable quality for irrigating citrus because of the low tolerance of citrus to salts. Use depends on the variety of citrus grown and the method of irrigation. The fine mist from low rate sprinklers evaporates rapidly and leaves a salt deposit on the leaves. If the ditch-irrigation method is used, almost double concentrations of salts can be tolerated. Artesian water is also used on ranches for watering cattle.

Farming

Pineapples were the first crop grown by the farmers who settled in St. Lucie County Area about 1842. They were planted on Hutchinson Island but died because the soil was too rich. When they were transferred to the sandy soil of the mainland, however, and supplemented with fertilizer, the crop flourished. Most of the plantings were on the Atlantic Coastal Ridge. Pineapples were the leading crop until the early 1920's when a mysterious disease struck. Production was brought to a standstill from which it never fully recovered. However, pineapples are still grown for local markets in the county.

Some oranges were also grown, but in 1894-95 a disastrous series of freezes doomed the future of citrus culture along the St. Johns River. The planting of citrus was then encouraged in the warmer Indian River region. Most of the western part of the survey area was in swamps and was covered with water for a long period each year. To use these areas for citrus cultivation, a water control system was needed. In 1919-20 the Fort Pierce Farms and North St. Lucie River Drainage Districts were formed. According to the Fort Pierce Chamber of Commerce, St. Lucie County Area now ranks third in the State in acreage and production of citrus.

The most common vegetable crop in the survey area is tomatoes. About 1,150 to 1,450 acres is planted to tomatoes each year. Because tomatoes are susceptible to disease, land is newly cleared for use each year. Other vegetables grown are beans, Irish potatoes, sweet potatoes, cabbage, lettuce, peppers, corn, eggplant, celery, cauliflower, okra, squash, and onions. Cucumbers, cantaloupe, watermelon, strawberries, and dewberries are also grown. At one time sugar cane was grown.

Fruits that have been grown or are now grown in the area are kumquats, limes, mulberries, gooseberries, Japanese persimmon, citron, pomegranate, sapodilla, custard apple, Jamaica apple, loquat, grapes, figs, plums, peanuts, papaya, avocado, and mango.

In 186l, thirty people owned cattle and 15 people owned 100 head or more. At that time cattle were grazed on the open range. After the Civil War, cattle raising became an important industry in Florida, and thousands of beef cattle were grazed in the back country west of Fort Pierce. In 1976 there were more than 52,000 cattle in St. Lucie County Area, according to the St. Lucie County Cattlemen's Association. There were 1,650 head of dairy cattle.

In the early days an attempt was made to raise hogs on Hutchinson Island. It was not successful, and the hogs were moved to the mainland. Hogs are still raised in the county.

In 1976 in St. Lucie County Area, about 73,500 acres was used for cropland, 78,500 acres was used for improved pasture, and 98,000 acres was used for range, according to the Fort Pierce Chamber of Commerce.

Transportation

St. Lucie County Area is served by several major highways. U.S. Highway 1 is in the eastern part of the survey area, parallel to the coast. Florida Highway 68 extends westward from Fort Pierce into Okeechobee County, and Florida Highway 70 crosses the survey area southwestward from Fort Pierce to the city of Okeechobee in Okeechobee County. The Sunshine State Parkway, also called the Florida Turnpike, crosses the survey area in a northwest-southeast direction. When completed, Interstate Highway 95 will traverse the eastern part of the survey area in a north-south direction.

The Florida East Coast Railway runs north-south along the Atlantic Coastal Ridge and also provides rail service from the Lake Okeechobee area to Fort Pierce. Ports around Fort Pierce provide transportation by water.

One airport is available for private use.

How this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

General soil map for broad land use planning

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 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 potential of each, in relation to that of the other map units, for major land uses and shows soil properties that limit use. Soil potential 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 *community development, citrus, improved pasture, vegetables,* and *woodland*. Cultivated crops are those grown extensively in the survey area. Specialty crops are the vegetables and fruits that generally require intensive management. Woodland refers to areas of native or planted pine trees. Urban uses include residential, commerical, and industrial developments. Intensive recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Extensive recreation areas are those used for nature study and as wilderness.

Soils of the sand ridges

The one map unit in this group consists of nearly level to sloping, excessively drained soils and nearly level, somewhat poorly drained soils. All of the soils are sandy throughout. Some have a yellow subsoil. This unit is mostly along the coastal ridge on the mainland, generally along U.S. Highway 1. A few small areas are in the southwestern part of the survey area.

1. St. Lucie-Satellite-Welaka Variant

Nearly level to sloping, execessively drained and somewhat poorly drained soils that are sandy throughout; some soils have a yellow subsoil

This map unit consists mostly of nearly level to sloping, deep, sandy soils on high, dunelike ridges. The largest area, in the eastern part of the survey area, is parallel to the Indian River and extends from Indian River County to Martin County. Another area, in the southwestern part of the survey area, is on isolated knolls and ridges. Natural vegetation is sand pine, sand live oak, rosemary, running oak, and pineland threeawn. Where the area has been cleared, there are a few cabbage palms.

This map unit makes up about 5,500 acres or about 1.5 percent of the survey area. It is about 45 percent St. Lucie soils, about 30 percent Satellite soils, 19 percent Welaka Variant soils, and about 6 percent soils of minor extent.

St. Lucie soils are excessively drained and generally are at higher elevation than Satellite soils. Typically, they are gray, light gray, and white sand to a depth of 80 inches or more (fig. 1).

Satellite soils are somewhat poorly drained and are at lower elevation than St. Lucie and Welaka Variant soils. Typically, they have a surface layer of dark gray sand about 6 inches thick. The substratum to a depth of 80 inches or more is light gray, light brownish gray, and grayish brown sand. This soil is more common in the southwestern part of the survey area than in the eastern part.

Figure 1.—Profile of St. Lucie sand, 0 to 8 percent slopes. These excessively drained soils are on the coastal ridge.

Welaka Variant soils are excessively drained and are at higher elevation than Satellite soils. Typically, they have a surface layer of black sand 5 inches thick. The subsurface layer is gray and light gray sand 13 inches thick. The subsoil to a depth of 96 inches or more is pinkish gray, strong brown, yellowish red, and strong brown sand.

Of minor extent in this map unit are the Astatula, Paola, Pendarvis, and Pompano soils. Paola soils on the high ridges are the most common minor soils.

Some areas of this map unit in the eastern part of the survey area are used for urban development. Part of the city of Fort Pierce, some industries, and many homesites are placed on this unit. Other areas, which were formerly used to grow pineapple, are mostly in cabbage palms. The rest of the unit is in natural vegetation.

Soils of the low ridges, knolls, and flatwoods

The five map units in this group consist of nearly level to gently sloping, somewhat excessively drained soils and nearly level, poorly drained soils. Some soils are sandy throughout, some have a loamy subsoil within a depth of 20 inches, and some are underlain by loamy material. Most of the soils are weakly cemented sand above a depth of 50 inches. These units are scattered throughout the mainland; however, they are most common in the eastern third and in the extreme western part of the survey area.

2. Salerno-Hobe-Waveland

Nearly level to gently sloping, poorly drained and somewhat excessively drained soils that have a dark sandy subsoil; some soils are sandy throughout, some subsoils are loamy below a depth of 40 inches, and some subsoils are weakly cemented

This map unit consists of flatwoods interspersed with narrow, slightly elevated ridges and a few scattered depressional areas. Three areas of this unit, ranging from about 1/8 mile to almost 1 mile wide and from about 1/4 mile to nearly 6 miles long, are along the North Fork of the St. Lucie River. Natural vegetation on the Hobe soils is sand pine, sand live oak, sawpalmetto, running oak, and rosemary. Natural vegetation on the Salerno and Waveland soils is south Florida slash pine, sawpalmetto, fetterbush, huckleberry, and Florida and pineland threeawn. Natural vegetation in the depressional areas is sandweed, stillingia, and longleaf threeawn.

This map unit makes up about 5,150 acres or about 1.4 percent of the survey area. It is about 50 percent Salerno soils, about 30 percent Hobe soils, about 13 percent Waveland soils, and about 7 percent soils of minor extent.

Salerno soils are poorly drained. Typically, the surface layer is black sand 5 inches thick. The subsurface layer is light brownish gray sand 50 inches thick. The subsoil is black, weakly cemented sand to a depth of 63 inches. The underlying material, to a depth of 80 inches or more, is dark grayish brown sand to a depth of 68 inches and olive gray sand below this layer.

Hobe soils are somewhat excessively drained. Typically, the surface layer is gray sand about 5 inches thick. The subsurface layer is white sand 50 inches thick. The subsoil, to a depth of 80 inches or more, is black sand to a depth of 65 inches and pale brown sandy loam below this layer.

Waveland soils are poorly drained. Typically, the surface layer is about 8 inches thick. It is black fine sand in the upper 4 inches and dark gray fine sand in the lower 4 inches. The subsurface layer is grayish brown sand and light gray fine sand. The subsoil to a depth of 53 inches is black, weakly cemented loamy sand (fig. 2). The substratum, to a depth of 80 inches or more, is dark grayish brown, grayish brown, and olive gray sand that has pockets of loamy sand and sandy loam.

Of minor extent in this map unit are the Ankona, Electra, Lawnwood, and Pendarvis soils.

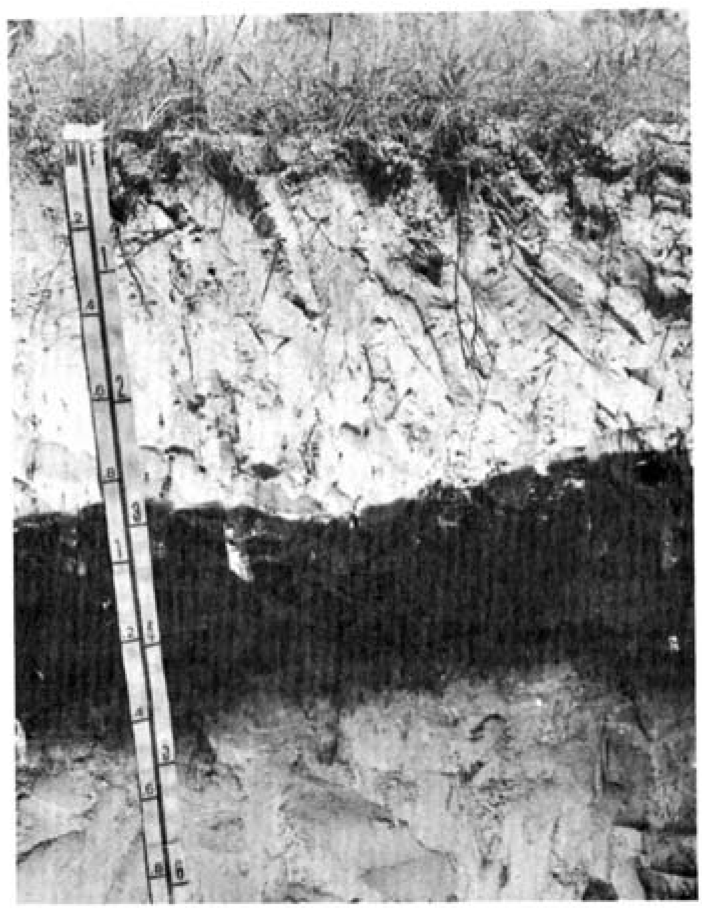

Figure 2.—Profile of Waveland fine sand showing dark, weakly cemented layers. Most soils with such layers are in the flatwoods.

Most areas of this map unit are in natural vegetation. A few areas are used for homesites and urban development.

3. Waveland-Lawnwood

Nearly level, poorly drained soils that are sandy throughout; the dark subsoil is weakly cemented

This map unit consists of broad flatwoods interspersed with depressional areas. A large area, about 1 mile to 5 miles wide, is west of and parallel to the Indian River and extends west along the southern edge of the survey area. Another large area is in the southwestern part of the survey area, and a small area is in the southcentral part. Natural vegetation is south Florida slash pine, sawpalmetto, fetterbush, tarflower, huckleberry, and lopsided Indian, Florida, and pineland threeawn grasses. The natural vegetation of the depressional area is sandweed, stillingia, and longleaf threeawn.

This map unit makes up about 60,350 acres or about 16.4 percent of the survey area. It is about 45 percent Waveland soils, 30 percent Lawnwood soils, and 25 percent soils of minor extent.

Typically, the Waveland soils have a surface layer of black and dark gray sand 8 inches thick. The subsurface layer is grayish brown sand and light gray fine sand 24 inches thick. The subsoil is black, weakly cemented loamy sand that extends to a depth of 53 inches. The substratum, to a depth of 80 inches or more, is grayish brown and olive gray sand that has pockets of loamy sand and sandy loam.

Typically, the Lawnwood soils have a surface layer of black and very dark gray sand about 8 inches thick. The subsurface layer is gray and light gray sand 20 inches thick. The subsoil extends to a depth of 58 inches. It is black, weakly cemented sand in the upper 24 inches and dark reddish brown sand in the lower part. The substratum, to a depth of 80 inches or more, is pale olive sand that has pockets of loamy sand and sandy loam.

Of minor extent in this map unit are the Pendarvis, Electra, Ankona, and Tantile soils.

A large part of this map unit is used for urban development. Some areas are used for citrus and improved pasture. The rest is native vegetation.

4. Basinger-Myakka-Lawnwood

Nearly level, poorly drained soils that are sandy throughout; the dark subsoil is weakly cemented in places

This map unit consists of broad, low sloughs interspersed with slightly elevated flatwoods. It is mostly in the extreme western part of the survey area; however, one small area is in the southeastern part. The largest area ranges from about 1/4 mile to 1 1/2 miles wide and is about 9 miles long. Natural vegetation in the sloughs is scattered south Florida slash pine and sawpalmetto, waxmyrtle, pineland threeawn, and maidencane. Natural vegetation on the flatwoods is south Florida slash pine, sawpalmetto, fetterbush, huckleberry, and Florida and pineland threeawn.

This map unit makes up about 9,950 acres or about 2.7 percent of the survey area. It is about 60 percent Basinger soils, 20 percent Myakka soils, 10 percent Lawnwood soils, and 10 percent soils of minor extent.

Typically, the Basinger soils have a surface layer of very dark gray sand about 5 inches thick. The subsurface layer is light brownish gray sand about 21 inches thick. The subsoil is dark brown sand to a depth of about 55 inches. The substratum, to a depth of 80 inches or more, is pale brown sand.

Typically, the Mayakka soils have a surface layer of black and very dark gray fine sand about 7 inches thick. The subsurface layer is gray and light gray fine sand about 20 inches thick. The subsoil is black, dark reddish brown, very dark grayish brown, and dark grayish brown fine sand. The substratum, to a depth of 80 inches or more, is brown and pale brown fine sand.

Typically, the Lawnwood soils have a surface layer of black and very dark gray sand about 8 inches thick. The subsurface layer is gray and light gray sand about 20 inches thick. The subsoil extends to a depth of 58 inches. It is black, weakly cemented sand in the upper 24 inches and dark reddish brown sand in the lower part. The substratum, to a depth of 80 inches or more, is pale olive sand.

Of minor extent in this unit are the Anclote and Kaliga soils.

Some areas of this map unit are in natural vegetation. Many areas, however, are used for improved pasture and range.

5. Nettles-Ankona-Pepper

Nearly level, poorly drained soils; the subsoil is dark, sandy, and weakly cemented in the upper part and loamy in the lower part below a depth of 40 inches

This map unit consists of broad flatwoods interspersed with depressional areas and sloughs. It is mostly in the eastern half of the survey area, but a few areas are near the western boundary. The largest area, about 7 miles wide and 8 1/2 miles long, is in the southeastern part of the survey area on the mainland. Another area is in the western part of the survey area. Natural vegetation on the flatwoods is south Florida slash pine, sawpalmetto, fetterbush, huckleberry, lopsided indiangrass, and Florida and pineland threeawn. Natural vegetation in the sloughs and depressional areas is sandweed, stillingia, and longleaf threeawn.

This map unit makes up about 73,600 acres or about 20 percent of the survey area. It is about 40 percent

Nettles soils, 19 percent Ankona soils, 12 percent Pepper soils, and 29 percent soils of minor extent.

Typically, the Nettles soils have a surface layer of black, very dark gray, and dark gray sand about 11 inches thick. The subsurface layer is light gray sand about 22 inches thick. The subsoil extends to a depth of 80 inches or more. It is black and dark reddish brown, weakly cemented sand and loamy sand in the upper 6 inches; dark reddish brown and dark brown sand that is not cemented in the next 16 inches; and pale olive fine sandy loam in the lower part.

Typically, the Ankona soils have a surface layer of black and dark gray sand about 11 inches thick. The subsurface layer is gray and light gray sand about 27 inches thick. The subsoil, to a depth of 80 inches or more, is black, weakly cemented sand in the upper 10 inches and olive gray sandy loam in the lower part.

Typically, the Pepper soils have a surface layer of black and dark gray sand about 9 inches thick. The subsurface layer is gray sand about 14 inches thick. The subsoil, to a depth of 80 inches or more, is black, weakly cemented sand in the upper 10 inches; dark reddish brown and dark brown sand that is not cemented in the next 15 inches; and olive gray and light olive gray sandy loam in the lower part.

Of minor extent in this map unit are the Floridana, Malabar, Oldsmar, Pineda, Pople, Riviera, and Wabasso soils. The Malabar and Oldsmar soils in sloughs and depressions are the most extensive minor soils.

Most areas of this map unit are in natural vegetation and are used for range. Some areas are used for improved pasture, citrus, or urban development.

6. Wabasso-Winder

Nearly level, poorly drained soils; the subsoil is dark and sandy in the upper part and loamy in the lower part or is loamy within a depth of 20 inches

This map unit consists of sandy and loamy soils on broad flatwoods interspersed with depressional areas. The largest area, about 8 miles long and 5 miles wide, is in the southcentral part of the survey area. Two smaller areas are in the northern part. Natural vegetation on the flatwoods is south Florida slash pine, sawpalmetto, huckleberry, and pineland threeawn. Natural vegetation in the depressional areas is sandweed, stillingia, and longleaf threeawn.

This map unit makes up about 23,550 acres or about 6.4 percent of the survey area. It is about 80 percent Wabasso soils, 10 percent Winder soils, and 10 percent soils of minor extent.

Typically, the Wabasso soils have a surface layer of black and very dark gray sand about 8 inches thick. The subsurface layer is dark gray and gray sand about 17 inches thick. The subsoil extends to a depth of about 60 inches. In sequence from the top, it is black sand, dark brown loamy sand, dark grayish brown sandy loam, and olive gray sandy loam. The substratum, to a depth of 80 inches or more, is olive gray sand that contains shell fragments.

Typically, the Winder soils have a surface layer of black sand about 1 inch thick. The subsurface layer is grayish brown and light brownish gray sand about 9 inches thick. The subsoil is gray sandy clay loam to a depth of about 25 inches. The underlying material is light gray, light olive gray, gray, and greenish gray sandy loam and sandy clay loam.

Of minor extent in this map unit are the Chobee, Hallandale, Hilolo, Pineda, Winder Variant, and Wabasso Variant soils.

Most areas of this map unit are used for citrus. Some areas remain in natural vegetation.

Soils of the swamps, marshes, and very wet areas that are subject to ponding or flooding

The five map units in this group consist of nearly level, poorly drained and very poorly drained soils. Some of these soils are organic throughout; some are stratified sand to clay; and some have a dark sandy subsoil. Some soils have a loamy subsoil within a depth of 20 inches; others have a loamy subsoil between depths of 20 to 40 inches. These units are mostly in the central part and in the western half of the survey area.

7. Pineda-Wabasso-Riviera

Nearly level, poorly drained soils; the subsoil is loamy within a depth of 40 inches or is dark and sandy in the upper part and loamy in the lower part

This map unit consists of broad sloughs and depressional areas interspersed with flatwoods. It occurs in scattered areas on the mainland. The largest area, about 17 miles long and 7 miles wide, is in the northwestern part of the survey area. Natural vegetation in the sloughs is scattered south Florida slash pine, waxmyrtle, cabbage palms in places, scattered sawpalmetto, and blue maidencane. Natural vegetation in the flatwoods is south Florida slash pine, sawpalmetto, huckleberry, fetterbush, and Florida and pineland threeawn. Natural vegetation in the depressional areas is sandweed, stillingia, and longleaf threeawn.

This map unit makes up about 80,200 acres or 21.8 percent of the survey area. It is about 65 percent Pineda soils, 12 percent Wabasso soils, 10 percent Riviera soils, and 13 percent soils of minor extent.

Typically, the Pineda soils have a surface layer of very dark grayish brown and dark brown sand about 6 inches thick. The subsurface layer is yellowish brown, strong brown, pale brown, and light gray sand about 32 inches thick. The subsoil is olive gray sandy loam and sandy clay loam to a depth of 52 inches. The substratum, to a depth of 80 inches or more, is gray loamy sand.

Typically, the Wabasso soils have a surface layer of black and very dark gray sand about 8 inches thick. The subsurface layer is dark gray and gray sand about 17 inches thick. The subsoil is black sand that extends to a depth of about 6 inches. In sequence, it consists of layers of black sand; dark brown loamy sand; dark grayish brown sandy loam; and gray sandy loam. The substratum, to a depth of 80 inches or more, is olive gray sand that has shell fragments.

Typically, the Riviera soils have a surface layer of gray sand about 1 inch thick. The subsurface layer is light gray and dark gray sand about 21 inches thick. The subsoil is dark gray sandy clay loam to a depth of 30 inches. The substratum, to a depth of 80 inches or more, is gray and dark gray sandy clay loam.

Of minor extent in this map unit are the Wabasso Variant, Chobee, Floridana, Hallandale, Hilolo, Kaliga, Pople, Riviera, Winder Variant, and Winder soils.

Most areas of this map unit are in natural vegetation and are used for rangeland.

8. Winder-Riviera

Nearly level, poorly drained soils; the loamy subsoil is within a depth of 20 inches or is between depths of 20 and 40 inches

This map unit consists of broad, low areas interspersed with numerous depressions and narrow, slightly elevated ridges between the depressions. It is in St. Johns Marsh, Allapattah Flats, Cypress Creek, and Five and Ten Mile Creeks. One area, about 1 mile to 9 miles wide, extends the entire length of the survey area; another small area is near the western boundary of the survey area. Natural vegetation in depressional areas and low areas is sandweed, stillingia, and longleaf threeawn. Natural vegetation on the ridges is waxmyrtle, blue maidencane, and in places, cabbage palms.

This map unit makes up about 90,150 acres or about 24.5 percent of the survey area. It is about 44 percent Winder soils, 36 percent Riviera soils, and 20 percent soils of minor extent.

Typically, the Winder soils have a surface layer of black sand about 1 inch thick. The subsurface layer is grayish brown and light brownish gray sand about 9 inches thick. The subsoil is gray sandy clay loam to a depth of about 24 inches. The substratum, to a depth of 80 inches or more, is light gray, light olive gray, gray, and greenish gray sandy loam and sandy clay loam.

Typically, the surface layer of the Riviera soils is gray sand about 1 inch thick. The subsurface layer is light gray and dark gray sand about 21 inches thick. The subsoil is dark grayish brown sandy clay loam to a depth of about 31 inches. The substratum, to a depth of 80 inches or more, is gray and dark gray sandy clay loam.

Of minor extent in this map unit are the Wabasso Variant, Chobee, Floridana, Hallandale, Hilolo, Kaliga, Pineda, Pople, Riviera, Winder Variant, and Winder soils.

Most areas of this map unit are used for citrus. Some areas remain in natural vegetation and are used for improved pasture and rangeland.

9. Chobee

Nearly level, very poorly drained soils; the subsoil is loamy

This map unit consists of four low marshy areas. One is in the southwestern part of the survey area, and the others are in the northcentral part. Natural vegetation is pickerelweed, maidencane, cypress, and a few oaks and grasses (fig. 3).

This map unit makes up about 5,150 acres or about 1.4 percent of the survey area. It is about 80 percent Chobee soils and 20 percent soils of minor extent.

Typically, the Chobee soils have a black surface layer of loamy sand about 11 inches thick. The subsoil is black, very dark gray, dark gray, and gray sandy clay loam.

The dominant minor soils in this map unit are the Winder Variant, Floridana, Hallandale, and Kaliga soils.

Most areas of this map unit are used for citrus. A few areas are in natural vegetation.

10. Samsula Variant-Myakka Variant

Nearly level, very poorly drained soils that are organic in places; the dark subsoil is sandy

This map unit consists of low, long, narrow fresh marshes in the Savannahs (fig. 4). The two areas, about 1/4 mile wide and 3 to 10 miles long, are north and south of Fort Pierce parallel to the Atlantic Coastal Ridge. Natural vegetation is buttonbush, sawgrass, and cordgrass.

This map unit makes up about 4,050 acres or about 1.1 percent of the survey area. It is about 60 percent Samsula Variant soils, 30 percent Myakka Variant soils, and 10 percent soils of minor extent.

Typically, the Samsula Variant soils have a surface layer of black muck about 25 inches thick. The buried subsurface layer is dark gray sand about 7 inches thick, and the buried subsoil is very dark gray sand to a depth of about 52 inches or more.

Typically, the Myakka Variant soils have a surface layer of black muck about 11 inches thick. The subsurface layer is white, light gray, and grayish brown sand. The subsoil is dark brown and dark reddish brown sand to a depth of 80 inches or more.

The dominant minor soils in this map unit are the Hontoon soils.

This map unit is in natural vegetation.

11. Fluvaquents-Terra Cela

Nearly level, very poorly drained soils; some soils are

Figure 3.—Cypress swamp in an area of Chobee fine sand. This soil is ponded for 6 to 9 months in most years.

organic throughout, and some have variable layers of sand to clay

This map unit consists of narrow flood plains along the St. Lucie River and Ten Mile and Five Mile Creeks in the southeastern part of the survey area. It is about 1/8 to 1/2 mile wide and about 13 miles long. Natural vegetation on the organic soils is a dense swamp of willows, sweetbay, maple, waxmyrtle, sawgrass, ferns, and vines. Natural vegetation on the mineral soils is cabbage palms, several wetland hardwoods, sawpalmetto, and a wide variety of herbaceous plants.

This map unit makes up about 3,700 acres or about 1 percent of the survey area. It is about 45 percent Fluvaquents, about 40 percent Terra Ceia soils, and 15 percent soils of minor extent.

Typically, Fluvaquents are variable within short distances in color, texture, and thickness of soil layers. The layers range from sand to clay.

Typically, the Terra Ceia soils are black muck to a depth of 80 inches or more.

This map unit is in natural vegetation.

Soils of the tidal areas

The one map unit in this group consists of nearly level to gently sloping, moderately well drained to somewhat poorly drained soils and nearly level, poorly drained and very poorly drained soils. Most of the soils are sandy throughout, but some soils are organic and are underlain with loamy mineral material within a depth of 40 inches. This unit is on Hutchinson Island.

12. Pompano Variant-Kaliga Variant-Canaveral

Nearly level to gently sloping, very poorly drained, somewhat poorly drained, and moderately well drained soils; some soils are sandy throughout and some are organic in the upper part and have loamy mineral material in the lower part

This map unit consists of broad, very poorly drained tidal swamps (fig. 5) and low, narrow, somewhat poorly drained to moderately well drained, gently undulating ridges along the Atlantic Ocean. The one area of this unit is on Hutchinson Island, and it extends the length of the survey area. Natural vegetation in the tidal swamps is mangrove. Natural vegetation on the low, gently undulating ridges is cabbage palms, sawpalmetto, sand live oaks, seagrapes, scattered pines, and numerous grasses.

This map unit makes up about 6,600 acres or about 1.8 percent of the survey area. It is about 55 percent Pompano Variant soils and Kaliga Variant soils that are mapped as an association, about 10 percent Canaveral soils, and 35 percent soils of minor extent.

Pompano Variant soils are very poorly drained. Typically, they have a surface layer of greenish gray fine sand about 1 inch thick and dark gray fine sand about 7 inches thick. The subsurface layers, to a depth of more than 80 inches, are gray and greenish gray fine sand mixed with shell fragments.

Kaliga Variant soils are very poorly drained. Typically, they are black and dark reddish brown muck about 35 inches thick. The underlying material, to a depth of 52 inches or more, is dark grayish brown sandy clay loam.

Canaveral soils are somewhat poorly drained to moderately well drained. Typically, they have a surface layer of dark brown fine sand about 6 inches thick. The subsurface layers are pale brown and gray fine sand mixed with shell fragments.

Of minor extent are the Turnbull Variant, Palm Beach, and Myakka soils, and Beaches.

Most areas of this map unit are in natural vegetation. Some areas, particularly the better drained areas along the coast, are used for homesites or other urban purposes.

Soil maps for detailed planning

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."

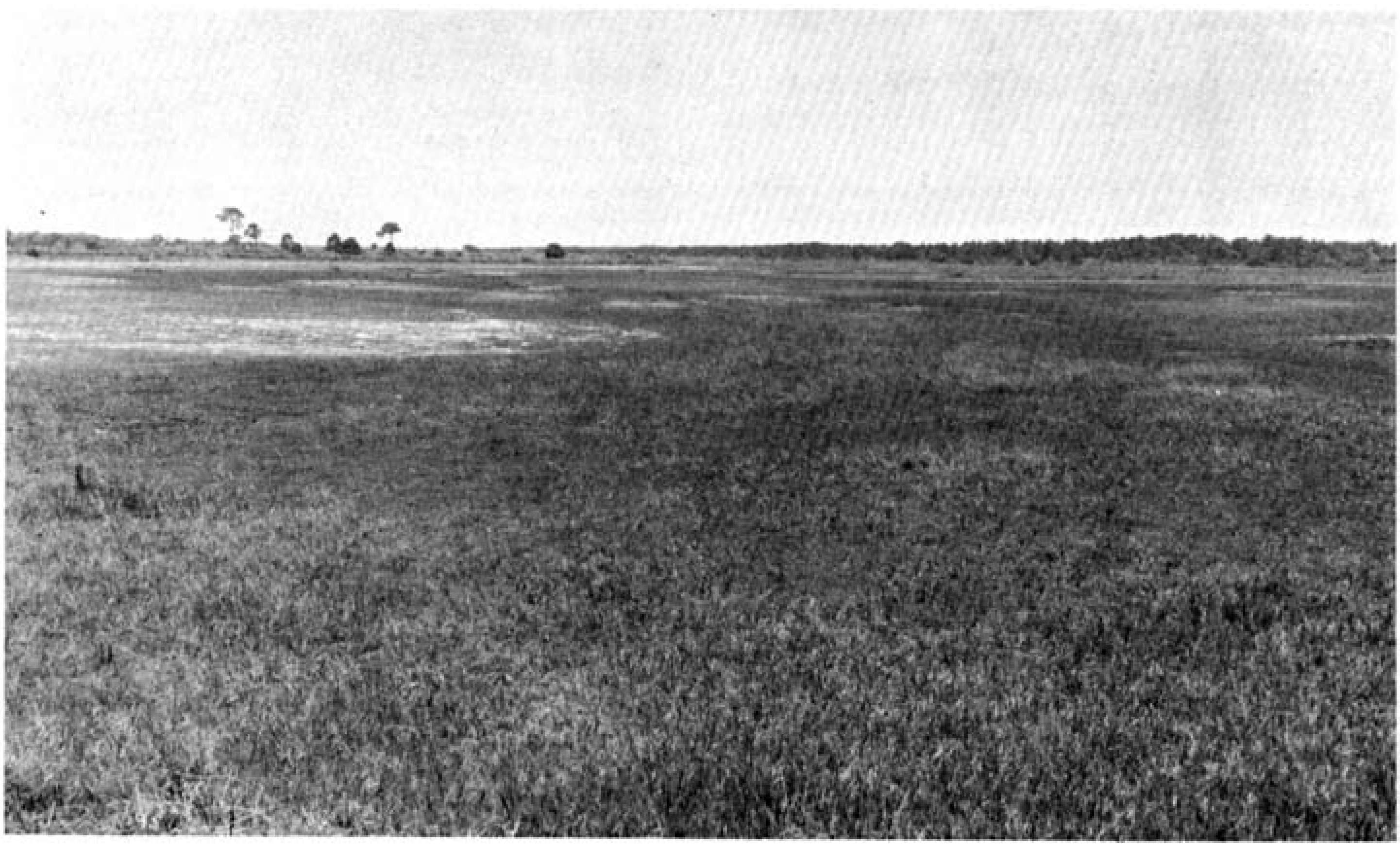

Figure 4.—Cordgrass and sawgrass on the Samsula-Myakka Variant association in an area of the Savannahs.

Figure 5.—Mangrove swamp in an area of the Pompano Variant-Kaliga Variant association. These swamps are common in the Indian River between Hutchinson Island and the mainland.

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 symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil, a brief description of the soil profile, and a listing of the principal hazards and limitations to be considered in planning management.

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, Riviera fine sand is one of several phases in the Riviera series.

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

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. Waveland-Lawnwood complex is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Pompano Variant-Kaliga Variant 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. Pits 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—Anclote sand. This very poorly drained, nearly level soil is in depressional areas and swamps. Slopes are smooth to concave and are less than 1 percent in most places, but they range from 0 to 2 percent.

Typically, the surface layer is sand 21 inches thick. It is black in the upper 4 inches and very dark gray in the lower 17 inches. The substratum is sand to a depth of 80 inches or more. It is gray in the upper 9 inches, dark grayish brown in the next 7 inches, and grayish brown below this layer.

Included with this soil in mapping are areas of Basinger soils and Floridana soils. Each of the included soils makes up less than 20 percent of any mapped area.

The water table in Anclote sand is at or near the surface during the rainy season in summer and after periods of heavy rainfall in other seasons and recedes to a depth of more than 20 inches the rest of the year. Available water capacity is medium in the surface layer and low in the substratum. Permeability is rapid throughout; however, because of the shallow water table, internal drainage is slow. Natural fertility and organic matter content are medium in the surface layer and low in the substratum.

In a large part of the acreage, natural vegetation is mostly cypress and cabbage palms. Some areas have been cleared and are used for improved pasture.

Under natural conditions, this soil has severe limitations for cultivated crops. It has high potential for vegetable crops if a well designed and adequately maintained water control system that provides rapid removal of excess surface and internal water during heavy rains is installed. Good seedbed preparation, crop rotation, and regular applications of fertilizer are needed. Cover crops should be grown two-thirds of the time and rotated with the vegetable crops. Cover crops and crop residue should be plowed under.

This soil is not suited to citrus without water control. With intensive water control measures, however, it has high potential for citrus. Trees should be planted in beds, and close growing vegetation should be maintained between the trees. Regular applications of fertilizer are needed.

Under natural conditions, this soil is too wet for most improved pasture grasses and legumes. With adequate water control, it has high potential for such plants as pangolagrass, bahiagrasses, and clovers. Simple drainage measures to remove excess surface water and proper applications of fertilizer and lime are needed. Controlled grazing helps to maintain plant vigor for highest yields.

This soil has high potential for pine. Slash pine is better suited than other species. A good water control system is needed to remove excessive surface water if the production potential is to be realized. Severe equipment limitations and seedling mortality are the main management concerns.

This soil has medium potential for dwellings without basements, small commercial buildings, and local roads and streets. Installation of water control measures helps to overcome wetness of the soil. Potential is low for septic tank absorption fields, playgrounds, shallow excavations, and sewage lagoon areas. Water control systems help to overcome the excessive wetness of the soil. Filling and mounding may be needed for septic tank absorption fields. Shoring of sidewalls is needed for shallow excavations, and sealing or lining with impervious material is needed for sewage lagoon areas. Potential is very low for trench type sanitary landfills. Water control systems are needed to overcome excessive wetness, and sealing or lining with impervious material is needed to overcome excessive seepage.

This soil is in capability subclass VIIw.

2—Ankona sand. This poorly drained, nearly level soil is on broad flatwoods. Slopes are smooth to concave and are less than 1 percent in most places, but they range to 2 percent along the edges of depressional areas.

Typically, the surface layer is sand 11 inches thick. It is black in the upper 3 inches and dark gray in the lower 8 inches. The subsurface layer is sand 38 inches thick. It is gray and light gray in the upper 24 inches and grayish brown in the lower 3 inches. The subsoil extends to a depth of 57 inches. It is black, moderately cemented sand in the upper 10 inches and dark grayish brown sandy loam in the lower 9 inches. The substratum, to a depth of 80 inches or more, is olive gray loamy sand.

Included with this soil in mapping are small areas of

Electra, Lawnwood, and Waveland soils. The included soils make up about 15 percent of any mapped area.

The water table in Ankona sand is within a depth of 10 inches for 1 to 4 months and between depths of 10 to 40 inches for 6 months or more during most years. It is perched above the upper part of the subsoil during the rainy season in summer and after periods of heavy rainfall. During extended dry periods the water table recedes to a depth of more than 40 inches. Available water capacity is 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, very slow to slow in the upper part of the subsoil, and moderately rapid to rapid in the lower part of the subsoil and substratum. Natural fertility and organic matter content are low.

In most areas, natural vegetation is south Florida slash pine and an understory of sawpalmetto, waxmyrtle, pawpaw, inkberry, fetterbush, lopsided indiangrass, creeping bluestem, chalky bluestem, Florida threeawn, and pineland threeawn. A few small areas are used for citrus, improved pasture, and urban purposes.

This soil has very severe limitations for cultivated crops mainly because of wetness and low soil fertility. Very intensive management is needed. The soil has medium potential for vegetable crops if a water control system that removes excess water in wet seasons and provides for subsurface irrigation in dry seasons is installed. Close growing, soil improving crops should be grown three-fourths of the time and rotated with the row crops. The soil improving crops and crop residue should be plowed under. Fertilizer and lime should be applied according to the need of the crop.

This soil is not suited to citrus unless very intensive management is provided. It has low potential for citrus if a carefully designed water control system that will maintain the water table below a depth of 4 feet is installed. Trees should be planted in beds to help lower the effective depth of the water table, and a vegetative cover should be maintained between the trees. Regular applications of fertilizer and lime are needed (fig. 6).

This soil has medium potential for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well managed. Water control measures to remove excess surface water after heavy rains and regular applications of fertilizer and lime are needed. Controlled grazing helps to prevent overgrazing and weakening of plants.

This soil has low potential for pine trees. Slash pine is better suited than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoons. Water control measures help to overcome excessive wetness. The size of absorption fields may need to be increased because of slow permeability. Sealing or lining of sewage lagoon areas helps to prevent excessive seepage. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious soil material is needed for trench sanitary landfills and sewage lagoon areas to reduce excessive seepage. Shoring of sidewalls is needed for shallow excavations.

This soil is in capability subclass IVw.

3—Ankona-Urban land complex. This complex consists of Ankona sand and Urban land. The components are so intermingled they cannot be separated at the scale used for mapping. Slope ranges from 0 to 2 percent.

About 50 to 70 percent of the complex is nearly level Ankona soils or Ankona soils that have been reworked or reshaped but are still recognizable as Ankona soil, and 15 to 50 percent is Urban land.

Typically, the surface layer of the Ankona soils is sand 11 inches thick. It is black in the upper 3 inches and dark gray in the lower 8 inches. The subsurface layer is gray, light gray, and grayish brown sand 27 inches thick. The subsoil, to a depth of 57 inches, is moderately cemented, black sand in the upper 10 inches and dark grayish brown sandy loam in the lower 9 inches. The substratum, to a depth of 80 inches or more, is olive gray loamy sand.

The areas of Urban land are covered by houses, streets, driveways, buildings, parking lots, and other uses. Unoccupied areas are mostly lawns, vacant lots, or playgrounds made up of Ankona soils. These areas are so small and intermixed with Urban land that it is impractical to map them separately.

Included with this complex in mapping are about 15 percent Nettles, Electra, Lawnwood, Pendarvis, and Tantile soils. A few areas that have as much as 80 percent or as little as 10 percent Urban land are also included.

Areas of soils that have been modified by grading and shaping are more extensive in newer communities than in older communities. Streets are commonly excavated below the original soil surface and the material excavated is spread over the adjacent area. Sand material from drainage ditches is often used as fill for sloughs or depressions. In addition, material from outside the area is frequently hauled in for fill.

In undrained areas, this complex has a water table within 10 inches of the surface for 1 to 4 months of most years. However, drainage systems have been established in most areas and depth to the water table depends upon the efficiency of the drainage system.

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

This complex is not placed in a capability subclass.

Figure 6.—Young citrus grove on Ankona sand. A good water control system is needed before citrus can be grown on this soil.

4—Arents, 0 to 5 percent slopes. This soil consists of soil material dug from several areas that have different kinds of soil. It is used to fill such areas as low sloughs, marshes, shallow depressions, and swamps above their natural ground levels.

In most places, the Arents soil is made up of loose, sandy mineral material; however, amounts of loamy and weakly cemented sandy materials that were subsoils in other areas are mixed throughout. A variable mixture of lenses, streaks, and pockets occur within short distances. Depth of the fill material ranges from about 20 to 50 inches. Several kinds of mineral soils underlie the fill material.

Included with this soil in mapping are small areas of Canaveral soil and sandy fill material that does not contain fragments of former subsoils. Also included are areas that are used as trench type sanitary landfills. These areas are made up of 50 to 80 percent solid waste materials; for example, plastic, wood, paper, metal, or glass. They are identified on the soil map as "Sanitary landfill."

The water table in this Arents soil is between depths of 20 and 50 inches for most of the year. Available water capacity and permeability are variable.

This soil has severe limitations for cultivated crops because of periodic wetness and low fertility. It has medium potential for vegetable crops if a water control system that removes excess water in wet seasons and provides for irrigation in dry seasons is installed. Good management practices include crop rotation with close growing crops grown at least two-thirds of the time, the plowing under of soil improving crops and other crop residue, and the application of fertilizer and lime according to the need of the crop.

This soil is poorly suited to citrus unless good water control is provided. It has medium potential for citrus if a well designed water control system is installed. Excess water needs to be rapidly removed from the soil to a depth of about 4 feet. Planting trees in beds lowers the effective depth of the water table. A cover of close growing vegetation should be maintained between the trees to protect the soil from erosion. Trees require regular applications of fertilizer. Lime is needed on some areas. Irrigation can be needed in seasons of low rainfall.

This soil has medium potential for improved pasture grasses. Pangolagrass and bahiagrass grow well. A water control system that removes excess surface water in times of high rainfall is needed. Regular applications of fertilizer are needed, and lime is needed in some areas. Carefully controlled grazing helps to maintain healthy plants for highest yields.

This soil has medium potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are the major management concerns.

Except in areas of sanitary landfill, this soil has high potential for dwellings without basements, small commercial buildings, and local roads and streets. Water control measures are needed to help overcome excessive wetness. The sandy surface layer needs to be stabilized for playground use. Except in areas of sanitary landfill, potential is medium for septic tank absorption fields and shallow excavations. Water control and the shoring of sidewalls for shallow excavations are needed. Potential is low for trench type sanitary landfills. Water control and sealing and lining with impervious material are needed. Potential is very low for sewage lagoon areas. Water control and sealing or lining with impervious material are needed.

This soil is in capability subclass IIIw.

5—Arents, 45 to 65 percent slopes. This soil consists of soil materials dug from canals and piled alongside, and materials excavated during construction of highway overpasses and interchanges and used for embankments. Most areas are long and narrow and have narrow ridgetops.

In most places, the Arents soil is made up of intermixed sandy mineral materials and amounts of loamy and weakly cemented sandy materials that were subsoils. A variable mixture of lenses, streaks, and pockets occur within short distances. Depth of the material ranges from a few inches at the outer edges of areas to 10 feet or more.

Included with this soil in mapping are small areas of sandy material that do not contain fragments of former subsoils and a few areas where the slope is less than 45 percent. The included soils make up less than 30 percent of the mapped area.

This Arents soil is not suited to cultivated crops, citrus, improved pasture, or pine. It has very low potential for these uses. Some areas have been shaped to help reduce erosion, and some areas have been covered with vegetation. Spanish needle, natalgrass, and a few other native grasses produce a sparse cover in some areas.

This soil has low potential for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Water control measures are needed to overcome excessive wetness for septic tank absorption fields, buildings without basements, and small commercial buildings. Unstable organic material needs to be removed for local roads and streets, and should be replaced with suitable material if the soil is to be used for dwellings without basements and small commercial buildings. The sandy surface layer should be stablized for playground use. Sealing or lining with impervious soil material is needed to help overcome excessive seepage for trench type sanitary landfills and sewage lagoon areas, and, in addition, water control measures are needed for sewage lagoon areas. Shoring of sidewalls is needed for shallow excavations.

This soil is in capability subclass VIIe.

6—Arents, organic substratum. This soil consists of soil materials dug from several areas with different kinds of soils that have been spread over muck in marshes or mangrove swamps. Slope ranges from 0 to 2 percent.

In most places, the Arents soil is made up of loose, sandy mineral material; however, amounts of loamy and weakly cemented sandy material that were subsoils in other areas are mixed throughout. A variable mixture of lenses, streaks, and pockets are within short distances. Depth of the fill material ranges from about 20 to 70 inches. Muck of variable thickness underlies the fill material, and mineral material underlies the muck.

Included with this soil in mapping are small areas that do not have a muck layer and areas that do not have fragments of former subsoils.

The water table in this Arents soil is within a depth of 50 inches for most of the year. Available water capacity and permeability are variable.

This soil has severe limitations for cultivated crops because of periodic wetness and low fertility. It has medium potential for vegetable crops if a water control system that removes excess water in wet seasons and provides for irrigation in dry seasons is installed. Good management practices include crop rotation that keeps the soil in close growing crops at least two-thirds of the time, the plowing under of soil improving crops and crop residue, and the application of fertilizer and lime according to the need of the crop.

This soil is poorly suited to citrus unless good water control is provided. It has medium potential for citrus if a well designed water control system is installed. Excess water needs to be removed from the soil to a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. A cover of close growing vegetation should be maintained between the trees to protect the soil from erosion. Trees require regular applications of fertilizer. Lime is needed on some areas. For highest yields, irrigation is needed in periods of low rainfall.

This soil has medium potential for improved pasture grasses. Pangolagrass and bahiagrass grow well. A water control system that removes excess surface water in periods of heavy rainfall is needed. Regular applications of fertilizer are required, and lime is needed in some areas. Carefully controlled grazing helps to maintain healthy plants for highest yields.

This soil has medium potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are the major management concerns.

This soil has high potential for playgrounds. However, land shaping and stabilization of the sandy surface layer are needed. Potential is medium for septic tank absorption fields, trench type sanitary landfills, and shallow excavations. The absorption field needs to be fitted to the slope on this soil, trench type sanitary landfills need to be sealed or lined with impervious soil material, and sidewalls of shallow excavations need to be shored. Potential is low for dwellings without basements, small commercial buildings, and local roads and streets. Land shaping is needed for all of these uses. Potential is very low for sewage lagoon areas. Sealing or lining with impervious soil material to overcome excessive seepage is needed.

This soil is in capability subclass IIIw.

7—Astatula sand, 0 to 5 percent slopes. This excessively drained, nearly level to gently sloping soil is on broad, high ridges. Slopes are smooth to convex.

Typically, the surface layer is very dark grayish brown sand about 4 inches thick. The underlying material, to a depth of 110 inches or more, is strong brown sand.

Included with this soil in mapping are small areas of Paola, Pendarvis, and Welaka Variant soils. The included soils make up less than 20 percent of any mapped area.

The water table in Astatula sand is below a depth of 72 inches annually. Available water capacity is very low, and permeability is very rapid. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is cabbage palm, hickory, and longleaf pine and an understory of bryophyllum. The most common native grass is pineland threeawn.

This soil is not suited to cultivated crops. It has very low potential for vegetable crops and low potential for citrus. A ground cover of close growing plants is needed between the trees to protect the soil from blowing. A well designed irrigation system is needed to maintain optimum moisture conditions and assure highest yields.

This soil has low potential for improved pasture grasses. Deep rooted plants, for example, coastal bermudagrass and bahiagrasses are well adapted, but yields are reduced by periodic droughts. Regular applications of fertilizer and lime are needed. Controlled grazing is needed to permit plants to recover from grazing and to help maintain vigor.

This soil has low potential for pine. Slash pine and sand pine are better suited than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil has very high potential for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed. Potential is high for small commercial buildings. Land shaping may be needed on the more sloping areas. Potential is medium for playgrounds, trench type 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 with impervious material is needed to reduce excessive seepage for trench type sanitary landfills. Shoring of sidewalls is needed for shallow excavations. Potential is very low for sewage lagoon areas. Sealing or lining with impervious soil material is needed to reduce excessive seepage.

This soil is in capability subclass VIs.

8—Basinger sand. This poorly drained, nearly level soil is in sloughs, on broad low flats, and along poorly defined drainageways in the flatwoods. Slopes are smooth to concave and are less than 1 percent in most places, but they range from 0 to 2 percent.

Typically, the surface layer is very dark gray sand about 5 inches thick. The subsurface layer is light brownish gray sand 21 inches thick. The subsoil is dark brown sand to a depth of 55 inches. The substratum, to a depth of 80 inches or more, is pale brown sand.

Included with this soil in mapping are small areas of Anclote, Myakka, and Pompano soil. Also included are areas that have a dark surface layer 6 to 10 inches thick, areas that have a loamy substratum, and areas that are brown and yellow in the substratum. The included soils make up less than 30 percent of any mapped area.

The water table in Basinger sand is at a depth of less than 10 inches for 2 to 6 months annually and between depths of 10 to 30 inches for periods of more than 6 months in most years. Available water capacity is low, and permeability is very rapid. However, internal drainage is slow because of a shallow water table. Natural fertility and organic matter content are low.

Natural vegetation consists of a few scattered slash pine and an understory of waxmyrtle, inkberry, sawpalmetto, and pondweed. In some areas in low hammocks, vegetation is mostly live oak and cabbage palms. The most common native grass is pineland threeawn. Creeping bluestem, lopsided indiangrass, blue maidencane, and Florida paspalum are also grown in this soil.

This soil has very severe limitations for crops because of wetness and low fertility. However, the soil has medium potential for some vegetable crops if very intensive management practices are followed. Soil improving measures and a good water control system that removes excess water in wet seasons and provides for irrigation in dry seasons are needed. Close growing, soil improving crops should be kept on the soil three-fourths of the time and rotated with the row crops. These soil improving crops and crop residue should be plowed under. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil is poorly suited to citrus under natural conditions. However, it has low potential for citrus if a carefully designed water control system that maintains the water table below a depth of 4 feet is installed. Planting trees in beds lowers the effective depth of the water table. Regular applications of fertilizer and lime are needed.

This soil has low potential for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well managed. Water control measures are needed to remove excess surface water during heavy rains. Regular applications of fertilizer and lime are needed. Controlled grazing is needed to prevent overgrazing and weakening of the plants.

This soil has low potential for pine. Slash pine is better suited than other species. A good water control system is needed to remove excessive surface water if the production potential is to be realized. Equipment limitations and moderate seedling mortality are the main management concerns.

This soil has medium potential for septic tank absorption fields, dwellings without basements, small commercial buildings, and local roads and streets. Water control measures are needed to overcome excessive wetness. Mounding may be needed for septic tank absorption fields. Potential is low for playgrounds and shallow excavations. Water control measures are needed. The sandy surface should be stabilized for playground use, and the sidewalls of shallow excavations should be shored. Potential is very low for trench type sanitary landfills and for sewage lagoon areas. Water control measures and sealing or lining with impervious soil material are needed.

This soil is in capability subclass IVw.

9—Beaches. Beaches consist of narrow strips of tide washed, very rapidly permeable sand along the Atlantic coast line (fig. 7). Beaches range from less than 100 feet to more than 500 feet in width, but in most places they are less than 200 feet wide. As much as half of the beach can be covered by water during daily high tides, and all of it can be covered during periods of storm. The shape and slope of the beaches commonly change with every storm. Most areas have a uniform, gentle slope to the water's edge. Other areas have wave-built ridges with short, stronger slopes ranging to 15 percent or more, and a few shallow inland swales.

Most beaches have no vegetation, but inland edges are sometimes sparsely covered with moonvine, railroad vine, sea oats, and seashore bermudagrass.

The water table ranges from a depth of 0 to 6 feet or more. The depth is highly variable, depending on distance from the water, height of the beach, effect of storms, and time of year.

Beaches are frequently mixed and reworked by waves. Near the water's edge the sand is firm or compact, but farther back the sand is drier and is loose. The beaches are made up of pale brown to light gray uncoated quartz sand grains mixed with multicolored, sand-size to 1/2-inch shell fragments and few to many coarser shell fragments. Some areas have pockets or lenses of coquina shell or large shell fragments and little or no sand. A few places in this map unit have rock outcrop. If the outcrop is at the water's edge, it commonly acts as a barrier to each incoming wave. Some areas are underlain by organic material.

Beaches are not suited to row crops, citrus, or pasture. They have very low potential for these uses. They are suited mainly to recreation and wildlife habitat. Because the beaches have great esthetic value, they are an important part of the waterfront.

This soil has very low potential for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. There are no feasible practical measures to overcome wetness and the hazard of flooding of this soil.

This soil is in capability subclass VIIIw.

10—Canaveral fine sand, 0 to 5 percent slopes. This moderately well drained to somewhat poorly drained, nearly level to gently sloping soil is on low dunelike ridges and side slopes that border depressional areas and sloughs near the coast. Slopes are smooth to concave in the sloughs and smooth to convex on the low dunelike ridges.

Typically, the surface layer is dark brown fine sand about 6 inches thick. The underlying material extends to a depth of 80 inches or more. The upper part, to a depth of 28 inches, is pale brown fine sand and the lower part is gray fine sand. There are many sand-size shell fragments.

Included with this soil in mapping are small areas of

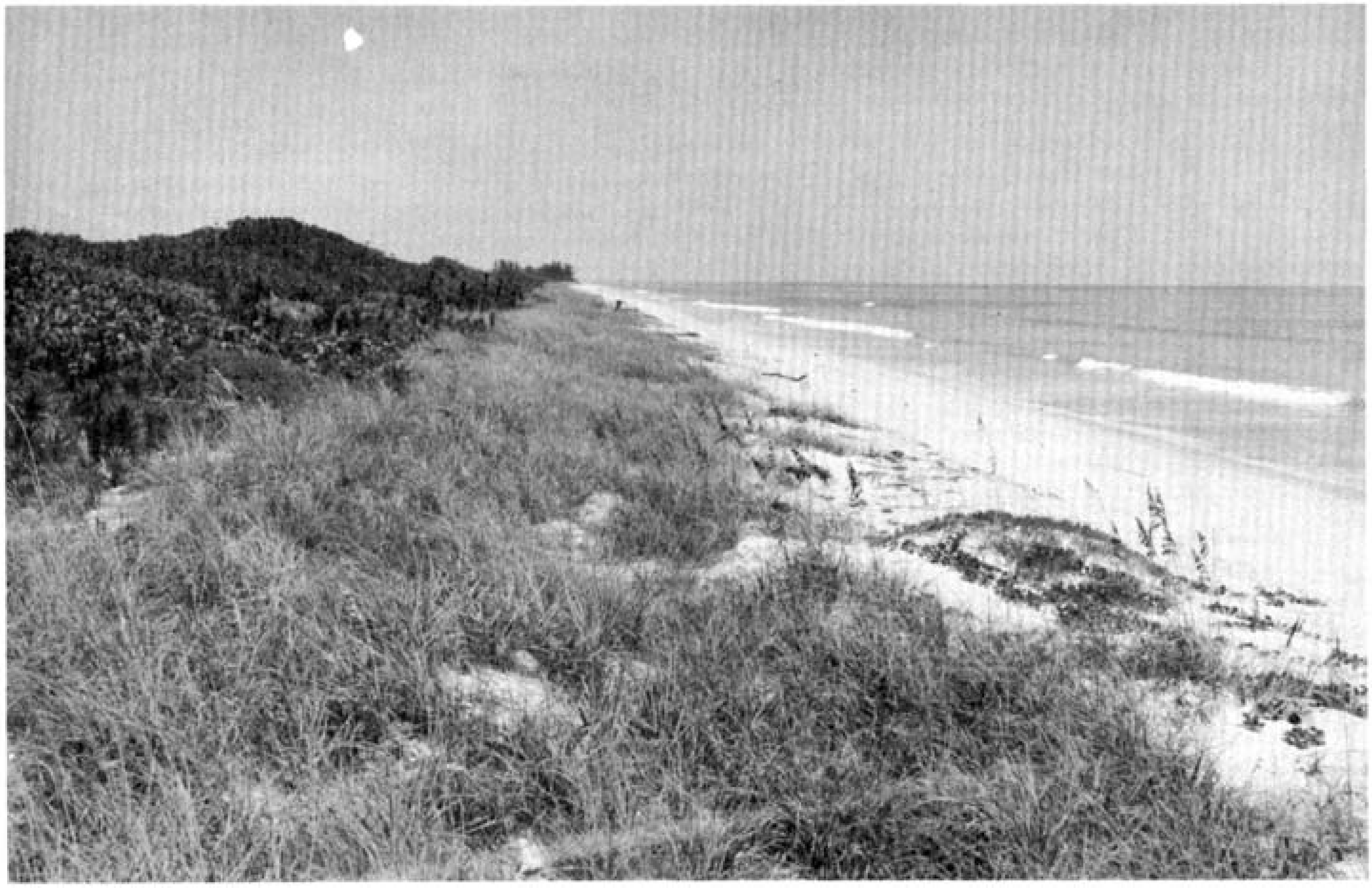

Figure 7.—Area of Beaches. Canaveral fine sand, 0 to 5 percent slopes, is on the beach and Palm Beach fine sand, 0 to 5 percent slopes, is on the high ridge.

Pompano, Myakka, and Palm Beach soils, about 10 percent of which have a dark surface layer. Also included are thin ledges of limestone. The included soils make up less than 30 percent of any mapped area.

The water table in Canaveral fine sand is between depths of 10 to 40 inches for 2 to 6 months or more and is within a depth of 60 inches for most of the rest of the year. Available water capacity is very low, and permeability is very rapid. Rainfall is rapidly absorbed but moves rapidly through the soil and very little water is retained. Natural fertility and organic matter content are very low.

In most areas, natural vegetation is cabbage palms, scattered sawpalmetto, magnolia, bay, and scattered slash pine. The understory is inkberry and pineland threeawn.

This soil is not suited to vegetable or other cultivated crops, and it is poorly suited to citrus and improved pasture grasses. It has very low potential for vegetable crops and low potential for citrus and pasture. Low natural fertility and a lack of water retention severely reduce the variety of grasses.

This soil has low potential for pine trees. Slash pine grows better than other species. Moderate equipment limitations and severe seedling mortality are the main management concerns.

This soil has very high potential for local roads and streets, and high potential for septic tank absorption fields, dwellings without basements, and small commercial buildings. Water control measures help to overcome excessive wetness. The soil has medium potential for playgrounds, trench type sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for playground use. Water control measures and sealing or lining with impervious material are needed to help reduce excessive seepage rates for trench type sanitary landfills, and shoring of sidewalls and water control measures are needed for shallow excavations. The soil has very low potential for sewage lagoon areas. Water control measures and sealing or lining with impervious material are needed to reduce excessive seepage.

This soil is in capability subclass VIs.

11—Chobee loamy sand. This very poorly drained, nearly level soil is in small to large depressional areas, along poorly defined drainageways, and on low lying flats. Slopes are smooth to concave and are less than 1 percent in most places, but they range from 0 to 2 percent.

Typically, the surface layer is black loamy sand 11 inches thick. The subsoil, to a depth of 80 inches or more, is sandy clay loam. In sequence from the top, it is black in the upper 13 inches; very dark gray in the next 11 inches; dark gray in the next 5 inches; gray with light gray calcareous nodules in the next 30 inches; and gray in the lower part.

Included with this soil in mapping are small areas of Winder Variant, Floridana, Hallandale, and Kaliga soils. Also included are areas of soils that have a thin muck surface layer. These soils are generally in the center of areas. The included soils make up less than 20 percent of any mapped area.

The water table in Chobee loamy sand is above the surface for 6 to 9 months in most years and within a depth of 10 inches for most of the rest of the year. In dry seasons, it is below a depth of 40 inches for short periods. Available water capacity is medium, and permeability is moderately rapid in the surface layer and slow to very slow in the subsoil. Natural fertility is high.

A large part of the acreage is planted to citrus. Natural vegetation is pickerelweed, lilies, and sawgrass in treeless areas and cypress or swamp maple, sweetgum, water oak, and cabbage palm in wooded areas.

Under natural conditions, Chobee soil has severe limitations for cultivated crops because of wetness. However, it has high potential for many crops if a well designed and maintained water control system that provides rapid removal of excess water during heavy rains is installed. Other soil management practices should include good seedbed preparation, crop rotation, and regular applications of fertilizer. Soil improving cover crops need to be grown at least two-thirds of the time and rotated with the row crops. Soil improving crops and crop residue should be plowed under.

This soil is not suited to citrus without water control. It has high potential for citrus 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 good cover of close growing vegetation is needed between the trees to prevent erosion. Regular applications of fertilizer are needed.

This soil is too wet for most improved pasture grasses under natural conditions; however, it has high potential if adequate water control is provided. Simple measures to remove water after rain are needed. Adequate applications of fertilizer and lime help to obtain high yields of pangolagrass, bahiagrasses, and white clover. Controlled grazing is needed to maintain plant vigor.

This soil has high potential for pine, but a good water control system is needed to remove excessive surface water if the production potential is to be realized. Slash pine is better adapted than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for sewage lagoon areas. Water control measures are needed to overcome excessive wetness. Potential is medium for trench type sanitary landfills and shallow excavations. Water control measures are needed to overcome excessive wetness. Potential is low for dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Water control measures are needed. Potential is very low for septic tank absorption fields. The installation of water control measures, addition of fill material, and mounding of the septic tank absorption field help to overcome excessive wetness.

This soil is in capability subclass IIIw.

12—Electra fine sand, 0 to 5 percent slopes. This somewhat poorly drained, nearly level and gently sloping soil is on low ridges and knolls. Slopes are smooth to convex and are less than 3 percent in most places, but they range from 0 to 5 percent.

Typically, the surface layer is gray fine sand 7 inches thick. The subsurface layer is white fine sand 40 inches thick. The subsoil extends to a depth of 80 inches or more. It is dark reddish brown fine sand in the upper 13 inches and light brownish gray fine sandy loam below this layer.

Included with this soil in mapping are small areas of Ankona, Hobe, Jonathan, and Pendarvis soils. The included soils make up less than 15 percent of any mapped area.

The water table in Electra fine sand is between depths of 25 to 40 inches for about 4 months and below a depth of 40 inches during dry periods. Available water capacity is very low to low to a depth of 47 inches and medium below this depth. Permeability is very rapid to a depth of 47 inches, moderate to a depth of 60 inches, and moderately slow to a depth of 80 inches or more. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is south Florida slash pine and scrub oak and an understory of sawpalmetto, fetterbush, gopherapple, tarflower, and running oak. The most common native grass is pineland threeawn.

This soil is not suited to cultivated crops. It has low potential for vegetables and citrus and medium potential for improved pasture grasses that are resistant to droughty conditions. Irrigation is needed in periods of low rainfall for highest yields. Grazing needs to be carefully controlled.

This soil has low potential for pine. Slash pine and sand pine are the best adapted species. Equipment limitations and seedling mortality are the main management concerns.

This soil has very high potential for dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed. Potential is high for septic tank absorption fields. Water control is needed. Potential is medium for playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. The sandy surface layer should be stabilized for playground use. Water control measures are needed for many uses. Sealing or lining with impervious soil material is needed for trench type sanitary landfills and sewage lagoon areas. Shoring of sidewalls is needed for shallow excavations.

This soil is in capability subclass VIs.

13—Floridana sand. This very poorly drained, nearly level soil is in wet depressional areas and on broad low flats. Slopes are smooth to concave and are less than 1 percent in most places, but they range from 0 to 2 percent.

Typically, the surface layer is 21 inches thick. In sequence from the top, it is black sand in the upper 3 inches; very dark gray sand in the next 2 inches; black sand in the next 6 inches; and very dark gray sand in the lower 10 inches. The subsurface layer is dark gray sand 4 inches thick. The subsoil extends to a depth of 60 inches. In sequence from the top of this layer, it is dark gray sandy clay loam with sandy krotovinas in the upper 12 inches; dark gray sandy clay loam in the next 13 inches; and gray sandy loam below this layer. The underlying material, to a depth of more than 80 inches, is gray and light gray sandy clay loam.

Included with this soil in mapping are small areas of Pineda, Riviera, and Winder soils. Also included are areas that have a light colored subsurface layer and areas that have a dark surface layer more than 24 inches thick. The included areas make up less than 15 percent of the map unit.

Floridana sand is ponded for more than 6 months annually. Available water capacity is medium in the surface layer and subsoil and low in the subsurface layer. Permeability is rapid in the surface and subsurface layers and slow to very slow in the subsoil. Internal drainage is slow because o a shallow water table. Natural fertility and organic matter are medium to a depth of 20 inches and low below this depth.

In a large part of the acreage, natural vegetation is sandweed and sand cordgrass in the depressional areas (fig. 8) and waxmyrtle on the broad low flats. In places, the vegetation is almost entirely cypress.

This soil is not suitable for cultivation under natural conditions. It has high potential for many vegetable crops if a well designed and maintained water control system that provides for rapid removal of excess water during heavy rains is installed. Other important soil management practices are good seedbed preparation, crop rotation, and regular applications of fertilizer and lime. Cover crops should be grown two-thirds of the time and rotated with the row crops. The soil improving crops and crop residue should be plowed under.

This soil is not suited to citrus unless water control measures that will maintain good soil aeration to a depth of about 4 feet are provided. The soil has high potential for citrus if water control is provided and if trees are planted in beds. A good cover of close growing vegetation is needed between the trees to prevent erosion. Trees require regular applications of fertilizer.

Under natural conditions, this soil is too wet for improved pasture grasses and legumes. It has high potential for many grasses and legumes if water control is provided. Pangolagrass, bahiagrasses, and clovers grow well if adequate amounts of fertilizer and lime are applied. Controlled grazing is needed to maintain plant vigor for highest yields.

This soil has high potential for pine if water control measures are provided. Slash pine is better adapted than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for sewage lagoon areas. Water control measures are needed to overcome excessive wetness. Potential is medium for trench type sanitary landfills and shallow excavations. Water control measures are needed. Potential is low for dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Water control measures are needed. Potential is very low for septic tank absorption fields. Installation of water control measures, the addition of fill material, and mounding of the septic tank absorption field help to overcome excessive wetness.

This soil is in capability subclass VIIw.

14—Fluvaquents. This very poorly drained, nearly level soil is on flood plains of rivers and creeks. Slopes are smooth to concave or convex and range from 0 to 2 percent. Color, texture, and thickness of the soil layers are variable within short distances. Texture ranges from sand to clay and thickness of layers ranges from 2 to 30 inches.

Included with this soil in mapping are small areas of Chobee, Kaliga, Pompano, Riviera, and Winder soils. The included soils make up less than 30 percent of any mapped area.

The water table in Fluvaquents is at a depth of less than 10 inches for 4 to 6 months and within a depth of 40 inches for 9 to 12 months. More than once every 2 years the soils are flooded for a period of 7 to 30 days. Available water capacity is medium to high in the loamy and clayey layers and low in the sandy layers. Permeability is rapid in the sandy layers and moderate to very slow in the loamy and clayey layers. Natural fertility and content of organic matter are low, but they vary.

Natural vegetation is cabbage palms and wetland hardwoods and an understory of sawpalmetto and herbaceous plants.

This soil is not suited to vegetable crops, citrus, pasture, or pine because of the hazard of flooding. It has very low potential for these uses.

Figure 8.—Pickerelweed, cordgrass, and stillingia in a very wet area of Floridana sand.

This soil has low potential for shallow excavations and for playgrounds and very low potential for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, trench type sanitary landfills, and sewage lagoon areas. Water control measures and flood protection are needed for all these uses. In addition, mounding may be needed for septic tank absorption fields.

This soil is in capability subclass VIIw.

15—Hallandale sand. This poorly drained, nearly level soil is on broad low flats, in low hammocks, and along poorly defined drainageways. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is very dark gray sand about 6 inches thick. The substratum to a depth of 12 inches is dark grayish brown sand in the upper 4 inches and a discontinuous layer of dark grayish brown loamy sand in the lower 2 inches. Below this is a 25-inch, hard fractured limestone ledge containing solution holes (fig. 9). The lower part of the substratum, to a depth of 80 inches or more, is gray sand that contains shell fragments.

Included with this soil in mapping are small areas of Hilolo, Pople, and Winder Variant soils. Also included are areas where the limestone ledge is within a depth of 7 inches, areas that have more than 7 inches of dark surface soil, and areas that have a sandy clay loam subsoil. The included soils make up less than 20 percent of any mapped area.

The water table in Hallandale sand is at a depth of less than 10 inches for 1 to 4 months and within a depth of 20 inches for 6 months or more. In the dry season, it is below the limestone ledge. Available water capacity is low in the surface layer, very low in the subsurface layer, and medium in the subsoil. Permeability is rapid throughout. Water moves through the solution holes in the limestone freely. Natural fertility is low.

Some of this soil has been cleared and is planted to citrus. The rest is in natural vegetation of slash pine and live oak and an understory of sawpalmetto and cabbage palm. Grasses are pineland threeawn and bluestem.

Under natural conditions this soil has very severe limitations for cultivated crops. Shallow rock and a high

Figure 9.—Profile of Hallandale sand. Hard limestone is a few inches below the surface.

water table near the surface during much of the year severely restrict root development. The soil has medium potential for vegetable crops if a good water control system is installed and soil improving measures are used. Excess water in wet seasons needs to be removed if the production potential of this soil is to be realized. Because rock is near the surface, the construction of a good water control system is difficult. Close growing, soil improving crops should be kept on the soil three-fourths of the time and rotated with the row crops. The soil improving crops and crop residue should be plowed under. Fertilizer and lime should be applied according to the need of the crop.

This soil has medium potential for citrus if very intensive management that includes a carefully designed water control system is provided. The water control system should maintain the water table below a depth of about 4 feet. Planting trees in beds lowers the effective depth of the water table. A vegetative cover should be maintained between the trees. Regular applications of fertilizer and lime are needed.

