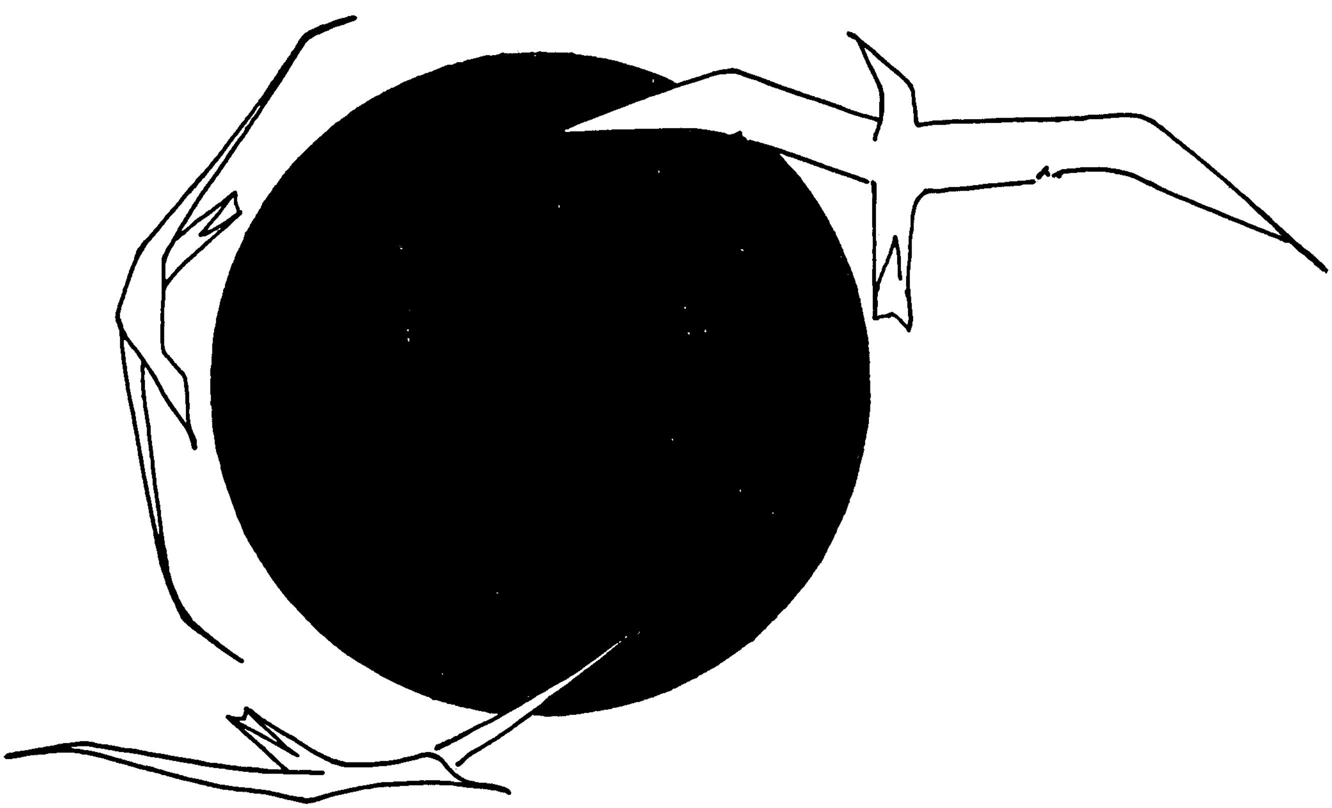
Soil Survey Of

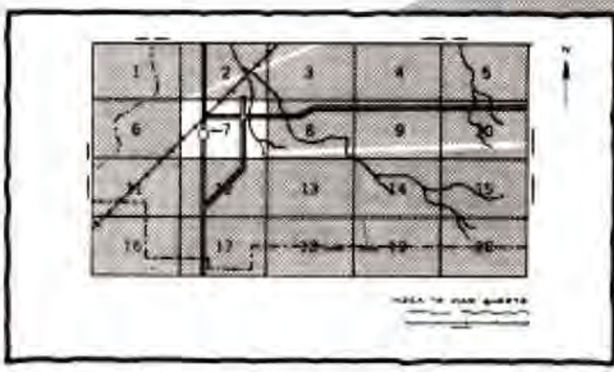
Martin County Area, Florida

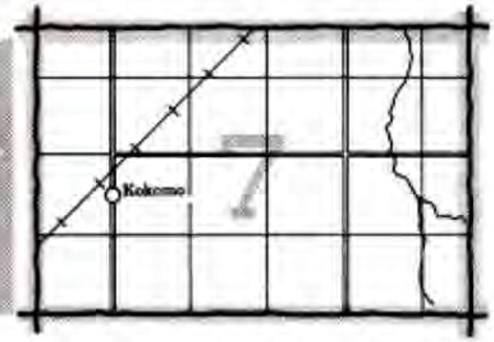
United States Department of Agriculture, Soil Conservation Service
in cooperation with University of Florida, Institute of Food and Agricultural Sciences
Agricultural Experiment Stations, Soil Science Department
and Florida Department of Agriculture and Consumer Services



HOW TO USE

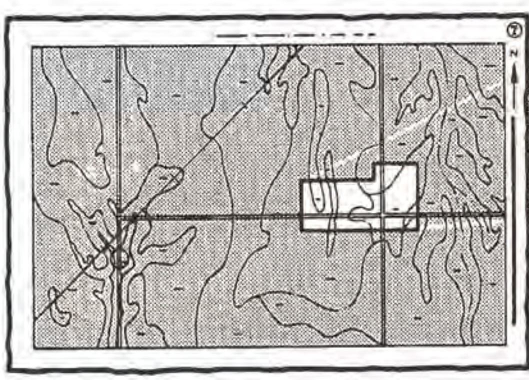
1. Locate your area of interest on the "Index to Map Sheets"

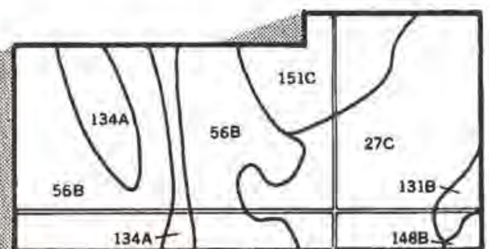




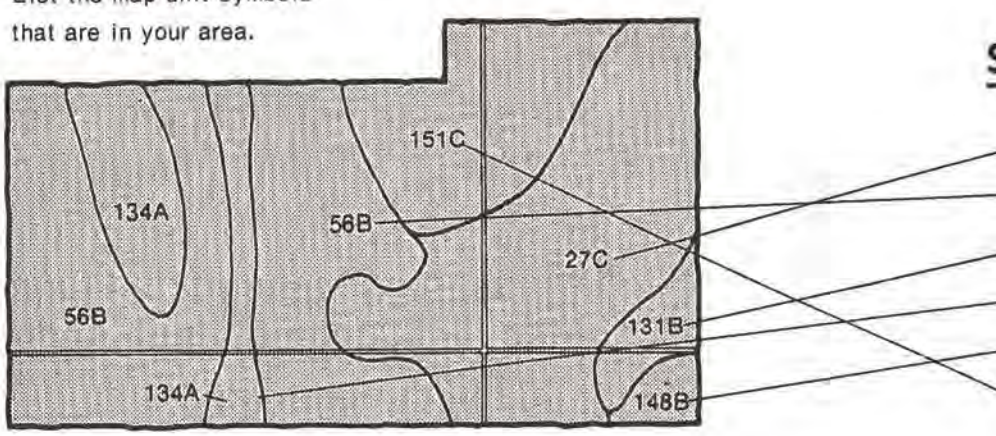
2. Note the number of the map sheet and turn to that sheet.

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





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

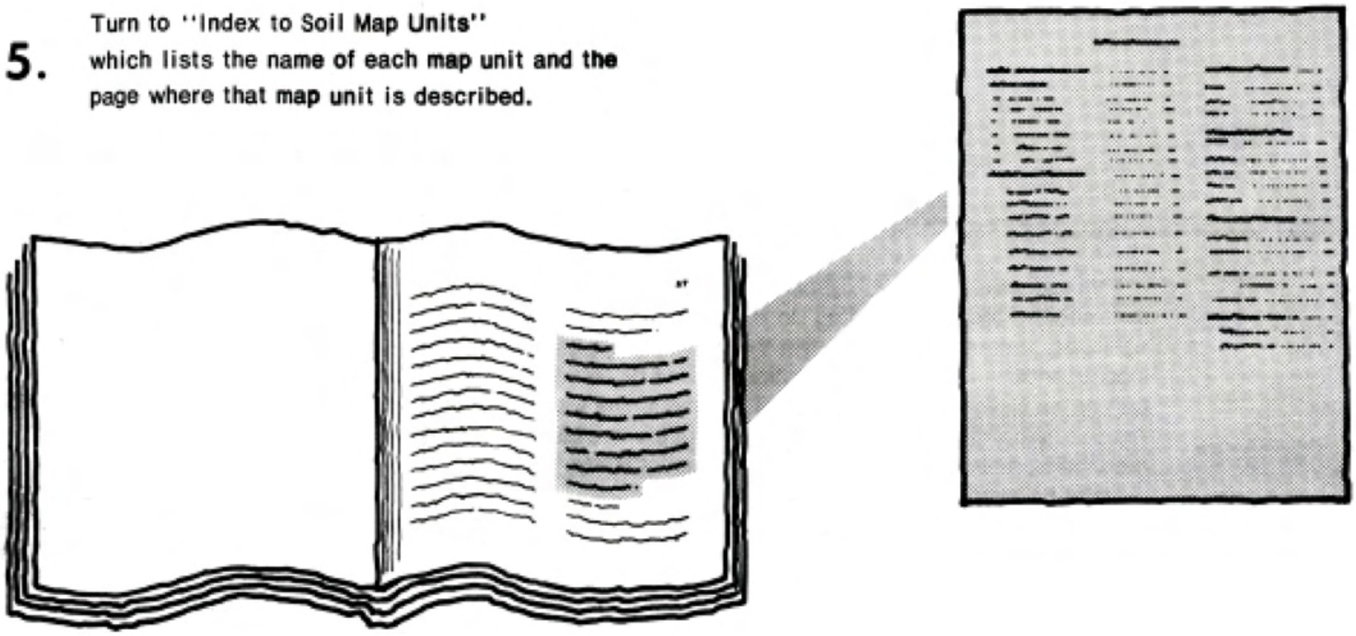


Symbols

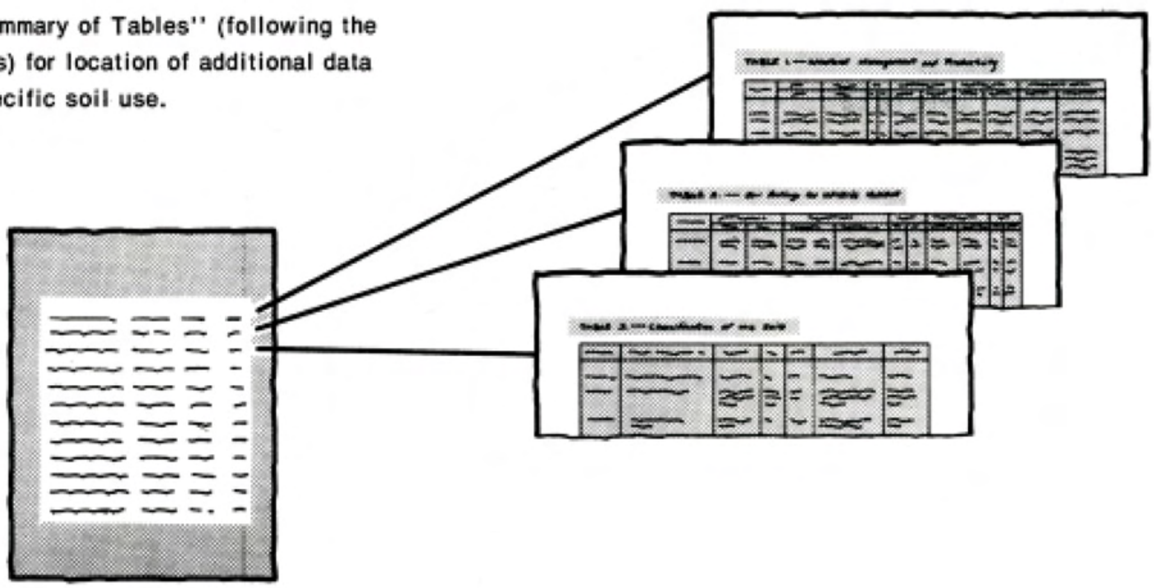
- 27C
- 56B
- 131B
- 134A
- 148B
- 151C

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 1974-1978. Soil names and descriptions were approved in 1979. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1978. This survey was made cooperatively by the Soil Conservation Service; the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department; the Martin County Board of County Commissioners; and the Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the Martin Soil and Water Conservation District.

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.

contents

soil series

Issued April 1981

index to map units

summary of tables

foreword

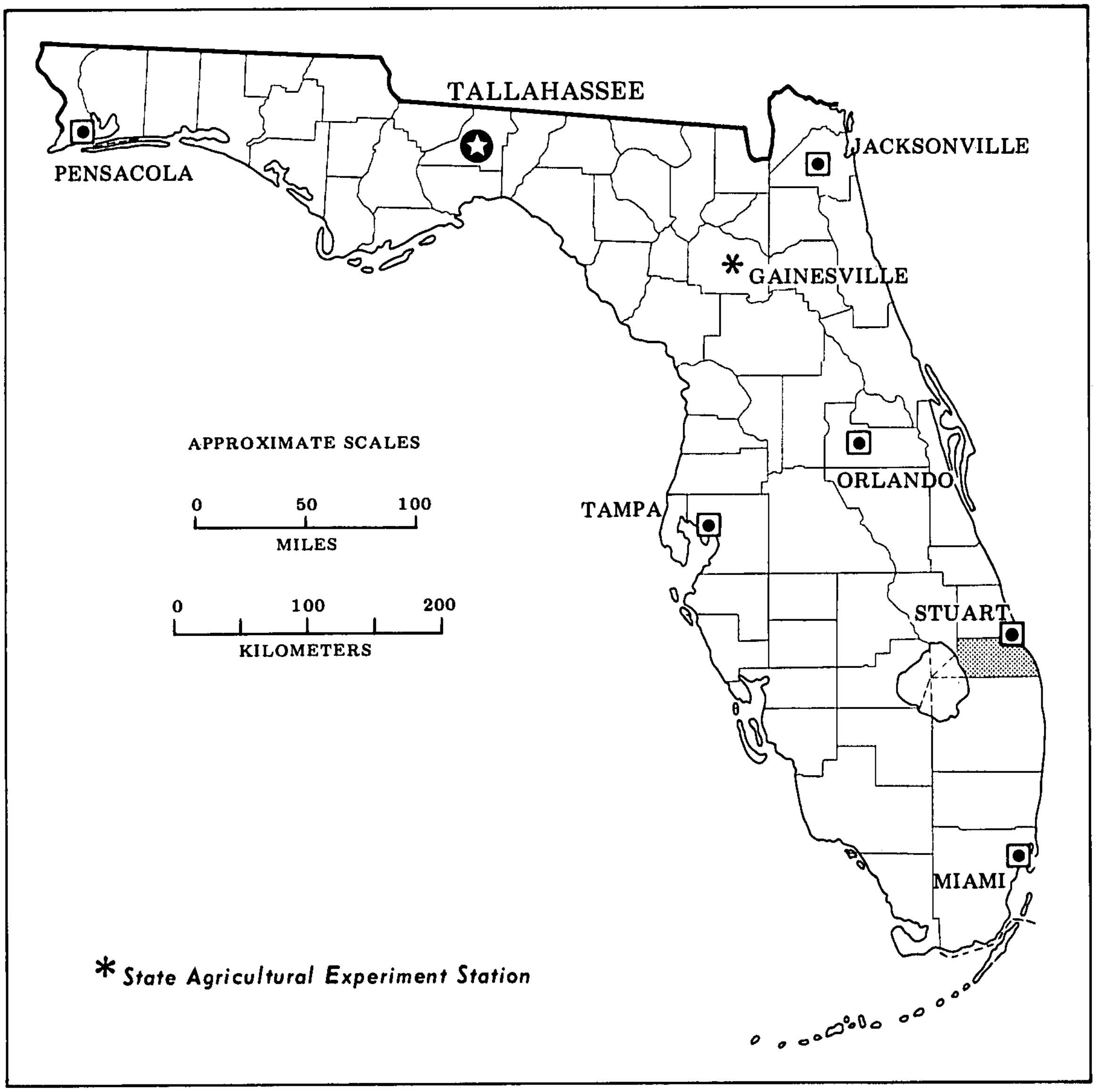
This soil survey contains information that can be used in land-planning programs in Martin County Area, Florida. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and 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 bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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

William E. Austin
State Conservationist
Soil Conservation Service



Martin County Area in Florida.

soil survey of
Martin County Area, Florida

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Others participating in the fieldwork were David J. Belz,
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United States Department of Agriculture, Soil Conservation Service
in cooperation with
University of Florida, Institute of Food and Agricultural Sciences,
Agricultural Experiment Stations, and Soil Science Department;
the Martin County Board of County Commissioners;
and the Florida Department of Agriculture and Consumer Services

MARTIN COUNTY AREA is in the southeastern part of peninsular Florida. It is bordered on the north by St. Lucie County, on the west by Okeechobee County and Lake Okeechobee, on the south by Palm Beach County, and on the east by the Atlantic Ocean. This survey joins the published surveys of Okeechobee, Palm Beach, and St. Lucie Counties, Florida.

The survey area, which does not include all of Martin County, covers 348,640 acres or about 545 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 about 2,482 acres of water in bodies of less than 40 acres. Also included within the county boundary is about 79,000 acres of saltwater and freshwater in the Indian River and Lake Okeechobee.

The survey area is about 33 miles long and about 21 miles wide at the widest point. Stuart, the county seat, is in the northeastern part of the county on the south shore of the St. Lucie River.

Tourism is one of the major nonagricultural industries in the survey area. The favorable climate, extensive open water areas, and numerous recreational opportunities attract both tourists and retirees from all over the country. Commercial and sport fishing are also an important part of the economy.

general nature of the survey area

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

climate

The climate of Martin County Area is characterized by a long, warm, humid summer and a mild winter. The moderating influence of the Atlantic Ocean and the Gulfstream on maximum temperatures in summer and minimum temperatures in winter is strong along the immediate coast, but it diminishes slightly a few miles inland. Because of the moderation of winter temperatures, the coastal area has a tropical climate. The rest of the survey area, which receives a slight moderating influence on temperatures from Lake Okeechobee, has a subtropical climate.

Mean annual rainfall is about 57 inches, but it ranges from 35 to 80 inches. Rainfall is unevenly distributed during the year. About 60 percent occurs from June through October; about 20 percent in March, April, and

May; and about 20 percent from November through February. Normal monthly rainfall during the wet season ranges from 5 to 9 inches or more. The start of the rainy season varies from early in May to late in June. Mid to late October generally marks the end of the wet season.

Extended dry periods can occur in any season, but such periods are most common in spring and fall. Occasionally, there are dry periods of less than 3 inches of rainfall within the wet season. Dry periods in the spring, however, when temperatures are high and ground water reserves are low, tend to be more serious. Early in 1977, only 1.51 inches of rain was recorded in a 3-month period at the Stuart reporting station.

The moist, unstable air in the survey area results in frequent showers that are generally of short duration. Winter and spring rains are not generally so intense as the summer thunderstorms. Thunderstorms are frequent during the summer, occurring on an average of every other day. They are sometimes heavy, with 2 to 3 inches of rain falling in 1 or 2 hours. Summarized climatic data, based on records collected at Stuart, are shown in table 1 (*12*).

Daylong rains are rare and almost always are associated with a tropical storm. Tropical storms can affect the area any time from late in May through mid-November. Winds reach hurricane force, 74 miles per hour or greater, in about 1 year out of 12.

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

Cold continental air is modified as it travels over water or flows down the Florida peninsula before reaching the Martin County Area. The coldest temperatures, and infrequent frosts, occur on the second or third night after the arrival of the cold air because heat is lost through radiation. Freezing temperatures of 32 degrees F occur less than 1 year out of 10. Temperatures of 28 degrees or less are rare. A record low of 26 degrees was recorded in January 1977 at the Stuart station. Freeze data shown in table 2 (*13*), taken at Ft. Pierce, West Palm Beach, and Okeechobee, encompass the conditions that can be expected in the Martin County Area. An important citrus and vegetable growing industry has been established because of the nearly frost-free winter.

Summer temperatures are tempered by the ocean breeze and by the frequent formation of cumulus clouds, which shade the land somewhat without completely obscuring the sun. Temperatures of 88 degrees F or higher have occurred in all months. Temperatures of 90 to 94 degrees F in summer are common. A high exceeding 96 degrees seldom occurs. August is the warmest month and has an average maximum temperature of about 90 degrees, but temperatures from June to September are much the same.

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

history and development

Prior to about 1500, the area that is now Martin County Area was a wilderness inhabited by Indians of the Ais and Jaegas tribes. Relics found in burial mounds and middens indicate habitation as far back as 3,000 B.C. Ponce deLeon was the first European to explore along the east coast, but his attempt to colonize in about 1513 failed. Little effort was made to settle the area for almost 300 years. The Seminole Indians moved into the area in the mid 18th century, and were practically the sole inhabitants for several decades. In the early 1800's the Spanish crown made several large land grants, most notably Hanson, Gomez, Hutchinson Island, and Sewall's Point. Extensive settlement of the area, however, was not begun until about 1880.

Most of the early settlers came to the area to grow pineapples on the sandy coastal ridge or to enjoy the excellent fishing. In the early 1900's, most of the area's present communities came into being, including Stuart (originally Potsdam), Jensen Beach, Port Salerno, and Hobe Sound.

In 1925, Martin County was formed from the northern part of Palm Beach County and a small part of southern St. Lucie County. Population growth and development remained slow until after World War II. According to the Martin County Historical Review, the population in 1956 was 13,100 (*8*). The population in 1977 was 76,000, according to census estimates. Except for the development around Indiantown, most of the current growth is occurring in the coastal area.

physiography, relief, and drainage

Martin County Area is in the Coastal lowlands unit of the Atlantic Coastal Plain physiographic province (*16*). The survey area is on the southeastern coast of peninsular Florida and extends from the Atlantic Ocean to Lake Okeechobee. It is divided into three physiographic subdivisions—the coastal ridge; the broad, sandy flatlands; and a narrow extension of the Everglades marsh along the shore of Lake Okeechobee (*15*). Another important area is the Allapattah Flats, an elongated marsh extending from St. Lucie County southeastward to just east of Indiantown.

The coastline of the Martin County Area is formed by two long barrier islands, Hutchinson Island and Jupiter Island. These are separated by the St. Lucie Inlet, the only ocean access within the county. Hutchinson Island, the northernmost island, is generally low in elevation, averaging about 3 feet above sea level. A narrow sand ridge, having an average elevation of 15 feet, parallels the ocean along the eastern edge of the island. Jupiter Island extends south from the inlet to Jupiter Inlet in northern Palm Beach County. It has lowlands in the northern part, but the southern part is dominated by a sandy ridge that has elevations ranging up to 30 feet (*16*).

Soils in the lowland areas on these islands consist of both organic and mineral materials and are subject to tidal flooding. The dominant vegetation is mangrove trees. Soils on the elevated ridges are mostly deep, excessively drained, mixed sands with shell fragments. Vegetation is mainly sawpalmetto, cabbage palm, sea-oats, and seagrape. Much of Jupiter Island has a dense cover of tropical hardwoods and shrubs.

The coastal ridge parallels the coastal area and is broken only by the St. Lucie River. The ridge ranges from about 1 to 3 miles wide. Elevation on the ridge ranges to 50 feet in several places and to 86 feet in Jonathan Dickinson State Park, the highest point in the Martin County Area. Soils on the ridge are deep, excessively drained sand and have highly variable slopes. Vegetation is chiefly sand pine, sawpalmetto, scrub oak, rosemary, and other woody shrubs.

The sandy flatlands, stretching westward from the coastal ridge to near Lake Okeechobee, make up the major part of the survey area. The flatlands consist mostly of flatwoods with numerous small ponds and grassy sloughs. The soils are predominantly nearly level, sandy, and wet and have a sandy subsoil that is weakly cemented with organic matter. In the south-central part of the survey area, limestone is below the soil in many places. Most areas of the flatwoods have an elevation ranging from 15 to 30 feet, but in the northwestern part elevation ranges to about 50 feet. Vegetation is mostly pine, sawpalmetto, and pineland threeawn.

The Everglades marsh, adjacent to Lake Okeechobee, is 15 to 20 feet above sea level. The Allapattah Flats marsh in the west-central part of the survey area is 25 to 30 feet above sea level. These marshes range from about 1 to 2 miles wide. Each is about 12 miles long. The soils are dominantly very poorly drained organic and mineral soils. There are numerous scattered areas of sandy soils that are shallow over limestone. Most of the marshland has been drained and is used for improved pasture, sugarcane, and citrus crops.

The surface drainage system in the survey area is poorly defined, except for Bessey Creek in the northeastern part, the South Fork of the St. Lucie River in the east-central part, and Loxahatchee River in the southeastern part. Before the land was developed, most natural drainage was through numerous closed depressions, sloughs, and poorly defined drainageways. The flow pattern was mainly toward the south and southwest. The St. Lucie Canal and numerous lesser canals and drainage systems have extensively altered the natural flow pattern.

water resources

Martin County Area has extensive areas of surface water in the coastal part, most of which are either salty or brackish. These include the St. Lucie River and its south fork, Indian River, Loxahatchee River, and the Intracoastal Waterway (fig. 1). In addition, there are

Figure 1.—A pleasure boat on the Intracoastal Waterway in an area of the Bessie-Okeelanta Variant-Terra Ceia Variant map unit.

several small streams and creeks that serve as tributaries (fig. 2) to the larger bodies of water. Although these extensive water areas are used for recreation and water transport, they are too salty to serve as a source of water for municipal, industrial, or agricultural uses. Lake Okeechobee is a potential source of huge quantities of freshwater, but it is approximately 30 miles from the major population center. There are no springs in the survey area.

The major source of freshwater in the survey area is nonartesian wells drilled into the shallow aquifer. These wells range in depth from about 15 to 115 feet. The quality of nonartesian water is generally superior to that of artesian water. The chemical composition of nonartesian water is such that the water generally is suitable for all purposes. Removing the iron content and color and reducing the hardness, however, generally are desirable if the water is used for domestic purposes. The nonartesian aquifer in the coastal area is the source of supply for most municipalities and for hundreds of privately owned wells (*3*).

Most artesian water in the survey area comes from the Floridan Aquifer, which lies at a depth of about 800 feet below the land surface. Since many areas are distant from major canals or other surface water supplies, the Floridan Aquifer is one of the main sources of water for irrigation. Many artesian wells are scattered throughout the survey area. Although the chloride content of artesian water is much higher than that of nonartesian water, the yield is much greater. Rainfall and ground water help to dilute the chloride concentration and make the water suitable for irrigation.

farming

Farming has long been important to the economy of the Martin County Area. Most of the land is used for various kinds of farming, although diversified cropping by individual farmers is not practiced. Most farming endeavors involve large areas of land devoted to a specific product.

Figure 2.—A small tributary to the Loxahatchee River offers an ideal setting for nature study. The slightly brackish water produces a dense cover of freshwater and saltwater tolerant vegetation. The soil is Terra Ceia Variant muck.

The main farming enterprises are citrus and beef production. In 1978, about 38,000 acres was planted to citrus (fig. 3) (*6, 14*). Oranges and grapefruit made up most of this acreage, but lemons were also an important crop. One of the world's largest lemon groves is in the survey area.

Approximately 36,000 acres was used as improved pasture (fig. 4) for beef and dairy production. Of this, 6,000 acres was grass and clover mixtures. Thirty-two thousand acres of managed range and 72,000 acres of grazeable woodlands provided additional grazing. In 1978, 6 dairy farms were in the survey area.

Many kinds of vegetables can be grown in the area. About 1,300 acres is used for vegetable crops each year (*6, 7, 14*). The major vegetable crops are cabbage (fig. 5), potatoes, peppers, tomatoes, and Chinese vegetables. Other common vegetables are watermelons, eggplants, and squash, but these are not grown on a regular basis. One large sugarcane farm is in the survey area. The production of flowers is of major importance to the economy of the area, though only about 300 acres is in flower farms.

Each year, urban development removes up to 1,000 acres of land from that available for agriculture. Almost all of this is unimproved rangeland or woodland that has been idle for many years.

transportation

Most of the Martin County Area is served by good transportation facilities. Several county, state, and federal highways provide ready access. The mainland is connected to the islands and beaches by a system of bridges. Scheduled airline service is not available in the area. Charter air service is available from Witham Field in Stuart. Both rail and bus service is available and numerous large trucking firms that have facilities for handling interstate trade serve the area.

recreation

A variety of recreational activities is available in the Martin County Area. Fishing, swimming, boating, water skiing, and horseback riding are popular. A number of parks and playgrounds are available for public use. Jonathan Dickinson State Park has facilities for all these activities, plus camping and canoeing. Both freshwater and saltwater fishing are readily available and highly popular year-round. Beaches at Jensen, Stuart, and Hobe Sound attract swimmers on all but the coldest days (fig. 6). Blowing Rocks, on the beach at the south line of Martin County, is a unique attraction.

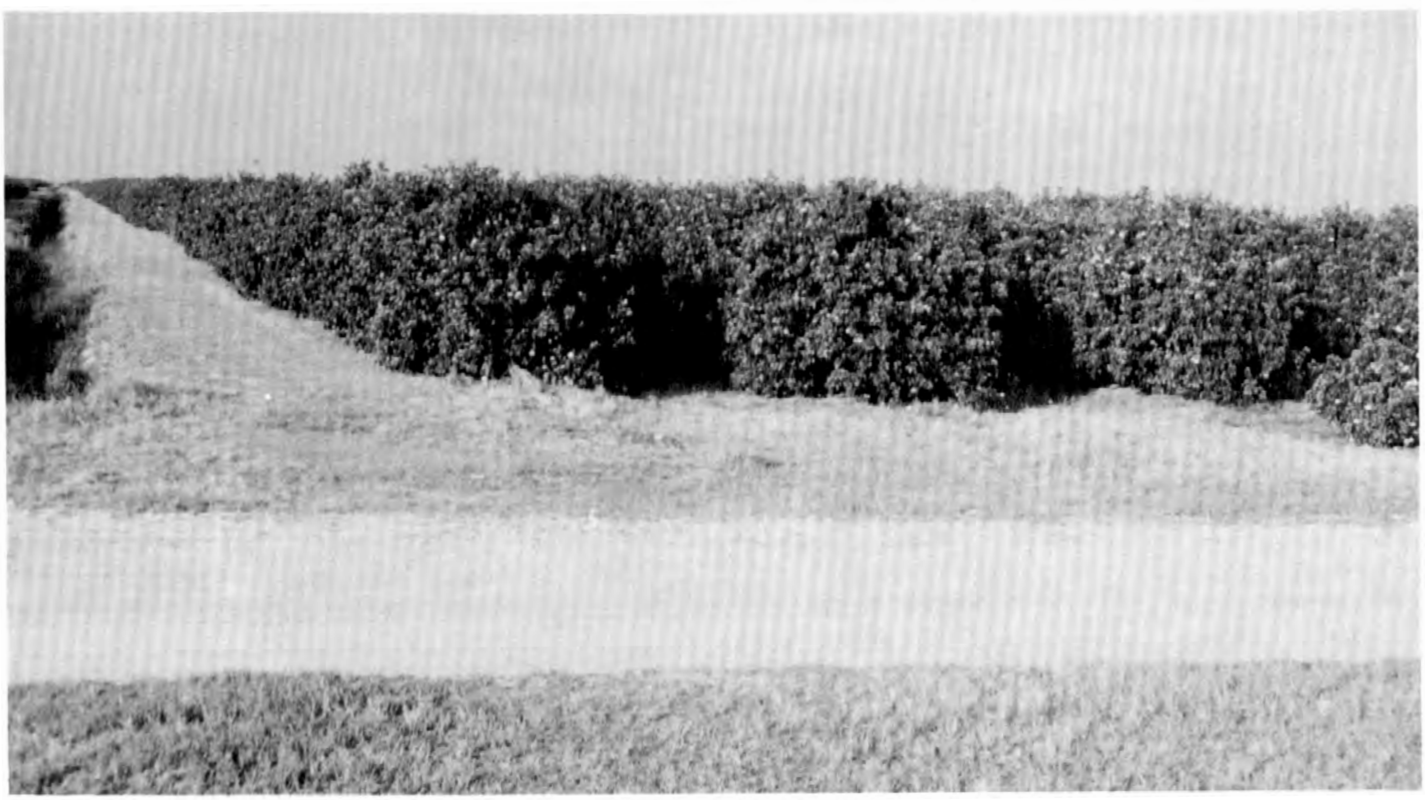

Figure 3.—A grove of orange trees on Floridana fine sand. The ditches are dual purpose. They drain off the excess surface water, control the water table, and provide for subsurface irrigation as the need arises.

Figure 4.—Cattle grazing improved pasture on Pineda sand. If simple surface drainage and good management are used, this poorly drained soil is well suited to produce good quality pasture of grass and clover.

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 units" and "Detailed soil map units."

Figure 5—Cabbage after one picking on nearly level Waveland sand. If water is controlled and management is good, vegetable crops can be grown on this soil.

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.

Figure 6.—Public beach on Hutchinson Island. Rock outcrops are scattered along the shoreline. Miles of open beaches provide year-round recreation in the survey area.

general soil map units

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

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

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or 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 suitabilty and potential for major land uses. Table 3 shows the extent of the map units shown on the general soil map. It lists the suitability and potential of each of the map units for major land uses and shows soil properties that limit use. Soil ratings are based on the practices commonly used in the survey area to overcome soil limitations. These ratings reflect the ease of overcoming the limitations. They also reflect the problems that will persist even if such practices are used.

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

soils of the sand ridges and coastal islands

These soils are on ridges and coastal beaches and in dunelike areas. They are nearly level to moderately steep, excessively drained to poorly drained, and are sandy throughout. Some of these soils consist of mixed sand and shell fragments. These soils are in the eastern part of the survey area. Two map units are in this group.

1. Paola-St. Lucie

Nearly level to moderately steep, excessively drained soils that are sandy to a depth of 80 inches or more

This map unit consists of nearly level to gently sloping ridges and sloping to moderately steep hillsides. It mainly occupies the high coastal ridge on the mainland that extends in a north-south direction across the county and the lower ridges and knolls adjacent to the St. Lucie River. In some areas, expecially in the vicinity of Jonathan Dickinson State Park and north of the St. Lucie River, slopes are complex. The largest area of this unit extends from the Stuart Airport southward to the Martin County line and averages about 1 mile wide. Another area extends from the St. Lucie County line to Sewall's Point and west along the north shore of the St. Lucie River. A smaller area encompasses most of the city of Stuart.

The natural vegetation is sand pine, scrub oak, rosemary, running oak, sawpalmetto, and pineland threeawn. The natural vegetation has been completely or partially removed in many areas.

This map unit makes up about 14,000 acres, or about 4 percent of the survey area. It is about 50 percent Paola soils, 30 percent St. Lucie soils, and 20 percent soils of minor extent.

The Paola soils are excessively drained. Typically, the surface layer is gray sand about 4 inches thick. The subsurface layer is dominantly white sand to a depth of about 32 inches. The subsoil is sand to a depth of about 68 inches; the upper 14 inches of the subsoil is yellowish brown, and the lower 22 inches is brownish yellow. The substratum is light yellowish brown sand to a depth of 80 inches or more.

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

Of minor extent in this unit are the Jonathan, Pomello, and Satellite soils.

Some areas of this unit are used for urban development. Stuart, Jensen Beach, Rio, Port Salerno, Hobe Sound, and Jonathan Dickinson State Park are in areas of this unit. Years ago, some areas were used for growing pineapples and mango trees. Numerous flower farms specializing in cut flowers and bulbs are in areas of this unit.

2. Palm Beach-Canaveral-Beaches

Nearly level to sloping, excessively drained, moderately well drained, and somewhat poorly drained soils that are sandy throughout and contain shell fragments; and beaches

This map unit consists of nearly level to sloping dunelike ridges and adjacent beaches. Areas are adjacent to the Atlantic Ocean on Hutchinson and Jupiter Islands. They extend from St. Lucie County in the north to Palm Beach County in the south and are broken only by the St. Lucie Inlet. Areas are less than 1/2 mile wide and include the community of Jupiter Island.

The natural vegetation in most areas of this unit is sawpalmetto, seagrape, sea-oats, and scattered cabbage palm. Much of Jupiter Island is covered with a variety of subtropical hardwoods, shrubs, and other plants.

This map unit makes up about 3,300 acres, or about 1 percent of the survey area. It is about 31 percent Palm Beach soils, 24 percent Canaveral soils, 14 percent Beaches, and 31 percent soils of minor extent.

The Palm Beach soils are excessively drained. Typically, the surface layer is black sand about 8 inches thick. The subsurface layer is dark grayish brown sand about 5 inches thick. Below this is sand to a depth of 80 inches or more; the upper 14 inches of the sand is brown, and the lower part is pale brown. Shells and shell fragments are throughout the soil.

The Canaveral soils are moderately well drained and somewhat poorly drained. Typically, the surface layer is dark brown sand and shell fragments and is about 6 inches thick. Below this is light brownish gray sand and shells to a depth of 80 inches or more.

Beaches are partly flooded daily by high tides and are completely flooded by storm tides. Typically, the surface layer is a mixture of light brownish gray shells and sand about 40 inches thick. Next is light gray shells and sand about 16 inches thick. Below this is gray shells and sand to a depth of 70 inches or more.

Of minor extent in this unit are the Cocoa Variant soils.

Most areas of this unit are in natural vegetation. Some areas are used for residential development, and some are used for recreation.

soils of the low ridges and knolls

These soils are on low ridges and knolls. They are somewhat excessively drained, moderately well drained, and poorly drained. They have a weakly cemented sandy subsoil, and in places are underlain by loamy material. Most areas of these soils are near the coast, but a few are in the western part of the survey area. One map unit is in this group.

3. Salerno-Jonathan-Hobe

Nearly level to gently sloping, poorly drained, moderately well drained, and somewhat excessively drained soils that have a dark colored, weakly cemented, dominantly sandy subsoil below a depth of 50 inches

This map unit consists of long narrow ridges, slightly elevated knolls, flatwoods, and scattered depressions. It is mainly in the eastern one-third of the survey area adjacent to the coastal ridge, and along major drainageways. Some small areas are along the west side of Allapattah Flats from Indiantown to the St. Lucie County line. Parts of Stuart, Palm City, and Jonathan Dickinson State Park are in this map unit.

The natural vegetation on the ridges and knolls is South Florida slash pine, scrub oak, sawpalmetto, fetterbush, cacti, and pineland threeawn. Sand pine and rosemary are in some areas. Vegetation in the flatwoods is South Florida slash pine, sawpalmetto, fetterbush, gallberry, running oak, pineland threeawn, and a wide variety of grasses.

This map unit makes up about 17,000 acres, or about 5 percent of the survey area. It is about 40 percent Salerno soils, 23 percent Jonathan soils, 12 percent Hobe soils, and 25 percent soils of minor extent.

The Salerno soils are poorly drained. Typically, the surface layer is sand about 9 inches thick; the upper 4 inches of the surface layer is black, and the lower 5 inches is very dark gray. The subsurface layer is sand to a depth of about 61 inches; the upper 8 inches of the subsurface layer is dark gray, the next 29 inches is light brownish gray, and the lower 15 inches is brown. The subsoil is black, weakly cemented fine sand in the upper 15 inches and dark reddish brown fine sand below this.

The Jonathan soils are moderately well drained to somewhat excessively drained. Typically, the surface layer is dark gray sand about 5 inches thick. The subsurface layer is sand to a depth of 56 inches; the upper 33 inches of the subsurface layer is light gray, and the lower 18 inches is light brownish gray. The subsoil is black, weakly cemented sand to a depth of 100 inches or more.

The Hobe soils are somewhat excessively drained. Typically, the surface layer is gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 70 inches; the upper 5 inches of the subsurface layer is gray, the next 35 inches is white, and the lower 26 inches is light gray. The upper part of the subsoil is black, weakly cemented fine sand about 4 inches thick over dark yellowish brown fine sand about 4 inches thick. The lower part of the subsoil is gray fine sandy loam.

Of minor extent in this unit are the Orsino, Pomello, Pomello Variant, Satellite Variant, St. Lucie, and Waveland soils.

Most areas of this unit are in natural vegetation. A small acreage is used for citrus and improved pasture. Some large areas are used for residential and urban development.

soils of the flatwoods

These nearly level, poorly drained soils are in broad areas of flatwoods. Most areas of these soils have a dark colored sandy subsoil that is weakly cemented in places. In some areas, the subsoil is sandy in the upper part and loamy in the lower part, or is loamy to a depth of 20 to 40 inches, or is sandy throughout. Four map units are in this group.

4. Waveland-Lawnwood-Basinger

Nearly level, poorly drained soils that have a dark colored, sandy, mainly weakly cemented subsoil

This map unit consists of broad flatwoods interspersed with depressions (fig. 7). The largest area of this unit occupies much of the land between Allapattah Flats and Lake Okeechobee in the western part of the survey area. An area 1 to 5 miles wide is just west of the coastal ridge and extends from Stuart southward to the Palm Beach County line. The third major area is in the north-central part of the survey area. It is 1 to 4 miles wide and extends from Green Ridge eastward and from the St. Lucie County line southward to the St. Lucie Canal. Smaller areas are in the northeastern part of the survey area adjacent to the St. Lucie County line.

The natural vegetation in the flatwoods is South Florida slash pine, sawpalmetto, fetterbush, gallberry, and dwarf huckleberry and bluestem, panicum, and pineland threeawn grasses. In the depressions the vegetation is sandweed, maidencane, stillingia, and sedges.

This map unit makes up about 73,000 acres, or about 21 percent of the survey area. It is about 45 percent Waveland soils, 20 percent Lawnwood soils, 10 percent Basinger soils, and 25 percent soils of minor extent.

The Waveland soils are poorly drained. Typically, the surface layer is dark gray sand about 18 inches thick. The subsurface layer is about 25 inches thick; the upper 18 inches of the subsurface layer is light gray sand, and the lower 7 inches is grayish brown sand. The subsoil is weakly cemented; the upper 4 inches of the subsoil is black sand, the next 30 inches is black loamy sand, and the lower 14 inches is black sand to a depth of 91 inches. The substratum is dark brown sand to a depth of 110 inches.

The Lawnwood soils are poorly drained. Typically, the surface layer is 5 inches of very dark gray fine sand over 12 inches of dark grayish brown fine sand. The subsurface layer is light brownish gray fine sand about 11 inches thick. The subsoil is weakly cemented and is

Figure 7.—A shallow, grassy pond in an area of flatwoods in the Waveland-Lawnwood-Basinger map unit. The soil in the pond is Waveland sand, depressional.

black loamy fine sand in the upper 14 inches and dark reddish brown fine sand in the lower 22 inches. Below this is brown loamy fine sand.

The Basinger soils are poorly drained. Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 28 inches; the upper 6 inches of the subsurface layer is grayish brown, and the lower 16 inches is light brownish gray. The subsoil is dark grayish brown fine sand to a depth of about 42 inches and has pockets of very dark grayish brown. The substratum is grayish brown fine sand in the upper 26 inches and brown fine sand in the lower 20 inches.

Of minor extent in this unit are the Oldsmar, Placid, Salerno, Samsula, and Wabasso soils.

Most areas of this unit are in natural vegetation and are used for range. Several large areas are used for improved pasture, and some areas are used for residential and urban development.

5. Nettles

Nearly level, poorly drained soils that have a subsoil that is dark colored, weakly cemented, and sandy in the upper part and loamy in the lower part

This map unit consists of broad flatwoods and scattered depressions. The only area of this unit is in the northeastern part of the survey area. It is along the Sunshine State Parkway, extending southeasterly from the St. Lucie County line for a distance of about 10 miles.

The natural vegetation in the flatwoods is South Florida slash pine, sawpalmetto, gallberry, fetterbush, running oak, pineland threeawn, and various grasses. In the depressions natural vegetation is sandweed, stillingia, redroot, maidencane, and a few grasses.

This map unit makes up about 21,000 acres, or about 6 percent of the survey area. It is about 75 percent Nettles soils and 25 percent soils of minor extent.

The Nettles soils are poorly drained. Typically, the surface layer is about 12 inches thick; the upper 5 inches of the surface layer is very dark gray sand, and the lower 7 inches is dark gray fine sand. The subsurface layer is gray fine sand about 20 inches thick. The upper part of the subsoil is about 19 inches thick and is weakly cemented; it is 11 inches of black sand over 8 inches of dark reddish brown fine sand. The lower part of the subsoil is grayish brown fine sandy loam about 11 inches thick. The substratum is dark grayish brown loamy sand to a depth of about 71 inches and grayish brown fine sandy loam below that to a depth of 80 inches.

Of minor extent in this unit are the Electra, Hobe, Oldsmar, Salerno, and Waveland soils. Oldsmar, Salerno, and Waveland soils are the most common.

Most areas of this unit have been cleared and are used for improved pasture grasses. Some areas are in natural vegetation and are used for range, and some areas are used for urban development and recreation.

6. Wabasso-Winder

Nearly level, poorly drained soils; some have a subsoil that is dark colored and sandy in the upper part and loamy in the lower part, and some have a loamy subsoil at a depth of less than 20 inches

This map unit consists of broad flatwoods interspersed with depressions and long, poorly defined drainageways. It is in the north-central part of the survey area, extending 3 to 8 miles south from the St. Lucie County line on either side of Florida Highway 609.

Natural vegetation in the flatwoods is South Florida slash pine, sawpalmetto, fetterbush, gallberry, waxmyrtle, and pineland threeawn, bluestem, and panicum grasses. Cabbage palms are scattered along the edges of drainageways and depressions. Natural vegetation in the drainageways and depressions is maidencane, sedges, buttonbush, willow, and sandweed.

This map unit makes up about 18,000 acres, or about 5 percent of the survey area. It is about 40 percent Wabasso soils, 35 percent Winder soils, and 25 percent soils of minor extent.

The Wabasso soils are poorly drained. Typically, the surface layer is sand about 7 inches thick; the upper 2 inches of the surface layer is black, and the lower 5 inches is very dark gray. The subsurface layer is sand about 13 inches thick; the upper 5 inches of the subsurface layer is gray, and the lower 8 inches is light brownish gray. The upper part of the subsoil is dominantly black sand about 16 inches thick. The lower part of the subsoil is sandy clay loam to a depth of 58 inches; the upper 5 inches is very dark grayish brown, the next 8 inches is dark grayish brown, the lower 9 inches is olive gray. The substratum is sandy clay loam to a depth of 80 inches; the upper 15 inches is olive gray, and the lower 7 inches is greenish gray.

The Winder soils are poorly drained. Typically, the surface layer is dark gray sand about 7 inches thick. The subsurface layer is gray sand about 8 inches thick. The subsoil is sandy clay loam to a depth of 42 inches; the upper 11 inches of the subsoil is light brownish gray, and the lower 16 inches is light gray. The substratum is greenish gray loamy sand to a depth of about 80 inches.

Of minor extent in this unit are the Chobee, Floridana, Oldsmar, Pineda, Riviera, and Tuscawilla soils. Oldsmar soils are most common in the flatwoods. Floridana and Riviera soils are most common in the low, wet areas.

Most areas of this unit are in natural vegetation and are used for range. Some large areas are used for improved pasture, and some are used for citrus crops.

7. Wabasso-Riviera-Oldsmar

Nearly level, poorly drained soils; most are sandy to a depth of 20 to 40 inches, but some are sandy to a depth of more than 40 inches, most have a subsoil that is dark colored and sandy in the upper part and loamy in the lower part

This map unit consists of broad, nearly level flatwoods interspersed with sloughs and depressions. Small to large areas are scattered throughout the survey area, except in the extreme eastern part. One of the large areas is about 11 miles long and 2 to 7 miles wide.

Natural vegetation in the sloughs is South Florida slash pine, cabbage palm, and waxmyrtle with scattered sawpalmetto and blue maidencane. In the flatwoods the natural vegetation is South Florida slash pine, sawpalmetto, huckleberry, fetterbush, and pineland threeawn. In the depressions the natural vegetation is sandweed, stillingia, sedges, and water tolerant grasses.

This map unit makes up about 77,640 acres, or about 22 percent of the survey area. It is about 30 percent Wabasso soils, 24 percent Riviera soils, 15 percent Oldsmar soils, and 31 percent soils of minor extent.

The Wabasso soils are poorly drained. Typically, the surface layer is mainly very dark gray sand about 7 inches thick. The subsurface layer is sand about 13 inches thick; the upper 5 inches of the subsurface layer is gray, and the lower 8 inches is light brownish gray. The upper part of the subsoil is mainly black sand about 16 inches thick. The lower part of the subsoil to a depth of about 58 inches is sandy clay loam; the upper 5 inches is very dark grayish brown, the next 8 inches is dark grayish brown, and the lower 9 inches is olive gray. The substratum is sandy clay loam; the upper 15 inches is olive gray, the lower part is greenish gray to a depth of 80 inches or more.

The Riviera soils are poorly drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 36 inches; the upper 13 inches of the subsurface layer is grayish brown, and the lower 19 inches is light gray. The subsoil is olive gray fine sandy loam to a depth of about 42 inches and has tongues of light gray fine sand from the overlying layers. The substratum is light gray fine sand to a depth of 80 inches or more. It has shell fragments in the lower part.

The Oldsmar soils are poorly drained. Typically, the surface layer is black sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 35 inches; the upper 9 inches of the subsurface layer is gray and the lower 21 inches is light gray. The upper part of the subsoil is fine sand to a depth of 46 inches; the upper 5 inches is black and the lower 6 inches is brown. The lower part of the subsoil to a depth of 60 inches is grayish brown fine sandy loam.

Of minor extent in this unit are the Malabar, Pineda, and Pinellas soils. The Malabar and Pineda soils are most common.

Most areas of this unit are in natural vegetation and are used for range. Some large areas are used for citrus crops and improved pasture.

soils of the sloughs and fresh water marshes

These soils are in broad sloughs, depressions, and marshes interspersed with slightly higher hammocks. They are poorly drained and very poorly drained. Some of these soils are sandy throughout; some have a loamy subsoil within a depth of 20 inches or at a depth of 20 to 40 inches; and some have a thick, dark colored surface layer. Some of these soils have hard limestone within a depth of 40 inches, and some are organic. These soils are in the western two-thirds of the survey area. Seven map units are in this group.

8. Pineda-Riviera

Nearly level, poorly drained soils that have a loamy subsoil at a depth of 20 to 40 inches

This map unit consists of broad sloughs interspersed with flatwoods and depressions. Most areas of this unit occur south of the St. Lucie Canal and west of the Sunshine State Parkway. One area is just east of Indiantown and extends north from the St. Lucie Canal.

The natural vegetation is South Florida slash pine, cabbage palm, waxmyrtle, gallberry, and fetterbush and blue maidencane, pineland threeawn, bluestem, and panicum grasses.

This map unit makes up about 70,000 acres, or about 20 percent of the survey area. It is about 40 percent Pineda soils, 30 percent Riviera soils, and 30 percent soils of minor extent.

The Pineda soils are poorly drained. Typically, the surface layer is sand about 8 inches thick; the upper 5 inches of the surface layer is dark gray, and the lower 3 inches is dark grayish brown. The subsurface layer is brown sand to a depth of about 15 inches. The subsoil is about 45 inches thick. The upper 21 inches of the subsoil is sand; it is 7 inches of brownish yellow over 14 inches of very pale brown. The next 8 inches of the subsoil is gray sandy loam, and the lower 16 inches is greenish gray fine sandy loam. The substratum is greenish gray fine sand with shell fragments to a depth of about 72 inches.

The Riviera soils are poorly drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 36 inches; the upper 13 inches of the subsurface layer is grayish brown and the lower 19 inches is light gray. The subsoil is olive gray fine sandy loam to a depth of about 42 inches and has tongues of light gray fine sand from the overlying layers. The substratum is light gray fine sand to a depth of 80 inches or more and has shell fragments in the lower part.

Of minor extent in this unit are the Boca, Oldsmar, and Pinellas soils. Oldsmar soils are the most common.

Many areas of this unit are in natural vegetation and are used for range. Some large areas are used for citrus crops and pasture.

9. Pineda-Riviera-Boca

Nearly level, poorly drained soils that have a loamy subsoil at a depth of 20 to 40 inches; some have limestone below the subsoil

This map unit consists of broad sloughs interspersed with flatwoods and depressions. Two areas are in the south-central part of the survey area. Another area is in the western part, northwest of the Barley Barber Swamp.

The natural vegetation is South Florida slash pine, cabbage palm, waxmyrtle, gallberry, and fetterbush and blue maidencane, pineland threeawn, bluestem, and panicum grasses.

This map unit makes up about 21,000 acres, or about 6 percent of the survey area. It is about 28 percent Pineda soils, 25 percent Riviera soils, 22 percent Boca soils, and 25 percent soils of minor extent.

The Pineda soils are poorly drained. Typically, the surface layer is sand about 8 inches thick; the upper 5 inches of the surface layer is dark gray and the lower 3 inches is dark grayish brown. The subsurface layer is brown sand to a depth of about 15 inches. The subsoil is about 45 inches thick. The upper 21 inches of the subsoil is sand; it is 7 inches of brownish yellow over 14 inches of very pale brown. The next 8 inches of the subsoil is gray sandy loam, and the lower 16 inches is greenish gray fine sandy loam. The substratum is greenish gray fine sand with shell fragments to a depth of 72 inches.

The Riviera soils are poorly drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 36 inches; the upper 13 inches of the subsurface layer is grayish brown, and the lower 19 inches is light gray. The subsoil is olive gray fine sandy loam to a depth of 42 inches and has tongues of light gray fine sand from the overlying layers. The substratum is light gray fine sand to a depth of 80 inches and has shell fragments in the lower part.

The Boca soils are poorly drained. Typically, the surface layer is fine sand about 8 inches thick; the upper 4 inches of the surface layer is very dark gray, and the lower 4 inches is dark gray. The subsurface layer is fine sand to a depth of about 25 inches; the upper 8 inches of the subsurface layer is light gray, and the lower 9 inches is pale brown. The subsoil is light gray fine sandy loam to a depth of about 32 inches. Limestone is at a depth of about 32 inches.