This soil has high potential for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well managed. Water control measures are needed to remove excess surface water after heavy rains, and regular applications of fertilizer and lime are required. Grazing should be controlled to prevent overgrazing and weakening of the plants.

This soil has low potential for pine. Slash pine is the best adapted species. The hazard of windthrow, equipment limitations, and seedling mortality are the main management concerns. Proper water control is needed if the production potential is to be realized.

This soil has medium potential for dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Water control measures are needed. The sandy surface layer should be stabilized for playground use. Potential is low for septic tank absorption fields, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Water control measures are needed. Sealing or lining with impervious soil material helps to reduce excessive seepage for trench type sanitary landfills and sewage lagoon areas.

This soil is in capability subclass IVw.

16—Hilolo loamy sand. This poorly drained, nearly level soil is on hammocks and along borders of depressional areas and sloughs. Slopes are smooth to convex and are less than 1 percent in most places, but they range from 0 to 2 percent.

Typically, the surface layer is loamy sand 7 inches thick. It is very dark gray in the upper 2 inches and black in the lower 3 inches. The subsoil extends to a depth of 53 inches. In sequence from the top of this layer, it is dark gray fine sandy loam in the upper 5 inches; dark gray sandy clay loam in the next 16 inches; gray fine sandy loam in the next 8 inches; and olive gray fine sandy loam in the lower 17 inches. The substratum, to a depth of more than 80 inches, is light olive gray loamy fine sand in the upper 21 inches and gray fine sandy loam below this layer.

Included with this soil in mapping are small areas of Winder Variant, Hallandale, Pineda, Pople, and Riviera soils. Also included are a few areas that have limestone boulders in the subsoil and areas that have a light colored subsurface layer. The included soils make up less than 35 percent of any mapped area.

The water table in Hilolo loamy sand is at a depth of less than 10 inches for 2 to 4 months in most years. It is between depths of 10 to 40 inches for 6 to 9 months and below a depth of 40 inches during dry periods. Available water capacity is low to medium in the surface layer and substratum and medium in the subsoil. Permeability is moderate to moderately slow in the subsoil and slow to very slow in the substratum. Natural fertility and organic matter content are moderate.

Most of the acreage has been cleared and is used for citrus. Natural vegetation is cabbage palms, water oak, longleaf pine, and slash pine, and an understory of waxmyrtle, sawpalmetto, and inkberry. The most common native grass is pineland threeawn.

This soil has severe limitations for cultivated crops because of wetness. It has high potential for vegetable crops if a complete water control system is installed and maintained. Such a system should remove excess surface water and internal water rapidly, and provide for subsurface irrigation. Good soil management includes crop rotation that keeps the soil in close growing crops at least two-thirds of the time. These soil improving crops and crop residue should be plowed under. Other important management practices are good seedbed preparation that includes bedding, and the application of fertilizers according to the need of the crop.

This soil has high potential for citrus if a water control system that maintains good drainage to about a depth of 4 feet is installed. Planting the trees in beds lowers the effective depth of the water table. A good cover of close growing vegetation should be maintained between the trees to protect the soil from erosion. Regular applications of fertilizer are required, but liming is not needed.

This soil has high potential for improved pasture grasses. It is well suited to pangolagrass, bahiagrasses, and clovers. Good pastures of grass or grass-clover mixtures can be grown with good management. Regular applications of fertilizer are needed, and grazing should be controlled for highest yields.

This soil has medium potential for pine. Slash pine is better adapted than other species. Water control is needed if the production potential is to be realized. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas and medium potential for playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to overcome excessive wetness. The sandy surface layer should be stabilized for playground use. Potential is low for septic tank absorption fields. Water control measures are needed, and the size of the absorption field should be increased.

This soil is in capability subclass IIIw.

17—Hobe sand, 0 to 5 percent slopes. This somewhat excessively drained, nearly level and gently sloping soil is on ridges and knolls in the flatwoods. Slopes are smooth to convex.

Typically, the surface layer is gray sand 5 inches thick. The subsurface layer is white sand 50 inches thick. The subsoil extends to a depth of more than 80 inches. It is black sand in the upper 10 inches and light brownish gray sandy loam below this layer.

Included with this soil in mapping is about 15 percent Electra, Jonathan, and Pendarvis soils. Also included are about 30 percent areas that do not have an argillic horizon within a depth of 80 inches. The included soils make up 30 percent of any mapped area.

The water table in Hobe sand is between depths of 50 to 60 inches for brief periods following heavy rainfall. It is generally between depths of 60 to 80 inches in wet seasons and below a depth of 80 inches during dry seasons. Available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is longleaf pine and slash pine in the lower areas and sand pine in the higher areas. The understory is scrub oak, rosemary, sawpalmetto, running oak, and pineland threeawn (fig. 10).

This soil is not suited to cultivated crops. It has low potential for citrus and improved pasture grasses and very low potential for vegetable crops.

This soil has very low potential for pine. Sand pine is better adapted than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil has very high potential for dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed. Potential is high for septic tank absorption fields and playgrounds. Water control measures are needed for septic tank absorption fields. The sandy surface layer should be stabilized for playground use. Potential is medium for shallow excavations. Water control is needed, and sidewalls should be shored. Potential is low for trench type sanitary landfills and sewage lagoon areas. Water control is needed. Sealing or lining with impervious soil material helps to overcome excessive seepage.

This soil is in capability subclass VIs.

18—Hontoon muck. This very poorly drained, nearly level organic soil is in fresh water swamps and broad marshes. Slopes are smooth to concave and are less than 1 percent in most places, but they range from 0 to 2 percent.

Typically, the surface layer is dark reddish brown muck about 6 inches thick. It is underlain to a depth of about 55 inches with dark reddish brown muck. Between depths of about 55 to 60 inches is black muck that has a high mineral content.

Included with this soil in mapping are small areas of Samsula Variant, Kaliga, and Myakka Variant soils. The included soils make up about 20 percent of any mapped area.

Figure 10.—Sand pine, scrub live oak, and sawpalmetto on an area of Hobe sand, 0 to 5 percent slopes.

The water table in Hontoon muck is at or above the surface for 6 to 9 months in most years. It is within a depth of 10 inches for most of the rest of the year. Available water capacity is high, and permeability is rapid. Natural fertility and organic matter are moderate.

In a large part of the acreage, natural vegetation is sawgrass and buttonbush. Maidencane occurs in places.

This soil has severe limitations for cultivated crops because of wetness. It is not suitable for cultivation under natural conditions, but it has high potential for vegetable crops if a well designed and maintained water control system is installed. This system needs to remove excess water from the soil when crops are growing and keep the soil saturated with water at all other times. Cover crops and crop residue should be plowed under.

This soil is not suited to citrus. It has very low potential for this use.

This soil has very high potential for improved grasses and clovers adapted to the area if water is properly controlled. Pangolagrass, bahiagrasses, and white clover produce high yields. The water table should be maintained near the surface to prevent excessive oxidation of the organic horizons. Applications of fertilizer that contain minor elements are needed. Grazing should be controlled for maximum yields.

This soil is not suited to pine. It has very low potential for this use.

This soil has very low potential for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Water control measures are needed. Because it has low strength, organic material should be replaced with suitable material for dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Sealing with impervious soil material is needed for trench type sanitary landfills and shallow lagoon areas.

This soil is in capability subclass IIIw.

19—Jonathan sand, 0 to 5 percent slopes. This moderately well drained, nearly level to gently sloping soil is on slightly elevated knolls and ridges. Slopes are smooth to convex.

Typically, the surface layer is gray sand 3 inches thick. The subsurface layer is white sand 65 inches thick. The subsoil, to a depth of 80 inches or more, is black, weakly cemented sand.

Included with this soil in mapping are areas of Hobe, Pendarvis, Salerno, and Waveland soils. The included soils make up less than 15 percent of any mapped area.

The water table in Jonathan sand is between depths of 40 to 60 inches for 1 to 4 months during the summer rainy season. It is below a depth of 60 inches for most of the rest of the year. Available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and slow to very slow in the subsoil. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is south Florida slash pine and several species of scrub oak, and an understory of sawpalmetto, fetterbush, gopherapple, tarflower, and running oak. The most common native grass is pineland threeawn.

This soil is not suited to cultivated crops. It has low potential for vegetable crops, citrus, and improved pasture grasses.

This soil has very low potential for pine. Sand pine is better adapted than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil has very high potential for dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed. Potential is high for septic tank absorption fields and playgrounds. Water control measures are needed for septic tank absorption fields. The sandy surface layer should be stabilized for playground use. Potential is medium for shallow excavations. Sidewalls should be shored. Potential is low for trench type sanitary landfills and sewage lagoon areas. Sealing or lining with impervious soil material is needed to reduce excessive seepage. Water control is needed for trench type sanitary landfills.

This soil is in capability subclass VIs.

20—Kaliga muck. This very poorly drained, nearly level organic soil is in fresh swamps and depressions. Areas range from small to large. Slope is less than 1 percent.

Typically, the surface layer is black muck about 27 inches thick. The next layer is dark reddish brown muck about 8 inches thick. The substratum, to a depth of 52 inches or more, is dark grayish brown sandy clay loam.

Included with this soil in mapping are small areas that are slightly less than 16 inches of muck and areas of Chobee, Floridana, and Hontoon soils. The included soils make up less than 20 percent of any mapped area.

The water table in Kaliga muck is at or above the surface except for extended dry periods. Available water capacity is high in the organic material and medium in the substratum, and permeability is rapid in the organic material and slow in the substratum. Natural fertility and organic matter content are high.

Natural vegetation is mostly buttonbush and sawgrass.

This soil has severe limitations for cultivated crops under natural conditions. It has high potential for vegetable crops if adequate water control is provided. A well designed and maintained water control system that removes excess water from the soil when vegetable crops are growing and keeps the soils saturated with water at all other times is needed. Cover crops and crop residue should be plowed under.

This soil is not suited to citrus. It has very low potential for this use.

This soil has high potential for improved pasture grasses and clovers if water is properly controlled. Pangolagrass, bahiagrasses, and white clover grow well. The water control system should maintain the water table near the surface to prevent excessive oxidation of the organic horizons. Grazing should be controlled for maximum yields.

This soil is not suited to pine. It has very low potential for this use.

This soil has very low potential for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Water control measures are needed. Because it has low strength, organic material needs to be replaced with suitable material for dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Sealing with impervious soil material is needed for trench type sanitary landfills and shallow lagoon areas.

This soil is in capability subclass IIIw.

21—Lawnwood sand. This poorly drained, nearly level soil is on broad flatwoods. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is about 8 inches thick. It is black sand in the upper 4 inches and very dark gray sand in the lower 4 inches. The subsurface layer is 21 inches thick. It is gray sand in the upper 7 inches and light gray sand in the lower 13 inches. The subsoil extends to a depth of 58 inches. The upper 24 inches is black, weakly cemented sand and the lower 6 inches is dark reddish brown sand. The substratum, to a depth of 80 inches, is pale olive sand that has a few large scattered pockets of loamy sand.

Included with this soil in mapping are small areas of Electra, Ankona, and Waveland soils. The included soils make up about 20 percent of any mapped area.

The water table in Lawnwood sand is within a depth of 10 inches for 1 to 4 months and is between depths of 10 to 40 inches for 6 months or more during most years. A water table is perched above the subsoil during the summer rainy season or after periods of heavy rainfall. It recedes to a depth of less than 40 inches during extended dry seasons. Available water capacity is low in the surface layer, very low in the subsurface layer, medium in the subsoil, and medium to low in the substratum. Permeability is rapid in the surface and subsurface layers, very slow to slow in the subsoil, and moderate to rapid in the substratum. Natural fertility and organic matter content are low.

This soil has very severe limitations for cultivated crops because of wetness. It has medium potential for vegetable crops if a water control system that removes excess water is provided. Good management includes crop rotation that keeps the soil in close growing, soil improving crops at least two-thirds of the time. These crops and crop residue should be plowed under. Fertilizer and lime should be applied according to the need of the crop.

This soil is poorly suited to citrus because of wetness. However, it has low potential for citrus if good drainage and good management are provided. Drainage outlets should be adequate to remove excess water from the soil rapidly to a depth of about 4 feet after heavy rains. Planting the trees in beds lowers the effective depth of the water table. A cover of close growing vegetation between the trees is needed to protect the soil from erosion. Regular applications of fertilizer are required. Irrigation is needed in seasons of low rainfall for highest yields.

This soil is well suited to improved pasture grasses, and it has medium potential for this use. Pangolagrass, bahiagrass, and clovers are well adapted and grow well if a water control system that removes surface water after heavy rainfall is provided. Regular applications of fertilizer are required. Grazing should be carefully controlled to maintain healthy plants for highest yields.

This soil has low potential for pine. Slash pine is the best adapted species. A good drainage system that removes excessive surface water is needed if the production potential is to be realized. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, and local roads and streets. Water control measures are needed. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Installation of water control measures helps to overcome excessive wetness. In some places, the size of the absorption field may need to be increased because permeability rates are lower than is acceptable. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious material to reduce excessive seepage is needed for trench type sanitary landfills and sewage lagoon areas. Shallow excavations should be shored.

This soil is in capability subclass IVw.

22—Lawnwood-Urban land complex. This complex consists of Lawnwood soils and Urban land so intermingled that they cannot be separated at the scale used for mapping. Slope ranges from 0 to 2 percent.

Lawnwood soils that are nearly level, or that have been reworked or reshaped but still are recognizable as Lawnwood soil make up 50 to 70 percent of the complex. Urban land makes up 15 to 50 percent.

Typically, the surface layer of the Lawnwood soils is 8 inches thick. It is black sand in the upper 4 inches and very dark gray sand in the lower 4 inches. The subsurface layer is gray and light gray sand 20 inches thick. The subsoil extends to a depth of 58 inches. It is black, weakly cemented sand in the upper 24 inches and dark reddish brown sand in the lower 6 inches. The substratum, to a depth of 80 inches or more, is pale olive sand.

The areas of Urban land are covered by houses, streets, driveways, buildings, parking lots, and other uses. Unoccupied areas are mostly lawns, vacant lots, or playgrounds made up of Lawnwood soils. These areas are so small and intermixed with Urban land that it is impractical to map them separately.

Included with this complex in mapping are about 15 percent Pendarvis soils and Waveland soils. A few areas that have as much as 80 percent or as little as 10 percent Urban land are also included. Areas of soils that have been modified by grading and shaping are more extensive in newer communities than in older communities. Streets are commonly excavated below the original surface and the material excavated is spread over the adjacent area. Sand material from drainage ditches is often used as fill in sloughs or depressions. In addition, material from outside the area is frequently hauled in for fill.

In undrained areas, the water table in this complex is within 10 inches of the surface for 1 to 4 months in most years. However, drainage systems have been established in most areas and depth to the water table depends upon the efficiency of the drainage system.

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

This complex is not placed in a capability subclass.

23—Malabar fine sand. This poorly drained, nearly level soil is in broad, poorly defined sloughs and on flats. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer is dark grayish brown fine sand 6 inches thick. The upper part of the subsoil extends to a depth of 24 inches. It is light yellowish brown fine sand in the upper 5 inches and yellowish brown fine sand in the lower 7 inches. A layer of light gray fine sand 18 inches thick separates the upper and lower parts of the subsoil. The lower part of the subsoil is gray fine sandy loam to a depth of 72 inches. The underlying material, to a depth of 80 inches or more, is white fine sand.

Included with this soil in mapping are small areas of Pineda, Riviera, Nettles, and Oldsmar soils. Also included are areas of a soil that has a stained layer above the lower part of the subsoil that turns red when burned and areas of a soil that has thin layers of ironstone. The included soils make up less than 20 percent of any mapped area.

The water table in Malabar fine sand is at a depth of less than 10 inches for 2 to 6 months during most years and between depths of 10 to 40 inches for most of the rest of the year. It is below a depth of 40 inches for short periods in dry seasons. Available water capacity is low in the surface layer, subsurface layer, and upper part of the subsoil and substratum and moderate in the lower part of the subsoil. Permeability is rapid in the surface layer, subsurface layer, upper part of the subsoil, and substratum and slow to very slow in the lower part of the subsoil. Natural fertility and organic matter content are low.

A large part of the acreage has been cleared and is planted to citrus. Natural vegetation in sloughs is slash pine, waxmyrtle, and cabbage palm in places and an understory of sawpalmetto and pineland threeawn. Natural vegetation along broad, poorly defined drainageways and on flats is scattered waxmyrtle, sandweed, and maidencane.

This soil has very severe limitations for cultivated crops because of wetness. It has medium potential for vegetable crops if water control is adequate. A water control system is needed to remove excess water rapidly if the productive potential of this soil is to be realized. Good soil management includes crop rotation that keeps the soil in close growing cover crops at least three-fourths of the time. The cover crops and crop residue should be plowed under. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this soil is poorly suited to citrus. It has medium potential for citrus if water is properly controlled. A carefully designed water control system needs to be installed that will maintain the water table below a depth of about 4 feet if the productive potential is to be realized. Planting trees in beds lowers the effective depth of the water table. Regular applications of fertilizer and lime are needed.

This soil has medium potential for improved pasture grasses. It is well suited to pangolagrass, bahiagrasses, and white clover if it is well managed. Water control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are required. Controlled grazing helps to prevent overgrazing and weakening of plants.

This soil has medium potential for pine. Slash pine is better adapted than other species. Water control is needed if the production potential is to be realized. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures are needed to overcome excessive wetness. Sewage lagoon areas should be sealed or lined with impervious soil material. Potential is low for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to help overcome excessive wetness. Mounding may be needed for septic tank absorption fields. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious material is needed for trench type sanitary landfills, and sidewalls of shallow excavations should be shored.

This soil is in capability subclass IVw.

24—Myakka fine sand. This poorly drained, nearly level soil is on broad flatwoods areas. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is fine sand 7 inches thick. It is black in the upper 3 inches and very dark gray in the lower 4 inches. The subsurface layer is fine sand 20 inches thick. It is gray in the upper 10 inches and light gray in the lower 10 inches. The subsoil extends to a depth of 43 inches. It is black fine sand in the upper 2 inches, dark reddish brown fine sand in the next 2 inches, very dark grayish brown fine sand in the next 7 inches, and dark grayish brown fine sand in the lower 5 inches. The substratum, to a depth of 80 inches or more, is fine sand. It is brown in the upper 4 inches and pale brown below this layer.

Included with this soil in mapping are small areas of Basinger, Lawnwood, Samsula Variant, Myakka Variant, and Waveland soils. Also included are slightly depressional areas that have more than 8 inches of dark surface layer. The included soils make up less than 20 percent of any mapped area.

The water table in Myakka fine sand is at a depth of less than 10 inches for 1 to 3 months during the summer rainy season and after periods of heavy rainfall, between depths of 10 to 40 inches for 6 to 9 months, and below a depth of 40 inches in dry seasons. Available water capacity is very low in the surface and subsurface layers and substratum and moderate in the subsoil. Permeability is rapid in the surface and subsurface layers and substratum and moderate to moderately rapid in the subsoil. Natural fertility and organic matter content are low.

In a large part of the acreage, natural vegetation is open forest of south Florida slash pine and an understory of sawpalmetto, running oak, inkberry, and fetterbush. The most common native grasses are pineland threeawn and Florida threeawn. Low panicum grows in places.

This soil has very severe limitations for cultivated crops. It has medium potential for a variety of vegetable crops if good water control and soil improving measures are provided. A water control system is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Close growing, soil improving crops should be kept on the soil three-fourths of the time and rotated with the row crops. These soil improving crops and crop residue should be plowed under. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil is poorly suited to citrus unless very intensive management is practiced. However, it has low potential for citrus if a carefully designed water control system that will maintain the water table below a depth of 4 feet is installed. Planting trees in beds lowers the effective depth of the water table. A vegetative cover needs to be maintained between the trees. Regular applications of fertilizer and lime are needed.

This soil has medium potential for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well 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 weakening of plants.

This soil has low potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, and local roads and streets. Water control measures are needed. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Installation of water control measures helps to overcome excessive wetness. The size of the absorption field may need to be increased because the permeability rate in this soil is lower than is acceptable. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious material helps to reduce excessive seepage for trench type sanitary landfills or sewage lagoon areas. Shoring of sidewalls is needed for shallow excavations.

This soil is in capability subclass IVw.

25—Nettles sand. This poorly drained, nearly level soil is on broad flatwoods areas. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is 11 inches thick. It is black sand in the upper 5 inches, very dark gray sand in the next 3 inches, and dark gray sand in the lower 3 inches. The subsurface layer is light gray sand 22 inches thick. The subsoil extends to a depth of 90 inches or more. It is black and dark reddish brown, weakly cemented sand and loamy sand in the upper 6 inches; dark reddish brown and dark brown sand in the next 16 inches; and pale olive gray fine sandy loam below this layer.

Included with this soil in mapping are small areas of Ankona, Oldsmar, Pepper, Pineda, and Wabasso soils. Also included are small areas of soils on the edges of sloughs which have a cemented, very friable, dark layer within a depth of 30 inches of the surface and a weakly cemented, less friable, dark layer below a depth of 30 inches. The included soils make up about 20 percent of any mapped area.

The water table in Nettles sand is within a depth of 10 inches for 2 to 4 months during wet seasons and between depths of 10 to 40 inches for 6 months or longer in most years. It is perched above the subsoil early in the summer rainy season and after periods of heavy rainfall in other seasons. During extended dry periods, the water table may recede to a depth below 40 inches. Available water capacity is very low to low in the surface and subsurface layers and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and very slow to slow in the subsoil. Natural fertility and organic matter content are low.

Some areas of these soils have been cleared and are cultivated. A few areas are used for urban purposes. Most areas are in natural vegetation of scattered south Florida slash pine and cabbage palm and an understory of sawpalmetto, waxmyrtle, inkberry, fetterbush, creeping bluestem, chalky bluestem, Florida threeawn, and pineland threeawn.

This soil has very severe limitations for cultivated crops. It has high potential for vegetable crops if water control and other good management practices are provided. The water control system needs to remove excess water in wet seasons and provide for subsurface irrigation in dry seasons. Soil improving crops should be kept on the soil three-fourths of the time and rotated with the row crops. These soil improving crops and crop residue should be plowed under. Bedding of rows needs to be included in seedbed preparation. Fertilizer and lime should be applied according to the need of the crop.

This soil has low potential for citrus. It is suited to citrus if a carefully designed water control system is installed that will maintain the water table below a depth of about 4 feet. Planting trees in beds lowers the effective depth of the water table. A vegetative cover should be maintained between the trees. Regular applications of fertilizer and lime are needed.

This soil has high potential for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well managed. Water control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are required. Grazing should be controlled to prevent overgrazing and weakening of plants.

This soil has medium potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures help to overcome excessive wetness. The size of absorption fields may need to be increased because of slow permeability. Sealing or lining of sewage lagoon areas helps to overcome excessive seepage. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to overcome excessive wetness. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious soil material is needed for trench sanitary landfills and sewage lagoon areas to reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This soil is in capability subclass IVw.

26—Oldsmar sand. This nearly level soil is in depressional areas in the flatwoods. These areas are more poorly drained than the surrounding flatwoods. Slopes are smooth to concave and range from nearly level in the center of the depression to 2 percent toward the edge.

Typically, the surface layer is sand 5 inches thick. It is black in the upper 1 inch and very dark gray in the lower 4 inches. The subsurface layer is gray sand 27 inches thick. The subsoil extends to a depth of 80 inches or more. In sequence from the top of this layer, it is very dark gray sand in the upper 2 inches; very dark reddish brown sand in the next 7 inches; black sand in the next 1 inch; olive gray fine sandy loam in the next 23 inches; and light olive gray fine sandy loam below this layer.

Included with this soil in mapping are small areas of Riviera soil and soils which have a dark surface layer 10 or more inches thick. Also included are a few areas that do not have a dark sandy subsoil and a few areas that have a dark subsoil at a depth of less than 30 inches. The included soils make up 25 percent or less of any mapped area.

The water table in Oldsmar sand is above the surface for 6 to 9 months or more in most years. Available water capacity is very low in the surface and subsurface layers and medium in the rest of the soil. Permeability is rapid in the surface and subsurface layers, moderate to moderately rapid in the sandy part of the subsoil, and slow to very slow in the loamy part of the subsoil. Natural fertility and organic matter content are low.

In most of the acreage, natural vegetation is scattered to dense sandweed, stillingia, longleaf threeawn, maidencane, and sand cordgrass.

Under natural conditions, this soil is not suited to cultivated crops because of ponding. However, it has medium potential for vegetable crops if very intensive management, soil improving measures, and a good water control system that removes excess water in wet seasons and provides for subsurface irrigation in dry seasons is installed. Close growing, soil improving crops should be kept on the soil three-fourths of the time and rotated with the row crops. Soil improving crops and crop residue should be plowed under. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil is not suited to citrus under natural conditions. It has medium potential for citrus if very intensive management and a good water control system that will maintain the water table below a depth of about 4 feet are provided. Planting the trees in beds lowers the effective depth of the water table. Regular applications of fertilizer and lime are needed.

This soil is not suited to pasture under natural conditions. However, it has medium potential for improved pasture if very intensive management, soil improving measures, and a good water control system are provided. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well 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 weakening of plants.

This soil has low potential for pine. Slash pine is better suited than other species. Water control measures need to be installed before trees can be planted. Severe equipment limitations and seedling mortality are the main management concerns.

This soil has medium potential for sewage lagoon areas, but water control measures are needed to help overcome excessive wetness. Sealing or lining with impervious material helps to reduce excessive seepage. Potential is low for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed. Fill material for septic tank absorption fields, buildings without basements, small commercial buildings, local roads and streets, and playgrounds; sealing or lining with impervious material for trench type sanitary landfills; and shoring of sidewalls for shallow excavations are needed. Mounding may be needed for septic tank absorption fields.

This soil is in capability subclass VIIw.

27—Palm Beach fine sand, 0 to 5 percent slopes. This excessively drained, nearly level or gently sloping soil is on dunelike ridges that are generally parallel to the coast. Slopes are smooth to convex.

Typically, the surface layer is grayish brown fine sand about 8 inches thick. The underlying material, to a depth of 80 inches or more, is fine sand that has many sand-size shell fragments. It is pale brown fine sand in the upper 22 inches and light gray fine sand and multicolored shell fragments below this layer.

Included with this soil in mapping are small areas of Canaveral soil and areas of soils that have a dark surface layer. The included soils make up less than 15 percent of any mapped area.

Palm Beach sand does not have a water table within a depth of 80 inches annually. Available water capacity is very low, and permeability is very rapid. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is cabbage palms, running oak, sawpalmetto, bay, and scrub oak.

This soil is not suited to vegetable crops, citrus, improved pasture grasses, or pine. It has low potential for all of these uses.

This soil has very high potential for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed. Potential is high for small commercial buildings. Land shaping may be needed on the more sloping areas. Potential is medium for playgrounds, trench type sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for playground use, and land shaping can be needed on the more sloping areas. Sealing or lining with impervious material helps to reduce excessive seepage for trench type sanitary landfills. Shoring of sidewalls for shallow excavations is needed. Potential is very low for sewage lagoon areas. Sealing or lining with impervious soil material is needed to reduce excessive seepage.

This soil is in capability subclass VIIs.

28—Paola sand, 0 to 8 percent slopes. This excessively drained, nearly level to sloping soil is on high dunelike ridges and in undulating areas. Slopes are smooth to convex or concave.

Typically, the surface layer is dark gray sand about 6 inches thick. The subsurface layer is 49 inches thick. It is light gray sand in the upper 9 inches and white sand in the lower 40 inches. The subsoil, to a depth of 80 inches or more, is brownish yellow sand that contains intrusions of the subsurface layer.

Included with this soil in mapping are small areas of Astatula, St. Lucie, and Welaka Variant soils. The included soils make up less than 15 percent of any mapped area.

This soil does not have a water table within a depth of 80 inches, and usually it is not within a depth of 120 inches annually. Available water capacity is very low, and permeability is very rapid. Natural fertility and organic matter content are very low.

In a large part of the acreage of Paola sand, natural vegetation is sand pine, scrub live oak, rosemary, and cabbage palms and an understory of pricklypear cactus, goldaster, and periwinkle. The most common native grass is pineland threeawn. Sandspur occurs in places.

This soil is not suited to vegetable crops, and it has very low potential for such crops. Potential is low for citrus and improved pasture grasses. The droughty condition and low natural fertility of the soil severely reduce the variety of grasses.

This soil has very low potential for pine. Sand pine is better suited than other species. Seedling mortality and equipment limitations are management concerns.

This soil has very high potential for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed. Potential is high for small commercial buildings. Land shaping can be needed on the more sloping areas. Potential is medium for playgrounds, trench type sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for playground use, and land shaping can be needed on the more sloping areas. Sealing or lining with impervious material helps to reduce excessive seepage for trench type sanitary landfills. Sidewalls of shallow excavations need to be shored. This soil has very low potential for sewage lagoon areas. Sealing or lining with impervious soil material is needed to reduce excessive seepage.

This soil is in capability subclass VIs.

29—Pendarvis sand, 0 to 5 percent slopes. This moderately well drained, nearly level and gently sloping soil is on low ridges and knolls in the flatwoods. Slopes are smooth to convex.

Typically, the surface layer is very dark gray sand about 6 inches thick. The subsurface layer is light gray sand 42 inches thick. The subsoil extends to a depth of 80 inches or more. It is black, weakly cemented loamy sand in the upper 14 inches; dark reddish brown sand in the next 14 inches; and dark yellowish brown loamy sand in the lower part.

Included with this soil in mapping are small areas of Ankona, Jonathan, Hobe, Lawnwood, and Waveland soils. The included soils make up less than 15 percent of any mapped area.

Pendarvis sand has a perched water table between depths of 24 to 40 inches for about 1 to 4 months during the summer rainy season and between depths of 40 to 60 inches for the rest of the year except during dry periods. Available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and slow to moderately slow in the subsoil. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is south Florida slash pine and several species of scrub oak and an understory of sawpalmetto, fetterbush, tarflower, and running oak. The most common native grass is pineland threeawn.

This soil is not suited to cultivated crops. It has low potential for vegetable crops and citrus and medium potential for improved pasture grasses that are resistant to droughty conditions. Irrigation is needed in periods of low rainfall for highest yields. Grazing should be carefully controlled.

This soil has low potential for pine. Slash pine and sand pine are the best adapted species. Equipment limitations and seedling mortality are the main management concerns.

This soil has very high potential for dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed. Potential is high for septic tank absorption fields. Water control is needed. Potential is medium for playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. The sandy surface layer should be stabilized for playground use. Water control measures are needed for many uses. Sealing or lining with impervious soil material is needed for trench type sanitary landfills and sewage lagoon areas. Shoring of sidewalls is needed for shallow excavations.

This soil is in capability subclass VIs.

30—Pendarvis-Urban land complex. This complex consists of Pendarvis sand and Urban land. The components are so intermingled they cannot be separated at the scale used for mapping. Slope ranges from 0 to 5 percent.

About 50 to 70 percent of the complex is nearly level to gently sloping Pendarvis soils or Pendarvis soils that have been reworked or reshaped but are still recognizable as Pendarvis soil, and 15 to 50 percent is Urban land.

Typically, the Pendarvis soil has a surface layer of very dark gray sand 6 inches thick. The subsurface layer is light gray sand 42 inches thick. The subsoil extends to a depth of 80 inches or more. It is black, weakly cemented loamy sand in the upper 14 inches; dark reddish brown sand in the next 14 inches; and dark yellowish brown loamy sand in the lower part.

The areas of Urban land are covered by houses, streets, driveways, buildings, parking lots, and similar uses. Unoccupied areas are mostly lawns, vacant lots, or playgrounds made up of Pendarvis soil. These areas are so small and intermixed with Urban land that it is impractical to map them separately.

Included with this complex in mapping are about 15 percent areas of Lawnwood, Satellite, Electra, and Waveland soils which are not covered by urban facilities. Also included are a few areas that have as much as 80 percent or as little as 10 percent Urban land.

Areas of soils that have been modified by grading and shaping are more extensive in newer communities than in older communities. Streets are commonly excavated below the original soil surface and the material excavated is spread over the adjacent area. Sand material from drainage ditches is often used as fill for sloughs or depressional areas. In addition, material from outside the area is frequently hauled in for fill.

In undrained areas, this complex has a water table perched above the subsoil for 1 to 4 months in the summer rainy season and between depths of 40 to 60 inches for most of the rest of the year. However, drainage systems have been established in most areas and depth to the water table depends upon the efficiency of the drainage system.

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

The complex is not placed in a capability subclass.

31—Pepper sand. This poorly drained, nearly level soil is on broad areas of flatwoods. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is sand 9 inches thick. It is black in the upper 6 inches and dark gray in the lower 3 inches. The subsurface layer is gray sand 14 inches thick. The subsoil extends to a depth of 99 inches or more. It is black, weakly cemented sand in the upper 10 inches, dark reddish brown sand in the next 15 inches; dark brown sand in the next 9 inches, and olive gray and light olive gray sandy loam in the lower part.

Included with this soil in mapping are small areas of Lawnwood, Nettles, Pineda, Tantile, and Wabasso soils. The included soils make up less than 20 percent of any mapped area.

Pepper sand has a water table within a depth of 10 inches for 2 to 4 months during the summer rainy season and between depths of 10 to 40 inches for 6 months during most years. It is perched above the subsoil during the summer rainy season and after periods of heavy rainfall. Available water capacity is low in the surface layer, very low in the subsurface layer, and low to medium in the subsoil. Permeability is rapid in the surface and subsurface layers and very slow to slow in the subsoil. Natural fertility and organic matter content are low.

In a large part of the acreage, natural vegetation is open forest of south Florida pine and an understory of sawpalmetto, running oak, inkberry, and fetterbush. The most common native grasses are pineland threeawn and Florida threeawn. Other grasses include several varieties of bluestem.

This soil has very severe limitations for cultivated crops. It has medium potential for vegetable crops if water control and other good management practices are provided. A water control system is needed to remove excess water in wet seasons and provide for subsurface irrigation in dry seasons. Soil improving crops should be kept on the soil three-fourths of the time and rotated with the row crops. These soil improving crops and crop residue should be plowed under. Bedding of rows should be included in seedbed preparation. Fertilizer and lime should be applied according to the need of the crop.

This soil has low potential for citrus. It is suited to citrus if a carefully designed water control system is installed that maintains the water below a depth of about 4 feet. Planting trees in beds lowers the effective depth of the water table. A vegetative cover should be maintained between the trees. Regular applications of fertilizer and lime are needed.

This soil has medium potential for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well managed. Water control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are required. Grazing should be controlled to prevent overgrazing and weakening of the plants.

This soil has medium potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures help to overcome excessive wetness. The size of absorption fields may need to be increased because of slow permeability. Sealing or lining of sewage lagoon areas helps to overcome excessive seepage. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to overcome excessive wetness. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious soil material is needed for trench sanitary landfills and sewage lagoon areas to reduce excessive seepage. Shoring of sidewalls is needed for shallow excavations.

This soil is in capability subclass IVw.

32—Pineda sand. This poorly drained, nearly level soil is in low hammocks; in broad, poorly defined sloughs; and on flats. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is sand 6 inches thick. It is very dark grayish brown in the upper 3 inches and dark brown in the lower 3 inches. The upper part of the subsoil extends to a depth of 34 inches. It is yellowish brown sand in the upper 6 inches, strong brown sand in the next 9 inches, and pale brown sand in the lower 13 inches. A layer of light gray sand 4 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil is olive gray sandy loam that extends to a depth of 52 inches. The upper 4 inches has intrusions of white sand. The substratum, to a depth of 80 inches or more, is gray loamy sand.

Included with this soil in mapping are small areas of Wabasso, Wabasso Variant, Hallandale, Malabar, Pople, Riviera, Winder, and Winder Variant soils. Also included are areas of soils similar to Pineda soils that have a dark layer directly overlying the yellowish layer. The included soils make up less than 20 percent of any mapped area.

Pineda sand has a water table at a depth of less than 10 inches for 1 to 6 months and between depths of 10 to 40 inches for most of the rest of the year. In a few areas, the soil is covered with shallow standing water for about 7 days to 6 months. For short periods in dry seasons the water table is below a depth of 40 inches. Available water capacity is very low in the surface and subsurface layers and substratum and moderate in the subsoil. Permeability is rapid in the surface and subsurface layers, slow to very slow in the subsoil, and moderately rapid to rapid in the substratum. Natural fertility and organic matter content are low.

A large part of the acreage has been cleared and is planted to citrus. Natural vegetation in sloughs is scattered slash pine, waxmyrtle, cabbage palm in places, scattered sawpalmetto, blue maidencane, and pineland threeawn. Along the broad, poorly defined drainageways and on flats, natural vegetation is scattered waxmyrtle, sandweed, and maidencane.

This soil has severe limitations for cultivated crops, but it has high potential for vegetable crops. A water control system is needed to remove excess water and to provide for subsurface irrigation. Good management includes crop rotation that keeps the soil in close growing cover crops at least two-thirds of the time. The cover crops and crop residue should be plowed under. Seedbed preparation should include bedding. Fertilizer should be applied according to the need of the crop.

Under natural conditions this soil is poorly suited to citrus. It has high potential for citrus if a water control system that maintains good drainage to a depth of about 4 feet is installed. Planting the trees in beds lowers the effective depth of the water table. A good cover of close growing vegetation is needed between the trees to protect the soil from erosion when the trees are young. Regular applications of fertilizer are needed.

This soil has high potential for improved pasture grasses. It is well suited to pangolagrass, bahiagrasses, and clovers. An excellent pasture of grass or a mixture of grass-clover can be grown with good management. Regular applications of fertilizer are required. Controlled grazing is needed for highest yields (fig. 11).

This soil has medium potential for pine. Slash pine is better suited than other species. A water control system is needed if the production potential is to be realized. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures are needed to overcome excessive wetness. Sealing or lining with impervious soil material is needed for sewage lagoon areas. Potential is low for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to help overcome excessive wetness. Mounding can be needed for septic tank absorption fields. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious material is needed for trench type sanitary landfills, and sidewalls of shallow excavations should be shored.

This soil is in capability subclass IIIw.

33—Pits. This map unit consists of excavations from which soil and geological material have been removed

Figure 11.—These broad sloughs of Pineda sand produce excellent pasture if well managed. Hammock on Hilolo loamy sand in the background provides good protection for cattle.

mostly for use in road construction or in building foundations. Included with Pits is sandy and loamy waste material that is piled or scattered around the edges of the pits. Pits are generally small, but a few excavations are large. Many of the pits have been abandoned. Some are filled with water and are shown as water on the soil map.

Pits have little or no value for farming or woodland use.

This map unit is not placed in a capability subclass.

34—Pompano sand. This poorly drained, nearly level soil is along poorly defined drainageways and on broad low flats. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is black sand about 3 inches thick. The substratum, to a depth of 80 inches or more, is light brownish gray, light gray, and grayish brown sand.

Included with this soil in mapping are small areas of Myakka Variant, Satellite, and Waveland soils. Also included are areas that have more than 6 inches of dark surface layer and a few areas that are in depressions. The included soils make up less than 15 percent of any mapped area.

Pompano sand has a water table within a depth of 10 inches for 2 to 6 months each year. During periods of extended heavy rainfall, the water table is at or a few inches above the surface. During the rest of the year, it is within 30 inches of the surface for more than 9 months. Available water capacity is very low, and permeability is very rapid. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is scattered longleaf pine and slash pine and an understory of waxmyrtle, inkberry, and sawpalmetto. The most common native grass is pineland threeawn. Creeping bluestem, blue maidencane, and Florida paspalum also occur.

Pompano sand has very severe limitations for cultivated crops. It has medium potential for a variety of vegetable crops if good water control measures and soil improving measures are provided. A water control system is needed to remove excess water in wet seasons and provide for subsurface irrigation in dry seasons. Close growing, soil improving crops need to be kept on the soil three-fourths of the time and rotated with the row crops. These soil improving crops and crop residue should be plowed under. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil has low potential for citrus. A water control system that maintains the water table below a depth of about 4 feet is needed. Planting trees in beds lowers the effective depth of the water table. Regular applications of fertilizer are needed.

This soil has low potential for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well managed. A water control system is needed to remove excess surface water after heavy rains. Regular applications of fertilizer are needed, and grazing should be controlled to help prevent overgrazing and weakening of plants.

This soil has low potential for pine. Slash pine is better suited than other species. Water control is needed before trees are planted if the production potential is to be realized. Seedling mortality and equipment limitations are the main management concerns.

This soil has medium potential for septic tank absorption fields, dwellings without basements, small commercial buildings, and local roads and streets. Water control is needed to ovecome excessive wetness. Mounding of septic tank absorption fields can be needed. Potential is low for playgrounds and shallow excavations. Water control measures are needed. The sandy surface layer should be stabilized for playground use. Sidewalls of shallow excavations should be shored. This soil has very low potential for trench type sanitary landfills and sewage lagoon areas. Water control measures and sealing or lining with impervious soil material are needed.

This soil is in capability subclass IVw.

35—Pompano Variant-Kaliga Variant association. This association consists of very poorly drained soils in tidal mangrove swamps in the Indian River. Kaliga Variant soils are generally in the center of the swamps where organic material is thickest, and Pompano Variant soils are on the outer edges. The pattern of the soils is regular and uniform. Areas of each soil are large enough to map separately, but mapping is extremely difficult due to dense vegetation and flooding, and because of foreseeable use, the soils were not separated in mapping. Slope is less than 2 percent.

Pompano Variant soils and closely similar soils make up about 65 percent of the association, and Kaliga Variant soils make up about 25 percent. Other soils make up 10 percent.

Typically, the Pompano Variant soils are fine sand that contain shell fragments throughout. The surface is overlain by an inch of undecomposed leaves and twigs. Beneath this covering, the surface layer is 8 inches thick. It is 1 inch of greenish gray fine sand and 7 inches of dark gray fine sand. The underlying material, to a depth of 80 inches or more, is gray fine sand in the upper 24 inches and greenish gray fine sand below this layer. In the closely similar soils, the surface layer is thin muck and the mineral layers are similar to the Pompano Variant soils in color. The similar soils are between the Pompano Variant soils and the Kaliga Variant soils.

The Pompano Variant soils and the closely similar soils have low available water capacity and rapid permeability. The water table is at or above the surface. These soils are flooded during normal high tides and storm periods. Many areas in the mosquito control impoundments are flooded for long periods.

Typically, the surface layer of the Kaliga Variant soils is black muck about 35 inches thick. The upper part of the substratum is dark grayish brown sandy clay loam about 17 inches thick.

The Kaliga Variant soils have high available water capacity and rapid permeability in the organic layer and medium available water capacity and slow permeability in the substratum. The water table is at or above the surface for most years. These soils are flooded during normal high tides and storm periods. Many areas in mosquito control impoundments are flooded for long periods.

Included in mapping are areas of Turnbull Variant soil, the most significant of the minor soils, and small areas of thin ledges of limestone.

In most areas of the Pompano Variant-Kaliga Variant association, natural vegetation is red and black mangrove and some white mangrove.

This association is not suited to cultivated crops, pasture, or pine. It has very low potential for these uses.

The potential is very low for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. A water control system and protection from flooding are needed. Sealing or lining with impervious soil material is needed to overcome excessive seepage for trench type sanitary landfills and sewage lagoon areas. Sidewalls of shallow excavations should be shored. The addition of fill material and mounding are needed for septic tank absorption fields.

These soils are in capability subclass VIIIw.

36—Pople sand. This poorly drained, nearly level soil is on flatwoods and in sloughs. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is very dark gray sand 3 inches thick. The subsurface layer is 26 inches thick. In sequence from the top of this layer, it is light brownish gray sand in the upper 6 inches; pale brown and yellowish brown sand in the next 11 inches; light gray sand in the next 4 inches; and brownish yellow sand in the lower 5 inches. The subsoil extends to a depth of 56 inches. In sequence from the top of this layer, it is dark grayish brown with sandy intrusions in the upper 9 inches; dark grayish brown in the next 4 inches; and gray sandy clay loam in the lower 8 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 Winder Variant, Winder, Hallandale, Hilolo, Pineda, and Riviera soils. The included soils make up less than 20 percent of any mapped area.

Pople sand has a water table at a depth of less than 10 inches for less than 3 months and between depths of 10 to 40 inches for 2 to 6 months. In slough areas, however, the water table is 1 to 3 inches above the surface for about 2 to 7 days during periods of heavy rainfall. It recedes to a depth of more than 40 inches during extended dry periods. Available water capacity is low in the surface and subsurface layers and medium in the subsoil and substratum. Permeability is moderately rapid in the surface layer and upper part of the subsoil, slow to very slow in the lower part of the subsoil, and moderately slow to moderate in the substratum. Natural fertility and organic matter content are low.

In a large part of the acreage, natural vegetation is scattered cabbage palms and south Florida slash pine and an understory of sawpalmetto and running oak. In places there is inkberry. The most common native grass is pineland threeawn. In the sloughs, the principal vegetation is maidencane and pineland threeawn and scattered clumps of sawpalmetto and south Florida slash pine.

This soil has severe limitations for cultivated crops. It has high potential for many vegetable crops if a complete water control system that removes excess surface and internal water rapidly and provides for subsurface irrigation is installed. Good soil management includes crop rotations that keep the soil in close growing crops at least two-thirds of the time. These soil improving crops and crop residue should be plowed under. Good seedbed preparation, bedding of rows, and applications of fertilizer according to the need of the crop are other good management practices.

This soil has high potential for citrus if a water control system that maintains good drainage to a depth of about 4 feet is installed. Planting the trees in beds lowers the effective depth of the water table. A good cover of close growing vegetation needs to be maintained between the trees to protect the soil from erosion. Regular applications of fertilizer are required.

This soil has high potential for improved pasture grasses. It is well suited to pangolagrass, bahiagrasses, and clovers. Good pastures of grass or grass-clover mixtures can be grown if good management is provided. Regular applications of fertilizer are required. Controlled grazing is needed for highest yields.

This soil has medium potential for pine. Slash pine is better suited than other species. A water control system is needed if the production potential is to be realized in slough areas. Seedling mortality and equipment limitations are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures are needed to overcome excessive wetness. Sealing or lining with impervious soil material is needed for sewage lagoon areas. Potential is low for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to help overcome excessive wetness. Mounding can be needed for septic tank absorption fields. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious material is needed for trench type sanitary landfills, and sidewalls of shallow excavations should be shored.

This soil is in capability subclass IIIw.

37—Riviera sand, depressional. This poorly drained, nearly level soil is in depressional areas. 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 gray sand 1 inch thick. The subsurface layer is light gray sand 12 inches thick. The next layer is dark gray sand 9 inches thick. The subsoil extends to a depth of 31 inches. It is dark gray sandy clay loam and has penetrations of gray sand. The next layer is gray sandy loam to a depth of 42 inches. The underlying material, to a depth of 80 inches or more, is dark gray sandy clay loam.

Included with this soil in mapping are small areas of Wabasso, Chobee, Floridana, Hallandale, Oldsmar, Pineda, and Winder soils. Also included are areas of soil on the slight ridges between depressions and areas that have a thin organic surface layer. The included soils make up less than 20 percent of any mapped area.

This Riviera soil is ponded for 6 to 9 months or more annually. The low ridges are covered with water for periods ranging from a few days to about 3 months. The water table is within a depth of 40 inches for most of the rest of the year. Only for short periods in dry seasons is the water table below a depth of 40 inches. This soil is not ponded in drainage districts or in other areas that have water control systems. However, if the water control system is not well maintained, the soil can become ponded. Available water capacity is low in the surface and subsurface layers and moderate in the subsoil and substratum. Permeability is rapid in the surface and subsurface layers, slow to very slow in the subsoil, and rapid in the substratum. Natural fertility and organic matter content are low.

A large part of the acreage has a water control system established and is planted to citrus. Natural vegetation in the depressional areas is sandweed and stillingia. Blue maidencane and, in places, cypress grow along the ridges of the depressional areas. Vegetation along the slight ridges is cypress, cabbage palms, and scattered longleaf pine or slash pine and an understory of sawpalmetto, waxmyrtle, pineland threeawn, and chalky bluestem.

Under natural conditions, this soil is not suited to cultivated crops. It has high potential for vegetable crops, however, if a complete water control system to protect the soil from ponding and to remove excess water rapidly is installed. Good soil management includes crop rotation that keeps the soil in close growing cover crops at least two-thirds of the time. The cover crops and crop residue should be plowed under. Seedbed preparation should include bedding. Fertilizer should be applied according to the need of the crop.

Under natural conditions, this soil is not suited to citrus. However, it has high potential for citrus if a water control system that maintains good drainage to a depth of about 4 feet is installed. Planting the trees in beds lowers the effective depth of the water table. A cover of close growing vegetation is needed between the trees to protect the soil from blowing when the trees are young. Regular applications of fertilizer are required.

Under natural conditions, this soil is not suited to improved pasture. However, it has high potential for good quality improved pasture if proper water control is provided. Excellent pastures of grass or grass-clover mixtures can be grown with good management. Regular applications of fertilizer are required. Controlled grazing is needed for highest yields.

This soil has low potential for pine. Slash pine is better suited than other species. A water control system that removes excessive surface water is needed before trees can be planted. Seedling mortality and equipment limitations are management concerns.

This soil has medium potential for sewage lagoon areas if water control measures are provided to help overcome excessive wetness. Sealing or lining with impervious material help to reduce excessive seepage. Potential is low for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed. Fill material is needed for septic tank absorption fields, buildings without basements, small commercial buildings, local roads and streets, and for playground use. Sealing or lining with impervious soil material is needed for trench type sanitary landfills, and sidewalls of shallow excavations should be shored. Mounding can be needed for septic tank absorption fields.

This soil is in capability subclass VIIw.

38—Riviera fine sand. This poorly drained, nearly level soil is in hammocks and along drainageways. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sand about 5 inches thick. The subsurface layer is 18 inches thick. It is light gray fine sand in the upper 9 inches and grayish brown fine sand in the lower 9 inches. The subsoil extends to a depth of 54 inches. It is gray sandy clay loam that has light gray vertical penetrations of sand. The substratum, to a depth of 80 inches or more, is greenish gray loamy fine sand and fine sand.

Included with this soil in mapping are small areas of Wabasso, Wabasso Variant, Floridana, Hallandale, Pineda, Winder Variant, and Winder soils. Also included are areas that have a dark surface layer of more than 6 inches and other areas that have a stained layer of organic matter above the subsoil. The included areas make up less than 20 percent of any mapped area.

This Riviera soil has a water table at a depth of less than 10 inches for 2 to 4 months in most years, and at a depth of 10 to 30 inches for most of the rest of the year. Only for short periods in dry seasons is the water table below a depth of 40 inches. Available water capacity is low in the surface and subsurface layers and moderate in the subsoil and substratum. Permeability is rapid in the surface and subsurface layers, slow to very slow in the subsoil, and rapid in the substratum. Natural fertility and organic matter content are low.

Nearly all of the acreage has been cleared and is planted to citrus. Natural vegetation is cabbage palms and scattered longleaf pine and slash pine and an understory of waxmyrtle and sawpalmetto. The most common native grasses are pineland threeawn and blue maidencane. Toothachegrass, broomsedge, creeping bluestem, Florida paspalum, sand cordgrass, and panicums are other grasses.

This soil has severe limitations for cultivated crops. However, it has high potential for vegetable crops if a water control system is installed to remove excess water and provide for subsurface irrigation. Good soil management includes crop rotation that keeps the soil in close growing cover crops at least two-thirds of the time. Cover crops and crop residue should be plowed under. Seedbed preparation should include bedding. Fertilizer should be applied according to the need of the crop.

Under natural conditions, this soil is poorly suited to citrus. However, it has high potential for citrus if a water control system that maintains good drainage to a depth of about 4 feet is installed. Planting the trees in beds lowers the effective depth of the water table. A good cover of close growing vegetation is needed between the trees to protect the soil from blowing when the trees are young. Regular applications of fertilizer are required.

This soil has high potential for improved pasture grasses. It is well suited to pangolagrass, bahiagrasses, and clovers. Excellent pasture of grass or grass-clover mixtures can be grown with good management. Regular applications of fertilizer are required, and controlled grazing is needed for highest yields.

This soil has high potential for pine. However, a water control system is needed if the production potential is to be realized. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and shallow excavations. Water control measures are needed to help overcome excessive wetness. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and sewage lagoon areas. Water control practices are needed. The sandy surface layer should be stabilized for playground use. Trench type sanitary landfills and sewage lagoon areas should be sealed or lined with impervious soil material to help overcome excessive seepage. Sidewalls of shallow excavations need to be shored.

This soil is in capability subclass IIIw.

39—Salerno sand. This poorly drained, nearly level soil is in flatwood areas. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is black sand about 5 inches thick. The subsurface layer is light grayish brown sand about 50 inches thick. The subsoil is black, weakly cemented sand to a depth of about 68 inches. The substratum, to a depth of 80 inches or more, is dark grayish brown sand in the upper 5 inches and olive gray sand below this layer.

Included with this soil in mapping are areas of similar soils that have a loamy layer below a depth of 60 inches and a weakly developed subsoil and areas where the subsoil extends to a depth of more than 80 inches. Also included are small areas of Pendarvis soils and Waveland soils. The included soils make up about 25 percent of any mapped area.

The Salerno soil has a water table within a depth of 10 inches for 2 to 4 months in the wet seasons in most years and recedes to a depth of below 40 inches during extended dry seasons. Available water capacity is low in the surface layer, very low in the subsurface layer, medium in the subsoil, and very low to low in the substratum. Permeability is rapid in the surface and subsurface layers, very slow to moderately slow in the subsoil, and rapid in the substratum. Internal drainage is slow because of a shallow water table. Natural fertility and organic matter content are low throughout.

In a large part of the acreage, natural vegetation is open forest of south Florida slash pine and an understory of sawpalmetto, pawpaw, and inkberry. The most common native grasses are pineland threeawn and Florida threeawn, lopsided indiangrass, and several varieties of bluestem.

This soil has very severe limitations for cultivated crops. Very intensive management practices are needed. The soil has medium potential for a variety of vegetable crops if a water control system that removes excess water in wet seasons and provides for subsurface irrigation in dry seasons is provided. Close growing, soil improving crops that are kept on the soil three-fourths of the time should be rotated with the row crops. Soil improving crops and crop residue should be plowed under. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crops.

The soil is poorly suited to citrus unless very intensive management is provided. However, it has low potential for citrus if a carefully designed water control system is installed that maintains the water table below a depth of 4 feet. Planting the trees in beds lowers the effective depth of the water table. A vegetative cover should be maintained between the trees. Regular applications of fertilizer and lime are needed.

This soil has medium potential for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well 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 weakening of the plants.

This soil has low potential for pine. Slash pine is better suited than other trees.

This soil has high potential for dwellings without basements, small commercial buildings, and local roads and streets. Water control measures are needed to overcome excessive wetness. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and sewage lagoon areas. Water control measures are needed. The sandy surface layer should be stabilized for playground use. Trench type sanitary landfills and sewage lagoon areas need to be sealed or lined with impervious material. Sidewalls of shallow excavations should be shored.

This soil is in capability subclass IVw.

40—Samsula Variant-Myakka Variant association. This association consists of very poorly drained, nearly level soils in the marshes of the Savannahs. Samsula Variant soils are generally in the center of areas where organic material is thicker, and Myakka Variant soils are on the outer edges or rims. The soils are regular in shape and uniform. Areas of each soil are large enough to map separately, but mapping is extremely difficult due to the dense vegetation and wetness, and because of foreseeable use, the soils were not separated in mapping. Slope is less than 2 percent.

Samsula Variant soils make up about 60 percent of the association, and Myakka Variant soils make up 30 percent. Other soils make up 10 percent of the map unit.

Typically, the surface layer of the Samsula Variant soils is black muck about 25 inches thick. Below this layer is 4 inches of black mucky sand and 7 inches of dark gray sand. The subsoil, to a depth of 52 inches or more, is dark gray sand.

Typically, the surface layer of the Myakka Variant soils is muck 12 inches thick. It is dark reddish brown in the upper 4 inches and black in the lower 8 inches. Below this layer, to a depth of 72 inches or more, is sand. In sequence, it is white in the upper 6 inches; light gray in the next 5 inches; grayish brown in the next 6 inches; and dark reddish brown and dark brown below.

Available water capacity in the Samsula Variant and Myakka Variant association is high in the organic layers and low in the sandy layers. Permeability is rapid in the organic layers and upper sandy layers and moderately rapid below. Natural fertility and organic matter content are high in the surface layer of both soils. The water table is at or above the surface for 6 to 9 months and within a depth of 10 inches for the rest of the year.

Included with these soils in mapping are areas of Hontoon muck that make up about 10 percent of the association.

In most areas of this association, natural vegetation is buttonbush, sawgrass, and cordgrass.

Under natural conditions, these soils have very severe limitations for cultivated crops. They have high potential for vegetable crops if adequate water control is provided. A well designed and maintained water control system is needed to remove excess water during growth of crops and to keep the water at saturation level at other times. Applications of a complete fertilizer are required. Water-tolerant cover crops should be grown if the soils are not used for row crops. Cover crops and crop residue should be plowed under.

Under natural conditions, these soils are not suited to citrus. They have very low potential for this use.

These soils have medium potential for improved pasture grasses and clovers if water control measures that maintain the water near the surface is provided. Such measures are needed to prevent excessive oxidation of organic horizons. Applications of fertilizer that contain minor elements are needed. Controlled grazing is needed for highest yields.

These soils are not suited to pine. They have very low potential for this use.

These soils have medium potential for septic tank absorption fields if water control measures are provided to reduce excessive wetness. Fill material is needed. Potential is very low for dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Water control measures are needed to help overcome excessive wetness. Organic materials need to be removed and backfilled with suitable soil material for dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Sealing or lining with impervious soil material helps to overcome excessive seepage for trench type sanitary landfills and sewage lagoon areas. Shoring of sidewalls is needed for shallow excavations.

This association is in capability subclass IVw.

41—Satellite sand. This somewhat poorly drained, nearly level soil is on low knolls and ridges. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is dark gray sand about 6 inches thick. The substratum, to a depth of 80 inches or more, is sand. It is light gray in the upper 27 inches, light brownish gray in the next 19 inches, and grayish brown in the lower part.

Included with this soil in mapping are small areas of Pompano and St. Lucie soils. The included soils make up less than 15 percent of any mapped area.

Satellite sand has a water table between depths of 10 to 40 inches for 2 to 6 months, but in most years it is within a depth of 60 inches for more than 9 months. In some areas the water table does not rise above a depth of 40 inches in some years. Available water capacity is very low, and permeability is very rapid. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is open forest of south Florida slash pine and an understory of scrub oak, sawpalmetto, and running oak. Fetterbush grows in places. The most common native grass is pineland threeawn.

This soil is not suited to cultivated crops. It has very low potential for vegetable crops. If high level management is provided, it has low potential for citrus.

This soil has low potential for improved pasture grasses. Pangolagrass and bahiagrass produce fair yields if good management is provided.

This soil has low potential for pine. Slash pine and sand pine are better suited than other species. Equipment limitations and severe seedling mortality are the main management concerns.

This soil has very high potential for local roads and streets. No corrective measures are needed. Potential is high for septic tank absorption fields, dwellings without basements, and small commercial buildings. Water control measures help to overcome excessive wetness. Potential is medium for playgrounds, trench type sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for playground use. Water control measures and sealing or lining with impervious material help to reduce excessive seepage for trench type sanitary landfills. Shoring of sidewalls and water control measures are needed for shallow excavations. Potential is very low for sewage lagoon areas. Water control measures and sealing or lining with impervious material are needed to reduce excessive seepage.

This soil is in capability subclass VIs.

42—St. Lucie sand, 0 to 8 percent slopes. This excessively drained, nearly level to sloping soil is on high dunelike ridges and in undulating areas. Slopes are smooth to convex on the ridges and concave in the undulating areas.

Typically, the surface layer is gray sand 6 inches thick. The underlying material, to a depth of 80 inches or more, is light gray and white sand.

Included with this soil in mapping are small areas of Astatula, Paola, and Welaka Variant soils. The included soils make up less than 15 percent of any mapped area.

The water table of St. Lucie sand is not within a depth of 80 inches. It usually is not within a depth of 120 inches annually. Permeability is very rapid, and available water capacity is very low. Natural fertility and organic matter content are very low.

In a large part of the acreage, natural vegetation is sand pine, scrub live oak, rosemary, and cabbage palmetto. The understory is goldaster, pricklypear cactus, and periwinkle. The most common native grass is pineland threeawn (fig. 12). Sandspur grows in some areas.

Under natural conditions, this soil is not suited to vegetable crops and improved pasture. It has very low potential for these uses. Absence of water and low natural fertility severely reduce the variety of adapted crops and grasses.

Potential is low for citrus on this soil.

This soil has very low potential for pine. Sand pine is better suited than other species. Limited use of equipment and seedling mortality are management concerns.

This soil has very high potential for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed. Potential is high for small commercial buildings. Land shaping may be needed on the more sloping areas. Potential is medium for playgrounds, trench type sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for playground use, and land shaping can be needed on the more sloping areas. Sealing or lining with impervious material is needed to reduce excessive seepage for trench type sanitary landfills. Sidewalls for shallow excavations should be shored. This soil has very low potential for sewage lagoon areas. Sealing or lining

Figure 12.—Sand pine on St. Lucie sand, 0 to 8 percent slopes. Sparse ground cover of pineland threeawn is in most areas.

with impervious soil material is needed to reduce excessive seepage.

This soil is in capability subclass VIIs.

43—Susanna sand. This poorly drained, nearly level soil is on the flatwoods. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is black sand 6 inches thick. The subsurface layer is about 19 inches thick. It is dark gray sand in the upper 12 inches and gray sand in the lower 7 inches. The subsoil extends to a depth of 48 inches. It is black, weakly cemented loamy sand in the upper 4 inches and very dark grayish brown and brown sandy loam in the next 19 inches. The substratum, to a depth of 80 inches or more, is light brownish gray loamy sand in the upper 15 inches and light brownish gray sand below this layer.

Included with this soil in mapping are small areas of Ankona, Chobee, Nettles, Pepper, Pineda, Riviera, Tantile, Wabasso, and Winder soils. Also included are areas where the substratum is medium acid to neutral. The included soils make up less than 20 percent of any mapped area.

The water table of Susanna sand is at a depth of less than 10 inches for 1 to 4 months and within a depth of 40 inches for about 6 months in most years. It is perched above the subsoil during the summer rainy season and after periods of heavy rainfall. During the dry seasons, the water table may recede to a depth of below 40 inches. Available water capacity is low in the surface layer, very low in the subsurface layers, and medium in the layers below. Permeability is rapid in the surface and subsurface layers, very slow to moderately slow in the subsoil, and moderately rapid to rapid in the substratum. Natural fertility and organic matter content are low.

In a large part of the acreage, natural vegetation is open forest of south Florida slash pine and an understory of sawpalmetto, running oak, inkberry, and fetterbush. The most common native grasses are pineland threeawn and Florida threeawn. Other grasses are chalky bluestem and panicum.

This soil has very severe limitations for cultivated crops. However, it has high potential for vegetable crops if a water control system that removes excess water in wet seasons and provides for subsurface irrigation in dry seasons is installed. Good management includes crop rotation that keeps the soil in close growing, soil improving crops at least two-thirds of the time. These crops and crop residue should be plowed under. Fertilizer and lime should be applied according to the need of the crop.

This soil is poorly suited to citrus. However, it has medium potential for citrus if very intensive water control and management are provided. After heavy rains, the excess water needs to be rapidly removed from the soil to a depth of about 4 feet. Planting the trees in beds helps lower the effective depth of the water table. A cover of close growing vegetation between the trees is needed to protect the soil from erosion. Regular applications of fertilizer are required. Irrigation in seasons of low rainfall is needed for highest yields.

This soil has medium potential for improved pasture grasses. Pangolagrass, bahiagrasses, and clovers are well adapted and grow well if they are well managed. Water control measures are needed to remove excess surface water after heavy rainfall. Fertilizer is required. Grazing should be carefully controlled to maintain healthy plants for highest yields.

This soil has medium potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures help to overcome excessive wetness. The size of absorption fields can need to be increased because of slow permeability. Sealing or lining of sewage lagoon areas helps to overcome excessive seepage. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to overcome excessive wetness. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious soil material is needed for trench sanitary landfills to reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This soil is in capability subclass IVw.

44—Tantile sand. This poorly drained, nearly level soil is in the flatwoods. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is sand about 9 inches thick. It is black in the upper 2 inches, very dark gray in the next 3 inches, and dark gray in the lower 4 inches. The subsurface layer is light gray sand 18 inches thick. The upper part of the subsoil extends to a depth of 59 inches. It is black sand in the upper 8 inches, dark reddish brown sand in the next 5 inches, brown sand in the next 10 inches, and pale brown loamy sand in the lower 10 inches. A layer of white sand 10 inches thick separates the upper and lower parts of the subsoil. The lower part of the subsoil is light brownish gray fine sandy loam to a depth of more than 80 inches.

Included with this soil in mapping are small areas of Ankona, Lawnwood, Nettles, and Pepper soils. The included soils make up less than 20 percent of any mapped area.

The water table of Tantile sand is within a depth of 10 inches for 2 to 4 months and between depths of 10 to 40 inches for 6 months or more during most years. It is perched above the subsoil early in the summer rainy season and after periods of heavy rainfall in other seasons. Available water capacity is low in the surface layer, very low in the subsurface layer, and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and very slow to moderately slow in the subsoil. Natural fertility and organic matter content are low.

In a large part of the acreage, natural vegetation is open forest of south Florida slash pine and an understory of sawpalmetto, running oak, and in places inkberry, pawpaw, and fetterbush. The most common grasses are pineland threeawn, lopsided indiangrass, and Florida threeawn.

This soil has very severe limitations for cultivated crops. However, it has high potential for vegetable crops if a water control system is installed. Such a system should be designed to remove excess water in wet seasons and to provide subsurface irrigation in dry seasons. Good management also includes crop rotations that keep the soil in close growing, soil improving crops at least two-thirds of the time. These crops and crop residue should be plowed under. Fertilizer and lime should be applied according to the need of the crop.

This soil is poorly suited to citrus. However, it has medium potential for citrus if very intensive water control and management are provided. After heavy rains, excess water needs to be rapidly removed from the soil to a depth of about 4 feet. Planting trees in beds helps lower the effective depth of the water table. A cover of close growing vegetation between the trees is needed to protect the soil from erosion. Regular applications of fertilizer are required. Irrigation in seasons of low rainfall is needed for highest yields.

This soil has medium potential for improved pasture grasses. Pangolagrass, bahiagrasses, and clovers are well adapted and grow well if they are well managed. Water control measures are needed to remove excess surface water after heavy rainfall. Applications of fertilizer are required. Grazing should be carefully controlled to maintain healthy plants for highest yields.

This soil has medium potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures help to overcome excessive wetness. The size of absorption fields may need to be increased because of slow permeability. Sealing or lining of sewage lagoon areas helps to overcome excessive seepage. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to overcome excessive wetness. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious soil material is needed for trench sanitary landfills to reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This soil is in capability subclass IVw.

45—Terra Ceia muck. This very poorly drained, nearly level soil is on the lower flood plains of rivers and streams. Slope is smooth and is less than 1 percent.

Typically, this soil is black muck to a depth of 80 inches or more.

Included with this soil in mapping are areas where the river or stream has meandered and deposited mineral material on top of the organic material and areas where the mineral material is within a depth of 52 inches. Also included are small areas of Pompano soils and Satellite soils. The included soils make up less than 30 percent of any mapped area.

The water table of Terra Ceia muck is at or above the surface for 6 to 9 months annually. The soil is subject to flooding by stream overflow. Available water capacity is very high in the root zone, and permeability is rapid throughout. However, internal drainage is slow because of the shallow water table. Natural fertility is high, and organic matter content is very high.

Natural vegetation is mostly a dense swamp growth of willows, sweet bay, maple, and waxmyrtle and an understory of giant ferns and vines. In a few open areas, vegetation is sawgrass and giant ferns.

Under natural conditions, this soil is not suited to cultivated crops. However, it has high potential for vegetable crops if a well designed and maintained water control system is installed. Such a system needs to remove excess water when crops are growing and keep the soil saturated at other times. Water-tolerant cover crops should be grown when the soils are not in use for truck crops. These cover crops and crop residue should be plowed under. Fertilizer that contains phosphates, potash, and minor elements are needed.

This soil is not suited to citrus. It has very low potential for this use.

This soil has high potential for most improved pasture grasses and clovers adapted to the area. High yields of pangolagrass, bahiagrasses, and white clover can be realized if water is properly controlled. The water table needs to be maintained near the surface to prevent excessive oxidation of the organic horizons. Fertilizer that contains minor elements is needed. Grazing should be controlled for highest yields.

This soil is not suited to pine. It has very low potential for this use.

This soil has very low potential for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Water control measures are needed. Organic materials which have low strength should be removed and replaced with suitable material for dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Sealing with impervious soil material is needed for trench type sanitary landfills and shallow lagoon areas.

This soil is in capability subclass IIIw.

46—Turnbull Variant sandy clay loam. This very poorly drained, nearly level soil is in tidal marshes. Slopes are dominantly less than 1 percent but range to 2 percent.

Typically, the surface layer is 23 inches thick. It is black sandy clay loam in the upper part and very dark gray fine sandy loam in the lower part. The substratum extends to a depth of 80 inches or more. It is gray sandy clay loam in the upper 13 inches and gray, very bouldery sandy clay loam below this layer.

Included with this soil in mapping are small areas of Pompano Variant and Kaliga Variant soils and areas that have more than 8 inches of organic material on the surface. The included soils make up less than 25 percent of any mapped area.

Turnbull Variant sandy clay loam is flooded by tidal waters daily. Available water capacity is very high in the surface layer and medium below. Permeability is slow to very slow in the surface layer and moderate to rapid below. Organic matter content is high.