Of minor extent in this unit are the Hallandale, Oldsmar, Pinellas, and Wabasso soils. The Oldsmar soils are most common.

Many areas of this unit are in natural vegetation and are used for range. Some areas are used for citrus crops and improved pasture.

10. Basinger-Ft. Drum-Valkaria

Nearly level, poorly drained soils that are sandy throughout; some have organic stained layers, some have layers high in carbonates within a depth of 20 inches, and some have a yellowish brown layer in the subsoil

This map unit consists of broad sloughs, depressions, poorly defined drainageways, and hammocks. The only area of this unit is in the extreme northwestern corner of the survey area.

The natural vegetation is South Florida slash pine, cabbage palm, waxmyrtle, sandweed, sawpalmetto, and gallberry and pineland threeawn, bluestem, panicum, and blue maidencane grasses.

This map unit makes up about 3,600 acres, or about 1 percent of the survey area. It is about 45 percent Basinger soils, 20 percent Ft. Drum soils, 15 percent Valkaria soils, and 20 percent soils of minor extent.

The Basinger soils are poorly drained. Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 28 inches; the upper 6 inches of the subsurface layer is grayish brown and the lower 16 inches is light brownish gray. The subsoil is dark grayish brown fine sand to a depth of about 42 inches and has pockets of very dark grayish brown. The upper 26 inches of the substratum is grayish brown fine sand, and the lower 20 inches is brown fine sand.

The Ft. Drum soils are poorly drained. Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is brown fine sand to a depth of about 14 inches. The subsoil is calcareous and about 19 inches thick; the upper 4 inches of the subsoil is light brownish gray loamy fine sand, and the lower 15 inches is light gray fine sand. The upper 18 inches of the substratum is brownish yellow loamy fine sand, and the lower 29 inches is gray fine sand to a depth of 80 inches or more.

The Valkaria soils are poorly drained. Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 13 inches. The subsoil is fine sand about 32 inches thick; the upper 6 inches of the subsoil is brown, the next 10 inches is pale brown, the next 6 inches is yellowish brown, and the lower 10 inches is brown. The substratum is fine sand to a depth of 80 inches; the upper 10 inches of the substratum is grayish brown, the next 15 inches is light gray, and the lower 10 inches is light yellowish brown.

Of minor extent in this unit are the Pinellas and Waveland soils. The Pinellas soils are the most common.

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

11. Winder-Riviera

Nearly level, poorly drained soils that have a loamy subsoil, mainly within a depth of 20 inches; some have a subsoil at a depth of 20 to 40 inches

This map unit consists of broad, low marshes that have scattered areas of organic soils and slightly elevated hammock islands. The only area is along the eastern side of the Allapattah Flats. It extends southeastward from the St. Lucie County line for about 7 miles and is about 1/2 to 1 mile wide.

The natural vegetation in the marsh areas is sandweed, maidencane, stillingia, pickerelweed, sedges, and water tolerant grasses. There are also scattered areas of willow, fireflag, red maple, and sawgrass. In the hammock areas, the natural vegetation is cabbage palm, oak, marlberry, wild coffee, and strangler fig.

This map unit makes up about 4,000 acres, or about 1 percent of the survey area. It is about 45 percent Winder soils, 30 percent Riviera soils, and 25 percent soils of minor extent.

The Winder soils are poorly drained. Typically, the surface layer is dark gray sand about 7 inches thick. The subsurface layer is gray sand about 8 inches thick. The subsoil is sandy clay loam to a depth of about 42 inches; the upper 11 inches of the subsoil is light brownish gray, and the lower 16 inches is light gray. The substratum is greenish gray loamy sand to a depth of about 80 inches.

The Riviera soils are poorly drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 36 inches; the upper 13 inches of the subsurface layer is grayish brown, and the lower 19 inches is light gray. The subsoil is olive gray fine sandy loam to a depth of about 42 inches and has tongues of light gray fine sand from the overlying layers. The substratum is light gray fine sand to a depth of 80 inches and has shell fragments in the lower part.

Of minor extent in this unit are the Chobee, Floridana, Gator, Hallandale, and Jupiter soils. The Floridana soils are the most common.

Most areas of this unit are used for improved pasture. Some large areas are used for citrus crops. The remainder is in natural vegetation and is used for range.

12. Floridana-Jupiter-Hilolo

Nearly level, poorly drained and very poorly drained soils that have a dark colored surface layer; most have a loamy subsoil within a depth of 40 inches, and some have limestone within a depth of 20 inches

This map unit consists of broad, low marshes and slightly elevated hammocks. Areas are mainly elongated and less than a mile wide. They are in the Allapattah Flats, in a drainageway extending from Indiantown to Barley Barber Swamp, and in the marsh area adjacent to Lake Okeechobee.

The natural vegetation in the marshes is waxmyrtle, buttonbush, pickerelweed, sawgrass, smartweed, maidencane, and water tolerant grasses. In the hammocks vegetation is cabbage palm, oaks, strangler fig, wild coffee, American beautyberry, greenbriar, and a few grasses.

This map unit makes up about 16,000 acres, or about 5 percent of the survey area. It is about 60 percent Floridana soils, 15 percent Jupiter soils, 7 percent Hilolo soils, and 18 percent soils of minor extent.

The Floridana soils are very poorly drained. Typically, the surface layer is black fine sand about 15 inches thick. The subsurface layer is light brownish gray fine sand about 12 inches thick. The upper 10 inches of the subsoil is grayish brown sandy clay loam, and the lower 13 inches is grayish brown fine sandy loam. Light gray fine sand is below this to a depth of 62 inches or more.

The Jupiter soils are poorly drained. Typically, the surface layer is black sand about 4 inches thick. Below this is about 6 inches of very dark grayish brown sand. Fractured limestone is at a depth of about 10 inches and is about 12 inches thick. Below this, is calcareous loamy sand to a depth of 84 inches or more; the upper 10 inches of the loamy sand is light brownish gray, the next 16 inches is light gray, the next 24 inches is olive gray, and the lower part is greenish gray.

The Hilolo soils are poorly drained. Typically, the surface layer is fine sand to a depth of 8 inches; the upper 3 inches of the surface layer is black and the lower 5 inches is very dark brown. The subsoil is sandy clay loam about 48 inches thick; the upper 32 inches of the subsoil is gray and the lower 16 inches is white. The substratum is light gray fine sandy loam.

Of minor extent in this unit are Canova Variant, Chobee, Gator, Hallandale, Riviera, and Tequesta Variant soils. The Canova Variant soils are only in an area of this unit near Lake Okeechobee. The Chobee soils are the most common minor soil in the marshes and the Hallandale soils are most common in the hammocks.

Most areas of this unit are used for improved pasture. Some areas are used for citrus and sugarcane. Most of the hammocks remain in natural vegetation.

13. Chobee-Gator

Nearly level, very poorly drained soils; some are loamy throughout, and some have an organic surface layer and a loamy substratum

This map unit consists of broad low marshes with scattered, small, wooded islands. An area of this unit is in the Allapattah Flats. It is about 5 miles long and up to 1.25 miles wide.

The natural vegetation is sawgrass, cypress, pickerelweed, maidencane, and a few water oaks and cabbage palms.

This map unit makes up about 3,600 acres or about 1 percent of the survey area. It is about 50 percent Chobee soils, 30 percent Gator soils, and 20 percent soils of minor extent.

The Chobee soils are very poorly drained. Typically, a layer of black muck about 3 inches thick overlies the mineral soil. The surface layer is black fine sandy loam about 6 inches thick. The subsoil is sandy clay loam to a depth of 42 inches; the upper 18 inches of the subsoil is black, and the lower 18 inches is gray and calcareous. The substratum is calcareous; the upper 7 inches of the substratum is grayish brown sandy loam, the next 9 inches is light olive gray sandy clay loam, and the lower 22 inches is greenish gray sandy clay loam to a depth of 80 inches or more.

The Gator soils are very poorly drained. Typically, the surface layer is muck about 24 inches thick; the upper 11 inches of the surface layer is black, and the lower 13 inches is dark reddish brown. The substratum is below this. The upper 24 inches of the substratum is very dark gray fine sandy loam, and the lower part is a mixture of gray and grayish brown sand and shell fragments to a depth of 56 inches or more.

Of minor extent in this unit are the Floridana, Hilolo, Jupiter, Tequesta Variant, and Winder soils. The Floridana soils are most common.

Most areas of this unit are used for improved pasture. Some areas are used for citrus production. Only small, scattered areas remain in native vegetation.

14. Okeelanta-Canova Variant-Floridana

Nearly level, very poorly drained soils; most are organic and have a sandy substratum, some have a thin organic surface layer and a loamy subsoil underlain by limestone, and some have a dark colored sandy surface layer and a loamy subsoil

This map unit consists of broad marshes adjacent to Lake Okeechobee. An area about 0.5 to 0.75 mile wide extends about 8 miles north from the Palm Beach County line. The native vegetation has been cleared from this area.

This map unit makes up about 3,500 acres, or about 1 percent of the survey area. It is about 40 percent Okeelanta soils, 30 percent Canova Variant soils, 20 percent Floridana soils, and 10 percent soils of minor extent.

The Okeelanta soils are very poorly drained. Typically, well decomposed organic material (muck) is to a depth of about 30 inches; the upper 4 inches of the muck is black, the next 22 inches is dark reddish brown, and the lower 4 inches is black and has a high sand content. Sand is below this; the upper 18 inches of the sand is very dark gray, and the lower 32 inches is dark grayish brown to a depth of 80 inches or more.

The Canova Variant soils are very poorly drained. Typically, a 12-inch layer of black muck overlies the mineral soil. The surface layer is black fine sand about 5 inches thick. The subsurface layer is gray fine sand about 13 inches thick. The subsoil is grayish brown sandy clay loam about 6 inches thick. The substratum is light brownish gray fine sandy loam. Limestone is at a depth of about 30 inches.

The Floridana soils are very poorly drained. Typically, the surface layer is black fine sand about 15 inches thick. The subsurface layer is light brownish gray fine sand about 12 inches thick. The subsoil is grayish brown sandy clay loam in the upper 10 inches, and grayish brown fine sandy loam in the lower 13 inches. Below this is light gray fine sand to a depth of 62 inches or more.

Of minor extent in this unit are Adamsville Variant, Pompano, Tequesta Variant, and Torry soils. The Adamsville Variant soils are on a natural dike along the entire western side of this unit and are the most extensive minor soils.

Most areas of this unit have been drained and are used for sugarcane. The rest is used mainly as improved pasture.

soils of the tidal swamps

These soils are in tidal swamps. They are organic and very poorly drained. These soils are on either side of the Intracoastal Waterway and along its tributaries in the eastern part of the survey area. One map unit is in this group.

15. Bessie-Okeelanta Variant-Terra Ceia Variant

Nearly level, very poorly drained organic soils; some have a clayey layer in the substratum, some have a sandy substratum, and some have more than 50 inches of organic material

This map unit consists of mangrove swamps that are subject to tidal flooding by saltwater. Areas of this map unit are on Hutchinson Island and along the Intracoastal Waterway, the Loxahatchee River, and the South Fork of the St. Lucie River.

The natural vegetation is dominantly red mangrove (fig. 8), with black mangrove in coastal areas, and white mangrove and cypress in the two river systems. Leather fern is also common along the inland rivers.

This map unit makes up about 3,000 acres, or about 1 percent of the survey area. It is about 45 percent Bessie soils, 30 percent Okeelanta Variant soils, 15 percent Terra Ceia Variant soils, and 10 percent soils of minor extent. The Bessie soils are dominant in the more extensive coastal areas of this unit, and Terra Ceia Variant soils are dominant in the inland river areas.

The Bessie soils are very poorly drained. Typically, the surface layer is dark reddish brown muck about 18 inches thick. Next is very dark grayish brown clay to a depth of 44 inches. Below this is dark gray fine sand and shell fragments.

The Okeelanta Variant soils are very poorly drained. Typically, the surface layer is black muck about 4 inches thick. Next is dark reddish brown muck about 16 inches thick. Below this is sand and shell fragments that are very dark brown in the upper 8 inches, very dark grayish brown in the next 8 inches, and gray in the lower part to a depth of 54 inches or more.

The Terra Ceia Variant soils are very poorly drained.

Figure 8.—Red mangrove in an area of Bessie-Okeelanta Variant-Terra Ceia Variant map unit that is flooded daily by tidal action. The bald cypress has been killed because of increased salinity after drainage of adjacent soils reduced the inflow of freshwater.

Typically, the surface layer is black muck about 12 inches thick. The next layer is dark reddish brown muck about 28 inches thick. Below this is black muck that has dark reddish brown muck pockets or lenses to a depth of 60 inches or more.

Of minor extent in this unit are very poorly drained Aquents and somewhat poorly drained Canaveral soils.

Most areas of this unit remain in natural vegetation. A few small areas have been filled in and are used for urban development and recreation.

detailed soil map units

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

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

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

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

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

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. St. Lucie-Urban land complex, 0 to 8 percent slopes, is an example.

Not all of the map units in this county have been mapped with the same degree of detail. Broadly defined units, indicated by a superscript on the soil map legend, are apt to be larger and to vary more in composition than the rest of the map units in the survey. Composition of these broadly defined units has been controlled well enough, however, to be interpreted for the expected use of the soils.

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.

2—Lawnwood fine sand. This nearly level soil is poorly drained. It is in broad areas of flatwoods. Areas range from about 10 to 200 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black and dark grayish brown fine sand. The subsurface layer is light brownish gray fine sand to a depth of about 28 inches. The subsoil is fine sand to a depth of 80 inches or more; the upper part of the subsoil is black and weakly cemented, the middle part is dark reddish brown and weakly cemented, and the lower part is brown and has darker colored, weakly cemented fragments.

Included with this soil in mapping are small areas of Waveland and St. Johns Variant soils and soils that do not have a cemented subsoil. Also included are small, shallow depressions. Total inclusions in any area are less than 20 percent.

The water table is at a depth of less than 10 inches for 2 to 4 months and at a depth of 10 to 40 inches for 6 months or more during most years. It is perched above the subsoil during the rainy period early in summer. In dry seasons, the water table recedes to a depth of 40 inches or more. Permeability is rapid in the surface and subsurface layers and slow to very slow in the subsoil. The available water capacity is low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the content of organic matter are low.

Most areas of this soil are in open forest. The natural vegetation is slash pine and an understory of sawpalmetto, gallberry, fetterbush, huckleberry, running oak, and waxmyrtle. Pineland threeawn is the most common native grass. Other grasses are creeping bluestem, chalky bluestem, lopsided indiangrass, little blue maidencane, and species of panicums.

This soil has very severe limitations for cultivated crops because of wetness. The number of adapted crops suited to this soil is limited unless intensive water control measures are used. If a water control system is designed to remove the excess water, this soil is suitable for vegetable crops. Good management, in addition to water control, includes crop rotations with close growing, soil improving crops on the land at least two-thirds of the time. These crops and the residue of all other crops should be used to protect the soil from erosion. Fertilizer and lime should be added according to the need of the crop.

Citrus trees are poorly suited to this soil because of the wetness. If adequately drained and well managed, this soil is suited to citrus. Drainage should be adequate to remove excess water from the soil rapidly to a depth of about 4 feet after heavy rains. Planting the trees on beds lowers the effective depth of the water table. A close growing cover crop is needed between the tree rows to protect the soil from blowing when dry and from washing during heavy rains. The trees require regular applications of fertilizer. To insure highest yields, irrigation is needed in seasons of low rainfall.

This soil is well suited to improved grasses. Pangolagrass, bahiagrass, and clovers are well adapted and grow well if well managed. Water control is required to remove surface water in times of high rainfall. Regular use of fertilizer is needed for high production, and grazing should be carefully controlled to maintain healthy plants.

The potential for pine trees is low. Equipment limitations and seedling mortality are the main management concerns. A good drainage system to remove the excess surface water is needed if the potential productivity is to be realized. Slash pine is the best adapted species.

This soil is in capability subclass IVw.

3—Lawnwood fine sand, depressional. This poorly drained soil is in depressions in the flatwoods. Areas range from about 2 to 40 acres. Slopes are smooth to concave and are 1 percent or less.

Typically, the surface layer is gray fine sand. Below this is light gray and white fine sand to a depth of 27 inches. The subsoil is dark brown, weakly cemented fine sand about 23 inches thick. The substratum is brown and pale brown fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Basinger, Waveland, St. Johns Variant, and Placid soils. Also included are areas of soils that are similar to this Lawnwood soil but do not have a cemented subsoil and small areas of soils that have several inches of organic material at the surface. Total inclusions in any area are less than 25 percent.

This soil is ponded more than 6 months in most years. Permeability is rapid in the surface and subsurface layers and slow to very slow in the subsoil. The available water capacity is low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the content of organic matter are low.

Most areas of this soil are in natural vegetation of St. Johnswort, ferns, and a variety of water tolerant grasses. Some scattered areas have waxmyrtle and melaleuca trees.

Under natural conditions, this soil is not suited to cultivated crops because of the ponding. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is suitable for vegetable crops. A water control system is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Row crops should be rotated with close growing, soil improving crops. The soil improving crops need to be in the rotation three-fourths of the time. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparations need to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

This soil is not suited to citrus trees in the natural state. It is poorly suited to citrus even if management is intensive and includes adequate water control.

In the natural state, this soil is not suited to pasture. However, if management is very intensive and soil improving measures and a good water control system are used, this soil is moderately suited for improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing and weakening of plants.

This soil has low potential for pine trees. Severe equipment limitations and seedling mortality are the main management concerns. A good water control system that removes the excess surface water is necessary before trees can be planted and the potential productivity realized. Slash pine is better suited than other species.

This soil is in capability subclass VIIw.

4—Waveland sand. This nearly level soil is poorly drained. It is in broad areas of flatwoods. Slopes are dominantly smooth and range from 0 to 2 percent

Typically, the surface layer is dark gray sand. The subsurface layer is light gray and grayish brown. The subsoil begins at a depth of 43 inches. The upper 4 inches of the subsoil is black sand and is not cemented. The next 30 inches is weakly cemented, black and dark reddish brown loamy sand. The next 14 inches is loose black sand, and below that is dark brown sand.

Included with this soil in mapping are soils that are similar to this Waveland soil but have a dark colored surface layer 10 to 14 inches thick. Also included are small areas of Basinger, Jonathan, Lawnwood, Nettles, Placid, and Salerno soils and small wet depressions. Total inclusions in any area make up about 20 percent.

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

Most areas of this soil are in natural vegetation. The natural vegetation is South Florida slash pine with an understory of sawpalmetto, gallberry, fetterbush, running oak, and dwarf huckleberry. Grasses are pineland threeawn, bluestem, and panicum.

This soil has very severe limitations for cultivated crops because of wetness and the sandy texture. The adapted crops are limited unless management is very intensive. If management is proper, this soil is suitable for a number of vegetable crops. A water control system is needed to remove the excess water in wet seasons and to provide water for subsurface irrigation in dry seasons. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparation needs to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

Citrus trees are suited to this soil after a carefully designed water control system has been installed to maintain the water table below a depth of 4 feet. Planting trees on beds helps lower the effective depth of the water table. Plant cover should be maintained. Regular applications of fertilizer and lime are needed.

This soil is well suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizers and lime are needed, and grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential for pine trees is medium. Slash pine is better suited than other trees. The main management concerns are equipment limitations during wet periods, seedling mortality, and plant competition. For best results, a simple water control system to remove excess surface water should be installed.

This soil is in capability subclass IVw.

5—Waveland sand, depressional. This poorly drained soil is in depressions in the flatwoods. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray sand. The subsurface layer is gray, light gray, and light brownish gray sand to a depth of 48 inches. The subsoil is black, weakly cemented sand and noncemented, dark reddish brown sand. Below this is brown sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Basinger, Lawnwood, Oldsmar, Placid, and St. Johns Variant soils. Also included are small areas of soils that are similar to this Waveland soil but have a thinner, noncemented subsoil or have a few inches of organic material at the surface. Total inclusions in any area are about 25 percent.

This soil is ponded for 6 to 9 months or more in most years. The natural fertility is low, and response to fertilizers is moderate. Permeability is rapid in the surface and subsurface layers and very slow to moderately slow in the subsoil. The available water capacity is medium in the subsoil and low in the surface layer.

The natural vegetation is St. Johnswort, needlerush, pipewort, ferns, panicums, maidencane, and other water tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops because of the ponding. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is suitable for vegetable crops. A water control system is needed to remove the excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Row crops should be rotated with close growing, soil improving crops. The soil improving crops need to be in rotation three-fourths of the time. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparations need to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

This soil is not suited to citrus trees in the natural state. It is poorly suited to citrus even if management is intensive and water control is adequate.

Under natural conditions, this soil is not suited to pasture. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is moderately suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing and weakening of plants.

This soil has low potential for pine trees. Severe equipment limitations and seedling mortality are the main management concerns. A good water control system that removes the excess surface water is necessary before trees can be planted and the potential productivity realized. Slash pine is better suited than other species.

This soil is in capability subclass VIIw.

6—Paola sand, 0 to 8 percent slopes. This nearly level to sloping soil is excessively drained. It is on the coastal ridge and isolated knolls in coastal areas. Areas are many hundreds of acres in size. Slopes are smooth to convex.

Typically, the surface layer is gray sand. The subsurface layer is white sand. Below this is yellowish brown and brownish yellow sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Paola soil but do not have a light colored subsurface layer and small areas of soils that have a thicker subsurface layer. Also included are small areas of Hobe, Jonathan, Orsino, Pomello, Satellite Variant, and St. Lucie soils. Total inclusions in any area are less than 20 percent.

The water table is below a depth of 72 inches throughout the year. Permeability is very rapid, and the available water capacity is very low throughout the profile. Natural fertility and the content of organic matter are very low.

Most areas of this soil are in natural vegetation. The vegetation is sand pine, scrub oak, rosemary, sawpalmetto, running oak, cacti, mosses, and lichens. Slash pine and scrub hickory are in some areas.

This soil is not suited to cultivated crops. It is poorly suited to citrus trees, and production is only fair if management is good. A ground cover of close growing plants is needed between tree rows to protect the soil from blowing. Fertilizer should be applied as needed. A well designed irrigation system helps maintain optimum moisture for maximum yields.

This soil has only fair suitability for pasture. Grasses, such as pangolagrass and bahiagrass, make only fair growth when fertilized. Grazing must be carefully controlled.

Potential is very low on this soil for pine trees. Equipment limitations and seedling mortality are the main management concerns. Sand pine is preferred for planting.

This soil is in capability subclass VIs.

7—St. Lucie sand, 0 to 8 percent slopes. This deep, nearly level to sloping sandy soil is excessively drained. It is on dry coastal ridges and on isolated knolls in the flatwoods. Areas range from a few acres to several hundred acres. Slopes are generally uniform and range from 0 to 8 percent.

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

Included with this soil in mapping are small areas of soils that are similar to this St. Lucie soil but have fine sand texture or have a thicker surface layer. Soils that have short, steeper slopes, ranging up to 30 percent, are in some places. Also included are small areas of Paola, Pomello, and Satellite Variant soils. Total inclusions in any area are less than 15 percent.

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

Most areas of this soil are in native vegetation. This consists of sand pine, scrub live oak, and an understory of sawpalmetto, rosemary, cacti, lichens, and deer moss. Pineland threeawn is the most common grass.

This soil is not suited to cultivated crops, citrus, and improved pasture because it is very droughty and infertile. Response to fertilizers is low. Irrigation water moves through the soil rapidly, and little is retained for plant use.

The potential for pine trees is very low. Equipment limitations and seedling mortality are the main management concerns. Sand pine is preferred for planting.

This soil is in capability subclass VIIs.

8—Palm Beach sand, 0 to 8 percent slopes. This nearly level to sloping soil is well drained to excessively drained. It is on dunelike ridges parallel to the coastline. Areas are generally several miles long and very narrow, though in places on Jupiter Island they range to 0.25 mile wide. Slopes range from 0 to 8 percent.

Typically, the surface layer is about 8 inches thick. It is a mixture of black sand and shell fragments. Below this is sand and shell fragments to a depth of 80 inches or more. The upper 5 inches of the sand and shell fragments is dark grayish brown, the next 14 inches is brown, and the lower 53 inches is pale brown.

Included with this soil in mapping are small areas of Canaveral soils. Also included are small areas of moderately well drained soils near the base of slopes. Total inclusions in any area are less than 10 percent.

The depth to the water table is more than 120 inches. Permeability is very rapid throughout the profile, and the available water capacity is very low. Natural fertility and the content of organic matter are very low.

A few areas of this soil are used for building sites or recreational purposes. Most areas remain in natural vegetation consisting of sawpalmetto, seagrape, sea-oats, and scattered cabbage palm. Parts of Jupiter Island are covered with a wide variety of subtropical hardwoods, shrubs, and other plants.

This soil is not suited to cultivated crops, citrus trees, or pasture.

The potential for pine trees is very low. Equipment limitations and seedling mortality are the main management concerns. Sand pine is preferred for planting in areas of expanding urban growth.

This soil is in capability subclass VIIs.

9—Pomello sand, 0 to 5 percent slopes. This nearly level to gently sloping soil is moderately well drained. It is on low ridges and knolls in the flatwoods. Areas range from about 5 to 100 acres. Slopes are smooth to convex.

Typically, the surface layer is gray sand about 3 inches thick. The subsurface layer is light gray sand about 43 inches thick. The subsoil is dark reddish brown sand about 21 inches thick and has scattered, weakly cemented fragments throughout. Below this is brown sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Pomello soil but the subsoil is below a depth of 50 inches, soils that have a weakly cemented subsoil, and soils that have a deep loamy fine sand layer. Also included are small areas of Jonathan, Orsino, Salerno, Satellite Variant, and Waveland soils. Total inclusions in any area are less than 20 percent.

The water table is at a depth of 24 to 40 inches for about 2 to 4 months during the wet season. It ranges from a depth of 40 to 60 inches for about 8 months during the drier seasons. Permeability is very rapid in the surface and subsurface layers and moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the content of organic matter are very low.

Most areas of this soil are in natural vegetation. The vegetation in most areas consists of South Florida slash pine, scrub live oak, sawpalmetto, fetterbush, running oak, and pineland threeawn. Some areas also have sand pine, and a few areas in the southeastern part of Martin County have turkey oak.

This soil is not suited to most commonly cultivated crops. It is poorly suited to citrus trees. Only fair yields can be obtained if the level of management is high. For maximum yields, sprinkler irrigation should be provided. Regular applications of fertilizers and lime are needed.

Improved pasture grasses are fairly well suited if good management practices are used. Bahiagrasses are better suited than other grasses. Clovers are not suited. Droughtiness is the major limitation except during the wet season. Regular applications of fertilizer and lime are needed. Grazing should be well controlled to permit vigorous growth for highest yields and to provide good ground cover.

The potential is low on this soil for pine trees. Seedling mortality, plant competition, and equipment mobility are the major management concerns for commercial tree production. South Florida slash pine and sand pine are preferred for planting.

This soil is in capability subclass VIs.

10—Basinger fine sand, depressional. This nearly level soil is poorly drained. It is in depressional areas in the flatwoods. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is light brownish gray fine sand about 18 inches thick. The subsoil is mixed, dark brown and grayish brown fine sand about 20 inches thick. Below this is fine sand to a depth of 80 inches or more. The upper 18 inches of the fine sand is pale brown, and the lower part is very pale brown.