Natural vegetation is red and black mangrove.

This soil is not suited to cultivated crops, citrus, pasture, or pine. It has very low potential for these uses.

This soil has very low potential for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Water control measures and protection from flooding are needed. Size of septic tank absorption fields should be increased and may need to be mounded. Footings and foundations need to be increased for dwellings without basements and small commercial buildings, and the structural strength should be increased for local roads and streets. Trench type sanitary landfills and lagoon areas should be sealed or lined with impervious soil material.

This soil is in capability subclass VIIIw.

47—Urban land. Urban land consists of areas that are more than 70 percent covered by airports, shopping centers, parking lots, large buildings, streets, and sidewalks. Other areas, for example, lawns, parks, vacant lots, and playgrounds are made up mostly of Ankona, Lawnwood, Nettles, Pendarvis, Pepper, Tantile, St. Lucie, Paola, and Waveland soils. The surface of these soils, to a depth of about 12 inches, has been covered with fill material consisting of sandy and loamy materials which contain limestone and shell fragments in places. These areas of soils are too small to be mapped separately.

Urban land is not placed in a capability subclass.

48—Wabasso sand. This poorly drained, nearly level soil is in flatwoods areas. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is sand about 8 inches thick. It is black in the upper 4 inches and very dark gray in the lower 4 inches. The subsurface layer is gray sand 17 inches thick. The subsoil extends to a depth of 60 inches. In sequence, it is black sand in the upper 5 inches; dark brown loamy sand in the next 4 inches; dark grayish brown sandy loam in the next 14 inches; and olive gray sandy clay loam in the lower 12 inches. The substratum is olive gray sand to a depth of 80 inches or more and contains shell fragments.

Included with this soil in mapping are small areas of Oldsmar, Parkwood, and Pineda soils. Also included are areas where the dark sandy subsoil is weakly cemented and slowly permeable. In the area of T. 37 S., R. 38 E and R. 39 E., the clay content of the subsoil is slightly higher than is described for the series. In this area the loamy subsoil is as shallow as 18 inches. The included soils make up less than 20 percent of any mapped area.

The water table of Wabasso sand is at a depth of less than 10 inches for 1 to 4 months during the summer rainy season and between depths of 10 to 40 inches for 6 to 9 months in most years. It is below a depth of 40 inches in dry seasons. The water table is perched above the subsoil during the summer and after periods of heavy rainfall. Available water capacity is low in the surface and subsurface layers and substratum and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and substratum and moderate to moderately slow in the dark sandy subsoil. It is very slow to slow in the loamy subsoil. Natural fertility and organic matter content are low.

In a large part of the acreage, natural vegetation is open forest of second growth longleaf pine or slash pine, and scattered to many cabbage palms. The understory is sawpalmetto, running oak, and in places inkberry and fetterbush. The most common native grasses are pineland threeawn and Florida threeawn and, in places, several varieties of bluestem.

This soil has severe limitations for cultivated crops because of wetness. It has medium potential for vegetable crops if a water control system that is designed to remove excess water in wet seasons and provide for subsurface irrigation in dry seasons is installed. Good management includes crop rotation that keeps the soil in close growing, soil improving crops at least two-thirds of the time. These crops and crop residue should be plowed under. Fertilizer and lime should be applied according to the need of the crop.

This soil is poorly suited to citrus because of wetness. However, it has medium potential for citrus if a water control system that rapidly removes excess water from the soil after heavy rains is provided. The water should be removed to a depth of about 4 feet. Planting trees in beds lowers the effective depth of the water table. A cover of close growing vegetation between the trees is needed to protect the soil from erosion. Regular applications of fertilizer are required. Irrigation can be needed in seasons of low rainfall for highest yields.

This soil has medium potential for improved pasture grasses. Pangolagrass, bahiagrasses, and clovers are well adapted and grow well if they are well managed. A water control system that removes excess surface water in periods of high rainfall is needed. Regular applications of fertilizer and carefully controlled grazing are needed to maintain healthy plants for highest yields.

This soil has medium potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures are needed to help overcome excessive wetness. The size of absorption fields may need to be increased because of slow permeability. Sealing or lining of sewage lagoon areas helps to overcome excessive seepage. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to overcome excessive wetness. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious soil material is needed to reduce excessive seepage for trench sanitary landfills. Sidewalls of shallow excavations should be shored.

This soil is in capability subclass IIIw.

49—Wabasso Variant sand. This poorly drained, nearly level soil is in flatwoods areas. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is black sand about 5 inches thick. The subsurface layer is gray sand 14 inches thick. The subsoil extends to a depth of 32 inches. It is mainly dark reddish brown and brown sand in the upper 6 inches, and dark grayish brown and olive gray sandy clay loam in the lower 7 inches. The substratum extends to a depth of 80 inches or more. In sequence, it is light gray very gravelly sandy loam in the upper 4 inches; brown sand and loamy sand containing calcium carbonate nodules in the next 9 inches; light olive brown, calcareous sandy loam in the next 5 inches; light olive gray loamy sand that contains shell fragments in the next 18 inches; and gray sandy loam and sandy clay loam that contain shell fragments in the lower part.

Included with this soil in mapping are small areas of Hallandale, Pople, Hilolo, and Wabasso soils. The included areas of Wabasso soil are less than 25 percent of any mapped area. The included areas of other soils are less than 20 percent of any mapped area.

The water table of Wabasso Variant sand is at a depth of less than 10 inches for less than 2 months in wet seasons and between depths of 10 to 40 inches for more than 6 months during most years. It is perched above the subsoil during the summer rainy season and after periods of heavy rainfall. The water table is at a depth of 40 inches or more during the dry season. Available water capacity is very low in the surface and subsurface layers and substratum and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and substratum, moderate in the dark sandy subsoil, and very slow to slow in the loamy subsoil. Internal drainage is slow because of the shallow water table. Natural fertility and organic matter content are low.

In a large part of the acreage, natural vegetation is live oak, cabbage palm, and a few south Florida slash pine and an understory of sawpalmetto, running oak, and inkberry (fig. 13). The most common native grass is pineland threeawn.

This soil has severe limitations for cultivated crops because of wetness. However, the soil has medium potential for vegetable crops if a water control system that is designed to remove excess water in wet seasons and provide for subsurface irrigation in dry seasons is installed. Good management includes crop rotation that keeps the soil in close growing, soil improving crops at least two-thirds of the time. These crops and crop residue should be plowed under. Fertilizer and lime should be applied according to the need of the crop.

This soil is poorly suited to citrus because of wetness. It has medium potential for citrus, however, if a water control system that rapidly removes excess water from the soil after heavy rains is provided. The water should be removed to a depth of about 4 feet. Planting trees in beds lowers the effective depth of the water table. A cover of close growing vegetation between the trees is needed to protect the soil from erosion. Regular applications of fertilizer are required. Irrigation can be needed in seasons of low rainfall for highest yields.

This soil has high potential for pasture grasses. Pangolagrass, bahiagrasses, and clovers are well adapted and grow well if they are well managed. A water control system to remove excess surface water during periods of heavy rainfall is needed. Regular applications of fertilizer are required. Carefully controlled grazing is needed to maintain healthy plants for highest yields.

This soil has medium potential for pine. Slash pine is better suited than other species.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, and sewage lagoon areas. Water control measures help to overcome excessive wetness. The size of absorption fields may need to be increased because of slow permeability. Sealing or lining of sewage lagoon areas helps to overcome excessive seepage. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed to overcome excessive wetness. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious soil material is needed for trench sanitary landfills to reduce excessive seepage. Sidewalls of shallow excavations should be shored.

This soil is in capability subclass IIIw.

50—Waveland fine sand. This poorly drained, nearly

Figure 13.—Oak, pine, and cabbage palm hammock on Wabasso Variant sand. Pineda sand is in the foreground.

level soil is on broad flatwoods areas. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is fine sand about 8 inches thick. It is black in the upper 4 inches and is dark gray in the lower 4 inches. The subsurface layer is 24 inches thick. It is grayish brown sand in the upper 9 inches, and light gray fine sand in the lower 15 inches. The subsoil extends to a depth of 53 inches. It is black loamy sand in the upper 8 inches and black sand in the lower 13 inches. The substratum to a depth of 80 inches or more is sand with pockets of loamy sand and sandy loam. It is dark grayish brown in the upper 4 inches, grayish brown in the next 9 inches, and olive gray in the lower part.

Included with this soil in mapping are small areas of Electra, Jonathan, Lawnwood, and Salerno soils. The included soils make up about 15 percent of any mapped area.

The water table of Waveland fine sand is within a depth of 10 inches for 1 to 4 months and within a depth of 40 inches for 6 months or more during most years. It is perched above the subsoil early in the summer rainy season and after periods of heavy rainfall in other seasons. The water table recedes to a depth of more than 40 inches during extended dry seasons. Available water capacity is low in the surface layer, very low in the subsurface layer, medium in the subsoil, and low in the substratum. Permeability is rapid in the surface and subsurface layers, very slow to slow in the subsoil, and moderate to rapid in the substratum. Natural fertility and organic matter content are low.

A few small areas of this soil are cleared and are used for improved pasture. Native vegetation is south Florida slash pine and an understory of palmetto, waxmyrtle, gallberry, pawpaw, huckleberry, fetterbush, lopsided indiangrass, creeping bluestem, chalky bluestem, Florida threeawn, and pineland threeawn (fig. 14).

This soil has very severe limitations for cultivated crops because of wetness. It has medium potential for vegetable crops if a water control system that is designed to remove excess water is installed. Good management includes crop rotations that keep the soil in close growing, soil improving crops at least two-thirds of the time. These crops and crop residue should be

Figure 14.—Waveland fine sand in an area of flatwoods. Pine, sawpalmetto, and several species of threeawn are the dominant vegetation.

plowed under. Fertilizer and lime should be applied according to the need of the crop.

This soil is poorly suited to citrus because of wetness. It has low potential for citrus. A good drainage system that rapidly removes excess water from the soil to a depth of about 4 feet after heavy rains is needed if citrus are to be grown. Planting the trees in beds lowers the effective depth of the water table. A cover of close growing vegetation between the trees is needed to protect the soil from erosion. Regular applications of fertilizer are required. Irrigation is needed in seasons of low rainfall for highest yields.

This soil has medium potential for improved pasture grasses. Pangolagrass, bahiagrass, and clovers are well adapted and grow well if they are well managed. Water control measures are needed to remove surface water in times of heavy rainfall. Regular applications of fertilizer are required. Carefully controlled grazing is needed to maintain healthy plants for highest yields.

This soil has low potential for pine. Slash pine is the best adapted species. A good drainage system that removes excessive surface water is needed if the production potential is to be realized. Equipment limitations and seedling mortality are the main management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, and local roads and streets. Water control measures are needed. Potential is medium for septic tank absorption fields, playgrounds, trench type sanitary landfills, shallow excavations, and sewage lagoon areas. Installation of water control measures helps to overcome excessive wetness. The size of the absorption field can need to be increased because of lower permeability rates. The sandy surface layer should be stabilized for playground use. Sealing or lining with impervious material is needed to reduce excessive seepage for trench type sanitary landfills and for sewage lagoon areas. Sidewalls of shallow excavations should be shored.

This soil is in capability subclass IVw.

51—Waveland-Lawnwood complex. This complex consists of poorly drained, depressional soils in the flatwoods. The soils are so intermixed that they could not be separated at the scale selected for mapping. Areas are 3 to 25 acres in size. Slope ranges from 0 to 2 percent.

Waveland sand makes up 45 to 65 percent of the complex, and Lawnwood sand makes up 25 to 45 percent.

Typically, the surface layer of Waveland soils is black fine sand 1 inch thick. The subsurface layer is light gray sand 21 inches thick. The subsoil is sand that extends to a depth of 50 inches. The upper 15 inches is dark grayish brown, the next 6 inches is dark reddish brown and is weakly cemented, and the lower 7 inches is dark brown. The substratum, to a depth of 80 inches or more, is sand that has pockets of loamy sand. It is pale brown in the upper 16 inches and light brownish gray below this layer.

Waveland soils are ponded for 6 to 9 months in most years (fig. 15). The available water capacity is low to a depth of about 5 inches, very low to a depth of 34 inches, and medium below this depth. Permeability is rapid in the surface layer and subsurface layer, slow to very slow in the subsoil, and moderately rapid to rapid in the substratum. Natural fertility and organic matter content are low.

Typically, the Lawnwood soil has a surface layer of very dark gray sand 3 inches thick. The subsurface layer is gray sand 19 inches thick. The subsoil is sand that extends to a depth of 26 inches. It is black and weakly cemented in the upper 4 inches and is dark reddish brown in the lower 3 inches. The substratum, to a depth of 80 inches or more, is reddish brown sand.

Lawnwood soils are ponded for 6 to 9 months in most years. The available water capacity is low to a depth of 3 inches, very low to a depth of 22 inches, and medium below this depth. Permeability is rapid in the

Figure 15.—Waveland-Lawnwood complex in a depressional area in the flatwoods. These soils are ponded for 6 to 9 months in most years.

surface layer and subsurface layer. It is moderately rapid to rapid in the substratum, and slow to very slow in the subsoil. Natural fertility and organic matter content are low.

Included with this complex in mapping are areas of soils that are similar to Waveland and Lawnwood soils which have a thick dark surface layer. The included soils make up 10 to 40 percent of the complex.

Natural vegetation is stillingia, sandweed, longleaf threeawn, maidencane, and sand cordgrass.

Under natural conditions, these soils are not suited to crops because of ponding. However, the soils have medium potential for vegetable crops if very intensive management, soil improving measures, and a good water control system are provided. A water control system is needed to remove excess water in wet seasons and to provide subsurface irrigation in dry seasons. Close growing, soil improving crops need to be rotated with the row crops. They should be grown three-fourths of the time. These soil improving crops and crop residue should be plowed under. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, these soils are not suited to citrus. Even with intensive management practices that include adequate water control, they have low potential for citrus.

These soils are not suited to pasture. They have medium potential for improved pasture grasses if very intensive management, soil improving measures, and a good water control system are provided. Pangolagrass, improved bahiagrasses, and white clover grow well if they are well managed. Water control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Controlled grazing is needed to prevent overgrazing and weakening of plants.

These soils have low potential for pine. A good water control system is needed to remove excessive surface water before the trees are planted if the production potential is to be realized. Slash pine is better suited than other species. Severe equipment limitations and seedling mortality are the main management concerns.

These soils have medium potential for sewage lagoons; however, water control measures are needed to help overcome excessive wetness. Sealing or lining with impervious material helps to reduce excessive seepage. Potential is low for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, trench type sanitary landfills, and shallow excavations. Water control measures are needed. In addition, fill material is needed for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Sealing or lining with impervious soil material is needed for trench type sanitary landfills. Sidewalls of shallow excavations should be shored. Mounding is needed in places for septic tank absorption fields.

This complex is in capability subclass VIIw.

52—Waveland-Urban land complex. This complex consists of Waveland soils and Urban land that are so intermingled that they cannot be separated at the scale used for mapping. Slope ranges from 0 to 2 percent.

Nearly level Waveland soils or Waveland soils that have been reworked or reshaped but still are recognizable as Waveland soil make up 50 to 70 percent of the complex, and Urban land makes up 15 to 50 percent.

Typically, the surface layer of the Waveland soils is fine sand 8 inches thick. It is black in the upper 4 inches and dark gray in the lower 4 inches. The subsurface layer is grayish brown sand and light gray fine sand 24 inches thick. The subsoil is black, weakly cemented loamy sand to a depth of 53 inches. The substratum, to a depth of 80 inches or more, is sand that has pockets of loamy sand and sandy loam.

The areas of Urban land are covered by houses, streets, driveways, buildings, parking lots, and other related uses. Unoccupied areas are mostly lawns, vacant lots, or playgrounds made up of Waveland soils. These areas are so small and so intermixed with Urban land that it is impractical to map them separately.

Included with this complex in mapping are about 15 percent areas of Ankona, Pendarvis, and Tantile soils. A few areas that have as much as 80 percent or as little as 10 percent Urban land are also included.

Areas of soils that have been modified by grading and shaping are more extensive in newer communities than in older communities. Streets are commonly excavated below the original surface and the material excavated is spread over the adjacent area. Sand material from drainage ditches is often used as fill for sloughs or depressions. In addition, material from outside the area is frequently hauled in for fill.

In undrained areas, the soils in this complex have a water table within a depth of 10 inches of the surface for 1 to 4 months of most years. However, drainage systems have been established in most areas and depth to the water table depends upon the efficiency of the drainage system.

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

This complex is not placed in a capability subclass.

53—Welaka Variant sand, 0 to 5 percent slopes. This excessively drained, nearly level to gently sloping soil is on upland ridges near the Indian River. Slopes are smooth to convex.

Typically, the surface layer is black sand 5 inches thick. The subsurface layer is sand about 13 inches thick. It is gray in the upper 3 inches and light gray in the lower 10 inches. The subsoil is sand to a depth of 96 inches or more. In sequence, it is pinkish gray in the upper 3 inches; strong brown in the next 14 inches; yellowish red in the next 41 inches; and strong brown below this layer.

Included with this soil in mapping are small areas of Paola, Pendarvis, and St. Lucie soils. The included soils make up less than 15 percent of any mapped area.

Welaka Variant sand does not have a water table within a depth of 80 inches annually. Available water capacity is very low throughout the soil, and permeability is very rapid. Natural fertility and organic matter content are low.

In a large part of the acreage, natural vegetation is cabbage palm and hickory and an understory of bryophyllum. The most common native grass is pineland threeawn.

This soil is not suited to cultivated crops because of droughtiness. Even with good management, it has very low potential for vegetable crops. Intensive soil management is needed if this soil is cultivated. Droughtiness and rapid leaching of plant nutrients reduce the variety of adapted crops. Unless irrigation is practiced, good yields are restricted to a few crops. Irrigation, however, is usually feasible if water is readily available. Soil improving crops and crop residue should be left on the ground or plowed under.

This soil is poorly suited to citrus. It has low potential for citrus. A good ground cover of close growing plants is needed between the trees to protect the soil from erosion. A well designed irrigation system to maintain optimum moisture conditions is needed for highest yields.

This soil has low potential for improved pasture grasses. Deep rooting plants, for example, coastal bermudagrass and bahiagrass are adapted. Yields, however, are reduced by periodic droughts. Regular applications of fertilizer and lime are needed. Controlled grazing is needed to maintain the vigor of plants.

This soil has low potential for pine. Sand pine is better suited than other species. Equipment limitations and seedling mortality are management concerns.

This soil has very high potential for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed. Potential is high for small commercial buildings. Land shaping can be needed on the more sloping areas. Potential is medium for playgrounds, trench type sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for playground use. Land shaping can be needed on the more sloping areas. Sealing or lining with impervious material is needed to reduce excessive seepage for trench type sanitary landfills. Sidewalls of shallow excavations should be shored. Potential is very low for sewage lagoon areas. Sealing or lining with impervious soil material is needed to reduce excessive seepage.

This soil is in capability subclass VIs.

54—Winder sand, depressional. This poorly drained, nearly level soil is in depressional areas. Most slopes are concave to smooth; however, a few slopes on slight ridges are convex. They range from 0 to 2 percent.

Typically, the surface layer is black sand 1 inch thick. The subsurface layer is sand 9 inches thick. It is grayish brown in the upper 2 inches and light brownish gray in the lower 7 inches. The subsoil is gray sandy clay loam to a depth of 25 inches. The next layer is sandy loam to a depth of 67 inches. It is light gray in the upper 7 inches, light olive gray in the next 10 inches, and gray in the lower 19 inches. The underlying material, to a depth of 80 inches or more, is greenish gray sandy clay loam overlying sandy loam.

Included with this soil in mapping are small areas of Chobee, Floridana, Hallandale, Pineda, Riviera, Wabasso, Wabasso Variant, and Winder Variant soils. Also included are a few areas that have a thin organic surface layer and areas that have slightly more clay in the subsoil than is typical. The included soils make up less than 20 percent of any mapped area.

Winder sand, depressional, is ponded for 6 to 9 months or more annually. The scattered low ridges are covered with water from a few days to about 3 months. The water table is within a depth of 40 inches for most of the rest of the year. Only for short periods in dry seasons is the water table below a depth of 40 inches. The soil is not ponded in drainage districts or in other areas where the water control systems have been maintained. However, if the water control system is not maintained, the soil can become ponded again. Available water capacity is low in the surface and subsurface layers, moderate in the subsoil, and very low in the substratum. Permeability is rapid in the surface and subsurface layers, slow to very slow in the subsoil, and moderate to rapid in the substratum. Natural fertility and organic matter content are low.

A large part of the acreage has been cleared and is planted to citrus. Natural vegetation is maidencane and stillingia. Blue maidencane and, in places, cypress grow along the edges of the depressional areas. Cypress, cabbage palm, and scattered longleaf pine or slash pine and an understory of sawpalmetto, waxmyrtle, pineland threeawn, and chalky bluestem grow on the slight ridges.

Under natural conditions, Winder soil, depressional, is not suited to cultivated crops. It has high potential for vegetable crops if a water control system that removes excess water rapidly and protects the soil from ponding is installed. Good soil management includes crop rotation that keeps the soil in close growing cover crops at least two-thirds of the time. The cover crops and crop residue should be plowed under. Seedbed preparation should include bedding. Fertilizer should be applied according to the need of the crop.

Under natural conditions, this soil is not suited to citrus. It has high potential for citrus, however, if a water control system that maintains good drainage to a depth of about 4 feet and protects the soil from ponding is installed. Planting trees in beds lowers the effective depth of the water table. A good cover of close growing vegetation is needed between the trees to protect the soils from blowing when the trees are young. Regular applications of fertilizer and occasional liming are required.

Under natural conditions, this soil is not suited to improved pasture. However, it has high potential for good quality pasture of improved grasses if proper water control is provided. Excellent pasture of grass or grass-clover mixtures can be grown with good management. Regular applications of fertilizer are required. Controlled grazing is needed for highest yields.

This soil has low potential for pine. Slash pine is better suited than other species. Water control is needed before trees can be planted. Equipment limitations and seedling mortality are management concerns.

This soil has high potential for sewage lagoon areas. Water control measures are needed to overcome excessive wetness. The potential is medium for shallow excavations. Water control measures are needed. Potential is low for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, playgrounds, and trench type sanitary landfills. Water control measures help to overcome excessive wetness. Fill material is needed for septic tank absorption fields, dwellings without basements, small commercial buildings, local roads and streets, and playgrounds. Mounding of septic tank absorption fields can be needed.

This soil is in capability subclass VIIw.

55—Winder loamy sand. This poorly drained, nearly level soil is in hammocks and along drainageways. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is 6 inches thick. It is black loamy sand in the upper 3 inches and very dark gray loamy sand in the lower 3 inches. The subsurface layer is sand 6 inches thick. It is grayish brown in the upper 3 inches and light brownish gray in the lower 3 inches. The subsoil extends to a depth of 61 inches. In sequence, it is dark grayish brown sandy clay loam with a few light brownish gray sandy tongues of the subsurface layer in the upper 9 inches; gray sandy clay loam in the next 12 inches; dark gray sandy loam in the next 16 inches; and gray loamy sand in the lower 12 inches. The substratum, to a depth of 80 inches or more, is light gray sand.

Included with this soil in mapping are small areas of Wabasso, Wabasso Variant, Floridana, Hallandale, Pineda, Riviera, and Winder Variant soils. Also included are areas that have a dark surface layer more than 7 inches thick. The included siols make up less than 20 percent of any mapped area.

The water table of Winder loamy sand is at a depth of less than 10 inches for 2 to 4 months and between depths of 10 to 40 inches for most of the rest of the year. Only for short periods in dry seasons is the water table below a depth of 40 inches. Available water capacity is low in the surface and subsurface layers. It is moderate in the subsoil and very low in the substratum. Permeability is rapid in the surface and subsurface layers. It is slow to very slow in the subsoil and moderate to rapid in the substratum. Natural fertility and organic matter content are low.

Almost all of the acreage has been cleared and is planted to citrus. Natural vegetation is cabbage palm, willow oak, scattered longleaf pine, and slash pine and an understory of waxmyrtle and sawpalmetto. The most common native grasses are pineland threeawn and blue maidencane. Toothache grass, broomsedge, creeping bluestem, Florida paspalum, sand cordgrass, and panicums are other grasses.

Under natural conditions, this soil has severe limitations for cultivated crops. However, it has high potential for vegetable crops if a water control system is installed and good management is practiced. Good soil management includes crop rotation that keeps the soil in close growing cover crops at least two-thirds of the time. Cover crops and crop residue should be plowed under. Seedbed preparation should include bedding. Fertilizer should be applied according to the need of the crop.

Under natural conditions, this soil is poorly suited to citrus. However, it has high potential for citrus if a water control system that maintains good drainage to a depth of about 4 feet is installed. Planting trees in beds lowers the effective depth of the water table. A good cover of close growing vegetation is needed between the trees to protect the soil from blowing when the trees are young. Regular applications of fertilizer and occasional liming are required.

This soil has high potential for improved pasture grasses. Pangolagrass, bahiagrass, and clovers are well suited. Excellent pasture of grasses or grass-clover mixtures can be grown if good management is practiced. Regular applications of fertilizer are required. Controlled grazing is needed for highest yields.

This soil has high potential for pine. Slash pine is the best adapted species. Water control is needed if the production potential is to be realized. Limitations to use of equipment and seedling mortality are management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, shallow excavations, and sewage lagoon areas. The potential is medium for septic tank absorption fields, playgrounds, and trench type sanitary landfills. Water control measures are needed to help overcome excessive wetness.

This soil is in capability subclass IIIw.

56—Winder Variant sand. This poorly drained, nearly level soil is on low hammocks and along poorly defined drainageways. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is black sand 6 inches thick. The subsurface layer is dark grayish brown sand 3 inches thick. The subsoil extends to a depth of 29 inches. In sequence, it is grayish brown sandy clay loam in the upper 11 inches, light brownish gray sandy clay loam in the next 5 inches; dark gray sandy clay loam in the next 2 inches; and gray gravelly sandy loam in the lower 2 inches. The substratum extends to a depth of 80 inches or more. It is light gray, very gravelly sandy loam in the upper 3 inches. The lower part of the substratum is sandy loam. It is gray in the upper 18 inches, light olive gray in the next 20 inches, and gray below this layer.

Included with this soil in mapping are small areas of Wabasso Variant, Hallandale, Hilolo, Pineda, Pople, and Winder soils. Also included are a few areas that have a slightly thicker surface layer and a few areas that do not have a loamy subsoil. The included soils make up less than 20 percent of any mapped area.

The water table of Winder Variant sand is at a depth of less than 10 inches for 2 to 6 months and between depths of 10 to 40 inches for 6 to 9 months. It is below a depth of 40 inches during dry seasons. Available water capacity is low in the surface and subsurface layers and substratum. It is medium to high in the subsoil. Permeability is rapid in the surface and subsurface layers. It is slow in the subsoil and moderate in the substratum. Water moves through the gravelly layer freely. Natural fertility is medium, and organic matter content is low.

A large part of the acreage is in citrus. Natural vegetation is hammock growth of cabbage palm, south Florida slash pine, and live oak and an understory of sawpalmetto and vines.

This soil has severe limitations for cultivated crops. It has medium potential for vegetable crops if a complete water control system that removes excess water rapidly and provides for subsurface irrigation is installed. Good soil management includes crop rotations that keep the soil in close growing cover crops at least two-thirds of the time. Cover crops and crop residue should be plowed under. Seedbed preparation should include bedding. Fertilizer should be applied according to the need of the crop.

This soil has high potential for citrus if a water control system that maintains the water table at a depth of about 4 feet is installed. Planting the trees in beds lowers the effective depth of the water table. A good cover of close growing vegetation is needed between the trees to protect the soils from blowing when the trees are young. Regular applications of fertilizer are required.

This soil has high potential for improved pasture grasses. Pangolagrass, bahiagrass, and clovers are well suited. Excellent pasture of grasses or grass-clover mixtures can be grown if good management is practiced. Regular applications of fertilizer are required. Controlled grazing is needed for highest yields.

This soil has high potential for pine. Slash pine is better suited than other species. Equipment limitations and seedling mortality are management concerns.

This soil has high potential for dwellings without basements, small commercial buildings, local roads and streets, shallow excavations, and sewage lagoon areas. It has medium potential for septic tank absorption fields, playgrounds, and trench type sanitary landfills. Water control measures are needed to help overcome excessive wetness.

This soil is in capability subclass IIIw.

Use and management of the soils

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

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other 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 in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where rock, 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

John D. Griffin, agronomist, Soil Conservation Service, helped prepare this section.

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 "Soil maps for detailed planning." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

More than 150,000 acres in St. Lucie County Area was used for citrus and improved pasture in 1973, according to the Florida Crop and Livestock Reporting Service. More than 71,000 acres was used for citrus. About 36,000 acres was used for oranges; about 26,000 acres, for grapefruit; and about 9,000 acres, for tangelos and tangerines. There was about 78,000 acres of improved pasture. Slightly less than 1,000 acres was used for vegetables, mainly tomatoes.

The western part of the survey area has good potential for increased citrus and vegetable production; however, this area is slightly more susceptible to damage by cold temperatures. Water control systems are needed if citrus and vegetables are to be grown. Much of the area has been cleared. The soil was used for vegetable crops for a few years, but more recently, it has been planted to improved pasture or has reverted to native forage plants.

In addition to the reserve productive capacity of this soil, food production could be increased considerably by extending the use of the latest crop production technology. This soil survey can greatly facilitate the application of such technology.

Most urban development is in the eastern part of the survey area in the vicinity of Fort Pierce and Port St. Lucie. About 250 acres a year are developed for urban uses.

Soil erosion by wind and water is a concern on the more sloping soils where areas are being developed for urban use and the surface is laid bare of a protective cover of vegetation. Soil erosion results in sediment entering streams. Control of erosion decreases the pollution of streams by sediment and improves the quality of water for municipal and recreational use and as habitat for fish and wildlife. Erosion control practices include the use of protective surface cover to reduce runoff and increase infiltration. Temporary seeding of vegetation and mulching reduces erosion.

Wind erosion is a hazard in some seasons. Soils that are planted to vegetables, recently planted citrus, and urban areas cleared of vegetation, are susceptible to wind erosion. Soil blowing can damage these soils and crops in a few hours if winds are strong and the soils are dry and bare of vegetation or surface mulch. Maintaining a vegetative cover, surface mulch, or roughing of surfaces through proper tillage methods minimizes soil blowing. Windbreaks of adapted plants, for example, Australian pine, slash pine, or bamboo are effective in reducing wind erosion on these soils.

Information about the design of erosion control practices for each kind of soil is available in local offices of the Soil Conservation Service.

Water control is a major management concern on much of the acreage used for crops and pasture in the survey area. Some soils, for example, Floridana, Chobee, and Kaliga soils are naturally so wet that the production of crops common to the area is generally not feasible without extensive water control systems. Poorly drained soils such as Hilolo, Myakka, Pepper, and Riviera soils are so wet that crops are damaged during most years without adequate water control. Soils on elevated sandy ridges, for example, St. Lucie, Paola, and Welaka Variant soils have good natural drainage most of the year, but they tend to dry out quickly after rains.

The design of both surface and subsurface water control systems varies with the kind of soil. A system combining surface drainage and tile drainage is needed in most areas of the poorly drained and very poorly drained soils if they are used for intensive row cropping. Drains should be more closely spaced in soils with slow permeability than in the more permeable soils. Tile drainage is very slow in Chobee soils. Finding adequate outlets for drainage systems is difficult in depressional areas.

Organic soils oxidize and subside when the pore spaces are filled with air. They are not generally used for crops in the survey area because special water control systems are needed to control the depth of the water table. Such a system needs to keep the water table at the level required by crops during the growing season and to raise it to the surface during other parts of the year to minimize oxidation and subsidence. Information about a water control system designed for each kind of soil is available in local offices of the Soil Conservation Service.

Soil fertility is naturally low in most of the soils in the survey area. Hontoon, Samsula Variant, Terra Ceia, Kaliga Variant, Chobee, and Floridana soils are among the most naturally fertile soils in the survey area. Except for Canaveral, Pompano Variant, Palm Beach, Pople, and Hilolo soils which are slightly acid to moderately alkaline, the surface layer of the mineral soils is generally strongly acid to slightly acid. Hontoon and Samsula Variant soils are the most acid, and Terra Ceia and Kaliga Variant soils are the most alkaline of the organic soils. These soils require special fertilizers because they are low in minor elements.

Many of the soils have a surface layer that is naturally strongly acid. These soils require applications of lime to raise the pH level if clover and other crops that grow best on soils with a pH near neutral are grown. Available phosphorus and potash levels, especially nitrogen, are naturally low in most of these soils. On all soils, applications of lime and fertilizer should be based on the results of soil tests, on the need of the crop, 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 is important in the germination of seeds and in the infiltration rate of water into the soil. Soils that have good tilth are granular and porous. Most of the soils used for crops in the survey area have a sandy surface layer that is light in color and low in content of organic matter. Generally the structure of such soils is weak. If the soil becomes very dry, a slight crust is formed, water beads up, and passage of water through the soil is impeded until the soil becomes wet. Once the crust forms, the infiltration rate is reduced and runoff is increased. Regular additions of crop residue, manure, and other organic material improve soil structure and reduce crust formation.

Field crops are not commonly grown in St. Lucie County Area. Common close growing crops for grazing use are rye and ryegrass. Seed crops can be produced from bahiagrass, clovers, and aeschynomeme.

Special crops grown in the survey area are vegetables, citrus, and nursery plants. A small acreage is used for tomatoes, watermelons, eggplant, peppers, and other vegetables. Citrus is the most important fruit in the county. The soils in the flatwoods are especially well suited to many vegetable and small fruit crops because the water table can be easily maintained by irrigation. The soils in the St. Johns River Marsh are well suited to citrus if water is controlled. Latest information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Pasture and forage crops are grown in the western part of the survey area. These crops are used mostly for cow-calf operations. The major warm-season perennial pasture plants are pangolagrass and improved bermuda and bahiagrasses. In winter these improved pasture grasses are supplemented with small grain, ryegrass, and white clover. There are no cool-season perennial pasture plants adapted to the soils and climate of St. Lucie County Area.

The improved pasture in many parts of the survey area has been greatly depleted by continued excessive use. Much of the area that was planted to improved pasture is now covered with weeds and brush. Where climate and topography are about the same, differences in the kind and amount of forage produced are related closely to the kind of soil. Effective management needs to consider the relationships of soils to each other, pasture plant species, water control, liming, and fertilization. Table 5 shows, for each kind of soil, the potential annual production of forage in animal unit months for each major forage plant.

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.

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.

Land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider 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 I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

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

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

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

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

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 "Soil maps for detailed planning."

Range and grazeable woodland

Clifford W. Carter, range conservationist, Soil Conservation Service, helped prepare this section.

Native grasses are an important part of the overall, year-round supply of forage to livestock producers in St. Lucie County Area. This forage is readily available, it is economical, and it provides important roughage needed by cattle.

The dominant native forage species that grow on a soil are generally the most productive and the most suitable for livestock. They will maintain themselves as long as the environment does not change. The forage species are grouped into three categories according to their response to grazing—decreasers, increasers, and invaders.

Decreasers generally are the most palatable plants, and they decrease in abundance if the range is under continuous heavy grazing. Increasers are less palatable to livestock; they increase for a while under continuous heavy grazing but eventually decrease. A small number of invaders are native to the range. They have little value for forage; consequently, they tend to increase after other vegetation has been grazed.

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.

Excellent condition produces 76 to 100 percent of potential; good condition, 51 to 75 percent of potential; fair condition, 26 to 50 percent of potential; and poor condition, 0 to 25 percent of potential. Only about 10 percent of the range in St. Lucie County Area is in excellent condition; about 70 percent is in fair or poor condition.

Table 7 shows the potential of each soil for the production of livestock forage. Potential production refers to the amount of herbage that can be expected to grow on well managed range. Yields are expressed in table 7 in terms of pounds of air-dry herbage per acre for range in excellent condition in favorable, normal, 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. Forage refers to total vegetation produced and does not reflect forage value or grazing potentials.

The productivity of the soils is closely related to the natural drainage of the soil. The wettest soils, for example, those soils in marshes, produce the most vegetation. The deep, droughty sandhills normally produce the least herbage annually.

Management of the soils for range should be planned with potential productivity in mind. Soils with the highest production potential should be given highest priority if economic considerations are important. Major management considerations are centered around livestock grazing. The length of time an area should be grazed, the season it should be used, how long and when the range should rest, the grazing pattern of livestock within a pasture that contains more than one soil, and the palatability of the dominant plants on the soil are basic considerations if range condition is to be improved or maintained. Manipulation of range often involves mechanical brush control, controlled burning, and especially controlled livestock grazing. These practices are very important. Without exception, the proper management of range will result in maximum sustained production, conservation of soil and water resources, and generally, improvement of the habitat for many wildlife.

Grazeable woodland is forest that has an understory of native grasses, legumes, and forbs. The understory is an integral part of the forest plant community. The native plants can be grazed without significantly impairing other forest values. On such forestland, grazing is compatible with timber management if it is controlled or managed in such a manner that timber and forage resources are maintained or enhanced.

Understory vegetation consists of grasses, forbs, shrubs, and other plants used by livestock or by grazing or browsing wildlife. A well managed wooded area can produce enough understory vegetation to supply food to large numbers of livestock and wildlife.

The amount of forage production varies according to the different kinds of grazeable woodland; the amount of shade cast by the canopy; the accumulation of fallen needles; the influence of time and intensity of grazing on the grasses and forage; and the number, size and spacing, and method of site preparation for tree plantings.

Woodland management and productivity

Carl D. Defazio, forester, Soil Conservation Service, and Roy Hopke, county forester, Division of Forestry, Florida Department of Agriculture and Consumer Services, helped prepare this section.

Approximately 47,000 acres or 13 percent of the land area in St. Lucie County Area is in woodland, nearly all of which is privately owned. The pine trees scattered throughout the survey area are not considered to be woodland.

South Florida slash pine, which grows in the flatwoods, makes up most of the woodland. However, a sizeable percentage of forested land is the oak-gum-cypress type. This type of woodland is in the fresh water swamps along Cypress Creek.

South Florida slash pine covers approximately 28,000 acres of flatwoods, according to the 1970 U.S. Forest Service Survey. Since wood production is the most important traditional value in the county, slash pine is the most important kind of forest in the area. Sand pine grows in a small part of the survey area, mostly along the Atlantic Coastal Ridge. These trees do not have high economic value.

Mixed oak and pine forest is in the eastern part of the survey area on slightly elevated areas in the flatwoods. There are several species of oak trees, but they have little commercial value. Mixed oak and hickory forest is on the flood plain of the north fork of the St. Lucie River. The magnificent stands of hickory which grow here are not economically valuable as lumber, but they have considerable value for wildlife and recreational use. The mixed oak and gum forests which grow along several creeks in the area are generally stocked with valuable sawtimber. However, these areas may be of more value for the wildlife they harbor and the water resources they protect than for the timber they could produce.

Native tropical trees, for example, gymbo limbo, satinleaf, Florida strangler fig, and false-mastic are found in a few areas, mostly along the eastern side of the Atlantic Coastal Ridge.

Mangrove forests are perhaps the most economically valuable trees in St. Lucie County Area. These red mangroves and other salt marsh trees make an important contribution to fisheries through their complex food chain structures. In addition, they provide valuable habitat for other wildlife.

Housing, intensive agriculture, and wildfire have reduced woodland resources in recent years. However, those areas protected from fire are reverting back to pine.

Timber management in the survey area generally consists of natural regeneration following harvest cutting. Prescribed burning is an important management tool. It is used extensively to reduce "rough" which is a dangerous fire hazard, and to help facilitate natural regeneration.

The county has scattered markets for wood products. A few small sawmills are present. Pulpwood is occasionally shipped to mills in the northern part of the State. Woodland in St. Lucie County Area also has high value as cover for cattle and wildlife and is aesthetically appealing for recreation. More detailed information about woodland management can be obtained from the local office of the Soil Conservation Service, County Extension Service, and Florida Division of Forestry.

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 (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 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 *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

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 a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blow 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 or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. 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* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of 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 calculated at age 25 for south Florida slash pine and at age 50 for all other species. The site index applies to fully stocked, even-aged, unmanaged stands. Common 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 suitable for commercial wood production and that are suited to the soils.

Windbreaks and environmental plantings

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

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

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

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

Recreation

The soils of the survey area are rated in table 9 according to 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 recreation use 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 slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or 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 mild 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 or 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, horseback riding, and bicycling 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

John F. Vance, Jr., biologist, Soil Conservation Service, helped prepare this section.

The original wildlife habitat in St. Lucie County has been greatly diminished because large areas are now in citrus groves, improved pastures, or urban areas. The most extensive remaining areas of good habitat are the undeveloped rangeland and the St. Johns River Marsh. Other important areas of smaller extent are the ocean beaches which are used extensively for nesting by endangered sea turtles; the mangrove islands in the Indian River which are especially valuable as rookery and roosting areas for wading birds and as nursery areas for many marine fish; and the Savannahs marsh area.

Endangered or threatened species that live in the survey area range from the little-known, seldom-seen Florida mouse to more commonly seen species, for example, the American alligator and the brown pelican. A detailed listing of endangered species together with information on range and habitat may be obtained from the local District Conservationist.

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 millet, cowpeas, and sunflowers.

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 ryegrass, bahiagrass, switchgrass, deervetch, hairy indigo, and 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, indiangrass, goldenrod, beggarweed, pokeweed, mushrooms, partridge-pea, milk pea, ragweed, deers-tongue, and low panicums.

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, sawpalmetto, sweetgum, inkberry, persimmon, elderberry, sumac, hickory, laurel cherry, cabbage palm, American beautyberry, blackberry, grape, huckleberry, viburnum, blueberry, and wax myrtle.

Coniferous plants furnish browse, seeds, and cones. 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, cypress, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture.

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, rushes, sedges, maidencane, reeds, wildrice, saltgrass, cordgrass, and cattail.

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, armadillo, meadowlark, field sparrow, killdeer, cottontail, 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, woodcock, thrushes, vireos, woodpeckers, squirrels, gray fox, raccoon, 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, shorebirds, rails, kingfishers, muskrat, alligators, and otter.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants.

Wildlife management

Wildlife habitat management thrives on disturbances such as controlled burning, grazing, chopping, cultivation, water level manipulation, mowing, and sometimes the use of pesticides. Each species of wildlife occupies a niche in a vegetative type; therefore, if management is for a particular species, an attempt is made to keep the vegetative community in the stage or stages that favor that species.

A primary factor in evaluating wildlife habitat is the plant diversity in an area. A wide range in vegetative types or age classes is generally favorable to wildlife. Increasing dominance by a few plant species is commonly accompanied by a corresponding decrease in numbers of wildlife.

Engineering

James E. Thomas, area engineer, Soil Conservation Service, helped prepare this section.

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 need to 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 (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) 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, and local roads and streets. 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 so 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, frost action potential, and depth to a high water table affect the traffic supporting capacity.

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 not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to 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 effectively filter the effluent. 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 and have low permeability 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 revegation. 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 embankments, dikes, and levees and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

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

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

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of 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 quality of the water as inferred from 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 rock or to a cemented pan, large stones, slope, and the hazard of cutbanks. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone such as salts. 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 rock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to rock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

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 grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 15.

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 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 a soil contains particles coarser than sand, 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 21.

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 oven-dry 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.

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

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

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

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

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements. 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 in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 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 without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion 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 18 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 18 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. Ston 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 of the plow layer 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 soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation 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 a 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.

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

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered is 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. 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 high. 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.

Only saturated zones within a depth of about 6 feet are indicated. 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.

Cemented pans are cemented or indurated subsurface layers within a depth of 5 feet. Such pans cause difficulty in excavation. Pans are classified as thin or thick. A thin pan is less than 3 inches thick if continously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A thick pan is more than 3 inches thick if continously indurated or more than 18 inches thick if discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Subsidence is the settlement of the soil surface. Initial subsidence generally results from drainage. Total subsidence is initial subsidence plus the slow sinking that occurs over a period of several years as a result of the oxidation or compression or organic material.

Not shown in the table 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 content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion 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 amount of sulfates in the saturation extract.

Physical, chemical, and mineralogical analyses of selected soils

C. T. Hallmark, V. W. Carlisle, and R. E. Caldwell, assistant professor and professors of Soil Science, respectively, Soil Science Department, University of Florida Agricultural Experiment Stations, prepared this section.

Physical, chemical, and mineralogical properties of representative pedons sampled in St. Lucie County Area are presented in Tables 18, 19, and 20. Analyses were conducted and coordinated by the Soil Characterization Laboratory at the University of Florida. Detailed profile descriptions of soils analyzed are given in alphabetical order in the section "Classification of the Soils." Laboratory data and profile information for additional soils in St. Lucie County Area as well as soils in other counties in Florida are on file at the Soil Science Department, University of Florida.

Soils were sampled by horizon from pits at carefully selected locations that represented typifying pedons. Samples were air-dried, crushed, and sieved through a 2-millimeter screen. Most of the analytical methods used are outlined in Soil Survey Investigations Report No. 1 (*12*).

Particle size distribution was determined by using a modification of the Bouyoucos hydrometer procedure with sodium hexametaphosphate as the dispersant (*5*). Hydraulic conductivity, bulk density, and water content data were obtained on undisturbed core samples. Organic carbon was determined by a modification of the Walkley-Black wet combustion method. Extractable bases were obtained by equilibrating and leaching soils with ammonium acetate buffered at pH 7.0. Sodium and potassium in the extract were determined by flame photometry and calcium and magnesium were determined by atomic absorption spectroscopy. Extractable acidity was determined by the barium chloride-triethanolamine method at pH 8.2. Sum of cations, which may be considered a measure of the cation exchange capacity, was obtained by summation of extractable bases and extractable acidity. Base saturation is the ratio of extractable bases to sum of cations expressed in percent. The pH measurements were made with a glass electrode using water in a 1:1 soil- solution ratio; 0.01 M calcium chloride solution in a 1:2 soil-solution ratio; and nitrogen-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 atomic absorption. Aluminum, carbon, and iron were extracted from suspected spodic horizons with 0.1 M sodium pyrophospate. Determination of aluminum and iron was by atomic absorption and extracted carbon by the Walkley-Black wet combustion method.

Peak heights are at 18-angstrom, 14-angstrom, 7.2-angstrom, 4.83-angstrom, and 4.31-angstrom positions. These positions represent montmorillonite and/or interstratified expandibles, vermiculite and/or 14-angstrom intergrades, kaolinite, gibbsite, and quartz, respectively. They were measured, summed, and normalized to give percentage of soil minerals identified in the X-ray diffractograms. These values are not an absolute quantity but a relative distribution of minerals in the clay fraction. The absolute percentage would require additional knowledge of particle size, crystallinity, unit structure substitution, and matrix affects.

The sandy nature of St. Lucie County Area soils is indicated in Table 18. Only four soils, the Floridana, Hilolo, Riviera and Winder soils, have horizons which contain more than 10 percent clay in the upper 2 feet of the pedon, and no horizon sampled has more than 30 percent clay. Myakka Variant, St. Lucie, and Welaka Variant pedons contain less than 5 percent clay throughout their profiles to a depth of 6 feet. Ankona, Electra, Floridana, Hallandale, Hilolo, Malabar, Nettles, Oldsmar, Pepper, Pineda, Riviera, Susanna, Tantile, Wabasso, Waveland, and Winder soils have significant textural increases of clay in the lower horizons. Silt contents are generally below 10 percent in the pedons studied. A notable exception is the Hilolo soil where nearly 15 percent silt values are in several of the subsoil horizons. With the exception of the Electra, Hallandale, Hilolo, Malabar, Riviera, Waveland, and Winder soils, medium sand dominates the sand fraction of all of the pedons sampled. Droughtiness is a common characteristic of sandy soils, particularly those soils that are naturally moderately well drained, well drained, or excessively drained.

Hydraulic conductivity data in Table 18 are a measure of the movement of water through the soil when the soil is saturated. Generally, hydraulic conductivities decrease as clay and silt percentages and bulk density increase and increase as organic matter and better developed structure increases. In the presented data, sandy loam and sandy clay loam textures commonly show hydraulic conductivities below 1.0 inch per hour and often values are below 0.1 inch per hour. Generally, sands and loamy sands exhibit higher hydraulic conductivities; however, soil structure also affects the hydraulic conductivity shown by the low values in the spodic horizons of the Ankona, Lawnwood, Myakka Variant, Nettles, Pepper, Susanna, and Waveland soils.

Plant available water holding capacity of soil can be estimated from bulk density and water content data in Table 18. Generally horizons that have sand and loamy sand textures retain less available water than do horizons that have sandy loam and sandy clay loam textures. When calculated to a depth of 40 inches, plant available water capacity ranges from nearly 2 inches in the Ankona, Electra, St. Lucie, and Tantile soils which are sandy throughout to more than 19 inches in the Samsula Variant pedon which has a thick surface horizon of organic material. Other pedons about which data are available are intermediate; they range from 2 to 6 inches of plant available water holding capacity in the upper 40 inches of the pedon.

Low values for extractable bases, sum of cations, and base saturations in Table 19 are indicative of low inherent soil fertility. Calcium and magnesium are the predominant bases; the largest amounts of these elements occur in the Hilolo soil. Sodium is generally uniformly low in all soils except in some horizons of the Hilolo, Myakka Variant, Riviera, and Samsula Variant pedons. In these soils extractable sodium is greater than 1 milliequivalent per hundred grams. Trace amounts of potassium combined with low base saturations underscore the absence of appreciable quantities of weatherable minerals in these soils. Sum of cations reflects the amount of organic matter, clay, and type of clay present; it increases as the amount of organic matter and clay content increase. Therefore, sum of cations generally is relatively high in the surface horizon where organic matter is high. It decreases with depth to the argillic or spodic horizon, and then again increases.

Organic carbon content is highest in the upper horizons and spodic horizons of all soils and is generally notably low in the A2 horizons. Since organic carbon is directly responsible for influencing nutrient and water retention capacities, management practices that conserve and maintain organic carbon are desirable. They are especially important on soils with low organic carbon and clay content, for example, the Electra, Hallandale, Lawnwood, Pendarvis, Pineda, St. Lucie, Susanna, Tantile, and Waveland soils.

Electrical conductivity values reflect the amount of free salts present in the soil solution. When these values are high (generally above 3 millihos per centimeter), plant growth may be adversely affected. Myakka Variant and Samsula Variant soils exhibit values sufficiently high in some horizons to indicate that growth of salt sensitive plants would be affected.

The pH determinations reflect the acidity of the soils. Nutrient availability generally is greatest in soil when the reaction in water is between pH 6 and 7. Addition of lime is a common management practice used to raise the pH of the plow layer. If soil reaction is between pH 7.5 to 8.2, as in the Hilolo, Pineda, and Riviera pedons, presence of free carbonate minerals is indicated. Free carbonates readily reduce phosphorus availability to plants. Soil reaction in calcium chloride and potassium chloride is generally 0.5 to 1.5 units lower than in water.

Sodium pyrophosphate extractable iron was 0.17 percent or less in selected horizons of Spodosols. The ratio of pyrophosphate extractable carbon and aluminum to clay in Ankona, Lawnwood, Myakka Variant, Nettles, Oldsman, Pendarvis, Pepper, Samsula Variant, Susanna, Tantile, Wabasso, and Waveland soils was sufficient to meet the chemical criteria for spodic horizons.

Citrate-dithionite extractable iron and aluminum are associated with the ability of a soil to absorb and in time to render phosphorus unavailable to plants. None of the surface horizons studied show high amounts of free sesquioxides; however, the Malabar, Pineda, and Welaka variant soils, as well as the Spodosols have appreciable amounts of iron and aluminum in the subsoil which will absorb phosphorus from solution percolating through the soils.

Mineralogy of the sand and silt fractions (not shown) is siliceous; quartz is dominant in all soils. Mineralogy of the crystalline components of the clay fraction is given in Table 20 for selected horizons of the pedons. In general the clay mineralogical suite is composed of montmorillonite, a 14-angstrom intergrade mineral, kaolinite, and quartz. Mica (illite) was noted only in the A11 horizon of the Winder soil; gibbsite and vermiculite were not found in any of the pedons. Because of the shrink-swell character of montmorillonite and the high amount of this mineral in the Floridana, Hilolo, Rivera, and Winder soils, the use of these soils for engineering purposes needs to be carefully investigated. Kaolinite, quartz, and the 14-angstrom intergrade minerals are present in all pedons;

the intergrade, however, was absent in the Winder pedon. Montmorillonite and the 14-angstrom intergrade minerals have higher cation exchange capacities than kaolinite and quartz. These minerals indicate more native ability of the soil to retain plant nutrients.

Engineering index test data

Table 21 contains engineering test data made by the Soils Laboratory, Florida Department of Transportation, Bureau of Materials and Research, on some of the major soil series in the survey area. These tests were made to help evaluate the soils for engineering purposes. The classifications given are based on data obtained by mechanical analysis and by tests to determine liquid limits and plastic limits.

The mechanical analyses were made by combined sieve and hydrometer methods (*5*). In this method, the various grain-sized fractions are calculated on the basis of all the material in the soil sample, including that coarser than 2 millimeters in diameter. The mechanical analyses used in this method should not be used in naming textural classes of soils.

Compaction (or moisture-density) data are important in earthwork. If soil material is compacted at a successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, density decreases with increase in moisture content. The highest dry density obtained in the compactive test is termed maximum dry density. As a rule, maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of the soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from a semisolid to a plastic state, and the liquid limit is the moisture content at which the soil material changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. The data on liquid limit and plasticity index in this table are based on laboratory tests of soil samples.

Hydraulic conductivity of selected soils

The rate of water movement through the soil is of considerable importance for many agricultural, engineering, and urban uses. An important soil property affected by soil water flow is the ability of the soil to transmit water. The saturated hydraulic conductivity is the constant which relates the rate of water transport for a soil or soil horizon. Quantative measurement of saturated hydraulic conductivity, commonly referred to as permeability, is expressed in inches per hour (in/hr).

Table 22 contains in situ saturated hydraulic conductivity test data of weakly cemented sandy subsoils (Bh horizons) and loamy subsoils (Bt horizons) of some of the major soil series in the survey area. Measurements were made below a water table using the piezometer method (*4*). This data was used to help evaluate the soils for engineering and agricultural uses and to estimate the permeability rates given in table 16.

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*13*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 23, the soils of the survey area are classified according to the system. 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 Entisol.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; 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 Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols 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 Haplaquents.

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 fine-loamy, mixed, nonacid, mesic Typic Haplaquents.

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. The texture of the surface layer or of the substratum can differ within a series.

Soil series and 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 (*11*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*13*). 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 "Soil maps for detailed planning."

Anclote series

Soils of the Anclote series are sandy, siliceous, hyperthermic Typic Haplaquolls. They are very poorly drained, rapidly permeable soils that formed in sandy marine sediment. These soils are in depressional areas and swamps. They are saturated during the summer rainy season and after periods of heavy rainfall in other seasons. Slope ranges from 0 to 2 percent.

Anclote soils are associated with Basinger, Floridana, and Myakka soils. Basinger and Myakka soils do not have a mollic epipedon. Floridana soils have an argillic horizon.

Typical pedon of Anclote sand, 2 miles south of Florida Highway 68 and 20.5 miles east of Fort Pierce, SW 1/4 NW 1/4 sec. 20, T. 35 S., R. 37 E.

A11—0 to 4 inches; black (10YR 2/1) sand; mixture of organic matter and uncoated sand grains; moderate medium granular structure; very friable; many fine and medium roots; medium acid; gradual wavy boundary.

A12—4 to 21 inches; very dark gray (10YR 3/1) sand; single grain; loose; few fine roots; medium acid; gradual wavy boundary.

C1g—21 to 30 inches; gray (10YR 5/1) sand; single grain; loose; slightly acid; gradual wavy boundary.

C2g—30 to 47 inches; dark grayish brown (2.5Y 4/2) sand; single grain; loose; slightly acid; gradual wavy boundary.

C3—47 to 80 inches; grayish brown (2.5Y 5/2) sand; single grain; loose; slightly acid.

Reaction ranges from medium acid to moderately alkaline throughout the profile.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or value of 3 and chroma of 2. Estimated organic matter content is 2 to 10 percent. Thickness ranges from 10 to 24 inches.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 6, and chroma of 2; hue of 5Y, value of 4 to 6, and chroma of 2 or l; or is neutral, and value is 4 to 6.

Ankona series

Soils of the Ankona series are sandy, siliceous, hyperthermic, ortstein Arenic Haplaquods. They are nearly level, poorly drained, very slowly to slowly permeable soils that formed in marine sandy and loamy sediments. These soils are in broad flatwoods. The water table is within a depth of 10 inches for 1 to 4 months and between depths of 10 to 40 inches for 6 months or more in most years. Slope ranges from 0 to 2 percent.

Ankona soils are closely associated with Electra, Lawnwood, Nettles, Pepper, Susanna, Tantile, and Waveland soils. The Lawnwood, Pepper, Susanna, and Tantile soils have a spodic horizon within a depth of 30 inches. Electra soils are better drained than Ankona soils. Waveland soils do not have an argillic horizon. Nettles soils have an argillic horizon that has high base saturation.

Typical pedon of Ankona sand, 200 feet north of canal, 0.3 mile west of Glades Road cutoff, 0.85 mile southwest of Selvitz Road, and 5 miles southwest of Fort Pierce, SE 1/4 SW 1/4 NW 1/4 sec. 31, T. 35 S., R. 40 E.

A11—0 to 3 inches; black (10YR 2/1) sand, rubbed; weak medium crumb structure; very friable; mixture of uncoated sand grains and organic matter that has salt-and-pepper appearance; many fine and medium roots; extremely acid; clear wavy boundary.

A12—3 to 11 inches; dark gray (10YR 4/1) sand, rubbed; single grain; loose; mixture of uncoated sand grains and organic matter; many fine and medium roots; strongly acid; clear wavy boundary.

A21—11 to 15 inches; gray (10YR 5/1) sand; common medium distinct very dark gray (10YR 3/1) streaks along root channels; single grain; loose; few fine roots; strongly acid; clear wavy boundary.

A22—15 to 29 inches; light gray (10YR 7/1) sand; common medium distinct very dark gray (10YR 3/1) streaks along root channels; single grain; loose; few fine roots; strongly acid; gradual wavy boundary.

A23—29 to 35 inches; gray (10YR 6/1) sand; single grain; loose; few fine roots; strongly acid; clear wavy boundary.

A24—35 to 38 inches; grayish brown (10YR 5/2) sand; single grain; loose; few fine roots; strongly acid; abrupt smooth boundary.

B21h—38 to 48 inches; black (N2/0) loamy sand; massive; moderately cemented in about 15 to 65 percent of vertical thickness in 90 percent or more of pedon; firm; few fine roots; sand grains well coated with colloidal organic matter; very strongly acid; clear irregular boundary.

B22tg—48 to 57 inches; dark grayish brown (2.5Y 4/2) sandy loam; few coarse distinct vertical streaks of black (N 2/0); weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; very strongly acid; clear wavy boundary.

Cg—57 to 80 inches; olive gray (5Y 4/2) loamy sand; few fine distinct light gray (10YR 7/2) streaks; weak medium granular structure; very friable; very strongly acid.

Reaction ranges from extremely acid to strongly acid throughout the profile.

The A1 horizon has rubbed color in hue of 10YR, value of 2 to 4, and chroma of 1, or value is 2 to 4 or is neutral. Where value is 3 or less, thickness is less than 10 inches. Unrubbed colors have a salt-and-pepper appearance. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; hue of 2.5Y, value of 5 through 8, and chroma of 2; or is neutral and value is 5 to 8.

A B1h horizon is in some pedons. Where present, it has hue of 10YR, value of 3 or 4, and chroma of 1 or 2, or value of 2 and chroma of 1. This horizon does not meet the requirements for a spodic horizon. Thickness ranges to 4 inches.

The B2h horizon has hue of 5YR, value of 2 or 3, and chroma of 1 to 3; hue of 7.5YR, value of 3, and chroma of 2; hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or is neutral, and has value of 2. Cementation ranges from not cemented to strongly cemented and is variable in most pedons; however, a weakly to strongly cemented subhorizon that is 1 inch or more thick is in more than half of each pedon. Consistence ranges from very firm in the strongly cemented parts to very friable in the parts that are not cemented. Thickness ranges from 4 to 18 inches with a few streaks extending into the C horizon.

In some pedons, there is a B3&Bh horizon. Where present, it has hue of 10YR, value of 3 to 5, and chroma of 3 or 4; or hue of 7.5YR, value of 4, and chroma of 2 or 4 with fragments of the Bh horizon. This horizon is fine sand, sand, loamy fine sand, or loamy sand.

The Btg horizon has hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 to 2; hue of 2.5Y, value of 4 to 7, and chroma of 2; or is neutral and value is 4 to 7 with mottles of gray, yellow, brown, or red. This horizon is sandy loam or sandy clay loam. Base saturation is less than 35 percent. Depth to the Bt horizon ranges from 40 to 80 inches.

In some pedons, a weakly expressed A12 horizon is between the Bh and Bt horizons. It has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 7, and chroma of 2; or is neutral and value is 4 to 7. The A12 horizon is sand or fine sand. Thickness ranges to 12 inches.

The Cg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 7, and chroma of 2; or is neutral and value is 4 to 7. The Cg horizon is sand, fine sand, loamy fine sand, or loamy sand.

Astatula series

Soils of the Astatula series are hyperthermic, uncoated Typic Quartzipsamments. They are nearly level to gently sloping, excessively drained, very rapidly permeable soils that formed in thick beds of marine and eolian sand. These soils are on broad high ridges. The water table is below a depth of 72 inches. Slope ranges from 0 to 5 percent.

Astatula soils are closely associated with Pendarvis, Paola, Satellite, St. Lucie, and Welaka Variant soils. Paola and Welaka Variant soils have light colored A2 horizons. Pendarvis and Satellite soils are more poorly drained than Astatula soils, and Pendarvis soils have a spodic horizon. St. Lucie soils are light colored.

Typical pedon of Astatula sand, 0 to 5 percent slopes, in a cleared area 0.1 mile east of U.S. Highway 1, 0.8 mile south of county line, and about 8 miles north of Fort Pierce, SE 1/4 SE 1/4 sec. 6, T. 34 S., R. 40 E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) sand; weak medium granular structure; very friable; many fine and common medium roots; medium acid; clear smooth boundary.

C1—4 to 16 inches; reddish yellow (7.5YR 6/8) sand; single grain; loose; many uncoated sand grains; common fine and many medium roots; slightly acid; gradual wavy boundary.

C2—16 to 110 inches; strong brown (7.5YR 5/8) sand; single grain; loose; many uncoated sand grains; slightly acid.

There is less than 5 percent silt and clay between depths of 10 and 40 inches. Reaction ranges from medium acid to slightly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. This horizon is a mixture of organic matter and uncoated sand grains. It is 2 to 8 inches thick. Some pedons have an AC horizon. Where present, they have mixed colors in hue of 10YR, value of 5, and chroma of 1; or value of 6 or 7 and chroma of 1 to 4.

The C horizon has hue of 7.5YR or 5YR, value of 5 to 7, and chroma of 6 or 8; hue of 10YR, value of 5 to 7, and chroma of 3 or 4; or value of 5 or 6 and chroma of 6 or 8. In some pedons, splotches with hue of 10YR, value of 5 to 8, and chroma of 1 occur. These splotches are the color of the uncoated sand grains. They do not indicate wetness.

Basinger series

Soils of the Basinger series are siliceous, hyperthermic Spodic Psammaquents. They are poorly drained, very rapidly permeable soils that formed in sandy marine sediment. These soils are in sloughs, on broad low flats, or along poorly defined drainageways in the flatwoods. The water table is within a depth of 10 inches for 2 to 6 months and between depths of 10 to 30 inches for more than 6 months in most years. Slope ranges from 0 to 2 percent.

Basinger soils are closely associated with Lawnwood, Pepper, and Malabar soils. Basinger soils do not have a spodic horizon. Lawnwood and Pepper soils have a spodic horizon, and Pepper soils have a Bt horizon underlying the spodic horizon. Basinger soils differ from the Malabar soils in not having a Bir and a Bt horizon.

Typical pedon of Basinger sand, in a slough 0.25 mile north of Florida Highway 68, 1.0 mile east of the Okeechobee county line, and 20.5 miles west of Fort Pierce, NE 1/4 NE 1/4 sec. 7, T. 35 S., R. 37 E.

Ap—0 to 5 inches; very dark gray (10YR 3/1) sand; mixture of organic matter and uncoated sand grains; weak medium granular structure; very friable; many fine and few medium roots; strongly acid; clear smooth boundary.

A2—5 to 26 inches; light brownish gray (10YR 6/2) sand; common medium distinct black (10YR 2/1) and very dark gray (10YR 3/1) streaks along root channels; single grain; loose; few fine roots; strongly acid; clear wavy boundary.

Bh—26 to 55 inches; dark brown (10YR 4/3) sand; few fine distinct black (10YR 2/1) streaks; common medium distinct brown (10YR 5/3) pockets; single grain; loose; many clean sand grains; strongly acid; gradual wavy boundary.

C—55 to 80 inches; pale brown (10YR 6/3) sand; slight increase of value with depth; single grain; loose; slightly acid.

Thickness of sand exceeds 80 inches.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. Thickness ranges from 1 to 12 inches. Where value is 3.5 or less, thickness is less than 6 inches. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. Thickness ranges from 6 to 20 inches. In some pedons, there is a thin transitional A3 horizon between the A2 horizon and Bh horizon. Combined thickness of the A horizons ranges from 8 to 40 inches. Reaction ranges from very strongly acid to mildly alkaline.

The Bh horizon has value that is one unit or more darker than the A horizon. It has hue of 10YR, value of 3 or 4, and chroma of 3; hue of 7.5YR, value of 3, and chroma of 2, or value of 4 and chroma of 4; or hue of 5YR, value of 3, and chroma of 3 or 4 with common to many uncoated sand grains. If the Bh horizon has the latter colors, it does not meet the requirements of a spodic horizon.

In places, few to many streaks and weakly cemented fragments of the Bh horizon having hue of 10YR, 5YR, or 7.5YR, value of 2 or 3, and chroma of 1 and 2; or hue of 5YR, value of 3, and chroma of 3 and 4 are in the Bh horizon. Reaction ranges from strongly acid to mildly alkaline.

The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7, and chroma of 1 or 2; or hue of 10YR, value of 4 to 6, and chroma of 3. Reaction is strongly acid to moderately alkaline. In some pedons, this horizon has some pockets of loamy sand and a few pockets of sandy loam.

Canaveral series

Soils of the Canaveral series are hyperthermic, uncoated Aquic Quartzipsamments. They consist of moderately well drained to somewhat poorly drained, very rapidly permeable soils that formed in thick beds of marine or aeolian sand and shell fragments. These soils are on low dunelike ridges and on side slopes bordering depressional areas and sloughs near the coast. The water table is between depths of 10 to 40 inches for 2 to 6 months or more annually. Slope is 0 to 5 percent.

Canaveral soils are closely associated with Turnbull Variant, Pompano Variant, Palm Beach, and Kaliga Variant soils. Palm Beach soils are better drained than Canaveral soils, and Turnbull Variant, Pompano Variant, and Kaliga Variant soils are more poorly drained.

Typical pedon of Canaveral fine sand, 0 to 5 percent slopes, 40 feet north of Jack Island State Park Road, approximately 0.1 mile west of Florida Highway A1A, and about 4 miles north-northeast of Fort Pierce, SW 1/4 SW 1/4 sec. 23, T. 34 S., R. 40 E.

A—0 to 6 inches; dark brown (10YR 4/3) fine sand; single grain; loose; common fine roots; about 15 percent by volume pale brown shell fragments; moderately alkaline; calcareous; clear wavy boundary.

C1—6 to 28 inches; pale brown (10YR 6/3) fine sand; common medium distinct brownish yellow (10YR 6/6) mottles; single grain; loose; few fine roots; about 25 percent by volume sand-size pale brown shell fragments; moderately alkaline, calcareous; clear wavy boundary.

C2—28 to 80 inches; gray (5Y 5/1) fine sand; single grain; loose; about 15 percent by volume sand-size pale brown shell fragments; moderately alkaline, calcareous.

All horizons effervesce weakly to strongly with dilute HCl. Stratified layers of sand and shells or shell fragments may occur throughout the soil. Reaction ranges from neutral to moderately alkaline.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 2 or 3. Where the A horizon has value of 3 or less, it is less than 10 inches thick. Total thickness of the A horizon is 6 to 15 inches. Content of shell fragments ranges from 5 to 20 percent by volume.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 2 or 3; hue of 5Y, value of 5 or 6, and chroma of 1 or 2; hue of 2.5Y, value of 5 or 6, and chroma of 2; or is neutral and value is 5 or 6. The C horizon is a mixture of sand and multicolored shell fragments. In some pedons the sand and shell fragments are stratified. Content of shell fragments ranges from 10 to 60 percent.

Chobee series

Soils of the Chobee series are fine-loamy, siliceous, hyperthermic Typic Argiaquolls. They are nearly level, very poorly drained, very slowly permeable soils that formed in unconsolidated, moderately fine marine sediment. These soils are in small to large depressional areas, along poorly defined drainageways, and on low lying flats. The water table is above the surface for 6 to 9 months in most years and is within 10 inches of the surface for most of the rest of the year except in very dry periods. Slope ranges from 0 to 2 percent.

Chobee soils are closely associated with Floridana, Hallandale, Hilolo, Pineda, Pople, Riviera, Winder, and Winder Variant soils. Except for Floridana soils, the associated soils do not have a mollic epipedon. Floridana soils have an argillic horizon between depths of 20 to 40 inches. Hallandale soils have limestone within a depth of 20 inches.

Typical pedon of Chobee loamy sand, 5 miles northwest of Fort Pierce, 0.05 mile east of Taylor Dairy Road, and 50 feet south of Florida Highway 608, NW 1/4 NE 1/4 sec. 36, T. 34 S., R. 39 E.