Included with this soil in mapping are small areas of soils that are similar to this Basinger soil but have a thin organic surface layer or have a black surface layer more than 10 inches thick. Also included are small areas of Placid and Sanibel soils. Total inclusions in any area are about 25 percent.

This soil is ponded for 6 to 9 months or more in most years. Permeability is very rapid throughout the profile. The available water capacity is very low, and natural fertility is low.

Most areas of this soil are in natural vegetation. This consists of St. Johnswort, maidencane, pickerelweed, needlerush, and other water tolerant grasses and sedges. A few areas are covered with cypress, water oak, and red maple.

Under natural conditions, this soil is not suited to cultivated crops because of ponding. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is suitable for vegetable crops. A water control system is needed to remove the excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Row crops should be rotated with close growing, soil improving crops. The soil improving crops need to be in the cropping system three-fourths of the time. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparations need to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

This soil is not suitable for citrus trees in the natural state. It is poorly suited even if intensive management practices are used and the water control is adequate.

Under natural conditions, this soil is not suited to pasture. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is moderately suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing and weakening of plants.

This soil has low potential for pine trees. Severe equipment limitations and seedling mortality are the main management concerns. A good water control system that removes the excess surface water is necessary before trees can be planted and the potential productivity realized. South Florida slash pine is better suited than other species.

This soil is in capability subclass VIIw.

12—St. Johns Variant sand. This nearly level soil is very poorly drained. It is in depressions and sloughs and at the base of short slopes in areas of flatwoods. Areas are generally long and narrow and range from about 5 to 50 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is black sand about 14 inches thick. The subsurface layer is sand to a depth of about 40 inches. The upper 16 inches of the subsurface layer is dark gray, and the lower 10 inches is gray. The subsoil is sand to a depth of 72 inches or more. The upper 8 inches of the subsoil is dark grayish brown, and the next 6 inches is black and has dark brown pockets or mottles. The next 8 inches of the subsoil is dark reddish brown mixed with black and grayish brown, and the lower 10 inches is brown.

Included with this soil in mapping are small areas of soils that are similar to this St. Johns Variant soil but the subsoil is at a depth of slightly less than 30 inches, areas of soils that have an ortstein, and some areas of this soil that have a brownish colored subsurface layer. Also included are small areas of Basinger, Lawnwood, Placid, Sanibel, and Waveland soils. Total inclusions in any area are less than 20 percent.

This soil is ponded for 6 months or more in most years, except for dry seasons, and the water table is within a depth of 10 inches the rest of the year. In dry seasons the water table can recede to a depth of 10 to 30 inches or more. The 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 moderate in the subsoil. The content of organic matter is medium to high in the surface and subsoil layers and low in other layers. Natural fertility is medium.

A few areas of this soil are used for improved pasture, but most areas remain in natural vegetation. The natural vegetation consists of St. Johnswort, maidencane, pickerelweed, needlerush, ferns, pineland threeawn, and other grasses. Sawpalmetto and South Florida slash pine are scattered throughout some areas.

Under natural conditions, this soil is not suited to cultivated crops because of ponding. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is suitable for vegetable crops. A water control system is needed to remove the excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Row crops need to be rotated with close growing, soil improving crops. The soil improving crops should be in the cropping system three-fourths of the time. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparations need to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

This St. Johns Variant soil is not suited to citrus trees in the natural state. It is poorly suited to citrus even if management is intensive and water control is adequate.

Under natural conditions, this soil is not suited to pasture. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is moderately suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing and weakening of plants.

This soil has low potential for pine trees, even if the excess wetness is overcome. Equipment limitations and seedling mortality are the main management concerns. Slash pine is better suited than most other trees for planting, but only after adequate water control is provided.

This soil is in capability subclass VIIw.

13—Placid sand. This nearly level soil is very poorly drained. It is in wet depressions and drainageways in the flatwoods. Areas range from a few acres to about 30 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is black sand. The subsurface layer is sand to a depth of more than 80 inches. It is dark grayish brown, gray, and light brownish gray.

Included with this soil in mapping are small areas of Basinger, Lawnwood, Sanibel, and St. Johns Variant soils. Also included are small areas of soils that are similar to this Placid soil but have 2 to 7 inches of organic material at the surface and small areas that have a brown to dark brown subsurface layer. Total inclusions in any area are less than 20 percent.

Most areas of this soil are ponded for 6 months or more each year. The water table is at a depth of less than 10 inches for most of the rest of the year, except in extended dry seasons. Permeability is rapid throughout the profile. The available water capacity is high in the surface layer and low in the subsurface layer. Natural fertility and the content of organic matter are high.

A few areas of this soil are drained and used for improved pasture. Most areas are in natural vegetation. The natural vegetation is pickerelweed, ferns, St. Johnswort, maidencane, redroot, sedges, and water tolerant grasses. Common trees are cypress, sweetbay, willow, and swamp maple.

Under natural conditions, this soil is not suited to cultivated crops. If good water control is provided, this soil is well suited to many vegetable crops. A well designed and maintained water control system should rapidly remove the excess water during heavy rains. Important in soil management are good seedbed preparation, crop rotations, and regular applications of fertilizer and lime. Cover crops need to be in the cropping system two-thirds of the time and should be rotated with row crops. All crop residue and soil improving crops should be used to protect the soil from erosion.

This Placid soil is not suited to citrus trees unless water control is maintained and good soil aeration is provided to a depth of about 4 feet. If water is controlled and trees are planted on beds, citrus trees grow well. A good, close growing cover crop is needed between the tree rows to prevent blowing and washing. The trees require regular applications of fertilizers.

Under natural conditions, this soil is too wet for improved pasture grasses and legumes. If the water is adequately controlled, suitability is high for many grasses and legumes. Pangolagrass, bahiagrasses, and clovers respond to adequate fertilizing and liming. Grazing should be controlled to maintain plant vigor for high yields.

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

This soil is in capability subclass VIIw.

14—Satellite Variant sand. This deep, nearly level sandy soil is moderately well drained. It is on slightly elevated ridges and knolls in the flatwoods. Areas range from about 5 to 200 acres. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is gray sand about 5 inches thick. Underlying this is sand to a depth of more than 80 inches. The upper 12 inches of this sand is light gray, the next 22 inches is light brownish gray, and the lower 41 inches is grayish brown.

Included with this soil in mapping are small areas of Jonathan, Orsino, Pomello, Salerno, St. Lucie, and Waveland soils. Total inclusions in any area are less than 15 percent.

The water table is at a depth of 40 to 60 inches for 6 to 9 months in most years and between depths of 30 to 40 inches for less than 60 cumulative days. It recedes below a depth of 60 inches for 2 to 4 months in drier seasons. Permeability is very rapid throughout the profile. The available water capacity, natural fertility, and content of organic matter are very low.

Some areas of this soil are used for urban development, but most areas remain in natural vegetation. The natural vegetation is South Florida slash pine, sawpalmetto, scrub oak, fetterbush, running oak, broomsedge bluestem, and pineland threeawn. A few areas also have sand pine and rosemary.

Common cultivated crops are not suited to this soil. Citrus is fairly well suited if management is good. Good management includes sprinkler irrigation and regular applications of fertilizers and lime. A close growing cover crop between trees is needed to prevent soil blowing.

Improved pasture grasses are fairly well suited to this soil if good management practices are used. Bahiagrasses are better adapted than most other grasses. Clovers are not suited.

This soil has low potential for pine trees. Seedling mortality and equipment limitations are the main management concerns. South Florida slash pine is preferred for planting.

This soil is in capability subclass VIs.

15—Electra fine sand. This nearly level soil is somewhat poorly drained. It is on low knolls and ridges in the flatwoods and adjacent to drainageways. Areas range from about 10 to 150 acres. Along streams they are generally elongated. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand. The subsurface layer is light gray fine sand to a depth of about 40 inches. The upper part of the subsoil is dark brown fine sand coated with colloidal organic matter, and the lower part is light gray fine sandy loam that has yellow, brown, and red mottles. The substratum is mottled, light gray loamy fine sand to a depth of 80 inches or more. The substratum becomes sandier as depth increases.

Included with this soil in mapping are small areas of Waveland, Nettles, and Pomello soils. Also included are a few areas of soils in which the upper, sandy part of the subsoil is not dark colored and soils in which the lower part of the subsoil is loamy fine sand. Total inclusions in any area are less than 20 percent.

The water table is at a depth of 25 to 40 inches for cumulative periods of 4 months in most years. It is below a depth of 60 inches during extreme dry periods. The available water capacity is low to very low in the surface and subsurface layers and medium in the subsoil and substratum. Permeability is rapid in the surface and subsurface layers, moderate in the sandy part of the subsoil, and slow or very slow in the loamy part. Natural fertility and the content of organic matter are very low.

A few small areas of this soil are used for improved pasture. Most areas remain in open forest. The natural vegetation is slash pine and an understory of scrub oak, sawpalmetto, fetterbush, running oak, lopsided indiangrass, pineland threeawn, and other grasses, vines, and forbs.

This soil is not suited to cultivated crops and is poorly suited to citrus trees. Irrigation is needed for maximum yields.

This soil has fair suitability for pasture. Yields for grasses such as pangolagrass and bahiagrass are fair if management is good.

The potential for pine trees is low. Slash pine and sand pine are preferred for planting. Equipment limitations and seedling mortality are the main management concerns.

This soil is in capability subclass VIs.

16—Oldsmar fine sand. This nearly level soil is poorly drained. It is in broad areas in the flatwoods. Areas are generally large, ranging to 1,000 acres or more. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of 35 inches. The upper 9 inches of the subsurface layer is gray, and the lower 21 inches is light gray. The upper 11 inches of the subsoil is black and brown fine sand and has organic matter coatings on the sand grains. The lower part of the subsoil is grayish brown fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of soils in which the dark colored, sandy part of the subsoil is above a depth of 30 inches or slightly deeper than 50 inches and in some small areas is less well developed than in the typical profile. Some areas of included soils have a thicker dark surface layer, a surface layer of sand, or a subsurface layer with more color. Also included are small areas of Basinger, Boca, Holopaw, Malabar, Nettles, Pinellas, and Wabasso soils. Total inclusions in any area are less than 20 percent.

The water table is at a depth of less than 10 inches for 1 to 3 months during wet seasons in most years. It is at a depth of 10 to 40 inches for 6 months or more, and recedes to a greater depth during extended dry periods. Permeability is rapid in the surface and subsurface layers. It is moderately rapid to moderately slow in the upper sandy part of the subsoil and slow to very slow in the lower loamy part. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the content of organic matter are low.

Some large areas of this soil are used for citrus or improved pasture grasses. Most areas remain in natural vegetation consisting of South Florida slash pine, scattered cabbage palm, sawpalmetto, waxmyrtle, gallberry, fetterbush, running oak, dwarf huckleberry, pineland threeawn, blue maidencane, and species of bluestem.

This soil has very severe limitations for cultivated crops because of wetness. The number of adapted crops is limited unless intensive water control measures are used. If a water control system is designed to remove the excess water in wet seasons and to provide for subsurface irrigation in dry seasons, this soil is suited to many kinds of flower and vegetable crops. Good management includes close growing, soil improving crops in the crop rotation, use of crop residue and cover crops to protect the soil from erosion, and applications of lime and fertilizers according to the need of the crop.

Under natural conditions, this soil is poorly suited to citrus trees because of wetness. If a well designed drainage system is used to remove the excess water to a depth of about 4 feet, this soil is suitable for citrus crops. Good management includes planting the trees on beds to lower the effective depth of the water table, use of a close growing cover crop between tree rows to protect the soil from blowing when dry and washing during heavy rains, and regular applications of fertilizers and lime as needed. Supplemental irrigation is needed in dry seasons for maximum yields.

This soil is well suited to pasture and hay crops. Pangolagrass, bahiagrass, and white clover grow well if well managed. A simple drainage system that removes the excess surface water in times of high rainfall is needed. Regular applications of fertilizers and lime are also needed. Grazing should be controlled to maintain healthy plants for best yields.

The potential is medium for pine trees. The major management concerns are plant competition, equipment mobility, and seedling mortality. South Florida slash pine is preferred for planting. A simple drainage system to remove excess surface water should be installed.

This soil is in capability subclass IVw.

17—Wabasso sand. This nearly level soil is poorly drained. It is in broad, openland areas in the flatwoods. Areas generally range up to about 1,000 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black and very dark gray sand about 7 inches thick. The subsurface layer is gray and light brownish gray sand. The upper part of the subsoil is black sand, and the lower part is very dark grayish brown, dark grayish brown, and olive gray sandy clay loam. The substratum is olive gray and greenish gray sandy clay loam.

Included with this soil in mapping are small areas of Boca, Oldsmar, Pineda, and Riviera soils. Also included are areas of soils that are similar to this Wabasso soil but have a thicker, dark colored surface layer, areas of soils that have a thicker sandy subsoil, and few to common, small, wet depressions that are less than 3 acres in size. Total inclusions in any area are less than 20 percent.

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

Most areas of this soil are in natural vegetation consisting of slash pine, scattered cabbage palm, sawpalmetto, waxmyrtle, gallberry, fetterbush, pineland threeawn, bluestems, panicums, and other grasses.

Under natural conditions, this soil has severe limitations for cultivated crops because of wetness. The number of crops is limited unless intensive water control measures are used. Many crops can be grown if management is good and a good water control system is designed to remove excess surface water in wet seasons and provide subsurface irrigation in dry seasons. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparation needs to include bedding. Fertilizer and lime should be applied according to the need of the crop.

Citrus trees are moderately suited if a well designed water control system is established to maintain the water table below a depth of 4 feet. Planting trees on beds helps lower the effective depth of the water table. A cover crop needs to be maintained between the tree rows. Fertilizer and lime should be applied as needed.

This soil is well suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove the excess surface water in times of high rainfall. Regular applications of fertilizer and lime are needed, and grazing should be controlled to maintain healthy plants.

The potential is medium for pine trees. The major management concerns are plant competition, equipment mobility, and seedling mortality during wet seasons. South Florida slash pine is preferred for planting. A simple water control system to remove excess surface water should be installed.

This soil is in capability subclass IIIw.

19—Winder sand. This nearly level soil is poorly drained. It is in long, low depressions in the flatwoods. Areas are 5 to 10 acres or range to several hundred acres. Slopes are smooth to concave and are less than 2 percent.

Typically, the surface layer is dark gray sand about 7 inches thick. The subsurface layer is gray sand about 8 inches thick. The subsoil is light brownish gray sandy clay loam and has sandy streaks in the upper 11 inches and light gray sandy clay loam in the lower 16 inches. The substratum is below a depth of 42 inches. It is greenish gray loamy sand and has white shell fragments in the lower part.

Included with this soil in mapping are small areas of Chobee, Floridana, Gator, Riviera, and Wabasso soils. Also included are small spots of soils that are similar to this Winder soil but have a few inches of organic material on the surface or have a loamy fine sand or loamy sand surface layer. Total inclusions in any area are less than 25 percent.

This soil is ponded for 6 to 9 months in most years, and the water table is at a depth of less than 40 inches the rest of the time. Permeability is rapid in the surface and subsurface layers, moderately slow in the upper part of the subsoil, and slow to very slow in the lower part of the subsoil. The available water capacity is low in the surface and subsurface layers and medium in the subsoil.

Most areas of this soil are in natural vegetation consisting of waxmyrtle, maidencane, blue maidencane, sand cordgrass, queensdelight, and a wide variety of sedges.

Under natural conditions, this soil is not suited to cultivated crops. However, if a water control system removes the excess water rapidly and protects the soil from ponding, this soil is suited to vegetable crops. Good management includes crop rotations that keep close growing cover crops in the cropping system at least two-thirds of the time. The cover crops and all other crop residue should be used to protect the soil from erosion. Seedbed preparation needs to include bedding. Fertilizers should be applied according to the need of the crop.

This soil is not suited to citrus trees because of ponding and wetness. However, if water control is adequate, this soil is suitable for citrus. Water control systems that maintain good drainage to a depth of about 4 feet and protect the soil from ponding are needed. Planting the trees on beds helps lower the effective depth of the water table. A good close growing cover crop is needed between the tree rows to protect the soil from blowing when the trees are young. The trees require regular applications of fertilizer and occasional liming.

Under natural conditions, this soil is not suited to improved pasture. However, if water control is adequate, this soil is suitable for good quality pasture of improved grasses. Good pasture of grass alone or grass-clover mixtures can be grown if management is good. Pasture requires regular applications of fertilizers and controlled grazing for highest yields.

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

This soil is in capability subclass VIIw.

20—Riviera fine sand. This nearly level soil is poorly drained. It is on broad, low flats and in drainageways. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is grayish brown to light gray fine sand to a depth of 36 inches. The subsoil is olive gray fine sandy loan that has a few fine tongues and pockets of light gray subsurface material. Next is light gray fine sand to a depth of about 56 inches and mixed fine sand and shell fragments to a depth of 80 inches or more.

Included with this soil in mapping are small areas of soil that has a dark colored surface layer more than 6 inches thick and soil that has an organic stained layer above the subsoil. Also included are small areas of Floridana, Holopaw, Pineda, Wabasso, and Winder soils. Total inclusions in any area are less than 20 percent.

The water table is 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 the rest of the time. It can recede below a depth of 40 inches for short periods in dry seasons. The available water capacity is 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 the content of organic matter are low.

Several large areas of this soil are used for citrus, truck crops, and improved pasture grasses. Most areas are in natural vegetation of South Florida slash pine, cabbage palm, sawpalmetto, waxmyrtle, blue maidencane, broomsedge bluestem, pineland threeawn, cordgrass, panicums, and a variety of sedges.

Under natural conditions, this soil has severe limitations for cultivated crops because of wetness. However, if a water control system removes the excess surface water in wet seasons and provides subsurface irrigation in dry seasons, this soil is suitable for common vegetable crops. Good management includes crop rotations that keep close growing cover crops in the cropping system two-thirds of the time and includes the use of cover crops and all crop residue to protect the soil from erosion. Other management practices are good seedbed preparation, bedding, and applying fertilizers according to the need of the crop.

Under natural conditions, this soil is poorly suited to citrus trees. However, if water control is adequate, this soil is well suited to the production of oranges and grapefruit. A water control system that maintains good drainage to a depth of about 4 feet is needed. The trees should be planted on beds, and a close growing cover crop needs to be maintained on the beds to prevent soil blowing while the trees are young. Regular applications of fertilizers are needed.

This soil is well suited to pasture and hay crops. Excellent pasture of pangolagrass, bahiagrass, or grass-clover mixtures can be grown if management is good. A simple drainage system to remove the excess surface water in wet seasons is needed. Also needed are regular applications of fertilizers and controlled grazing.

The potential is medium for pine trees, but a water control system is needed if the potential productivity is to be realized. Equipment limitations, plant competition, and seedling mortality are the main management concerns.

This soil is in capability subclass IIIw.

21—Pineda sand. This nearly level soil is poorly drained. It is in low grassy flats in most parts of the county. Areas vary considerably in size, ranging from 5 to 1,000 acres. Slopes are smooth and dominantly less than 1 percent but range from 0 to 2 percent.

Typically, the surface layer is dark gray and dark grayish brown sand. The subsurface layer is brown fine sand and has yellow and brownish yellow mottles. The upper part of the subsoil is brownish yellow and very pale brown fine sand that is coated with iron oxides. The lower part of the subsoil is mottled, gray fine sandy loam. Below this is grayish fine sandy loam. The substratum is a mixture of gray sand and white shell fragments to a depth of 72 inches or more.

Included with this soil in mapping are small areas of Boca, Malabar, Oldsmar, Pinellas, Riviera, Wabasso, and Winder soils. Also included are areas of soils that have organic stained layers or a thin, discontinuous Bh horizon above the loamy subsoil and areas of soils that have a thicker, dark colored surface layer. Total inclusions in any area are less than 20 percent.

The water table is within a depth of 10 inches for 2 to 6 months during wet seasons in most years and at a depth of 10 to 40 inches most of the remaining time. Some areas are covered in places with shallow water for 1 to 2 months. Permeability is rapid, except it is slow to very slow in the lower part of the subsoil. The available water capacity is very low in the surface and subsurface layers and substratum and medium in the subsoil. Natural fertility and the content of organic matter are low.

Some large areas of this soil are used for citrus crops and improved pasture. Most areas remain in natural vegetation of slash pine, cabbage palm, waxmyrtle, gallberry, fetterbush, blue maidencane, broomsedge bluestem, chalky bluestem, low panicums, pineland threeawn, and numerous grasses.

This soil has severe limitations for cultivated crops. If a water control system is established to remove excess water and provide a means of applying subsurface irrigation, this soil is well suited to vegetable crops. Good management includes crop rotations that keep close growing cover crops in the cropping system at least two-thirds of the time. The cover crops and all other crop residue should be used to protect the soil from erosion. Seedbed preparation needs to include bedding. Fertilizers should be applied according to the need of the crop.

Under natural conditions this soil is poorly suited to citrus trees, but if water control is adequate, it is well suited to citrus. Water control systems that maintain good drainage to a depth of about 4 feet are needed. Planting the trees on beds lowers the effective depth of the water table. A close growing cover crop is needed between the tree rows to protect the soil from blowing when the trees are young. The trees require regular applications of fertilizer.

This soil is well suited to improved pasture, especially to pangolagrass, bahiagrass, and clovers. Excellent pasture of grass alone or grass-clover mixtures can be grown if management is good. Pasture requires regular applications of fertilizers and controlled grazing for highest yields.

The potential is medium for pine trees, but a water control system is needed if the potential productivity is to be realized. Equipment limitations and seedling mortality are the main management concerns. Slash pine is better suited than other species.

This soil is in capability subclass IIIw.

22—Okeelanta muck. This nearly level soil is very poorly drained. It is in depressions and freshwater swamps and marshes. The two major areas are a long, narrow swamp along the eastern foot of the coastal ridge and a marsh area adjacent to Lake Okeechobee. Slopes are smooth to concave and 0 to 1 percent.

Typically, the surface layer is black muck about 4 inches thick. Next is dark reddish brown muck about 22 inches thick over a 4-inch layer of black muck mixed with sand. Below this to a depth of 80 inches or more is sand that is very dark gray in the upper 18 inches and dark grayish brown below.

Included with this soil in mapping are small areas of soils that are similar to this Okeelanta soil but have organic material to a depth of 40 inches or more. Also included are small areas of Samsula and Sanibel soils.

Total inclusions in any area range from about 10 to 15 percent.

This soil is ponded for 6 to 9 months or more in most years. The water table is within a depth of 10 inches most of the rest of the year. Internal drainage is slow because it is inhibited by the high water table. Permeability is rapid in all layers. The available water capacity is very high in the organic material and low in the underlying sand. Natural fertility is moderate.

The area of this soil near Lake Okeechobee is drained and is used for sugarcane. All other areas are in natural vegetation of red maple, cabbage palm, water oak, redbay, strangler fig, sawgrass, arrowhead, vines, and ferns.

This soil is not suited to cultivated crops unless the excess water is controlled. If the water is adequately controlled, this soil is well suited to many vegetable crops and sugarcane. A well designed and maintained water control system should provide for removing excess water while crops are growing on the soil and for keeping the soil saturated with water at all other times. Fertilizers that contain phosphates, potash, and minor elements are needed. Lime is needed on the more acid soils. Cover crops should be maintained on the soil when crops are not being grown, and all plant residue and cover crops should be used to protect the soil from erosion.

When the excess water is properly controlled, this soil is well suited to improved pasture grasses. Pangolagrass, bahiagrass, St. Augustine grass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excessive oxidation of the organic material. Fertilizers high in phosphates, potash, and minor elements are needed. Grazing should be controlled to permit maximum yields.

This soil is not suitable for the production of citrus or pine trees.

This soil is in capability subclass IIIw.

23—Urban land. This miscellaneous area is more than 70 percent covered by shopping centers, parking lots, large buildings, houses, streets, sidewalks, airports, and related facilities. The natural soil cannot be observed. Unoccupied areas, mostly lawns, vacant lots, playgrounds, and parks, consist mainly of St. Lucie, Paola, Pomello, and Waveland soils. These soils have been generally altered by grading and shaping, or have been covered with 5 to 12 inches of sandy fill material. The unoccupied areas are too small to map separately. Slopes are mostly nearly level, but range to sloping in a few places.

This map unit is not assigned to a capability subclass.

24—Orsino sand, 0 to 5 percent slopes. This nearly level to gently sloping soil is moderately well drained. It is in transitional sites between excessively drained soils on ridges and poorly drained soils in areas of the flatwoods. Areas are mainly in the Port Salerno area and range from about 20 to 100 acres. Slopes are smooth to convex and range from 0 to 5 percent.

Typically, the surface layer is gray sand. The subsurface layer is white sand. Next is strong brown and yellowish brown sand stained by organic matter. Below this is light yellowish brown and very pale brown sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Jonathan, Paola, Salerno, Satellite Variant, and Waveland soils. Also included are soils that are similar to this Orsino soil but have more strongly developed organic stained layers. Total inclusions in any area are less than 20 percent.

The water table is at a depth of 40 to 60 inches for more than 6 months in most years and below a depth of 60 inches during the dry season. Permeability is very rapid throughout the profile, and the available water capacity is very low or low. Natural fertility and the content of organic matter are very low.

This Orsino soil has very severe limitations for cultivated crops. It requires intensive management if cultivated. Droughtiness and rapid leaching of plant nutrients reduce the variety of adapted crops and potential yields of crops that are adapted. Row crops should be planted on the contour in strips alternating with strips of close growing crops. Close growing crops are needed in the crop rotation at least three-fourths of the time. Soil improving crops and all crop residue should be left on the ground to protect the soil from erosion. Only a few crops produce good yields without irrigation. Irrigation is generally feasible if irrigation water is readily available.

Citrus trees are moderately well suited to this soil. A close growing cover crop is needed between the tree rows to protect the soil from blowing and washing. Good yields of oranges and grapefruit can be obtained in some years without irrigation. A well designed irrigation system to maintain optimum moisture conditions is needed to assure high yields.

Pasture and hay crops are moderately well suited to this soil. Deep rooting plants, such as Coastal bermudagrass and bahiagrass, are well adapted, but yields are reduced by periodic droughts. Regular fertilizing and liming are needed. Grazing should be controlled to permit plants to recover from grazing and maintain vigor.

The potential is low for pine trees on this soil. Equipment limitations, seedling mortality, and plant competition are the main management concerns. Slash and sand pines are preferred in planting.

This soil is in capability subclass IVs.

25—Beaches. Beaches consist of nearly level to sloping, narrow strips of tide-washed sands and shell fragments. Beaches are along the Atlantic Ocean shoreline.

No one pedon represents beaches. They commonly are a mixture of light brownish gray sand and fine shell fragments in the upper 40 inches. Next is light gray or gray sand and shell fragments. Below this is gray sand and shell fragments to a depth of 70 inches or more.

The soil is moderately alkaline. Shell fragments are calcareous. Texture is dominantly sand but ranges from fine sand to coarse sand. Shell fragments are mostly sand size, but in places coarser fragments or whole shells are scattered through the soil or in pockets or lenses. Layers within the soil differ only in color or shell content. They may be in any sequence or may have a uniform color and shell content throughout.

Beaches range from less than 100 feet to more than 500 feet in width. As much as half of the area may be flooded daily during high tides, and all of the area may be flooded by storm tides. Most beaches gently slope to the water's edge, though the shape and slope can change with every storm.

Rock outcrops are in scattered places along the beaches and are extensive at Blowing Rocks near the south county line. In some spots, the outcrops are visible only during low tide.

Depth to the water table is highly variable depending on distance from the shore, elevation of the beach, and the tidal condition. Commonly, the water table can range from a depth of 0 to 6 feet, depending on the time and place, and the depth can fluctuate daily.

This map unit is not placed in a capability subclass.

26—Pompano fine sand. This nearly level soil is poorly drained. It is in sloughs in the flatwoods. Areas range from about 5 to 50 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand. Below this is light brownish gray, grayish brown, and light gray fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Basinger, Holopaw, Malabar, and Placid soils. Also included are a few areas of soils that are ponded for 6 months or more. Total inclusions in any area range to about 25 percent.

The water table is at a depth of less than 10 inches for 2 to 6 months a year and a depth of 10 to 30 inches for periods of more than 6 months in most years. Permeability is very rapid throughout the profile. The available water capacity and content of organic matter are very low. Natural fertility is low.

Most areas of this soil remain in open forest. Natural vegetation is scattered slash pine and cabbage palm and an understory of sawpalmetto, waxmyrtle, gallberry, St. Johnswort, pineland threeawn, blue maidencane, and other grasses.

Under natural conditions, this soil has very severe limitations for cultivated crops because of wetness and the sandy texture. The number of adapted crops is limited unless management is very intensive. However, if water control is good and soil improving measures are used, this soil is suitable for a number of vegetable crops. A water control system is needed to remove the excess water in wet seasons and to provide water through subsurface irrigation in dry seasons. Seedbed preparation needs to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

Citrus trees are poorly suited to this soil in its natural condition. This soil is suitable for citrus only after a carefully designed water control system that maintains the water table below a depth of about 4 feet has been installed. Planting trees on beds helps lower the effective depth of the water table. A cover crop should be maintained between tree rows. Regular applications of fertilizer and lime are needed.

This soil is well suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow satisfactorily if well managed. A water control system that removes excess surface water after heavy rains is needed. Regular applications of fertilizer and lime are needed, and grazing should be controlled to prevent overgrazing and weakening of the plants.

Potential is low for longleaf and slash pine on this soil. A water control system to remove excess surface water is necessary if the potential productivity is to be realized. Seedling mortality and equipment limitations are the main management concerns. Slash pine is better suited to planting than other trees.

This soil is in capability subclass IVw.

27—Arents, organic substratum, 0 to 2 percent slopes. This nearly level soil is somewhat poorly drained. It consists of fill material that was excavated and spread over organic soils, then shaped or smoothed to suit the desired use. The mixed fill material was spread over the surface of the natural organic soil to a depth of about 20 to 50 inches. The areas are irregular in shape and range from about 2 to 50 acres.

The texture and thickness of the layers of this soil are highly variable from place to place. A common profile has a surface layer about 36 inches thick. The surface layer is mixed dark gray and dark brown fine sand and has a few lumps of gray fine sandy loam and small pockets of black muck. Next is 10 inches of dark gray and grayish brown fine sand that has some black and very dark gray fine sand mixed into the upper part. Below this, the upper 20 inches is undisturbed dark reddish brown muck that has few to common, gray fine sand pockets. Below this is dark grayish brown and grayish brown fine sand to a depth of 70 inches. The upper part of this fine sand has a few pockets and tongues of black muck.

Included with this soil in mapping are a few areas of soil in which the organic layer is over thin to thick layers of calcareous or saline silty clay loam. Also included are small areas that have less than 20 inches of fill material overlying the natural soil, a few areas that have material mixed with shell fragments in the surface layer or below the muck layer, and a few spots of more poorly drained soil. Total inclusions in any area are less than 25 percent.

The water table is at a depth of 20 to 40 inches during most of the year. Permeability is mainly rapid. The available water capacity is variable but is generally low in the mineral soil layers and high in the organic layer. Natural fertility is low.

Most areas of this soil are used for urban development. Some small areas are used for citrus where low, wet organic soils are covered so that continuous, uniform bedding can be established.

This soil is poorly suited to citrus trees. The weight of the overburden in the beds compresses the underlying organic material and allows the beds to sag. Also, the compression reduces permeability and in places causes a thin seal to form at the surface of the organic material. In these places the water table remains high, trees grow poorly, and the drainage furrows hold water and become boggy.

The potential is variable for most urban uses because of a wide range in soil properties. Low soil strength and wetness are the major limitations. This soil has high potential for playgrounds. Onsite investigation is necessary to detérmine the limitations and suitability of each site.

This soil is not assigned to a capability subclass.

28—Canaveral sand, 0 to 5 percent slopes. This nearly level to gently sloping soil is somewhat poorly drained to moderately well drained. It is on low dunelike ridges and side slopes bordering sloughs and mangrove swamps. Areas range from 15 to about 100 acres. Slopes are smooth to convex and range from 0 to 5 percent.

Typically, the surface layer is dark brown sand and shell fragments. The underlying layers are light brownish gray sand and multicolored shell fragments.

Included with this soil in mapping are soils that are similar to this Canaveral soil but have a thicker, dark colored surface layer or have steeper slopes. Also included are small areas of Arents, Arents organic substratum, Palm Beach, and Cocoa Variant soils. Total inclusions in any area are about 25 percent.

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

Native vegetation consists of cabbage palm, scattered sawpalmetto, and magnolia and bay trees. Many areas have Australian pine and cabbage palm and a sparse ground cover of grasses and sedges.

This soil is not suited to cultivated crops. It is poorly suited to improved pasture grasses. Low water retention and low natural fertility severely reduce the variety of grasses.

The potential is low for pine trees. Moderate equipment limitations and severe seedling mortality are the main management concerns. Slash pine is better adapted than other species.

This soil is in capability subclass VIs.

30—Bessie muck. This nearly level, organic soil is very poorly drained. It is in mangrove swamps along coastal areas, especially the Intracoastal Waterway. Areas range from about 20 to 200 acres. Slopes are less than 1 percent.

Typically, the surface layer is dark reddish brown muck about 18 inches thick. This layer has a high percent of fine mineral material. Next is 26 inches of very dark grayish brown clay. Below this is dark gray fine sand with shell fragments.

Included with this soil in mapping are small areas of Okeelanta Variant, Aquents, and Canaveral soils. Also included are small areas of soils that have less than 16 inches or more than 40 inches of organic material and small areas of soils that have a mineral surface layer overlying organic materials. Total inclusions in any area are less than 20 percent.

The water table is dependent on tidal action. It is at or above the surface during high tides and storm periods and is within a depth of 10 inches at all other times. The available water capacity is very high in the organic surface layer and high in the clayey substratum. Permeability is rapid in the organic layer and slow or very slow in the clayey substratum. The natural fertility is medium, and salinity is high.

The natural vegetation is a dense growth of red, black, and white mangrove trees and bushy sea-oxeye, sea purslane, leather fern, and glasswort in more open areas.

This soil is not suitable for cultivated crops, citrus, pasture, or pine trees.

This soil is in capability subclass VIIIw.

31—Cocoa Variant sand. This nearly level soil is moderately well drained. It is on low ridges on Hutchinson Island. Areas range from about 10 to 40 acres. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is sand about 14 inches thick; the upper 8 inches of the surface layer is very dark brown, and the lower 6 inches is brown. The subsoil is brown sand about 6 inches thick. Next is very pale brown sand to a depth of about 25 inches. Below this is coquina limestone. The layers below the surface layer are about 50 percent shell fragments.

Included with this soil in mapping are small areas of soils that are similar to this Cocoa Variant soil but have a thinner, dark colored surface layer. An area on Jupiter Island has soils that are similar to this soil but are slightly elevated, well drained, do not have the dark colored surface layer, and have a redder subsoil. The behavior of these soils is enough like Cocoa Variant soils that nothing would be gained by mapping them separately. Also included are small areas of Canaveral and Palm Beach soils and soils deeper than 40 inches to limestone. Total inclusions in any area are less than 15 percent.

The water table is at a depth of 30 to 40 inches for brief periods during the wet season or after heavy rains. It is generally in or below the rock layer, depending on the depth of the rock. The water table is at a depth of 40 to 60 inches most of the rest of each year and is probably never below this depth because of the proximity of sea level. The available water capacity is low or very low in all layers. Permeability is rapid throughout the soil. Natural fertility is low.

Some areas of this soil are used for urban development or recreation areas. The natural vegetation is cabbage palm, sawpalmetto, Australian pine, patches of seagrape, and other shrubs and grasses.

This soil has very severe limitations for cultivated crops because of droughtiness and rapid leaching of plant nutrients. Soil improving crops and all crop residue should be left on the surface to help protect the soil from erosion. Only a few crops produce good yields without irrigation. Areas of this soil are rapidly being developed for urban uses, which generally precludes its use for crops.

This soil is suitable for citrus. A good ground cover of close growing plants is needed between the trees to protect the soil from blowing. Good yields of oranges and grapefruit can be obtained in some years without irrigation. However, an irrigation system to maintain optimum moisture conditions is needed to assure best yields.

The suitability of this soil for pasture is moderate. Deep rooting plants, such as Coastal bermudagrass and bahiagrass, are well adapted but yields are reduced by periodic drought. Regular fertilizing and liming are needed. Grazing should be controlled to permit plants to maintain vigor for best yields.

The potential for pine trees is medium. Equipment limitations, seedling mortality, and plant competition are the main management concerns. South Florida slash pine is preferred for planting.

This soil is in capability subclass IVs.

32—Udorthents, 0 to 35 percent slopes. This soil is on a large dike around Lake Okeechobee. It consists of mixed material that was excavated from adjacent areas and shaped to form a large dike. The dike is approximately 25 to 30 feet high, 300 feet wide at the base, and continuous along the lake shoreline, except where broken by the St. Lucie Canal.

The texture, color, and thickness of this soil vary from one area to another. A more common profile has a surface layer of mixed, very dark gray and grayish brown fine sand about 1 inch thick. The next layer is mixed grayish brown and pale brown fine sand that has numerous shell fragments and some rock fragments. Below this is many feet of boulders and cobbles with grayish brown fine sand and loamy material in the voids between rocks.

Included with this soil in mapping are long narrow areas at the base of each side of the dike where the water table is within a depth of 60 inches. Total inclusions in any area are about 10 percent.

Permeability is rapid except in places on the crest of the dike where the soil has been compacted. Runoff is rapid. The available water capacity is commonly low. Most of the dike surface has been planted to bahiagrass. The grass grows fairly well in wet seasons but suffers in drier seasons. Maintenance of the grass is needed continuously if erosion is to be prevented. Areas of this soil are protected from grazing animals and are not available for other uses.

This soil is not assigned to a capability subclass.

33—Paola-Urban land complex, 0 to 8 percent slopes. This complex consists of small areas of nearly level to sloping, excessively drained Paola soils and Urban land. Areas of the soils and Urban land are so intermingled they could not be separated at the scale used in mapping. Areas of the complex are rectangular or elongated and range from 10 to 160 acres.

The Paola soils make up about 45 to 60 percent of this complex. Typically, the surface layer of the Paola soil is gray sand. The subsurface layer is white sand. Below this is yellowish sand to a depth of 80 inches or more.

Urban land makes up 25 to 35 percent of this complex. It is occupied by shopping centers, parking lots, houses, buildings, streets, sidewalks, and related structures. Unoccupied or openland areas are mainly lawns, vacant lots, or playgrounds. These areas consist mostly of Paola soils.

The St. Lucie, Pomello, and Satellite Variant soils make up about 5 to 30 percent of the land not covered by urban facilities. Some of these soils have a shallower water table, but otherwise they have properties similar to the Paola soils. Some unoccupied areas of these soils have been cut, filled, or smoothed for future development.

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

This complex is not assigned to a capability subclass.

34—St. Lucie-Urban land complex, 0 to 8 percent slopes. This complex consists of small areas of nearly level to sloping, excessively drained St. Lucie soils and Urban land. Areas of the soils and Urban land are so intermingled they could not be separated at the scale used in mapping. Areas of the complex are generally rectangular or elongated and range from 10 to about 160 acres.

The St. Lucie soils make up about 45 to 60 percent of this complex. Typically, the surface layer of the St. Lucie soil is gray sand about 3 inches thick. Underlying white sand extends to a depth of 80 inches or more.

Urban land makes up 25 to 35 percent of this complex. It is occupied by shopping centers, parking lots, houses, buildings, streets. sidewalks, and related structures. Unoccupied or openland areas are mainly lawns, vacant lots, or playgrounds. These areas consist mostly of St. Lucie soils.

The Paola, Pomello, and Satellite Variant soils make up about 5 to 30 percent of the land not covered by urban facilities. Some of these soils have a shallower water table, but otherwise they have properties similar to the St. Lucie soils. Some unoccupied areas of soils in this complex have been cut, filled, or smoothed for urban development.

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

This complex is not assigned to a capability subclass.

35—Salerno sand. This nearly level soil is poorly drained. It is in broad areas of flatwoods. Areas range from about 20 to 500 acres. Slopes are dominantly smooth and range from 0 to 2 percent.

Typically, the surface layer is black to very dark gray sand about 9 inches thick. The subsurface layer is dark gray to brown fine sand to a depth of 61 inches. Next is cemented black sand about 15 inches thick. Below this is dark reddish brown sand that has weakly cemented fragments to a depth of 100 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Salerno soil but have noncemented subsoil and soils that have loamy sand below the subsoil. Also included are small areas of Basinger, Hobe, Jonathan, Oldsmar, Placid, and Waveland soils. Total inclusions in any area are about 20 percent.

The water table is within a depth of 10 inches for 2 to 4 months during the wet season in most years and below a depth of 40 inches for 1 to 4 months in dry seasons. The internal drainage is slow and is impeded by the water table that is perched above the subsoil for long periods. Permeability is rapid to a depth of 61 inches and very slow to moderately slow between depths of 61 and 76 inches. The available water capacity is low in the surface layer, very low in the subsurface layer, and low in the subsoil. Natural fertility and the content of organic matter are low.

Some large areas of this soil are used for improved pasture, but most areas remain in natural vegetation. The natural vegetation is South Florida slash pine, sawpalmetto, gallberry, fetterbush, waxmyrtle, creeping bluestem, broomsedge bluestem, chalky bluestem, pineland threeawn, and panicums.

Under natural conditions, this soil has very severe limitations for cultivated crops because of wetness and poor soil qualities. Adapted crops are limited unless very intensive management practices are used. If water control is good and soil improving measures are used, this soil is suitable for many vegetable crops. A water control system is needed to remove the excess water in wet seasons and provide water through subsurface irrigation in dry seasons. Row crops need to be rotated with close growing, soil improving crops. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparation needs to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

Citrus is poorly suited to this soil, unless management is very intensive. This soil can be made suitable for citrus if a carefully designed water control system is installed to maintain the water table below a depth of 4 feet. The trees should be planted on beds and a cover crop maintained between the tree rows. Regular applications of fertilizer and lime are needed.

This soil is moderately suited to pasture. Pangolagrass, improved bahiagrasses, and white clover produce moderate yields if well managed. A water control system to remove excess surface water is needed. Regular applications of fertilizer and lime are needed and grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential is low for pine trees on this soil. Equipment limitations, seedling mortality, and plant competition are the main management concerns. Slash pine is preferred in planting.

This soil is in capability subclass IVw.

36—Arents, 0 to 2 percent slopes. This nearly level soil is somewhat poorly drained to moderately well drained. It consists of fill material that was excavated and spread over the surface of wet mineral soils, then smoothed to suit the desired use. The mixed fill material was spread to a depth of about 20 to 50 inches. Areas are irregular in shape and range from about 5 to 50 acres.

The texture and thickness of the layers of this soil are highly variable from place to place. A common profile has a surface layer of light brownish gray fine sand about 30 inches thick. It has numerous small to large lumps of dark grayish brown sandy loam and sandy clay loam and few to common, firm, black and dark reddish brown fragments. Below this is the natural undisturbed soil in which the upper 6 inches is black, mucky fine sand that has a few small pockets of dark gray and very dark gray fine sand and black organic matter. Below a depth of 36 inches is dark grayish brown fine sand that has a few lenses of very dark gray fine sand and pockets of dark gray and light gray fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Arents soil, but have less than 20 inches or more than 50 inches of mixed overburden material and small areas of soils underlain by organic material. Also included are a few areas where garbage and other refuse has been deposited and covered by a layer of mixed soil material. These areas are labeled Sanitary Landfill on the maps where they occur. Total inclusions in any area are less than 25 percent.

The water table is below a depth of 30 inches during most of the year. Permeability is variable but generally is rapid. The available water capacity is variable but generally is low. Natural fertility and the content of organic matter are low.

This soil is not used as cropland. It consists of mixed soil material used to fill low areas to make them suitable for building sites or other urban uses. Even though it was constructed for such uses, the potential of this soil is variable for urban development because of the wide range in soil properties. Soil strength is likely to be variable because of differences in thickness, texture, and degree of compaction. Onsite investigation is needed for each use.

This soil is not assigned to a capability subclass.

38—Floridana fine sand, depressional. This nearly level soil is very poorly drained. It is in wet sloughs and depressions. Areas range from 10 to about 80 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 15 inches thick. The subsurface layer is light brownish gray fine sand to a depth of 27 inches. The subsoil is grayish brown sandy clay loam. Next is grayish brown fine sandy loam, and below this is light gray fine sand to a depth of 62 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Floridana soil but are underlain by limestone at a depth of 30 to 50 inches, soils that have a very thick surface layer, and soils that have a subsoil slightly deeper than 40 inches. Also included are small areas of Chobee, Riviera, Tequesta Variant, and Winder soils. Total inclusions in any area are less than 20 percent.

This soil is ponded for more than 6 months during most years. The water table is at a depth of less than 10 inches for much of the remainder of the year. Permeability is rapid in the surface and subsurface layers and slow to very slow in the subsoil. The available water capacity is medium in the surface layer and subsoil and low in the subsurface layer. The content of organic matter is high, and natural fertility is medium.

Some areas of this soil are drained and used for cultivated crops, or citrus. Most areas remain in natural vegetation consisting of cypress, willow, and bay trees, pickerelweed, waxmyrtle, primrose willow, sawgrass, smartweed, and water-tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops. If water control is good, this soil is well suited to many vegetable crops. A well designed and maintained water control system should provide rapid removal of excess water during heavy rains. Important management practices include good seedbed preparation, crop rotations, and regular applications of fertilizer and lime. Cover crops need to be rotated with row crops and should be in the cropping sequence two-thirds of the time. All crop residue and soil improving crops should be used to protect the soil from erosion.

This soil is not suited to citrus trees unless the excess water is controlled and good soil aeration is maintained to a depth of about 4 feet. If water is controlled and trees are planted on beds, citrus trees grow well. A close growing cover crop is needed between the tree rows to prevent blowing and washing. The trees require regular applications of fertilizers.

This soil is too wet for improved pasture grasses and legumes in its natural state, but if water control is adequate, suitability is high for many grasses and legumes. Pangolagrass, bahiagrass, and clover grow well if properly fertilized and limed. Grazing should be controlled to maintain plant vigor for high yields.

The potential is high for pine trees if water is controlled. Slash pine is better adapted than other species. Equipment limitations and seedling mortality are the main management concerns.

This soil is in capability subclass VIIw.

39—Quartzipsamments, 0 to 8 percent slopes. This nearly level to sloping soil is excessively drained. It consists of thick deposits of mixed sand and shell materials. These materials were dredged from adjacent canals and deposited in long, narrow ridges along the banks. The deposits are generally 5 to 20 feet thick, and in most areas are not shaped. The water table is below a depth of 60 inches.

The texture and thickness of the layers in this soil vary from one area to another. A more common profile has a surface layer of mixed grayish brown fine sand and shell fragments about 6 inches thick. Below this is mixed light gray fine sand and shell fragments to a depth of 80 inches or more.

Included with this soil in mapping are a few areas that have steeper slopes. Some areas along the fringes of the overburden have a surface covering of dark gray, sticky clay that has washed out of the loose overburden materials and redeposited at the base. This layer ranges from about 2 to 8 inches thick. Small areas of this soil are spoil islands, or mounds, along the Intracoastal Waterway. These areas have an elevation of about 2 to 8 feet. They have a water table as shallow as 2 feet on the fringes adjacent to the waterway. Also included are Arents and Canaveral soils. Total inclusions in any area are about 15 percent.

The available water capacity is variable but is commonly very low. Permeability is rapid or very rapid. Runoff is rapid. The natural fertility and content of organic matter are very low.

A few broader, gently sloping areas of this soil are used for citrus, or as roadways and homesites. Most areas are not utilized, except as a source of fill material. This soil has low potential for most agricultural uses because of soil reaction, low natural fertility, and droughtiness.

This soil is not assigned to a capability subclass.

40—Sanibel muck. This nearly level soil is very poorly drained. It is in marshes and swamps, depressions, and poorly defined drainageways. Areas range from about 5 to 100 acres. Slopes are smooth to concave and are less than 1 percent.

Typically, the surface layer is muck about 12 inches thick; the upper 7 inches of the surface layer is black, and the lower 5 inches is dark reddish brown. Next is very dark grayish brown sand about 4 inches thick. Below this is sand to a depth of 80 inches or more. The upper 7 inches of the sand is grayish brown, and the lower part is light gray.

Included with this soil in mapping are small areas of soils that are similar to this Sanibel soil but have slightly less than 8 inches of muck on the surface or have 10 inches or more of dark colored sand immediately below the muck surface layer. Also included are small areas of Basinger, Okeelanta, Samsula, and Placid soils. Total inclusions in any area are less than 20 percent.

The water table is at a depth of less than 10 inches for 6 to 12 month in most years. Water is ponded on the surface for 2 to 6 months during wet seasons. The available water capacity is very high in the organic surface layer and medium in the sand layer. Permeability is rapid. The natural fertility is moderate.

Some areas of this soil are used for crops and improved pasture. Most areas remain in natural vegetation of redbay, red maple, black willow, cypress, waxmyrtle, sawgrass, maidencane, needlerush, and other grasses and sedges.

This soil has severe limitations for cultivated crops because of wetness. Under natural conditions this soil is not suited to cultivated crops, but if the wetness is adequately controlled, it is well suited to most vegetable crops and sugarcane. A well designed and maintained water control system is needed. The water control system should remove the excess water when crops are on the land and keep the soils saturated with water at all other times. Fertilizers that contain phosphates, potash, and minor elements are needed. Water tolerant cover crops should be on the soils when they are not in use for row crops. All crop residue and cover crops need to be used to protect the soil from erosion.

This soil is not suited to citrus or to pine trees.

Most improved grasses and clovers adapted to the area grow well on this soil if water is properly controlled. High yields of pangolagrass, bahiagrass, and white clover are possible. Water control should maintain the water table near the surface to prevent excessive oxidation of the organic surface layer. Fertilizers high in potash, phosphorus, and minor elements are needed. Grazing should be controlled to permit maximum yields.

This soil is in capability subclass IIIw.

41—Jonathan sand, 0 to 5 percent slopes. This nearly level to gently sloping soil is moderately well drained. It is on slightly elevated knolls and ridges in the flatwoods, mainly in the eastern part of the county. Areas range from 5 to 200 acres or more. Slopes are smooth to convex and range from 0 to 5 percent.

Typically, the surface layer is dark gray sand about 5 inches thick. The subsurface layer is sand to a depth of about 56 inches. The upper 33 inches of the subsurface layer is light gray, and the lower 18 inches is light brownish gray. The subsoil is black, weakly cemented sand to a depth of 100 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Jonathan soil but have a weakly cemented subsoil at a depth of slightly less than 50 inches or slightly more than 80 inches. Also included are small areas of Hobe, Pomello Variant, Salerno, Satellite Variant, and Waveland soils. Total inclusions in any area are less than 20 percent.

The water table is at a depth of 40 to 60 inches for 1 to 4 months during the wet season, and may rise for brief periods to a depth of 36 inches. It is below 60 inches most of the rest of each year. Permeability is very rapid in the surface and subsurface layers and slow or very slow in the subsoil. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the content of organic matter are very low.

Some large areas of this soil are used for urban development. The rest is in natural vegetation of South Florida slash pine, sawpalmetto, species of scrub oak, gallberry, fetterbush, running oak, gopher apple, grassleaf goldastor, cacti, and scattered sprigs of pineland threeawn and other grasses. Sand pine and rosemary are in some areas.

This soil is not suited to cultivated crops because of droughtiness and the sandy texture. It is only fairly well suited to improved pasture grasses, even if good management practices are used. Bahiagrasses are better suited than most other grasses. Clovers are not suited. Droughtiness is the major limitation except during the wet season. Regular applications of fertilizers and lime are needed.

This soil has fair suitability for citrus trees. Fair yields can be obtained with a high level of management. Droughtiness is the major limitation, and for maximum yields sprinkler irrigation should be provided. Regular applications of fertilizers and lime are needed.

The potential of this soil is very low for the commercial production of pine trees. Seedling mortality and equipment limitations are the major management concerns. South Florida slash pine and sand pine are preferred in planting.

This soil is in capability subclass VIs.

42—Hallandale sand. This nearly level, shallow soil is poorly drained. It is in broad, low flats and along the edges of drainageways. Areas range from 5 to about 65 acres. Slopes are smooth and are 1 percent or less.

Typically, the surface layer is black sand about 4 inches thick. Below this is sand to a depth of about 13 inches. The upper 4 inches of this sand is light brownish gray, and the lower 5 inches is grayish brown. Next is hard, fractured limestone about 7 inches thick. Below this, the upper 21 inches of the substratum is light gray and white sandy clay loam. The next 17 inches is light brownish gray sandy loam. The next 18 inches is greenish gray fine sandy loam, and below this the substratum is greenish gray fine sandy loam mixed with shell fragments to a depth of 60 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Hallandale soil but have rock at a depth of slightly less than 6 inches or slightly more than 20 inches and soils that have a thin layer of loamy or carbonatic material over the rock. Some small areas have a few scattered rock outcrops. Also included are small areas of Boca, Jupiter, Pineda, Riviera, and Wabasso soils. Total inclusions in any area are less than 20 percent.

This soil is periodically covered with shallow water for a few days to a month in especially wet periods. In most years, the water table is at a depth of less than 10 inches for about 4 months during wet seasons and at a depth of 10 to 30 inches most of the rest of the year. Permeability is rapid in the sandy layer above the limestone. The limestone is impermeable, but has sufficient fractures and solution holes to permit water movement. The available water capacity is low or very low above the rock. Natural fertility and the content of organic matter are very low.

Many areas of this soil are used for improved pasture. Most areas remain in natural vegetation of South Florida slash pine, cabbage palm, sawpalmetto, waxmyrtle, gallberry, blue maidencane, pineland threeawn, bluestems, and various grasses.

Under natural conditions, this soil has very severe limitations for cultivated crops because of the wetness and shallow root zone. The high water table and shallow depth to rock severely restrict root development. If water control is adequate, this soil is moderately well suited to vegetable crops. The water control system must be designed to remove excess surface water in wet seasons. The shallow depth to rock makes such a system difficult to construct. Row crops need to be planted on beds and rotated with soil improving crops. All crop residue should be used to protect the soil from erosion, and fertilizers should be applied as needed.

This soil is poorly suited to citrus if water is not adequately controlled. A water control system that maintains the water table at a depth of 4 feet and intensive management are needed for citrus production. Trees need to be planted on beds, and a close growing cover crop should be maintained between the tree rows. Regular applications of fertilizers and lime are needed.