Ap—0 to 11 inches; black (10YR 2/1) loamy sand; weak fine subangular blocky structure; friable; many fine and medium roots; slightly acid; gradual wavy boundary.

B21tg—11 to 24 inches; black (10YR 2/1) sandy clay loam; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; common fine and medium roots; slightly acid; gradual wavy boundary.

B22tg—24 to 35 inches; very dark gray (10YR 3/1) sandy clay loam; common streaks of black (10YR 2/1) fine sand; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; common fine and medium roots; neutral; gradual wavy boundary.

B23tg—35 to 40 inches; dark gray (10YR 4/1) sandy clay loam; common fine distinct yellowish brown (10YR 5/6), brown (10YR 5/3), and black (10YR 2/1) streaks along root channels; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; few fine and medium roots; mildly alkaline; gradual wavy boundary.

B24tgca—40 to 47 inches; gray (5Y 5/1) sandy clay loam; common medium distinct light yellowish brown (10YR 6/4) and brownish yellow (10YR 6/6) mottles; common fine distinct very dark gray (10YR 3/1) streaks; common medium white (10YR 8/1) calcium carbonate nodules; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; common medium roots; moderately alkaline; calcareous; gradual wavy boundary.

B25tgca—47 to 70 inches; gray (5Y 5/1) sandy clay loam; many medium distinct light brownish gray (2.5Y 6/2) and common medium distinct yellowish brown (10YR 5/6) mottles; common medium distinct light gray (10YR 7/1) calcium carbonate nodules; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; common medium roots; moderately alkaline; calcareous; clear wavy boundary.

B26tg—70 to 80 inches; gray (5Y 5/1) sandy clay loam; weak coarse subangular blocky structure; sand grains bridged and coated with clay; firm; few medium distinct light gray (10YR 7/1) calcium carbonate nodules; moderately alkaline; calcareous.

Solum thickness is more than 40 inches.

The Al or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Reaction ranges from slightly acid to moderately alkaline. The organic matter content is about 5 to 20 percent. Thickness of the A horizon is 3 to 18 inches.

The Bt and Btca horizons have hue of 10YR, value of 2 to 5, and chroma of 1; hue of 5Y, value of 4 to 6, and chroma of 1 or 2 with or without mottles; hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 with mottles; or is neutral and value is 4 or 5. The Bt and Btca horizons are sandy loam or sandy clay loam. Clay content in the upper 20 inches of the argillic horizon ranges from 18 to 35 percent. Reaction ranges from slightly acid to mildly alkaline in the Bt horizon, and from neutral to moderately alkaline in the Btca horizon.

In some pedons, the Bt horizon contains pyrites, but the presence of these pyrites cannot be predicted. If the water table is lowered, the pyrites react to form acids that can lower the pH to 3.5 or less. Thickness of the B horizon ranges from 20 to 65 inches.

Some pedons have a Cg horizon. This horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 6, and chroma of 2; or is neutral and value is 4 to 6. The C horizon is loamy sand, loamy fine sand, sandy loam, or sandy clay loam. In some pedons, the C horizon is a mixture of sand and shell fragments. Reaction ranges from neutral to moderately alkaline.

Electra series

Soils of the Electra series are sandy, siliceous, hyperthermic Arenic Ultic Haplohumods. They are somewhat poorly drained, moderately slowly permeable soils that formed in sandy and loamy marine sediments. These soils are on low ridges and knolls. A water table is between depths of 25 to 40 inches for about 4 months of the year and below a depth of 40 inches in dry periods. Slope ranges from 0 to 5 percent.

Electra soils are closely associated with Ankona, Hobe, Jonathan, Pendarvis, and Waveland soils. Hobe soils are better drained, and Ankona soils are more poorly drained than Electra soils. Ankona, Jonathan, Pendarvis, and Waveland soils have an ortstein horizon. Jonathan and Pendarvis soils do not have an argillic horizon. Jonathan soils have a spodic horizon below a depth of 50 inches.

Typical pedon of Electra fine sand, 0 to 5 percent slopes, 400 feet east of telephone cable line trail, 0.15 mile south of Banyan Road, 0.1 mile west of U.S. Highway 1, and 8.5 miles south of Fort Pierce, NE 1/4 NE1/4 sec. 27, T. 36 S., R. 40 E.

A1—0 to 7 inches; gray (10YR 5/1) fine sand; weak medium granular structure; very friable; many fine and medium roots, few coarse roots; extremely acid; clear smooth boundary.

A2—7 to 47 inches; white (10YR 8/1) fine sand; few fine distinct grayish brown (10YR 5/2) streaks along root channels; single grain; loose; common fine and medium roots and few coarse roots decreasing to common medium roots below a depth of about 24 inches; sand grains are uncoated; strongly acid; abrupt wavy boundary.

B2h—47 to 60 inches; dark reddish brown (5YR 3/2) fine sand; few coarse distinct dark brown (10YR 4/3) mottles near base of horizon; massive; friable; few fine roots; sand grains well coated with colloidal organic matter; very strongly acid; clear wavy boundary.

B2tg—60 to 80 inches; light brownish gray (2.5Y 6/2) fine sandy loam; many coarse distinct dark grayish brown (10YR 4/2) streaks; weak medium subangular blocky structure; friable; common medium dead and few fine live roots; sand grains bridged and coated with clay; very strongly acid.

The A horizon has hue of 10YR, value that ranges from 4 to 6, and chroma of 1. The A2 horizon has hue of 10YR, value that ranges from 5 to 8, and chroma of 1 or 2. Darker streaks along root channels are few to common. Thickness of the A horizon ranges from 30 to 50 inches. Reaction ranges from extremely acid to strongly acid.

Some pedons have a thin B1h horizon. Where present, this horizon has hue of 10YR, value that ranges from 2 to 4, and chroma of 1 or 2. The B1h horizon does not meet the requirements of a spodic horizon. Thickness ranges to 3 inches.

The Bh horizon has hue of 5YR, value of 2 or 3, and chroma of 1 or 2; hue of 10YR, value of 2, and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2. In some pedons, there are few to common, hard, darker Bh fragments 1 to 3 inches in diameter. Thickness of the Bh horizon ranges from 7 to 18 inches. Reaction ranges from extremely acid to strongly acid.

In some pedons an A12 horizon is present. Where present, it has hue of 10YR, value of 4 or 5, and chroma of 2. Thickness ranges to 8 inches.

Total thickness of the A, Bh, and A12 horizons is 40 to less than 80 inches. Reaction ranges from extremely acid to strongly acid.

The Btg horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or 4; or hue of 2.5Y, value of 6 or 7, and chroma of 2 to 4. Few to many mottles are yellow, red, and gray. This horizon is fine sandy loam, sandy loam, or sandy clay loam. It is 6 to more than 20 inches thick. Lenses or streaks of fine sand, sand, loamy fine sand, or loamy sand are in some pedons.

Some pedons have a B3g horizon. Where present, this horizon has colors similar to those of the Btg horizon. The B3g horizon is loamy fine sand, loamy sand, sandy loam, or fine sandy loam. Reaction ranges from extremely acid to strongly acid.

Floridana series

Soils of the Floridana series are loamy, siliceous, hyperthermic Arenic Argiaquolls. They are nearly level, very poorly drained, slowly to very slowly permeable soils that formed in sandy and loamy marine sediments. These soils are in wet depressional areas and on low flats. They are ponded for more than 6 months in most years. Slope ranges from 0 to 2 percent.

Floridana soils are closely associated with Chobee, Pineda, Riviera, Kaliga, and Winder soils. Pineda, Riviera, and Winder soils have an ochric epipedon. Chobee soils have an argillic horizon within a depth of 20 inches. Kaliga soils are organic.

Typical pedon of Floridana sand, in a depressional area about 17 miles west of Fort Pierce, 1.55 miles north of Florida Highway 68, and 0.5 mile west of main trail, NW 1/4 NW 1/4 NW 1/4 sec. 26, T. 34 S., R. 37 E.

A11—0 to 3 inches; black (10 YR 2/1) sand; moderate fine crumb structure; very friable; many fine roots; medium acid; clear wavy boundary.

A12—3 to 5 inches; very dark gray (10YR 3/1) rubbed sand; weak fine crumb structure; very friable; few fine roots; medium acid; clear smooth boundary.

A13—5 to 11 inches; black (10YR 2/1) sand; common medium distinct grayish brown (10YR 5/2) streaks; moderate medium crumb structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

A14—11 to 21 inches; very dark gray (10YR 3/1) sand; common coarse distinct grayish brown (10YR 5/2) bodies that are 1 to 1.5 inches in diameter and 2 to 5 inches long; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium crumb structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

A2—21 to 25 inches; dark gray (10YR 4/1) sand; common medium distinct grayish brown (10YR 5/2) bodies that are 1 to 2 inches in diameter and 1 to 3 inches long; single grain; loose; few fine roots; very strongly acid; abrupt irregular boundary.

B21tg&A—25 to 37 inches; dark gray (10YR 4/1) sandy clay loam; common light brownish gray (10YR 6/2) sandy penetrations of the A2 horizon that are 1 to 2 inches in diameter and 2 to 12 inches long; common fine distinct yellowish brown (10YR 5/8) mottles along root channels; common medium faint very dark gray (5Y 3/1) bodies; moderate medium subangular blocky structure; friable; sand grains bridged and coated with clay; many dead roots; few fine roots; very strongly acid; gradual wavy boundary.

B22tg&A—37 to 50 inches; dark gray (10YR 4/1) sandy clay loam; common coarse distinct gray (10YR 5/1) sandy bodies that are 1 to 3 inches in diameter; moderate medium subangular blocky structure; firm; sand grains bridged and coated with clay; very strongly acid; clear smooth boundary.

B3g—50 to 60 inches; gray (10YR 5/1) sandy loam; common coarse distinct black (5Y 2.5/1) bodies; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; very strongly acid; clear smooth boundary.

C1g—60 to 65 inches; light gray (5Y 6/1) sandy clay loam with pockets of sandy loam; common medium distinct dark gray (5YR 4/1) sandy pockets; massive; very friable; strongly acid; gradual wavy boundary.

C2g—65 to 81 inches; gray (5Y 5/1) sandy clay loam; common fine distinct brownish gray (10YR 5/2) sandy pockets; massive; firm; strongly acid.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. This horizon is a mixture of uncoated sand grains and organic matter. Thickness ranges from 10 to 24 inches. The A2 horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Thickness is 4 to 18 inches. Reaction is strongly acid or medium acid. Thickness of the A horizon is 20 to 40 inches.

The Btg part of the Btg&A horizon has hue of 10YR or is neutral, and chroma of 1 or less; hue of 5Y, value of 4, and chroma of 1 with or without mottles; hue of 10YR, value of 4 to 7, and chroma of 2; or hue of 2.5Y, value of 5 to 7, and chroma of 2 with mottles. Pedons that have matrix colors of chroma 1 or less may not have mottles. This horizon ranges from sandy loam to sandy clay loam, and penetrations of sand or fine sand extend vertically into the horizon from the A2 horizon. Reaction ranges from medium acid to moderately alkaline.

In some pedons, there are small bodies of pyrites in the Btg horizon. The presence of pyrites, however, cannot be predicted. If the water table is lowered, the pyrites can react to form acids that may lower the pH to 3.5 or less in local spots.

The C horizon has hue of 10YR or 5Y, value of 5 or 6, and chroma of 1 or 2; or is neutral and has value of 5 or 6. This horizon ranges from sandy clay loam to sand. It is mixed with shell fragments in many places. Reaction is strongly acid to moderately alkaline.

Hallandale series

Soils of the Hallandale series are siliceous, hyperthermic Typic Psammaquents. They are nearly level, poorly drained, rapidly permeable soils that formed in a thin bed of sandy sediment underlain by a fractured limestone ledge. These soils are on broad low flats, in low hammocks, and along poorly defined drainageways. They have a water table within a depth of 10 inches for 1 to 4 months of the year and within a depth of 20 inches for 6 months or more. Slope ranges from 0 to 2 percent.

Hallandale soils are closely associated with Winder Variant, Chobee, Hilolo, Pineda, Pople, Riviera, and Winder soils. None of these soils have limestone within a depth of 20 inches.

Typical pedon of Hallandale sand, in an orange grove 180 feet south of Immokalee Road, 1 mile west of junction of Florida Highway 713 (King's Highway) and Florida Highway 608, and about 6.2 miles northwest of Fort Pierce, NW 1/4 NW 1/4 sec. 35, T. 34 S., R. 39 E.

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

C1—6 to 10 inches; dark grayish brown (10YR 4/2) sand; few fine distinct very dark gray (10YR 3/1) crumbs; single grain; loose; common fine roots; slightly acid; clear wavy boundary.

C2—10 to 12 inches; dark grayish brown (10YR 4/2) discontinuous loamy sand covering about 45 percent of the pedon; common medium distinct yellowish brown (10YR 5/4) and few fine distinct yellowish brown (10YR 5/6) mottles; few fine distinct very dark gray (5Y 3/1) bodies; weak medium granular blocky structure; friable; few fine roots; neutral; abrupt irregular boundary.

R—12 to 37 inches; hard fractured limestone ledge containing an average of 4 to 5 solution holes per square meter ranging from 6 to 12 inches in diameter and 6 inches deep to complete penetration through the rock; solution holes are filled with dark grayish brown Bt material; rock is rippable from outer edges of ledge; surface of rock is smooth and undulating with rounded edges; abrupt wavy boundary.

IIC3—37 to 80 inches; gray (5Y 5/2) sand; common coarse faint (5Y 5/2) pockets of loamy sand and sandy loam and many medium distinct light gray (10YR 7/2) shell fragments; massive; very friable; moderately alkaline; calcareous.

Combined thickness of the A and C horizons is 6 to 20 inches.

The A1 or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. This horizon is a mixture of organic matter and uncoated sand grains. Thickness ranges from 3 to 7 inches. Reaction ranges from strongly acid to slightly acid.

The A2 horizon, where present, has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Reaction ranges from medium acid to moderately alkaline.

In some pedons, there is a B horizon. It has hue of 10YR, value of 5, and chroma of 3 or 4; value of 6, and chroma of 3 or 4; or value of 4 and chroma of 4. Reaction ranges from medium acid to moderately alkaline. In some pedons, this horizon has mottles in shades of gray, brown, or yellow. The B horizon is sand or fine sand and has clay content of 1 to 3 percent.

In many pedons, a C horizon is between the A horizon and limestone and in solution holes in the limestone ledge and there is no B horizon. It has hue of 10YR, value of 4, and chroma of 1 or 2; value of 5 or 6, and chroma of 1 of 3; value of 7 and chroma of 1 to 4; or value of 8 and chroma of 3 or 4. Mottles are yellow, brown, and gray. The C horizon is dominantly sand; however, in less than half of the pedon a thin layer of loamy sand immediately overlies the limestone boulders.

The underlying hard limestone is a continuous fractured ledge 1 to 3 feet thick. Solution holes in the limestone range from 3 inches to 36 inches in diameter, and from 4 inches deep to complete penetration through the limestone. In some pedons, soft carbonatic material or small fragments of weathered rock are at the place of contact with the limestone. Below the limestone is sand, fine sand, loamy sand, sandy loam, or sandy clay loam containing few to many shell fragments. This horizon has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 5 to 7, and chroma of 1 or 2; or is neutral and value is 5 to 7. Reaction ranges from slightly acid to moderately alkaline.

Hilolo series

Soils of the Hilolo series are fine-loamy, siliceous, hyperthermic Mollic Ochraqualfs. They are nearly level, poorly drained, slowly permeable soils that formed in beds of marine sandy and loamy materials that are influenced by underlying alkaline material. These soils are on dense palm hammocks and along borders of depressional areas and sloughs. The water table is within a depth of 10 inches for 2 to 4 months of the year and between depths of 10 to 40 inches for 6 to 9 months. Slope ranges from 0 to 2 percent.

Hilolo soils are associated with Pepper, Hallandale, Pineda, Pople, Riviera, Tantile, Winder Variant, and Winder soils. Winder Variant and Hallandale soils have limestone in the profile. Pepper soils have a spodic horizon. Pople soils have an argillic horizon between depths of 20 to 40 inches. Pineda, Riviera, and Winder soils do not have a calcareous, argillic horizon.

Typical pedon of Hilolo loamy sand, in a hammock 50 feet north of Delaware Avenue, 0.2 mile east of Hartman Road, 0.25 mile south of Florida Highway 68 (Orange Avenue), and 2.5 miles west of Fort Pierce, NW 1/4 SW 1/4 sec. 8, T. 35 S., R. 40 E.

A11—0 to 2 inches; very dark gray (10YR 3/1), black (10YR 2/1) loamy sand, rubbed; weak medium granular structure; very friable; many fine and few medium roots; common pieces of organic matter; mildly alkaline; gradual smooth boundary.

A12—2 to 7 inches; black (10YR 2/1) loamy sand; weak medium granular structure; very friable; few fine, medium and coarse roots; weak effervescence with dilute HCL; mildly alkaline; calcareous; gradual wavy boundary.

B21tgca—7 to 12 inches; dark gray (10YR 4/1) fine sandy loam with common medium fine very dark gray (10YR 3/1) mottles and common medium distinct gray (10YR 5/1) calcium carbonate nodules; weak medium subangular blocky structure; friable; few medium and large roots; sand grains bridged and coated with clay; strong effervescence with dilute HCl; moderately alkaline; calcareous; gradual wavy boundary.

B22tgca—12 to 28 inches; dark gray (10YR 4/1) sandy clay loam; common medium distinct light gray (10YR 7/1) calcium carbonate nodules; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; few medium roots; strong effervescence with dilute HCl; moderately alkaline; calcareous; gradual wavy boundary.

B23tgca—28 to 36 inches; gray (10YR 5/1) fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; common medium distinct light gray (10YR 7/1) calcium carbonate nodules; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; very few medium roots; strong effervescence with dilute HCl; moderately alkaline; calcareous; abrupt irregular boundary.

B24tgca—36 to 43 inches; olive gray (5Y 4/2) fine sandy loam; few medium distinct very dark grayish brown (10YR 3/2) 1 inch in diameter streaks along vertical root channels; few 3-inch diameter pockets of sticky light gray (10YR 7/2) calcium carbonates; common medium distinct calcium carbonate nodules; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; very few medium roots; strong effervescence with dilute HCl; moderately alkaline; calcareous; gradual wavy boundary.

B31g—43 to 50 inches; olive gray (5Y 4/2) fine sandy loam; few fine distinct light gray (10YR 7/1) calcium carbonate nodules; very friable; very few medium roots; moderate effervescence with dilute HC1; strongly alkaline; calcareous; gradual wavy boundary.

B32g—50 to 53 inches; olive gray (5Y 5/2) fine sandy loam; few fine distinct black (10YR 2/l) streaks along root channels; few concentrated areas of white (10YR 8/1) calcium carbonate nodules and powder; few medium distinct brownish yellow (10YR 6/6) and very pale brown (10YR 8/4) mottles; weak medium subangular blocky structure; very friable; very few medium roots; strong effervescence with dilute HCl; strongly alkaline; calcareous; gradual wavy boundary.

C1g—53 to 74 inches; light olive gray (5Y 6/2) loamy fine sand; few fine distinct very dark gray (10YR 3/1) streaks along root channels; few 2-inch diameter pockets of gray (10YR 6/1) fine sand; few fine distinct light gray (10YR 7/1) calcium carbonate nodules; massive; very friable; moderate effervescence with dilute HCl; strongly alkaline; calcareous; gradual wavy boundary.

C2g—74 to 80 inches; gray (5Y 5/1) fine sandy loam; many medium distinct gray (10YR 6/1) mottles; few fine distinct light gray (10YR 7/1) calcium carbonate nodules; massive; very friable; moderate effervescence with dilute HCl; strongly alkaline; calcareous.

The thickness of the solum ranges from 40 to 60 inches. The A1 or Ap horizon has hue of 10YR, value of 2, and chroma of 1; or value of 3, and chroma of 1 or 2; hue of 2.5Y, value of 3, and chroma of 2; or is neutral and value is 2 or 3. The A horizon is sand, fine sand, loamy sand, or loamy fine sand. Thickness is 6 to 10 inches. Reaction ranges from neutral to moderately alkaline. The lower 2 or 3 inches of the A1 horizon is not calcareous in all pedons. In some pedons, a thin horizon of calcareous sand or loamy sand is between the A horizon and Btgca horizons. Where present, chroma is 2 or less.

The B2tgca horizon has hue of 10YR or is neutral, value of 4 to 8, and chroma of 1 with or without mottles; hue of 10YR, value of 7 or 8, and chroma of 2; or hue of 2.5Y, value of 4 to 8, and chroma of 2 with mottles. The horizon is sandy loam, fine sandy loam, or sandy clay loam. Weighted clay content of the upper 20 inches of the control section ranges from 18 to 35 percent. Thickness is 12 to 50 inches. Reaction is mildly alkaline or moderately alkaline and calcareous.

The B3g horizon has color similar to that of the B2tgca horizon, and, in addition, has hue of 5Y, value of 4 to 7, and chroma of 1 or 2. It is sandy loam or fine sandy loam. Thickness is 0 to 15 inches. Reaction ranges from mildly alkaline to strongly alkaline and calcareous.

The Cg horizon has hue of 10YR, 2.5Y, 5Y, 5GY, or 5BG, value of 5 or 6, and chroma of 2 or less. It ranges from sand to fine sandy loam. Some pedons contain shells or shell fragments. Reaction ranges from mildly alkaline to strongly alkaline.

Hobe series

Soils of the Hobe series are sandy, siliceous, hyperthermic Arenic Ultic Haplohumods. They are nearly level and gently sloping, somewhat excessively drained, moderately permeable soils that formed in thick beds of sandy and loamy marine sediments. These soils are on elevated knolls and ridges in the flatwoods. The water table is generally below a depth of 60 inches. Slope ranges from 0 to 5 percent.

Hobe soils are closely associated with Electra, Pendarvis, and Jonathan soils. Electra and Pendarvis soils have a Bh horizon between depths of 30 to 50 inches and are more poorly drained than Hobe soils. Jonathan soils do not have an argillic horizon.

Typical pedon of Hobe sand, 0 to 5 percent slopes, in a wooded area 100 feet north of Lansdowne Avenue, 0.2 mile east of Crowberry Drive in Port St. Lucie, and about 8 miles south of Fort Pierce, NE 1/4 NE 1/4 sec. 3, T. 37 S., R. 40 E.

A1—0 to 5 inches; gray (10YR 5/1) sand; weak medium granular structure; very friable; strongly acid; clear wavy boundary.

A2—5 to 55 inches; white (10YR 8/1) sand; single grain; loose; slightly acid; abrupt wavy boundary.

Bh—55 to 65 inches; black (10YR 2/1) sand; common medium distinct dark brown (7.5YR 3/2) bodies; massive; friable; sand grains well coated with organic matter; very strongly acid; gradual wavy boundary.

Btg—65 to 80 inches; light brownish gray (10YR 6/2) sandy loam; common medium distinct strong brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; extremely acid.

The A1 horizon has hue of 10YR, value of 4 to 6, and chroma of 1. Thickness ranges from 1 to 8 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; or is neutral and value is 6 to 8. Darker streaks are along root channels in some pedons. Reaction ranges from very strongly acid to slightly acid. Combined thickness of the A horizons ranges from 50 to 70 inches.

In some pedons a B1h horizon is present. It has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The B1h horizon does not meet the requirements of a spodic horizon. Thickness is 0 to 3 inches. The B2h horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2; hue of 5YR, value of 3, and chroma of 3 or 4; or hue of 7.5YR, value of 3, and chroma of 2. In less than 40 percent of each pedon, the B2h horizon is firm and weakly to strongly cemented. Generally, few to common lighter colored sand pockets are in the B2h horizon. Thickness is 2 to 20 inches.

Where present, the B3&Bh horizon has hue of 10YR, value of 3 or 4, and chroma of 3 or 4; or hue of 5YR, value of 4, and chroma of 3 or 4 with weakly cemented Bh bodies. In some pedons, this horizon does not have weakly cemented Bh bodies and is a B3 horizon. Reaction ranges from extremely acid to strongly acid. The B3&Bh horizon is sand or fine sand.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or hue of 2.5Y, value of 5 to 7, and chroma of 2. It is sandy loam, fine sandy loam, or sandy clay loam. Some pedons have lenses or streaks of fine sand, sand, loamy sand, or loamy fine sand. This horizon is discontinuous or dips below a depth of 80 inches in some pedons; however, it is present in 60 percent or more of each pedon. Reaction ranges from extremely acid to strongly acid.

Hontoon series

Soils of the Hontoon series are dysic, hyperthermic Typic Medisaprists. They are nearly level, very poorly drained, rapidly permeable soils that formed in moderately thick beds of hydrophytic, nonwoody plant remains. These soils are in fresh water swamps and broad marshes. The water table is at or above the surface for 6 to 9 months in most years. Slope ranges from 0 to 2 percent.

Hontoon soils are closely associated with Waveland, Salerno, Lawnwood, Pompano, Samsula Variant, and Myakka Variant soils. Hontoon soils differ from those soils in having sapric material more than 51 inches thick. Samsula Variant and Myakka Variant soils have a Bh horizon within the control section. Waveland, Salerno, and Lawnwood soils have a spodic horizon. Pompano soils are sandy to a depth of 80 inches or more.

Typical pedon of Hontoon muck, in Upper Savannas marsh 0.5 mile south of Florida Highway 713, 0.25 mile west of U.S. Highway I, and 7.5 miles north of Fort Pierce, NE 1/4 NE 1/4 sec. 7, T. 34 S., R. 40 E.

Oa1—0 to 6 inches; dark reddish brown (5YR 3/2) muck; about 85 percent fiber, 10 percent rubbed; massive; friable; brown (10YR 5/3) sodium pyrophosphate extract; extremely acid in 0.01 molar calcium chloride; clear wavy boundary.

Oa2—6 to 55 inches; dark reddish brown (5YR 2/2) well decomposed muck (sapric material), unrubbed and rubbed; about 24 percent fiber unrubbed, 2 percent rubbed; massive; friable; dark brown (10YR 3/3) sodium pyrophosphate extract; extremely acid in 0.01 molar calcium chloride; gradual wavy boundary.

Oa3—55 to 60 inches; black (10YR 2/1) muck (sapric material) containing about 75 percent sand; about 2 percent fiber, unrubbed; massive; very friable; dark reddish brown (10YR 3/2) sodium pyrophosphate extract; very strongly acid (4.5) in 0.01 molar calcium chloride.

Reaction is less than 4.5 in 0.01 molar calcium chloride. The Oa horizons have hue of 10YR, value of 2, and chroma of 1 or 2; and hue of 5YR, value of 2 or 3, and chroma of 2 or 3. Sodium pyrophosphate extract is in hue of 10YR, value of 2 through 4, and chroma of 4 or less; value of 5 and chroma of 2 through 8; value of 6 and chroma of 3 through 8; or value of 7 and chroma of 4 through 8. Mineral content within a depth of 16 to 51 inches ranges from about 5 to 30 percent and to 75 percent below that depth.

Jonathan series

Soils of the Jonathan series are sandy, siliceous, hyperthermic, ortstein Typic Haplohumods. They are moderately well drained, slowly to very slowly permeable soils that formed in sandy marine sediment. These soils are on slightly elevated knolls and ridges in the flatwoods. The water table is at a depth of 40 to 60 inches for 1 to 4 months during the summer rainy season. Slope ranges from 0 to 5 percent.

Jonathan soils are closely associated with Electra, Hobe, Lawnwood, Pendarvis, Salerno, and Waveland soils. Hobe soils are better drained than Jonathan soils, and Lawnwood, Salerno, and Waveland soils are more poorly drained. Pendarvis soils have a spodic horizon at a depth of 30 to 50 inches. Electra soils have an argillic horizon and do not have an ortstein horizon.

Typical pedon of Jonathan sand, 0 to 5 percent slopes, in a wooded area 20 feet north of Becher Road, 0.2 mile west of Gilson Road, and 16.25 miles south of Fort Pierce, NE 1/4 SW 1/4 sec. 36, T. 37 S., R. 40 E.

A1—0 to 3 inches; gray (10YR 5/1) sand; single grain; loose; common medium and fine roots; medium acid; clear wavy boundary.

A2—3 to 68 inches; white (10YR 8/1) sand; single grain; loose; medium acid; common medium and coarse roots that decrease to few below a depth of about 40 inches; abrupt wavy boundary.

Bh—68 to 80 inches; black (5YR 2/1) sand; massive; firm; weakly cemented in more than half of the horizon; sand grains well coated with colloidal organic matter; very strongly acid.

Reaction ranges from very strongly acid to medium acid in the A horizon and from extremely acid to very strongly acid in the Bh horizon.

The A horizon is more than 50 inches thick. The A1 horizon has hue of 10YR, value of 4 through 7, and chroma of 1 or 2; or is neutral and value is 4 to 6. Thickness ranges from 1 to 6 inches. The A2 horizon has hue of 10YR, value of 5 through 8, and chroma of 1 or 2; or is neutral and value is 5 through 8 with darker vertical streaks in old root channels. In some pedons, a transitional B1h horizon 1/2 inch to 4 inches thick containing uncoated sand grains is between the A2 horizon and the Bh horizon.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1 or 2; hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 2 through 4. This horizon is more than 10 inches thick. In most pedons, cementation is variable; however, more than half of the Bh horizon in each pedon is weakly or moderately cemented. Light gray pockets of A2 horizon material are in many pedons.

Some pedons have a B3 horizon within a depth of 80 inches that has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 3 or 4; or a B3&Bh horizon that has similar matrix colors and firm, darker fragments of the Bh horizon.

In a few pedons, a C horizon in hue of 10YR, value of 5 through 7, and chroma of 2 through 4 occurs within a depth of 80 inches. The C horizon is fine sand or sand with or without pockets or balls of loamy sand or loamy fine sand.

Kaliga series

Soils of the Kaliga series are loamy, siliceous, dysic, hyperthermic Terric Medisaprists. They are nearly level, very poorly drained, slowly permeable soils that formed in moderately thick beds of hydrophytic, nonwoody plant remains and underlying loamy material. These soils are in small to large fresh water swamps and depressional areas. The water table is at or above the surface except for extended dry periods. Slope is less than 1 percent.

Kaliga soils are closely associated with Floridana, Pineda, Riviera, and Winder soils. All of those soils are mineral.

Typical pedon of Kaliga muck, about 9.4 miles west of Fort Pierce, 0.3 mile north of Florida Highway 68, 0.2 mile west along north side of a small ditch, and 50 feet north of the ditch, NE 1/4 NW 1/4 sec. 7, T. 35 S., R. 38 E.

Oa1—0 to 10 inches; black (10YR 2/1) muck, rubbed and pressed; about 7 percent fiber, 1 percent rubbed; weak fine and medium granular structure; very friable; many fine and coarse roots; many medium roots; brown (10YR 4/3) sodium pyrophosphate extract; about 11 percent mineral content; very strongly acid; pH 3.9 in 0.0l molar calcium chloride; gradual wavy boundary.

Oa2—10 to 27 inches; black (5YR 2/1) muck, rubbed and pressed; about 10 percent fiber, 3 percent rubbed; massive; friable; few fine and coarse roots, medium roots; brown (10YR 4/3) sodium pyrophosphate extract; 28 percent mineral content; very strongly acid; pH 3.9 in 0.01 molar calcium chloride; gradual wavy boundary.

Oa3—27 to 35 inches; dark reddish brown (5YR 2/2) muck, rubbed and pressed; about 3 percent fiber, none rubbed; massive; friable; few medium roots; dark yellowish brown (10YR 3/4) sodium pyrophosphate extract; 40 percent mineral content; very strongly acid; pH 3.9 in 0.01 molar calcium chloride; gradual wavy boundary.

IIC—35 to 52 inches; dark grayish brown (10YR 4/2) sandy clay loam; massive; friable; sand grains bridged and coated with clay; neutral.

Reaction of the organic material is less than 4.5 in 0.01 molar calcium chloride. Thickness ranges from 16 to 40 inches. The Oa horizon has hue of 10YR, value of 2, and chroma of 1; hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 1 to 3.

The IIC horizon is in hue of 10YR, value of 2 to 4, and chroma of 1 or 2; hue of 2.5Y, value of 2 to 5, and chroma of 2; or is neutral, and value is 2 to 4. The IIC horizon is sandy loam or sandy clay loam. Reaction ranges from very strongly acid to neutral. In some pedons, the IIC horizon contains pyrites, but the presence of the pyrites cannot be predicted. If the water table is lowered, the pyrites can react to form acids that may lower the pH to 3.5 or less.

Kaliga Variant

Soils of the Kaliga Variant are loamy, siliceous, euic, hyperthermic Terric Medisaprists. They are nearly level, very poorly drained, slowly permeable soils that formed in moderately thick beds of hydrophytic nonwoody plant remains over loamy material. These soils are in broad, medium to large coastal tidal swamps. They are flooded daily during normal high tides and during storms. Slope is less than 1 percent.

Kaliga Variant soils are closely associated with Canaveral, Turnbull Variant, Pompano Variant, and Myakka soils. All of the associated soils are mineral.

Typical pedon of Kaliga Variant muck, in a mangrove swamp 0.1 mile north of Florida Highway A1A, 0.2 mile east along trail, 2.5 miles south of Seaway Drive, and 3.75 miles east-southeast of Fort Pierce, SE 1/4 NE 1/4 sec. 18, T. 35 S., R. 41 E.

Oa1—0 to 20 inches; black (5YR 2/1) muck; about 30 percent fiber, about 6 percent rubbed; massive; many fine roots; very friable; brown (10YR 6/3) sodium pyrophosphate extract; very strongly acid; pH 4.5 in 0.01 molar calcium chloride; gradual wavy boundary.

Oa2—20 to 38 inches; black (5Y 2/1) muck, about 30 percent fiber, about 6 percent rubbed; massive; very friable; many fine roots; brown (10YR 5/3) sodium pyrophosphate extract; about 10 percent mineral material; strongly acid; pH 4.8 in 0.01 molar calcium chloride; gradual wavy boundary.

IIC1—38 to 51 inches; dark olive gray (5Y 3/1) sandy clay loam; less than 20 percent organic matter content; n value greater than 0.7; massive; friable; common fine roots; moderately alkaline; clear wavy boundary.

IIC2—51 to 65 inches; olive gray (5Y 4/2) loamy sand; common fine distinct very dark gray (10YR 3/1) streaks; massive; very friable; moderately alkaline; gradual wavy boundary.

IIC3—65 to 80 inches; olive gray (5Y 4/2) sand; common fine distinct very dark gray (10YR 3/1) streaks; massive; very friable; moderately alkaline.

Reaction of the organic material is 4.5 or more in 0.01 molar calcium chloride. Salinity is 8 to 16 millihos per centimeter. Thickness of the organic material ranges from 16 to 40 inches. The Oa horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2. Mineral content ranges from 10 to 30 percent, and increases with depth.

The IIC1 horizon has hue of 10YR, 2.5Y, 5Y, 5BG, or 5GY, value of 2 to 5, and chroma of 1 or 2. It is sandy clay loam or sandy loam. Thickness is 12 to 30 inches. Salinity is more than 8 millihos per centimeter. Reaction is medium acid to moderately alkaline. The n value is more than 0.7.

The IIC2 and IIC3 horizons have hue of 10YR, 2.5Y, or 5Y, value of 3 to 6, and chroma of 0 to 2. They are loamy fine sand, loamy sand, fine sand, or sand mixed in places with shell fragments. Salinity is more than 4 millihos per centimeter. Reaction is slightly acid to moderately alkaline.

Lawnwood series

Soils of the Lawnwood series are sandy, siliceous, hyperthermic, ortstein Aeric Haplaquods. They are nearly level, poorly drained, very slowly to slowly permeable soils that formed in marine sandy and loamy sediment. These soils are on broad flatwoods and in depressional areas. During most years, the water table is within a depth of 10 inches for 1 to 4 months and between depths of 10 to 40 inches for 6 months or more. Depressional areas are ponded. Slope ranges from 0 to 2 percent.

Lawnwood soils are closely associated with Electra, Ankona, Nettles, Pepper, Susanna, and Waveland soils. Electra soils are better drained than Lawnwood soils. Ankona, Pepper, Susanna, and Nettles soils have an argillic horizon below the Bh horizon. Waveland soils have a thick Bh horizon below a depth of 30 inches.

Typical pedon of Lawnwood sand, in a flatwoods area 6.5 miles north of Fort Pierce, 0.9 mile west of U.S. Highway 1, and 140 feet north of Indrio Road, sec. 18, T. 34 S., R. 40 E.

A11—0 to 4 inches; black (10YR 2/1) sand; moderate medium granular structure; very friable; many fine medium and coarse roots; very strongly acid; clear smooth boundary.

A12—4 to 8 inches; very dark gray (10YR 3/1) sand; common medium faint black (10YR 2/1) worm casts; weak medium granular structure; few fine medium and common coarse roots; very strongly acid; clear smooth boundary.

A21—8 to 15 inches; gray (10YR 5/1) sand; single grain; loose; few fine medium and many coarse roots; strongly acid; gradual wavy boundary.

A22—15 to 28 inches; light gray (10YR 7/1) sand; common medium distinct very dark gray (10YR 3/1) streaks along root channels; few fine and medium roots; medium acid; abrupt wavy boundary.

B21h—28 to 52 inches; black (5YR 2/1) sand; about 30 percent by volume dark reddish brown (5YR 2/2, 5YR 3/2) sand bodies; massive; black matrix is weakly cemented and firm, dark reddish brown bodies are friable; few fine roots; sand grains well coated with colloidal organic matter; very strongly acid; gradual wavy boundary.

B22h—52 to 58 inches; dark reddish brown (5YR 3/2) sand; common medium distinct pale brown (10YR 6/3) and few medium distinct dark brown (10YR 4/3) bodies; massive; very friable; common uncoated sand grains; strongly acid; gradual wavy boundary.
C1—58 to 63 inches; pale olive (5Y 6/3) sand that has few scattered large pockets of loamy sand; single grain; loose; strongly acid; clear wavy boundary.
C2—63 to 80 inches; pale olive (5Y 6/3) sand that has few large scattered pockets of loamy sand and sandy loam; sandy loam is discontinuous in 60 percent of pedon; few medium faint light gray (5Y 7/2) bodies of sand; massive; very friable; sand grains coated with clay in loamy part; strongly acid.

The A1 horizon has rubbed color in hue of 10YR, value of 2 to 4, and chroma of 1. Where value is less than 3.5, thickness is less than 10 inches. Unrubbed colors have a salt-and-pepper appearance. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Combined thickness of the A2 horizon is less than 30 inches. Reaction ranges from extremely acid to slightly acid.

In some pedons, there is a B1h horizon between the A2 horizon and Bh horizon. Where present, it has hue of 10YR, value of 3 to 5, and chroma of 1 and 2; or value of 2 and chroma of 1. The B1h horizon does not meet the requirements for a spodic horizon. Reaction ranges from very strongly acid to slightly acid. When moist, all or part of the B2h horizon is weakly or moderately cemented into a massive horizon that is present in more than half of each pedon.

In some pedons, the cemented part occurs as a subhorizon and is continuous horizontally throughout the pedon; in some pedons, cementation is not continuous but occurs in more than 50 percent of the pedon; and in some pedons, the cemented B2h horizon or subhorizon is continuous but contains less than 50 percent bodies that are not cemented. The B2h horizon ranges from weakly or moderately cemented with consistence of firm or very firm to not cemented and friable or loose. Cemented horizons are frequently brittle.

The B21h horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; or is neutral and value is 2. Sand grains are thickly coated with colloidal organic matter. The B22h horizon has hue of 10YR, value of 3, and chroma of 1 or 2; hue of 5YR, value of 3, and chroma of 2 to 4; or hue of 7.5YR, value of 3, and chroma of 2. In some pedons that have B23h and B24h horizons, colors are similar to that of the B22h horizon. In some pedons, particularly those with B23h and B24h horizons, the B22h horizon has color similar to that of the B21h horizon. The B2h horizon is fine sand, loamy fine sand, or loamy sand. Reaction ranges from extremely acid to strongly acid.

Where present, the B3 horizon has hue of 7.5YR, value of 4, and chroma of 3 or 4; value of 3 and chroma of 2; hue of 10YR, value of 3, and chroma of 2 or 3; or value 4 to 6 and chroma of 3 or 4. A B3&Bh horizon that contains dark, weakly cemented fragments of the Bh horizon is in some pedons. Where present, color is similar to that of the B3 horizon. The B3 and B3&Bh horizons are sand or fine sand.

The C horizon has hue of 10YR, value of 5 or 7, and chroma of 2 to 4; hue of 5Y, value of 5 or 7, and chroma of 1 to 3; or is neutral and value is 5 to 7. The C horizon is sand with common to many, medium to large scattered pockets of loamy sand and sandy loam. Reaction ranges from extremely acid to strongly acid. The C horizon ranges from a depth of 40 to 80 inches.

Malabar series

Soils of the Malabar series are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs. They are nearly level, poorly drained, slowly or very slowly permeable soils that formed in unconsolidated, marine sandy and loamy materials that are influenced by underlying alkaline material. These soils are on broad, poorly defined sloughs and flats. The water table is at a depth of less than 10 inches for 2 to 6 months of the year and between depths of 10 to 40 inches for most of the rest of the year. Slope ranges from 0 to 2 percent.

Malabar soils are closely associated with Basinger, Floridana, Oldsmar, Pineda, and Riviera soils. Basinger soils are sandy to a depth of 80 inches or more. Floridana soils have a mollic epipedon. Riviera soils do not have a Bir horizon. Oldsmar soils have a spodic horizon. Pineda soils have an argillic horizon at a depth of 20 to 40 inches.

Typical pedon of Malabar fine sand, in a low flat area 0.4 mile north of Florida Highway 712, .02 mile west of Florida Highway 611B (Selvitz Road), 500 feet south of canal, 6 citrus rows east from a small ditch, and 5 miles south-southeast of Fort Pierce, NW 1/4 NW 1/4 sec. 5, T. 36 S., R. 40 E.

A1—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak, medium granular structure; very friable; many fine roots, neutral; clear smooth boundary.
A2—6 to 12 inches; dark grayish brown (10YR 4/2) fine sand; single grain; loose; common medium roots; neutral; clear wavy boundary.
B1ir—12 to 17 inches; light yellowish brown (10YR 6/4) fine sand; common medium distinct grayish brown (10YR 5/2) streaks; single grain; loose; sand grains weakly cemented with iron oxide; few fine roots; neutral; clear wavy boundary.
B2ir—17 to 24 inches; yellowish brown (10YR 5/8) fine sand; common medium distinct brownish yellow (10YR 6/6) and few medium distinct strong brown (7.5YR 5/6) streaks; weak medium granular struc-

ture; very friable; sand grains well coated with iron oxide; neutral; clear wavy boundary.

A'2—24 to 42 inches; light gray (10YR 7/2) fine sand; common fine distinct very dark gray (10YR 3/1) streaks along old root channels; single grain; loose; neutral; abrupt irregular boundary.

B'2tg—42 to 72 inches; gray (5Y 5/1) fine sandy loam; common fine distinct brownish yellow (10YR 6/6) mottles and common medium distinct dark gray (5Y 4/1) mottles in upper part along root channels; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; horizontal and vertical lenses of sandy clay loam 1 to 2 inches thick; few krotovinas of light gray (10YR 7/2) sand that are 1 to 3 inches wide and 3 to 10 inches deep; few fine roots; mildly alkaline; clear smooth boundary.

C—72 to 80 inches; white (10YR 8/1) fine sand; single grain; loose; medium acid.

Thickness of the solum is 46 to 80 inches. Combined thickness of the A, Bir, and A'2 horizons is 40 to 80 inches.

The A1 or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1. This horizon is a mixture of organic matter and uncoated sand grains. Thickness ranges from 4 to 8 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 3, or less; or hue of 2.5Y, value of 5 or 6, and chroma of 2. Thickness ranges from 6 to 18 inches. Reaction ranges from medium to neutral.

The Bir horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8; or hue of 7.5YR, value of 5 or 6, and chroma of 6 or 8. Thickness ranges from 4 to 26 inches. The Bir horizon is sand or fine sand. Reaction ranges from medium acid to moderately alkaline.

Where present, the A'2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 5 to 7, and chroma of 2; or is neutral and value is 5 to 7. Reaction ranges from medium acid to moderately alkaline. Thickness ranges to 10 inches.

The Btg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; hue of 5Y, value of 5, and chroma of 1 or 2; or is neutral and value is 5 to 7. The Btg horizon is sandy loam or sandy clay loam with few to many sandy intrusions that are 1/2 inch to 2 inches in diameter and 2 to 15 inches long. Thickness ranges from 7 to 30 inches.

In some pedons, the Bt horizon contains small bodies of pyrites (*7, 8*), but the presence of these pyrites cannot be predicted. If the water table is lowered, the pyrites can react to form acids that may lower the pH to 3.5 or less in local spots. Reaction ranges from medium acid to moderately alkaline.

The Cg horizon has hue of 10YR, value of 5 to 8, and chroma of 2; hue of 2.5Y, value of 5 or 6, and chroma of 2; hue of 5Y, value of 5, and chroma of 1, or is neutral and value is 5 or 6. The Cg horizon ranges from sandy clay loam to sand or fine sand. In some places, the horizon is a mixture of sand and shell fragments. Reaction ranges from slightly acid to moderately alkaline.

Myakka series

Soils of the Myakka series are sandy, siliceous, hyperthermic Aeric Haplaquods. They are nearly level, poorly drained, moderately to moderately rapid permeable soils that formed in beds of sandy marine sediment. These soils are on broad flatwoods areas. In most years, the water table is within a depth of 10 inches for 1 to 3 months and between depths of 10 to 40 inches for 6 to 9 months. Slope ranges from 0 to 2 percent.

Myakka soils are closely associated with Basinger, Lawnwood, Samsula Variant, Myakka Variant, and Waveland soils. Basinger soils do not have a spodic horizon. Lawnwood and Waveland soils have an ortstein horizon. Myakka Variant soils have a histic epipedon. Samsula Variant soils are organic.

Typical pedon of Myakka fine sand, in a flatwoods area 27 miles southwest of Fort Pierce, SE 1/4 SW 1/4 sec. 31, T. 37 S., R. 37 E.

A11—0 to 3 inches; black (10YR 2/1) fine sand; mixed uncoated sand grains and organic matter; weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

A12—3 to 7 inches; very dark gray (10YR 3/1) fine sand; mixed uncoated sand grains and organic matter; single grain; loose; common fine roots; very strongly acid; gradual wavy boundary.

A21—7 to 17 inches; gray (10YR 6/1) fine sand; single grain; loose; few fine roots; extremely acid; gradual wavy boundary.

A22—17 to 27 inches; light gray (10YR 7/1) fine sand; single grain; loose; very strongly acid; abrupt wavy boundary.

B21h—27 to 29 inches; black (5YR 2/1) fine sand; massive; very friable; sand grains coated with colloidal organic matter; extremely acid; clear wavy boundary.

B22h—29 to 31 inches; dark reddish brown (5YR 2/2) fine sand; massive; very friable; sand grains coated with colloidal organic matter; extremely acid; gradual wavy boundary.

B23h—31 to 38 inches; very dark grayish brown (10YR 3/2) fine sand; common medium distinct black (5YR 2/1) bodies; massive; very friable; very strongly acid; gradual wavy boundary.

B3&Bh—38 to 43 inches; dark grayish brown (10YR 4/2) fine sand; common fine distinct black (5YR 2/1) bodies; single grain; loose; very strongly acid; gradual wavy boundary.

C1—43 to 47 inches; brown (10YR 5/3) fine sand; single grain; loose; strongly acid; gradual wavy boundary.

C2—47 to 53 inches; pale brown (10YR 6/3) fine sand; single grain; loose; strongly acid; gradual wavy boundary.

C3—53 to 80 inches; pale brown (10YR 6/3) fine sand; common fine distinct light olive brown (2.5Y 5/6) mottles; single grain; loose; strongly acid.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. This horizon is a mixture of uncoated sand grains and organic matter. Where value is less than 3.5, thickness is less than 8 inches. Reaction ranges from extremely acid to strongly acid unless limed. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Reaction ranges from extremely acid to strongly acid. Combined thickness of the A horizons is 20 to 30 inches.

Where present, the B1h horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2 with many uncoated sand grains. Thickness ranges to 2 inches. The Bh horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2; hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 3, and chroma of 3 or 4. Thickness ranges from 6 to 14 inches. Sand grains in this horizon are coated with colloidal organic matter. Reaction of the Bh horizon ranges from extremely acid to strongly acid.

The B3&Bh horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4; or hue of 7.5YR, value of 3 or 4, and chroma of 2 or 4 with darker, weakly cemented fragments of the Bh horizon. Reaction ranges from extremely acid to strongly acid.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. Reaction is very strongly acid or strongly acid.

Myakka Variant

Soils of the Myakka Variant are sandy, siliceous, hyperthermic Aeric Haplaquods. They are nearly level, very poorly drained, moderately rapidly permeable soils that formed in thick beds of sand overlain by a thin mantle of organic material. These soils are on broad marshy areas. The water table is at or above the surface for 6 to 9 months and within a depth of 10 inches for the rest of the year. Slope ranges from 0 to 2 percent.

Myakka Variant soils are closely associated with Lawnwood, Hontoon, Oldsmar, Waveland, Pompano, and Samsula Variant soils. Lawnwood, Oldsmar, Pompano, and Waveland soils are better drained than Myakka Variant soils and do not have a histic epipedon. Hontoon and Samsula Variant soils have organic material more than 16 inches thick.

Typical pedon of Myakka Variant mucky peat, in the Jensen Savannahs Fresh Marsh 0.7 mile south of Walton Road, 0.1 mile west of South Indian River Drive (Florida Highway 707), and 11 miles south of Fort Pierce, NW 1/4 SE 1/4 NE 1/4 sec. 5, T. 37 S., R. 41 E.

Oe—12 to 8 inches; dark reddish brown (5YR 2/2) mucky peat, broken face, rubbed and pressed; about 76 percent fiber, 24 percent fiber rubbed; massive; friable; many fine roots; white (10YR 8/1) sodium pyrophosphate extract; extremely acid in 0.01 molar calcium chloride; clear smooth boundary.

Oa—8 to 0 inches; black (5YR 2.5/1) muck (sapric), broken face, rubbed and pressed; about 40 percent fiber, 8 percent fiber rubbed; massive; very friable; few fine roots; brown (10YR 5/3) sodium pyrophosphate extract; extremely acid in 0.01 molar calcium chloride; clear wavy boundary.

A21b—0 to 6 inches; white (10YR 8/1) sand; many coarse distinct black (10YR 2/1) pockets of organic matter; weak medium granular structure; very friable; strongly acid; clear wavy boundary.

A22b—6 to 11 inches; light gray (10YR 7/1) sand; common medium distinct very dark gray (10YR 3/1) bodies; single grain; loose; strongly acid; gradual wavy boundary.

A23b—11 to 17 inches; grayish brown (10YR 5/2) sand; single grain; loose; strongly acid; clear wavy boundary.

B21hb—17 to 26 inches; dark reddish brown (5YR 3/3) sand; massive; very friable; sand grains coated with colloidal organic matter; strongly acid; gradual wavy boundary.

B22hb—26 to 32 inches; dark brown (10YR 3/3) sand; single grain; loose; sand grains coated with colloidal organic matter; very strongly acid; gradual wavy boundary.

B23hb—32 to 38 inches; dark brown (10YR 4/3) sand; single grain; loose; sand grains coated with colloidal organic matter; strongly acid; gradual wavy boundary.

B24hb—38 to 65 inches; dark reddish brown (5YR 2.5/2) sand; single grain; loose; sand grains coated with colloidal organic matter; strongly acid; gradual wavy boundary.

B25hb—65 to 72 inches; dark reddish brown (5YR 3/3) sand; single grain; loose; sand grains well coated with colloidal organic matter; medium acid.

The Oa and Oe horizons have hue of 10YR and 5YR, value of 2, and chroma of 1 or 2; hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 3, and chroma of 2 or 3. Thickness is 8 to 16 inches. Reaction is 4.5 or less in 0.01 molar calcium chloride.

Some pedons do not have an A1b horizon. Where present, the A1b horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. This horizon is a mixture of uncoated sand grains and organic matter. Thickness is 0 to 14 inches. The A2b horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Thickness ranges from 4 to 27 inches. Combined thickness of the Ab horizons is less than 30 inches. Reaction ranges from very strongly acid to neutral. The A horizon is sand or fine sand.

The Bhb horizon has hue of 10YR or 5YR, value of 2, and chroma of 1; hue of 5YR, value of 2 or 3, and chroma of 2 or 3; hue of 7.5YR or 10YR, value of 3, and chroma of 2; or hue of 10YR, value of 4, and chroma of 3. The Bhb horizon is sand or fine sand. Reaction ranges from very strongly acid to neutral.

Nettles series

Soils of the Nettles series are sandy, siliceous, hyperthermic, ortstein Alfic Arenic Haplaquods. They are poorly drained, very slowly permeable to slowly permeable soils that formed in marine sandy and loamy sediments. These soils are in broad, nearly level flatwood areas. In most years, the water table is within a depth of 10 inches for 2 to 4 months and within a depth of 10 to 40 inches for 6 months or longer. Slope ranges from 0 to 2 percent.

Nettles soils are geographically closely associated with Ankona, Malabar, Pineda, Lawnwood, Pepper, Riviera, Susanna. Tantile, Waveland, and Wabasso soils. Ankona soils have an argillic horizon and low base saturation. Lawnwood, Pepper, Susanna, Tantile, and Wabasso soils have a Bh horizon within a depth of 30 inches. Waveland soils do not have an argillic horizon, and Pineda and Riviera soils do not have a spodic horizon.

Typical pedon of Nettles sand, in a flatwoods area, 80 feet north of trail, 0.3 mile southwest of Avenue Q and Angle Road, and about 3.5 miles west-northwest of Fort Pierce, SE 1/4 NW 1/4, sec. 6, T. 36 S., R. 40 E.

A11—0 to 5 inches; black (10YR 2/1) sand, rubbed; uncoated sand grains and pieces of organic matter give salt-and-pepper effect; weak medium granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

A12—5 to 8 inches; very dark gray (10YR 3/1) sand; weak medium granular structure; very friable; common fine and medium roots; extremely acid; clear smooth boundary.

A13—8 to 11 inches; dark gray (10YR 4/1) sand; single grain; loose; common medium and few fine roots; very strongly acid; gradual wavy boundary.

A2—11 to 33 inches; light gray (10YR 7/1) sand; common medium distinct very dark gray (10YR 3/1) streaks along root channels; single grain; loose; few fine and medium roots; very strongly acid; abrupt wavy boundary.

B21h—33 to 36 inches; black (5YR 2/1) sand; massive; very firm; weakly cemented; horizontal layer 0.5 inch thick of friable, very dark grayish brown (10YR 3/2) sand 1.5 inches below upper boundary; sand grains throughout the horizon well coated with colloidal organic matter; very strongly acid; clear wavy boundary.

B22h—36 to 39 inches; dark reddish brown (5YR 2/2) loamy sand; massive; weakly cemented; sand grains well coated with colloidal organic matter; friable; very strongly acid; clear wavy boundary.

B23h—39 to 46 inches; dark reddish brown (5YR 3/4) sand; common medium distinct black (5YR 2/1) mottles; massive; friable; sand grains coated with colloidal organic matter; very strongly acid; gradual wavy boundary.

B24h—46 to 55 inches; dark brown (7.5YR 3/2) sand; common fine distinct olive (5Y 5/3) streaks in lower 6 inches; massive; friable; strongly acid; gradual wavy boundary.

B21tg—55 to 77 inches; olive gray (5Y 5/2) fine sandy loam; common coarse distinct krotovinas filled with white (10YR 8/1) sand; moderate medium subangular blocky structure; friable; sand grains bridged and coated with clay; strongly acid; clear irregular boundary.

B22tg—77 to 90 inches; olive gray (5Y 5/2) fine sandy loam; common medium distinct very dark gray (10YR 3/1) streaks along old root channels; common 1/8-inch thick lenses of light gray (10YR 7/1) sand; moderate medium subangular blocky structure; friable; sand grains bridged and coated with clay; strongly acid.

The A1 or Ap horizon has rubbed hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Where the A1 horizon has value of less than 3.5, thickness is less than 10 inches. Unrubbed, the horizon has a salt-and-pepper appearance. The A2 horizon has hue of 10YR, value 5 to 8, and chroma 1 or 2. Combined thickness of the A horizon ranges from 30 to 50 inches. Reaction ranges from extremely acid to medium acid.

In some pedons there is a B1h horizon. Where present, it has hue of 10YR, value of 3 to 5, and chroma of 1 or 2; or it has value of 2 and chroma of 1 and does not meet the requirements of a spodic horizon. Thickness ranges from 0 to 4 inches. If moist, all or part of the B2h horizon is weakly or moderately cemented into a massive horizon that is present in more than half of each pedon.

In some pedons, the cemented part of the B2h horizon occurs as a subhorizon and is continuous horizontally throughout the pedon; in some pedons, cementation is not continuous horizontally but occurs in more than 50 percent of the pedon; and in some pedons, the cemented B2h horizon or subhorizon is continuous horizontally but contains less than 50 percent bodies that are not cemented. The B2h horizon ranges from weakly cemented or moderately cemented and firm or very firm consistence to absence of cementation and friable or loose consistence. Cemented horizons are frequently brittle.

The B21h and B22h horizons have hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; or is neutral and value is 2. Some pedons, however, do not have the B22h horizon in the colors described. Sand grains are well coated with colloidal organic matter. The B23h and B24h horizons, and in some pedons the B22h horizon, have hue of 5YR, value of 3, and chroma of 2 to 4; or they have hue of 7.5YR, value of 3, and chroma of 2. These horizons are not cemented and range from loose to friable in consistence. Thickness of the B2h horizon is variable, and ranges from about 6 to as much as 36 inches or more. Reaction ranges from very strongly acid to slightly acid. The B horizon is sand, fine sand, loamy sand, or loamy fine sand.

In some pedons, a B3&Bh horizon is below the Bh horizon. Where present, it has hue of 5YR, value of 3, and chroma of 4; hue of 10YR, value of 3, and chroma of 2 or 3, or value of 4 to 6 and chroma of 3 or 4; hue of 7.5YR, value of 4, and chroma of 3 or 4, or value of 3 and chroma of 2 with few to common dark weakly cemented fragments of the Bh horizon. Thickness ranges from 0 to 5 inches. Texture and reaction ranges of the B3&Bh horizon are similar to those of the Bh horizon. In some pedons, there is a B3 horizon. Where present, it has characteristics similar to the B3&Bh horizon but does not have fragments of the Bh horizon.

In some pedons, an A'2 horizon is between the Bh and Btg horizons. If present, it has hue of 10YR, value of 5 to 8, and chroma of 1 to 3; hue of 2.5Y, value of 5 to 8, and chroma of 1 to 3; or is neutral and value is 5 to 8. The A'2 horizon is sand or fine sand.

The Btg horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 6, and chroma of 2; or is neutral and value is 4 to 6. It may have mottles of gray, yellow, brown, or red. The Btg horizon is sandy loam, fine sandy loam, or sandy clay loam. Reaction is highly variable and ranges from strongly acid to mildly alkaline. In some places, the more strongly acid reaction is caused by pyrites which oxidize and release acid when the water level is lowered. The presence of pyrites cannot be predicted.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 0 to 3; or hue of 5Y, 5G, or 5BG, value of 5 or 6, and chroma of 1 or 2 with mottles of gray, yellow, brown, or red. The C horizon is sand, loamy sand, fine sand, or loamy fine sand. In horizons of sand or fine sand, there are common to many pockets of loamy sand and sandy loam. Reaction ranges from medium acid to mildly alkaline.

Oldsmar series

Soils of the Oldsmar series are sandy, siliceous, hyperthermic Alfic Arenic Haplaquods. They are nearly level, slowly to very slowly permeable soils in depressional areas in the flatwoods. These soils are more poorly drained than the surrounding flatwoods. In most years, water stands above the surface for 6 to 9 months or more. Slope ranges from 0 to 2 percent.

Oldsmar soils are closely associated with Ankona, Wabasso, Kaliga, Malabar, Nettles, Pepper, Pineda, and Riviera soils. Ankona, Nettles, and Pepper soils have an ortstein horizon. Wabasso soils have a spodic horizon within a depth of 30 inches. Malabar and Pineda soils have a Bir horizon. Riviera soils have an argillic horizon between depths of 20 to 40 inches. Kaliga soils are organic.

Typical pedon of Oldsmar sand, in a depressional area about 5.5 miles southwest of Fort Pierce, 0.7 mile southwest of Florida Highway 611B, 0.2 mile north of Florida Highway 709 on graded road, and 650 feet west of road, NW 1/4 NE 1/4 sec. 31, T. 35 S., R. 40 E.

A11—0 to 1 inches; black (10YR 2/1) sand; moderate medium crumb structure; friable; many fine and few medium roots; extremely acid; clear smooth boundary.

A12—1 to 5 inches; very dark gray (10YR 3/1) sand; few fine distinct black (10YR 2/1) streaks in old root channels; weak medium crumb structure; very friable; few fine and medium roots; very strongly acid; clear wavy boundary.

A2—5 to 32 inches; gray (10YR 6/1) sand; few fine very dark gray (10YR 3/1) streaks along root channels; single grain; loose; few medium roots; neutral; gradual wavy boundary.

B1h—32 to 34 inches; very dark gray (10YR 3/1) sand; single grain; loose; many uncoated sand grains; slightly acid; gradual wavy boundary.

B21h—34 to 41 inches; dark reddish brown (5YR 2/2) sand; common faint black (5YR 2/1) and common medium faint dark reddish brown (5YR 3/2) bodies; massive; very friable; many uncoated sand grains; medium acid; abrupt wavy boundary.

B22h—41 to 42 inches; black (5YR 2/1) sand; massive; very friable; sand grains well coated with organic matter; medium acid; abrupt wavy boundary.

B21tg—42 to 65 inches; olive gray (5Y 5/2) fine sandy loam; moderate medium subangular blocky structure; friable; sand grains bridged and coated with clay; medium acid; gradual wavy boundary.

B22tg—65 to 80 inches; light olive gray (5Y 6/2) fine sandy loam; weak medium subangular blocky structure; very friable; sand grains bridged and coated with clay; medium acid.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. This horizon is a mixture of organic matter and uncoated sand grains. Thickness ranges from 2 to 8 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Combined thickness of the A horizon ranges from 28 to 45 inches. Reaction ranges from very strongly acid to neutral.

The B1h horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2 and is more than one unit of value darker than the horizon above it. Thickness ranges from 2 to 23 inches. The B1h horizon does not meet the requirements of a spodic horizon.

The B2h horizon has hue of 10YR, 7.5YR, or 5YR, value of 2 or 3, and chroma of 1 or 2. Dark bodies are commonly present. The Bh horizon is sand or fine sand.

Reaction ranges from extremely acid through slightly acid. Thickness ranges from 6 to 14 inches. Combined thickness of the A horizon and Bh horizon is more than 40 inches. The lower boundary of the Bh horizon generally lies directly upon the underlying B2t horizon.

The B2tg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 6, and chroma of 2; hue of 5Y, value of 3 to 6, and chroma of 1 or 2; or is neutral and value is 5 or 6. This horizon is fine sandy loam, sandy loam, or sandy clay loam. Reaction ranges from strongly acid to neutral.

In some pedons the Bt horizon contains pyrites, but the presence of pyrites cannot be predicted. If the water table is lowered, the pyrites can oxidize and release acids that may lower the pH to 3.5 or less.

The C horizon has hue of 5Y, 5GY, or 5BG, value of 5 or 6, and chroma of 1 or 2. It is sand or loamy sand. Reaction ranges from medium acid to moderately alkaline.

Palm Beach series

Soils of the Palm Beach series are hyperthermic uncoated Typic Quartzipsamments. They are excessively drained, very rapidly permeable soils that formed in thick beds of marine or eolian sand and shell fragments on dunelike ridges that are generally parallel to the coast. The water table is below a depth of 80 inches. Slope ranges from 0 to 5 percent.

Palm Beach soils are closely associated with Canaveral and Turnbull Variant soils. Those soils are more poorly drained than Palm Beach soils.

Typical pedon of Palm Beach fine sand, 0 to 5 percent slopes, 55 feet east of Florida Highway A1A, 2.2 miles north of junction of Atlantic Boulevard and Royal Palm Avenue, 4.5 miles north of Fort Pierce, SE 1/4 SW 1/4 sec. 14, T. 34 S., R. 40 E.

A—0 to 8 inches; grayish brown (10YR 5/2) fine sand; single grain; loose; few fine roots; about 20 percent pale brown fine shell fragments; moderately alkaline; calcareous; gradual wavy boundary.

C1—8 to 30 inches; pale brown (10YR 6/3) fine sand; single grain; loose; about 40 percent by volume sand-size shell fragments; moderately alkaline; calcareous; gradual wavy boundary.

C2—30 to 80 inches; multicolored shell fragments mixed with light gray fine sand; single grain; very loose; about 50 to 80 percent shell fragments that range from sand-size to about 1 centimeter in diameter; moderately alkaline; calcareous.

The soil is dry for as many as 50 consecutive days in most years. All horizons have weak to strong effervescence when mixed with dilute HCl. Stratified layers of fine sand and shells or shell fragments may occur throughout the soil.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. It has 5 to 35 percent by volume sand-size, multicolored shell fragments. This horizon is a mixture of organic matter, uncoated sand grains, and shell fragments. Thickness of the horizon is 2 to 8 inches.

The C horizon has hue of 10YR, value of 5 to 6, and chroma of 2 or 3. It has about 15 to 80 percent shell fragments, mostly sand-size but ranging to 1 centimeter in diameter. The horizon is generally similar in color to the shells. The C horizon may have lenses of fine sand and multicolored shells or shell fragments, or mixed fine sand and shells.

Paola series

Soils of the Paola series are hyperthermic, uncoated Spodic Quartzipsamments. They are excessively drained, very rapidly permeable soils that formed in thick beds of marine or eolian sand on high dunelike broad ridges and in undulating areas. These soils have a water table below a depth of 80 inches. Slope ranges from 0 to 8 percent.

Paola soils are closely associated with Astatula, Pendarvis, Satellite, St. Lucie, and Welaka Variant soils. Astatula soils do not have an A2 horizon. Pendarvis and Satellite soils are more poorly drained than Paola soils. Pendarvis soils have a spodic horizon, and St. Lucie soils do not have a B horizon. Unlike the Paola soils, Welaka Variant soils do not have intrusions of the A horizon into the B horizon, and they do not have a discontinuous Bh horizon between the A2 and B horizons.

Typical pedon of Paola sand, in an area 50 feet east of railroad tracks, about 1 mile south of Citrus Avenue railroad overpass, and about 1.1 mile south of Fort Pierce, SW 1/4 SE 1/4 sec. 15, T. 35 S, R. 40 E.

A1—0 to 6 inches; dark gray (10YR 4/1) sand; single grain; loose; few fine roots; very strongly acid; clear wavy boundary.

A21—6 to 15 inches; light gray (10YR 7/1) sand; single grain; loose; slightly acid; gradual wavy boundary.

A22—15 to 55 inches; white (10YR 8/1) sand; few medium distinct splotches of brownish yellow (10YR 6/6) in lower part; single grain; loose; neutral; gradual irregular boundary.

B&A—55 to 80 inches; brownish yellow (10YR 6/6) sand; single grain; loose; many tongues of sand from the A horizon; outer edges of tongues stained with dark brown (7.5YR 3/2) organic material that are weakly cemented in places; thin (less than 2 inches thick) discontinuous layers of dark brown (7.5YR 3/2) weakly cemented sand at irregular intervals at the place of contact between the A horizon and B horizon; neutral.

The A1 horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The horizon is a mixture of organic matter and uncoated sand grains. The A2 horizon has hue of 10YR or 2.5Y, value of 6 to 8, and chroma of 1 or 2. Reaction ranges from very strongly acid to neutral.

The B&A horizon has hue of 10YR, value of 5 to 7, and chroma of 6 or 8; or hue of 7.5YR, value of 5 or 6, and chroma of 6 or 8; or value of 5 and chroma of 3 or 4. Intrusions of A2 material are absent in some pedons. In some pedons, weakly cemented reddish brown or very dark grayish brown fragments 1/2 inch to 3 inches thick are scattered throughout the B&A horizon.

In many pedons, a thin discontinuous layer 2 to 5 inches is beneath the A2 horizon. It has hue of 10YR or 5YR, value of 4, and chroma of 3 or 4; or hue of 7.5YR, value of 3, and chroma of 2. Where this layer is absent, an AB horizon 4 to 6 inches thick is between the A2 horizon and B horizon. Reaction of the B&A horizon is very strongly acid to neutral.

Where present, the C horizon has hue of 10YR, value of 5 to 8, and chroma of 3 or 4. Reaction ranges from strongly acid to neutral.

Pendarvis series

The soils of the Pendarvis series are sandy, siliceous, hyperthermic, ortstein Arenic Haplohumods. They are moderately well drained, slowly to moderately slowly permeable soils that formed in sandy marine sediment. These soils are on low ridges and knolls in the flatwoods. A perched water table is between depths of 24 to 40 inches for about 1 to 4 months and between depths of 40 to 60 inches for the rest of the year except in dry periods. Slope ranges from 0 to 5 percent.

Pendarvis soils are closely associated with Ankona, Hobe, Electra, Jonathan, Lawnwood, and Waveland soils. Jonathan and Hobe soils are better drained than Pendarvis soils and have a Bh horizon below a depth of 50 inches. Ankona, Lawnwood, and Waveland soils are more poorly drained. Electra soils have an argillic horizon. Electra and Hobe soils do not have an ortstein horizon.

Typical pedon of Pendarvis sand, 0 to 5 percent slopes, in a wooded flatwoods area, 5 miles south of Fort Pierce, 0.8 mile east of U.S. Highway 1, and 100 feet south of Florida Highway 712 (Midway Road), SW 1/4 NW 1/4 sec. 2, T. 36 S., R. 40 E.

A1—0 to 6 inches; very dark gray (10YR 3/1) sand; mixed uncoated sand grains and organic matter; single grain; loose; many fine medium and coarse roots; strongly acid; clear smooth boundary.

A21—6 to 36 inches; light gray (10YR 6/1) sand; single grain; loose; common fine and many medium roots decreasing to few below a depth of 22 inches; slightly acid; gradual wavy boundary.

A22—36 to 48 inches; light gray (10YR 7/1) sand; common medium distinct very dark gray (10YR 3/1) splotches; single grain; loose; few fine roots; medium acid; abrupt wavy boundary.

B21h—48 to 62 inches; black (N 2/0) loamy sand; massive; firm; weakly cemented; sand grains thickly coated with colloidal organic matter; extremely acid; gradual wavy boundary.

B22h—62 to 76 inches; dark reddish brown (5YR 3/2) sand; common medium faint dark reddish brown (5YR 2/2) bodies; single grain; loose; sand grains thinly coated with colloidal organic matter; very strongly acid; gradual wavy boundary.

B3—76 to 80 inches; dark yellowish brown (10YR 4/4) loamy sand; weak medium granular structure; very friable; many uncoated sand grains; very strongly acid.

The A2 horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or is neutral and value is 2 to 4. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Reaction ranges from strongly acid to slightly acid. Thickness of the A horizon ranges from 30 to 50 inches.

In some pedons there is a B1h horizon. Where present, it has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It has few to many streaks and splotches of material from the A2 horizon. The B1h horizon does not meet spodic requirements. Thickness ranges to 3 inches.

The B2h horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 5YR, value of 2 or 3, and chroma of 1 to 3; hue of 7.5YR, value of 3, and chroma of 2; or is neutral and value is 2.

Cementation is absent or ranges to strongly cemented. About 25 to 70 percent of the entire Bh horizon or a subhorizon 1 inch or more thick that occurs in more than 50 percent of each pedon is weakly cemented or moderately cemented. Consistence ranges from very firm in the cemented part to friable in that part which is not cemented.

The Bh horizon is fine sand, sand, loamy fine sand, or loamy sand. Reaction ranges from extremely acid to medium acid. Thickness of the B2h horizon, which is highly variable within short distances, ranges from 10 to more than 40 inches.

The B3 horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4; or hue of 7.5YR, value of 4, and chroma of 2 or 4. Some pedons have a B3&Bh horizon that has color similar to that of the B3 horizon. The B3&Bh horizon has dark, weakly cemented fragments of the Bh horizon. Reaction ranges from extremely acid to medium acid. The B3&Bh horizon is fine sand, sand, loamy fine sand, or loamy sand.

Where present, the C horizon has hue of 10YR, 2.5YR, or 5Y, value of 3 or less, and chroma of 5 to 7. Reaction ranges from extremely acid to medium acid.

This horizon is fine sand, sand, loamy fine sand, or loamy sand.

Pepper series

Soils of the Pepper series are sandy, siliceous, hyperthermic, ortstein Alfic Haplaquods. They are nearly level, poorly drained, very slowly to slowly permeable soils that formed in beds of marine sandy and loamy materials that are influenced by underlying alkaline material. These soils are on broad flatwoods. The water table is within a depth of 10 inches for 2 to 4 months and between depths of 10 to 40 inches for 6 months or more in most years. Slope ranges from 0 to 2 percent.

Pepper soils are closely associated with Ankona, Wabasso, Chobee, Lawnwood, Oldsmar, Pineda, Malabar, Nettles, Susanna, Tantile, and Waveland soils. Ankona, Oldsmar, Nettles, and Waveland soils have a spodic horizon below a depth of 30 inches. Wabasso soils do not have an ortstein horizon. Lawnwood soils do not have an argillic horizon. Susanna and Tantile soils have an argillic horizon that has low base saturation. Chobee, Pineda, and Malabar soils do not have a spodic horizon. Chobee soils have a mollic epipedon. Pineda and Malabar soils have a Bir horizon.

Typical pedon of Pepper sand, in a flatwoods area about 3.5 miles northwest of Fort Pierce, 0.3 mile southwest of Avenue Q and Angle Road, and 60 feet south of trail, NE 1/4 SW 1/4 sec. 6, T 35 S., R. 40 E.

A11—0 to 6 inches; black (10YR 2/1) sand, rubbed; moderate medium granular structure; very friable; many fine roots; color is that of mixed uncoated sand grains and organic matter; very strongly acid; clear wavy boundary.

A12—6 to 9 inches; dark gray (10YR 4/1) sand; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

A2—9 to 23 inches; gray (10YR 5/1) sand; single grain; loose; common medium and few fine roots; medium acid; abrupt wavy boundary.

B21h—23 to 28 inches; black (10YR 2/1) sand; massive; firm; weakly cemented; common fine and few fine roots; sand grains well coated with colloidal organic matter; very strongly acid; gradual wavy boundary.

B22h—28 to 33 inches; black (5YR 2/1) sand; massive; very firm; weakly cemented; sand grains well coated with colloidal organic matter; very strongly acid; gradual wavy boundary.

B23h—33 to 42 inches; dark reddish brown (5YR 3/3) sand; common fine distinct black (20YR 2/1) mottles; massive; very friable; strongly acid; gradual wavy boundary.

B24h—42 to 48 inches; dark reddish brown (5YR 3/2) sand; common medium distinct black (10YR 2/1) mottles; massive; friable; strongly acid; gradual wavy boundary.

B25h—48 to 57 inches; dark brown (7.5YR 3/2) sand; many coarse distinct black (10YR 2/1) mottles; massive; friable; strongly acid; clear wavy boundary.

B21tg—57 to 77 inches; olive gray (5Y 5/2) sandy loam; many light gray (2.5Y 7/2) sand streaks 1/8 to 1/4 inch wide; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; strongly acid; gradual wavy boundary.

B22tg—77 to 99 inches; light olive gray (5Y 6/2) sandy loam; few fine distinct light gray (10YR 7/1) sand streaks; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; strongly acid.

The A2 or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is a mixture of uncoated sand grains and organic matter. Where value is less than 3.5, thickness is less than 10 inches. Thickness ranges from 6 to 13 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Thickness ranges from 10 to 24 inches. Combined thickness of the A horizon is less than 30 inches. Reaction ranges from extremely acid to medium acid.

In many pedons, there is a B1h horizon. Where present, it has hue of 10YR, value of 3 to 5, and chroma of 1 or 2 with many uncoated sand grains. Thickness ranges to 3 inches. This horizon does not meet the requirements of a spodic horizon.

The B2h horizon has hue of 5YR or 10YR, value of 2, and chroma of 1 or 2; or hue of 5YR or 7.5YR, value of 3, and chroma of 2. Thickness is variable within short distances and ranges from about 8 to 45 inches or more. In most pedons, cementation is variable. It is absent or ranges to weakly cemented. In more than half of each pedon, there is a weakly cemented subhorizon that is 1 inch or more thick. Consistence ranges from very firm in the weakly cemented parts to very friable in the parts which are not cemented. In some pedons, there are few to common streaks or pockets of uncoated sand.

In some pedons, there is a B3 or B3&Bh horizon. Where present, it has hue of 10YR, value of 3, and chroma of 2 or 3; value of 4 to 6 and chroma of 3 or 4; or hue of 7.5YR, value of 3, and chroma of 2, or value of 4 and chroma of 3 or 4. Thickness ranges to 12 inches. The B3&Bh horizon, where present, has color similar to that of the B3 horizon, and it has few to common, weakly cemented, darker fragments of the Bh horizon. Thickness ranges to 20 inches. Reaction ranges from very strongly acid to slightly acid.

Some pedons have an A'2 horizon between the Bh and Btg horizons. Where present, it has hue of 10YR, value of 5 to 8, and chroma of 1 to 3; hue of 2.5YR, value of 5 to 8, and chroma of 1 to 3, or is neutral and value is 5 to 8. Thickness ranges to 12 inches. The A'2 horizon is sand or fine sand. Reaction ranges from very strongly acid to slightly acid. In some pedons, the Bh horizon rests directly on the Btg horizon. Combined thickness of the A, Bh, and A'2 horizons is more than 40 inches.

The Btg horizon has hue of 10YR and 5Y, value of 4 to 6, and chroma of 2 or 1; hue of 2.5Y, value of 4 to 6, and chroma of 2; or is neutral and value is 4 or 6. The Btg horizon is sandy loam or sandy clay loam. Many pedons have lenses and pockets of sand and loamy sand. Reaction is highly variable within short distances and ranges from strongly acid to mildly alkaline.

In some pedons, the Bt horizon contains pyrite; however, the presence of pyrite cannot be predicted. If the water table is lowered, the pyrite can oxidize and form acids that may lower the pH to 3.5 or less in local spots.

The C horizon has hue of 10YR, 5Y, 5GY, and 5BG, value of 5 or 6, and chroma of 1 or 2; hue of 2.5Y, value of 5 or 6, and chroma of 2; or is neutral and value is 5 or 6. The C horizon is variable. It ranges from sand to sandy clay loam and may be stratified. Reaction ranges from medium acid to mildly alkaline.

Pineda series

Soils of the Pineda series are loamy, siliceous, hyperthermic Arenic Glossaqualfs. They are poorly drained, slowly to very slowly permeable soils that formed in unconsolidated marine sandy and loamy materials that are influenced by underlying alkaline material. These soils are in low hammocks, in broad, poorly defined sloughs, and on flats. The water table is within a depth of 10 inches for 1 to 6 months and between depths of 10 to 40 inches for most of the rest of the year. Slope ranges from 0 to 2 inches.

Pineda soils are closely associated with Wabasso, Wabasso Variant, Floridana, Hallandale, Malabar, Riviera, and Winder soils. Winder Variant and Winder soils have an argillic horizon within a depth of 20 inches. Floridana soils have a mollic epipedon. Hallandale soils have hard limestone within a depth of 20 inches. Riviera soils do not have a Bir horizon and have an abrupt textural change. Wabasso and Wabasso Variant soils have a spodic horizon.

Typical pedon of Pineda sand, in a broad, low flat area 230 feet east of main trail, 2.55 miles north of Florida Highway 68 (Orange Avenue), and 17 miles west of Fort Pierce, NW 1/4 SW 1/4 sec. 35, T. 34 S., R. 37 E.

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) sand; moderate medium granular structure; very friable; many fine roots; neutral; clear smooth boundary.

A12—3 to 6 inches; dark brown (10YR 3/3) sand; weak medium granular structure; very friable; many fine roots; moderately alkaline; clear wavy boundary.

B21ir—6 to 12 inches; yellowish brown (10YR 5/6) sand; single grain; loose; sand grains well coated with iron oxide; many fine roots; moderately alkaline; gradual wavy boundary.

B22ir—12 to 21 inches; strong brown (7.5YR 5/8) sand; weak medium subangular blocky structure; very friable; sand grains well coated with iron oxide; few fine roots; moderately alkaline; clear wavy boundary.

B3ir—21 to 34 inches; pale brown (10YR 6/3) sand; single grain; loose; slightly acid; clear wavy boundary.

A'2—34 to 38 inches; light gray (10YR 7/2) sand; single grain; loose; neutral; abrupt irregular boundary.

B21tg—38 to 42 inches; olive gray (5Y 5/2) sandy loam; common white (10YR 8/1) sandy intrusions 1 inch in diameter and 3 to 4 inches deep; common medium distinct olive brown (2.5Y 4/4) and olive (5Y 5/3) mottles; weak coarse subangular blocky structure; friable; neutral; sand grains coated and bridged with clay; gradual wavy boundary.

B22tg—42 to 52 inches; olive gray (5Y 5/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/4) and few medium faint gray (10YR 5/1) mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; gradual wavy boundary.

Cg—52 to 80 inches; gray (5Y 5/1) loamy sand; massive; very friable; mildly alkaline.

The solum is 40 to 80 inches in thickness. Combined thickness of the A, Bir, and A'2 horizons ranges from 20 to 40 inches.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2, or value of 3 and chroma of 3. This horizon is a mixture of organic matter and uncoated sand grains. Thickness ranges from 1 inch to 12 inches. Where value is 3.5 or less, thickness is less than 7 inches. Where present, the A2 horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 3 or less. Thickness ranges to 10 inches. Reaction ranges from medium acid to neutral.

The B2ir horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 or 8. Thickness ranges from 6 to 16 inches. Where present, the B3ir horizon has hue of 10YR, value of 6 to 8, and chroma of 3 or 4; or hue of 2.5YR, value of 6 to 8, and chroma of 4. It has yellow or brown mottles. The Bir horizon is sand or fine sand. Reaction ranges from medium acid to neutral.

The A'2 horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Reaction ranges from medium acid to neutral.

In some pedons, a B'hir horizon is at the base of the A'2 horizon. Where present, it has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 7.5YR, 10YR, or 2.5Y, value of 3, and chroma of 2; or hue of 10YR, value of 3, and chroma of 3. This horizon becomes redder on ignition. Thickness ranges to 3 inches. Reaction is medium acid to neutral.

The Btg horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 6, and chroma of 2; or is neutral and value is 4 to 6. It has mottles of yellow, red, olive, and brown. There are vertical sandy intrusions from the upper horizons extending into this horizon. The Btg horizon is sandy loam, fine sandy loam, or sandy clay loam and has lenses or pockets of loamy sand or loamy fine sand. Reaction ranges from neutral to moderately alkaline.

In some pedons, the Bt horizon contains pyrites; however, the presence of these pyrites cannot be predicted (*7, 8*). If the water table is lowered, the pyrites form acids that may lower the pH to 3.5 or less.

The Cg horizon has hue of 10YR, 2.5Y, 5Y, 5GY, or 5BG, value of 5 or 6, and chroma of 1 or 2. It ranges from sandy clay loam to loamy sand, or it is a mixture of sand and shell fragments or shell fragments and calcium carbonate. Reaction ranges from neutral to moderately alkaline.

Pompano series

Soils of the Pompano series are siliceous, hyperthermic Typic Psammaquents. They are poorly drained, very rapidly permeable soils that formed in thick beds of marine or eolian sand. These soils are along poorly defined drainageways and in broad low flats. Slope ranges from 0 to 2 percent. In most years, the water table is within a depth of 10 inches for 2 to 6 months and within a depth of 30 inches for more than 9 months.

Pompano soils are closely associated with Lawnwood, Myakka Variant, Waveland, Samsula Variant, and Satellite soils. Satellite soils are better drained than Pompano soils. Myakka Variant soils have a histic epipedon and a spodic horizon. Lawnwood and Waveland soils have a spodic horizon. Samsula Variant soils are organic.

Typical pedon of Pompano sand, in a poorly defined drainageway 60 feet south of county sanitary landfill road, 0.5 mile west of U.S. Highway 1, and 4 miles north of Fort Pierce, NW 1/4 SE 1/4 sec. 20, T. 34 S., R. 40 E.

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

C1—3 to 15 inches; light brownish gray (10YR 6/2) sand; single grain; loose; few coarse and fine roots; strongly acid; gradual wavy boundary.

C2—15 to 44 inches; light gray (10YR 7/1) sand; single grain; loose; strongly acid; gradual wavy boundary.

C3—44 to 54 inches; light brownish gray (10YR 6/2) sand; single grain; loose; neutral; gradual wavy boundary.

C4—54 to 80 inches; grayish brown (10YR 5/2) sand; single grain; loose; neutral.

Reaction ranges from strongly acid to mildly alkaline. Thickness of sand exceeds 80 inches.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1. This horizon is a mixture of uncoated sand and organic matter. Where value is less than 3.5, thickness is less than 6 inches. Total thickness of the A horizon is 3 to 15 inches.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2.

Pompano Variant

Soils of the Pompano Variant are siliceous, hyperthermic Typic Psammaquents. They are nearly level, very poorly drained, rapidly permeable, sandy soils that formed in thick beds of sand and shells. These soils are in broad, medium to large coastal tidal swamps. They are flooded daily during normal high tides. The water table is at or above the surface. Slope is less than 1 percent.

Pompano Variant soils are closely associated with Canaveral, Myakka, Kaliga Variant, and Turnbull Variant soils. Canaveral soils are better drained than Pompano Variant soils. Myakka soils have a spodic horizon. Turnbull Variant soils have a loamy mineral horizon and a high n value. Kaliga Variant soils are organic.

Typical pedon of Pompano Variant fine sand, in an area of mangrove swamp 150 feet north of Florida Highway A1A, 2.25 miles southeast of intersection of Seaway Drive and South Ocean Drive, 3 miles southeast of Fort Pierce, NE 1/4 SE 1/4 sec. 13, R. 40 E., T. 35 S.

O1—1 to 0 inch; undecomposed leaves and twigs.

A11—0 to 1 inch; greenish gray (5GY 5/1) fine sand; single grain; very friable; few fine and medium roots; moderately alkaline; abrupt smooth boundary.

A12—1 to 8 inches; dark gray (5Y 4/1) fine sand; common coarse distinct very dark grayish brown (10YR 3/2) mottles; few coarse distinct very dark gray (10YR 3/1) pieces of organic matter; single grain; loose; 30 percent fine shell fragments; few fine and medium roots; moderately alkaline; gradual wavy boundary.

C1—8 to 32 inches; gray (5Y 5/1) fine sand; few medium distinct very dark grayish brown (10YR 3/2) streaks along root channels; single grain; loose; 40 percent fine shell fragments; few medium roots; moderately alkaline; gradual wavy boundary.

C2—32 to 80 inches; greenish gray (5GY 5/1) fine sand; few medium distinct very dark grayish brown (10YR 3/2) streaks along root channels; single grain; loose; 40 percent fine shell fragments; moderately alkaline.

This soil has 8 to 16 millhos per centimeter salinity. Reaction ranges from slightly acid to moderately alkaline. Shell content ranges from 10 to 40 percent. The soil is sand or fine sand. Silt and clay are less than 10 percent in the 10 to 40 inch control section.

The A horizon has hue of 10YR, 2.5Y, 5Y, or 5GY, value of 2 to 5, and chroma of 2 or less. Matrix colors of chroma of 2 or less are caused by uncoated sand grains. The A11 horizon is absent in some pedons.

The C horizon has hue of 10YR, 2.5Y, 5Y, 5BG, or 5GY, value of 5 to 8, and chroma of 2 or less.

Pople series

Soils of the Pople series are loamy, siliceous, hyperthermic Arenic Glossaqualfs. They are nearly level, poorly drained, slowly permeable soils that formed in sandy and loamy marine sediments. These soils are on flatwoods and in sloughs. In most years, the water table is within a depth of 10 inches for less than 3 months and between depths of 10 to 40 inches for 2 to 6 months. Slope is 0 to 2 percent.

Pople soils are closely associated with Hilolo, Pineda, Riviera, and Winder soils. Hilolo and Winder soils have an argillic horizon within a depth of 20 inches. Pineda and Riviera soils do not have a calcareous A2 or Btg horizon. Riviera soils do not have iron coatings on the sand grains in the A2 horizon.

Typical pedon of Pople sand, in a flatwoods area 20 feet south of east-west powerline, 15 feet west of end of canal, 0.15 mile east of Carlton Road extension, 0.85 mile north of Florida Highway 709 (Glades Road cutoff), and 18 miles southwest of Fort Pierce, NW 1/4 NW 1/4 sec. 15, T. 36 S., R. 37 E.

A1—0 to 3 inches; very dark gray (10YR 3/1) sand, rubbed; unrubbed color is mixture of uncoated sand grains and organic matter; weak, medium granular structure; very friable; many fine and few medium roots; slightly acid; clear wavy boundary.

A21—3 to 9 inches; light brownish gray (10YR 6/2) sand; single grain; loose; few fine roots; slightly acid; gradual wavy boundary.

A22—9 to 18 inches; pale brown (10YR 6/3) sand; single grain; loose; slightly acid; gradual wavy boundary.

A23—18 to 20 inches; yellowish brown (10YR 5/6) sand; few fine distinct light gray (10YR 7/2) secondary calcium carbonate lenses; weak medium granular structure; very friable; sand grains coated with iron oxide; moderately alkaline; calcareous; clear smooth boundary.

A24ca—20 to 24 inches; light gray (10YR 7/2) sand; common medium faint light gray (10YR 7/2) secondary calcium carbonate in interstices between sand grains and as coatings on the sand grains; few medium distinct very dark gray (10YR 3/1) streaks along old root channels; few medium distinct brownish yellow (10YR 6/6) mottles; weak medium granular structure; friable; common hard calcium carbonate nodules 1/2 inch to 1 1/2 inches in diameter; very strong effervescence; moderately alkaline; calcareous; gradual wavy boundary.

A25ca—24 to 29 inches; brownish yellow (10YR 6/6) sand; few medium faint yellowish brown (10YR 5/8) mottles; common nodules of calcium carbonate 1/4 to 1 inch in diameter around old root channels; sand grains coated with iron oxide; single grain; friable; very strong effervescense; moderately alkaline; calcareous; abrupt irregular boundary.

B&A—29 to 38 inches; dark grayish brown (10YR 4/2) sandy clay loam; many coarse distinct light olive brown (2.5Y 5/6, 5/4) mottles; few medium distinct hollow nodules 1/8 to 1/4 inch in diameter and lenses of white (5Y 8/2) secondary accumulations of calcium carbonate; common tongues of light brownish gray (10YR 6/2) sand 1/2 to 1 inch in diameter and 3 to 9 inches long with many coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; very strong effervescence; moderately alkaline; calcareous; gradual wavy boundary.

B22tgca—38 to 42 inches; dark grayish brown (10YR 4/2) sandy clay loam; common coarse distinct light olive brown (2.5Y 5/6) mottles; common medium distinct very dark gray (10YR 3/1) streaks along root channels; few medium distinct light gray (10YR 7/2) secondary calcium carbonate cylinders along root channels; weak, coarse subangular blocky structure; friable; sand grains bridged and coated with clay; strong effervescence; moderately alkaline; calcareous; gradual wavy boundary.

B23tgca—42 to 50 inches; gray (5Y 5/1) sandy clay loam; common medium faint olive (5Y 5/4) mottles in upper 2 inches; common medium distinct pale olive (5Y 6/3, 6/4) mottles along root channels; few medium distinct light gray (5Y 7/2) calcium carbonate nodules along root channels; weak coarse subangular blocky structure; sand grains bridged and coated with clay; moderate effervescence; moderately alkaline; calcareous; gradual wavy boundary.

B3gca—50 to 56 inches; gray (5Y 6/1) sandy loam; common medium distinct yellow (5Y 7/6) mottles; common hard light gray (10YR 7/2) calcium carbonate nodules 1/4 to 1/2 inch in diameter; few fine distinct very dark gray (10YR 3/1) streaks along root channels; massive; friable; strong effervescence; moderately alkaline; calcareous; gradual wavy boundary.

C1g—56 to 60 inches; gray (5Y 6/1) sandy loam; about 5 percent white (10YR 8/2) calcium carbonate in thin layers; massive; friable; strong effervescence; moderately alkaline; calcareous; gradual wavy boundary.

C2g—60 to 80 inches; gray (5Y 6/1) sandy loam; about 10 percent white (10YR 8/2) calcium carbonate in thin layers; massive; friable; strong effervescence; moderately alkaline; calcareous.

Combined thickness of the A horizons ranges from 20 to 40 inches. Reaction of the A1 and A21 horizons ranges from medium acid to mildly alkaline. The rest of the profile is mildly alkaline or moderately alkaline and is calcareous. The sandy epipedon is sand or fine sand.

The A1 or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The A21 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 5 to 7, and chroma of 2; or is neutral and value is 5 to 7.

Except for the A24ca horizon, the sandy epipedon has hue of 10YR, value of 6, and chroma of 2; or value of 5 or 6 and chroma of 6 or 8; or hue of 7.5YR, value of 5, and chroma of 6 or 8. Accumulations of secondary carbonates occur as coatings on sand grains, in interstices between sand grains, and as root casts, or they may occur only as root casts. Sand grains are coated with iron oxide.

The A24ca horizon has hue of 10YR, 2.5Y, or 5Y, value of 6 to 8, and chroma of 2 or less. Secondary carbonate accumulations occur as coatings on sand grains, in interstices between sand grains, and as root casts.

The Bt horizon has hue of 10YR, 5Y, or 5GY; value of 4 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 6, and chroma of 2; or is neutral and value is 4 to 6. Few to many sandy tongues or intrusions are in the upper part of the Bt horizon. Secondary accumulations of carbonates are dominantly casts of old roots or nodules. Effervescence is moderate to very strong throughout the matrix. The matrix is sandy loam, fine sandy loam, or sandy clay loam. Clay content averages about 15 to 25 percent, but ranges to 35 percent.

The B3 horizon has color and accumulations of carbonate similar to those of the Bt horizon. It is sandy loam, fine sandy loam, or sandy clay loam.

The C horizon has hue of 10YR, 5Y, 5BG, or 5GY, value of 5 or 6, and chroma of 1 or 2; hue of 2.5Y, value of 5 or 6, and chroma of 2; or is neutral and value is 5 or 6. It ranges from loamy sand to sandy clay loam. Calcium carbonate typically appears as nodules or thin layers. In some pedons, there are few to many shell fragments.

Riviera series

Soils of the Riviera series are loamy, siliceous, hyperthermic Arenic Glossaqualfs. They are nearly level, poorly drained, slowly to very slowly permeable soils that formed in unconsolidated, marine sandy and loamy materials that are influenced by the underlying alkaline material. These soils are in hammocks, on broad low flats, and in depressional areas. The water table is within a depth of 10 inches for 2 to 4 months and between depths of 10 to 30 inches for most of the rest of the year. Depressional areas are ponded for 6 to 9 months or more annually.

Riviera soils are closely associated with Wabasso, Chobee, Floridana, Hallandale, Winder, and Winder Variant soils. Wabasso soils have a spodic horizon. Chobee and Floridana soils have a mollic epipedon. Hallandale soils have limestone within a depth of 20 inches. Winder and Winder Variant soils have an argillic horizon within a depth of 20 inches.

Typical pedon of Riviera fine sand, in a hammocky area 20 feet south of trail, 0.45 mile west of Caperhaven Road, 0.75 mile south of Florida Highway 68 (Orange Avenue), and 6.0 miles west of Fort Pierce, SE 1/4 NW 1/4 sec. 13, T. 35 S., R. 39 E.

A1—0 to 5 inches; dark grayish brown (10YR 4/2) fine sand; weak medium granular structure; very friable; many fine medium and coarse roots; very strongly acid; clear smooth boundary.

A21—5 to 14 inches; light gray (10YR 7/2) fine sand; few fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; common coarse and few fine roots; medium acid; abrupt irregular boundary.

A22—14 to 23 inches; grayish brown (10YR 5/2) fine sand; common medium distinct light yellowish brown (2.5Y 6/4) mottles; 30 percent light gray (10YR 7/2) sandy penetrations that are 1/2 to 3 inches wide and 4 to 10 inches deep; single grain; very friable; few fine roots; many uncoated sand grains; neutral; abrupt irregular boundary.

B21tg&A—23 to 44 inches; gray (N 6/0) sandy clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles around root channels; 20 percent light gray (10YR 7/2) sandy tongues of A2 horizon material 1/8 inch to 6 inches in diameter and about 2 to 15 inches deep; moderate medium subangular blocky structure; friable; sand grains bridged and coated with clay; common fine roots; moderately alkaline; gradual wavy boundary.

B22tg—44 to 54 inches; gray (5Y 6/1) sandy clay loam; common medium distinct white (10YR 8/1) shell fragments 1/2 inch in diameter; common medium distinct black (10YR 2/1) streaks along root channels; weak medium subangular blocky structure; friable; few fine roots; mildly alkaline; calcareous; gradual wavy boundary.

C1g—54 to 72 inches; greenish gray (5G 5/1) loamy fine sand; common medium distinct light olive gray (5Y 6/2) sand bodies 1/8 to 1/2 inch in diameter; common medium distinct black (10YR 2/1) sand bodies in and around root channels surrounded by few medium distinct, grayish brown (10YR 5/2) sand bodies approximately 1/16 inch thick; common medium distinct olive (5Y 5/4) mottles about 1/8 inch thick; few medium distinct white (10YR 8/1) shell fragments; massive; very friable; mildly alkaline; calcareous; gradual wavy boundary.

C2g—72 to 80 inches; greenish gray (5GY 5/1) fine sand; many coarse distinct olive (5Y 5/4) and grayish brown (10YR 5/2) mottles; massive; very friable; mildly alkaline.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. This horizon is a mixture of organic matter and uncoated sand grains. Thickness ranges from 2 to 15 inches. Where the A1 horizon has a value of less than 3.5, thickness is less than 6 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. It is sand or fine sand. Reaction ranges from very strongly acid to slightly acid. Combined thickness of the A horizons is 20 to 40 inches.

The Btg and B&A horizons have hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 5 or 6, and chroma of 2; or is neutral and value is 5 or 6. The B part of the B&A horizon is sandy loam or sandy clay loam and has penetrations of fine sand from the A2 horizon. Thickness ranges from 6 to 27 inches. Reaction ranges from slightly acid to moderately alkaline.

In some pedons, the B2tg horizon contains small bodies of pyrite, (*7, 8*), but their presence cannot be predicted. If the water table is lowered, the pyrite can oxidize and form acids that may lower the pH to 3.5 or less in local spots within the horizon.

Some pedons have a B3g horizon in hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 or 2. The B3g horizon is loamy sand or sandy loam. Thickness ranges from 0 to 12 inches.

The C horizon has hue of 10YR, 5Y, 5G, 5BG, or 5GY, value of 5 or 6, and chroma of 1 or 2; hue of 2.5Y, value of 5 or 6, and chroma of 2; or is neutral and value is 4 to 6. The C horizon ranges from fine sand to fine sandy loam, or it is a mixture of sand and shell fragments and calcium carbonate.

Salerno series

Soils of the Salerno series are sandy, siliceous, hyperthermic, ortstein Grossarenic Haplaquods. They are poorly drained, very slowly to moderately slowly permeable soils that formed in beds of marine sandy sediment. These soils are on broad flatwoods. The water table is within a depth of 10 inches for 2 to 4 months in most years. Slope ranges from 0 to 2 percent.

Salerno soils are closely associated with Ankona, Hobe, Jonathan, Pendarvis, and Waveland soils. Hobe, Jonathan, and Pendarvis soils are better drained than Salerno soils. Waveland soils have a spodic horizon between depths of 30 to 50 inches. Ankona soils have an argillic horizon below the spodic horizon.

Typical pedon of Salerno sand, in a wooded area 50 feet west of Black Horse Street, 150 feet south of west end of Airview Avenue in Port St. Lucie, and about 12 miles south of Fort Pierce, NW 1/4 SE 1/4 sec. 9, T. 37 S., R. 40 E.

A1—0 to 5 inches; black (10YR 2/1) sand; weak medium granular structure; very friable; many fine and few medium roots; strongly acid; gradual smooth boundary.

A2—5 to 55 inches; light brownish gray (10YR 6/2) sand; single grain; loose; few fine and few medium roots; strongly acid; abrupt smooth boundary.

B2h—55 to 68 inches; black (10YR 2/1) sand; massive; very firm, weakly cemented; sand grains well coated with organic matter; very strongly acid; gradual wavy boundary.

C1—68 to 73 inches; dark grayish brown (10YR 4/2) sand; single grain; loose; strongly acid; gradual wavy boundary.

C2—73 to 80 inches; olive gray (5Y 5/2) sand with few small lenses of loamy sand; massive; very friable; strongly acid.

Reaction ranges from extremely acid to strongly acid in all horizons.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is a mixture of uncoated sand grains and organic matter. Thickness of the A1 horizon ranges from 2 to 10 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Combined thickness of the A horizons ranges from 50 to 76 inches.

In some pedons, there is a transitional B1h horizon between the A horizon and Bh horizon. Where present, the B1h horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. There are many uncoated sand grains. Thickness ranges to 4 inches. The B1h horizon does not meet the requirements of a spodic horizon.

The B2h horizon has hue of 10YR, value of 2, and chroma of 1 or 2; hue of 7.5YR, value of 3, and chroma of 2; hue of 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 or 3; or is neutral and value is 2.

Cementation is absent from or the pedon can be weakly cemented. The vertical thickness in about 20 to 65 percent or more of the B2h horizon or a subhorizon 1 inch or more thick in more than 50 percent of each pedon is weakly cemented. Consistence ranges from very firm in the cemented part to friable in the part that is not cemented. Sand grains are coated with colloidal organic material.

In some pedons, the Bh horizon has streaks or pockets of A2 horizon material. Thickness ranges from 10 to 20 inches. The B2h horizon is sand or loamy sand. Reaction ranges from extremely acid to strongly acid.

Where present, the B3 horizon has hue of 5YR, value of 3, and chroma of 4; hue of 7.5YR, value of 4, and chroma of 4; or hue of 10YR, value of 3, and chroma of 3 or 4. The B3 horizon does not meet the requirements of a spodic horizon. It is not cemented. Some pedons have a B3&Bh horizon. Where present, it has color similar to that of the B3 horizon and few to common, medium to coarse fragments of the Bh horizon.

The C horizon has hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 5 or 6, and chroma of 1 or 2; or is neutral and value is 5 or 6. The C horizon is sand and has common small to medium lenses of loamy sand.

Samsula Variant

Soils of the Samsula Variant 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 remains and underlying sandy material. These soils are in marshes. The water table is at or above the surface for 6 to 9 months and within a depth of 40 inches for the rest of the year. Slope is less than 1 percent.

Samsula Variant soils are closely associated with Lawnwood, Oldsmar, Myakka Variant, Hontoon, and Waveland soils. Except for the Hontoon soils, all of those soils have a spodic horizon. Myakka Variant soils have a histic epipedon. Hontoon soils have organic material more than 52 inches deep.

Typical pedon of Samsula Variant muck, in an area of Jensen Savannas Fresh Marsh 0.1 mile south of Walton Road, 0.6 mile west of Florida Highway 707 (South Indian River Drive), and 10.5 mile south of Fort Pierce, SE 1/4 NE 1/4 SE 1/4 sec. 32, T. 37 S., R. 41 E.

Oa1—0 to 13 inches; black (5YR 2/1) muck, broken face, rubbed and pressed; about 60 percent fiber, 6 percent rubbed; massive; very friable; many fine roots; pale brown (10YR 6/3) sodium pyrophosphate extract; extremely acid, 3.5 in 0.01 molar calcium chloride; clear wavy boundary.

Oa2—13 to 25 inches; black (N 2/0) muck, broken face, rubbed and pressed; about 36 percent fiber, 4 percent rubbed; massive; very friable; many fine roots; dark brown (10YR 4/3) sodium pyrophosphate extract; extremely acid, 3.6 in 0.01 molar calcium chloride; clear wavy boundary.

A1b—25 to 29 inches; black (N 2/0) mucky sand; less than 20 percent organic material; massive; friable; few fine roots; extremely acid; clear wavy boundary.

A2b—29 to 36 inches; dark gray (10YR 4/1) or very dark gray (10YR 3/1) sand, rubbed; single grain; loose; extremely acid; gradual wavy boundary.

Bhb—36 to 52 inches; very dark gray (10YR 3/1) sand; single grain; loose; sand grains that have thinly coated organic matter; extremely acid.

Reaction of the organic material is less than 4.5 in 0.01 molar calcium chloride. Thickness of the organic material ranges from 16 to 40 inches.

The Oa 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. Sodium pyrophosphate extract is in hue of 10YR, value of 2 to 4, and chroma of 4 or less; value of 5 and chroma of 2 to 8; value of 6 and chroma of 3 to 8; or value of 7 and chroma of 4 to 8.

An A1b horizon is not present in all pedons. Where present, it has hue of 10YR, value of 2 to 3, and chroma of 1 or 2; or is neutral and value is 2 or 3. This horizon is a mixture of uncoated sand grains and organic matter. It ranges to 12 inches thick. The A2b horizon has hue of 10YR, value of 4 to 7, and chroma of 1; or hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2. It is 2 to 24 inches thick. Reaction ranges from extremely acid to neutral. The Ab horizon is mucky sand, sand, or fine sand.

The Bhb horizon has hue of 10YR, value of 3 or 4, and chroma of 3 to 1; hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 2 or 3. It has none to many small, black, weakly cemented fragments of the Bh horizon. The Bhb horizon is sand or fine sand. Thickness is 4 to 30 inches. Reaction is extremely acid to neutral.

Satellite series

Soils of the Satellite series are hyperthermic, uncoated Aquic Quartzipamments. They are somewhat poorly drained, very rapidly permeable soils that formed in thick beds of marine or eolian sand on low knolls and ridges. Slope ranges from 0 to 2 percent. The water table is between depths of 10 to 40 inches for 2 to 6 months of the year and within a depth of 60 inches for more than 9 months.

Satellite soils are closely associated with Myakka Variant, Pompano, Paola, Pendarvis, Samsula Variant, St. Lucie, and Welaka Variant soils. Myakka Variant, Pompano, and Samsula Variant soils are more poorly drained than Satellite soils, and Paola, Pendarvis, St. Lucie, and Welaka Variant soils are better drained. Pendarvis soils have a spodic horizon, and Paola and Welaka Variant have a B horizon. Myakka Variant soils have a histic epipedon, and Samsula Variant soils are organic.

Typical pedon of Satellite sand, in a wooded area 150 feet south of county sanitary landfill road, 0.2 mile west of U.S. Highway 1, and 4 miles north of Fort Pierce, NE 1/4 SE 1/4 sec. 20, T. 34 S., R. 40 E.

A1—0 to 6 inches; dark gray (10YR 4/1) sand; weak medium crumb structure; very friable; many fine roots; medium acid; clear wavy boundary.

C1—6 to 33 inches; light gray (10YR 7/1) sand; single grain; loose; few fine roots; slightly acid; gradual wavy boundary.

C2—33 to 52 inches; light brownish gray (10YR 6/2) sand; single grain; loose; slightly acid; gradual wavy boundary.

C3—52 to 80 inches; grayish brown (10YR 5/2) sand; common medium distinct brown (10YR 4/3) streaks along old root channels; single grain; loose; neutral.

Thickness of sand exceeds 80 inches. Reaction ranges from strongly acid to slightly acid in the A horizon and upper part of the C horizon and from medium acid to mildly alkaline in the lower part of the C horizon.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1. This horizon is a mixture of organic matter and uncoated sand grains. Thickness ranges from 1 inch to 8 inches.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. In some pedons, this horizon has mottles in shades of yellow, brown, or red.

St. Lucie series

Soils of the St. Lucie series are hyperthermic, uncoated Typic Quartzipsamments. They are excessively drained, very rapidly permeable soils that formed in thick beds of marine or eolian sand on high, dunelike, broad ridges and in undulating areas. These soils do not have a water table within a depth of 80 inches. Slope ranges from 0 to 8 percent.

St. Lucie soils are closely associated with Astatula, Pendarvis, Paola, Satellite, and Welaka Variant soils. Pendarvis and Satellite soils are more poorly drained than St. Lucie soils. Pendarvis soils have a spodic horizon. Paola soils have an A2 horizon and a B horizon, and Welaka Variant soils have a Bir horizon.

Typical pedon of St. Lucie sand, 0 to 8 percent slopes, in a cleared area 70 feet north of Savannas Road, 0.1 mile west of Florida Highway 707 (South Indian River Drive), 1.1 miles south of Citrus Avenue, and approximately 1.2 miles south of Fort Pierce, NW 1/4 NW 1/4 sec. 23, T. 35 S., R. 40 E.

A—0 to 6 inches; gray (10YR 5/1) sand, dark gray (10YR 4/1) moist and rubbed; weak medium granular structure; very friable; many fine roots that are mostly horizontal; slightly acid; clear smooth boundary.

C1—6 to 8 inches; light gray (10YR 7/2) sand, gray (10YR 6/1) moist and rubbed; single grain; loose; few fine and common medium roots that are mostly horizontal; slightly acid; clear smooth boundary.

C2—8 to 26 inches; white (10YR 8/1) sand, light gray (10YR 7/1) moist; single grain; loose; common medium roots; neutral; gradual wavy boundary.

C3—26 to 80 inches; white (10YR 8/1) sand, white (10YR 8/1) moist; single grain; loose; mildly alkaline.

Thickness of sand exceeds 80 inches. Reaction ranges from strongly acid to slightly acid in the A horizon and upper part of the C horizon. Reaction of the lower part of the C horizon ranges from slightly acid to mildly alkaline. Content of silt and clay is less than 5 percent in all horizons.

The A horizon when rubbed has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It ranges from 1 inch to 8 inches thick. It is a mixture of organic matter and uncoated sand grains.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2.

Susanna series

Soils of the Susanna series are sandy, siliceous, hyperthermic, ortstein Ultic Haplaquods. They are poorly drained, very slowly to moderately slowly permeable soils that formed in sandy and loamy marine sediments. These soils are in the flatwoods. In most years, the water table is within a depth of 10 inches for 1 to 4 months and within a depth of 40 inches for about 6 months. Slope ranges from 0 to 2 percent.

Susanna soils are closely associated with Ankona, Chobee, Nettles, Pepper, Pineda, Riviera, Tantile, Wabasso, and Winder soils. Ankona and Nettles soils have a spodic horizon below a depth of 30 inches. Chobee soils have a mollic epipedon and do not have a spodic horizon. Pepper and Tantile soils have an argillic horizon below a depth of 40 inches. Pineda, Riviera, and Winder soils do not have a spodic horizon. Wabasso soils have an argillic horizon that has high base saturation.

Typical pedon of Susanna sand, in a flatwoods area, approximately 6 miles west of Fort Pierce, 0.35 mile north of Florida Highway 70 (Okeechobee Road), 0.45 mile west of Coolidge Road, 0.1 mile south of trail, 200 feet northwest of orange grove, and 150 feet north of fence, NW 1/4 SW 1/4 sec. 23, T. 35 S., R. 39 E.

A1—0 to 6 inches; black (10YR 2/1) sand, rubbed; color is a mixture of light gray sand grains and black organic matter; moderate medium granular structure; very friable; many fine and medium and few coarse roots; very strongly acid; clear smooth boundary.

A21—6 to 18 inches; dark gray (10YR 4/1) sand; single grain; loose; few fine and common medium roots; strongly acid; gradual wavy boundary.

A22—18 to 25 inches; gray (10YR 6/1) sand; single grain; loose; few fine and medium roots; medium acid; abrupt wavy boundary.

B2h—25 to 29 inches; black (N 2/0) loamy sand; massive; firm; weakly cemented; few fine roots; sand grains well coated with colloidal organic matter; very strongly acid; clear wavy boundary.

B21t—29 to 41 inches; very dark grayish brown (10YR 3/2) sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; common medium distinct black (10YR 2/1) streaks along root channels; weak medium subangular blocky structure; friable; common fine roots; sand grains bridged and coated with clay; very strongly acid; gradual wavy boundary.

B22t—41 to 48 inches; brown (10YR 5/3) sandy loam; many coarse distinct strong brown (7.5YR 5/8) and few medium distinct yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; strongly acid; gradual wavy boundary.

C1—48 to 63 inches; light brownish gray (2.5Y 6/2) loamy sand; root channels filled with dark grayish brown (10YR 4/2) sand surrounded by reddish yellow (7.5YR 6/8) sand; moderate medium granular structure; friable; strongly acid; gradual wavy boundary.

C2—63 to 80 inches; light brownish gray (2.5Y 6/2) sand; single grain; loose; strongly acid.

The A1 horizon has hue of 10YR, value of 2 to 3, and chroma of 1 or 2. This horizon is a mixture of organic matter and uncoated sand grains. The A2 horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2. It may or may not have darker streaks along root channels. Combined thickness of the A horizons is less than 30 inches. Reaction ranges from very extremely acid to medium acid.

Where present, the B1h horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The B1h horizon does not meet the requirements of a spodic horizon. The B2h horizon has hue of 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 to 4; hue of 7.5YR, value of 3, and chroma of 2; or hue of 10YR, value of 2, and chroma of 1 or 2.

Cementation is absent or ranges to weakly cemented in the B2h horizon. It is variable in many pedons; however, a subhorizon 1 inch or more thick in more than half of each pedon is weakly cemented. Consistence ranges from very firm in the weakly cemented part to very friable in the part that is not cemented. Thickness ranges from 1 to 8 inches.

In some pedons, there is a B3&Bh horizon or a B3 horizon. Where present, the matrix has hue of 10YR, value of 3, and chroma of 2 or 3; value of 4, and chroma of 3 or 4; or hue of 7.5YR, value of 4, and chroma of 2 to 4. In many pedons, few to common, fine to coarse weakly cemented bodies of the Bh horizon occur in this horizon. Spodic fragments range from common to many in the B3&Bh horizon. This horizon is sand, fine sand, loamy sand, or loamy fine sand.

In few places, there is an A12 horizon. It has hue of 10YR, value of 5 to 8, and chroma of 1 to 3; is neutral and value is 5 to 8; or has hue of 2.5Y, value of 5 to 8, and chroma of 1 to 3. Reaction is very strongly acid or strongly acid. This horizon is sand or fine sand.

Combined thickness of the A horizon and Bh horizon is less than 40 inches.

The B2t horizon has hue of 10YR, value of 3 to 7, and chroma of 1 to 3; hue of 2.5Y, value of 4 to 7, and chroma of 2; or is neutral and value is 4 to 7. Texture is sandy loam, fine sandy loam, or sandy clay loam. In some pedons, lenses of sandy material are in this horizon. Reaction is very strongly acid or strongly acid.

The C horizon has hue of 10YR, 2.5Y, 5Y, 5G, or 5BG, value of 5 or 6, and chroma of 2 or less. Texture is sand, loamy sand, or sandy loam. Reaction is very strongly acid or strongly acid.

Tantile series

Soils of the Tantile series are sandy, siliceous, hyperthermic, ortstein Ultic Haplaquods. They are nearly level, poorly drained, very slowly to moderately slowly permeable soils that formed in beds of sandy and loamy marine sediments. These soils are on broad flatwoods. In most years, the water table is within a depth of 10 inches for 2 to 4 months and between depths of 10 to 40 inches for 6 months or more. Slope ranges from 0 to 2 percent.

Tantile soils are closely associated with Ankona, Lawnwood, Nettles, Pendarvis, Pepper, Susanna, and Waveland soils. Pendarvis soils are better drained than Tantile soils and do not have an argillic horizon. Susanna soils have an argillic horizon within a depth of 40 inches. Nettles and Pepper soils have high base saturation in an argillic horizon. Lawnwood soils do not have an argillic horizon. Ankona and Waveland soils have a spodic horizon below a depth of 30 inches.

Typical pedon of Tantile sand, in a wooded area 0.05 mile south of Nebraska Avenue, 110 feet east of edge of 25th Street, and 2.75 miles southwest of Fort Pierce, NW 1/4 SW 1/4 sec. 16, T. 35 S., R. 40 E.

A11—0 to 2 inches; black (10YR 2/1) sand, rubbed; unrubbed color is mixed organic matter and uncoated sand grains; weak fine granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.

A12—2 to 5 inches; very dark gray (10YR 3/1) sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

A13—5 to 9 inches; dark gray (10YR 4/1) sand; single grain; loose; few fine and common medium and coarse roots; strongly acid; clear smooth boundary.

A21—9 to 16 inches; light gray (10YR 6/1) sand; few medium distinct dark gray (10YR 3/1) streaks along root channels; single grain; loose; few fine and coarse roots; common medium roots; medium acid; gradual wavy boundary.

A22—16 to 26 inches; light gray (10YR 7/1) sand; common medium distinct very dark gray (10YR 3/1) streaks along root channels; single grain; loose; common medium roots; medium acid; abrupt wavy boundary.

B21h—26 to 34 inches; black (10YR 2/1) sand; massive; firm; weakly cemented in more than 60 percent of horizon; sand grains coated with colloidal organic matter; few fine roots; very strongly acid; gradual wavy boundary.

B22h—34 to 39 inches; dark reddish brown (5YR 3/3) sand; moderate medium granular structure; very friable; sand grains coated with colloidal organic matter; strongly acid; gradual wavy boundary.

B3&Bh—39 to 49 inches; brown (10YR 5/3) sand; common coarse distinct dark reddish brown (5YR 2/2) moderately cemented spodic fragments in lower 6 inches; weak medium granular structure; very friable; common fine and medium roots; strongly acid; gradual wavy boundary.

B3—49 to 59 inches; pale brown (10YR 6/3) loamy sand; common medium distinct brownish yellow (10YR 6/6) mottles, common medium distinct white (10YR 8/1) vertical sand streaks, and few medium distinct dark reddish brown (5YR 3/2) cemented spodic fragments; moderate medium granular structure; very friable; common medium roots; strongly acid; abrupt irregular boundary.

A'2—59 to 69 inches; white (10YR 8/1) sand; common medium distinct yellow (10YR 7/6) mottles and few medium distinct black streaks along root channels; single grain; loose; few medium roots; medium acid; abrupt irregular boundary.

B'tg—69 to 80 inches; light brownish gray (2.5Y 6/2) fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles and common fine distinct very dark gray (10YR 3/1) streaks along root channels; moderate medium subangular blocky structure; friable; common medium roots; very strongly acid.

Reaction ranges from extremely acid to medium acid in all horizons.

When rubbed, the A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Where value is less than 3.5, thickness is less than 10 inches. Thickness ranges from 8 to 14 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Combined thickness of the A horizons is less than 30 inches.

In some pedons, a thin transitional B1h horizon is between the A horizon and Bh horizon. Where present, it has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. This horizon does not meet the requirements for a spodic horizon. Thickness is 0 to 4 inches. The B2h horizon has hue of 10YR, value of 2, and chroma of 1 or 2; hue of 7.5YR, value of 3, and chroma of 2; hue of 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 to 4.

Cementation is absent or ranges to weakly cemented. In most pedons, cementation is variable; however, a weakly cemented subhorizon 1 inch or more thick is in more than half of each pedon. Consistence ranges from very firm in the weakly cemented parts to very friable in the parts that are not cemented. In some pedons, few to common vertical streaks or bodies of gray, brown, and yellow sand are in the B2h horizon. Thickness is 4 to 24 inches.

The B3&Bh and B3 horizons have hue of 10YR, value of 3, and chroma of 2 or 3, or value of 4 to 6, and chroma of 3 or 4; or hue of 7.5YR, value of 4, and chroma of 3 or 4, or value of 3 and chroma of 2. Spodic fragments that range from common to many are in the B3&Bh horizon. The horizon is sand, fine sand, loamy sand, or loamy fine sand.

The A'2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3; hue of 2.5Y, value of 5 to 8, and chroma of 1 to 3; or is neutral and has value of 5 to 8. The A'2 horizon is sand or fine sand.

The B'tg horizon has hue of 10YR or 5Y, value of 4 or 6, and chroma of 1 or 2; hue of 2.5Y, value of 4 or 6, and chroma of 2; or is neutral and has value of 4 or 6. The B'tg horizon is sandy loam, fine sandy loam, or sandy clay loam.

Where present, the C horizon has hue of 10YR, 5Y, 5GY, value of 5 or 6, and chroma of 1 or 2; hue of 2.5Y, value of 5 or 6, and chroma of 2; or is neutral and has value of 5 or 6. The C horizon is variable, ranging from sand to sandy clay loam, and may be stratified.

Terra Ceia series

Soils of the Terra Ceia series are euic, hyperthermic Typic Medisaprists. They are very poorly drained, rapidly permeable soils that formed from nonwoody, fibrous, hydrophytic plant remains. These soils are on the lower flood plains of the north fork of the St. Lucie River. They are subject to flooding by stream overflow. The water table is at or above the surface for 6 to 9 months annually. Slope is less than 1 percent.

Terra Ceia soils are closely associated with Ankona, Electra, Fluvaquents, and Pendarvis soils. Terra Ceia soils differ from those soils in consisting of organic material.

Typical pedon of Terra Ceia muck, in marsh area 500 feet east from the end of Verada Avenue in Port St. Lucie, approximately 8 miles south of Fort Pierce, NW 1/4 NW 1/4 sec. 27, T. 36 S., R. 40 E.

Oa1—0 to 35 inches; black (10YR 2/1) well decomposed muck; 44 percent fiber unrubbed, 12 percent rubbed; massive; very friable; many roots; brown (10YR 5/3) sodium pyrophosphate extract; neutral; pH 4.8 in 0.01 molar calcium chloride; gradual wavy boundary.

Oa2—35 to 80 inches; black (10YR 2/1) well decomposed muck; 44 percent fiber unrubbed, 8 percent rubbed; massive; very friable; common roots; dark grayish brown (10YR 4/2) sodium pyrophosphate extract; neutral; pH 4.8 in 0.01 molar calcium chloride.

Soil pH is 4.5 or more in 0.01 molar calcium chloride.

Thickness of the organic material is more than 52 inches. The Oa horizon has hue of 10YR, value of 2, and chroma of 1; or hue of 5YR, value of 2 or 3, and chroma 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 pyrosphate extract is in hue of 10YR, value of 2 to 4, and chroma of 4 or less; value of 5 and chroma of 2 to 6; value of 6 and chroma of 3 to 6; or value of 7 and chroma of 4 or 6.

Turnbull Variant

Soils of the Turnbull Variant are fine-loamy, siliceous, hyperthermic Typic Hydraquents. They are very poorly drained, slowly or very slowly permeable soils that formed in loamy marine sediment and from limestone boulders. These soils are in tidal marshes and are flooded by daily tides. Slope ranges from 0 to 2 percent.

Turnbull Variant soils are closely associated with Chobee, Nettles, Wabasso, and Winder Variant soils. Wabasso soils and Nettles soils have a spodic horizon underlain by an argillic horizon. Chobee soils have an argillic horizon and a mollic epipedon. Winder Variant soils have an argillic horizon overlying limestone boulders. The associated soils have an n value of less than 0.7.

Typical pedon of Turnbull Variant sandy clay loam, from an area of tidal marsh 275 feet north of Link Port Canal, 0.6 mile east of Florida Highway 605, and about 6.5 miles north of Fort Pierce, SE 1/4 NE 1/4 sec. 8, T. 34 S., R. 40 E.

A11—0 to 6 inches; black (10YR 2/1) sandy clay loam; massive; very friable; few fine medium and coarse roots; high organic matter content; soil flows with slight difficulty between fingers; calculated n value is 2.3; neutral; gradual wavy boundary.

A12—6 to 23 inches; very dark gray (10YR 3/1) fine sandy loam; massive; friable; soil flows with slight difficulty between the fingers; calculated n value is 0.9; few coarse roots; many dead roots; mildly alkaline; gradual wavy boundary.

C1g—23 to 36 inches; gray (2.5Y 5/1) sandy clay loam; common medium distinct very dark gray (10YR 3/1) streaks along root channels; few medium distinct yellowish brown (10YR 5/4) splotches; massive; sticky when wet; moderately alkaline; abrupt irregular boundary.

IIC2g—36 to 50 inches; gray (2.5Y 5/1) very bouldery sandy clay loam; few medium distinct yellowish brown (10YR 5/4) splotches; massive; friable; moderately alkaline; gradual wavy boundary.

IIC3g—50 to 80 inches; gray (2.5Y 5/1) bouldery sandy clay loam; common medium distinct light gray (10YR 6/2) calcium carbonate nodules; massive; friable; moderately alkaline.

This soil has an n value of more than 0.7 and at least 8 percent clay in all subhorizons between 8 and 20 inches below the mineral surface.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 2.5Y, value of 2, and chroma of 2; or is neutral and value is 2 or 3. Thickness is 8 to 28 inches. Reaction is medium acid to moderately alkaline.

The Cg horizon has hue of 10YR, value of 2 to 6, and chroma of 1; or is neutral and value is 2 to 6. It is sandy loam or sandy clay loam. Thickness is 10 to 25 inches. Reaction ranges from medium acid to moderately alkaline in the natural state.

Combined thickness of the A horizon and Cg horizon is less than 40 inches.

Mineral material between boulders in the IICg horizon has hue of 10YR, 2.5Y, or 5Y, value of 2 to 6, and chroma of 1 or less. The IICg horizon is bouldery or very bouldery sandy loam or sandy clay loam. Boulders are 1 foot to 6 feet in diameter and decrease in number with increasing depth. Reaction is mildly alkaline or moderately alkaline. Some pedons have shell fragments below the IICg horizon.

Wabasso series

Soils of the Wabasso series are sandy, siliceous, hyperthermic Alfic Haplaquods. They are nearly level, poorly drained, slowly and very slowly permeable soils that formed in beds of marine sandy and loamy materials that are influenced by underlying alkaline material. These soils are on broad flatwoods. In most years, the water table is within a depth of 10 inches for 1 to 4 months and between depths of 10 to 40 inches for 6 to 9 months. Slope ranges from 0 to 2 percent.

Wabasso soils are closely associated with Ankona, Hilolo, Nettles, Pepper, Pineda, Riviera, Susanna, Wabasso Variant, and Winder soils. Ankona and Susanna soils have low base saturation in the argillic horizon. Pepper soils have an argillic horizon below a depth of 40 inches. Wabasso Variant soils have a layer of limestone boulders within a depth of 40 inches. Hilolo, Pineda, Riviera, and Winder soils do not have a spodic horizon. Nettles soils have a spodic horizon below a depth of 30 inches.

Typical pedon of Wabasso sand, in flatwoods area about 17 miles west of Fort Pierce, 2.15 miles north of Florida Highway 68, and 75 feet west of main trail, SW 1/4 NW 1/4 sec. 35, T. 34 S., R. 37 E.

A11—0 to 4 inches; black (10YR 2/1) sand, rubbed; mixture of clean sand grains and organic matter gives salt-and-pepper effect; moderate medium granular structure; very friable; many fine medium and coarse roots; very strongly acid; clear smooth boundary.

A12—4 to 8 inches; very dark gray (10YR 3/1) sand, rubbed; mixture of clean sand grains and organic matter gives salt-and-pepper effect; weak medium granular structure; very friable; many fine and medium roots; very strongly acid; gradual wavy boundary.

A21—8 to 16 inches; gray (10YR 5/1) sand; single grain; loose; common fine and many medium roots; very strongly acid; gradual wavy boundary.

A22—16 to 25 inches; gray (10YR 5/1) sand; common medium distinct black (10YR 2/1) streaks along root channels; single grain; loose; common fine and medium roots; strongly acid; abrupt wavy boundary.

B21h—25 to 30 inches; black (10YR 2/1) sand; weak medium subangular blocky structure; friable; common medium roots; strongly acid; gradual wavy boundary.

B22h—30 to 34 inches; dark brown (10YR 3/2) loamy sand; common fine distinct black (10YR 2/1) streaks along root channels; massive; friable; few fine roots; sand grains coated with colloidal organic matter; strongly acid; gradual wavy boundary.

B21tg—34 to 48 inches; dark grayish brown (2.5Y 4/2) sandy loam; common fine distinct black (10YR 2/1) streaks along root channels; common medium distinct olive brown (2.5Y 4/4) mottles and sandy pockets; weak medium subangular blocky structure; sand grains bridged and coated with clay; friable; few fine roots; strongly acid; gradual wavy boundary.

B22tg—48 to 60 inches; olive gray (5Y 5/2) sandy clay loam; many coarse distinct very dark grayish brown (2.5Y 3/2) mottles; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; moderately alkaline; clear wavy boundary.

Cg—60 to 80 inches; olive gray (5Y 5/2) sand; many medium distinct light gray (10YR 7/2) shell fragments; single grain; very friable; strongly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. This horizon is a mixture of uncoated sand grains and organic matter. Thickness ranges from 2 to 12 inches, but where value is less than 3.5, thickness is less than 10 inches. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Thickness ranges from 6 to 22 inches. Reaction ranges from very strongly acid to medium acid. Combined thickness of the A horizon is less than 30 inches.

In some pedons, there is a B1h horizon. Where present, it has hue of 10YR, value of 2 to 4, and chroma of 1 or 2 with many uncoated sand grains. Thickness ranges to 3 inches. The B2h horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 2 to 4. Sand grains are coated with organic matter. Thickness ranges from 2 to 14 inches.

In some pedons, there is a B3 or B3&Bh horizon. Where present, it has hue of 10YR, value of 4, and chroma of 2 or 3. Thickness ranges to 14 inches. The B3&Bh horizon, where present, has matrix colors similar to those of the B3 horizon and in addition has black or dark reddish brown fragments of the Bh horizon. Thickness ranges to 8 inches. Reaction of the Bh horizon ranges from very strongly acid to medium acid. The Bh horizon is sand or fine sand.

In some pedons, there is an A'2 horizon between the Bh and Btg horizons. Where present, it has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 5 to 7, and chroma of 2; or is neutral and has value of 5 or 6. Thickness ranges to 8 inches. Reaction ranges from strongly acid to mildly alkaline. The A'2 horizon is sand or fine sand. In most pedons, the Bh horizon rests directly on the Btg horizon. Combined thickness of the A, Bh, and A'2 horizons is less than 40 inches.

The B21tg horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4; or value of 5 or 6 and chroma of 1 to 3; or hue of 2.5Y, value of 4 to 6, and chroma of 2 with mottles in shades of brown, yellow, red, or gray. Generally, value of 3 or 4 occurs in most pedons and organic carbon content is commonly 1 percent or more. The B22tg horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3; hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 or less; or is neutral and value is 5 or 6. A few brownish streaks or pockets of sand and light colored carbonatic accumulations are in some pedons. Reaction ranges from strongly acid to moderately alkaline.

In some pedons the Btg horizon contains pyrite, but the presence of the pyrite cannot be predicted. If the water table is lowered, the pyrite can react to form acids that may lower the pH to 3.5 or less in local spots in the horizon. Thickness is 5 to 30 inches. The Btg horizon is sandy loam or sandy clay loam.

The Cg horizon has hue of 5Y, value of 5 or 6, and chroma of 2 or less; or is neutral and value is 5 or 6. The Cg horizon is sand, loamy sand, or sandy loam. Many pedons contain calcium nodules and shell fragments. Reaction ranges from strongly acid to mildly alkaline.

Wabasso Variant

Soils of the Wabasso Variant are sandy, siliceous, hyperthermic Alfic Haplaquods. They are poorly drained, slowly or very slowly permeable soils that formed in sandy and loamy marine sediments overlying limestone pebbles and boulders. These soils are in the flatwoods. In most years, the water table is within a depth of 10 inches for less than 2 months and between depths of 10 to 40 inches for more than 6 months. Slope ranges from 0 to 2 percent.

Wabasso Variant soils are closely associated with Chobee, Hallandale, Hilolo, Pineda, Pople, Riviera, Wabasso, and Winder soils. Except for the Wabasso soils, those soils do not have a spodic horizon. Wabasso soils do not have limestone.

Typical pedon of Wabasso Variant sand, in a flatwoods area 100 feet west of farm road, 0.6 mile north of Florida Highway 68 (Orange Avenue), and 18.5 miles west of Fort Pierce, SE 1/4 SE 1/4 sec. 4, T. 35 S., R. 37 E.

A1—0 to 5 inches; black (10YR 2/1) sand; moderate fine crumb structure; very friable; many fine and common medium roots; common small organic matter fragments 1/8 inch in diameter; many uncoated sand grains; very strongly acid; clear smooth boundary.

A2—5 to 19 inches; gray (10YR 5/1) sand; common medium distinct dark gray (10YR 4/1) and very dark gray (10YR 3/1) streaks along root channels; single grain; loose; many fine and common medium roots; strongly acid; clear wavy boundary.

B1h—19 to 20 inches; very dark gray (10YR 3/1) sand; single grain; loose; common fine and few medium roots; many uncoated sand grains; strongly acid; abrupt wavy boundary.

B21h—20 to 22 inches; dark reddish brown (5YR 3/2) sand; massive; friable; sand grains well coated with organic matter; strongly acid; clear wavy boundary.

B22h—22 to 23 inches; dark reddish brown (5YR 3/3) sand; massive; very friable; sand grains well coated with organic matter; strongly acid; clear wavy boundary.

B3h—23 to 25 inches; brown (10YR 4/3) sand; single grain; loose; many uncoated sand grains; slightly acid; clear wavy boundary.

B21tg—25 to 28 inches; dark grayish brown (10YR 4/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles along root channels and common medium faint grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; moderately alkaline; clear wavy boundary.

B22tg—28 to 32 inches; olive gray (5Y 5/2) sandy clay loam; common medium distinct olive brown (2.5Y 4/4) mottles along root channels; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; moderately alkaline; abrupt irregular boundary.

IIC—32 to 36 inches; light gray (10YR 7/1) very gravelly sandy loam; common medium faint white (10YR 8/1) calcium carbonate nodules and few fine distinct yellowish brown (10YR 5/6) mottles along old root channels; massive; very friable; about 60 percent limestone gravel; moderately alkaline; calcareous; gradual wavy boundary.

IIIC1—36 to 40 inches; brown (10YR 5/3) sand; few bodies of sandy clay loam; few medium faint grayish brown (10YR 5/2) mottles; weak medium granular structure; very friable; moderately alkaline; calcareous; gradual wavy boundary.

IIIC2—40 to 45 inches; brown (10YR 5/3) mixture of sand and loamy sand; common medium distinct white (10YR 8/1) hard calcium carbonate nodules 1/4 to 1/2 inch in diameter; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium granular structure; very friable; moderately alkaline; calcareous; gradual wavy boundary.

IIIC3—45 to 50 inches; light olive brown (2.5Y 5/4) sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium granular structure; friable; moderately alkaline; calcareous; clear wavy boundary.

IVC1—50 to 68 inches; light olive gray (5Y 6/2) loamy sand; few fine distinct yellowish brown (10YR 5/6) mottles; 45 percent white (10YR 8/1) whole and fragments of shells 1/4 to 1/2 inch in diameter; weak medium granular structure; very friable; moderately alkaline; calcareous; gradual wavy boundary.

IVC2—68 to 75 inches; gray (5Y 6/1) sandy loam; 20 percent white (10YR 8/1) shell fragments; moderate medium granular structure; friable; moderately alkaline; calcareous; gradual wavy boundary.

IVC3—75 to 80 inches; gray (5Y 6/1) sandy clay loam; 10 percent white (10YR 8/1) shell fragments; massive; firm; moderately alkaline; calcareous.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is a mixture of uncoated sand grains and organic matter. Thickness ranges from 4 to 10 inches. Where value is less than 3.5, thickness is less than 10 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Thickness ranges from 4 to 18 inches. Reaction ranges from very strongly acid to slightly acid. Thickness of the A horizon is less than 30 inches.

A B1h horizon is below the A2 horizon and has hue of 10YR, value of 2 to 4, and chroma of 1 or 2 with many uncoated sand grains and small pockets or vertical streaks that have hue of 10YR, value of 5 to 7, and chroma of 1. Thickness ranges from 1 to 4 inches. This horizon does not meet the requirements of spodic horizons.

The B2h horizon has hue of 10YR, 7.5YR, or 5YR, value of 2 or 3, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 3 or 4. Sand grains are coated with organic matter. The Bh horizons with value of 2 and chroma of 2 or more are less cemented and more friable than other horizons.

The B3h horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4 with or without darker fragments. Reaction of the Bh horizon ranges from very strongly acid to slightly acid.

In some pedons, an A'2 horizon is between the Bh and Btg horizons. Where present, this A'2 horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4. It is mottled in shades of yellow or brown. The A'2 horizon is sand or fine sand. Reaction is very strongly acid to neutral. Combined thickness of the A, Bh, and A'2 horizons is less than 35 inches.

The Btg horizon has hue of 10YR, 2.5Y, 5Y, 5BG, or 5GY, value of 5 or 6, and chroma of 1 or 2; or hue of 10YR, value of 3 to 6, and chroma of 3 or 4. Fine to medium, few to many, distinct mottles are reddish yellow, brownish yellow, strong brown, and red. Some pedons have light colored carbonatic accumulations. The Btg horizon is fine sandy loam or sandy clay loam. Reaction ranges from medium acid to moderately alkaline.

The IIC horizon is within a depth of 20 to 40 inches. It is very gravelly sandy loam or very gravelly sandy clay loam. The IIC and IIIC horizons have hue of 10YR, 2.5Y, 5Y, 5GY, or 5BG, value of 5 or 6, and chroma of 1 or 2. The IIIC horizon is sand, loamy sand, or sandy loam. There are many shell fragments. Reaction ranges from neutral to moderately alkaline.

Waveland series

Soils of the Waveland series are sandy, siliceous, hyperthermic, ortstein Arenic Haplaquods. They are nearly level, poorly drained, very slowly to slowly permeable soils that formed in marine sandy and loamy sediments. These soils are on broad flatwoods and in depressional areas. The water table is within a depth of 10 inches for 1 to 4 months and within a depth of 40 inches for 6 months or more annually. Depressional areas are ponded. Slope ranges from 0 to 2 percent.

Waveland soils are closely associated with Ankona, Jonathan, Electra, Lawnwood, Pepper, Tantile, and Susanna soils. Electra and Jonathan soils are better drained than Waveland soils. Lawnwood soils have an A horizon less than 30 inches thick. Pepper, Tantile, and Susanna soils have an argillic horizon below the spodic horizon.

Typical pedon of Waveland fine sand, in a wooded area about 9 miles south of Fort Pierce, 1.2 miles north of Walton Road, and 1.15 miles east of U. S. Highway 1, SW 1/4 NE 1/4 sec. 36, T. 36 S., R. 40 E.

A11—0 to 4 inches; black (10YR 2/1) fine sand, rubbed; moderate medium crumb structure; very friable; many fine medium and coarse roots; color is of mixed organic matter and uncoated fine sand grains; very strongly acid; clear smooth boundary.

A12—4 to 8 inches; dark gray (10YR 4/1) sand; few medium distinct very dark gray (10YR 3/1) streaks along root channels; weak medium crumb structure; very friable; many fine medium and coarse roots; many uncoated sand grains; medium acid; gradual wavy boundary.

A21—8 to 17 inches; grayish brown (10YR 5/2) sand; few fine and medium distinct very dark gray (10YR 3/1) streaks along root channels; single grain; loose; common fine and many medium roots; slightly acid; gradual wavy boundary.