This soil is well suited to improved pasture grasses if a water control system is designed to remove the excess surface water. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Regular applications of fertilizers and lime are needed, and grazing should be controlled.

The potential is low for pine tree production, even if a water control system removes the excess surface water. Windthrow hazard and seedling mortality are the main management concerns.

This soil is in capability subclass IVw.

44—Boca fine sand. This nearly level soil is poorly drained. It is in areas of flatwoods. Slopes are less than 2 percent.

Typically, the surface layer is fine sand to a depth of about 8 inches. The upper 4 inches of the surface layer is very dark gray, and the lower 4 inches is dark gray. The subsurface layer is fine sand about 17 inches thick. The upper 8 inches of the subsurface layer is light gray, and the lower 9 inches is pale brown. The subsoil is light gray fine sandy loam about 7 inches thick. Below this is hard limestone about 8 inches thick. Underlying the limestone are layers of light gray fine sand, greenish gray loamy fine sand, and light gray fine sand mixed with shell fragments to a depth of 60 inches or more.

Included with this soil in mapping are soils that are similar to this Boca soil but have black, organic matter enriched layers or have soft carbonate accumlation in place of or overlying the hard limestone. Also included are small areas of Hallandale, Pineda, Pinellas, Riviera, and Wabasso soils. Total inclusions in any area are about 20 percent.

The water table is at a depth of less than 10 inches for 2 to 4 months in most years. In drier seasons, the depth to the water table coincides with the depth of the limestone layer. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. The available water capacity is low in the surface layer, very low in the subsurface layer, and medium in the subsoil. Natural fertility and the content of organic matter are low.

Many areas of this soil are in open forest. The natural vegetation is slash pine and cabbage palm and an understory of sawpalmetto, waxmyrtle, gallberry, fetterbush, blue maidencane, pineland threeawn, bluestems, and other native grasses.

Under natural conditions, this soil has severe limitations for cultivated crops because of the wetness and shallow depth to rock. The variety of adapted crops is limited unless intensive water control and soil improving measures are used. However, if a good water control system removes the excess water in wet seasons and provides water through subsurface irrigation in dry seasons, this soil is suitable for adapted vegetable crops. Seedbed preparation needs to include bedding of the rows. Row crops need to be rotated with close growing, soil improving crops, and these crops should be in the cropping system two-thirds of the time. Fertilizer and lime should be added according to the need of the crop.

This soil is suited to citrus only after a carefully designed water control system has been installed. The water control system should maintain the water table below a depth of 4 feet. Planting the trees on beds lowers the effective depth of the water table. A cover crop should be maintained between the rows of trees. Regular applications of fertilizer and lime are needed.

Improved pasture grasses are well suited to this soil. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. A simple drainage system is needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain vigorous plants for highest yields and good ground cover.

The potential is high for pine trees on this soil. A simple drainage system is needed to remove excess water in the wet season. Plant competition and seedling mortality are management concerns. South Florida slash pine is better suited to this soil than other trees.

This soil is in capability subclass IIIw.

45—Hilolo fine sand. This nearly level soil is poorly drained. It is in hammocks and along borders of depressions and sloughs. Areas range from about 5 to 50 acres. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is fine sand to a depth of 8 inches. The upper 3 inches of the surface layer is black, and the lower 5 inches is very dark brown. The subsoil is calcareous sandy clay loam to a depth of 56 inches. The upper 32 inches of the subsoil is gray, and the lower 16 inches is white. Below this is light gray fine sandy loam to a depth of 66 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Hilolo soil but have limestone below the subsoil, soils that have a dark surface layer more than 10 inches thick, and soils that have a sandy surface layer slightly more than 20 inches thick. Also included are small spots of Chobee, Jupiter, and Pinellas soils. Total inclusions in any area are less than 25 percent.

The water table is at a depth of less than 10 inches for 2 to 4 months in most years. It is at a depth of 10 to 40 inches for 6 to 9 months and below 40 inches in dry seasons. The available water capacity is low to medium in the surface layer and medium in the subsoil and substratum. Permeability is rapid in the surface layer, moderate to moderately slow in the subsoil, and slow to very slow below the subsoil. Natural fertility and the content of organic matter are medium.

Most areas of this soil are used for citrus. The rest is in natural vegetation of cabbage palm, South Florida slash pine, live oak, water oak, scattered sawpalmetto, wild coffee, ferns, American beautyberry, and species of bluestem and a few other grasses.

This soil has severe limitations for cultivated crops because of wetness. If a complete water control system is installed and maintained, this soil is suitable for many adapted vegetable crops. The water control system should be designed to remove excess surface water rapidly and provide a means for subsurface irrigation. Good management includes crop rotations that keep close growing cover crops in the cropping system two-thirds of the time, use of cover crops and all crop residue to protect the soil from erosion, bedding, and applications of fertilizers according to the need of the crop.

Citrus crops are well suited to this soil. A well designed water control system that will maintain good drainage to a depth of about 4 feet is needed. The trees need to be planted on beds. A good close growing cover crop should be maintained between the tree rows to prevent soil blowing in dry weather and eroding in rainy seasons. Regular applications of fertilizers are needed, but lime is already present in adequate amounts.

This soil is excellent for improved pasture grasses. It is well suited to pangolagrass, bahiagrass, and white clover. A simple surface drainage system is needed. For maximum yields, regular applications of fertilizers are needed and grazing should be controlled.

The potential is medium for pine trees. A simple drainage system is needed to remove the excess surface water. Seedling mortality, plant competition, and occasional equipment limitations are the major management concerns.

This soil is in capability subclass IIIw.

47—Pinellas fine sand. This nearly level soil is poorly drained. It is in flatwoods and hammock areas bordering sloughs and depressions. Areas range from about 5 to 50 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper 6 inches of the subsurface layer is grayish brown. The lower part of the subsurface layer has carbonate accumulations and is calcareous. It is dark grayish brown in the upper 2 inches, light gray in the next 3 inches, and white in the lower 10 inches. The subsoil is light olive gray fine sandy loam about 12 inches thick. Below this is about 14 inches of light olive gray fine sand over light gray fine sand and shell fragments to a depth of 60 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Pinellas soil but have a subsoil slightly deeper than 40 inches or have a dark colored surface layer more than 6 inches thick. Small areas of soils have a yellowish horizon above the subsoil. Limestone boulders are below the subsoil in some pedons. Also included are small areas of Boca, Ft. Drum, Hallandale, Hilolo, Pineda, Riviera, and Tuscawilla soils. Total inclusions in any area are less than 25 percent.

The water table is within a depth of 10 inches for less than 3 months and at a depth of 10 to 40 inches for 4 to 6 months during most years. The water table can recede to a depth of more than 40 inches during extended dry periods. Permeability is rapid in the surface and subsurface layer and moderate in the subsoil. The available water capacity is very low in the surface layer and medium in the subsurface layer and subsoil. Natural fertility and the content of organic matter are low.

Some areas of this soil are used for citrus. Most areas remain in natural vegetation. The natural vegetation is South Florida slash pine, cabbage palm, sawpalmetto, waxmyrtle, and gallberry. It also includes grasses, such as broomsedge and chalky bluestems, blue maidencane, lopsided indiangrass, sand cordgrass, and pineland threeawn.

Under natural conditions, this soil has severe limitations for cultivated crops. Wetness resulting from a high water table is the major limiting factor. This soil is well suited to many vegetable crops if a complete water control system is used to remove the excess surface water and provide a means for applying subsurface irrigation. Good management practices include crop rotations that keep close growing cover crops on the soil between cropping seasons, use of cover crops and all crop residue to protect the soil from erosion, good seedbed preparation, bedding, and applications of fertilizers according to the need of the crop.

Citrus trees are suited to this soil if a water control system is designed to maintain the water table below a depth of 4 feet. Planting the trees on beds helps provide good surface drainage. A good close growing cover crop is needed between tree rows to protect the soil from blowing. Regular applications of fertilizers are needed.

This soil is well suited to pasture and hay crops. Pangolagrass, improved bahiagrasses, and clovers grow well. Management practices include regular applications of fertilizers and controlled grazing.

The potential is medium for pine trees. The major concerns in management are seedling mortality, windthrow hazard, and plant competition. Slash pine is better suited than other species.

This soil is in capability subclass IIIw.

48—Jupiter sand. This nearly level, shallow soil is poorly drained. It is in low flats and hammocks along the fringes of broad, marshy drainageways. Areas range from 5 to about 150 acres. Slopes are smooth to convex and are dominantly 1 percent or less.

Typically, the surface layer is sand about 10 inches thick. The upper 4 inches of the surface layer is black, and the lower 6 inches is very dark grayish brown. Below this is hard, fractured limestone about 12 inches thick. The substratum is calcareous loamy sand. The upper 10 inches of the substratum is light brownish gray, the next 16 inches is light gray, the next 24 inches is olive gray, and the lower part is greenish gray and is mixed with white shell fragments to a depth of 84 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Jupiter soil but have a thin layer of loamy material over the limestone, soils that have less than 6 inches of sandy material over the limestone, and scattered spots of exposed limestone. Also included are small areas of Canova Variant, Chobee, Floridana, Hallandale, and Hilolo soils. Total inclusions in any area are less than 25 percent.

Some areas of this soil are covered with water for brief periods in the wet season. The water table is at a depth of less than 10 inches for 2 to 4 months in the wet season during most years. It is at a depth of 10 to 40 inches in drier seasons. Permeability is rapid in the sandy surface layer above the rock. The hard limestone is impermeable but has sufficient fractures and solution holes to permit water movement. Permeability is moderate to rapid in the substratum. The available water capacity is low to medium in the surface layer. Natural fertility and the content of organic matter are medium.

A few areas of this soil are used for citrus and improved pasture grasses. Most areas are in natural vegetation of water oak, cabbage palm, red maple, strangler fig, marlberry, wild coffee, greenbriar, ferns, and a few sprigs of grasses.

Under natural conditions, this soil has very severe limitations for cultivated crops because of the wetness and shallow root zone. The shallow depth to rock and the high water table severely restrict root development. If water control is adequate, this soil is suitable for adapted vegetable crops. The water control system must be designed to remove excess surface water in wet seasons. However, the shallow depth to rock makes such a system difficult to construct. Row crops need to be placed on beds and should be rotated with soil improving crops. All crop residue and soil improving crops should be used to protect the soil from erosion. Fertilizers should be applied according to the need of the crop.

This soil is poorly suited to citrus if the excess water is not controlled. Citrus can be grown if water control and intensive management are provided. The water control system should be designed and constructed to maintain the water table at a depth of 4 feet. Trees need to be planted on beds, and a cover crop should be maintained between tree rows. Regular applications of fertilizers are needed.

Pasture is well suited to this soil. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. A water control system is needed to remove the excess surface water after heavy rains. Regular applications of fertilizers are needed, and grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential is low for pine tree production, even if a water control system removes the excess surface water. Windthrow hazard and seedling mortality are the main management concerns.

This soil is in capability subclass IVw.

49—Riviera fine sand, depressional. This nearly level soil is poorly drained. It is in depressions. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is gray fine sand about 2 inches thick. The subsurface layer is gray fine sand to a depth of 28 inches. The upper 14 inches of the subsurface layer is light gray, the next 4 inches is gray, and the lower 8 inches is light brownish gray. The upper 10 inches of the subsoil is gray fine sandy loam that has pockets and tongues of material from the subsurface layer, and the lower 11 inches is grayish brown sandy clay loam. Below this is grayish brown loamy fine sand with pockets of fine sand to a depth of 50 inches or more.

Included with this soil in mapping are small areas of Chobee, Floridana, Holopaw, Pineda, Wabasso, and Winder soils. Also included are small spots of soils that have a thin layer of organic material on the surface. Total inclusions in any area are less than 20 percent.

This soil is ponded for 6 to 9 months in most years. During the dry season, the water table recedes to a depth of 10 to 40 inches. The available water capacity is low in the surface and subsurface layers, medium in the upper 10 inches of the subsoil, and low below this. Permeability is rapid in the sandy surface and subsurface layers, slow or very slow in the upper part of the subsoil, and rapid below this. Natural fertility and the content of organic matter are low.

Numerous areas of this soil are used for citrus and improved pasture grasses. Most areas remain in native vegetation of queensdelight, sand cordgrass, St. Johnswort, maidencane, and water tolerant grasses and sedges. Some areas have dense to scattered stands of cypress trees.

Under natural conditions, this soil is not suited to cultivated crops, improved pasture grasses, or citrus. It occupies the lowest positions in the landscape, and drainage outlets are generally not available. However, the depressions in which this soil occurs are generally so numerous in areas of soils being developed that they are included in the developments. Although this soil receives the same drainage and management as the adjoining soils, it generally does not produce so well.

In the natural state, areas of this soil provide nesting and feeding areas for a variety of wetland wildlife.

This soil is in capability subclass VIIw.

50—Okeelanta Variant muck. This nearly level soil is very poorly drained. It is in tidal mangrove swamps along the Intracoastal Waterway and the upper reaches of the Loxahatchee River and the South Fork of the St. Lucie River. Areas generally range from about 20 to 200 acres. Slopes are less than 1 percent.

Typically, the surface layer is black muck about 4 inches thick. Next is dark reddish brown mucky peat about 16 inches thick. Below this is sand mixed with shell fragments to a depth of 60 inches or more. The upper 8 inches of sand is very dark brown, the next 8 inches is very dark grayish brown, the next 6 inches is dark grayish brown, and the lower 18 inches is grayish brown.

Included with this soil in mapping are small areas of Aquents, Bessie, and Canaveral soils. Also included are small areas of soils that are similar to this Okeelanta Variant soil but have slightly less than 16 inches of organic material and soils that do not have mucky peat in the organic material. Total inclusions in any area are less than 20 percent.

This soil is flooded by high tides, daily or seasonally, and during storm periods. The water table is within a depth of 10 inches at all other times. Permeability is rapid in all layers. The available water capacity is very high in the organic layers and very low to low in the underlying sand and shell layers. Natural fertility is high.

All areas of this soil are in natural vegetation of red and black mangrove trees, with scattered areas of white mangrove in places. Openland in the mangrove areas is covered with glasswort, bushy sea-oxeye, and other salt-tolerant plants.

This soil is not suited to cultivated crops, improved pasture grasses, or pine trees. Wetness and salinity are the major limiting factors. Areas of this soil are better utilized if left in their native condition and used as wildlife habitat and marine life breeding areas.

This soil is in capability subclass VIIIw.

51—Pompano fine sand, occasionally flooded. This nearly level soil is poorly drained. It is in narrow drainageways. Areas are long, narrow, and highly dissected by stream action. Slopes are dominantly 0 to 2 percent, but stream dissection has created numerous short steep side slopes.

Typically, the surface layer is dark gray fine sand. Below this is fine sand to a depth of 80 inches or more. The upper part is light gray and has white pockets. Next is mottled light brownish gray with dark grayish brown and very dark grayish brown pockets. The lower part is light gray fine sand with a few grayish brown pockets.

Included with this soil in mapping are small areas of soils that have a finer textured, darker colored surface layer and soils that have an organic surface layer 2 to 12 inches thick. Also included are more poorly drained soils in stream bottoms and old isolated meanders and soils in small fringe areas that have a dark colored, weakly cemented sandy subsoil. Total inclusions in any area are about 30 percent.

The water table is generally at a depth of 10 to 40 inches, but depth to the water table at any particular site depends on the elevation of the soil surface above the stream bottom. Occasionally, rainfall over the watershed produces flooding. When this occurs, the soil is covered with fast moving water for brief periods of 2 to 7 days. At all other times the stream provides drainage for the soil.

Permeability and the available water capacity are somewhat variable, but in most places permeability is very rapid, and the available water capacity is low. Natural fertility and the content of organic matter are low.

Areas are in native vegetation consisting of dense stands of cabbage palm, water oak, sweetbay, swamp maple, cypress, slash pine, ferns, vines, and grasses.

This soil is not suited to cultivated crops, pasture, citrus, or pine trees.

This soil is in capability subclass VIIw.

52—Malabar sand. This nearly level soil is poorly drained. It is in broad, low areas of flatwoods and sloughs. Areas range from about 10 to 100 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is very dark gray sand about 5 inches thick. The subsurface layer is light gray sand about 10 inches thick. The upper 14 inches of the subsoil is brownish yellow sand, the next 13 inches is very pale brown sand, and the lower part is gray sandy loam to a depth of 80 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Malabar soil but are discontinuous in the lower part of the subsoil, or have a dark colored, organic stained layer above the lower part of the subsoil, or have a loamy sand subsoil. Also included are small areas of Boca, Holopaw, Oldsmar, Pineda, Pinellas, and Riviera soils. Total inclusions in any area are less than 20 percent.

The water table is within a depth of 10 inches for 2 to 6 months during most years. It is at a depth of 10 to 40 inches most of the rest of each year. Permeability is rapid in all layers above the subsoil and slow to very slow in the subsoil. The available water capacity is low or very low in the surface and subsurface layers and upper part of the sandy subsoil and medium in the lower part of the subsoil. Natural fertility and the content of organic matter are low.

Some areas of this soil are used for citrus or improved pasture grasses. Most areas remain in natural vegetation consisting of South Florida slash pine, cabbage palm, waxmyrtle, gallberry, sawpalmetto, blue maidencane, St. Johnswort, bluestems, pineland threeawn, and sedges.

This soil has very severe limitations for cultivated crops because of wetness, but if water is adequately controlled, this soil is suited to adapted vegetable crops. A water control system is needed that will remove the excess surface water rapidly. Good management practices include crop rotations that keep close growing cover crops in the cropping system three-fourths of the time. The cover crops and all crop residue should be used to protect the soil from erosion. Crops need to be planted on beds, and fertilizers should be applied according to the needs of the crop.

Under natural conditions, this soil is poorly suited to citrus, but if a well designed water control system is provided, citrus can be grown. The system should maintain the water table below a depth of 4 feet and provide for subsurface irrigation. Trees need to be planted on beds, and a close growing cover crop should be maintained between the tree rows. Regular applications of fertilizers are needed.

This soil is well suited to pasture and hay crops. Pangolagrass, bahiagrass, and white clover grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizers are needed, and grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential is medium on this soil for pine trees. Equipment limitations and seedling mortality are the major management concerns. A simple drainage system to remove excess surface water is needed if the potential productivity is to be realized. Slash pine is better suited than other species.

This soil is in capability subclass IVw.

53—Arents, 2 to 35 percent slopes. This steep soil is well drained to excessively drained. It is mainly on the dike around the Florida Power and Light cooling reservoir and the older, eroded spoil banks along the C-23 Canal. This soil consists of mixed, heterogeneous materials that were excavated from adjacent areas and canals. The material is as much as 30 feet thick in places. Areas are commonly 200 to 300 feet wide and many miles long.

Typically, the soil material to a depth of many feet is a mixture of grayish and brownish fine sand. Some parts are highly mottled in shades of gray, brown, and yellow. Few to common lumps of mottled sandy loam and sandy clay loam are scattered through the matrix and are remnants of former subsoils. Pockets of organic materials and fragments of former dark colored sandy subsoils are also scattered through the matrix. In places, thin discontinuous lenses of black sandy materials occur several inches apart as evidence of alternating layers of topsoil and other layers deposited by dragline operations. Shell fragments, whole shells, and a few rock fragments are in some pedons.

Included with this soil in mapping are small areas of soils in which slopes are steeper than 35 percent and range to vertical. The slopes are commonly the result of erosion. Total inclusions in any area are less than 10 percent.

Most soil properties are variable. However, permeability is dominantly rapid, and the available water capacity is mostly low. Reaction ranges from strongly acid to moderately alkaline.

The areas of this soil have been shaped to form a dike or exist as mounds of excess spoil material. This soil is not suited to agricultural or urban uses. The spoil areas are an excellent source of fill material.

This soil is not assigned to a capability subclass.

54—Oldsmar fine sand, depressional. This nearly level soil is poorly drained. It is in wet depressions in the flatwoods. Areas generally range from about 5 to 50 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is fine sand about 12 inches thick. The upper 5 inches of the surface layer is very dark gray, and the lower 7 inches is dark grayish brown. The subsurface layer is light gray fine sand about 21 inches thick. The upper part of the subsoil is black, dark reddish brown, and brown fine sand that has coatings of organic matter, and the lower part of the subsoil is dark grayish brown sandy clay loam about 8 inches thick. The substratum is light olive gray sandy loam to a depth of 68 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Oldsmar soil but have a thicker, dark colored surface layer, a few small areas of soils that have a thin layer of muck on the surface, and areas of soils that have a sand texture. Some small areas of this soil have a less well developed, lighter colored sandy subsoil, rather than the typical black color. Also included are small areas of Basinger, Floridana, Holopaw, Riviera, and Wabasso soils. Total inclusions in any area are less than 25 percent.

This soil is ponded for 6 to 9 months or more in most years, and the water table is within 10 inches of the surface most of the rest of the time. The 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, rapid to moderately slow in the upper sandy part of the subsoil, and slow to very slow in the lower loamy part. Natural fertility and the content of organic matter are low.

Most areas of this soil remain in natural vegetation consisting of St. Johnswort, needlerush, pipewort, queensdelight, ferns, sedges, blue maidencane, and various grasses.

Under natural conditions, this soil is not suited to cultivated crops because of ponding. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is suitable for vegetable crops. A water control system is needed to remove the excess water in wet seasons and provide for subsurface irrigation in dry seasons. Row crops should be rotated with close growing, soil improving crops. The rotation needs to include soil improving crops three-fourths of the time. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparation needs to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

This soil is not suited to citrus trees in the natural state and is poorly suited even if management is intensive and water control is adequate.

Under natural conditions, this soil is not suited to pasture. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is moderately suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing and weakening of plants.

The potential is low on this soil for pine trees. Severe equipment limitations and seedling mortality are the main management concerns. A good water control system that removes the excess surface water is necessary before trees can be planted and the potential productivity realized. Slash pine is better than other species to plant.

This soil is in capability subclass VIIw.

55—Basinger fine sand. This nearly level soil is poorly drained. It is in sloughs and poorly defined drainageways in the flatwoods. Slopes are less than 2 percent.

Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 28 inches. The upper 6 inches of the subsurface layer is grayish brown, and the lower 16 inches is light brownish gray. The subsoil is dark grayish brown fine sand and has discontinuous lenses and pockets of black and dark reddish brown. The next layer is grayish brown fine sand. Below this is brown fine sand to a depth of 80 inches or more.

Included with this soil in mapping are areas of soils that are similar to this Basinger soil but have a dark colored surface layer 9 to 12 inches thick or that have loamy sand or loamy fine sand below a depth of 40 inches. Also included are areas of Lawnwood and Waveland soils and a few small areas of Placid and St. Johns Variant soils in depressions. Total inclusions in any area make up about 15 percent.

The water table is at a depth of less than 10 inches for 2 to 6 months annually and at a depth of 10 to 30 inches for more than 6 months in most years. Permeability is very rapid throughout the profile. The available water capacity is very low. Natural fertility is low.

Most areas of this soil are in open forest. The natural vegetation is slash pine and an understory of sawpalmetto, waxmyrtle, gallberry, and pineland threeawn.

Under natural conditions, this soil has very severe limitations for cultivated crops because of wetness and sandy texture. The number of adapted crops is limited, unless management is very intensive. However, if good water control measures and soil improving measures are used, this soil is suitable for a number of vegetable crops. A water control system is needed to remove the excess water in wet seasons and provide water through subsurface irrigation in dry seasons. Seedbed preparation needs to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

This soil in its natural condition is poorly suited to citrus trees. It is suitable for citrus only after a carefully designed water control system that maintains the water table below a depth of about 4 feet has been installed. Planting trees on beds helps lower the effective depth of the water table. A cover crop should be maintained between tree rows. Regular applications of fertilizer and lime are needed.

Improved pasture grasses are well suited to this soil. Pangolagrass, improved bahiagrasses, and white clover grow satisfactorily if well managed. A water control system that removes the excess surface water after heavy rains is needed. Regular applications of fertilizer and lime are needed, and grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential is low on this soil for longleaf and slash pine. A water control system to remove the excess surface water is necessary if the potential productivity is to be realized. Seedling mortality and equipment limitations are the main management concerns. Slash pine is preferred for planting.

This soil is in capability subclass IVw.

56—Wabasso sand, depressional. This nearly level soil is poorly drained. It is in wet depressions in the flatwoods. Areas range from about 5 to 100 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 5 inches thick. The subsurface layer is white and light gray fine sand about 26 inches thick. The upper part of the subsoil is black fine sand about 4 inches thick, and the lower part is grayish brown sandy clay loam about 8 inches thick. The substratum is light brownish gray loamy fine sand.

Included with this soil in mapping are small areas of Floridana, Oldsmar, Riviera, Tequesta Variant, and Winder soils. Also included are soils that are similar to this Wabasso soil but have an organic surface layer; soils that have a thicker sandy subsoil; and soils that have a thick, dark colored surface layer. Total inclusions in any area are less than 25 percent.

This soil is ponded for 6 to 9 months or more in most years. The available water capacity is very low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. Permeability is rapid in the surface and subsurface layers. It is moderate in the upper, sand part of the subsoil and slow or very slow in the lower part. Natural fertility is low.

Most areas of this soil remain in natural vegetation consisting of St. Johnswort, sedges, redroot, queensdelight, maidencane, and other water tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops because of the ponding. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is suited to vegetable crops. A water control system is needed to remove excess water in wet seasons and provide for subsurface irrigation in dry seasons. Row crops should be rotated with close growing, soil improving crops. The soil improving crops need to be in the rotation three-fourths of the time. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparations need to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

This soil is not suited to citrus trees in the natural state. It is poorly suited to citrus even if management is intensive and water control is adequate.

Under natural conditions, this soil is not suited to pasture. However, if very intensive management, soil improving measures, and a good water control system are used, this soil is moderately suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing and weakening of plants.

The potential is low on this soil for pine trees. Severe equipment limitations and seedling mortality are the main management concerns. A good water control system that removes the excess surface water is necessary before trees can be planted and the potential productivity realized. Slash pine is better suited than other species.

This soil is in capability subclass VIIw.

57—Chobee loamy sand. This nearly level soil is very poorly drained. It is in small to large depressions and poorly defined drainageways and on broad, low flats. Areas range from as little as 5 to 10 acres in isolated depressions to 3,000 acres or more in the broad Allapattah Flats. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, this soil has a 3-inch layer of black muck on the surface. The surface mineral layer is black loamy sand about 6 inches thick. The subsoil is sandy loam and sandy clay loam about 36 inches thick. The upper part of the subsoil is black, and the lower part is gray. Below this is the calcareous substratum to a depth of 80 inches or more. The upper 7 inches of the substratum is grayish brown sandy loam, the next 9 inches is light olive gray clay loam, and the lower 22 inches is greenish gray sandy clay loam that has pockets of loamy sand.

Included with this soil in mapping are small areas of Floridana, Gator, Riviera, Tequesta Variant, and Winder soils. Also included are small areas of soils that are similar to this Chobee soil but have 6 to 16 inches of organic material on the surface and a few areas of soils that have a surface texture of loamy fine sand or sandy loam. Total inclusions in any area are less than 20 percent.

The water table is above the surface or within a depth of 10 inches for 6 to 9 months or more in most years. It is at a depth of 10 to 30 inches for short periods during dry seasons. The available water capacity is medium in all layers. Permeability is moderately rapid in the surface layer and slow or very slow in the subsoil and substratum. The natural fertility is medium.