A22—17 to 32 inches; light gray (10YR 7/1) fine sand; common medium distinct very dark gray (10YR 3/1) streaks along root channels; single grain; loose; common fine roots; neutral; abrupt wavy boundary.

B21h—32 to 40 inches; black (5YR 2/1) loamy sand; massive; very firm; weakly cemented; few fine roots; sand grains well coated with organic matter; very strongly acid; gradual wavy boundary.

B22h—40 to 53 inches; black (5YR 2/1) sand; common coarse faint black (10YR 2/1) very firm fragments; massive; firm; weakly cemented; sand grains well coated with organic matter; strongly acid; clear wavy boundary.

C1—53 to 57 inches; dark grayish brown (10YR 4/2) sand with common large pockets of loamy sand; few distinct light gray (10YR 7/2) randomly connected sand streaks 1/16 inch in diameter; weak medium subangular blocky structure; friable; strongly acid; gradual wavy boundary.

C2—57 to 66 inches; grayish brown (2.5Y 5/2) sand with common large scattered pockets of sandy loam and loamy sand; single grain in loamy sand part, weak medium subangular blocky structure in sandy loam part; loose, very friable; sandy loam is discontinuous in about 60 percent of pedon; sand grains coated and bridged with clay in sandy loam; strongly acid; gradual wavy boundary.

C3—66 to 75 inches; olive gray (5Y 5/2) sand with few scattered pockets of sandy loam; single grain in sand part; single grain, weak medium subangular blocky structure in sandy loam part; very friable; sand grains coated with clay in sandy loam part; strongly acid; gradual wavy boundary.

C4—75 to 81 inches; olive gray (5Y 5/2) sand with few medium pockets of loamy sand; single grain; very friable; strongly acid.

The A1 horizon has rubbed hue of 10YR, value of 2 to 4, and chroma of 1. Where value is less than 3.5, thickness is less than 10 inches. Unrubbed colors have a salt-and-pepper appearance. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Combined thickness of the A horizon ranges from 30 to 50 inches. Reaction ranges from extremely acid to neutral.

Some pedons have a B1h horizon. Where present, it has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The B1h horizon does not meet the requirements for a spodic horizon. Reaction ranges from extremely acid to medium acid. Thickness ranges to 4 inches.

The B2h horizon has hue of 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 to 4; hue of 7.5YR, value of 3, and chroma of 2; or hue of 10YR, value of 2, and chroma of 1 or 2. In some pedons, there are pockets of A2 horizon material in the B2h horizon.

Cementation is absent or ranges to weakly cemented. It is variable in most pedons; however, a subhorizon 1 inch or more thick in more than half of each pedon is weakly cemented. Consistence ranges from very firm in the weakly cemented parts to very friable in the parts that are not cemented. In some pedons, few to common vertical streaks of the Bh horizon extend into the C horizon. Thickness of the Bh horizon is highly variable within short distances.

The B3 horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4; hue of 7.5YR, value of 3, and chroma of 3; or value of 4 and chroma of 2 or 4. Some pedons have a B3&Bh horizon that has weakly cemented fragments of the Bh horizon and is similar in color to the B2h horizon. The Bh horizon is fine sand, sand, loamy fine sand, or loamy sand. Reaction is extremely acid to strongly acid.

The C horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 to 4; hue of 2.5Y, value of 5 or 6, and chroma of 2 or 4; or is neutral and has value of 5 or 6. The C horizon is sand or fine sand. In many pedons, few to common, medium to large randomly scattered discontinuous pockets of loamy sand and fine sandy loam are in the C horizon. Reaction ranges from extremely acid to strongly acid.

Welaka Variant

Soils of the Welaka Variant are hyperthermic, uncoated Spodic Quartzipsamments. They are nearly level to gently sloping, excessively drained, very rapidly permeable soils that formed in thick beds of marine and eolian sand. These soils are on upland ridges near the Indian River. The water table is below a depth of 80 inches. Slope ranges from 0 to 5 percent.

Welaka Variant soils are closely associated with Astatula, Pendarvis, Paola, Satellite, and St. Lucie soils. Pendarvis soils and Satellite soils are more poorly drained than Welaka Variant soils, and Pendarvis soils have a spodic horizon. Astatula soils do not have an A2 horizon. Paola soils have tongues of the A2 horizon extending into the B horizon and a discontinuous Bh horizon. St. Lucie soils are light colored sand to a depth of 80 inches or more.

Typical pedon of Welaka Variant sand, 0 to 5 percent slopes, 100 feet west of Florida Highway 707 (Indian River Drive), 0.85 mile south of Citrus Avenue, approximately 1.0 mile south of Fort Pierce, SE 1/4 NE 1/4 sec. 15, T. 35 S., R. 40 E.

Ap—0 to 5 inches; black (10YR 2/1) sand; moderate medium granular structure; very friable; many fine and few medium roots; neutral; clear smooth boundary.

A21—5 to 8 inches; gray (10YR 5/1) sand; single grain; loose; common fine and medium roots; neutral; clear wavy boundary.

A22—8 to 18 inches; light gray (10YR 7/1) sand; common coarse, faint light brownish gray (10YR 6/2) streaks; single grain; loose; common fine and medium and few coarse roots; neutral; gradual wavy boundary.

B1—18 to 21 inches; pinkish gray (7.5YR 6/2) sand; single grain; loose; many uncoated sand grains; common fine medium and coarse roots; medium acid; gradual wavy boundary.

B21ir—21 to 35 inches; strong brown (7.5YR 5/6) sand; single grain; loose; sand grains well coated with iron oxide; common tongues of reddish brown (5YR 4/3); many fine streaks of uncoated sand grains that are 3 to 6 inches apart and 3 to 10 inches long; common fine, medium, and coarse roots; strongly acid; gradual wavy boundary.

B22ir—35 to 76 inches; yellowish red (5YR 5/6) sand; single grain; loose; sand grains well coated with iron oxide; common fine roots; strongly acid; gradual wavy boundary.

B23ir—76 to 96 inches; strong brown (7.5YR 5/6) sand; single grain; loose; few fine roots; strongly acid.

The A1 or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or value of 3 and chroma of 2. Thickness ranges from 2 to 6 inches. This horizon is a mixture of organic matter and uncoated sand grains. Where present, the A1 horizon has hue of 10YR, value of 4 to 6, and chroma of 1. Thickness of the A1 horizon ranges from 2 to 12 inches. The A2 horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. Combined thickness of the A horizons is dominantly less than 40 inches but ranges to 75 inches in some pedons. Reaction of the A horizon ranges from medium acid to neutral.

The B1 horizon has hue of 10YR or 7.5YR, value of 6 or 7, and chroma of 3 or 4; or hue of 7.5YR, value of 6 or 7, and chroma of 2. The B2ir horizon has hue of 10YR, 7.5YR, or 5YR, value of 5 or 6, and chroma of 6 or 8; or value of 5 and chroma of 4; or hue of 7.5YR or 5YR, value of 4, and chroma of 4. Sand grains are well coated with iron oxide. Reaction of the B horizon is strongly acid to mildly alkaline.

The silt and clay content is less than 5 percent between depths of 10 and 40 inches.

Winder series

Soils of the Winder series are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs. They are nearly level, poorly drained, slowly to very slowly permeable soils that formed in unconsolidated marine sand, and loamy materials influenced by underlying alkaline material. These soils are in hammocks, along poorly defined drainageways, and in depressional areas. A water table is within a depth of 10 inches for 2 to 4 months and between depths of 10 to 40 inches for most of the rest of the year. Depressional areas are ponded for 6 to 9 months in most years. Slope ranges from 0 to 2 percent.

Winder soils are closely associated with Wabasso, Chobee, Kaliga, Winder Variant, Hallandale, and Riviera soils. Chobee soils have a mollic epipedon. Wabasso soils have a spodic horizon. Winder Variant soils have very pebbly sandy loam within a depth of 40 inches.

Hallandale soils have limestone within a depth of 20 inches. Riviera soils have an argillic horizon between depths of 20 to 40 inches. Kaliga soils are organic.

Typical pedon of Winder loamy sand, in a grassy slough approximately 3 miles southwest of Fort Pierce, 0.4 mile south of Florida Highway 70 (Okeechobee Road), 0.4 mile east of McNeil Road, and 60 feet north of Kirby Loop Road, NW 1/4 NW 1/4 sec. 20, T. 35 S., R. 40 E.

A11—0 to 3 inches; black (10YR 2/1) loamy sand; moderate medium crumb structure; very friable; many fine and common medium roots; neutral; clear smooth boundary.

A12—3 to 6 inches; very dark gray (10YR 3/1) loamy sand; single grain; loose; common fine roots; neutral; clear smooth boundary.

A21—6 to 9 inches; grayish brown (10YR 5/2) sand; single grain; loose; few fine roots; neutral; clear wavy boundary.

A22—9 to 12 inches; light brownish gray (10YR 6/2) sand; single grain; loose; few fine roots; neutral; abrupt smooth boundary.

B&A—12 to 21 inches; dark grayish brown (10YR 4/2) sandy clay loam; many medium distinct strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; common light brownish gray (10YR 6/2) vertical sandy tongues of the A2 horizon 1/2 to 1 inch wide and 2 feet long; weak medium subangular blocky structure; firm; sand grains bridged and coated with clay in the B part; few medium and coarse roots; neutral; gradual wavy boundary.

B21tg—21 to 33 inches; gray (10YR 5/1) sandy clay loam; many coarse yellowish brown (10YR 5/6), few fine distinct yellowish red (5YR 4/6), and common medium distinct yellowish brown (10YR 5/4) mottles; few medium distinct gray (10YR 6/1) sandy tongues; weak medium subangular blocky structure; very friable; sand grains bridged and coated with clay; few fine roots; neutral; gradual wavy boundary.

B22tg—33 to 49 inches; dark gray (10YR 4/1) sandy loam; many coarse distinct yellowish brown (10YR 5/6) and few fine distinct yellowish red (5YR 4/6) mottles; few medium distinct light gray (10YR 7/2) sandy tongues; weak medium subangular blocky structure; very friable; sand grains bridged and coated with clay; few fine roots; neutral; gradual wavy boundary.

B3—49 to 61 inches; gray (10YR 6/1) loamy sand; many medium distinct brownish yellow (10YR 6/6), and few fine distinct strong brown (7.5YR 5/6) mottles; common medium distinct light gray (10YR 7/2) sand pockets; weak medium subangular blocky structure; very friable; sand grains coated with clay; few fine roots; neutral; gradual wavy boundary.

C—61 to 80 inches; light gray (10YR 7/1) sand; common coarse yellowish brown (10YR 5/6) mottles; few fine distinct strong brown (7.5YR 5/6) streaks along old root channels; single grain; loose; slightly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Where value is 3 or less, thickness is less than 7 inches. The horizon is sand or loamy sand. The A2 horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2. Thickness is 4 to 12 inches. Reaction is strongly acid to neutral. Combined thickness of the A horizons is less than 20 inches.

The B&A and B2tg horizons have hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 6, and chroma of 2; or is neutral and value is 4 to 6. Sandy tongues of A2 horizon material in the B&A horizon have hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Reaction ranges from medium acid to moderately alkaline. Thickness ranges from 4 to 25 inches. The B&A and B2tg horizons are sandy loam or sandy clay loam.

In some pedons, the Bt horizon contains small bodies of pyrite, but the presence of pyrite cannot be predicted (*7, 8*). If the water table is lowered, the pyrite can oxidize and form acids that may lower the pH in spots within the horizon to 3.5 or less.

The C horizon has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1 or 2; hue of 2.5, value of 5 to 7, and chroma of 2; or is neutral and value is 5 to 7. The C horizon ranges from sandy clay loam to loamy sand to a mixture of sand and shell fragments, or to a mixture of shell fragments and calcium carbonate. Reaction ranges from slightly acid to moderately alkaline.

Winder Variant

Soils of the Winder Variant are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs. They are nearly level, poorly drained, slowly permeable soils that formed in marine loamy and sandy sediments overlying a ledge of hard fractured limestone. These soils are in hammocks. In most years, the water table is within a depth of 10 inches for 2 to 6 months and between depths of 10 to 40 inches for 6 to 9 months. Slope ranges from 0 to 2 percent.

Winder Variant soils are closely associated with Chobee, Hallandale, Hilolo, Pople, Riviera, and Winder soils. Except for Hallandale soils, the associated soils do not contain limestone. Hallandale soils have a ledge of limestone within a depth of 20 inches. Chobee soils have a mollic epipedon. Pople soils have high chroma in the A horizon.

Typical pedon of Winder Variant sand, in a citrus grove 0.15 mile north of citrus trail, 0.75 mile from eastern edge of grove, 0.8 mile north of Indio Road extension, 4.35 miles west of Johnson Road, and 12 miles north-northwest of Fort Pierce, NW 1/4 SW 1/4 sec. 11, T. 34 S., R. 38 E.

Ap—0 to 6 inches; black (10YR 2/1) sand, rubbed; color is of mixed organic matter and uncoated sand grains; single grain; loose; many fine and few medium roots; medium acid; abrupt smooth boundary.

A2—6 to 9 inches; dark grayish brown (10YR 4/2) sand; many coarse distinct dark brown (10YR 4/3) mottles; few fine distinct very dark gray (10YR 3/1) streaks along root channels; single grain; loose; few fine medium and coarse roots; medium acid; abrupt wavy boundary.

B&A—9 to 20 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; common tongues of sandy A2 horizon; weak medium subangular blocky structure; friable; few medium and coarse roots; sand grains bridged and coated with clay; slightly acid; clear wavy boundary.

B21tgca—20 to 25 inches; light brownish gray (10YR 6/2) sandy clay loam; few fine faint light gray (10YR 7/2) calcium carbonate nodules; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; moderately alkaline; abrupt smooth boundary.

B22tgca—25 to 27 inches; dark gray (10YR 4/1) sandy clay loam; common medium distinct light gray (10YR 7/2) pockets of calcium carbonate; few medium faint gray (10YR 5/1) pockets of sand; moderately alkaline; calcareous; abrupt irregular boundary.

B3ca—27 to 29 inches; gray (10YR 5/1) gravelly sandy loam; many coarse distinct light gray (10YR 7/2) limestone fragments and soft calcium carbonate nodules; common medium distinct gray (10YR 5/1) pockets of sand; massive; friable; moderately alkaline; calcareous; abrupt irregular boundary.

IIC1—29 to 32 inches; light gray (10YR 7/2) very gravelly sandy loam; many calcium carbonate nodules 1/4 to 1/2 inch in diameter; massive; friable; pebbles are hard limestone; moderately alkaline; calcareous; clear wavy boundary.

IIC2—32 to 44 inches; gray (10YR 6/1) sandy loam; many coarse distinct yellowish brown (10YR 5/6, 5/8) mottles; few fine distinct light gray (10YR 7/2) calcium carbonate nodules; massive; friable; moderately alkaline; calcareous; gradual wavy boundary.

IIIC3—44 to 50 inches; gray (10YR 6/1) sandy loam; few fine distinct yellowish brown (10YR 5/6, 5/8) mottles; few fine distinct light gray (10YR 7/2) calcium carbonate nodules; common coarse faint light brownish gray (10YR 6/2) sandy lenses; massive; friable; moderately alkaline; calcareous; gradual wavy boundary.

IIIC4—50 to 65 inches; light olive gray (5Y 6/2) sandy loam; few fine distinct yellowish brown (10YR 5/6) mottles; common shell fragments 3 millimeters to 1 centimeter in diameter; common medium distinct light gray (10YR 7/2) calcium carbonate nodules; massive; very friable; moderately alkaline; calcareous; gradual wavy boundary.

IIIC5—65 to 70 inches; light olive gray (5Y 6/2) sandy loam; common coarse distinct light gray (10YR 7/2) calcium carbonate fragments; common shell fragments 3 millimeters to 1 centimeter in diameter; many coarse distinct yellowish brown (10YR 5/6, 5/8) mottles; massive; friable; moderately alkaline; calcareous; gradual wavy boundary.

IIIC6—70 to 80 inches; gray (5Y 5/1) sandy loam; common medium distinct light gray (10YR 7/2) shell fragments less than 1/4 inch in diameter; few medium distinct yellowish brown (10YR 5/6, 5/8) mottles; massive; friable; moderately alkaline; calcareous.

The A1 or Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. This horizon is a mixture of uncoated sand grains and organic matter. Where value is less than 3.5, thickness is less than 7 inches. Thickness ranges from 2 to 11 inches. The A2 horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 2 with mottles. Thickness ranges to 16 inches. Combined thickness of the A horizons is less than 20 inches. Reaction ranges from strongly acid to moderately alkaline.

The B&A, B2tgca, and Btgca horizons have hue of 10YR or 5Y, value of 3 to 6, and chroma of 1 or 2; hue of 2.5Y, value of 3 to 6, and chroma of 2; or is neutral and value is 3 to 6. The B part of the B&A horizon is sandy clay loam. Tongues of A2 horizon material are similar in color to those of the A2 horizon. Reaction ranges from medium acid to moderately alkaline. Thickness ranges from 6 to 20 inches.

The B3ca horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; or hue of 2.5Y, value of 6 to 8, and chroma of 2. This horizon is absent in some pedons, and the Btgca horizon rests on the IIC horizon.

The Btgca horizon contains common to many limestone pebbles. It is gravelly sandy loam or gravelly sandy clay loam and has pockets of sand in many places. Reaction is slightly acid to moderately alkaline. Thickness is 0 to 16 inches.

Depth to the IIC horizon ranges from 20 to 40 inches. The IIC horizon is a continuous ledge that ranges from a few inches to 2 feet thick. It is very pebbly sandy loam or very pebbly sandy clay loam. The IIIC horizon has hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 4 to 7, and chroma of 2; or is neutral and value is 4 to 7. The IIIC horizon is sand, loamy sand, sandy loam, or sandy clay loam mixed with few to many shell fragments. Reaction ranges from slightly acid to moderately alkaline.

Formation of the soils

In this section, the process of soil formation is 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 develops depends on five major factors. These factors are the climate under which soil material has existed since accumulation; the plant and animal life in and on the soil; the type of parent material; the relief, or lay of the land; and 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. In some places, the effect of the parent material is modified greatly by the effects of climate, relief, and plants and animals in and on the soil. As a soil forms, it is influenced by more than one of 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. All of the soils in St. Lucie County Area formed in material that overlies and is influenced by four major geologic formations (*10*).

The oldest formation, the Caloosahatchee Marl, is of Pliocene Age. It underlies the entire survey area, and consists mostly of sand and varying amounts of shell, some of which are preserved unbroken. The formation is not exposed, but in places it lies close enough to the surface to be cut into by the deeper canals.

The other three formations are of Pleistocene Age. The Fort Thompson Formation is in the northern part of the county, west of Ten Mile Ridge. It rests unconformably on the Caloosahatchee Marl. This formation consists of tan to buff carbonate and layers of coarse sand and shell fragments that are cemented to form sandstone where sand prevails, and coquina rock where shell fragments dominate.

The Anastasia Formation underlies most of the survey area and probably rests on the Fort Thompson and Caloosahatchee Marl Formations. It consists of sand, shell beds, and thin discontinuous layers of sandy limestone and sandstone. This formation generally has coarser sand grains and shell fragments and more cemented layers than the Fort Thompson Formation.

Pamlico Sand is of late Pleistocene Age. It mantles all of the survey area, and it is the basic material in which most of the mineral soils have formed. The present land surface, which is about 25 feet above sea level, is Pamlico Sand. Along the coastal ridge, Pamlico Sand is heaped into ridges and dunes that are more than 25 feet high.

Savannahs and small, low areas are in the eastern and southwestern parts of the survey area. They overlie Pamlico Sand and consist of recently accumulated organic material that ranges from 2 to 6 feet thick. In places, this organic material overlies the Anastasia Formation.

Climate

St. Lucie County Area has a tropical climate near the coast and a humid subtropical climate in the rest of the county. 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 survey area.

Few differences among the soils are caused by the climate; however, climate aids in rapid decomposition of organic matter, and it 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. Because of these climatic conditions, many soils are sandy, and 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 also been important agents. Plant and animal life furnish organic matter to the soil and bring plant nutrients from the lower layers to the upper layers of soil. In places, plants and animals are the cause of differences in the amount of organic matter, nitrogen, and plant nutrients in the soil and differences in soil structure and porosity. For example, roots of trees and crayfish have penetrated loamy subsoil and mixed sandy surface layers with the subsoil.

Micro-organisms, including bacteria and fungi, help to weather and break down minerals and to decompose organic matter. These organisms are most numerous in the upper few inches of the soil. Earthworms and other small animals inhabit the soil, alter its chemical composition, and mix it with other soil material. However, 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 because of man's activities; nevertheless, these activities have had little effect on the soils except for loss of organic matter.

Relief

Relief has affected the formation of soils in St. Lucie County Area mainly through its influence on soil and water relationships. Other factors of soil formation generally associated with relief, for example, erosion, temperature, and plant cover, are of minor importance.

The survey area is made up of flatwoods, swamps and marshes, and coastal ridge. Differences among the soils in these areas are directly related to relief.

The soils in the flatwoods have a high water table and are periodically wet to the surface. Therefore, they are not so highly leached as those soils of the northwest ridge. The soils in the swamps and marshes are covered with water for long periods of time. In many places they have high organic matter content. The soils in the coastal ridge are at a higher elevation than the soils in the flatwoods and swamps and marshes. Because these deep sandy soils are mostly excessively drained, they are not influenced by a ground water table. However, they are more subject to erosion than soils in other parts of the survey area.

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 materials into soil varies according to the nature of the geologic material and the interaction of the other factors. Some basic minerals from which soils are formed weather fairly rapidly; other minerals are chemically inert and show little change over long periods of time. The translocation of fine particles within the soil to form horizons is variable under different conditions, but the processes always take a relatively long period of time.

In St. Lucie County Area, the dominant geological materials are inactive. The sands are almost pure quartz and are highly resistant to weathering. The finer textured silts and clays are the product of earlier weathering.

In terms of geological time, relatively little time has elapsed since the material in which the soils in the survey area have developed was laid down or emerged from the sea. The loamy and clayey horizons formed in place through processes of clay translocation.

Processes of soil formation

Soil morphology refers to that process which involves the formation of the soil horizon or soil horizon differentiation. The differentiation of horizons in soils in St. Lucie County Area is the result of accumulation of organic matter, leaching of carbonates, reduction and transfer of iron, or accumulation of silicate clay minerals. Sometimes more than one of these processes is involved.

Some organic matter has accumulated in the upper layers of most of the soils to form an A1 horizon. The quantity of organic matter is small in some of the soils and fairly large in others.

Carbonates and salts have been leached in all of the soils. Because the leaching permitted the subsequent translocation of silicate clay materials in some soils, the effects of leaching have been indirect. Most of the soils of the survey area are leached to varying degrees.

Except in the excessively drained soils, the process of chemical reduction, or gleying, is evident in many of the soils in St. Lucie County Area. Gleying is caused by wetness. Gray matrix color in the B horizon in many soils and grayish mottles in some other soils indicate the reduction of iron. In some sandy soils, however, gray is the color of the sand grains. In some horizons, reddish-brown mottles and concretions indicate the segregation of iron and a 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 survey area. Movement of clay, organic matter, or iron is evident in many of the soils; for example, in a light colored, leached A2 horizon; a Bt or Bh horizon in which sand grains are bridged and coated with clay or colloidal organic matter; or in a few patchy clay films on ped faces and in root channels. Other processes involved in soil formation, however, are less important in the formation of horizons in the soils of St. Lucie County Area than the translocation of silicate clays.

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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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	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.

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. Mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter.

Coarse textured soil. Sand or loamy sand.

Cobbles. A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

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). Excessive decrease in volume of soft soil 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 arresting grazing for a prescribed period.

Depth to rock. Bedrock is too near the surface for the specified use.

Depression. An area that is 6 inches to 2 feet or more lower in elevation than the surrounding area and is ponded for long periods of time.

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 for 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.

Effervescence. As used in this survey, the bubbling of carbon dioxide when dilute hydrochloric acid is applied to calcium carbonates.

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, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess humus. Too much organic matter for intended use.

Excess salt. A harmful concentration of salts and exchangeable sodium in such location that growth of most crops is less than normal.

Fast intake (in tables). The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

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 the 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 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 (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 (or hummock). Broad, nearly level, low ridges of poorly drained, dominantly loamy soils that are slightly elevated above adjacent areas and that have a characteristic vegetation of cabbage palms and scattered pines and oaks with an understory of sawpalmetto and native 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.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. 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 Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

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.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

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—

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.

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.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous areas. Areas that have little or no natural soil and support little or no vegetation.

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 colored, 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 practical measures known. No feasible or practical measures to overcome adverse soil properties for the selected use are known.

No water. 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.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

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 affecting 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 0.20 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, differences in slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding (or ponds). Shallow water standing above the soil surface for long (usually more than 3 months) periods of time.

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 outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Porosity. The degree to which the total volume of a soil, sediment, or rock is permeated with pores or cavities.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Pyrite. Iron disulfide, a common brass-yellow mineral with metallic luster; fool's gold.

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 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.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called groundwater runoff or seepage flow from ground water.

Salty water. Water containing a concentration of salts and exchangeable sodium harmful to most plants when applied as irrigation.

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.

Seepage (in tables). The movement of water through the soil. Seepage 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.

Shear strength. A laboratory determination which is used with other laboratory data to evaluate the load supporting capability of a soil.

Shore side walls. Construct walls along sides of excavated trenches to prevent soil from caving.

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.

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.

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.

Slough. A broad, slightly depressional, poorly defined drainageway that is commonly grassy.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in 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 separates. Mineral particles less than 2 mm 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 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.

Special equipment. The equipment needed to traverse soft and wet soils of low strength.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or 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 content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface stabilization. Firming the surface by an appropriate means so that vehicles or foot traffic can traverse an area.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

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, silt loam, 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 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.

Unit, map. A unique natural landscape that has a distinct pattern of soils and drainage features. Map unit areas are shown on the General Soil Map.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

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 or underlying rock material 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 tabel 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 in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wetness. Soil that is wet during the period of use.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data were recorded at Fort Pierce, Florida]

Month	Temperature: Normal monthly mean	Temperature: Normal daily maximum	Temperature: Normal daily minimum	Temperature: Mean number of days with temperature of-- 90° F or higher	Temperature: Mean number of days with temperature of-- 32° F or lower	Precipitation: Normal total	Precipitation: Mean number of days with rainfall of-- 0.10 inch or more	Precipitation: Mean number of days with rainfall of-- 0.50 inch or more
	°F	°F	°F			Inches		
January	64.8	72.3	52.1	0	1	1.90	4	1
February	65.7	74.0	55.5	0	(*)	2.44	5	2
March	68.4	76.8	56.9	(*)	0	3.49	6	3
April	72.6	80.0	63.3	(*)	0	4.32	6	3
May	76.7	83.8	68.1	1	0	4.19	8	3
June	80.0	87.1	71.2	6	0	6.07	9	5
July	81.6	88.7	72.5	10	0	5.23	10	3
August	81.9	89.5	73.1	15	0	6.01	10	4
September	81.0	87.6	73.2	6	0	8.46	12	5
October	76.7	83.0	68.1	1	0	8.27	8	4
November	70.4	78.4	61.2	(*)	0	2.75	4	1
December	66.3	73.7	54.7	0	(*)	2.14	5	1
Year	73.8	81.2	64.2	39	1	55.27	87	35

*Less than half a day.

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded at Fort Pierce, Florida]

Freeze threshold temperature	Mean date of last spring occurrence	Mean date of first fall occurrence	Mean number of days between dates	Years of record, spring	Number of occurrences in spring	Years of record, fall	Number of occurrences in fall
32	January 6	(*)	(*)	30	6	30	3
28	(*)	(*)	(*)	30	0	30	0

*When the frequency of occurrence in either spring or fall is 1 year in 10 or less, mean dates are not given.

TABLE 3.--POTENTIAL AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP

[See text for definitions of potential ratings. To reach soil potential, limitations need to be overcome]

Map unit	Extent of area	Community development	Citrus	Improved pasture	Vegetables	Woodland
	Pct					
1. St. Lucie-Satellite-Welaka Variant.	1.5	Very high	Low: droughty.	Low: droughty.	Very low: droughty.	Low: droughty.
2. Salerno-Hobe-Waveland	1.4	High: wetness.	Low: wetness.	Medium: wetness.	Medium: wetness.	Low: wetness.
3. Waveland-Lawnwood	16.4	High: wetness.	Low: wetness.	Medium: wetness.	Medium: wetness.	Low: wetness.
4. Basinger-Myakka-Lawnwood	2.7	Medium: wetness.	Low: wetness.	Low: wetness.	Medium: wetness.	Low: wetness.
5. Nettles-Ankona-Pepper	20.0	High: wetness.	Low: wetness.	Medium: wetness.	Medium: wetness.	Medium: wetness.
6. Wabasso-Winder	6.4	High: wetness.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Medium: wetness.
7. Pineda-Wabasso-Riviera	21.8	High: wetness.	High: wetness.	High: wetness.	High: wetness.	Medium: wetness.
8. Winder-Riviera	24.5	Low: wetness, ponding.	High: wetness, ponding.	High: wetness, ponding.	High: wetness, ponding.	Low: wetness, ponding.
9. Chobee	1.4	Low: wetness, ponding.	High: wetness, ponding.	High: wetness, ponding.	High: wetness, ponding.	High: wetness, ponding.
10. Samsula Variant-Myakka Variant.	1.1	Very low: wetness, ponding.	Very low: wetness, ponding, low strength.	Medium: wetness, ponding.	High: wetness, ponding.	Very low: wetness, ponding.
11. Fluvaquents-Terra Ceia	1.0	Very low: wetness, flooding.	Very low: wetness, flooding.	Very low: wetness, flooding.	Very low: wetness, flooding.	Very low: wetness, flooding.
12. Pompano Variant-Kaliga Variant-Canaveral.	1.8	Very low: wetness, flooding.	Very low: wetness, flooding, excess salt.	Very low: wetness, flooding, excess salt.	Very low: wetness, flooding, excess salt.	Very low: wetness, flooding, excess salt.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Anclote sand	300	0.1
2	Ankona sand	14,198	3.8
3	Ankona-Urban land complex	1,131	0.3
4	Arents, 0 to 5 percent slopes	7,408	2.0
5	Arents, 45 to 65 percent slopes	2,459	0.7
6	Arents, organic substratum	309	0.1
7	Astatula sand, 0 to 5 percent slopes	266	0.1
8	Basinger sand	6,532	1.8
9	Beaches	440	0.1
10	Canaveral fine sand, 0 to 5 percent slopes	1,755	0.5
11	Chobee loamy sand	9,019	2.5
12	Electra fine sand, 0 to 5 percent slopes	1,122	0.3
13	Floridana sand	4,066	1.1
14	Fluvaquents	1,800	0.5
15	Hallandale sand	1,128	0.3
16	Hilolo loamy sand	3,819	1.0
17	Hobe sand, 0 to 5 percent slopes	1,549	0.4
18	Hontoon muck	446	0.1
19	Jonathan sand, 0 to 5 percent slopes	322	0.1
20	Kaliga muck	1,773	0.5
21	Lawnwood sand	19,293	5.2
22	Lawnwood-Urban land complex	1,009	0.3
23	Malabar fine sand	6,126	1.7
24	Myakka fine sand	2,088	0.6
25	Nettles sand	29,798	8.1
26	Oldsmar sand	5,108	1.4
27	Palm Beach fine sand, 0 to 5 percent slopes	371	0.1
28	Paola sand, 0 to 8 percent slopes	318	0.1
29	Pendarvis sand, 0 to 5 percent slopes	1,805	0.5
30	Pendarvis-Urban land complex	385	0.1
31	Pepper sand	9,349	2.5
32	Pineda sand	52,388	14.2
33	Pits	106	*
34	Pompano sand	256	0.1
35	Pompano Variant-Kaliga Variant association	3,857	1.0
36	Pople sand	6,771	1.8
37	Riviera sand, depressional	31,107	8.5
38	Riviera fine sand	10,734	2.9
39	Salerno sand	2,592	0.7
40	Samsula Variant-Myakka Variant association	4,185	1.1
41	Satellite sand	1,657	0.5
42	St. Lucie sand, 0 to 8 percent slopes	2,564	0.7
43	Susanna sand	1,486	0.4
44	Tantile sand	4,017	1.1
45	Terra Ceia muck	1,538	0.4
46	Turnbull Variant sandy clay loam	291	0.1
47	Urban land	948	0.3
48	Wabasso sand	29,356	8.0
49	Wabasso Variant sand	1,888	0.5
50	Waveland fine sand	23,714	6.4
51	Waveland-Lawnwood complex	6,079	1.7
52	Waveland-Urban land complex	1,448	0.4
53	Welaka Variant sand, 0 to 5 percent slopes	1,054	0.3
54	Winder sand, depressional	34,026	9.2
55	Winder loamy sand	8,433	2.3
56	Winder Variant sand	1,102	0.3
	Water	861	0.2
	Total	367,950	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Oranges	Grapefruit	Tomatoes	Cucumbers	Pangola grass	Bahiagrass	Grass-clover
	Box	Box	Ton	Ton	AUM*	AUM*	AUM*
1------------------------ Anclote	---	---	---	---	11	10	12
2------------------------ Ankona	350	450	8	5	10	9	12
3------------------------ Ankona-Urban land	---	---	---	---	---	---	---
4**, 5**, 6**. Arents							
7------------------------ Astatula	350	400	---	---	4	3	---
8------------------------ Basinger	350	450	13	6	10	8	12
9**. Beaches							
10----------------------- Canaveral	400	525	---	---	---	4	---
11----------------------- Chobee	---	---	---	---	11	11	15
12----------------------- Electra	---	---	---	---	---	6	---
13----------------------- Floridana	---	---	---	---	11	10	13
14**. Fluvaquents							
15----------------------- Hallandale	375	500	16	8	8	6	9
16----------------------- Hilolo	450	650	8	---	10	9	12
17----------------------- Hobe	---	---	---	---	---	4	---
18----------------------- Hontoon	---	---	---	---	14	15	17
19----------------------- Jonathan	---	---	---	---	---	3	---
20----------------------- Kaliga	---	---	---	---	12	12	15
21----------------------- Lawnwood	325	400	12	6	10	9	12
22----------------------- Lawnwood-Urban land	---	---	---	---	---	---	---
23----------------------- Malabar	325	575	13	6	10	9	12

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Oranges	Grapefruit	Tomatoes	Cucumbers	Pangola grass	Bahiagrass	Grass-clover
	Box	Box	Ton	Ton	AUM*	AUM*	AUM*
24 Myakka	350	550	13	6	10	9	12
25 Nettles	350	550	13	6	10	9	12
26 Oldsmar	---	---	---	---	---	---	---
27 Palm Beach	---	---	---	---	---	---	---
28. Paola							
29 Pendarvis	250	350	---	---	---	4	---
30 Pendarvis-Urban land	---	---	---	---	---	---	---
31 Pepper	350	450	13	6	10	9	12
32 Pineda	425	575	13	6	10	9	12
33**. Pits							
34 Pompano	300	400	13	6	10	8	10
35**:							
Pompano Variant	---	---	---	---	---	---	---
Kaliga Variant	---	---	---	---	---	---	---
36 Pople	425	575	13	---	10	9	12
37 Riviera	---	---	---	---	---	---	---
38 Riviera	425	575	13	7	10	9	12
39 Salerno	350	450	10	6	10	9	12
40**:							
Samsula Variant	---	---	---	---	---	---	---
Myakka Variant	---	---	---	---	---	---	---
41 Satellite	---	---	---	---	---	5	---
42 St. Lucie	---	---	---	---	---	---	---
43 Susanna	350	450	10	6	10	9	12
44 Tantile	350	450	8	6	10	9	12

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Oranges	Grapefruit	Tomatoes	Cucumbers	Pangola grass	Bahiagrass	Grass-clover
	Box	Box	Ton	Ton	AUM*	AUM*	AUM*
45: Terra Ceia	---	---	---	---	10	12	15
46: Turnbull Variant	---	---	---	---	---	---	---
47**. Urban land							
48: Wabasso	400	575	13	6	10	9	12
49: Wabasso Variant	400	575	13	6	10	9	12
50: Waveland	325	400	15	6	10	9	12
51: Waveland-Lawnwood	---	---	---	---	---	---	---
52: Waveland-Urban land	---	---	---	---	---	---	---
53: Welaka Variant	250	300	---	---	---	4	---
54: Winder	---	---	---	---	---	---	---
55: Winder	450	650	8	6	10	9	12
56: Winder Variant	450	650	12	6	10	9	12

* 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	124,531	---	124,531	---	---
IV	125,639	---	125,639	---	---
V	---	---	---	---	---
VI	9,772	---	---	9,772	---
VII	79,254	---	76,319	2,935	---
VIII	4,147	---	4,147	---	---

TABLE 7.--POTENTIAL PRODUCTION AND COMPOSITION OF LIVESTOCK FORAGE

[Only the soils that produce significant amounts of forage are listed]

Soil name and map symbol	Potential production		Composition of forage		
	Kind of year	Dry weight	Grass and grasslikes	Forbs	Woody plants and trees
		Lb/acre	Pct	Pct	Pct
1-----Anclote	Favorable	6,000	85	15	(*)
	Normal	5,000			
	Unfavorable	3,000			
2-----Ankona	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
7-----Astatula	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
8-----Basinger	Favorable	6,000	85	15	(*)
	Normal	5,000			
	Unfavorable	3,000			
11-----Chobee	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
12-----Electra	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
13-----Floridana	Favorable	10,000	80	15	5
	Normal	8,500			
	Unfavorable	4,000			
14-----Fluvaquents	Favorable	10,000	80	5	15
	Normal	8,000			
	Unfavorable	4,500			
15-----Hallandale	Favorable	4,000	75	10	15
	Normal	3,000			
	Unfavorable	2,000			
16-----Hilolo	Favorable	4,000	55	20	25
	Normal	3,000			
	Unfavorable	2,000			
17-----Hobe	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
18-----Hontoon	Favorable	10,000	80	15	5
	Normal	8,000			
	Unfavorable	4,000			
19-----Jonathan	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
21-----Lawnwood	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
23-----Malabar	Favorable	7,000	70	15	15
	Normal	5,000			
	Unfavorable	3,000			
24-----Myakka	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
25-----Nettles	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			

See footnote at end of table.

TABLE 7.--POTENTIAL PRODUCTION AND COMPOSITION OF LIVESTOCK FORAGE

Soil name and map symbol	Potential production		Composition of forage		
	Kind of year	Dry weight	Grass and grasslikes	Forbs	Woody plants and trees
		Lb/acre	Pct	Pct	Pct
26. Oldsmar	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
28. Paola	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
29. Pendarvis	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
31. Pepper	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
32. Pineda	Favorable	6,000	85	15	(*)
	Normal	4,500			
	Unfavorable	3,000			
34. Pompano	Favorable	6,000	85	15	(*)
	Normal	4,500			
	Unfavorable	3,000			
36. Pople	Favorable	6,000	70	15	15
	Normal	4,500			
	Unfavorable	3,000			
37. Riviera	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
38. Riviera	Favorable	7,000	70	20	15
	Normal	5,000			
	Unfavorable	3,000			
39. Salerno	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
40. Samsula Variant-Myakka Variant	Favorable	10,000	80	15	5
	Normal	8,500			
	Unfavorable	4,000			
41. Satellite	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
42. St. Lucie	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
43. Susanna	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
44. Tantile	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
48. Wabasso	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
49. Wabasso Variant	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			

See footnote at end of table.

TABLE 7.--POTENTIAL PRODUCTION AND COMPOSITION OF LIVESTOCK FORAGE

Soil name and map symbol	Potential production		Composition of forage		
	Kind of year	Dry weight	Grass and grasslikes	Forbs	Woody plants and trees
		Lb/acre	Pct	Pct	Pct
50:					
Waveland	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
Lawnwood	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
51:					
Waveland	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
Lawnwood	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
53 Welaka Variant	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
54 Winder	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
55 Winder	Favorable	4,000	55	20	25
	Normal	3,000			
	Unfavorable	2,000			
56 Winder Variant	Favorable	4,000	55	20	25
	Normal	3,000			
	Unfavorable	2,000			

*Trace.

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. Site index was calculated at age 25 for south Florida slash pine and at age 50 for all other species]

Soil name and map symbol	Ordination symbol	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
1------------------ Anclote	2w	Severe	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	75 70 50	Slash pine, south Florida slash pine.
2------------------ Ankona	4w	Moderate	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	60 55 40	Slash pine, south Florida slash pine.
7------------------ Astatula	5s	Severe	Moderate	Slight	Slight	Sand pine-----------	50	Sand pine.
8------------------ Basinger	4w	Severe	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	60 55 40	Slash pine, south Florida slash pine.
10----------------- Canaveral	4s	Severe	Severe	Slight	Moderate	Sand pine----------- Slash pine----------	55 55	Slash pine, sand pine, south Florida slash pine.
11----------------- Chobee	2w	Severe	Moderate	Slight	Severe	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	75 65 50	Slash pine, south Florida slash pine.
12----------------- Electra	4s	Moderate	Severe	Slight	Slight	Slash pine---------- Sand pine----------- Longleaf pine-------	55 55 50	Slash pine, sand pine, south Florida slash pine.
13----------------- Floridana	2w	Severe	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	75 70 50	Slash pine, south Florida slash pine.
16----------------- Hilolo	3w	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	75 65 50	Slash pine, south Florida slash pine.
17----------------- Hobe	5s	Moderate	Severe	Slight	Slight	Sand pine-----------	50	Sand pine.
19----------------- Jonathan	5s	Moderate	Severe	Slight	Slight	Sand pine-----------	50	Sand pine.
20----------------- Kaliga	4w	Severe	Severe	Moderate	Severe	Sweetgum------------ Baldcypress--------- Red maple----------- Pond pine-----------	70 --- --- ---	
21----------------- Lawnwood	4w	Moderate	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	60 55 40	Slash pine, south Florida slash pine.
23----------------- Malabar	3w	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine---------------	70 65 45	Slash pine, south Florida slash pine.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
24 Myakka	4w	Moderate	Moderate	Moderate	Moderate	Slash pine Longleaf pine South Florida slash pine	60 55 40	Slash pine, south Florida slash pine.
25 Nettles	3w	Moderate	Moderate	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine	70 65 45	Slash pine, south Florida slash pine.
26 Oldsmar	4w	Severe	Severe	Severe	Severe	South Florida slash pine	40	South Florida slash pine.
28 Paola	5s	Moderate	Severe	Slight	Slight	Sand pine	50	Sand pine.
29 Pendarvis	4s	Moderate	Severe	Slight	Moderate	Slash pine Sand pine	55 55	Slash pine, sand pine, south Florida slash pine.
31 Pepper	3w	Moderate	Moderate	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine	70 65 40	Slash pine, south Florida slash pine.
32 Pineda	3w	Moderate	Severe	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine	70 65 45	Slash pine, south Florida slash pine.
34 Pompano	4w	Severe	Severe	Slight	Moderate	Slash pine South Florida slash pine	60 40	Slash pine, south Florida slash pine.
36 Pople	3w	Moderate	Severe	Slight	Moderate	Slash pine Longleaf pine	70 65	Slash pine, south Florida slash pine.
37 Riviera	4w	Severe	Severe	Severe	Severe	South Florida slash pine	40	South Florida slash pine.
38 Riviera	3w	Moderate	Moderate	Moderate	Moderate	Slash pine Longleaf pine South Florida slash pine	70 65 45	Slash pine, south Florida slash pine.
39 Salerno	4w	Moderate	Moderate	Moderate	Moderate	Slash pine Longleaf pine South Florida slash pine	60 55 40	Slash pine, south Florida slash pine.
41 Satellite	4s	Moderate	Severe	Slight	Moderate	Slash pine Longleaf pine Sand pine	60 55 55	Slash pine, sand pine, south Florida slash pine.
42 St. Lucie	5s	Severe	Moderate	Slight	Slight	Sand pine	50	Sand pine.
43 Susanna	3w	Moderate	Moderate	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine	70 65 45	Slash pine, south Florida slash pine.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
44 Tantile	3w	Moderate	Moderate	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine	80 65 45	Slash pine, south Florida slash pine.
48 Wabasso	3w	Moderate	Moderate	Moderate	Moderate	Slash pine Longleaf pine South Florida slash pine	70 65 45	Slash pine, south Florida slash pine.
49 Wabasso Variant	3w	Moderate	Moderate	Slight	Moderate	Slash pine Longleaf pine South Florida slash pine	70 65 45	Slash pine, south Florida slash pine.
50 Waveland	4w	Moderate	Moderate	Moderate	Moderate	Slash pine South Florida slash pine	60 40	Slash pine, south Florida slash pine.
51*:								
Waveland	4w	Severe	Severe	Severe	Severe	Slash pine South Florida slash pine	60 40	Slash pine, south Florida slash pine.
Lawnwood	4w	Severe	Severe	Severe	Severe	South Florida slash pine	40	South Florida slash pine.
53 Welaka Variant	4s	Moderate	Severe	Slight	Moderate	Sand pine	55	Sand pine.
54 Winder	4w	Severe	Severe	Severe	Severe	Slash pine South Florida slash pine	60 40	Slash pine, south Florida slash pine.
56 Winder Variant	2w	Moderate	Moderate	Slight	Moderate	South Florida slash pine	50	Slash pine, south Florida slash pine.

TABLE 9.--RECREATIONAL 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]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1 Anclote	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
2 Ankona	Severe: wetness, percs slowly.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: too sandy, wetness.
3*:					
Ankona	Severe: wetness, percs slowly.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: too sandy, wetness.
Urban land.					
4*, 5*, 6*. Arents					
7 Astatula	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
8 Basinger	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.
9*. Beaches					
10 Canaveral	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: too sandy.
11 Chobee	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
12 Electra	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
13 Floridana	Severe: wetness, percs slowly, ponding.	Severe: wetness, ponding.	Severe: wetness, percs slowly, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
14*. Fluvaquents					
15 Hallandale	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: depth to rock, wetness.	Severe: wetness, too sandy.	Severe: too sandy, wetness.
16 Hilolo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
17 Hobe	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
18 Hontoon	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.
19 Jonathan	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
20 Kaliga	Severe: wetness, excess humus, percs slowly.	Severe: wetness, excess humus.	Severe: excess humus, wetness, percs slowly.	Severe: wetness, excess humus.	Severe: excess humus, wetness.
21 Lawnwood	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
22*:					
Lawnwood	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
Urban land.					
23 Malabar	Severe: wetness, too sandy.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, too sandy.
24 Myakka	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
25 Nettles	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, cemented pan.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
26 Oldsmar	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: too sandy, ponding, wetness.	Severe: too sandy, ponding, wetness.	Severe: too sandy, ponding, wetness.
27 Palm Beach	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
28 Paola	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, soil blowing.	Severe: too sandy.	Severe: too sandy.
29 Pendarvis	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
30*:					
Pendarvis	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Urban land.					
31 Pepper	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, cemented pan.	Severe: wetness, too sandy.	Severe: too sandy, wetness.
32 Pineda	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
33*. Pits					
34 Pompano	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
35*:					
Pompano Variant	Severe: floods, wetness, too sandy.	Severe: floods, wetness, too sandy.	Severe: too sandy, wetness, floods.	Severe: wetness, too sandy, floods.	Severe: too sandy, excess salt, floods.
Kaliga Variant	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus, floods.	Severe: too sandy, excess salt, floods.
36 Pople	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
37 Riviera	Severe: ponding, wetness, percs slowly.	Severe: ponding, wetness, too sandy.	Severe: wetness, ponding, percs slowly.	Severe: ponding, wetness, too sandy.	Severe: ponding, wetness, too sandy.
38 Riviera	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
39 Salerno	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.
40*:					
Samsula Variant	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.
Myakka Variant	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.
41 Satellite	Severe: too sandy, wetness.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: too sandy.
42 St. Lucie	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
43 Susanna	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, cemented pan.	Severe: wetness, too sandy.	Severe: too sandy, wetness.
44 Tantile	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, cemented pan.	Severe: wetness, too sandy.	Severe: too sandy, wetness.
45 Terra Ceia	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.
46 Turnbull Variant	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: excess salt, floods, wetness.
47*. Urban land					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
48-------------------- Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
49-------------------- Wabasso Variant	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
50-------------------- Waveland	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
51*:					
Waveland-------------	Severe: wetness, ponding, too sandy.	Severe: wetness, ponding, too sandy.	Severe: wetness, ponding, too sandy.	Severe: wetness, ponding, too sandy.	Severe: wetness, ponding, too sandy.
Lawnwood-------------	Severe: wetness, ponding, too sandy.	Severe: wetness, ponding, too sandy.	Severe: wetness, ponding, too sandy.	Severe: wetness, ponding, too sandy.	Severe: wetness, ponding, too sandy.
52*:					
Waveland-------------	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
Urban land.					
53-------------------- Welaka Variant	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, soil blowing.	Severe: too sandy.	Severe: too sandy.
54-------------------- Winder	Severe: wetness, percs slowly, ponding.	Severe: ponding, wetness.	Severe: wetness, percs slowly, ponding.	Severe: ponding, wetness.	Severe: ponding, wetness.
55-------------------- Winder	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
56-------------------- Winder Variant	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1----------------- Anclote	Very poor	Poor	Poor	Fair	Poor	---	Good	Good	Poor	Fair	Good	Poor.
2----------------- Ankona	Poor	Fair	Fair	Poor	Fair	---	Poor	Poor	Fair	Fair	Poor	Fair.
3*:												
Ankona------------	Poor	Fair	Fair	Poor	Fair	---	Poor	Poor	Fair	Fair	Poor	Fair.
Urban land.												
4*, 5*, 6*. Arents												
7----------------- Astatula	Poor	Poor	Poor	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
8----------------- Basinger	Poor	Poor	Fair	Poor	Poor	---	Good	Fair	Poor	Poor	Fair	Fair.
9*. Beaches												
10---------------- Canaveral	Poor	Poor	Fair	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
11---------------- Chobee	Poor	Poor	Poor	Fair	Poor	---	Good	Good	Poor	Poor	Good	Poor.
12---------------- Electra	Poor	Poor	Fair	Poor	Poor	---	Poor	Poor	Poor	Poor	Poor	Poor.
13---------------- Floridana	Poor	Poor	Fair	Poor	Poor	---	Good	Fair	Poor	Poor	Fair	Poor.
14*. Fluvaquents												
15---------------- Hallandale	Poor	Poor	Poor	Poor	Poor	---	Fair	Good	Poor	Poor	Fair	Fair.
16---------------- Hilolo	Poor	Fair	Fair	Fair	Poor	---	Good	Good	Fair	Fair	Good	Fair.
17---------------- Hobe	Poor	Poor	Poor	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
18---------------- Hontoon	Very poor	Very poor	Poor	Fair	Very poor	---	Good	Good	Very poor	Fair	Good	Poor.
19---------------- Jonathan	Poor	Poor	Poor	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
20---------------- Kaliga	Very poor	Poor	Poor	Fair	Poor	---	Good	Good	Poor	Poor	Good	Poor.
21---------------- Lawnwood	Poor	Fair	Fair	Poor	Fair	---	Fair	Poor	Fair	Fair	Poor	Fair.
22*:												
Lawnwood----------	Poor	Fair	Fair	Poor	Fair	---	Fair	Poor	Fair	Fair	Poor	Fair.
Urban land.												

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
23: Malabar	Poor	Poor	Poor	Poor	Poor	---	Fair	Fair	Poor	Poor	Fair	Fair.
24: Myakka	Poor	Fair	Good	Poor	Fair	---	Fair	Poor	Fair	Fair	Poor	Fair.
25: Nettles	Poor	Fair	Fair	Poor	Fair	---	Poor	Poor	Fair	Fair	Poor	Fair.
26: Oldsmar	Very poor	Very poor	Very poor	Very poor	Very poor	---	Good	Good	Very poor	Very poor	Good	Fair.
27: Palm Beach	Poor	Poor	Poor	Very poor	Very poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
28: Paola	Poor	Poor	Fair	Very poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
29: Pendarvis	Poor	Poor	Poor	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
30*:												
Pendarvis	Poor	Poor	Poor	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
Urban land.												
31: Pepper	Poor	Fair	Fair	Poor	Fair	---	Poor	Poor	Fair	Fair	Poor	Fair.
32: Pineda	Poor	Fair	Fair	Poor	Poor	---	Good	Fair	Fair	Poor	Fair	Fair.
33*. Pits												
34: Pompano	Poor	Fair	Poor	Poor	Poor	---	Fair	Fair	Poor	Poor	Fair	Fair.
35*:												
Pompano Variant	Very poor	Very poor	Very poor	Very poor	Very poor	---	Poor	Good	Very poor	Very poor	Fair	Very poor.
Kaliga Variant	Very poor	Very poor	Very poor	Very poor	Very poor	---	Poor	Good	Very poor	Very poor	Fair	Very poor.
36: Pople	Poor	Fair	Fair	Poor	Poor	---	Good	Fair	Fair	Poor	Fair	Fair.
37: Riviera	Very poor	Poor	Very poor	Very poor	Very poor	---	Good	Good	Very poor	Very poor	Good	Very poor.
38: Riviera	Poor	Fair	Fair	Fair	Fair	---	Poor	Fair	Fair	Fair	Fair	Fair.
39: Salerno	Poor	Fair	Good	Poor	Fair	---	Fair	Poor	Fair	Fair	Poor	Fair.
40*:												
Samsula Variant	Very poor	Very poor	Poor	Fair	Very poor	---	Good	Good	Very poor	Very poor	Good	Very poor.
Myakka Variant	Very poor	Poor	Poor	Very poor	Very poor	---	Good	Good	Poor	Very poor	Good	Poor.
41: Satellite	Very poor	Poor	Poor	Poor	Poor	---	Poor	Very poor	Poor	Poor	Very poor	Poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
42----------------- St. Lucie	Poor	Poor	Fair	Very poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
43----------------- Susanna	Poor	Fair	Fair	Poor	Fair	---	Poor	Poor	Fair	Fair	Poor	Fair.
44----------------- Tantile	Poor	Fair	Fair	Poor	Fair	---	Poor	Poor	Fair	Fair	Poor	Fair.
45----------------- Terra Ceia	Very poor	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good	Poor.
46----------------- Turnbull Variant	Very poor	Very poor	Very poor	Very poor	Very poor	---	Poor	Good	Very poor	Very poor	Fair	Very poor.
47*. Urban land												
48----------------- Wabasso	Poor	Poor	Poor	Poor	Good	---	Fair	Poor	Poor	Fair	Poor	Fair.
49----------------- Wabasso Variant	Poor	Poor	Poor	Poor	Good	---	Fair	Poor	Poor	Fair	Poor	Fair.
50----------------- Waveland	Poor	Fair	Fair	Poor	Fair	---	Fair	Poor	Fair	Fair	Poor	Fair.
51*: Waveland-----------	Very poor	Very poor	Very poor	Very poor	Very poor	---	Fair	Good	Very poor	Very poor	Good	Very poor.
Lawnwood-----------	Very poor	Very poor	Very poor	Very poor	Very poor	---	Fair	Good	Very poor	Very poor	Good	Very poor.
52*: Waveland-----------	Poor	Fair	Fair	Poor	Fair	---	Fair	Poor	Fair	Fair	Poor	Fair.
Urban land.												
53----------------- Welaka Variant	Poor	Poor	Fair	Very poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	Poor.
54----------------- Winder	Very poor	Very poor	Very poor	Very poor	Very poor	---	Good	Good	Very poor	Very poor	Good	Very poor.
55----------------- Winder	Poor	Fair	Fair	Fair	Fair	---	Fair	Fair	Fair	Fair	Fair	Fair.
56----------------- Winder Variant	Fair	Fair	Fair	Fair	Fair	---	Good	Fair	Fair	Fair	Fair	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]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1. Anclote	Severe: wetness, cutbanks cave, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
2. Ankona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3*:					
Ankona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.					
4*, 5*, 6*. Arents					
7. Astatula	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
8. Basinger	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
9*. Beaches					
10. Canaveral	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
11. Chobee	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
12. Electra	Severe: cutbanks cave, wetness.	Slight	Severe: wetness.	Slight	Moderate: wetness.
13. Floridana	Severe: cutbanks cave, wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
14*. Fluvaquents					
15. Hallandale	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.
16. Hilolo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
17. Hobe	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
18. Hontoon	Severe: excess humus, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, wetness, low strength.	Severe: excess humus, low strength, wetness.
19. Jonathan	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
20 Kaliga	Severe: too clayey, wetness.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: low strength, wetness.
21 Lawnwood	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
22*:					
Lawnwood	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.					
23 Malabar	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
24 Myakka	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
25 Nettles	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
26 Oldsmar	Severe: cutbanks cave, wetness, ponding.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.
27 Palm Beach	Severe:	Slight	Slight	Slight	Slight.
28 Paola	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
29 Pendarvis	Severe: cutbanks cave.	Moderate: wetness.	Moderate: wetness, cemented pan.	Moderate: wetness, slope.	Moderate: wetness.
30*:					
Pendarvis	Severe: cutbanks cave.	Moderate: wetness.	Moderate: wetness, cemented pan.	Moderate: wetness, slope.	Moderate: wetness.
Urban land.					
31 Pepper	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
32 Pineda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
33*. Pits					
34 Pompano	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
35*:					
Pompano Variant	Severe: cutbanks cave, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
35*: Kaliga Variant	Severe: excess humus, wetness, floods.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: low strength, wetness, floods.
36 Pople	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
37 Riviera	Severe: wetness, cutbanks cave, ponding.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.
38 Riviera	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
39 Salerno	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
40*: Samsula Variant	Severe: excess humus, wetness, cutbanks cave.	Severe: excess humus, low strength, wetness.	Severe: excess humus, wetness, low strength.	Severe: excess humus, wetness, low strength.	Severe: excess humus, wetness, low strength.
Myakka Variant	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: excess humus, wetness.
41 Satellite	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
42 St. Lucie	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
43 Susanna	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
44 Tantile	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
45 Terra Ceia	Severe: excess humus, wetness, floods.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: low strength, wetness, floods.
46 Turnbull Variant	Severe: wetness, floods.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: low strength, wetness, floods.
47*. Urban land					
48 Wabasso	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
49 Wabasso Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
50 Waveland	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
51*:					
Waveland	Severe: cutbanks cave, wetness, ponding.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.
Lawnwood	Severe: cutbanks cave, wetness, ponding.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.
52*:					
Waveland	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.					
53 Welaka Variant	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
54 Winder	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.
55 Winder	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
56 Winder Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: 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," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 Anclote	Severe: wetness, ponding.	Severe: wetness, seepage, ponding.	Severe: wetness, seepage, ponding.	Severe: wetness, seepage, ponding.	Poor: wetness, seepage, too sandy.
2 Ankona	Severe: wetness, percs slowly, cemented pan.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness.
3*:					
Ankona	Severe: wetness, percs slowly, cemented pan.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness.
Urban land.					
4*, 5*, 6*. Arents					
7 Astatula	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
8 Basinger	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: too sandy, seepage, wetness.
9*. Beaches					
10 Canaveral	Severe: wetness.	Severe: seepage, slope.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, seepage.
11 Chobee	Severe: wetness, percs slowly, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Poor: wetness.
12 Electra	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, too sandy, seepage.	Severe: seepage, wetness.	Poor: too sandy.
13 Floridana	Severe: wetness, percs slowly.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, too sandy.
14*. Fluvaquents					
15 Hallandale	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
16 Hilolo	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
17 Hobe	Moderate: wetness.	Severe: seepage.	Severe: wetness, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
18 Hontoon	Severe: wetness.	Severe: excess humus, seepage, wetness.	Severe: excess humus, seepage, wetness.	Severe: wetness, seepage.	Poor: excess humus, seepage, wetness.
19 Jonathan	Severe: wetness.	Severe: seepage.	Severe: cemented pan, wetness, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
20 Kaliga	Severe: wetness, percs slowly.	Severe: seepage, excess humus, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
21 Lawnwood	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness, seepage.
22*:					
Lawnwood	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness, seepage.
Urban land.					
23 Malabar	Severe: wetness, percs slowly.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness.
24 Myakka	Severe: wetness.	Severe: seepage, wetness.	Severe: too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
25 Nettles	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness, seepage.
26 Oldsmar	Severe: percs slowly, ponding, wetness.	Severe: seepage, ponding.	Severe: wetness, ponding, seepage.	Severe: seepage, ponding.	Poor: too sandy, wetness.
27 Palm Beach	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, too sandy.
28 Paola	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
29 Pendarvis	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, too sandy.	Moderate: wetness.	Poor: too sandy.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
30*:					
Pendarvis	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, too sandy.	Moderate: wetness.	Poor: too sandy.
Urban land.					
31 Pepper	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
32 Pineda	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: wetness.
33*. Pits					
34 Pompano	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, seepage, too sandy.
35*:					
Pompano Variant	Severe: floods, wetness.	Severe: seepage, floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: too sandy, wetness, seepage.
Kaliga Variant	Severe: floods, wetness, percs slowly.	Severe: seepage, floods, excess humus.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: wetness, excess humus.
36 Pople	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
37 Riviera	Severe: ponding, wetness, percs slowly.	Severe: seepage, ponding, wetness.	Severe: seepage, ponding, wetness.	Severe: seepage, ponding, wetness.	Poor: wetness, too sandy.
38 Riviera	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, too sandy.
39 Salerno	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: too sandy, wetness, seepage.
40*:					
Samsula Variant	Severe: wetness, subsides.	Severe: excess humus, seepage, wetness.	Severe: excess humus, seepage, wetness.	Severe: wetness, seepage.	Poor: excess humus, seepage, wetness.
Myakka Variant	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: seepage, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
41------------------ Satellite	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: seepage, wetness.	Poor: seepage, wetness, too sandy.
42------------------ St. Lucie	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
43------------------ Susanna	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: too sandy, wetness.
44------------------ Tantile	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness, seepage.
45------------------ Terra Ceia	Severe: wetness, floods.	Severe: seepage, floods, excess humus.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: excess humus, wetness.
46------------------ Turnbull Variant	Severe: floods, wetness, large stones.	Severe: seepage, floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: wetness.
47*. Urban land					
48------------------ Wabasso	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: too sandy, seepage, wetness.	Severe: wetness.	Poor: too sandy, wetness.
49------------------ Wabasso Variant	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: too sandy, wetness.
50------------------ Waveland	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: too sandy, wetness.
51*:					
Waveland-----------	Severe: ponding, cemented pan, wetness.	Severe: seepage, ponding, wetness.	Severe: ponding, seepage, wetness.	Severe: ponding, seepage, wetness.	Poor: too sandy, wetness.
Lawnwood-----------	Severe: ponding, cemented pan, wetness.	Severe: seepage, ponding, wetness.	Severe: seepage, wetness, too sandy.	Severe: ponding, wetness.	Poor: too sandy, wetness, seepage.
52*:					
Waveland-----------	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: too sandy, wetness.
Urban land.					
53------------------ Welaka Variant	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
54*: Winder	Severe. ponding, wetness, percs slowly.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: floods, wetness.	Poor: wetness.
55: Winder	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: floods, wetness.	Poor: wetness.
56: Winder Variant	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

* 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 "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1 Anclote	Poor: wetness, area reclaim.	Fair: excess humus.	Unsuited: excess fines.	Poor: wetness.
2 Ankona	Poor: wetness.	Fair: excess fines.	Unsuited	Poor: too sandy, wetness.
3*:				
Ankona	Poor: wetness.	Fair: excess fines.	Unsuited	Poor: too sandy, wetness.
Urban land.				
4*, 5*, 6*. Arents				
7 Astatula	Good	Good	Unsuited: excess fines.	Poor: too sandy.
8 Basinger	Poor: wetness.	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy, wetness.
9*. Beaches				
10 Canaveral	Fair: wetness.	Good	Unsuited	Poor: too sandy.
11 Chobee	Poor: wetness.	Unsuited	Unsuited	Poor: thin layer, wetness.
12 Electra	Fair: wetness.	Good	Unsuited: excess fines.	Poor: too sandy.
13 Floridana	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
14*. Fluvaquents				
15 Hallandale	Poor: wetness, thin layer.	Poor	Unsuited	Poor: too sandy, wetness.
16 Hilolo	Poor: wetness.	Poor: excess fines.	Unsuited	Poor: wetness.
17 Hobe	Good	Good	Unsuited	Poor: too sandy.
18 Hontoon	Poor: excess humus, low strength, wetness.	Unsuited	Unsuited	Poor: wetness.
19 Jonathan	Good	Good	Unsuited	Poor: too sandy.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
20 Kaliga	Poor: low strength, wetness, shrink-swell.	Poor: excess fines, excess humus.	Unsuited	Poor: excess humus, wetness.
21 Lawnwood	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
22*:				
Lawnwood	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
Urban land.				
23 Malabar	Poor: wetness.	Fair: excess fines.	Unsuited	Poor: wetness, too sandy.
24 Myakka	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
25 Nettles	Poor: wetness.	Fair: excess fines.	Unsuited	Poor: too sandy, wetness.
26 Oldsmar	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
27 Palm Beach	Good	Good	Unsuited	Poor: too sandy.
28 Paola	Good	Good	Unsuited	Poor: too sandy.
29 Pendarvis	Fair: wetness.	Good	Unsuited	Poor: too sandy.
30*:				
Pendarvis	Fair: wetness.	Good	Unsuited	Poor: too sandy.
Urban land.				
31 Pepper	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
32 Pineda	Poor: wetness.	Good	Unsuited: excess fines.	Poor: too sandy, wetness.
33*. Pits				
34 Pompano	Poor: wetness.	Good	Unsuited	Poor: too sandy, wetness.
35*:				
Pompano Variant	Poor: wetness.	Good	Unsuited	Poor: too sandy, excess salt, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
35*:				
Kaliga Variant	Poor: low strength, wetness.	Poor: excess humus.	Unsuited	Poor: excess humus.
36 Pople	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
37, 38 Riviera	Poor: wetness, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy, wetness.
39 Salerno	Poor: wetness.	Good	Unsuited	Poor: too sandy, wetness.
40*:				
Samsula Variant	Poor: excess humus, low strength, wetness.	Unsuited	Unsuited	Poor: wetness.
Myakka Variant	Poor: wetness.	Poor: excess fines.	Unsuited	Poor: wetness, excess humus.
41 Satellite	Fair: wetness.	Good	Unsuited	Poor: too sandy.
42 St. Lucie	Good	Good	Unsuited	Poor: too sandy.
43 Susanna	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
44 Tantile	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
45 Terra Ceia	Poor: wetness, low strength.	Unsuited	Unsuited	Poor: wetness, excess humus.
46 Turnbull Variant	Poor: low strength, wetness, shrink-swell.	Poor: excess fines.	Unsuited	Poor: excess salt, wetness.
47*. Urban land				
48 Wabasso	Poor: wetness.	Poor: excess fines.	Unsuited	Poor: too sandy, wetness.
49 Wabasso Variant	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
50 Waveland	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
51*:				
Waveland	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
Lawnwood	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
52*:				
Waveland	Poor: wetness.	Poor: thin layer.	Unsuited	Poor: too sandy, wetness.
Urban land.				
53 Welaka Variant	Good	Good	Unsuited	Poor: too sandy.
54, 55 Winder	Poor: wetness.	Poor: excess fines.	Unsuited	Poor: thin layer, wetness.
56 Winder Variant	Poor: wetness.	Poor: excess fines.	Poor: excess fines.	Poor: too sandy, 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. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1 Anclote	Piping, seepage.	Favorable	Wetness, poor outlets.	Wetness	Not needed	Not needed.
2 Ankona	Seepage, piping, wetness.	Slow refill	Percs slowly	Wetness, fast intake, percs slowly.	Not needed	Not needed.
3*:						
Ankona	Seepage, piping, wetness.	Slow refill	Percs slowly	Wetness, fast intake, percs slowly.	Not needed	Not needed.
Urban land.						
4*, 5*, 6*. Arents						
7 Astatula	Seepage, unstable fill, piping.	No water	Not needed	Droughty, fast intake, seepage.	Too sandy, soil blowing.	Droughty.
8 Basinger	Seepage, piping, wetness.	Favorable	Cutbanks cave	Wetness, droughty, fast intake.	Not needed	Wetness.
9*. Beaches						
10 Canaveral	Seepage, piping.	Deep to water	Favorable	Droughty, fast intake, wetness.	Too sandy, soil blowing.	Wetness, droughty.
11 Chobee	Wetness	Slow refill	Poor outlets, percs slowly.	Wetness	Not needed	Wetness.
12 Electra	Seepage, piping.	Deep to water	Cutbanks cave	Wetness, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
13 Floridana	Wetness	----------------	Cutbanks cave, percs slowly.	Wetness, fast intake, percs slowly.	Not needed	Not needed.
14*. Fluvaquents						
15 Hallandale	Unstable fill, seepage, piping.	Large stones	Depth to rock, floods, wetness.	Rooting depth, wetness.	Not needed	Not needed.
16 Hilolo	Wetness	Slow refill	Favorable	Wetness, soil blowing, fast intake.	Not needed	Wetness.
17 Hobe	Seepage, piping.	No water	Not needed	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
18 Hontoon	Compressible, low strength, excess humus.	Favorable	Excess humus, poor outlets, wetness.	Favorable	Not needed	Not needed.
19 Jonathan	Seepage, piping.	No water	Not needed	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
20----------------- Kaliga	Excess humus, wetness.	Slow refill----	Percs slowly, excess humus.	Wetness--------	Not needed-----	Not needed.
21----------------- Lawnwood	Seepage, wetness.	Slow refill----	Percs slowly, cemented pan.	Wetness, droughty, fast intake.	Not needed-----	Wetness, droughty, cemented pan.
22*:						
Lawnwood---------	Seepage, wetness.	Slow refill----	Percs slowly, cemented pan.	Wetness, droughty, fast intake.	Not needed-----	Wetness, droughty, cemented pan.
Urban land.						
23----------------- Malabar	Seepage, piping, wetness.	Favorable------	Cutbanks cave, wetness.	Wetness--------	Not needed-----	Wetness.
24----------------- Myakka	Seepage, piping, wetness.	Deep to water	Cutbanks cave, wetness.	Wetness, droughty.	Not needed-----	Not needed.
25----------------- Nettles	Seepage, piping, wetness.	Slow refill----	Percs slowly, cemented pan.	Droughty, fast intake.	Not needed-----	Wetness, droughty, cemented pan.
26----------------- Oldsmar	Seepage, piping, wetness.	Favorable------	Cutbanks cave, poor outlets.	Ponding, wetness, droughty.	Not needed-----	Not needed.
27----------------- Palm Beach	Seepage, unstable fill, piping.	No water-------	Not needed-----	Droughty, fast intake.	Too sandy, soil blowing.	Not needed.
28----------------- Paola	Seepage, piping.	No water-------	Not needed-----	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Not needed.
29----------------- Pendarvis	Seepage, piping.	Deep to water	Cemented pan---	Wetness, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
30*:						
Pendarvis--------	Seepage, piping.	Deep to water	Cemented pan---	Wetness, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
Urban land.						
31----------------- Pepper	Seepage, wetness.	Slow refill----	Percs slowly, cemented pan.	Wetness, droughty, fast intake.	Not needed-----	Wetness, droughty, rooting depth.
32----------------- Pineda	Seepage, wetness.	Slow refill----	Percs slowly---	Wetness, fast intake, percs slowly.	Not needed-----	Wetness.
33*. Pits						
34----------------- Pompano	Seepage, piping.	Favorable------	Wetness, cutbanks cave.	Wetness--------	Not needed-----	Wetness.
35*:						
Pompano Variant--	Seepage, piping, wetness.	Salty water----	Floods, excess salt.	Wetness, floods, excess salt.	Not needed-----	Wetness, excess salt.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
35*:						
Kaliga Variant	Excess humus, wetness.	Salty water	Floods, excess humus, excess salt.	Wetness, floods, excess salt.	Not needed	Wetness, excess salt.
36 Pople	Seepage, wetness.	Slow refill	Percs slowly	Wetness, fast intake, percs slowly.	Not needed	Wetness.
37 Riviera	Favorable	Favorable	Poor outlets, cutbanks cave, ponding.	Ponding, wetness, percs slowly.	Not needed	Ponding, wetness.
38 Riviera	Favorable	Favorable	Percs slowly	Wetness, fast intake, percs slowly.	Not needed	Wetness.
39 Salerno	Seepage, piping, wetness.	Slow refill	Favorable	Wetness, droughty, fast intake.	Not needed	Wetness, droughty.
40*:						
Samsula Variant	Seepage, excess humus, wetness.	Favorable	Excess humus	Wetness, excess humus.	Not needed	Not needed.
Myakka Variant	Seepage	Favorable	Excess humus	Wetness, fast intake.	Not needed	Wetness.
41 Satellite	Seepage, piping.	Deep to water	Cutbanks cave	Droughty, fast intake, wetness.	Not needed	Droughty.
42 St. Lucie	Seepage, piping.	No water	Not needed	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
43 Susanna	Thin layer, wetness.	Slow refill	Percs slowly, cemented pan.	Wetness, droughty, fast intake.	Not needed	Wetness, droughty, rooting depth.
44 Tantile	Seepage, piping, wetness.	Slow refill	Percs slowly, cemented pan.	Wetness, droughty, fast intake.	Not needed	Wetness, droughty, rooting depth.
45 Terra Ceia	Excess humus, seepage, wetness.	Favorable	Floods, excess humus.	Wetness, floods.	Not needed	Not needed.
46 Turnbull Variant	Wetness, excess salt.	Slow refill, salty water.	Percs slowly, floods, excess salt.	Wetness, percs slowly, floods.	Not needed	Wetness, excess salt, percs slowly.
47*. Urban land						
48 Wabasso	Seepage, wetness.	Deep to water	Percs slowly	Wetness	Not needed	Not needed.
49 Wabasso Variant	Wetness	Slow refill	Favorable	Wetness, droughty, fast intake.	Not needed	Wetness, droughty.
50 Waveland	Seepage, piping, wetness.	Slow refill	Percs slowly, cemented pan.	Wetness, droughty, fast intake.	Not needed	Wetness, droughty, cemented pan.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
51*:						
Waveland	Seepage, piping, wetness.	Slow refill	Percs slowly, cemented pan, ponding.	Wetness, ponding, droughty.	Not needed	Wetness, droughty, cemented pan.
Lawnwood	Seepage, wetness.	Favorable	Percs slowly, cemented pan, ponding.	Wetness, ponding, droughty.	Not needed	Wetness, droughty, cemented pan.
52*:						
Waveland	Seepage, piping, wetness.	Slow refill	Percs slowly, cemented pan.	Wetness, droughty, fast intake.	Not needed	Wetness, droughty, cemented pan.
Urban land.						
53 Welaka Variant	Seepage, piping.	No water	Not needed	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
54 Winder	Favorable	Favorable	Wetness, poor outlets, ponding.	Ponding, percs slowly.	Not needed	Not needed.
55 Winder	Favorable	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Not needed	Not needed.
56 Winder Variant	Wetness	Slow refill	Favorable	Wetness, fast intake, soil blowing.	Not needed	Wetness.