A large acreage of this soil is used for improved pasture, and a small acreage is planted in citrus. The natural vegetation in swampy areas is red maple, water oak, and cabbage palm and an understory of ferns and water tolerant grasses. Vegetation in the open marsh areas and depressions is maidencane, pickerelweed, smartweed, and patches of sawgrass.

In the natural state, this soil is too wet for cultivated crops. If water control is adequate, it is well suited to many adapted vegetable crops. A well designed and maintained water control system should rapidly remove the excess surface water. Other management practices needed are good seedbed preparation, bedding, and rotating row crops with soil improving crops. All crop residue and soil improving crops should be used to protect the soil from erosion. Regular applications of fertilizers are needed.

Under natural conditions, this soil is not suited to citrus. However, if a well designed water control system is installed, citrus can be grown. The system should be designed to maintain the water table at a depth of about 4 feet. Trees need to be planted on beds, and a close growing cover crop should be maintained between the tree rows to prevent soil blowing or washing. Regular applications of fertilizers are needed.

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

If a water control system is used to remove the excess surface water, the potential is high on this soil for pine trees. Equipment limitations, seedling mortality, and plant competition are the major management concerns.

This soil is in capability subclass IIIw.

58—Gator muck. This nearly level soil is very poorly drained. It is in wet depressions and broad marsh areas. Areas range from 5 to 10 acres to about 1,000 acres. Slopes are 1 percent or less.

Typically, the surface layer is muck about 24 inches thick. The upper 11 inches of the muck is black, and the lower 13 inches is dark reddish brown. Next is very dark gray fine sandy loam about 24 inches thick. Below this is gray and brownish gray sand and common shell fragments to a depth of 56 inches or more.

Included with this soil in mapping are small areas of Chobee, Tequesta Variant, and Floridana soils. Also included are areas of soils that have sandy layers between the organic layer and loamy substratum. Total inclusions in any area are less than about 20 percent.

In the natural condition, this soil is covered with water, or the water table is within a depth of 10 inches except in extended dry seasons. The available water capacity is very high in the organic layer, medium in the loamy layer, and low in the underlying sandy material. Permeability is rapid in the organic layer and moderate in the loamy layer. The natural fertility is medium to high.

A few large areas of this soil are used for improved pasture. Other areas have natural vegetation consisting of willows, red maple, sawgrass, pickerelweed, sedges, ferns, maidencane, and water tolerant grasses (fig. 9).

This soil is not suitable for cultivated crops unless the water is controlled. However, if adequate water control is provided, it is well suited to most vegetable crops and sugarcane. A well designed and maintained water control system should remove the excess water when crops are growing on the soil and needs to keep the soils saturated with water at all other times. Water tolerant cover crops need to be on the soils when they are not being row cropped. All crop residue and cover crops should be used to protect the soil from erosion.

Most improved grasses and clovers grow well on this soil if the water is properly controlled. Pangolagrass, bahiagrass, 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 to permit maximum yields.

This soil is not suitable for citrus trees or pine trees.

This soil is in capability subclass IIIw.

60—Tequesta Variant muck. This nearly level soil is very poorly drained. It is in depressions and marshy areas. Most areas are 5 to 20 acres, but a few range to 100 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is black muck about 14 inches thick. The next layer is black sand about 12 inches thick. Below this is a layer of light brownish gray sand about 4 inches thick. The subsoil is grayish brown, light sandy clay loam in the upper 10 inches and dark grayish brown loamy sand in the lower 8 inches. Below this is light gray and light brownish gray sand to a depth of 50 inches or more.

Included with this soil in mapping are small areas of soils that have a loamy sand A horizon or an A1 horizon less than 10 inches thick. Some small areas have soils in which the muck surface layer is slightly less than 6 inches thick or the subsoil is slightly deeper than 20 inches. Also included are small areas of Chobee, Floridana, Gator, Riviera, and Winder soils. Total inclusions in any area are less than 30 percent.

The water table is within a depth of 10 inches, or the soil is ponded for 6 to 9 months or more in most years. Permeability is rapid in the organic surface and sandy subsurface layers and is moderately slow or slow in the subsoil. The available water capacity is very high in the organic surface layer, low in the sandy layers below the organic material, and medium in the subsoil. Natural fertility is medium.

A few areas of this soil have been drained and used for citrus or improved pasture. Most areas remain in natural vegetation of sawgrass, waxmyrtle, willow, pickerelweed, smartweed, duckpotato, buttonbush, ferns, sedges, maidencane, and water tolerant grasses. Cypress trees are in some areas.

In the native condition, this soil is too wet for cultivated crops. If water control is adequate, this soil is well suited to many locally important crops. A well designed and maintained water control system should rapidly remove the excess water during heavy rains. Management practices include good seedbed preparation, crop rotations, and regular applications of fertilizers. Crop rows need to be bedded. Soil improving

Figure 9.—Dense tropical vegetation on Gator muck along the banks of a small stream. The soil is subject to flooding. Preserving the natural vegetation along the winding stream enhances the beauty of the landscape.

crops need to be rotated with the row crops, and all crop residue and soil improving crops should be used to protect the soil from erosion.

If a complete water control system is installed, this soil is moderately suited to citrus. A water control system that maintains good soil aeration to a depth of 4 feet is needed. Trees need to be planted on beds, and a close growing cover crop should be maintained between tree rows to prevent blowing and washing. Regular applications of fertilizers and lime are needed.

This soil is too wet for most improved pasture grasses, but if water control is adequate, it is well suited to pangolagrass, St. Augustine grass, and white clover. Simple water control measures are needed to remove excess water after heavy rains. Regular applications of fertilizers and lime are needed, and grazing should be controlled to maintain plant vigor for best yields.

Under natural conditions, this soil is not suited to pine trees. However, if water control is adequate, the potential is high for pine. Equipment limitations, seedling mortality, windthrow hazard, and plant competition are management concerns. South Florida slash pine is preferred for planting.

This soil is in capability subclass IIIw.

61—Hobe fine sand, 0 to 5 percent slopes. This nearly level to gently sloping soil is somewhat excessively drained. It is on knolls and ridges in coastal areas of flatwoods. Slopes are smooth to convex.

Typically, the surface layer is gray fine sand. The subsurface layer is gray, white, and light gray fine sand to a depth of about 70 inches. In places the upper 4 inches of the subsoil is black, strongly cemented fine sand coated with organic matter. The lower 4 inches is dark yellowish brown fine sand coated with organic matter and has weakly cemented, dark brown lumps. The lower part of the subsoil is gray fine sandy loam to a depth of 88 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Hobe soil but are moderately well drained. Also included are small areas of Jonathan, Nettles, Pomello, Salerno, Satellite Variant, and St. Lucie soils. Total inclusions in any area are about 20 percent.

The water table can be at a depth of 50 to 60 inches for brief periods but generally is at a depth of 60 to 80 inches during the wet season and below 80 inches the remainder of the year. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the content of organic matter are very low.

The native vegetation consists of sand pine, with scattered slash pine in some areas. The understory vegetation is sand live oak, sawpalmetto, fetterbush, sand heath, running oak, cacti, and scattered pineland threeawn, panicums, and other grasses.

This soil is not suited to cultivated crops because of droughtiness and sandy texture. It is only fairly well suited to improved pasture grasses even if good management practices are used. Bahiagrasses are better suited than other improved grasses. Clovers are not suited. Droughtiness is the major limitation except during the wet season. Regular applications of fertilizers and lime are needed.

The suitability of this soil is fair for citrus trees. Fair yields can be obtained if a high level of management is used. Droughtiness is the major limitation, and for maximum yields sprinkler irrigation should be provided. Regular applications of fertilizers and lime are needed.

The potential of this soil is very low for commercial production of pine trees. Sand pines are preferred for planting. Seedling mortality and mobility of equipment are the major management concerns for commercial tree production.

This soil is in capability subclass VIs.

62—Nettles sand, depressional. This nearly level soil is poorly drained. It is in depressions and drainageways in the flatwoods. Areas are generally small, ranging from about 5 to 20 acres. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface 1 inch is very dark gray sand. The subsurface layer is sand to a depth of about 34 inches; the upper 4 inches of the subsurface layer is gray, and the lower 29 inches is light gray. The subsoil is between depths of 34 and 70 inches. The upper 4 inches of the subsoil is firm, weakly cemented, black sand, the next 18 inches is grayish brown sandy loam, and the lower 14 inches is light brownish gray sandy loam. Below this is light brownish gray loamy sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Basinger, Oldsmar, Placid, and Waveland soils. Also included are soils that are similar to this Nettles soil but have a thicker, dark colored surface layer. Total inclusions in any area are less than 20 percent.

This soil is ponded for 6 months or more in most years. In extremely dry seasons, the water table can recede to a depth of 20 inches or more. The available water capacity is low or very 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 moderately slow in the subsoil.

Most areas of this soil remain in natural vegetation consisting of St. Johnswort, hatpin, queensdelight, ferns, waxmyrtle, broomsedge bluestem, panicums, and a variety of sedges.

Under natural conditions, this soil is not suited to cultivated crops, citrus, or improved pasture grasses. This soil occupies the lowest positions in the landscape, and adequate outlets for artificial drainage are not available.

The potential is low on this soil for pine trees. Equipment limitations and seedling mortality are the main management concerns. Slash pine is preferred for planting, but only after a water control system has been installed.

This soil is in capability subclass VIIw.

63—Nettles sand. This nearly level soil is poorly drained. It is in broad areas of flatwoods, mainly in the northeastern part of the county. Areas are generally quite large, ranging up to 2,000 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is about 12 inches thick. The upper 5 inches of the surface layer is very dark gray sand, and the lower 7 inches is dark gray fine sand. The subsurface layer is gray fine sand about 20 inches thick. The upper part of the subsoil is fine sand weakly cemented with organic matter. It is black in the upper 11 inches and dark reddish brown in the lower 8 inches. The lower part of the subsoil is grayish brown fine sandy loam about 11 inches thick. Below this is about 9 inches of dark grayish brown loamy fine sand over grayish brown loamy fine sand to a depth of 80 inches.

Included with this soil in mapping are small areas of Oldsmar, Salerno, St. Johns Variant, and Waveland soils. Also included are soils that are similar to this Nettles soil but have a weakly cemented subsoil at a depth of slightly less than 30 inches or slightly more than 50 inches. Total inclusions in any area are less than 30 percent.

The water table is at a depth of 10 to 40 inches for 4 to 6 months or more during most years. It is at a depth of less than 10 inches for 2 to 4 months during wet seasons. The water table is perched above the subsoil early in the wet season and after heavy rains in other seasons. During extended dry periods, the water table can recede to a depth of more than 40 inches. The available water capacity is low to very 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 moderately slow in the subsoil.

Some areas of this soil are used for cultivated crops or for pasture. A few areas are used for urban development. Most areas remain in natural vegetation consisting of South Florida slash pine and an understory of gallberry, waxmyrtle, sawpalmetto, fetterbush, dwarf huckleberry, redroot, running oak, pineland threeawn, bluestems, indiangrass, and panicums.

This soil has very severe limitations for cultivated crops because of wetness. However, if water is properly controlled and management is good, this soil is suited to many adapted vegetable crops. The water control system should be designed to remove the excess surface water in wet seasons and to provide for subsurface irrigation in dry seasons. Management practices should include bedding, rotation of row crops with soil improving crops, use of crop residue and cover crops to protect the soil from erosion, and regular applications of fertilizers and lime.

Under natural conditions, this soil is poorly suited to citrus trees. It is suitable for citrus only after a well designed water control system has been installed to maintain the water table below a depth of 4 feet. Planting trees on beds helps to lower the effective depth of the water table. A cover crop should be maintained between the rows of trees. Regular applications of fertilizers and lime are needed.

This soil is well suited to pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. A simple water control system is needed to remove the excess surface water after heavy rains. Regular applications of fertilizers and lime are needed. Grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential is medium on this soil for pine trees. Equipment limitations and seedling mortality are the major management concerns. South Florida slash pine is better suited than other species.

This soil is in capability subclass IVw.

64—EauGallie fine sand. This nearly level soil is poorly drained. It is in broad areas of flatwoods. Areas range from 20 to 200 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand. The subsurface layer is grayish brown and light brownish gray fine sand to a depth of about 28 inches. The upper part of the subsoil is black fine sand coated with organic matter, and the lower part is grayish brown sandy clay loam. The substratum is mixed grayish brown fine sand, loamy fine sand, and fine sandy loam.

Included with this soil in mapping are small areas of Lawnwood, Waveland, Oldsmar, and Wabasso soils and scattered wet depressions. Also included are soils that are similar to this EauGallie soil but have yellowish or brownish colors in the subsurface layer. Total inclusions in any one delineation are less than 20 percent.

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

Some areas of this soil are used for improved pasture, but most areas are in open forest. The natural vegetation is slash pine, sawpalmetto, waxmyrtle, gallberry, pineland threeawn, and species of bluestem, panicum, and other grasses.

This soil has very severe limitations for cultivated crops because of wetness and sandy texture in the root zone. The number of adapted crops is limited unless management is very intensive. If water control is good and soil improving measures are used, this soil is well suited to a number of vegetable crops. A water control system is needed to remove the excess water in wet seasons and to provide water through subsurface irrigation in dry seasons. Row crops need to be rotated with close growing, soil improving crops. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparation needs to include bedding of the rows. Fertilizer and lime should be added according to the need of the crop.

Unless management is very intensive, this soil is poorly suited to citrus. It is suitable for citrus only after installation of a water control system that is carefully designed to maintain the water table below a depth of 4 feet. Planting the trees on beds helps to lower the effective depth of the water table. A cover crop should be maintained between the tree rows. Regular applications of fertilizers and lime are needed.

This soil is well suited to pasture. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizers and lime are needed, and grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential for pine trees on this soil is medium. Equipment limitations, seedling mortality, and plant competition are the main management concerns. Slash pine is preferred for planting.

This soil is in capability subclass IVw.

65—Tuscawilla sand. This nearly level soil is poorly drained. It is in low semihammock areas bordering depressions and sloughs and in the intervening open flatwoods. Areas range from about 20 to 100 acres. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black sand about 4 inches thick. The subsurface layer is sand to a depth of about 12 inches. The upper 4 inches of the subsurface layer is dark gray, and the lower 4 inches is light brownish gray. The upper 3 inches of the subsoil is dark grayish brown loamy sand, the next 7 inches is grayish brown sandy clay, and the lower 10 inches is white, calcareous sandy clay loam. Below this is 14 inches of light brownish gray loamy sand. The substratum is light brownish gray to greenish gray, calcareous sandy loam mixed with shell fragments to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Pineda, Pinellas, Riviera, Wabasso, and Winder soils. Also included are small, slightly depressed areas that have a slightly thicker, dark colored surface layer or that are wet for longer periods. Total inclusions in any area are less than 20 percent.

The water table is at a depth of less than 10 inches for 2 to 4 months in most years, and within a depth of 40 inches most of the rest of the year. Permeability is rapid in the surface and subsurface layers, moderate in the subsoil, and rapid in the substratum. The available water capacity is low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. Internal drainage is slow and is impeded by the shallow water table. Natural fertility is moderate.

Some areas of this soil are used for citrus crops or improved pasture. Most areas remain in natural vegetation consisting of slash pine, cabbage palm, sawpalmetto, waxmyrtle, Florida threeawn, bluestem, and numerous grasses.

Under natural conditions, this soil is poorly suited to cultivated crops because of wetness. If a complete water control system is designed to remove the excess surface water and provide subsurface irrigation, this soil is suitable for many fruit and vegetable crops. Crop residue and soil improving crops should be used to protect the soil from erosion. Seedbed preparation needs to include bedding, and fertilizers should be applied according to the need of the crop.

If a water control system provides good drainage to a depth of about 4 feet, this soil is well suited to citrus trees. Trees need to be planted on beds and a cover crop should be maintained between the tree rows to protect the soil from erosion by wind or water. Fertilizer should be applied as needed.

This soil is well suited to improved pasture grasses. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures are needed to remove excess surface water during wet seasons. Regular applications of fertilizer are needed, and grazing should be controlled to maintain healthy plants.

The potential on this soil is high for pine trees. The major management concerns are plant competition, equipment mobility, and seedling mortality during wet seasons. Slash pine is preferred for planting. A simple water control system to remove excess surface water should be provided.

This soil is in capability subclass IIIw.

66—Holopaw fine sand. This nearly level soil is poorly drained. It is in low, flat areas and poorly defined drainageways in the flatwoods. Slopes are smooth to concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand. The subsurface layer is fine sand to a depth of 42 inches. It is light gray in the upper part and light brownish gray in the lower part. The subsoil is grayish brown sandy loam. The substratum is light olive gray loamy sand to a depth of 80 inches or more.

Included with this soil in mapping are soils that are similar to this Holopaw soil but have a black surface layer 10 to 14 inches thick, small depressional areas that are ponded, and a few scattered areas of soils that have an organic stained, dark brown to very dark grayish brown sandy layer above the subsoil. Also included are small areas of Basinger, Malabar, Nettles, Oldsmar, Pompano, and Riviera soils. Total inclusions in any area are about 15 percent.

In most years, the water table is at a depth of less than 10 inches for cumulative periods of 2 to 6 months. In drier seasons, it recedes to a depth of 40 inches or more. Permeability is rapid in the surface and subsurface layers and is moderately rapid in the subsoil. Available water capacity is low to very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the content of organic matter are low.

Most areas of this soil are in natural vegetation consisting of scattered slash pine, cabbage palm, sawpalmetto, waxmyrtle, saltbush, St. Johnswort, blue maidencane, pineland threeawn, bluestems, panicums, and other grasses and forbs.

Under natural conditions, this soil has very severe limitations for cultivated crops because of wetness and other soil factors. The number of adapted crops is limited unless management is very intensive. However, if a good water control system removes the excess surface water and provides for subsurface irrigation in dry seasons and the level of management is high, this soil is suitable for cultivated crops. Row crops should be rotated with soil improving cover crops. The cover crops need to be in the cropping system three-fourths of the time. The rows need to be bedded, and fertilizer and lime should be added according to the need of the crop.

This soil is poorly suited to citrus unless management is very intensive. It is well suited to citrus after a carefully designed water control system is installed to maintain the water table below a depth of 4 feet. The trees need to be planted on beds, and a cover crop should be maintained between the tree rows. Regular applications of fertilizer and lime are needed.

Improved pasture is well suited to this soil. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed, and grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential is medium on this soil for slash pine. A water control system to remove excess surface water is necessary if the potential productivity is to be realized. Seedling mortality and equipment limitations are the main management concerns. Slash pine is better suited to planting than other trees.

This soil is in capability subclass IVw.

67—Aquents, frequently flooded. This nearly level, very poorly drained soil consists of stratified deposits of marine sediment. It is in small to large mangrove swamps in coastal areas. This soil is flooded daily by tidal action or is covered by salt or brackish water during seasonal or storm tides.

The color, texture, and thickness of the layers of this soil vary from one area to another. A common profile has a surface layer of dark grayish brown loamy fine sand about 12 inches thick. The next layer is gray fine sand about 8 inches thick. Below this is a mixture of very dark grayish brown and dark grayish brown loamy fine sand about 12 inches thick. Next is gray fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas that have 6 to 16 inches of muck on the surface. Also included are Bessie, Okeelanta Variant, and Canaveral soils. Total inclusions in any area are about 25 percent.

Permeability is slow to moderate in the loamy or clayey layers and rapid in all other layers. The available water capacity is variable but is dominantly low. Only salt tolerant plants grow on this soil.

This soil is not suited to cultivated crops, citrus, pasture, or pine trees. It is poorly suited to urban uses. A few small areas have been covered with several feet of fill material and are used for homesites. This soil is best used in its native condition as nesting and breeding grounds for fish and wildlife.

This soil is in capability subclass VIIIw.

68—Pits. Pits consist of open excavations from which soil and geologic material have been removed for use in road construction or for foundation purposes. Most areas of this unit include mounds between excavations of overburden, unusable material, or material to be used as needed. Pits, locally called borrow pits, range from small to large.

This map unit is not assigned to a capability subclass.

69—Hontoon muck. This deep, nearly level, organic soil is very poorly drained. It is in heavily wooded freshwater swamps. Slopes are less than 2 percent.

Typically, the soil is black muck to a depth of about 65 inches. It commonly has pockets or discontinuous lenses of dark reddish brown, more fibrous material.

Included with this soil in mapping are small areas of Samsula and Sanibel soils and narrow bands of Basinger and Placid soils along the fringes of this soil. Total inclusions in any area are less than 10 percent.

The water table is at or above the surface except during extended dry periods. Permeability is rapid. The available water capacity is very high. Natural fertility is moderate.

The natural vegetation in most areas is sweetbay or redbay with an understory of vines and bracken fern. Red maple is in some areas.

Under natural conditions, this soil is not suited to cultivated crops. If an adequate water control system is installed, it is well suited to most vegetable crops, especially leafy crops, and improved pasture grasses. Fertilizers that contain phosphates, potash, and minor elements are needed. Heavy applications of lime are needed to correct the high acidity of this soil.

This soil is not suited to citrus trees or pine trees. The potential is high on this soil as habitat for wetland wildlife.

This soil is in capability subclass IIIw.

70—Canova Variant muck. This nearly level soil is very poorly drained. It is in low positions near Lake Okeechobee, extending from near the Palm Beach County line north to Chancey Bay. Slopes are concave and are 0 to 1 percent.

Typically, the surface layer is black muck about 12 inches thick. Next is black fine sand about 5 inches thick. Below this is gray fine sand about 13 inches thick. The subsoil is grayish brown sandy clay loam about 6 inches thick. The substratum is calcareous, light brownish gray fine sandy loam and has shell fragments. Below this is hard limestone.

Included with this soil in mapping are small areas of Floridana, Jupiter, Okeelanta, and Tequesta Variant soils. Also included are soils that are similar to this Canova Variant soil but have the subsoil or limestone, or both, at a greater depth. Total inclusions in any area range to about 30 percent.

All areas of this soil are drained, and the water table is controlled within a depth of 10 to 36 inches, or according to the needs of the crop. Before this soil was drained, the water table was above the surface most of the time. Permeability is rapid in the organic surface and mineral subsurface layers and moderately slow to slow in the subsoil. The available water capacity is very high in the organic surface layer, low in the mineral subsurface layer, and medium in the subsoil. Natural fertility is medium, and the content of organic matter is high.

If the artificial drainage is good and continually maintained, this soil is well suited to cultivated crops and improved pasture grasses. If crops other than sugarcane are grown, the soil needs to be protected from blowing by planted windbreaks or close growing crops. Between cropping periods, the water table should be held as near the surface as possible to reduce oxidation of the organic material. Regular applications of complete fertilizers are needed.

This soil is not suited to pine trees.

This soil is in capability subclass IIIw.

72—Adamsville Variant sand, 0 to 5 percent slopes. This nearly level to gently sloping soil is somewhat poorly drained. It is on a low, narrow ridge parallel to the shoreline of Lake Okeechobee. Slopes are smooth to convex and range from 0 to 5 percent.

Typically, the surface layer is dark gray sand about 3 inches thick. Light gray sand is below this to a depth of about 54 inches or more. Next is black muck about 16 inches thick. Below this is dark grayish brown sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of soil that have discontinuous layers of black sand in the sandy material above the organic material. In a few pedons, black sand occurs in place of the organic material. Also included are small spots of Pompano soils. Total inclusions in any area are less than 10 percent.

In most years, the water table is at a depth of 20 to 40 inches for 2 to 4 months. It is at a depth of 40 to 60 inches the rest of the time, except during dry periods when it is below 60 inches. Permeability is rapid in the sandy layers and moderate in the organic layer. The available water capacity is very low in the upper 54 inches and very high in the underlying organic material. Natural fertility is low.

A few small areas of this soil are used for homesites. Most areas remain in natural vegetation. The vegetation consists of cabbage palm, cypress, live oak, strangler fig, and other hardwoods and a ground cover of coffeeweed, switchgrass, and other shrubs and grasses.

Under natural conditions, this soil has severe limitations for cultivated crops because of periodic wetness and because of the sandy texture in the root zone. However, this soil is suited to a number of vegetable and flower crops if a water control system is used to remove the excess water in wet seasons, sprinkler irrigation is used in dry seasons, and soil improving measures are included in management. Regular applications of a complete fertilizer are needed.

Under natural conditions, this soil is poorly suited to citrus. It is well suited to citrus if a drainage system is used to remove excess water rapidly from the soil to a depth of about 4 feet and if supplemental sprinkler irrigation is used. A close growing cover crop should be maintained between the tree rows to protect the soil from blowing, and regular applications of fertilizer are needed.

If properly fertilized and managed, this soil is moderately well suited to improved pasture. Pangolagrass and bahiagrass are well suited. Grazing should be controlled to maintain healthy plants for highest yields.

This soil has low potential for slash pine. Seedling mortality and equipment limitations are the main management concerns.

This soil is in capability subclass IIIw.

73—Samsula muck. This nearly level, organic soil is very poorly drained. It is in depressions and in freshwater swamps and marshes. Slopes are smooth to concave and are 0 to 1 percent.

Typically, the surface layer is muck about 34 inches thick. The upper 12 inches of the surface layer is black, and the lower 22 inches is dark reddish brown. Below this is sand to a depth of 80 inches or more. The upper 10 inches of the sand is very dark gray, the lower 36 inches is light brownish gray.

Included with this soil in mapping are small areas of soils that have more than 40 inches of muck and soils that have loamy material below a depth of 40 inches. Also included are small areas of Okeelanta, Sanibel, and St. Johns Variant soils. Total inclusions in any area are 10 to 20 percent.

In the natural condition, this soil is ponded for 6 to 9 months or more in most years. The water table is at a depth of less than 10 inches the rest of the year. Internal drainage is slow and is inhibited by the water table. Permeability is rapid in all layers. The available water capacity is very high in the organic material and very low in the underlying sand. Natural fertility is moderate.

Most areas of this soil are in natural vegetation of St. Johnswort, maidencane, red maple, sawgrass, waxmyrtle, and water tolerant grasses, shrubs, and forbs.

This soil is not suited to cultivated crops unless water is controlled. If the water is adequately controlled, this soil is well suited to some vegetable crops. A well designed and maintained water control system should remove the excess water when crops are growing on the soil and should keep the soil saturated with water at all other times. Fertilizers that contain phosphates, potash, and trace elements are needed. Lime is needed. Cover crops need to be maintained on the soil when crops are not being grown, and all plant residue and cover crops should be used to protect the soil from erosion.

If water is properly controlled, this soil is well suited to improved pasture grasses. Pangolagrass, bahiagrass, St. Augustine grass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Lime is needed, and fertilizers high in phosphates, potash, and trace elements are needed. Grazing should be controlled to permit highest possible yields.

This soil is not suited to citrus or pine trees.

This soil is in capability subclass IVw.

74—Torry muck. This nearly level, organic soil is very poorly drained. Areas of this soil are in the southwestern corner of the county adjacent to Lake Okeechobee. Slopes are smooth and are less than 1 percent.

Typically, the upper layer of this soil is black muck that has a high content of clay. Between the depths of 24 and 56 inches is black muck that is fibrous, looser, and much lower in clay content than the upper layer. Below this is light gray loamy marl about 6 inches thick. Hard limestone is at a depth of about 62 inches.

Included with this soil in mapping are small areas of soils that are similar to this Torry soil but have an organic surface layer high in clay and slightly less than 18 inches thick. Also included are small areas of Okeelanta muck. Total inclusions in any area are less than 10 percent.