* 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]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
1------------------ Anclote	0-21	Sand------------	SP, SP-SM	A-3, A-2-4	0	100	95-100	85-100	2-12	---	NP
	21-80	Sand, fine sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	95-100	85-100	2-20	---	NP
2------------------ Ankona	0-38	Sand------------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	38-48	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	75-95	5-25	---	NP
	48-57	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-95	20-35	25-40	4-18
	57-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
3*:											
Ankona------------	0-38	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	38-48	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
	48-57	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-95	20-35	25-40	4-18
	57-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
Urban land.											
4*, 5*, 6*. Arents											
7------------------ Astatula	0-99	Sand------------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
8------------------ Basinger	0-80	Sand------------	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
9*. Beaches											
10----------------- Canaveral	0-6	Fine sand--------	SP	A-3	0	100	100	90-100	1-4	---	NP
	6-80	Fine sand, sand, coarse sand.	SP	A-3	0	70-100	70-95	65-90	1-3	---	NP
11----------------- Chobee	0-11	Loamy sand-------	SM, SM-SC	A-2-4	0	100	100	85-99	12-25	<30	NP-10
	11-80	Sandy clay loam	SC	A-2-6, A-2-7, A-6, A-7	0	100	100	85-99	25-45	35-45	20-25
12----------------- Electra	0-7	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	75-99	3-10	---	NP
	7-47	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	75-99	3-10	---	NP
	47-60	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-99	8-15	---	NP
	60-80	Sandy clay loam, sandy clay, fine sandy loam.	SC, SM-SC, SM	A-2, A-4, A-6, A-2-4	0	100	90-100	75-99	13-45	<40	NP-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
13----------------- Floridana	0-21	Sand------------	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	21-25	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	25-81	Sandy loam, sandy clay loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	85-95	13-35	<30	NP-16
14*. Fluvaquents											
15----------------- Hallandale	0-6	Sand------------	SP, SP-SM	A-3	0	100	100	90-100	2-8	---	NP
	6-12	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-8	---	NP
	12	Weathered bedrock.									
16----------------- Hilolo	0-7	Loamy sand------	SM	A-2-4	0	100	100	80-95	13-25	---	NP
	7-12	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6, A-6, A-4	0	100	100	85-99	25-50	<30	NP-15
	12-28	Sandy clay loam	SC	A-6, A-7-6	0	100	100	85-99	36-50	23-44	10-24
	28-53	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	85-99	13-35	<30	NP-15
	53-80	Loamy sand, loamy fine sand, fine sandy loam.	SM	A-2-4	0	100	100	85-99	13-25	---	NP
17----------------- Hobe	0-5	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	1-7	---	NP
	5-55	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	1-7	---	NP
	55-65	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	6-15	---	NP
	65-80	Sandy clay loam, sandy loam, fine sandy loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-100	15-35	22-40	4-15
18----------------- Hontoon	0-60	Muck------------	PT	---	0	---	---	---	---	---	---
19----------------- Jonathan	0-3	Sand------------	SP	A-3	0	100	100	85-100	1-4	---	NP
	3-68	Fine sand, sand	SP	A-3	0	100	100	85-100	1-4	---	NP
	68-80	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-15	---	NP
20----------------- Kaliga	0-35	Muck------------	PT	---	---	---	---	---	---	---	---
	35-52	Sandy clay, clay, sandy clay loam.	SC, CL, CH	A-7, A-4, A-6	0	100	100	75-100	36-85	20-73	8-40
21----------------- Lawnwood	0-8	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	8-28	Sand, fine sand	SP	A-3	0	100	100	85-100	2-4	---	NP
	28-52	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	52-58	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	58-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
22*:											
Lawnwood----------	0-8	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	8-28	Sand, fine sand	SP	A-3	0	100	100	85-100	2-4	---	NP
	28-52	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	52-58	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	58-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
Urban land.											
23----------------- Malabar	0-12	Sand------------	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	12-24	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-99	3-12	---	NP
	24-42	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-99	1-10	---	NP
	42-72	Sandy clay loam, fine sandy loam, sandy loam.	SC, SM-SC, SM	A-2-4, A-4, A-6	0	100	100	80-99	22-40	<40	NP-15
	72-80	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-20	---	NP
24----------------- Myakka	0-27	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	27-38	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	38-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
25----------------- Nettles	0-8	Sand------------	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	8-33	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	33-39	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
	39-55	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	55-90	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	100	85-100	20-35	<28	NP-7
26----------------- Oldsmar	0-32	Sand------------	SP, SP-SM	A-3	0	100	100	75-100	2-10	---	NP
	32-42	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3	0	100	100	70-100	5-20	---	NP
	42-80	Fine sandy loam, sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-100	19-35	20-35	5-15
27----------------- Palm Beach	0-80	Fine sand--------	SP, SW	A-3	0	100	75-95	15-90	1-5	---	NP
28----------------- Paola	0-55	Sand------------	SP	A-3	0	100	100	85-100	1-2	---	NP
	55-80	Sand, fine sand	SP	A-3	0	100	100	80-100	1-4	---	NP
29----------------- Pendarvis	0-48	Sand------------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	48-62	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	62-76	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	76-80	Sand, fine sand, loamy sand.	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
30*:											
Pendarvis---------	0-48	Sand------------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	48-62	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	62-76	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	76-80	Sand, fine sand, loamy sand.	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
Urban land.											
31----------------- Pepper	0-6	Sand------------	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	6-23	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	23-33	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
	33-57	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	57-99	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	100	85-100	13-35	<28	NP-7
32----------------- Pineda	0-38	Sand------------	SP, SP-SM	A-3	0	100	100	80-95	2-5	---	NP
	38-80	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2-4, A-2-6	0	100	100	80-95	15-35	<30	NP-12
33*. Pits											
34----------------- Pompano	0-80	Sand------------	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
35*:											
Pompano Variant---	0-80	Fine sand-------	SP, SP-SM	A-3	0	90-100	90-100	80-95	1-10	---	NP
Kaliga Variant----	0-38	Muck------------	PT	---	---	---	---	---	---	---	---
	38-51	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6, A-4, A-6	0	100	100	80-95	18-45	<37	NP-20
	51-80	Loamy sand, fine sand, sand.	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
36----------------- Pople	0-9	Sand------------	SP, SP-SM	A-3	0	100	100	80-95	2-5	---	NP
	9-29	Sand, fine sand	SP, SP-SM	A-3	0	90-100	90-100	80-90	2-5	---	NP
	29-56	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	85-95	85-95	80-90	15-35	20-30	4-12
	56-80	Loamy sand, sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	90-100	90-100	85-95	13-35	<30	NP-12
37----------------- Riviera	0-30	Sand------------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	30-35	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	35-80	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	20-35	20-40	4-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
38----------------- Riviera	0-23	Fine sand-------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	23-44	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	44-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	0	60-100	50-100	40-100	3-16	---	NP
39----------------- Salerno	0-5	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	5-55	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	1-8	---	NP
	55-68	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	68-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
40*:											
Samsula Variant---	0-25	Muck------------	PT	---	---	---	---	---	---	---	---
	25-36	Sand, fine sand, mucky sand.	SP, SP-SM	A-3	0	100	100	80-95	2-10	---	NP
	36-52	Sand, fine sand	SP-SM, SM, SP	A-3, A-2-4	0	100	100	80-95	2-15	---	NP
Myakka Variant----	12-0	Muck------------	PT	---	0	---	---	---	---	---	---
	0-17	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-95	1-10	---	NP
	17-72	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
41----------------- Satellite	0-80	Sand------------	SP	A-3	0	100	100	60-95	1-4	---	NP
42----------------- St. Lucie	0-80	Sand------------	SP	A-3	0	100	100	80-99	1-4	---	NP
43----------------- Susanna	0-6	Sand------------	SP, SP-SM	A-3	0	100	100	75-95	2-10	---	NP
	6-25	Sand, fine sand	SP, SP-SM	A-3	0	100	100	75-95	2-10	---	NP
	25-29	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	75-95	5-20	---	NP
	29-48	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	100	75-95	17-35	<28	NP-7
	48-80	Sand, loamy sand, fine sandy loam.	SP-SM, SM, SM-SC	A-3, A-2-4	0	100	100	75-95	5-25	<28	NP-7
44----------------- Tantile	0-5	Sand------------	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	5-26	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	26-34	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
	34-49	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	49-69	Sand, fine sand	SM, SM-SC	A-2-4	0	100	100	85-95	5-12	---	NP
	69-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	100	85-95	20-35	<28	NP-7
45----------------- Terra Ceia	0-80	Muck------------	PT	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
46----------------- Turnbull Variant	0-6	Sandy clay loam	SC	A-2-4, A-2-6, A-4, A-6	0	100	100	80-100	25-45	23-44	10-25
	6-23	Fine sandy loam	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-30	<30	NP-10
	23-36	Sandy clay loam	SC	A-2-4, A-2-6, A-4, A-6	0	100	100	80-100	25-45	23-44	10-25
	36-50	Very bouldery sandy clay loam.	SC	A-2-4, A-2-6, A-4, A-6	35-70	100	100	70-90	25-45	23-44	10-25
	50-80	Bouldery fine sandy loam, bouldery sandy clay loam.	---	A-2-4, A-2-6, A-4, A-6	15-35	100	100	60-80	20-45	15-44	5-25
47*. Urban land											
48----------------- Wabasso	0-25	Sand------------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	25-34	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	0	100	100	80-100	2-20	---	NP
	34-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2-4, A-2-6	0	100	100	85-100	15-35	<30	NP-13
	60-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
49----------------- Wabasso Variant	0-20	Sand------------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	20-23	Sand------------	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
	23-25	Sand------------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	25-32	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	20-35	16-37	6-20
	32-36	Very gravelly sandy loam, very gravelly sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	35-70	100	60-80	60-80	20-35	16-37	6-20
	36-80	Sand, loamy sand, sandy loam.	SP-SM, SM, SM-SC, SC	A-3, A-2-4	0	100	100	95-100	6-35	<30	NP-9
50----------------- Waveland	0-4	Fine sand-------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	4-32	Sand, fine sand	SP	A-3	0	100	100	85-100	1-4	---	NP
	32-40	Sand, fine sand, loamy sand.	SP-SM, SM	A-2-4	0	100	100	85-100	12-20	---	NP
	40-53	Sand, fine sand, loamy sand.	SP-SM, SM	A-2-4	0	100	100	85-95	12-20	---	NP
	53-66	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	<23	NP-3
	66-81	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
51*:											
Waveland----------	0-4	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	4-32	Sand, fine sand	SP	A-3	0	100	100	85-100	1-4	---	NP
	32-40	Sand, fine sand, loamy sand.	SP-SM, SM	A-2-4	0	100	100	85-100	12-20	---	NP
	40-53	Sand, fine sand, loamy sand.	SP-SM, SM	A-2-4	0	100	100	85-95	12-20	---	NP
	53-66	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	<23	NP-3
	66-81	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
Lawnwood----------	0-8	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	8-28	Sand, fine sand	SP	A-3	0	100	100	85-100	2-4	---	NP
	28-52	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	52-58	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	58-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
52*:											
Waveland----------	0-4	Sand------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	4-32	Sand, fine sand	SP	A-3	0	100	100	85-100	1-4	---	NP
	32-40	Sand, fine sand, loamy sand.	SP-SM, SM	A-2-4	0	100	100	85-100	12-20	---	NP
	40-53	Sand, fine sand, loamy sand.	SP-SM, SM	A-2-4	0	100	100	85-95	12-20	---	NP
	53-66	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	<23	NP-3
	66-81	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
Urban land.											
53---------------- Welaka Variant	0-18	Sand------------	SP	A-3	0	100	100	80-100	1-2	---	NP
	18-96	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	1-4	---	NP
54---------------- Winder	0-10	Sand------------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	10-63	Sandy clay loam	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	18-35	20-40	11-26
	63-80	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	60-80	50-100	40-95	3-20	<35	NP-10
55---------------- Winder	0-6	Loamy sand------	SM, SM-SC	A-2-4	0	100	100	80-100	12-25	---	NP
	6-12	Loamy sand, sandy loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-25	<35	NP-10
	12-33	Sandy clay loam	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	18-35	20-40	7-26
	33-49	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	60-80	50-100	40-95	15-35	<35	NP-20
	49-80	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	60-80	50-100	40-95	3-20	<35	NP-10

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
56----------------- Winder Variant	0-6	Sand------------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	6-9	Sand------------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	9-27	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	13-35	20-37	6-20
	27-29	Gravelly sandy loam, gravelly sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0-15	60-80	50-75	50-70	13-35	20-37	6-20
	29-32	Very gravelly sandy loam, very gravelly sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	35-70	100	60-80	60-80	20-35	20-37	6-20
	32-80	Loamy sand, sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	75-100	50-75	50-70	13-35	<37	NP-20

* 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 <2mm	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/cm3	In/hr	In/in	pH	Mmhos/cm					Pct
1----------------	0-21	<5	1.45-1.65	6.0-20	0.10-0.15	5.6-8.4	<2	Very low	0.17	5	2	2-8
Anclote	21-80	<5	1.50-1.65	6.0-20	0.03-0.10	5.6-8.4	<2	Very low	0.17			
2----------------	0-38	<5	1.20-1.70	6.0-20	0.02-0.05	3.6-5.5	<2	Low--------	0.28	5	2	2-6
Ankona	38-48	2-12	1.70-1.80	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.28			
	48-57	13-30	1.70-1.80	0.6-6.0	0.13-0.17	3.6-5.5	<2	Low--------	0.43			
	57-80	5-12	1.65-1.75	6.0-20	0.05-0.10	3.6-5.5	<2	Low--------	0.28			
3*:												
Ankona-----------	0-38	<5	1.20-1.70	6.0-20	0.02-0.05	3.6-5.5	<2	Low--------	0.28	5	2	2-6
	38-48	2-12	1.70-1.80	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.28			
	48-57	13-30	1.70-1.80	0.6-6.0	0.13-0.17	3.6-5.5	<2	Low--------	0.43			
	57-80	5-12	1.65-1.75	6.0-20	0.05-0.10	3.6-5.5	<2	Low--------	0.28			
Urban land.												
4*, 5*, 6*. Arents												
7---------------- Astatula	0-99	1-3	1.45-1.60	>20	0.02-0.05	4.5-6.5	<2	Very low	0.15	5	2	<.5
8---------------- Basinger	0-80	1-6	1.40-1.65	>20	0.03-0.07	3.6-8.4	<2	Very low	0.10	5	2	.5-2
9*. Beaches												
10---------------	0-6	>2	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Very low	0.15	5	2	>.5
Canaveral	6-80	>1	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Very low	0.15			
11---------------	0-11	7-20	1.45-1.50	2.0-6.0	0.10-0.15	6.1-7.3	<2	Low--------	0.24	5	3	2-7
Chobee	11-80	20-35	1.55-1.75	<0.2	0.12-0.17	7.4-8.4	<2	Moderate	0.32			
12---------------	0-7	<6	1.40-1.55	6.0-20	0.05-0.10	3<6-6<5	<2	Very low	0.15	5	2	1-2
Electra	7-47	<6	1.41-1.70	6.0-20	0.02-0.07	3.6-6.5	<2	Very low	0.15			
	47-60	1-6	1.50-1.70	0.6-2.0	0.10-0.15	3.6-5.5	<2	Very low	0.20			
	60-80	15-38	1.60-1.75	<0.2	0.10-0.15	3.6-5.5	<2	Very low	0.32			
13---------------	0-21	2-12	1.40-1.65	6.0-20	0.10-0.15	5.6-8.4	<2	Very low	0.17	5	2	6-15
Floridana	21-25	1-12	1.52-1.65	6.0-20	0.05-0.10	5.6-8.4	<2	Very low	0.32			
	25-81	12-30	1.60-1.85	<0.2	0.10-0.15	5.6-8.4	<2	Low--------	0.20			
14*. Fluvaquents												
15---------------	0-6	<5	1.40-1.55	6.0-20	0.05-0.10	5.1-6.5	<2	Low--------	0.17	2	2	.5-2
Hallandale	6-10	<5	1.50-1.65	6.0-20	0.03-0.05	6.1-6.5	<2	Low--------	0.17			
	10-12	8-14	1.70-1.80	6.0-20	0.05-0.10	6.6-8.4	<2	Low--------	0.17			
	16	---	---	---	---	---	---	-----------	---			
16---------------	0-7	4-13	1.30-1.60	0.6-20	0.08-0.12	6.6-8.4	<2	Low--------	0.32	5	2	1-5
Hilolo	7-12	12-25	1.30-1.60	0.2-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.37			
	12-28	20-35	1.50-1.75	0.2-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.37			
	28-53	12-25	1.55-1.85	0.2-2.0	0.10-0.15	7.4-9.0	<2	Low--------	0.37			
	53-80	5-18	1.50-1.80	<0.2	0.05-0.10	7.4-9.0	<2	Low--------	0.32			
17---------------	0-5	<1-3	1.30-1.55	>20	0.05-0.08	3.6-6.5	<2	Low--------	0.17	5	2	1-2
Hobe	5-55	<1-3	1.50-1.70	>20	0.01-0.05	3.6-6.5	<2	Low--------	0.20			
	55-65	2-7	1.40-1.65	0.6-2.0	0.10-0.15	3.6-5.5	<2	Low--------	0.20			
	65-80	15-30	1.60-1.70	0.6-2.0	0.11-0.15	3.6-5.5	<2	Low--------	0.24			
18--------------- Hontoon	0-60	---	---	6.0-20	0.20-0.25	4.5-5.5	<2	Low--------	---	---	2	>60

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay <2mm	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/cm3	In/hr	In/in	pH	Mmhos/cm					Pct
19---------------- Jonathan	0-3	<1-3	1.30-1.55	6.0-20	0.05-0.08	4.5-5.5	<2	Low--------	0.17	5	2	1-2
	3-68	<1-3	1.50-1.70	6.0-20	0.01-0.05	4.5-5.5	<2	Low--------	0.24			
	68-80	1-6	1.65-1.75	<0.2	0.10-0.15	3.6-5.0	<2	Low--------	0.28			
20---------------- Kaliga	0-35	---	0.15-0.35	6.0-20	0.20-0.25	3.6-4.4	<2	Very low	---	---	2	50-97
	35-52	30-70	1.60-1.65	<0.2	0.10-0.20	4.5-7.3	<2	High-------	0.32			
21---------------- Lawnwood	0-8	<2	1.30-1.60	>6.0	0.03-0.08	3.6-6.5	<2	Low--------	0.24	5	2	1-3
	8-28	<1	1.50-1.70	>6.0	0.01-0.03	3.6-5.5	<2	Low--------	0.24			
	28-52	2-8	1.30-1.55	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	52-58	2-6	1.30-1.55	<0.6	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	58-80	5-18	1.42-1.70	0.6-6.0	0.07-0.11	3.6-5.5	<2	Low--------	0.32			
22*:												
Lawnwood--------	0-8	<2	1.30-1.60	>6.0	0.03-0.08	3.6-6.5	<2	Low--------	0.24	5	2	1-3
	8-28	<1	1.50-1.70	>6.0	0.01-0.03	3.6-5.5	<2	Low--------	0.24			
	28-52	2-8	1.30-1.55	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	52-58	2-6	1.30-1.55	<0.6	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	58-80	5-18	1.42-1.70	0.6-6.0	0.07-0.11	3.6-5.5	<2	Low--------	0.32			
Urban land.												
23---------------- Malabar	0-12	<4	1.20-1.55	6.0-20	0.03-0.08	5.6-8.4	<2	Low--------	0.20	5	2	1-2
	12-24	<5	1.50-1.75	6.0-20	0.05-0.10	5.6-8.4	<2	Low--------	0.20			
	24-42	<5	1.50-1.70	6.0-20	0.02-0.05	5.6-8.4	<2	Low--------	0.20			
	42-72	12-25	1.60-1.75	<0.2	0.10-0.15	5.6-8.4	<2	Low--------	0.32			
	72-80	<8	1.50-1.70	2.0-20	0.05-0.08	5.6-8.4	<2	Low--------	0.15			
24---------------- Myakka	0-27	<2	1.36-1.44	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.20	5	2	1-2
	27-38	2-8	1.47-1.59	0.6-6.0	0.10-0.15	3.6-6.5	<2	Low--------	0.20			
	38-80	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.17			
25---------------- Nettles	0-8	<2	1.32-1.44	6.0-20	0.05-0.10	3.6-6.0	<2	Very low	0.17	5	2	1-3
	8-33	<2	1.43-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Very low	0.17			
	33-39	4-13	1.20-1.59	<0.2	0.10-0.15	4.5-6.5	<2	Very low	0.24			
	39-55	2-8	1.35-1.59	0.2-2.0	0.10-0.15	4.5-6.5	<2	Very low	0.20			
	55-90	10-30	1.55-1.75	<0.6	0.10-0.15	5.5-7.8	<2	Low--------	0.24			
26---------------- Oldsmar	0-32	<3	1.25-1.65	6.0-20	0.02-0.05	3.6-7.3	<2	Very low	0.20	5	2	1-2
	32-42	1-8	1.42-1.59	0.2-6.0	0.10-0.15	3.6-7.3	<2	Low--------	0.20			
	42-80	15-30	1.60-1.69	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.24			
27---------------- Palm Beach	0-80	>2	1.25-1.50	>20	0.02-0.05	7.4-8.4	<2	Low--------	0.15	5	1	>.5
28---------------- Paola	0-55	<2	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Very low	0.15	5	1	<.5
	55-80	<3	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Very low	0.15			
29---------------- Pendarvis	0-48	<2	1.20-1.60	>6.0	0.02-0.05	4.5-6.5	<2	Low--------	0.20	5	2	<1
	48-62	2-8	1.00-1.40	0.06-0.6	0.10-0.15	3.6-6.0	<2	Low--------	0.24			
	62-76	2-7	1.30-1.65	0.6-2.0	0.10-0.15	3.6-6.0	<2	Low--------	0.24			
	76-80	5-10	1.42-1.70	>2.0	0.05-0.10	3.6-6.0	<2	Low--------	0.24			
30*:												
Pendarvis--------	0-48	<2	1.30-1.60	>6.0	0.02-0.05	4.5-6.5	<2	Low--------	0.20	5	2	<1
	48-62	2-8	1.00-1.30	0.06-0.6	0.10-0.15	3.6-6.0	<2	Low--------	0.24			
	62-76	2-7	1.30-1.55	0.6-2.0	0.10-0.15	3.6-6.0	<2	Low--------	0.24			
	76-80	5-10	1.42-1.60	>2.0	0.05-0.10	3.6-6.0	<2	Low--------	0.24			
Urban land.												
31---------------- Pepper	0-6	<2	1.32-1.44	6.0-20	0.05-0.10	3.6-6.0	<2	Very low	0.17	5	2	1-4
	6-23	<2	1.43-1.57	6.0-20	0.02-0.05	3.6-6.0	<2	Very low	0.17			
	23-33	4-13	1.47-1.59	<0.2	0.10-0.15	4.5-6.5	<2	Very low	0.24			
	33-57	2-8	1.47-1.59	0.2-2.0	0.05-0.10	4.5-6.5	<2	Very low	0.20			
	57-99	10-30	1.49-1.70	<0.6	0.10-0.15	5.6-7.8	<2	Low--------	0.24			
32---------------- Pineda	0-38	<8	1.05-1.60	6.0-20	0.02-0.05	5.6-7.3	<2	Low--------	0.17	5	2	.5-6
	38-80	10-25	1.50-1.85	<0.2	0.10-0.15	6.6-8.4	<2	Low--------	0.24			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay <2mm	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
									K	T		
	In	Pct	G/cm3	In/hr	In/in	pH	Mmhos/cm					Pct
33*. Pits												
34--------------- Pompano	0-80	<5	1.30-1.65	>20	0.02-0.05	4.5-7.8	<2	Very low	0.17	5	2	1-5
35*:												
Pompano Variant-	0-80	1-5	1.45-1.65	6.0-20	0.05-0.10	6.6-8.4	8-16	Low--------	0.15	5	2	1-5
Kaliga Variant--	0-38	---	0.25-0.35	2.0-6.0	0.20-0.25	4.5-7.8	8-16	Low--------	---	---	2	>60
	38-51	12-30	1.60-1.70	0.06-0.2	0.10-0.15	5.6-8.4	8-16	Low--------	0.24			
	51-80	5-10	1.42-1.60	>2.0	0.05-0.10	6.1-8.4	8-16	Low--------	0.24			
36--------------- Pople	0-9	2-6	1.25-1.45	2.0-20	0.03-0.08	5.6-7.8	<2	Low--------	0.17	5	2	.5-6
	9-29	4-8	1.30-1.60	2.0-20	0.03-0.08	7.4-8.4	<2	Low--------	0.17			
	29-56	15-30	1.50-1.70	<0.2	0.10-0.15	7.4-8.4	<2	Low--------	0.24			
	56-80	10-30	1.45-1.70	0.2-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.24			
37--------------- Riviera	0-30	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-6.5	<2	Low--------	0.17	4	2	.1-2
	30-35	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low--------	0.28			
	35-80	15-25	1.50-1.70	<0.2	0.12-0.15	6.1-8.4	<2	Low--------	0.28			
38--------------- Riviera	0-23	<6	1.35-1.65	6.0-20	0.05-0.08	4.5-6.5	<2	Low--------	0.17	4	2	.1-2
	23-44	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low--------	0.28			
	44-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	Low--------	0.15			
39--------------- Salerno	0-5	<1-4	1.35-1.50	6.0-20	0.05-0.10	3.6-7.3	<2	Low--------	0.24	5	2	1-4
	5-55	<1-3	1.50-1.65	6.0-20	0.02-0.05	3.6-7.3	<2	Low--------	0.24			
	55-68	3-12	1.40-1.70	<0.6	0.05-0.10	3.6-5.5	<2	Low--------	0.24			
	68-80	3-8	1.45-1.65	6.0-20	0.02-0.10	3.6-5.5	<2	Low--------	0.24			
40*:												
Samsula Variant-	0-25	---	0.20-0.40	6.0-20	0.20-0.25	3.6-4.4	<2	Low--------	---	---	2	25-80
	25-36	1-8	0.65-1.50	6.0-20	0.10-0.18	3.6-7.3	<2	Low--------	0.15			
	36-52	1-5	1.35-1.60	2.0-6.0	0.10-0.15	3.6-7.3	<2	Low--------	0.15			
Myakka Variant--	12-0	---	0.25-0.40	6.0-20	0.20-0.25	5.1-7.3	<2	Low--------	---	---	2	25-80
	0-17	<5	1.20-1.65	6.0-20	0.10-0.15	5.1-7.3	<2	Low--------	0.15			
	17-72	<8	1.35-1.60	2.0-6.0	0.10-0.15	5.1-7.3	<2	Low--------	0.15			
41--------------- Satellite	0-80	<2	1.50-1.60	>20	0.02-0.05	4.5-7.8	<2	Very low	0.15	5	2	<1
42--------------- St. Lucie	0-80	<2	1.50-1.60	>20	0.02-0.05	3.6-7.3	<2	Very low	0.15	5	1	<1
43--------------- Susanna	0-6	<2	1.32-1.44	6.0-20	0.05-0.10	3.6-6.0	<2	Very low	0.17	5	2	.5-3
	6-25	<2	1.43-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Very low	0.17			
	25-29	4-13	1.47-1.59	<0.2	0.10-0.15	4.5-5.5	<2	Very low	0.24			
	29-48	10-30	1.50-1.69	<0.6	0.10-0.15	4.5-5.5	<2	Low--------	0.24			
	48-80	3-18	1.49-1.70	2.0-20	0.05-0.10	4.5-5.5	<2	Very low	0.20			
44--------------- Tantile	0-5	<2	1.30-1.50	6.0-20	0.05-0.10	4.5-6.0	<2	Very low	0.17	5	2	.5-2
	5-26	<2	1.35-1.57	6.0-20	0.02-0.05	4.5-6.0	<2	Very low	0.17			
	26-34	4-13	1.47-1.80	<0.2	0.10-0.15	4.5-6.0	<2	Very low	0.24			
	34-49	4-13	1.47-1.65	0.2-2.0	0.10-0.15	4.5-6.0	<2	Very low	0.20			
	49-69	<2	1.54-1.80	6.0-20	0.02-0.05	4.5-6.0	<2	Very low	0.17			
	69-80	10-30	1.60-1.75	<0.6	0.10-0.15	4.5-6.0	<2	Low--------	0.24			
45--------------- Terra Ceia	0-80	---	0.15-0.35	6.0-20	0.30-0.50	5.6-8.4	<2	Low--------	---	---	2	>60
46--------------- Turnbull Variant	0-6	20-35	0.3-1.25	<0.2	0.20-0.25	5.6-8.4	>16	High-------	0.34	2	2	2-8
	6-23	11-20	0.3-1.25	<0.2	0.10-0.20	5.6-8.4	>16	High-------	0.24			
	23-36	20-35	1.0-1.50	0.2-6.0	0.10-0.15	6.1-6.5	4-8	High-------	0.34			
	36-50	20-35	1.50-1.65	0.6-6.0	0.05-0.10	7.4-8.4	2-4	Low--------	---			
	50-80	14-35	1.50-1.65	0.6-6.0	0.05-0.10	7.4-8.4	2-4	Low--------	---			
47*. 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 <2mm	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/cm3	In/hr	In/in	pH	Mmhos/cm					Pct
48---------------- Wabasso	0-25	<5	1.25-1.55	6.0-20	0.02-0.05	4.5-6.5	<2	Low--------	0.20	5	2	1-4
	25-34	1-13	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low--------	0.20			
	34-60	8-30	1.60-1.80	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	60-80	2-8	1.40-1.70	6.0-20	0.05-0.10	7.4-8.4	<2	Low--------	0.17			
49---------------- Wabasso Variant	0-20	2-7	1.35-1.45	6.0-20	0.02-0.05	4.5-6.5	<2	Low--------	0.20	5	2	1-4
	20-23	4-9	1.45-1.65	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low--------	0.20			
	23-25	3-8	1.35-1.45	6.0-20	0.02-0.05	5.6-8.4	<2	Low--------	0.20			
	25-32	15-30	1.55-1.70	<0.2	0.10-0.10	5.6-8.4	<2	Low--------	0.24			
	32-36	15-30	1.55-1.75	0.6-2.0	0.05-0.08	6.6-8.4	<2	Low--------	0.24			
	36-80	3-18	1.40-1.65	0.6-2.0	0.02-0.15	6.6-8.4	<2	Low--------	0.24			
50---------------- Waveland	0-4	<1	1.30-1.60	>6.0	0.03-0.08	3.6-7.3	<2	Low--------	0.24	5	2	1-3
	4-32	<1	1.40-1.70	>6.0	0.01-0.03	3.6-6.0	<2	Low--------	0.24			
	32-40	2-8	0.95-1.65	<0.2	0.10-0.15	3.6-6.0	<2	Low--------	0.24			
	40-53	3-12	1.30-1.70	<0.6	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	53-66	5-18	1.42-1.70	2.0-20	0.10-0.15	3.6-5.5	<2	Low--------	0.32			
	66-81	3-10	1.45-1.65	2.0-20	0.05-0.10	3.6-5.5	<2	Low--------	0.24			
51*:												
Waveland---------	0-4	<1	1.30-1.60	>6.0	0.03-0.08	3.6-7.3	<2	Low--------	0.24	5	2	1-3
	4-32	<1	1.40-1.70	>6.0	0.01-0.03	3.6-6.0	<2	Low--------	0.24			
	32-40	2-8	0.95-1.65	<0.2	0.10-0.15	3.6-6.0	<2	Low--------	0.24			
	40-53	3-12	1.30-1.70	<0.6	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	53-66	5-18	1.42-1.70	2.0-20	0.10-0.15	3.6-5.5	<2	Low--------	0.32			
	66-81	3-10	1.45-1.65	2.0-20	0.05-0.10	3.6-5.5	<2	Low--------	0.24			
Lawnwood---------	0-8	<2	1.30-1.60	>6.0	0.03-0.08	3.6-6.5	<2	Low--------	0.24	5	2	1-3
	8-28	<1	1.50-1.70	>6.0	0.01-0.03	3.6-5.5	<2	Low--------	0.24			
	28-52	2-8	1.30-1.55	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	52-58	2-6	1.30-1.55	<0.6	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	58-80	5-18	1.42-1.70	0.6-6.0	0.07-0.11	3.6-5.5	<2	Low--------	0.32			
52*:												
Waveland---------	0-4	<1	1.30-1.60	>6.0	0.03-0.08	3.6-7.3	<2	Low--------	0.24	5	2	1-3
	4-32	<1	1.40-1.70	>6.0	0.01-0.03	3.6-6.0	<2	Low--------	0.24			
	32-40	2-8	0.95-1.65	<0.2	0.10-0.15	3.6-6.0	<2	Low--------	0.24			
	40-53	3-12	1.30-1.70	<0.6	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	53-66	5-18	1.42-1.70	2.0-20	0.10-0.15	3.6-5.5	<2	Low--------	0.32			
	66-81	3-10	1.45-1.65	2.0-20	0.05-0.10	3.6-5.5	<2	Low--------	0.24			
Urban land.												
53---------------- Welaka Variant	0-18	<4	1.30-1.55	>20	0.02-0.05	5.6-7.3	<2	Very low	0.15	5	1	1-3
	18-96	<2	1.45-1.75	>20	0.02-0.05	5.1-7.8	<2	Very low	0.15			
54---------------- Winder	0-10	1-6	1.40-1.65	6.0-20	0.03-0.08	5.6-7.8	<2	Low--------	0.20	5	2	.1-2
	10-63	20-30	1.60-1.70	<0.2	0.10-0.15	6.6-8.4	<2	Low--------	0.32			
	63-80	5-12	1.40-1.65	2.0-0.6	0.03-0.06	7.4-8.4	<2	Low--------	0.32			
55---------------- Winder	0-6	4-8	1.45-1.65	6.0-20	0.06-0.10	5.6-7.8	<2	Low--------	0.20	5	2	1-3
	6-12	1-18	1.45-1.65	0.2-0.6	0.06-0.10	6.1-7.8	<2	Low--------	0.20			
	12-33	13-30	1.60-1.70	<0.2	0.10-0.15	6.6-8.4	<2	Low--------	0.32			
	33-49	12-25	1.50-1.70	<0.2	0.06-0.12	7.4-8.4	<2	Low--------	0.32			
	49-80	5-12	1.40-1.65	2.0-0.6	0.03-0.06	7.4-8.4	<2	Low--------	0.32			
56---------------- Winder Variant	0-6	1-5	1.30-1.50	6.0-20	0.08-0.12	5.1-8.4	<2	Low--------	0.20	5	1	1-3
	6-9	1-5	1.45-1.60	6.0-20	0.05-0.08	5.6-8.4	<2	Low--------	0.20			
	9-27	15-30	1.50-1.70	0.06-0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.32			
	27-29	15-30	1.50-1.70	0.2-0.6	0.05-0.10	6.1-8.4	<2	Low--------	0.24			
	29-32	15-30	1.55-1.75	0.2-0.6	0.05-0.08	6.1-8.4	<2	Low--------	0.24			
	32-80	7-30	1.45-1.70	0.2-2.0	0.10-0.15	6.1-8.4	<2	Low--------	0.32			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Cemented pan		Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
					Ft			In		In	In		
1: Anclote	D	None	---	---	+2-1.0	Apparent	Jun-Mar	---	---	---	---	Moderate	Moderate.
2: Ankona	C/D	None	---	---	0-1.0	Apparent	Jun-Feb	30-50	Rippable	---	---	High	High.
3*:													
Ankona	C/D	None	---	---	0-1.0	Apparent	Jun-Feb	30-50	Rippable	---	---	High	High.
Urban land.													
4*, 5*, 6*. Arents													
7: Astatula	A	None	---	---	>6.0	---	---	---	---	---	---	Low	High.
8: Basinger	A/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	---	---	High	Moderate.
9*. Beaches													
10: Canaveral	C	None	---	---	1.0-3.0	Apparent	Jun-Nov	---	---	---	---	Moderate	Low.
11: Chobee	B/D	None	---	---	+2-1.0	Apparent	Jun-Feb	---	---	---	---	Moderate	Low.
12: Electra	C	None	---	---	2.0-3.5	Apparent	Jul-Oct	---	---	---	---	Low	High.
13: Floridana	B/D	None	---	---	+2-1.0	Apparent	Jun-Feb	---	---	---	---	Moderate	Low.
14*. Fluvaquents													
15: Hallandale	A/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	---	---	High	Low.
16: Hilolo	D	None	---	---	0-1.0	Apparent	Jun-Oct	---	---	---	---	High	Low.
17: Hobe	A	None	---	---	5.0-6.0	Apparent	Jun-Oct	---	---	---	---	Low	High.
18: Hontoon	A/D	None	---	---	+2-1.0	Apparent	Jan-Dec	---	---	4-8	>52	High	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Cemented pan		Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
					Ft			In		In	In		
19----------------- Jonathan	B	None---------	---	---	3.0-5.0	Apparent	Jun-Oct	50-75	Rippable	---	---	Low-------	High.
20----------------- Kaliga	A/D	None---------	---	---	+2-0	Apparent	Jun-Apr	---	---	16-20	24-45	High-----	High.
21----------------- Lawnwood	B/D	None---------	---	---	0-1.0	Perched	Jun-Oct	20-30	Rippable	---	---	High-----	High.
22*:													
Lawnwood---------	B/D	None---------	---	---	0-1.0	Perched	Jun-Oct	20-30	Rippable	---	---	High-----	High.
Urban land.													
23----------------- Malabar	B/D	None---------	---	---	0-1.0	Apparent	Jun-Nov	---	---	---	---	High-----	Low.
24----------------- Myakka	A/D	None---------	---	---	0-1.0	Apparent	Jun-Feb	---	---	---	---	High-----	High.
25----------------- Nettles	B/D	None---------	---	---	0-1.0	Perched	Jun-Oct	30-50	Rippable	---	---	High-----	Moderate.
26----------------- Oldsmar	B/D	None---------	---	---	+2-1.0	Apparent	Jun-Feb	---	---	---	---	Moderate	High.
27----------------- Palm Beach	A	None---------	---	---	>6.0	---	---	---	---	---	---	Low-------	Low.
28----------------- Paola	A	None---------	---	---	>6.0	---	---	---	---	---	---	Low-------	High.
29----------------- Pendarvis	C	None---------	---	---	2.0-3.5	Perched	Jun-Oct	30-50	Rippable	---	---	Moderate	High.
30*:													
Pendarvis--------	C	None---------	---	---	2.0-3.5	Perched	Jun-Oct	30-50	Rippable	---	---	Moderate	High.
Urban land.													
31----------------- Pepper	C/D	None---------	---	---	0-1.0	Perched	Jun-Oct	15-30	Rippable	---	---	High-----	Moderate.
32----------------- Pineda	B/D	Rare---------	---	---	0-1.0	Apparent	Jun-Nov	---	---	---	---	High-----	Low.
33*. Pits													
34----------------- Pompano	A/D	None---------	---	---	0-1.0	Apparent	Jun-Nov	---	---	---	---	High-----	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Cemented pan		Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
					Ft			In		In	In		
35*:													
Pompano Variant--	D	Frequent----	Very long	Jan-Dec	+2-1.0	---	Jan-Dec	---	---	---	---	High-----	Low.
Kaliga Variant---	D	Frequent----	Very long	Jan-Dec	+2-1.0	Apparent	Jan-Dec	---	---	4-8	14-34	High-----	Low.
36---------------- Pople	C/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	---	---	---	---	High-----	Low.
37---------------- Riviera	B/D	None--------	---	---	+2-1.0	Apparent	Jun-Dec	---	---	---	---	High-----	High.
38---------------- Riviera	B/D	None--------	---	---	0-1.0	Apparent	Jun-Dec	---	---	---	---	High-----	High.
39---------------- Salerno	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	50-72	Rippable	---	---	High-----	High.
40*:													
Samsula Variant--	A/D	None--------	---	---	+2-0	Apparent	Jun-Feb	---	---	4-8	35-40	High-----	High.
Myakka Variant---	C/D	None--------	---	---	+1-0	Apparent	Jun-Feb	---	---	4-8	8-16	High-----	Moderate.
41---------------- Satellite	C	None--------	---	---	1.0-3.5	Apparent	Jun-Nov	---	---	---	---	Low------	Moderate.
42---------------- St. Lucie	A	None--------	---	---	>6.0	---	---	---	---	---	---	Low------	Moderate.
43---------------- Susanna	C/D	None--------	---	---	0-1.0	Perched	Jun-Oct	15-30	Rippable	---	---	High-----	High.
44---------------- Tantile	C/D	None--------	---	---	0-1.0	Perched	Jun-Oct	15-30	Rippable	---	---	High-----	High.
45---------------- Terra Ceia	A/D	None to common.	Long------	Jun-Nov	+1-1.0	Apparent	App	---	---	4-8	50-60	Moderate	Moderate.
46---------------- Turnbull Variant	D	Frequent----	Very long	Jan-Dec	+2-0	Apparent	Jan-Dec	---	---	---	---	High-----	Low.
47*. Urban land													
48---------------- Wabasso	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	---	---	---	---	Moderate	High.
49---------------- Wabasso Variant	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	---	---	---	---	Moderate	High.
50---------------- Waveland	B/D	None--------	---	---	0-1.0	Perched	Jun-Oct	30-50	Rippable	---	---	High-----	High.
51*:													
Waveland---------	B/D	None--------	---	---	+2-1.0	Perched	Jun-Oct	30-50	Rippable	---	---	High-----	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Cemented pan		Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
					Ft			In		In	In		
51*:													
Lawnwood	B/D	None	---	---	+2-1.0	Perched	Jun-Oct	20-30	Rippable	---	---	High	High.
52*:													
Waveland	B/D	None	---	---	0-1.0	Perched	Jun-Oct	30-50	Rippable	---	---	High	High.
Urban land.													
53 Welaka Variant	A	None	---	---	>6.0	---	---	---	---	---	---	Low	Low.
54 Winder	B/D	None	---	---	+2-1.0	Apparent	Jun-Dec	---	---	---	---	High	Low.
55 Winder	B/D	None	---	---	0-1.0	Apparent	Jun-Dec	---	---	---	---	High	Low.
56 Winder Variant	C/D	None	---	---	0-1.0	Apparent	Jul-Sep	---	---	---	---	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS

Soil series and sample numbers	Depth	Horizon	Particle size distribution (Percent less than 2 mm): 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										Gm/hr	G/cc	Pct (wt)	Pct (wt)	Pct (wt)
Ankona:															
S76FL-111-027-1-----	0-3	A11	0.1	14.7	67.0	12.1	1.1	95.0	3.5	1.5	59.4	1.22	12.3	10.4	5.0
S76FL-111-027-2-----	3-11	A12	0.1	12.4	69.1	14.6	1.7	97.9	1.9	0.2	44.1	1.15	6.1	4.7	2.6
S76FL-111-027-3-----	11-15	A21	0.2	12.2	69.6	8.6	1.3	91.9	7.8	0.3	38.3	1.40	3.7	2.7	1.1
S76FL-111-027-4-----	15-29	A22	0.1	12.4	68.6	16.7	1.7	99.5	0.3	0.2	39.8	1.55	2.7	1.9	0.9
S76FL-111-027-5-----	29-35	A23	0.0	13.3	68.9	15.9	1.6	99.7	0.1	0.2	23.3	1.68	3.3	2.1	0.7
S76FL-111-027-6-----	35-38	A24	0.0	12.8	68.2	16.3	1.6	98.9	0.6	0.5	18.6	1.61	4.4	2.1	0.6
S76FL-111-027-7-----	38-48	B21h	0.1	10.4	57.4	17.9	1.8	87.6	5.0	7.4	0.0	1.71	18.2	16.6	4.1
S76FL-111-027-8-----	48-57	B22tg	0.1	6.8	46.0	27.7	2.7	83.3	2.1	14.6	0.0	1.79	17.1	15.8	7.0
S76FL-111-027-9-----	57-80	Cg	0.1	5.8	41.2	36.6	5.1	88.8	2.4	8.8	0.5	1.68	15.5	12.1	3.9
Electra:															
S75FL-111-015-1-----	0-7	A1	0.0	1.2	19.2	70.4	6.0	96.8	2.6	0.6	20.2	1.34	7.3	4.9	3.3
S75FL-111-015-2-----	7-24	A22	0.0	1.2	21.2	70.5	5.8	98.7	1.2	0.1	13.7	1.41	3.9	2.9	1.5
S75FL-111-015-3-----	24-47	A22	0.0	1.2	17.8	73.0	6.5	98.5	0.9	0.6	13.2	1.50	3.4	2.3	1.4
S75FL-111-015-4-----	47-60	B2h	0.0	1.2	16.3	67.0	6.3	90.8	3.2	6.0	2.1	1.61	12.9	10.2	3.3
S75FL-111-015-5-----	60-80	B2tg	0.0	0.6	11.2	66.3	3.8	81.9	1.6	16.5	0.0	1.68	16.7	13.6	5.9
Floridana:															
S76FL-111-022-1,2---	0-3	A11	0.2	7.0	46.0	38.6	2.5	94.3	3.5	2.2	6.5	1.50	10.8	7.3	2.7
S76FL-111-022-3-----	3-5	A12	0.2	7.0	46.4	37.9	1.7	93.2	2.2	4.6	4.6	1.54	13.2	9.6	2.7
S76FL-111-022-4-----	5-11	A13	0.2	6.3	46.6	38.4	1.5	93.0	1.7	5.3	3.1	1.63	10.0	7.8	3.0
S76FL-111-022-5-----	11-21	A14	0.3	6.6	45.3	33.5	1.2	86.9	2.2	10.9	3.6	1.57	7.9	5.8	2.6
S76FL-111-022-6-----	21-25	A2	0.2	6.9	44.6	32.1	1.1	84.9	3.4	11.7	1.3	1.63	16.8	12.9	4.8
S76FL-111-022-7-----	25-37	B21t&A	0.4	8.5	45.8	28.8	0.8	84.3	3.3	12.4	1.9	1.76	17.9	15.8	6.5
S76FL-111-022-8-----	37-50	B22t&A	0.8	9.8	42.8	28.7	0.8	82.9	3.0	14.1	3.6	1.75	17.9	16.2	9.9
S76FL-111-022-9-----	50-60	B3g	0.5	8.4	41.2	26.5	0.9	77.5	3.7	18.8	0.6	1.81	16.5	14.5	10.0
S76FL-111-022-10----	60-66	C1g	0.3	6.3	38.4	26.5	0.8	72.3	4.8	22.9	1.8	1.67	21.8	20.6	19.4
S76FL-111-022-11----	66-81	C2g	0.2	6.6	38.1	25.8	0.8	71.5	4.5	24.0	0.4	1.83	17.2	15.4	14.3
Hallandale:															
S75FL-111-005-1-----	0-6	Ap	0.1	5.1	43.4	39.8	6.0	94.4	3.3	2.3	13.4	1.47	10.6	8.8	2.5
S75FL-111-005-2-----	6-10	C1	0.1	5.0	37.4	44.5	8.0	95.0	2.3	2.7	8.4	1.60	5.8	4.5	1.1
S75FL-111-005-3-----	10-12	C2	0.1	4.2	37.5	40.0	6.8	88.6	2.6	8.8	0.3	1.79	14.6	13.5	6.5
Hilolo:															
S76FL-111-019-1-----	0-2	A11	0.0	3.2	50.8	32.7	6.6	93.3	2.3	4.4	--	--	--	--	--
S76FL-111-019-2-----	2-7	A12	0.0	1.9	31.2	36.6	11.0	80.7	11.5	7.8	0.9	1.32	28.2	24.0	11.9
S76FL-111-019-3-----	7-12	B21tgca	0.0	1.7	20.2	33.6	11.6	67.1	15.0	17.9	0.6	1.30	27.3	24.1	14.9
S76FL-111-019-4-----	12-28	B22tgca	0.1	1.1	15.0	31.7	10.5	58.4	15.2	26.4	0.7	1.50	21.7	19.2	13.7
S76FL-111-019-5-----	28-36	B23tgca	0.0	1.3	19.7	40.8	13.1	74.9	8.3	16.8	0.6	1.62	21.6	19.2	10.4
S76FL-111-019-6-----	36-43	B24tgca	0.0	1.2	17.4	37.1	10.6	66.3	15.8	17.9	0.3	1.81	17.2	14.1	8.2
S76FL-111-019-7-----	43-50	B31g	0.0	1.4	20.6	46.2	13.9	82.1	5.8	12.1	0.2	1.72	16.7	15.2	6.6
S76FL-111-019-8-----	50-53	B32g	0.0	1.1	16.6	45.8	15.3	78.8	6.9	14.3	0.1	1.72	16.7	14.7	8.2
S76FL-111-019-9-----	53-74	C1g	0.0	1.4	23.6	45.1	17.0	87.1	3.3	9.6	0.0	1.76	18.5	14.0	7.5
S76FL-111-019-10----	74-80	C2g	0.0	0.9	15.5	43.7	21.1	81.2	5.5	13.3	0.0	1.73	17.3	13.7	7.6

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample numbers	Depth	Horizon	Particle size distribution (Percent less than 2 mm)								Hydraulic conductivity (saturated)	Bulk density field moisture	Water content		
			Sand						Silt (0.05-0.002)	Clay (< 0.002)			1/10 bar	1/3 bar	15 bar
			Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)							
	In										Gm/hr	G/cc	Pct (wt)		
Lawnwood:															
S75FL-111-006-1-----	0-4	A11	0.0	7.9	60.2	26.4	2.1	96.6	2.2	1.2	6.7	1.39	9.9	7.6	3.1
S75FL-111-006-2-----	4-8	A12	0.0	5.3	54.9	34.0	3.6	97.8	1.9	0.3	18.9	1.43	7.9	6.5	2.8
S75FL-111-006-3-----	8-15	A21	0.0	6.1	51.9	36.4	4.1	98.5	1.4	0.1	14.9	1.64	4.0	3.1	1.3
S75FL-111-006-4-----	15-28	A22	0.0	5.2	49.6	39.5	4.7	99.0	1.0	0.0	10.0	1.69	3.0	2.2	0.9
S75FL-111-006-5-----	28-52	B21h	0.0	4.7	43.8	37.1	4.5	90.1	3.3	6.6	1.8	1.50	21.0	17.4	4.2
S75FL-111-006-6-----	52-58	B22h	0.0	5.5	48.2	36.0	3.7	93.4	2.9	3.7	3.3	1.52	15.3	11.3	3.5
S75FL-111-006-7-----	58-63	C1	0.0	5.7	51.2	34.7	2.5	94.1	0.1	5.8	--	--	--	--	--
S75FL-111-006-8-----	63-80	C2	0.0	3.1	44.4	42.9	3.5	93.9	0.7	5.4	--	--	--	--	--
Malabar:															
S77FL-111-029-1-----	0-6	A1	0.0	1.2	15.9	64.8	14.3	96.2	2.9	0.9	9.6	1.25	13.8	9.4	3.8
S77FL-111-029-2-----	6-12	A2	0.1	1.6	15.0	63.4	15.1	96.2	2.9	0.9	11.2	1.49	6.4	3.5	0.7
S77FL-111-029-3-----	12-17	B1ir	0.1	1.5	14.9	64.7	16.0	97.2	2.1	0.7	11.5	1.53	6.6	3.7	0.4
S77FL-111-029-4-----	17-24	B2ir	0.0	1.2	14.4	65.0	14.5	95.1	2.7	2.2	6.9	1.61	7.4	4.5	1.6
S77FL-111-029-5-----	24-42	A'2	0.0	1.3	13.6	65.0	17.3	97.2	2.1	0.7	19.0	1.58	5.3	2.6	0.3
S77FL-111-029-6-----	42-72	B'2tg	0.1	1.2	11.6	51.0	18.0	81.9	3.7	14.4	0.0	1.73	17.9	16.1	9.1
S77FL-111-029-7-----	72-80	C	0.0	1.7	24.2	62.8	9.6	98.3	1.2	0.5	--	--	--	--	--
Myakka Variant:															
S76FL-111-024-1-----	12-8	Oe	--	--	--	--	--	--	--	--	--	--	--	--	--
S76FL-111-024-2-----	8-0	Oa	--	--	--	--	--	--	--	--	--	--	--	--	--
S76FL-111-024-3-----	0-6	A21b	0.1	5.2	55.9	37.0	0.8	99.0	0.7	0.3	17.1	1.54	4.8	2.6	1.7
S76FL-111-024-4-----	6-11	A22b	0.3	5.5	53.7	37.9	1.5	98.9	0.7	0.4	11.6	1.62	3.4	2.1	1.3
S76FL-111-024-5-----	11-17	A23b	0.6	6.7	55.3	35.2	1.3	99.1	0.5	0.4	15.5	1.63	2.4	1.2	1.1
S76FL-111-024-6-----	17-26	B21hb	0.5	6.7	54.0	33.4	1.5	96.1	1.5	2.4	--	--	--	--	--
S76FL-111-024-7-----	26-32	B22hb	0.5	7.0	55.8	32.7	1.1	97.1	1.3	1.6	--	--	--	--	--
S76FL-111-024-8-----	32-38	B23hb	1.1	7.6	56.3	32.4	0.9	98.3	0.9	0.8	--	--	--	--	--
S76FL-111-024-9-----	38-65	B24hb	1.0	8.7	49.9	37.8	0.5	97.9	1.2	0.9	--	--	--	--	--
S76FL-111-024-10----	65-72	B25hb	0.6	8.8	62.4	26.2	0.2	98.2	1.0	0.8	--	--	--	--	--
Nettles:															
S75FL-111-012-1-----	0-5	A11	0.0	2.4	57.8	30.8	3.5	94.5	5.2	0.3	18.1	1.43	8.3	6.1	2.9
S75FL-111-012-2-----	5-8	A12	0.0	1.7	53.0	37.9	5.1	97.7	1.9	0.4	21.2	1.42	6.1	4.1	1.2
S75FL-111-012-3-----	8-11	A13	0.0	1.5	51.1	40.3	5.5	98.4	1.4	0.2	14.5	1.50	4.0	2.6	1.0
S75FL-111-012-4-----	11-33	A2	0.0	2.1	52.0	39.2	5.5	98.8	0.9	0.3	18.9	1.60	3.6	3.0	1.1
S75FL-111-012-5-----	33-36	B21h	0.0	1.5	45.1	38.3	4.5	89.4	5.4	5.2	0.0	1.50	24.8	23.9	7.7
S75FL-111-012-6-----	36-39	B22h	0.0	1.5	40.2	36.6	5.4	83.7	5.5	10.8	6.7	1.22	10.6	8.2	4.4
S75FL-111-012-7-----	39-46	B23h	0.0	1.6	46.4	40.8	4.9	93.7	2.6	3.7	9.4	1.48	9.8	7.8	4.0
S75FL-111-012-8-----	46-49	B24h	0.0	1.7	47.6	41.6	4.9	95.8	2.2	2.0	31.1	1.36	8.3	6.3	2.3
S75FL-111-012-9-----	49-55	B24h	0.0	1.5	45.6	42.3	5.0	94.4	2.5	3.1	12.7	1.53	7.4	5.7	2.6
S75FL-111-012-10----	55-77	B21tg	0.0	0.9	25.5	43.7	10.1	80.2	2.5	17.3	12.4	1.57	4.7	3.6	1.4
S75FL-111-012-11----	77-90	B22tg	0.0	0.5	12.2	47.6	20.2	80.5	3.3	16.2	0.2	1.71	19.4	18.0	9.4

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample numbers	Depth	Horizon	Particle size distribution (Percent less than 2 mm)								Hydraulic conductivity (saturated)	Bulk density field moisture	Water content		
			Sand						Silt (0.05-0.002)	Clay (< 0.002)			1/10 bar	1/3 bar	15 bar
			Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)							
	In										Gm/hr	G/cc	Pct (wt)		
Oldsmar:															
S75FL-111-007-1-----	0-1	A11	0.1	11.7	55.4	18.6	2.2	88.0	9.6	2.4	1.7	1.28	30.0	23.6	5.1
S75FL-111-007-2-----	1-5	A12	0.1	12.1	58.9	22.4	3.3	96.8	2.5	0.7	13.5	1.63	7.3	4.9	1.8
S75FL-111-007-3-----	5-19	A2	0.1	12.5	59.0	23.6	3.9	99.1	0.8	0.1	31.6	1.55	4.3	3.6	1.6
S75FL-111-007-4-----	19-32	A2	0.1	11.5	56.6	25.9	4.6	98.7	1.0	0.3	29.2	1.63	3.3	2.6	1.1
S75FL-111-007-5-----	32-34	B1h	0.1	12.3	57.0	24.3	4.2	97.9	1.1	1.0	--	--	--	--	--
S75FL-111-007-6-----	34-41	B21h	0.1	13.8	58.7	19.6	2.6	94.8	0.8	4.4	--	--	--	--	--
S75FL-111-007-7-----	41-42	B22h	0.1	7.1	38.9	42.4	7.3	95.8	2.1	2.1	--	--	--	--	--
S75FL-111-007-8-----	42-65	B21tg	0.1	2.6	25.4	46.6	7.9	82.6	1.7	15.7	--	--	--	--	--
S75FL-111-007-9-----	65-80	B22tg	0.1	1.7	19.5	50.1	10.3	81.7	2.5	15.8	--	--	--	--	--
Pendarvis:															
S76FL-111-026-1-----	0-3	A11	0.0	8.4	71.8	17.6	0.7	98.5	0.0	1.5	--	--	--	--	--
S76FL-111-026-2-----	3-6	A11	0.0	6.7	68.7	22.1	1.2	98.7	1.0	0.3	--	--	--	--	--
S76FL-111-026-3-----	6-13	A21	0.0	7.6	67.4	22.4	1.6	99.0	0.8	0.2	30.6	1.57	2.8	2.2	1.5
S76FL-111-026-4-----	13-22	A21	0.0	7.0	61.4	28.2	2.5	99.1	0.7	0.2	33.7	1.38	2.9	2.1	1.1
S76FL-111-026-5-----	22-36	A21	0.1	7.6	61.7	27.5	2.1	99.0	0.8	0.2	33.7	1.21	3.5	2.8	1.5
S76FL-111-026-6-----	36-48	A22	0.0	6.8	58.8	30.2	2.5	98.3	1.3	0.4	27.4	1.58	5.4	4.5	1.4
S76FL-111-026-7-----	48-62	B1h	0.0	7.8	56.0	18.0	1.1	82.9	10.8	6.3	5.0	1.40	16.4	12.7	5.6
S76FL-111-026-8-----	62-76	B22h	0.0	5.5	62.1	25.3	0.7	93.6	0.9	5.5	3.5	1.65	10.2	8.0	4.0
S76FL-111-026-9-----	76 80	B3	0.0	8.0	62.0	17.4	0.6	88.0	2.3	9.7	5.7	1.68	7.6	5.2	2.5
Pepper:															
S76FL-111-013-1-----	0-6	A11	0.0	1.9	53.4	32.5	4.3	92.1	6.2	1.7	12.9	1.41	10.9	8.0	2.6
S76FL-111-013-2-----	6-9	A12	0.0	1.6	48.3	41.1	6.2	97.2	1.1	1.7	15.5	1.50	5.9	3.9	1.3
S76FL-111-013-3-----	9-23	A2	0.0	1.8	50.7	39.6	5.8	97.9	0.7	1.4	12.9	1.54	4.5	3.0	0.9
S76FL-111-013-4-----	23-28	B21h	0.0	1.8	45.3	37.9	5.5	90.5	3.0	6.5	1.2	1.57	21.4	16.5	4.0
S76FL-111-013-5-----	28-33	B22h	0.0	1.6	43.8	37.7	5.6	88.7	5.3	6.0	0.1	1.49	21.7	16.5	5.4
S76FL-111-013-6-----	33-42	B23h	0.0	1.8	46.6	37.5	5.0	90.9	2.3	6.8	7.4	1.53	8.8	7.6	4.5
S76FL-111-013-7-----	42-48	B24h	0.0	1.8	47.4	38.7	4.6	92.5	2.9	4.6	5.9	1.52	15.1	13.2	4.6
S76FL-111-013-8-----	48-57	B25h	0.0	1.6	47.5	37.7	4.5	91.3	3.4	5.3	2.2	1.57	15.1	11.5	4.8
S76FL-111-013-9-----	57-77	B221tg	0.0	1.4	38.3	37.8	5.4	82.9	7.0	10.1	1.4	1.70	13.7	10.8	4.6
S76FL-111-013-10----	77-100	B22tg	0.0	0.5	14.1	51.4	20.3	86.5	1.6	12.1	0.0	1.62	21.2	17.6	10.4
Pineda:															
S76FL-111-017-1-----	0-3	A11	0.2	6.2	47.3	35.8	0.6	90.1	8.6	1.3	25.4	1.08	27.0	22.0	7.1
S76FL-111-017-2-----	3-6	A12	0.1	7.4	53.4	35.3	0.6	96.8	2.5	0.7	36.7	1.38	10.3	8.4	1.6
S76FL-111-017-3-----	6-12	B21ir	0.2	7.7	50.1	38.9	0.6	97.5	1.3	1.2	35.7	1.46	5.7	5.0	0.7
S76FL-111-017-4-----	12-21	B22ir	0.2	8.4	49.2	38.2	1.0	97.0	0.6	2.4	27.4	1.54	7.5	6.8	3.1
S76FL-111-017-5-----	21-34	B3ir	0.2	7.6	45.7	42.5	1.2	97.2	1.0	1.8	14.2	1.57	5.4	4.0	0.4
S76FL-111-017-6-----	34-38	A'2	0.3	9.2	48.7	37.8	0.7	96.7	1.2	2.1	18.9	1.57	7.6	6.3	0.7
S76FL-111-017-7-----	38-42	B21tg	0.3	7.4	47.7	36.7	0.8	92.9	0.8	6.3	--	--	--	--	--
S76FL-111-017-8-----	42-52	B22tg	0.3	5.7	41.4	31.2	0.7	79.3	1.1	19.6	0.5	1.81	14.6	12.0	7.7
S76FL-111-017-9-----	52-80	Cg	0.5	8.5	45.5	28.3	0.9	83.7	1.8	14.5	--	--	--	--	--

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample numbers	Depth	Horizon	Particle size distribution (Percent less than 2 mm): 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										Gm/hr	G/cc	-----Pct (wt)----		
Riviera:															
S75FL-111-018-1-----	0-5	A1	0.0	1.1	23.3	59.3	12.6	96.3	2.6	1.0	7.8	1.38	23.4	20.3	2.7
S75FL-111-018-2-----	5-14	A21	0.0	1.9	23.0	60.0	12.8	97.7	1.6	0.7	10.6	1.45	7.8	5.9	0.6
S75FL-111-018-3-----	14-23	A22	0.0	1.8	22.5	57.7	11.1	93.1	2.0	4.9	3.6	1.60	7.6	5.5	2.0
S75FL-111-018-4-----	23-44	B21tg&A	0.2	1.7	18.6	49.1	9.6	79.2	2.7	18.1	5.2	1.67	22.0	19.6	11.3
S75FL-111-018-5-----	44-54	B22tg	0.0	1.2	18.7	42.7	7.7	70.3	5.8	23.9	--	--	--	--	--
S75FL-111-018-6-----	54-72	C1g	0.6	2.3	23.1	53.4	8.1	97.5	3.5	9.0	1.5	1.62	17.3	13.9	4.2
S75FL-111-018-7-----	72-80	C2g	0.3	1.7	20.6	56.8	8.6	88.0	6.2	5.8	1.0	1.59	17.3	14.1	5.4
Samsula Variant:															
S76FL-111-023-1-----	0-13	Oa1	--	--	--	--	--	--	--	--	--	--	--	--	--
S76FL-111-023-2-----	13-25	Oa2	--	--	--	--	--	--	--	--	6.1	0.23	312.3	268.8	33.1
S76FL-111-023-3-----	25-29	A1b	0.2	5.0	42.0	26.0	1.4	74.6	19.2	6.2	0.9	0.66	102.1	89.2	20.3
S76FL-111-023-4-----	29-36	A2b	0.4	9.8	58.6	28.8	1.2	98.8	0.0	1.2	5.9	1.50	11.6	7.8	1.4
S76FL-111-023-5-----	36-52	Bhb	0.4	9.0	59.0	28.1	1.0	97.5	0.9	1.6	13.2	1.57	10.2	7.5	1.7
St. Lucie:															
S75FL-111-010-1-----	0-6	A1	0.1	7.2	72.3	18.1	0.6	98.3	1.2	0.5	70.9	1.38	3.8	3.4	1.8
S75FL-111-010-2-----	6-8	C1	0.0	6.8	73.8	17.7	0.5	98.8	1.2	0.0	77.6	1.47	3.2	2.7	1.5
S75FL-111-010-3-----	8-26	C2	0.0	9.0	73.5	16.3	0.6	99.5	0.3	0.2	67.9	1.55	2.9	2.5	1.5
S75FL-111-010-4-----	26-50	C3	0.1	9.7	71.3	17.6	0.5	99.2	0.8	0.0	58.1	1.58	2.2	1.9	1.2
S75FL-111-010-5-----	50-80	C3	0.1	9.9	71.8	16.9	0.4	99.1	0.9	0.0	--	--	--	--	--
Susanna:															
S75FL-111-014-1-----	0-6	A1	0.3	15.4	63.8	15.1	2.3	96.9	1.3	1.8	41.3	1.43	9.5	7.7	3.4
S75FL-111-014-2-----	6-18	A21	0.4	11.3	54.8	24.3	6.9	97.7	1.6	0.7	12.9	1.62	4.5	3.1	1.2
S75FL-111-014-3-----	18-25	A22	0.5	11.6	49.9	26.9	9.2	98.1	1.2	0.7	11.9	1.67	3.9	2.4	0.9
S75FL-111-014-4-----	25-29	B2h	0.6	10.2	45.0	20.8	6.1	82.7	7.0	10.3	0.4	1.47	25.1	22.0	7.8
S75FL-111-014-5-----	29-41	B21t	0.4	9.6	47.4	18.8	5.5	81.7	2.8	15.5	0.7	1.55	19.1	16.3	9.0
S75FL-111-014-6-----	41-48	B22t	0.5	11.7	45.2	16.5	7.6	81.5	2.9	15.6	0.3	1.67	18.9	16.9	6.4
S75FL-111-014-7-----	48-63	C1	0.5	10.7	48.2	16.2	9.0	84.6	3.7	11.7	0.3	1.53	23.8	21.8	9.1
S75FL-111-014-8-----	63-80	C2	0.4	11.7	54.5	16.6	7.1	90.3	2.3	7.4	--	--	--	--	--
Tantile:															
S75FL-111-011-1-----	0-2	A11	0.0	5.7	66.5	22.6	1.7	96.5	3.0	0.5	21.2	1.47	9.3	7.8	4.5
S75FL-111-011-2-----	2-5	A12	0.0	6.6	68.8	20.8	1.4	97.6	1.9	0.5	27.4	1.30	7.2	6.0	2.0
S75FL-111-011-3-----	5-9	A13	0.0	6.0	64.1	25.3	2.4	97.8	1.7	0.5	35.1	1.39	5.9	4.7	1.4
S75FL-111-011-4-----	9-16	A21	0.0	5.3	63.0	27.5	2.7	98.5	1.5	0.0	27.7	1.47	2.8	2.2	0.9
S75FL-111-011-5-----	16-26	A22	0.0	4.9	56.7	32.5	4.4	98.5	1.5	0.0	29.2	1.55	2.7	2.0	1.0
S75FL-111-011-6-----	26-34	B21h	0.0	5.5	53.1	27.5	3.3	89.4	4.5	6.1	2.6	1.79	10.1	8.3	3.0
S75FL-111-011-7-----	34-39	B22h	0.0	5.0	55.4	30.6	2.5	93.5	2.5	4.0	30.0	1.49	5.9	4.4	2.0
S75FL-111-011-8-----	39-43	B3&Bh	0.0	5.6	58.1	27.2	2.6	93.5	2.2	4.3	18.2	1.58	5.3	4.1	1.9
S75FL-111-011-9-----	43-49	B3&Bh	0.0	5.0	54.0	30.8	3.3	93.1	2.3	4.6	7.4	1.64	7.2	5.5	1.8
S75FL-111-011-10----	49-59	B3	0.0	5.6	51.7	26.1	2.5	85.9	1.8	12.3	1.5	1.77	11.2	9.6	4.8
S75FL-111-011-11----	59-69	A'2	0.0	3.5	47.1	38.2	8.9	97.7	1.4	0.9	9.2	1.62	3.2	2.0	0.4
S75FL-111-011-12----	69-80	B'tg	0.0	1.8	30.4	36.3	13.6	82.1	2.8	15.1	0.4	1.75	15.6	13.0	8.1

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample numbers	Depth	Horizon	Particle size distribution (Percent less than 2 mm): Sand: Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	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	1/3 bar	15 bar
	In										Gm/hr	G/cc	-----Pct (wt)----		
Wabasso:															
S75FL-111-016-1-----	0-4	A11	0.1	9.4	54.6	28.6	0.6	93.3	4.4	2.3	20.2	1.31	14.3	11.1	3.3
S75FL-111-016-2-----	4-8	A12	0.2	8.7	55.7	31.7	0.7	97.0	2.1	0.9	26.9	1.43	8.8	6.3	5.6
S75FL-111-016-3-----	8-16	A21	0.4	8.5	53.8	35.3	1.0	99.0	0.5	0.5	25.4	1.52	4.1	4.0	1.9
S75FL-111-016-4-----	16-25	A22	0.4	8.9	48.9	40.0	1.2	99.4	0.2	0.4	35.2	1.48	7.9	4.3	2.0
S75FL-111-016-5-----	25-30	B21h	0.3	10.0	51.3	35.2	0.9	97.7	1.0	1.3	9.1	1.61	8.2	5.8	1.4
S75FL-111-016-6-----	30-34	B22h	0.3	9.1	46.3	30.0	0.9	86.6	0.7	12.7	0.8	1.72	21.9	15.6	4.2
S75FL-111-016-7-----	34-48	B21tg	0.3	7.2	42.3	34.7	0.7	85.2	1.1	13.7	1.9	1.71	11.4	8.8	4.4
S75FL-111-016-8-----	48-60	B22tg	0.5	7.8	41.9	25.6	1.2	77.0	5.6	17.4	--	--	--	--	--
S75FL-111-016-9-----	60-80	Cg	0.2	8.3	46.0	34.9	0.6	90.0	1.2	8.8	0.1	1.77	6.4	4.7	2.9
Waveland:															
S75FL-111-009-1-----	0-4	A11	0.0	1.8	39.7	50.4	4.5	96.4	3.1	0.5	26.6	1.33	8.0	7.2	3.0
S75FL-111-009-2-----	4-8	A12	0.0	2.6	45.1	46.7	4.0	98.4	1.4	0.2	23.4	1.41	5.2	4.7	2.2
S75FL-111-009-3-----	8-17	A21	0.0	3.1	42.4	48.7	4.5	98.7	1.0	0.3	15.4	1.54	3.5	3.3	1.7
S75FL-111-009-4-----	17-32	A22	0.0	3.0	41.0	50.6	4.4	99.0	0.6	0.4	15.5	1.56	5.0	4.7	1.6
S75FL-111-009-5-----	32-40	B21h	0.0	2.6	35.3	43.0	3.4	84.3	11.3	4.4	0.1	0.99	53.0	49.7	14.7
S75FL-111-009-6-----	40-49	B22h	0.0	2.7	37.2	47.4	3.6	90.9	5.1	4.0	3.9	1.34	17.0	13.5	4.8
S75FL-111-009-7-----	49-53	B22h	0.0	2.6	37.1	49.2	4.1	93.0	2.9	4.1	7.9	1.53	5.5	2.5	3.1
S75FL-111-009-8-----	53-57	C1	0.0	2.5	33.9	48.4	4.2	89.0	2.3	8.7	0.7	1.66	15.2	11.1	5.6
S75FL-111-009-9-----	57-66	C2	0.0	2.9	36.4	39.4	3.3	82.0	1.8	16.2	0.1	1.63	18.8	15.6	8.2
S75FL-111-009-10----	66-75	C3	0.0	2.4	33.3	51.8	3.9	91.4	1.6	7.0	1.3	1.63	12.1	6.2	3.1
S75FL-111-009-11----	75-81	C4	0.0	1.4	25.1	60.8	6.1	93.4	1.7	4.9	--	--	--	--	--
Welaka Variant:															
S75FL-111-003-1-----	0-5	Ap	0.2	8.8	63.5	17.3	2.0	91.8	4.9	3.3	23.2	1.33	12.0	9.4	5.9
S75FL-111-003-2-----	5-8	A21	0.1	9.1	70.8	17.2	0.7	97.9	1.3	0.8	52.8	1.46	2.9	2.5	1.3
S75FL-111-003-3-----	8-18	A22	0.2	8.9	73.1	17.0	0.2	99.4	0.4	0.2	63.4	1.54	2.8	2.3	0.9
S75FL-111-003-4-----	18-21	B1	0.2	8.4	71.9	18.0	0.2	98.7	0.6	0.7	49.2	1.48	2.7	1.9	0.9
S75FL-111-003-5-----	21-35	B21ir	0.1	7.9	68.6	20.9	0.5	98.0	1.0	1.0	55.1	1.47	7.5	6.1	0.5
S75FL-111-003-6-----	35-55	B22ir	0.2	10.1	64.1	22.4	0.3	97.1	1.2	1.7	53.9	1.64	3.8	3.2	0.7
S75FL-111-003-7-----	55-76	B22ir	0.5	12.7	62.5	22.0	0.3	98.0	0.4	1.6	33.6	1.72	1.9	1.4	0.3
S75FL-111-003-8-----	76-96	B23ir	0.3	2.9	62.3	23.0	0.3	98.8	0.5	0.7	27.8	1.68	9.8	8.2	0.2
Winder:															
S77FL-111-033-1-----	0-3	A11	0.2	2.3	31.5	39.2	12.5	84.7	8.0	6.3	--	--	--	--	--
S77FL-111-033-2-----	3-6	A12	0.1	2.3	31.4	40.4	11.9	86.1	9.0	4.9	--	--	--	--	--
S77FL-111-033-3-----	6-9	A21	0.1	2.4	34.8	42.2	14.5	94.0	3.6	2.4	--	--	--	--	--
S77FL-111-033-4-----	9-12	A22	0.1	2.4	33.2	44.8	14.9	95.4	3.0	1.6	--	--	--	--	--
S77FL-111-033-5-----	12-21	B&A	0.1	1.8	23.9	35.0	13.4	74.2	5.5	20.3	--	--	--	--	--
S77FL-111-033-6-----	21-33	B21tg	0.1	2.2	28.6	39.8	12.0	82.7	3.6	13.7	--	--	--	--	--
S77FL-111-033-7-----	33-49	B22tg	0.0	2.0	29.0	39.0	13.4	83.4	3.9	12.7	--	--	--	--	--
S77FL-111-033-8-----	49-61	B3	0.1	4.0	32.0	34.1	14.2	84.4	4.6	11.0	--	--	--	--	--
S77FL-111-033-9-----	61-80	C	0.2	4.9	41.1	37.7	7.9	91.8	2.3	5.9	--	--	--	--	--

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS

Soil name and sample numbers	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	$CaCl_2$ 0.01M (1:2)	KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
			--Milliequivalents/100 grams of soil---							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Ankona:																				
S76FL-111-027-1-	0-3	A11	0.63	0.28	0.02	0.04	0.97	6.71	7.68	13	2.10	0.06	4.2	3.2	2.8	--	--	--	--	--
S76FL-111-027-2-	3-11	A12	0.10	0.09	0.02	0.02	0.23	2.60	2.83	8	0.79	0.03	4.7	3.4	3.0	--	--	--	--	--
S76FL-111-027-3-	11-15	A21	0.00	0.02	0.00	0.00	0.02	0.87	0.89	2	0.28	0.02	4.8	3.7	3.3	--	--	--	--	--
S76FL-111-027-4-	15-29	A22	0.00	0.00	0.00	0.00	0.00	0.43	0.43	--	0.10	0.02	6.2	4.6	4.3	--	--	--	--	--
S76FL-111-027-5-	29-35	A23	0.01	0.00	0.00	0.00	0.01	0.22	0.23	4	0.08	0.04	5.3	4.6	4.1	--	--	--	--	--
S76FL-111-027-6-	35-38	A24	0.02	0.02	0.01	0.00	0.05	0.65	0.70	7	0.15	0.04	4.9	3.9	3.6	0.15	0.00	0.02	0.00	0.04
S76FL-111-027-7-	38-48	B21h	0.16	0.33	0.03	0.00	0.52	31.8	32.4	2	3.36	0.06	4.5	3.7	3.5	2.62	0.02	0.58	0.27	0.03
S76FL-111-027-8-	48-57	B22tg	0.41	1.18	0.09	0.03	1.71	10.4	12.1	14	0.40	0.05	4.8	3.9	3.6	--	--	--	--	--
S76FL-111-027-9-	57-80	Cg	0.44	1.32	0.08	0.03	1.87	5.85	7.72	24	0.20	0.06	5.0	4.0	3.7	--	--	--	--	--
Electra:																				
S75FL-111-015-1-	0-7	A1	0.49	0.16	0.08	0.02	0.75	5.83	6.58	11	0.77	0.08	4.3	3.5	3.2	--	--	--	0.02	0.05
S75FL-111-015-2-	7-24	A22	0.04	0.02	0.01	0.00	0.07	0.72	0.79	9	0.09	0.02	5.5	4.3	4.1	--	--	--	--	--
S75FL-111-015-3-	24-47	A22	0.03	0.02	0.01	0.00	0.06	0.35	0.41	15	0.05	0.02	6.3	5.5	5.0	--	--	--	0.00	0.05
S75FL-111-015-4-	47-60	B2h	0.09	0.04	0.03	0.01	0.17	7.06	7.23	2	0.82	0.03	5.0	4.0	4.0	0.38	0.00	0.10	0.10	0.04
S75FL-111-015-5-	60-80	B2tg	0.13	0.19	0.05	0.02	0.39	9.36	9.75	4	0.33	0.04	5.0	4.2	4.1	--	--	--	0.20	0.05
Floridana:																				
S76FL111-022-1-2	0-3	A11	2.19	0.18	0.05	0.02	2.44	3.24	5.68	43	0.96	0.06	5.7	5.1	4.9	--	--	--	0.04	0.06
S76FL-111-022-3-	3-5	A12	2.84	0.25	0.08	0.02	3.19	2.31	5.50	58	0.56	0.10	5.5	5.4	5.0	--	--	--	0.03	0.04
S76FL-111-022-4-	5-11	A13	2.94	0.26	0.09	0.01	3.30	2.02	5.32	62	0.24	0.10	5.3	5.2	4.8	--	--	--	0.02	0.06
S76FL-111-022-5-	11-21	A14	5.34	0.48	0.18	0.02	6.02	4.55	10.6	57	0.32	0.44	4.6	4.5	4.1	--	--	--	0.03	0.10
S76FL-111-022-6-	21-25	A2	6.78	0.55	0.17	0.03	7.53	4.98	12.5	60	0.41	0.60	4.5	4.4	3.9	--	--	--	0.03	0.09
S76FL-111-022-7-	25-37	B21t&A	7.16	0.65	0.13	0.04	7.98	3.25	11.2	71	0.34	0.44	4.8	4.7	4.2	--	--	--	0.01	0.08
S76FL-111-022-8-	37-50	B22t&A	7.94	0.58	0.13	0.06	8.71	4.76	13.5	65	0.12	0.46	4.5	4.4	3.9	--	--	--	0.01	0.09
S76FL-111-022-9-	50-60	B3g	12.66	0.84	0.15	0.08	13.73	6.93	20.7	66	0.11	0.36	4.7	4.5	3.9	--	--	--	0.01	0.10
S76FL-111-022-10	60-66	C1g	12.59	0.82	0.16	0.08	13.65	6.64	20.3	67	0.09	0.30	5.3	5.3	4.5	--	--	--	0.02	0.43
S76FL-111-022-11	66-81	C2g	12.90	0.93	0.15	0.08	14.06	7.79	21.9	64	0.11	0.65	5.2	4.8	4.1	--	--	--	0.01	0.10
Hallandale:																				
S75FL-111-005-1-	0-6	Ap	1.40	0.60	T*	0.60	2.60	3.40	6.00	43	0.91	0.13	6.0	5.2	4.8	--	--	--	0.03	0.07
S75FL-111-005-2-	6-10	C1	1.40	0.40	T	0.30	2.10	1.90	4.00	53	0.28	0.09	6.2	5.7	5.2	--	--	--	0.03	0.06
S75FL-111-005-3-	10-12	C2	0.70	1.20	T	0.60	2.50	3.40	5.90	42	0.42	0.17	7.0	6.8	6.4	--	--	--	0.06	0.20
Hilolo:																				
S76FL-111-019-1-	0-2	A11	12.12	0.75	0.04	0.10	13.01	1.13	14.1	92	1.30	0.22	7.7	7.3	7.3	--	--	--	0.03	0.05
S76FL-111-019-2-	2-7	A12	25.31	0.72	0.10	0.11	26.24	3.54	29.1	88	3.06	0.33	7.6	7.2	7.0	--	--	--	0.08	0.18
S76FL-111-019-3-	7-12	B21tgca	30.70	0.54	0.11	0.06	31.41	3.20	34.6	91	2.56	0.28	7.9	7.5	7.3	--	--	--	0.08	0.21
S76FL-111-019-4-	12-28	B22tgca	25.70	0.27	0.10	0.03	26.10	1.56	27.7	94	1.04	0.24	8.2	7.6	7.5	--	--	--	0.04	0.10
S76FL-111-019-5-	28-36	B23tgca	26.64	0.89	0.24	0.04	27.81	3.46	31.3	89	0.21	0.34	8.4	7.7	7.3	--	--	--	0.07	0.80
S76FL-111-019-6-	36-43	B24tgca	23.83	0.49	0.36	0.02	24.70	1.56	26.3	94	0.18	0.34	8.2	7.6	7.2	--	--	--	0.06	0.40
S76FL-111-019-7-	43-50	B31g	21.09	0.45	0.77	0.03	22.34	1.90	24.2	92	0.19	0.32	8.7	7.8	7.4	--	--	--	0.04	0.10
S76FL-111-019-8-	50-53	B32g	21.95	0.43	1.13	0.04	23.55	2.25	25.8	91	0.23	0.47	8.8	7.9	7.5	--	--	--	0.04	0.08
S76FL-111-019-9-	53-74	C1g	13.88	0.20	0.80	0.04	14.92	1.47	16.4	91	0.07	0.44	8.7	7.7	7.4	--	--	--	0.04	0.09
S76FL-111-019-10	74-80	C2g	15.00	0.26	0.92	0.07	16.25	2.25	18.5	88	0.05	0.40	8.8	7.8	7.5	--	--	--	0.04	0.04

See footnote at end of table.

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample numbers	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum	Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	pH: $CaCl_2$ 0.01M (1:2)	pH: KCl 1N (1:1)	Pyrophosphate extractable: C	Pyrophosphate extractable: Fe	Pyrophosphate extractable: Al	Citrate dithionite extractable: Al	Citrate dithionite extractable: Fe
			--Milliequivalents/100 grams of soil---							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Lawnwood:																				
S75FL-111-006-1-	0-4	A11	0.20	0.10	0.10	T	0.40	3.70	4.10	10	1.01	0.07	4.5	3.8	3.2	--	--	--	--	--
S75FL-111-006-2-	4-8	A12	0.10	0.10	T	T	0.20	2.40	2.60	8	0.57	0.06	4.6	3.7	3.3	0.26	0.00	0.00	--	--
S75FL-111-006-3-	8-15	A21	T	T	T	T	T	0.20	1.20	--	0.20	0.03	5.2	4.0	3.5	0.14	0.00	0.00	--	--
S75FL-111-006-4-	15-28	A22	T	T	T	0.00	T	0.50	0.50	--	0.10	0.04	5.9	5.2	4.2	0.10	0.00	0.00	0.00	0.02
S75FL-111-006-5-	28-52	B21h	0.30	0.50	0.20	T	1.00	22.3	23.3	4	2.36	0.15	4.8	4.1	3.9	1.88	0.00	0.29	0.24	0.05
S75FL-111-006-6-	52-58	B22h	0.10	0.30	0.10	T	0.50	8.90	9.40	5	0.83	0.10	5.3	4.5	4.3	0.66	0.00	0.19	0.19	0.06
S75FL-111-006-7-	58-63	C1	0.10	0.60	0.10	T	0.80	2.90	3.70	22	0.14	0.08	5.5	4.5	4.1	--	--	--	--	--
S75FL-111-006-8-	63-80	C2	0.20	0.70	0.20	T	1.10	2.50	3.60	31	0.13	0.11	5.4	4.5	4.2	--	--	--	--	--
Malabar:																				
S77FL-111-029-1-	0-6	A1	4.28	1.08	0.04	0.06	5.46	1.77	7.23	76	1.19	0.13	6.9	6.3	6.4	--	--	--	--	--
S77FL-111-029-2-	6-12	A2	1.22	0.20	0.02	0.02	1.46	0.86	2.32	63	0.35	0.06	6.9	6.4	6.4	--	--	--	--	--
S77FL-111-029-3-	12-17	B1ir	0.58	0.12	0.05	0.01	0.76	0.56	1.32	58	0.14	0.10	6.8	6.5	6.5	0.02	0.05	0.05	0.03	0.09
S77FL-111-029-4-	17-24	B2ir	0.34	0.08	0.00	0.01	0.43	0.30	0.73	59	0.07	0.03	7.0	6.6	6.6	0.00	0.06	0.02	0.04	1.16
S77FL-111-029-5-	24-42	A'2	0.17	0.08	0.01	0.01	0.27	0.09	0.36	75	0.05	0.04	7.0	6.9	6.8	--	--	--	--	--
S77FL-111-029-6-	42-72	B'2tg	5.61	0.19	0.96	0.26	7.02	3.02	10.0	70	0.20	0.24	7.7	6.6	5.8	--	--	--	0.02	0.06
S77FL-111-029-7-	72-80	C	0.06	0.02	0.09	0.00	0.17	0.13	0.30	57	0.03	0.14	5.7	6.3	5.4	--	--	--	--	--
Myakka Variant:																				
S76FL-111-024-1-	12-8	Oe	9.97	3.80	5.17	0.90	19.84	89.6	109	18	42.8	5.75	4.7	4.3	4.1	--	--	--	--	--
S76FL-111-024-2-	8-0	Oa	4.41	4.12	0.99	0.17	9.69	49.6	59.3	16	12.7	1.40	4.7	4.1	3.9	--	--	--	--	--
S76FL-111-024-3-	0-6	A21b	0.16	0.10	0.07	0.00	0.33	1.01	1.34	25	0.31	0.05	5.4	4.6	4.4	--	--	--	--	--
S76FL-111-024-4-	6-11	A22b	0.12	0.06	0.04	0.00	0.22	0.58	0.80	28	0.22	0.03	5.3	4.7	4.5	--	--	--	--	--
S76FL-111-024-5-	11-17	A23b	0.08	0.05	0.03	0.00	0.16	0.43	0.59	27	0.10	0.04	5.4	5.0	4.6	--	--	--	--	--
S76FL-111-024-6-	17-26	B21hb	0.23	0.20	0.07	0.01	0.51	4.91	5.42	9	0.73	0.05	5.2	4.6	4.4	0.63	0.00	0.15	0.10	0.03
S76FL-111-024-7-	26-32	B22hb	0.15	0.13	0.03	0.01	0.32	3.46	3.78	8	0.40	0.05	5.2	4.9	4.5	0.36	0.00	0.15	0.09	0.03
S76FL-111-024-8-	32-38	B23hb	0.06	0.05	0.03	0.00	0.14	1.44	1.58	9	0.20	0.04	5.4	5.0	4.6	0.15	0.00	0.05	0.05	0.04
S76FL-111-024-9-	38-65	B24hb	0.18	0.09	0.05	0.01	0.33	4.33	4.66	7	0.56	0.06	5.5	4.8	4.6	0.56	0.00	0.20	0.12	0.05
S76FL-111-024-10	65-72	B25hb	0.14	0.08	0.03	0.01	0.26	4.19	4.45	6	0.54	0.04	5.6	5.0	4.7	0.53	0.00	0.20	0.13	0.04
Nettles:																				
S75FL-111-012-1-	0-5	A11	0.52	0.34	0.07	0.04	0.97	7.51	8.48	11	2.22	0.08	4.5	3.4	3.2	--	--	--	0.02	0.06
S75FL-111-012-2-	5-8	A12	0.18	0.09	0.06	0.09	0.42	1.34	1.76	24	0.46	0.08	4.4	3.7	3.6	--	--	--	--	--
S75FL-111-012-3-	8-11	A13	0.13	0.03	0.06	0.02	0.24	0.58	0.82	29	0.17	0.06	4.9	4.1	3.9	--	--	--	--	--
S75FL-111-012-4-	11-33	A2	0.01	0.02	0.01	0.00	0.04	0.08	0.12	33	0.02	0.02	6.7	5.2	5.5	--	--	--	0.00	0.03
S75FL-111-012-5-	33-36	B21h	0.90	1.31	0.17	0.01	2.39	19.9	20.3	12	4.14	0.12	4.5	3.6	3.3	3.70	0.02	0.22	0.20	0.03
S75FL-111-012-6-	36-39	B22h	0.26	0.40	0.11	0.01	0.78	19.9	20.7	4	1.97	0.10	4.7	3.9	3.8	2.40	0.01	0.32	0.27	0.03
S75FL-111-012-7-	39-46	B23h	0.10	0.12	0.06	0.01	0.29	10.9	11.1	3	1.03	0.08	4.9	4.2	4.2	0.90	0.01	0.25	0.24	0.04
S75FL-111-012-8-	46-49	B24h	0.06	0.06	0.02	0.00	0.14	6.18	6.32	2	0.50	0.04	5.2	4.3	4.3	0.43	0.02	0.15	0.16	0.04
S75FL-111-012-9-	49-55	B24h	0.11	0.07	0.03	0.01	0.22	4.67	4.89	4	0.44	0.04	5.3	4.4	4.4	0.33	0.01	0.15	0.14	0.04
S75FL-111-012-10	55-77	B21tg	2.46	2.51	0.31	0.06	5.34	2.84	8.18	65	0.11	0.01	5.2	4.3	3.8	--	--	--	0.04	0.04
S75FL-111-012-11	77-90	B22tg	3.26	2.88	0.32	0.06	6.52	4.84	11.4	57	0.21	0.10	5.5	4.3	3.9	--	--	--	0.04	0.06

See footnote at end of table.

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample numbers	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum	Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	pH: $CaCl_2$ 0.01M (1:2)	pH: KCl 1N (1:1)	Pyrophosphate extractable: C	Pyrophosphate extractable: Fe	Pyrophosphate extractable: Al	Citrate dithionite extractable: Al	Citrate dithionite extractable: Fe
			--Milliequivalents/100 grams of soil---							Pct	Pct	Mmho/cm				Pct	Pct	Pct	Pct	Pct
Oldsmar:																				
S75FL-111-007-1-	0-1	A11	0.90	0.40	0.20	0.10	1.60	11.3	12.9	12	4.28	0.29	4.1	3.6	3.3	--	--	--	--	--
S75FL-111-007-2-	1-5	A12	0.10	T	T	T	0.10	4.30	4.40	2	0.84	0.06	4.7	3.8	3.6	--	--	--	--	--
S75FL-111-007-3-	5-19	A2	T	T	0.00	0.00	T	0.30	0.30	--	0.06	0.04	6.7	5.9	4.9	--	--	--	--	--
S75FL-111-007-4-	19-32	A2	T	T	T	0.00	T	0.20	0.20	--	0.04	0.04	7.0	6.4	5.2	--	--	--	--	--
S75FL-111-007-5-	32-34	B1	T	T	T	0.00	T	0.40	0.40	--	0.07	0.04	6.5	5.8	4.8	0.13	0.00	0.02	0.01	0.02
S75FL-111-007-6-	34-41	B21h	0.50	0.30	T	T	0.80	3.50	4.30	19	0.49	0.08	5.6	4.7	4.3	0.33	0.00	0.06	0.04	0.02
S75FL-111-007-7-	41-42	B22h	1.00	0.30	0.10	T	1.40	4.80	6.20	23	2.89	0.12	5.7	5.0	4.5	0.61	0.02	0.05	0.04	0.05
S75FL-111-007-8-	42-65	B21tg	3.00	2.70	0.20	T	5.90	3.90	9.80	60	0.24	0.10	5.9	5.2	4.3	0.18	0.07	0.52	--	--
S75FL-111-007-9-	65-80	B22tg	3.30	3.00	0.20	T	6.50	4.00	10.5	62	0.18	0.14	5.7	4.9	4.2	0.18	0.11	0.88	--	--
Pendarvis:																				
S76FL-111-026-1-	0-3	A11	0.69	0.12	0.00	0.02	0.83	0.87	1.70	49	0.40	0.04	5.5	4.3	4.2	--	--	--	--	--
S76FL-111-026-2-	3-6	A11	0.53	0.09	0.00	0.02	0.64	1.15	1.79	36	0.37	0.04	5.5	4.3	4.3	--	--	--	--	--
S76FL-111-026-3-	6-13	A21	0.15	0.03	0.00	0.01	0.19	0.52	0.71	27	0.21	0.02	6.1	4.6	4.4	--	--	--	--	--
S76FL-111-026-4-	13-22	A21	0.08	0.02	0.00	0.00	0.10	0.26	0.36	28	0.11	0.02	6.2	5.1	4.7	--	--	--	--	--
S76FL-111-026-5-	22-36	A21	0.03	0.02	0.00	0.00	0.05	0.14	0.19	26	0.12	0.02	5.9	4.8	4.0	--	--	--	--	--
S76FL-111-026-6-	36-48	A22	0.03	0.02	0.00	0.00	0.05	0.43	0.48	10	0.12	0.01	5.8	4.2	3.6	--	--	--	--	--
S76FL-111-026-7-	48-62	B1h	0.07	0.16	0.02	0.01	0.26	42.9	43.1	1	3.73	0.06	4.2	3.5	3.4	3.00	0.03	0.58	0.35	0.04
S76FL-111-026-8-	62-76	B22h	0.01	0.07	0.02	0.01	0.11	6.50	6.61	2	0.22	0.04	4.9	4.1	4.0	0.20	0.03	0.38	0.10	0.04
S76FL-111-026-9-	76-80	B3	0.02	0.07	0.00	0.01	0.10	14.9	15.0	1	0.67	0.04	4.6	3.9	3.8	--	--	--	--	--
Pepper:																				
S76FL-111-013-1-	0-6	A11	0.65	0.43	0.16	0.05	1.29	6.34	7.63	17	1.75	0.24	4.1	3.4	3.3	--	--	--	0.02	0.05
S76FL-111-013-2-	6-9	A12	0.08	0.11	0.02	0.01	0.22	1.34	1.56	14	0.51	0.04	5.0	3.9	3.6	--	--	--	0.00	0.05
S76FL-111-013-3-	9-23	A2	0.03	0.07	0.00	0.01	0.11	0.67	0.78	14	0.25	0.03	5.6	3.8	3.8	--	--	--	0.00	0.03
S76FL-111-013-4-	23-28	B21h	1.18	2.55	0.28	0.01	4.02	17.0	21.0	19	2.99	0.12	4.8	3.9	3.5	2.76	0.04	0.15	0.12	0.05
S76FL-111-013-5-	28-33	B22h	1.32	2.84	0.35	0.00	4.51	23.6	28.1	16	3.98	0.19	4.7	3.9	3.6	4.43	0.03	0.40	0.30	0.04
S76FL-111-013-6-	33-42	B23h	0.58	1.23	0.17	0.00	1.98	18.9	20.9	9	1.79	0.10	5.2	4.4	4.1	1.64	0.03	0.35	0.32	0.05
S76FL-111-013-7-	42-48	B24h	0.38	0.77	0.15	0.00	1.30	17.0	18.3	7	1.67	0.14	5.3	4.5	4.3	1.50	0.05	0.50	0.48	0.06
S76FL-111-013-8-	48-57	B25h	0.37	0.75	0.17	0.00	1.29	13.3	14.6	9	1.28	0.14	5.3	4.6	4.4	1.27	0.05	0.50	0.42	0.06
S76FL-111-013-9-	57-77	B21tg	0.94	3.17	0.34	0.03	4.48	5.84	10.3	43	0.47	0.12	5.3	4.6	4.2	--	--	--	0.13	0.05
S76FL-111-013-10	77-99	B22tg	1.89	2.47	0.43	0.04	4.83	4.01	8.84	55	0.15	0.21	5.4	4.4	4.2	--	--	--	0.06	0.08
Pineda:																				
S75FL-111-017-1-	0-3	A11	9.45	0.71	0.30	0.07	10.53	3.97	14.5	73	3.38	0.26	6.7	6.3	6.2	--	--	--	0.04	0.26
S75FL-111-017-2-	3-6	A12	2.41	0.16	0.11	0.01	2.69	0.52	3.21	84	0.52	0.18	8.0	7.3	7.3	--	--	--	0.04	0.24
S75FL-111-017-3-	6-12	B21ir	2.38	0.12	0.11	0.01	2.62	0.43	3.05	86	0.42	0.15	8.4	7.5	7.5	0.00	0.06	0.00	0.04	0.22
S75FL-111-017-4-	12-21	B22ir	0.74	0.06	0.15	0.00	0.95	0.17	1.12	85	0.07	0.25	8.2	7.4	7.4	0.08	0.02	0.00	0.05	0.73
S75FL-111-017-5-	21-34	B3ir	0.54	0.04	0.11	0.00	0.68	0.26	0.95	72	0.06	0.38	6.1	6.1	5.8	--	--	--	0.02	0.11
S75FL-111-017-6-	34-38	A'2	1.24	0.12	0.29	0.00	1.65	0.43	2.08	79	0.05	0.55	6.8	6.6	6.2	--	--	--	0.02	0.11
S75FL-111-017-7-	38-42	B21tg	2.49	0.25	0.31	0.01	3.06	1.12	4.18	73	0.06	0.56	6.7	6.4	5.9	--	--	--	0.04	0.18
S75FL-111-017-8-	42-52	B21tg	7.70	0.76	0.28	0.06	8.80	3.20	12.0	73	0.06	0.32	7.2	6.8	6.0	--	--	--	0.06	0.37
S75FL-111-017-9-	52-80	Cg	6.50	0.65	0.19	0.05	7.39	3.11	10.5	70	0.06	0.20	7.6	7.0	6.3	--	--	--	0.04	0.12

See footnote at end of table.

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample numbers	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	$CaCl_2$ 0.01M (1:2)	KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
			--Milliequivalents/100 grams of soil---							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Riviera:																				
S75FL-111-018-1-	0-5	A1	0.31	0.14	0.04	0.04	0.53	4.10	4.63	11	0.57	0.04	4.9	4.0	3.8	--	--	--	0.04	0.05
S75FL-111-018-2-	5-14	A21	0.06	0.03	0.02	0.00	0.11	1.31	1.42	8	0.11	0.03	5.5	4.4	4.3	--	--	--	--	--
S75FL-111-018-3-	14-23	A22	2.81	0.80	0.15	0.01	3.77	1.47	5.24	72	0.11	0.30	6.6	6.2	6.1	--	--	--	0.04	0.09
S75FL-111-018-4-	23-44	B21tg&A	16.08	2.42	2.37	0.04	20.91	2.85	23.8	88	0.14	1.85	7.9	7.4	7.2	--	--	--	0.06	0.56
S75FL-111-018-5-	44-54	B22tg	17.35	0.89	0.39	0.09	18.72	1.64	20.4	92	0.14	0.75	7.8	7.4	7.3	--	--	--	--	--
S75FL-111-018-6-	54-72	C1g	18.88	0.88	0.44	0.07	20.27	1.30	21.6	94	0.12	0.90	7.6	7.4	7.3	--	--	--	--	--
S75FL-111-018-7-	72-80	C2g	21.82	0.97	1.21	0.03	24.03	1.38	25.4	95	0.23	1.65	7.8	7.6	7.4	--	--	--	0.05	0.07
Samsula Variant:																				
S76FL-111-023-1-	0-13	Oa1	10.73	12.86	2.40	0.50	26.49	192	218	12	44.6	3.25	3.8	3.5	3.1	--	--	--	--	--
S76FL-111-023-2-	13-25	Oa2	2.09	3.43	0.84	0.08	6.44	118	125	5	22.6	0.30	4.2	3.6	3.4	--	--	--	--	--
S76FL-111-023-3-	25-29	A1b	0.21	0.49	0.25	0.02	0.97	46.8	47.7	2	7.96	0.10	4.2	3.6	3.6	--	--	--	--	--
S76FL-111-023-4-	29-36	A2b	0.01	0.04	0.03	0.00	0.08	4.11	4.19	2	0.62	0.04	4.4	3.9	3.9	--	--	--	--	--
S76FL-111-023-5-	36-52	Bhb	0.06	0.04	0.05	0.00	0.15	3.25	3.40	4	0.46	0.06	4.4	4.0	4.0	0.24	0.00	0.10	0.03	0.04
St. Lucie:																				
S75FL-111-010-1-	0-6	A11	0.67	0.09	0.01	0.01	0.78	1.50	2.28	34	0.63	0.04	6.1	4.6	4.5	--	--	--	--	--
S75FL-111-010-2-	6-8	C1	0.22	0.03	0.01	0.00	0.26	0.83	1.09	24	0.27	0.02	6.3	4.6	4.2	--	--	--	--	--
S75FL-111-010-3-	8-26	C2	0.03	0.00	0.00	0.00	0.03	0.17	0.20	15	0.04	0.02	7.2	6.4	6.0	--	--	--	--	--
S75FL-111-010-4-	26-50	C3	0.02	0.01	0.00	0.00	0.03	0.08	0.11	27	0.04	0.02	7.4	6.7	6.3	--	--	--	--	--
S75FL-111-010-5-	50-80	C3	0.01	0.01	0.01	0.00	0.03	0.08	0.11	27	0.02	0.02	7.6	6.7	6.4	--	--	--	--	--
Susanna:																				
S75FL-111-014-1-	0-6	A1	0.16	0.11	0.02	0.01	0.30	2.84	3.14	10	0.80	0.02	4.9	3.4	3.2	--	--	--	0.01	0.06
S75FL-111-014-2-	6-18	A21	0.04	0.04	0.01	0.01	0.10	0.67	0.77	13	0.26	0.02	5.2	3.9	3.6	--	--	--	0.00	0.06
S75FL-111-014-3-	18-26	A22	0.02	0.02	0.02	0.00	0.06	0.17	0.23	26	0.10	0.02	5.8	4.6	4.1	--	--	--	0.00	0.06
S75FL-111-014-4-	26-29	B2h	0.16	0.66	0.11	0.05	0.98	24.2	25.2	4	2.78	0.06	4.5	3.6	3.4	2.63	0.17	1.25	0.28	0.14
S75FL-111-014-5-	29-41	B21t	0.14	0.87	0.09	0.01	1.11	14.4	15.5	7	0.98	0.01	4.7	4.0	3.7	0.71	0.17	0.98	0.27	0.41
S75FL-111-014-6-	41-48	B22t	0.24	1.34	0.07	0.02	1.67	9.18	10.9	15	0.46	0.04	5.1	4.1	3.8	--	--	--	0.23	1.50
S75FL-111-014-7-	48-63	C1	0.62	1.33	0.07	0.01	2.03	5.51	7.54	27	0.23	0.03	5.2	4.1	3.8	--	--	--	0.08	0.32
S75FL-111-014-8-	63-80	C2	1.48	0.77	0.04	0.01	2.30	2.81	5.11	45	0.14	0.04	5.4	4.3	3.9	--	--	--	--	--
Tantile:																				
S75FL-111-011-1-	0-2	A11	1.59	0.29	0.03	0.02	1.93	2.17	4.10	47	0.88	0.03	5.8	4.6	4.6	--	--	--	0.02	0.04
S75FL-111-011-2-	2-5	A12	0.35	0.10	0.02	0.01	0.48	1.67	2.15	22	0.48	0.04	5.3	3.9	3.8	--	--	--	--	--
S75FL-111-011-3-	5-9	A13	0.11	0.05	0.02	0.00	0.18	0.67	0.85	21	0.28	0.03	5.6	4.1	3.9	--	--	--	--	--
S75FL-111-011-4-	9-16	A21	0.04	0.02	0.02	0.00	0.08	0.17	0.25	32	0.14	0.02	6.3	4.5	4.3	--	--	--	0.14	0.04
S75FL-111-011-5-	16-26	A22	0.04	0.02	0.03	0.00	0.09	0.08	0.17	53	0.08	0.04	6.3	5.0	4.9	--	--	--	0.17	0.03
S75FL-111-011-6-	26-34	B21h	0.08	0.06	0.03	0.01	0.18	10.0	10.2	2	1.40	0.05	4.8	3.8	3.8	1.30	0.02	0.15	0.12	0.03
S75FL-111-011-7-	34-39	B22h	0.01	0.01	0.02	0.00	0.04	7.18	7.22	1	0.63	0.04	5.1	4.4	4.3	0.54	0.01	0.20	0.16	0.04
S75FL-111-011-8-	39-43	B&Bh	0.01	0.00	0.03	0.00	0.04	4.17	4.21	1	0.30	0.04	5.1	4.5	4.3	0.30	0.02	0.10	0.06	0.04
S75FL-111-011-9-	43-49	B3&Bh	0.07	0.05	0.00	0.04	0.16	4.17	4.33	4	0.31	0.06	5.1	4.4	4.3	0.14	0.02	0.10	0.02	0.04
S75FL-111-011-10	49-59	B3	0.30	1.83	0.07	0.03	2.23	4.67	6.90	32	0.24	0.06	5.1	4.2	3.9	--	--	--	0.06	0.17
S75FL-111-011-11	59-69	A'2	0.02	0.07	0.01	0.01	0.11	0.33	0.44	25	0.04	0.02	5.6	4.6	4.6	--	--	--	0.02	0.04
S75FL-111-011-12	69-80	B'tg	0.52	3.00	0.06	0.05	3.63	9.10	12.7	29	0.10	0.06	5.0	4.1	3.8	--	--	--	0.06	0.08

See footnote at end of table.

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample numbers	Depth	Horizon	Extractable bases					Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ 0.01M (1:2)	KCl 1N (1:1)	C	Fe	Al	Al	Fe
			--Milliequivalents/100 grams of soil---							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Wabasso:																				
S75FL-111-016-1-	0-4	A11	1.88	0.45	0.07	0.03	2.43	8.64	11.0	22	1.80	0.04	4.9	3.8	3.5	--	--	--	0.02	0.06
S75FL-111-016-2-	4-8	A12	0.62	0.14	0.05	0.01	0.82	3.24	4.06	20	0.97	0.05	5.0	3.8	3.7	--	--	--	--	--
S75FL-111-016-3-	8-16	A21	0.20	0.06	0.03	0.00	0.29	1.51	1.80	16	0.48	0.03	5.0	3.8	3.6	--	--	--	--	--
S75FL-111-016-4-	16-25	A22	0.06	0.04	0.01	0.00	0.11	1.08	1.19	9	0.17	0.02	5.1	3.9	3.7	--	--	--	0.00	0.06
S75FL-111-016-5-	25-30	B21h	0.72	0.10	0.03	0.00	0.85	3.67	4.52	19	0.59	0.04	5.1	4.0	3.9	0.46	0.02	0.05	0.03	0.09
S75FL-111-016-6-	30-34	B22h	4.68	0.61	0.11	0.01	5.41	7.20	12.6	43	1.19	0.18	5.2	4.6	4.2	0.54	0.15	0.14	0.06	0.37
S75FL-111-016-7-	34-48	B21tg	3.88	0.46	0.08	0.01	4.43	4.17	8.60	52	0.59	0.11	5.2	4.6	4.2	0.22	0.07	0.11	0.03	0.19
S75FL-111-016-8-	48-60	B22tg	22.00	0.44	0.19	0.03	22.67	2.42	25.1	90	0.14	0.18	8.3	7.6	7.4	--	--	--	0.02	0.09
S75FL-111-016-9-	60-80	Cg	6.10	0.61	0.12	0.04	6.86	4.46	11.3	61	0.34	0.22	5.3	4.8	4.2	--	--	--	0.05	0.30
Waveland:																				
S75FL-111-009-1-	0-4	A11	0.50	0.20	T	T	0.70	3.50	4.20	--	1.26	0.04	5.0	3.7	3.5	--	--	--	--	--
S75FL-111-009-2-	4-8	A12	0.10	0.10	T	T	0.20	1.20	1.40	--	0.45	0.03	5.6	4.2	3.7	0.14	0.00	0.00	--	--
S75FL-111-009-3-	8-17	A21	T	T	T	T	T	0.40	0.40	--	0.18	0.03	6.3	4.7	4.0	0.09	0.00	0.00	--	--
S75FL-111-009-4-	17-32	A22	T	T	T	T	T	0.20	0.20	--	0.12	0.04	7.0	5.9	5.0	0.04	0.00	0.00	--	--
S75FL-111-009-5-	32-40	B21h	0.60	1.00	0.20	T	1.80	52.4	54.2	--	5.68	0.16	4.6	3.8	3.5	5.35	0.00	0.01	0.52	0.01
S75FL-111-009-6-	40-49	B22h	T	T	T	T	T	23.5	23.5	--	2.22	0.08	5.1	4.5	4.3	1.76	0.00	0.01	0.62	0.01
S75FL-111-009-7-	49-53	B22h	T	0.10	0.10	T	0.20	14.3	14.5	--	1.13	0.08	4.6	4.5	4.3	1.07	0.00	0.01	0.36	0.01
S75FL-111-009-8-	53-57	C1	0.10	0.20	0.10	T	0.40	10.4	10.8	--	0.45	0.08	5.1	4.4	4.2	0.40	0.00	0.00	0.22	0.02
S75FL-111-009-9-	57-66	C2	0.40	1.00	0.20	T	1.60	9.00	10.6	--	0.17	0.06	5.3	4.3	3.9	--	--	--	0.09	0.02
S75FL-111-009-10	66-75	C3	0.20	0.50	0.10	T	0.80	1.80	2.60	--	0.14	0.08	5.2	4.3	4.1	--	--	--	0.06	0.02
S75FL-111-009-11	75-80	C4	0.20	0.50	0.10	T	0.80	3.00	3.80	--	0.11	0.06	5.5	4.4	4.3	--	--	--	0.04	0.03
Welaka Variant:																				
S75FL-111-003-1-	0-5	Ap	9.60	1.30	0.10	0.10	11.0	2.70	12.7	80	2.32	0.19	7.1	6.8	6.5	--	--	--	--	--
S75FL-111-003-2-	5-8	A21	1.80	0.20	T	T	2.00	2.90	4.90	41	0.53	0.08	6.6	6.0	5.8	--	--	--	--	--
S75FL-111-003-3-	8-18	A22	0.20	T	0.00	0.00	0.20	0.50	0.70	40	0.12	0.06	6.6	6.1	5.3	0.07	0.00	0.00	0.05	0.07
S75FL-111-003-4-	18-21	B1	0.20	0.10	T	0.00	0.30	1.60	1.90	16	0.16	0.06	5.6	4.8	4.2	0.00	0.00	0.00	0.02	0.09
S75FL-111-003-5-	21-35	B21ir	0.20	T	T	0.00	0.20	2.90	3.10	6	0.26	0.05	5.4	4.8	4.2	0.07	0.00	0.00	0.06	0.17
S75FL-111-003-6-	35-55	B22ir	0.10	T	T	0.00	0.10	3.10	3.20	3	0.17	0.05	5.4	4.7	4.3	0.07	0.00	0.00	0.11	0.26
S75FL-111-003-7-	55-76	B22ir	0.10	T	T	0.00	0.10	1.60	1.70	6	0.10	0.04	5.5	5.0	4.4	0.14	0.00	0.00	0.07	0.18
S75FL-111-003-8-	76-96	B23ir	T	T	T	0.00	T	1.00	1.00	--	0.06	0.07	5.5	5.3	4.6	0.07	0.08	0.06	0.05	0.15
Winder:																				
S77FL-111-033-1-	0-3	A11	20.85	6.21	0.18	0.52	27.76	6.10	33.9	82	5.62	0.41	7.2	6.7	6.7	--	--	--	--	--
S77FL-111-033-2-	3-6	A12	8.28	2.93	0.09	0.18	11.48	5.97	17.5	66	2.63	0.20	6.8	6.3	6.3	--	--	--	--	--
S77FL-111-033-3-	6-9	A21	1.81	0.62	0.02	0.05	2.50	0.95	3.45	72	0.46	0.08	6.9	6.3	6.4	--	--	--	--	--
S77FL-111-033-4-	9-12	A22	0.81	0.38	0.01	0.03	1.23	0.35	1.58	78	0.14	0.09	6.8	6.3	6.3	--	--	--	--	--
S77FL-111-033-5-	12-21	B&A	8.48	5.80	0.76	0.34	15.38	5.88	21.3	72	0.27	0.25	7.1	6.2	5.8	--	--	--	0.13	0.75
S77FL-111-033-6-	21-33	B21tg	5.10	3.96	0.58	0.19	9.83	3.53	13.4	74	0.10	0.17	7.2	6.2	5.7	--	--	--	0.08	0.35
S77FL-111-033-7-	33-49	B22tg	4.89	3.44	0.55	0.16	9.04	3.10	12.1	74	0.08	0.16	7.1	6.1	5.6	--	--	--	0.06	0.40
S77FL-111-033-8-	49-61	B3	3.41	2.19	0.42	0.11	6.13	1.68	7.81	78	0.07	0.16	7.2	6.2	5.7	--	--	--	--	--
S77FL-111-033-9-	61-80	C	1.92	1.35	0.23	0.06	3.56	1.12	4.68	76	0.05	0.15	6.5	5.8	5.1	--	--	--	--	--

*Trace.

TABLE 20.--CLAY MINERALOGY OF SELECTED SOILS

Soil series and sample numbers	Depth	Horizon	Clay minerals			
			Montmorillonite	14Å intergrade	Kaolinite	Quartz
	In		Pct	Pct	Pct	Pct
Ankona:						
S76FL-111-027-1----	0-3	A11	0	0	0	5
S76FL-111-027-7----	38-48	B21h	0	13	22	65
S76FL-111-027-8----	48-57	B22tg	33	16	41	10
S76FL-111-027-9----	57-80	Cg	70	8	16	6
Electra:						
S75FL-111-015-1----	0-7	A1	12	T*	25	0
S75FL-111-015-4----	47-60	B2h	19	19	26	0
S75FL-111-015-5----	60-80	B2tg	12	26	50	0
Floridana:						
S76FL-111-022-1,2--	0-3	A11	87	T	0	13
S76FL-111-022-7----	25-37	B21t&A	72	18	3	7
S76FL-111-022-11---	66-81	C2g	73	15	10	2
Hallandale:						
S75FL-111-005-1----	0-6	Ap	68	18	7	7
S75FL-111-005-3----	10-12	C2	85	10	4	1
Hilolo:						
S76FL-111-019-1----	0-2	A11	85	T	5	10
S76FL-111-019-4----	12-28	B22tgca	40	0	0	60
S76FL-111-019-9----	53-74	C1g	90	T	8	2
Lawnwood:						
S75FL-111-006-1----	0-4	A11	0	0	0	8
S75FL-111-006-5----	28-52	B21h	0	32	23	45
S75FL-111-006-8----	63-80	C2	30	30	39	1
Malabar:						
S77FL-111-029-1----	0-6	A1	T	25	0	75
S77FL-111-029-4----	17-24	B2ir	0	0	0	100
S77FL-111-029-6----	42-72	B'2tg	76	0	18	6
S77FL-111-029-7----	72-80	C	44	0	18	38
Myakka Variant:						
S76FL-111-024-6----	17-26	B21hb	T	38	0	62
S76FL-111-024-9----	38-66	B24hb	T	T	0	5
Nettles:						
S76FL-111-012-1----	0-5	A11	0	0	0	100
S76FL-111-012-7----	39-46	B23h	0	0	0	100
S76FL-111-012-11---	77-90	B22tg	57	7	28	8
Oldsmar:						
S75FL-111-007-1----	0-1	A11	0	0	0	5
S75FL-111-007-6----	34-41	B21h	0	24	18	58
S75FL-111-007-8----	42-65	B21tg	51	23	22	4
Pendarvis:						
S76FL-111-026-1----	0-3	A11	T	T	0	0
S76FL-111-026-9----	76-80	B3	62	14	17	7
Pepper:						
S76FL-111-013-1----	0-6	A11	0	0	0	100
S76FL-111-013-4----	23-28	B21h	2	1	4	93
S76FL-111-013-9----	57-77	B21tg	18	28	47	7
Pineda:						
S75FL-111-017-1----	0-3	A11	38	24	8	0
S75FL-111-017-3----	6-12	B21ir	0	32	26	0
S75FL-111-017-8----	42-52	B22tg	44	20	19	0
S75FL-111-017-9----	52-80	Cg	T	13	16	0

See footnotes at end of table.

TABLE 20.--CLAY MINERALOGY OF SELECTED SOILS--Continued

Soil series and sample numbers	Depth	Horizon	Clay minerals: Montmorillonite	Clay minerals: 14Å intergrade	Clay minerals: Kaolinite	Clay minerals: Quartz
	In		Pct	Pct	Pct	Pct
Riviera:						
S75FL-111-018-1----	0-5	A1	74	10	13	0
S75FL-111-018-4----	23-44	B21tg&A	31	46	19	0
S75FL-111-018-7----	72-80	C2g	71	6	10	13
Samsula Variant:						
S75FL-111-023-3----	25-29	A1b	T	T	0	95
S75FL-111-023-5----	36-52	Bhb	14	37	14	35
St. Lucie:						
S75FL-111-010-1----	0-6	A1	55	8	10	27
S75FL-111-010-5----	50-80	C3	0	0	5	95
Susanna:						
S75FL-111-014-1----	0-6	A1	0	0	0	100
S75FL-111-014-4----	25-29	Bh	28	37	16	0
S75FL-111-014-6----	41-48	B22t	54	18	20	0
S75FL-111-014-8----	63-80	C2	72	13	10	0
Tantile:						
S75FL-111-011-1----	0-2	A11	0	0	0	100
S75FL-111-011-6----	26-34	B21h	0	0	0	100
S75FL-111-011-10---	49-59	B3	20	20	50	10
S75FL-111-011-12---	69-80	B'tg	24	10	58	8
Wabasso:						
S75FL-111-016-1----	0-4	A11	8	5	3	0
S75FL-111-016-6----	30-34	B22h	30	46	19	0
S75FL-111-016-9----	60-80	Cg	74	13	8	0
Waveland:						
S75FL-111-009-1----	0-4	A11	0	0	0	10
S75FL-111-009-5----	32-40	B21h	0	0	0	15
S75FL-111-009-9----	57-66	C2	50	28	20	2
S75FL-111-009-11---	75-81	C4	50	28	19	3
Welaka Variant:						
S75FL-111-003-1----	0-5	Ap	61	21	12	6
S75FL-111-003-2----	5-8	A21	54	24	13	9
S75FL-111-003-5----	21-35	B21ir	0	40	21	39
S75FL-111-003-7----	55-76	B22ir	10	64	14	12
Winder:						
S77FL-111-033-1----	0-3	A11	0	0**	44	39
S77FL-111-033-5----	12-21	B&A	91	0	9	0
S77FL-111-033-6----	21-33	B21tg	95	0	5	C

*Trace.
**17 percent mica.

TABLE 21.--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) (1). See the section "Soil series and morphology" for location of pedon sampled. Dashes indicate data were not available]

Soil name, report number, horizon, and depth in inches	Classification		Mechanical analyses[1]								Liquid limit	Plasticity index	Moisture density[2]	
	AASHTO[3]	Unified[4]	>3 inches	Percentage passing sieve-- No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	Percentage smaller than-- 0.05 mm	0.02 mm	0.005 mm	0.002 mm			Maximum density	Optimum density
			Pct										Pct	Pct
Ankona sand:														
(S76FL-111-027)														
(FDOT 66, 67, 68, 69)														
A22-------------15-29	A-3(0)	SP	0	100	73	2	0	0	0	0	--	--	103.9	13.5
B21h-----------38-48	A-2-4(0)	SP-SM	0	100	79	11	6	0	0	0	--	--	110.4	13.1
B22tg----------48-57	A-2-4(0)	SM-SC	0	100	85	18	15	13	11	10	21	6	116.6	13.2
Cg-------------57-80	A-2-4(0)	SM	0	100	87	16	13	8	8	7	--	--	115.7	11.5
Electra fine sand:														
(S75FL-111-015)														
(FDOT 30, 31, 32)														
A2(part)-------24-47	A-3(0)	SP	0	100	97	3	1	0	0	0	--	--	98.7	15.5
B2h------------47-60	A-3(0)	SP-SM	0	100	97	9	6	4	2	1	--	--	107.9	12.3
B2tg-----------60-80	A-2-4(0)	SM	0	93	76	13	12	11	9	9	--	--	115.2	13.0
Floridana sand:														
(S76FL-111-022)														
(FDOT 53, 54, 55)														
A13-------------5-11	A-3(0)	SP-SM	0	100	86	7	0	0	0	0	--	--	108.7	11.8
B21tg&A--------25-37	A-2-4(0)	SM	0	100	86	13	13	12	10	8	--	--	114.9	114.9
B22tg&A--------37-50	A-2-4(0)	SM	0	100	89	17	16	15	13	12	--	--	115.3	115.3
Hallandale sand:														
(S75FL-111-005)														
(FDOT 4)														
Ap---------------0-6	A-3(0)	SP-SM	0	100	91	7	3	0	0	0	--	--	104.7	111.8
Hilolo loamy sand:														
(S76FL-111-019)														
(FDOT 42, 43, 44)														
B22tgca--------12-28	A-6(3)	SC	0	100	96	41	35	29	22	14	34	17	104.8	18.2
B31g-----------43-50	A-2-4(0)	SM	0	100	95	18	14	10	8	6	--	--	114.5	12.7
C1g------------53-74	A-2-4(0)	SM	0	100	96	22	19	16	14	13	--	--	112.4	11.6
Lawnwood sand:														
(S75FL-111-006)														
(FDOT 5, 6, 7)														
A21-------------8-15	A-3(0)	SP	0	100	87	2	1	1	0	0	--	--	101.9	12.8
B21h-----------28-52	A-2-4(0)	SP-SM	0	100	89	12	5	0	0	0	--	--	101.2	16.1
C2-------------63-80	A-3(0)	SP-SM	0	100	91	6	6	5	4	4	--	--	121.5	14.6
Malabar fine sand:														
(S77FL-111-029)														
(FDOT 72, 73, 74)														
B2ir-----------17-24	A-3(0)	SP-SM	0	100	97	6	5	3	3	3	--	--	101.9	15.1
A'2------------24-42	A-3(0)	SP	0	100	97	4	3	2	1	1	--	--	100.9	16.6
B'2tg----------42-72	A-2-4(0)	SM	0	100	98	23	20	15	14	13	--	--	112.5	14.1
Myakka Variant mucky peat:														
(S76FL-111-024)														
(FDOT 57, 58)														
A21b, A22b, and A23b ----------------0-17	A-3(0)	SP	0	100	89	1	0	0	0	0	--	--	102.0	13.8
B22hb----------26-32	A-3(0)	SP-SM	0	100	99	5	3	1	0	0	--	--	109.9	12.5

See footnotes at end of table.

TABLE 21.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Mechanical analyses[1]								Liquid limit	Plasticity index	Moisture density[2]	
	AASHTO[3]	Unified[4]	>3 inches	Percentage passing sieve--			Percentage smaller than--						Maximum density	Optimum density
				No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
			Pct										Pct	Pct
Nettles sand: (S75FL-111-012) (FDOT 21, 22, 23)														
A2-------------11-33	A-3(0)	SP	0	100	93	3	1	0	0	0	--	--	101.7	14.5
B21h-----------33-36	A-2-4(0)	SM	0	100	95	15	10	4	2	1	--	--	102.5	15.9
B22tg----------77-90	A-2-4(0)	SM	0	100	99	23	20	16	13	13	--	--	109.3	13.1
Oldsmar sand: (S75FL-111-007) (FDOT 8, 9, 10)														
A2--------------5-32	A-3(0)	SP	0	100	75	2	1	0	0	0	--	--	108.6	13.5
B21h-----------34-41	A-3(0)	SP-SM	0	100	73	5	5	5	1	0	--	--	111.8	10.0
B22tg----------65-80	A-2-4(0)	SC	0	100	94	19	18	17	16	15	26	8	112.2	9.9
Pendarvis sand: (S76FL-111-026) (FDOT 63, 64, 65)														
A21-------------6-36	A-3(0)	SP	0	100	83	3	0	0	0	0	--	--	102.0	14.4
B21h-----------48-62	A-2-4(0)	SM	0	100	85	14	0	0	0	0	--	--	96.0	19.5
B3-------------76-80	A-3(0)	SP-SM	0	100	85	7	6	5	3	1	--	--	119.4	11.3
Pepper sand: (S76FL-111-013) (FDOT 24, 25, 26)														
A2--------------9-23	A-3(0)	SP	0	100	94	4	2	0	0	0	--	--	102.1	14.3
B22h-----------28-33	A-2-4(0)	SP-SM	0	100	94	11	6	0	0	0	--	--	102.7	15.4
B22tg----------77-99	A-2-4(0)	SM	0	100	98	12	17	12	12	11	--	--	109.6	12.5
Pineda sand: (S75FL-111-017) (FDOT 37, 38)														
B22ir----------12-21	A-3(0)	SP	0	100	84	3	3	2	0	0	--	--	105.1	13.0
B22tg----------42-52	A-2-4(0)	SM	0	100	86	18	18	17	15	14	--	--	114.4	12.5
Riviera fine sand: (S75FL-111-018) (FDOT 39, 40, 41)														
A21-------------5-14	A-3(0)	SP	0	100	95	4	3	1	0	0	--	--	104.2	12.9
B21tg&A--------23-44	A-2-4(0)	SM	0	100	97	18	16	13	12	11	--	--	113.6	13.3
B22tg, C1g, and C2g ---------------44-80	A-2-4(0)	SM	0	100	96	16	14	12	8	8	--	--	112.3	12.5
Samsula Variant muck: (S76FL-111-023) (FDOT 56)														
Bhb------------36-52	A-3(0)	SP	0	100	85	3	2	0	0	0	--	--	104.8	12.2
St. Lucie sand: (S75FL-111-010) (FDOT 17)														
C2--------------8-26	A-3(0)	SP	0	100	82	1	1	0	0	0	--	--	99.6	14.1
Susanna sand: (S75FL-111-014) (FDOT 27, 28, 29)														
A22------------18-25	A-3(0)	SP	0	100	79	4	3	0	0	0	--	--	108.3	13.0
B2h------------25-29	A-2-4(0)	SP-SM	0	100	82	16	12	6	4	3	--	--	106.8	16.3
B22t-----------41-48	A-2-4(0)	SM-SC	0	100	76	17	15	13	11	9	21	5	119.5	12.2

See footnotes at end of table.

TABLE 21.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Mechanical analyses[1]								Liquid limit	Plasticity index	Moisture density[2]	
	AASHTO[3]	Unified[4]	>3 inches	Percentage passing sieve--			Percentage smaller than--						Maximum density	Optimum density
				No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
			Pct										Pct	Pct
Tantile sand: (S75FL-111-011) (FDOT 18, 19, 20)														
A22------------16-26	A-3(0)	SP	0	100	87	3	2	0	0	0	--	--	101.8	14.6
B21h-----------26-34	A-3(0)	SP-SM	0	100	88	10	5	1	0	0	--	--	112.0	12.5
B'tg-----------69-80	A-2-4(0)	SM	0	100	95	20	17	14	13	11	--	--	113.2	13.7
Wabasso sand: (S75FL-111-016) (FDOT 33, 34, 35, 36)														
A22------------16-25	A-3(0)	SP	0	100	84	2	1	0	0	0	--	--	101.0	14.4
B21h-----------25-30	A-3(0)	SP	0	100	83	3	3	1	0	0	--	--	106.5	12.1
B22tg----------48-60	A-2-4(0)	SM	0	100	87	15	15	15	13	12	--	--	114.2	13.0
Cg-------------60-80	A-2-4(0)	SM	0	100	98	15	15	12	8	6	--	--	110.0	14.5
Waveland fine sand: (S75FL-111-009) (FDOT 14, 15, 16)														
A22------------17-32	A-3(0)	SP	0	100	92	2	3	2	2	1	--	--	100.8	15.2
B21h-----------32-40	A-2-4(0)	SM	0	100	94	16	6	0	0	0	--	--	79.8	19.1
C2-------------57-66	A-2-4(0)	SM	0	100	94	19	18	16	13	12	22	3	114.2	13.5
Welaka Variant sand: (S75FL-111-003) (FDOT 1, 2)														
A22--------------5-18	A-3(0)	SP	0	100	80	1	0	0	0	0	--	--	105.6	11.8
B22ir----------35-76	A-3(0)	SP	0	100	81	2	2	1	0	0	--	--	109.3	10.4
Winder loamy sand: (S77FL-111-033) (FDOT 83, 84, 85, 86, 87)														
A&B------------12-21	A-2-6(1)	SC	0	100	94	25	22	18	16	15	30	13	108.5	15.3
B21tg----------21-33	A-2-4(0)	SM-SC	0	100	95	23	19	15	13	13	23	7	114.1	13.1
B22tg----------33-49	A-2-4(0)	SM-SC	0	100	94	18	19	14	13	12	23	5	113.8	14.1
B3-------------49-61	A-2-4(0)	SM	0	100	94	16	13	11	10	9	--	--	111.9	11.3
C--------------61-80	A-3(0)	SP-SM	0	100	91	10	8	5	5	5	--	--	110.3	10.4

[1]Mechanical analyses according to AASHTO designation T88-70 (1). 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 T99-70 (1).

[3]Based on AASHTO Designation M 145-66 (1).

[4]Based on AASHTO Designation D 2487-69 (2).

TABLE 22.--IN SITU SATURATED HYDRAULIC CONDUCTIVITY TEST DATA

Soil name and map symbol	Soil horizon tested	Number of tests	Hydraulic conductivity	Permeability
			In/hr	
2---------------- Ankona	Bh	6	0.004-0.015	Very slow.
		3	0.065-0.157	Slow.
		1	0.214	Moderately slow.
11--------------- Chobee	Bt	14	0-0.012	Very slow.
13--------------- Floridana	Bt	5	0-0.003	Very slow.
21--------------- Lawnwood	Bh	12	0-0.034	Very slow.
		3	0.076-0.130	Slow.
		1	0.348	Moderately slow.
		1	1.276	Moderate.
23--------------- Malabar	Bt	5	0-0.003	Very slow.
24--------------- Myakka	Bh	6	0.676-1.452	Moderate.
25--------------- Nettles	Bh	14	0-0.028	Very slow.
		1	0.747	Moderate.
26--------------- Oldsmar	Bt	17	0-0.005	Very slow.
29--------------- Pendarvis	Bh	1	0.131	Slow.
		6	0.230-0.510	Moderately slow.
		1	0.683	Moderate.
31--------------- Pepper	Bh	9	0.001-0.059	Very slow.
		3	0.063-0.083	Slow.
		1	0.201	Moderately slow.
32--------------- Pineda	Bt	18	0.001-0.035	Very slow.
37--------------- Riviera	Bt	14	0-0.005	Very slow.
44--------------- Tantile	Bh	8	0.004-0.032	Very slow.
		4	0.061-0.177	Slow.
		1	0.209	Moderately slow.
50--------------- Waveland	Bh	22	0-0.048	Very slow.
		1	0.171	Slow.
		1	0.219	Moderately slow.
54--------------- Winder	Bt	14	0-0.006	Very slow.

TABLE 23.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Anclote	Sandy, siliceous, hyperthermic Typic Haplaquolls
Ankona	Sandy, siliceous, hyperthermic, ortstein Arenic Haplaquods
Astatula	Hyperthermic, uncoated Typic Quartzipsamments
Basinger	Siliceous, hyperthermic Spodic Psammaquents
Canaveral	Hyperthermic, uncoated Aquic Quartzipsamments
Chobee	Fine-loamy, siliceous, hyperthermic Typic Argiaquolls
Electra	Sandy, siliceous, hyperthermic Arenic Ultic Haplohumods
Floridana	Loamy, siliceous, hyperthermic Arenic Argiaquolls
Hallandale	Siliceous, hyperthermic Typic Psammaquents
Hilolo	Fine-loamy, siliceous, hyperthermic Mollic Ochraqualfs
Hobe	Sandy, siliceous, hyperthermic Arenic Ultic Haplohumods
Hontoon	Dysic, hyperthermic Typic Medisaprists
Jonathan	Sandy, siliceous, hyperthermic, ortstein Typic Haplohumods
Kaliga	Loamy, siliceous, dysic, hyperthermic Terric Medisaprists
Kaliga Variant	Loamy, siliceous, euic, hyperthermic Terric Medisaprists
Lawnwood	Sandy, siliceous, hyperthermic, ortstein Aeric Haplaquods
Malabar	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Myakka	Sandy, siliceous, hyperthermic Aeric Haplaquods
Myakka Variant	Sandy, siliceous, hyperthermic Aeric Haplaquods
Nettles	Sandy, siliceous, hyperthermic, ortstein Alfic Arenic Haplaquods
Oldsmar	Sandy, siliceous, hyperthermic Alfic Arenic Haplaquods
Palm Beach	Hyperthermic, uncoated Typic Quartzipsamments
Paola	Hyperthermic, uncoated Spodic Quartzipsamments
Pendarvis	Sandy, siliceous, hyperthermic, ortstein Arenic Haplohumods
Pepper	Sandy, siliceous, hyperthermic, ortstein Alfic Haplaquods
Pineda	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Pompano	Siliceous, hyperthermic Typic Psammaquents
Pompano Variant	Siliceous, hyperthermic Typic Psammaquents
Pople	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Riviera	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Salerno	Sandy, siliceous, hyperthermic, ortstein Grossarenic Haplaquods
Samsula Variant	Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists
Satellite	Hyperthermic, uncoated Aquic Quartzipsamments
St. Lucie	Hyperthermic, uncoated Typic Quartzipsamments
Susanna	Sandy, siliceous, hyperthermic, ortstein Ultic Haplaquods
Tantile	Sandy, siliceous, hyperthermic, ortstein Ultic Haplaquods
Terra Ceia	Euic, hyperthermic Typic Medisaprists
Turnbull Variant	Fine-loamy, siliceous, hyperthermic Typic Hydraquents
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods
Wabasso Variant	Sandy, siliceous, hyperthermic Alfic Haplaquods
Waveland	Sandy, siliceous, hyperthermic, ortstein Arenic Haplaquods
Welaka Variant	Hyperthermic, uncoated Spodic Quartzipsamments
Winder	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs
Winder Variant	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs

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