All areas of this soil are artificially drained. If the drainage system is not maintained, the soil is saturated or covered with water for 6 to 9 months or more in most years. Permeability is moderate to a depth of 24 inches and rapid between depths of 24 and 56 inches. The available water capacity is very high to a depth of 56 inches. Natural fertility is high.

All areas of this soil are used for crops or improved pasture and have been cleared of natural vegetation.

If a well designed water control system is maintained and management is good, this soil is well suited to select vegetable crops and sugarcane. The water control system should remove the excess water while crops are growing on the soil and should keep the soil saturated at all other times. Water tolerant cover crops need to be on the soil when crops are not being grown. Crop residue and cover crops should be used to protect the soil from erosion. Fertilizers high in phosphorus, potash, and minor elements are needed.

This soil is not suited to the production of citrus or pine trees.

If water is properly controlled, this soil is well suited to the improved pasture grasses and clovers adapted to the area. High yields of St. Augustine grass, pangolagrass, bahiagrass, and white clover can be obtained. Water control should maintain the water table near the surface to prevent excessive oxidation of the organic horizons. Fertilizers high in potash, phosphorus, and minor elements are needed. Grazing should be controlled to maintain plant vigor and permit maximum yields.

This soil is in capability subclass IIIw.

75—Ft. Drum fine sand. This nearly level soil is poorly drained. It is on low ridges and in flats that border sloughs and depressional areas. Slopes are smooth to convex and are less than 2 percent.

Typically, the surface layer is a dark gray fine sand 7 inches thick. The subsurface layer is brown fine sand to a depth of 14 inches. The subsoil is about 19 inches thick. The upper 4 inches of the subsoil is light brownish gray, calcareous fine sand and has brownish yellow mottles, the next 10 inches is light gray, calcareous fine sand and has brownish yellow mottles, and the lower part is light gray, calcareous fine sand and has yellow and olive yellow mottles to a depth of 33 inches. The substratum is about 18 inches of brownish yellow fine sand with many medium pockets of light gray fine sand over light gray fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of soils that have a thicker, darker colored surface layer than this Ft. Drum soil and soils that do not have mottles in the upper 20 inches and are yellow. Also included are small areas of Salerno, Malabar, Oldsmar, Pinellas, and Valkaria soils. Total inclusions in any area are 15 to 25 percent.

The water table is on the surface or within a depth of 10 inches for 1 to 2 months annually and at a depth of 10 to 40 inches for 9 months in most years. Permeability is rapid in the surface layer, subsurface layer, and substratum and is moderate in the subsoil. The available water capacity is low in the surface layer, subsurface layer, and substratum and is medium in the subsoil.

Most areas of this soil are in natural vegetation consisting of cabbage palm, sawpalmetto, broomsedge bluestem, chalky bluestem, and pineland threeawn.

Under natural conditions, this soil has very severe limitations for cultivated crops because of wetness and the sandy texture. The number of adapted crops is limited unless intensive management practices are used. However, if water control is good and soil improving practices are part of management, a number of vegetable crops can be grown. Fertilizer should be added according to the need of the crop. The high calcium content of the subsoil reduces the need for lime.

Under natural conditions, this soil is poorly suited to citrus trees because of wetness. If the wetness is adequately controlled, trees grow well. A carefully designed water control system should maintain the water table below a depth of 4 feet. Planting trees on beds helps to lower the effective depth of the water table. A cover crop needs to be maintained between the tree rows. Fertilizer should be applied as needed. The high calcium content of the subsoil reduces the need for lime.

This soil is well suited to improved pasture grasses. Pangolagrass, improved bahiagrasses, and white clover grow well if well managed. Water control measures are needed to remove excess water from the surface after heavy rains. Regular applications of fertilizer are needed. The high calcium content of the subsoil reduces the need for lime. Grazing should be controlled to prevent overgrazing and weakening of the plants.

The potential is medium on this soil for pine trees. A water control system to remove excess surface water is necessary if the potential productivity is to be realized. Equipment limitations and seedling mortality are the main management concerns. Slash pine is better suited to planting than other trees.

This soil is in capability subclass IVw.

76—Valkaria fine sand. This nearly level soil is poorly drained. It is in poorly defined drainageways and low lying areas. Slopes are less than 2 percent.

Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 13 inches. The subsoil is fine sand to a depth of about 45 inches. The upper 6 inches of the subsoil is brown, the next 10 inches is pale brown and mottled with yellowish brown, the next 6 inches is yellowish brown, and the lower part of the subsoil is grayish brown and mottled with pale brown. The substratum is grayish brown, light gray, light yellowish brown fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Basinger, Ft. Drum, Malabar, and Oldsmar soils. Also included are small areas of soils that have discontinuous lenses or pockets of loamy material or dark colored, organic stained sands below the subsoil. Total inclusions in any area are about 20 percent.

The water table is at a depth of less than 10 inches for 3 to 6 months and at a depth of 10 to 40 inches for 6 months or more in most years. Permeability is rapid throughout the profile. The available water capacity is low to very low. Natural fertility is low.

Many areas of this soil are used for improved pasture. Natural vegetation consists of cabbage palm, sawpalmetto, waxmyrtle, St. Johnswort, and pineland threeawn.

Under natural conditions, this soil has very severe limitations for cultivated crops because of wetness and the sandy texture. The number of adapted crops is limited unless very intensive management practices are followed. However, if water control is good and soil improving measures are included in management, this soil is suitable for a number of vegetable crops. A water control system is needed to remove excess water in wet seasons and to provide for subsurface irrigation in dry seasons. Seedbed preparation should include bedding of the rows.

This soil in a natural condition is poorly suited to citrus trees. It is well suited to citrus if a carefully designed water control system is installed to maintain the water table below a depth of about 4 feet. Planting trees on beds helps to lower the effective depth of the water table. A cover crop should be maintained between tree rows. Regular applications of fertilizer and lime are needed.

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

The potential is low on this soil for pine trees. A water control system to remove excess surface water is necessary if the potential productivity is to be realized. Seedling mortality, plant competition, and equipment limitations are the main management concerns. Slash pine is better suited to planting than other trees.

This soil is in capability subclass IVw.

77—St. Lucie sand, 8 to 20 percent slopes. This deep, strongly sloping to moderately steep sandy soil is excessively drained. It is on the coastal ridge. Areas range from about 10 to 100 acres. Slopes are single or complex and range from 8 to 20 percent.

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

Included with this soil in mapping are small areas of soils that are similar to this St. Lucie soil but have texture of fine sand and soils that have slightly steeper slopes. Also included are Paola, Pomello, and Satellite Variant soils. Total inclusions in any area are less than 15 percent.

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

Most areas of this soil remain in native vegetation consisting of sand pine, scrub oak, and an understory of sawpalmetto, rosemary, deer moss, lichens, and cacti. Pineland threeawn is the most common grass.

This soil is not suited to cultivated crops, citrus, or improved pasture. The combined hazards of low natural fertility, droughtiness, and moderately steep slopes are too severe for such uses.

The potential is very low on this soil for pine trees. Equipment limitations, hazard of erosion on the steeper slopes, and seedling mortality are the main management concerns. Sand pine is preferred for planting.

This soil is in capability subclass VIIs.

78—Pomello Variant fine sand. This nearly level soil is moderately well drained. It is on broad, low ridges in the west-central part of the flatwoods. Areas range from about 25 to 250 acres. Slopes are smooth to convex and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 3 inches thick. The subsurface layer is fine sand to a depth of about 52 inches. The upper 12 inches of the subsoil is black fine sand that has organic matter coatings, and the lower 6 inches of the subsoil is brown fine sand thinly coated or stained with organic matter. Below this is brown fine sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Pomello soil but have a cemented subsoil at depths of less than 50 inches or have a less well developed subsoil. Also included are small areas of Jonathan, Pomello, Satellite Variant, Salerno, and Waveland soils. Total inclusions in any area are less than 25 percent.

In most years, the water table is at a depth of 30 to 40 inches for 1 to 4 months during the wet season. During most of the rest of the year, it is at a depth of 40 to 60 inches. It can recede below 60 inches during extremely dry seasons. Permeability is very rapid in the surface and subsurface layers and moderate in the subsoil. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the content of organic matter are very low.

A few small areas of this soil are used for improved pasture. Most areas are in natural vegetation consisting of South Florida slash pine, varieties of scrub oak, sawpalmetto, fetterbush, running oak, pineland threeawn, and other grasses. Sand pine and turkey oak are in a few small areas.

This soil is not suited to cultivated crops. It is poorly suited to citrus trees. Only fair yields can be obtained even if the management is high. For maximum yields, sprinkler irrigation should be provided. Regular applications of fertilizers and lime are needed.

This soil is only fairly well suited to improved pasture grasses, even if good management is used. Bahiagrass is better adapted than other grasses. Clovers are not suited. Droughtiness is the major limitation, except during a part of the wet season. Regular applications of fertilizers and lime are needed. Grazing should be well controlled to permit vigorous growth for highest yields and to provide good ground cover.

The potential of this soil is low for commercial production of pine trees. Seedling mortality and equipment mobility are the main management concerns. South Florida slash pine and sand pine are preferred for planting.

This soil is in capability unit VIs.

79—Terra Cela Variant muck. This nearly level, organic soil is very poorly drained. It is in mangrove swamps along the Loxahatchee River and South Fork of the St. Lucie River. Slopes are smooth and less than 1 percent.

Typically, the surface layer is black muck about 12 inches thick. Next is dark reddish brown muck to a depth of 40 inches. Below this is black muck to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Aquents, Canaveral, and Okeelanta Variant soils. Total inclusions in any area are less than 15 percent.

This soil is covered with water during daily high tides and during seasonal or storm tides. The water table is within a depth of 10 inches at all other times. Permeability is moderate to moderately rapid throughout the profile, but internal drainage is impeded by the shallow water table. The available water capacity is very high in all layers. Natural fertility is moderate, but salinity is too high for most plants to tolerate.

The natural vegetation is red mangrove, white mangrove, cypress, pondapple, leather fern, and vines. Red maple and cabbage palm grow along the outer edges of some areas.

This soil is not suited to cultivated crops, improved pasture, or pine trees. The potential for these uses is very low.

In a natural condition, this soil is better used as habitat for marine life than for most other uses. Areas are major breeding and spawning habitat for shellfish and other marine life.

This soil is in capability subclass VIIIw.

86—Paola sand, 8 to 20 percent slopes. This strongly sloping to moderately steep soil is excessively drained. It is on the coastal ridge. Areas range from about 10 to 100 acres. Slopes are single or complex.

Typically, the surface layer is gray sand. The subsurface layer is white sand. Below this is yellowish sand to a depth of 80 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Paola soil but do not have a white subsurface layer and soils that are similar but have a deeper yellowish layer. In places are soils that have a few short, steeper slopes. Also included are small areas of Orsino, Pomello, Satellite Variant, and St. Lucie soils. Total inclusions in any area are less than 20 percent.

The available water capacity is very low, and permeability is very rapid throughout the profile. The water table is below a depth of 72 inches at all times.

Most areas of this soil remain in native vegetation consisting of sand pine, scrub live oak, and an understory of sawpalmetto, rosemary, mosses, lichens, and cacti.

This soil is not suited to cultivated crops, citrus, or improved pasture. The combined hazards of low natural fertility, droughtiness, and moderately steep slopes are too severe for such uses.

The potential for pine trees on this soil is very low. Equipment limitations, hazard of erosion on the steeper slopes, and seedling mortality are the main management concerns. Sand pine is preferred for planting.

This soil is in capability subclass VIIs.

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 limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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

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

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

crops and pasture

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

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the predicted yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Detailed soil map units." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

Approximately 81,000 acres in the survey area was used for crops and pasture in 1978 (*6, 7, 14*). Of this, about 5,000 acres was used for sugarcane, about 36,000 acres was used for pasture, and about 40,000 acres was used for specialty crops. Specialty crops included citrus fruits on approximately 38,000 acres; vegetables, mainly potatoes, cabbage, and tomatoes, on approximately 1,300 acres; and flowers on about 300 acres.

Potential of the soils in the Martin County Area for increased food production is good. Almost 210,000 acres of potentially good cropland is presently used for pasture, range, and woodland. Conversion of this land to crops would require intensive conservation measures to control water and soil blowing. In addition to the reserve capacity represented by this land, food production could be increased considerably by extending the latest crop production technology to all cropland in the survey area. This soil survey can greatly facilitate the application of such technology.

Acreage in forest land and rangeland has gradually decreased as more and more land is used for urban development and improved pasture. Acreage in crops and citrus fruits has remained stable over the past several years. The land in improved pasture has increased slightly. The use of this soil survey to help make land use decisions that will influence the future role of farming in the county is discussed in the section "General soil map units."

Soil erosion is a hazard on disturbed soils in areas undergoing development. Water erosion can damage these soils if rains are intense and the soils are bare of vegetation and surface mulch.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the topsoil material is lost and the subsoil is exposed.

Second, water erosion results in sediment entering streams. Control of erosion minimizes sediment pollution of streams and lakes and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Erosion control practices provide surface cover, reduce runoff, and increase infiltration.

Wind erosion is a major hazard on sandy and organic soils. Wind erosion can damage soils and tender crops in a few hours in unprotected areas if the winds are strong and the soil is dry and bare of vegetation and surface mulch. Maintaining plant cover and surface mulch minimizes wind erosion.

Wind erosion is damaging for several reasons. It reduces soil fertility by removing finer soil particles and organic matter; damages or destroys crops by sandblasting; spreads disease vectors, insects, and weed seeds; and creates health and cleaning problems. Control of wind erosion minimizes duststorms and improves air quality.

Field windbreaks and stripcrops 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 and the susceptibility of the crop to damage from sandblasting. Windbreaks and stripcrops reduce the windspeed and reduce the distance the wind blows across the field. Field windbreaks of such adapted trees and shrubs as eucalyptus, South Florida slash pine, southern redcedar, and grafted non-fruiting and suckering varieties of Australian pine and stripcrops of millet, small grain, sugarcane, and sunflowers are effective in reducing wind erosion and crop damage.

Clearing and disturbing only the minimum area needed for works and improvements help reduce water runoff and wind erosion. Mulching also helps reduce damage from water runoff and soil blowing and improves moisture conditions for seedlings.

Information for the design of erosion control practices for each kind of soil is contained in "Water and Wind Erosion Control Handbook for Florida" available in local offices of the Soil Conservation Service.

Soil drainage is a major management concern on much of the acreage used for crops and pasture in the survey area. Under natural conditions, most areas of the soils are so wet that production of common crops and pasture plants is generally not possible. In this category are the very poorly drained Chobee, Floridana, Gator, Okeelanta, and Winder soils and the poorly drained Basinger, Oldsmar, Pineda, Wabasso, and Waveland soils. In addition, most of these soils have low available water capacity and are droughty during dry periods. Therefore, a combination of drainage and irrigation systems is needed for intensive crop and pasture production. The design of the drainage and irrigation systems varies according to the kind of soil and the crops and pasture plants grown.

Successful citrus production requires more intensive management on the poorly drained and very poorly drained soils. Citrus trees have a deep taproot and need a deep rooting zone. The soils need surface and subsurface drainage, and the citrus trees need irrigation for intensive production. Drip irrigation is gaining widespread use. The design of both the drainage and irrigation systems varies according to the kind of soil and citrus crops grown.

Some soils have a weakly cemented subsoil which slows the movement of water through the soil. In this category are the Jonathan, Lawnwood, Nettles, Salerno, and Waveland soils. These soils are wetter during rainy seasons and remain wet long after the wet season is over. Although the cemented subsoil is a severe limitation to the soil drainage required for most uses, it can be used to maintain a shallow water table for specific crops.

When organic soils are drained, the pore spaces fill with air and the organic material subsides and oxidizes. Therefore, special drainage and irrigation systems are needed to control the depth and period of drainage. Oxidation and subsidence of these soils can be minimized by keeping the water table at the highest practical level for the crop and cultivation practices during the growing season, and by raising the water table to the surface the rest of the time.

Information on drainage and irrigation for each kind of soil is contained in the Technical Guide available in local offices of the Soil Conservation Service.

Soil fertility is naturally low on most soils in the survey area. Most of the mineral soils have a sandy, light colored surface. Exceptions are the Chobee, Floridana, and Jupiter soils which have a dark surface. Organic soils, such as Gator, Hontoon, Okeelanta, and Samsula soils, have a dark surface.

The soils with a loamy subsoil within a depth of 40 inches have a higher available water capacity and respond better to fertilizers and management. In this category are Chobee soils that have a loamy surface layer and subsoil and such soils as Floridana, Pineda, Pinellas, Riviera, and Winder soils that have a sandy surface layer and loamy subsoil.

Most other mineral soils have either a deep, sandy profile; a loamy subsoil below a depth of 40 inches; or a sandy subsoil weakly cemented with organic matter. These soils are leached of plant nutrients rapidly and do not respond so well as loamy soils to fertilizers and management. In this category are such soils as Basinger, Hobe, Jonathan, Nettles, Oldsmar, Paola, Salerno, St. Lucie, and Waveland soils. In addition, Hobe, Jonathan, Paola, and St. Lucie soils are too droughty and too low in fertility to be suitable for most crops. The soils with organic accumulations in the subsoil also have iron and aluminum accumulations which interfere with the availability of other plant nutrients and which can be toxic to some plants. In this category are such soils as Lawnwood, Nettles, Oldsmar, Wabasso, and Waveland soils.

Some soils, such as Hallandale soils, have a layer of hard limerock at a depth of less than 20 inches; some, such as Boca soils, have limerock at a depth of less than 40 inches. These soils are saturated during rainy periods and droughty during dry periods. The presence of rock makes the construction of a drainage and irrigation system more difficult.

Most of the soils in the survey area have a surface layer that is strongly acid to very strongly acid. If they have never been limed, the soils require applications of ground limestone to supply calcium and raise the pH level sufficiently for good growth of crops, citrus fruits, and pasture. Levels of nitrogen, potassium, and available phosphorus are naturally low in most of the mineral soils. The organic soils, such as Gator, Okeelanta, and Samsula soils, are low in most plant nutrients except nitrogen. Fertilizers applied to these soils should contain minor elements, especially copper. On all soils, additions of lime and fertilizer should be based on the results of soil tests, the need of the crop, and the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply to each crop.

Soil tilth is an important factor in the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous. Most of the mineral soils in the survey area have a sandy surface layer that is light in color and low in organic matter content. Chobee and Floridana soils are exceptions because they have a dark surface layer and medium organic matter content. The organic soils, such as Gator, Okeelanta, and Samsula soils, have a dark surface layer that is high in organic matter content.

Generally, mineral soils have weak structure or are structureless. Intense rain on dry soils that are low in organic matter content causes the colloidal material to cement, forming a slight crust. The crust is hard when dry and slightly impervious to water. Once the crust has formed, it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material can help improve soil structure and reduce crust formation.

Mineral soils generally should be plowed only a short time before planting. Most of these soils are sandy, and are subject to damaging soil blowing if they are plowed several weeks before planting.

Field crops suited to the soils and climate of the survey area include several crops that are not now commonly grown. The acreage of sugarcane, the only field crop grown in the survey area, has remained constant over the past several years. The acreage of selected varieties of sugarcane suited to mineral soils and of rice and sunflowers could be increased if economic conditions are favorable.

Specialty crops grown commercially in the survey area include citrus fruits; some vegetables, mainly cabbage, peppers, potatoes, and tomatoes; and flowers, mostly chrysanthemums. If economic conditions are favorable, cucumbers, eggplants, squash, sweet corn, and watermelons could be grown.

If drainage and irrigation are adequate, the poorly drained and the very poorly drained soils are well suited to vegetable crops.

Oranges are the main citrus crop. Grapefruit and specialty fruits are also grown. If drainage and irrigation are adequate, citrus crops can be grown on the poorly drained and very poorly drained soils. Citrus crops are more productive on soils, such as Pineda, Riviera, and Wabasso soils, that respond better to drainage, irrigation, and management.

Soils in low lying areas where air drainage is poor generally are poorly suited to early vegetables and citrus fruits. This condition is more common in some of the wetter soils in the western half of the survey area.

Information and suggestions for growing specialty crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Pasture in the soil survey area is used to produce forage for beef cattle and dairy cattle. Cow-calf operations are the major beef cattle systems. Bahiagrass and pangolagrass are the main pasture plants (fig. 10). On soils that have subsurface irrigation, white clover is grown in combination with grass for winter and spring grazing. Excess grass is harvested for hay (fig. 11) when the weather is favorable. The dairies chop green feed daily for feeding.

If adequately drained, most of the poorly drained soils are well suited to pasture. Some of the very poorly drained soils, such as Chobee, Floridana, and Gator soils, are very well suited to pasture if drainage is adequate. Hemarthriagrass is suited to the poorly drained and very poorly drained soils. Subsurface irrigation increases the length of the growing season and the total forage production. Legumes, such as white clover, are well suited to these soils if adequate lime, fertilizer, and good management are used.

Pasture in many parts of the survey area has been greatly depleted by continuous excessive grazing. Yields from pasture can be increased by using lime, fertilizer, legumes, rotation, irrigation, and good management practices.

Differences in the amount and kind of pasture yields are related closely to the kind of soil. Pasture management is based on the relationship of soils, pasture plants, lime, fertilizer, and moisture.

Information and suggestions for pasture can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Hay and pasture yields are predicted for varieties of grasses and legumes suited to each soil under a high level of management. The predicted yields are shown in table 5 in animal unit months.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management

Figure 10.—Improved pasture in an area of poorly drained Lawnwood fine sand. This soil is well suited to pasture if grazing is controlled.

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.

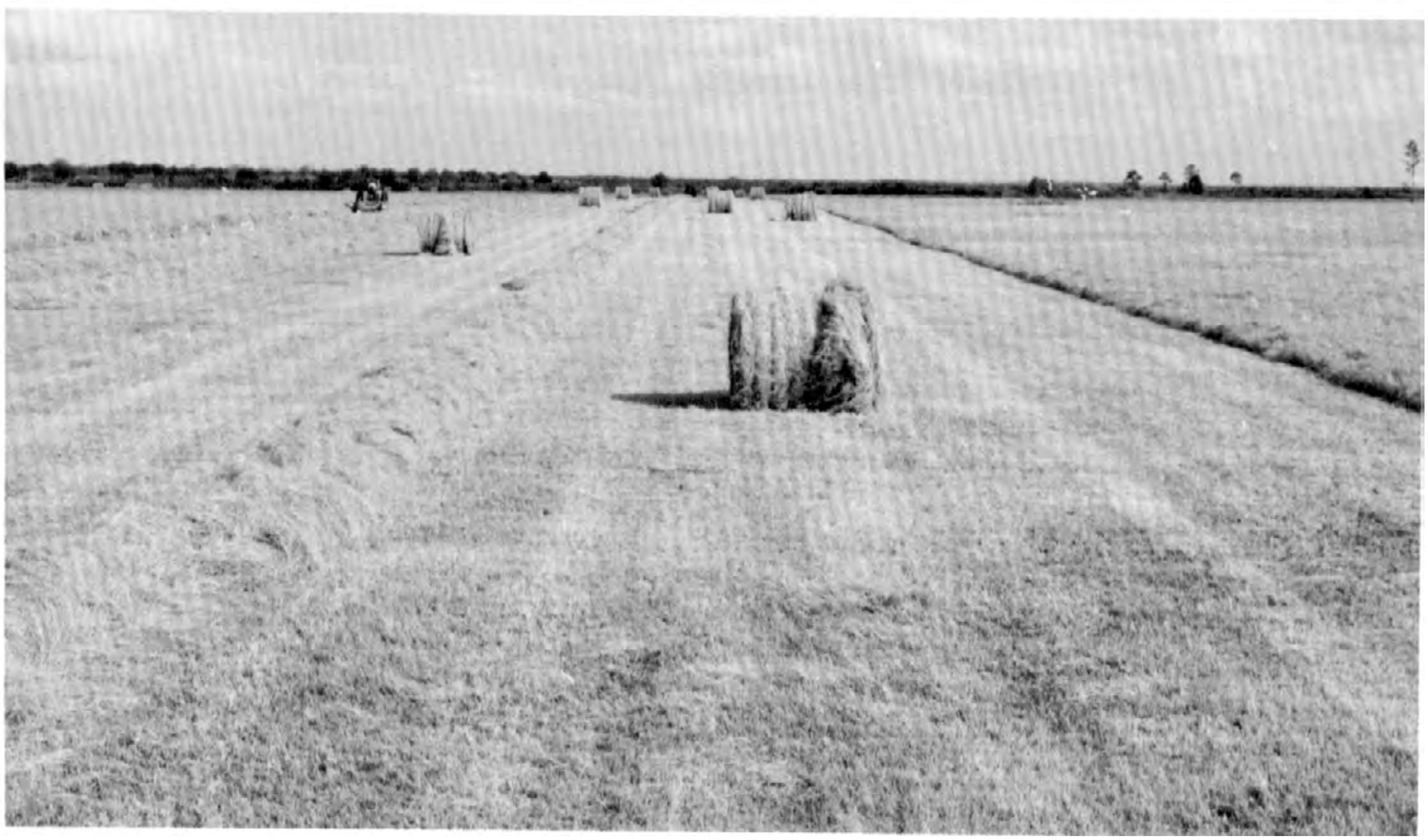

Figure 11.—Haying on Basinger fine sand. This poorly drained soil produces good yields of improved grasses if management is good.

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 "Detailed soil map units."

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 the Martin County area. This forage is readily available, it is economical, and it provides important roughage needed by cattle. About 100,000 acres, or 30 percent of the survey area, is used as native grazing areas by domestic livestock.

The dominant native forage species that grow on a soil are generally the most productive and the most suitable for livestock. They 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 as 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 kinds and amounts of plants, in relation to its potential. Four classes are used to measure range condition. Range in *excellent* condition produces 76 to 100 percent of its potential; range in *good* condition produces 51 to 75 percent; range in *fair* condition produces 26 to 50 percent; and range in *poor* condition produces 0 to 25 percent. Only about 15 percent of the range in the Martin County Area is in excellent condition; about 65 percent is in fair or poor condition.

Table 7 shows the potential of each soil for the production of livestock forage. Potential production is 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 soil is closely related to the natural drainage. The wettest soils, for example those soils in marshes, produce the most herbage. The deep, droughty sandhills generally produce the least herbage annually.

Management of the soils for range should be planned with potential productivity in mind. Soils that have 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 that 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 commonly involves the mechanical control of brush, the control of burning, and especially the control of livestock grazing. These practices are very important. Without exception, the proper management of range results in maximum sustained production, conservation of soil and water resources, and generally, improvement of the habitat for many kinds of 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 forest land, grazing is compatible with timber management if it is controlled or managed in a manner that maintains or enhances timber and forage resources.

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, and the influence of time and intensity of grazing on the grasses and forage. It also varies according to the number, size, and spacing for tree plantings and the method of site preparation.

woodland management and productivity

Carl D. DeFazio, forester, Soil Conservation Service, and Roy D. Hopke, forester, Florida Division of Forestry, helped prepare this section.

Approximately 49,000 acres, or 14 percent, of the Martin County Area is woodland. Most of the forest is on Waveland, Wabasso, Oldsmar, Pineda, and Riviera soils. Most of the woodland is privately owned. In addition to this commercial woodland, a large percentage of land in the survey area has scattered trees.

South Florida slash pine, the major tree of the survey area, grows on all but the excessively drained and very poorly drained soils. Sand pine is economically competitive along the coastal ridge in the eastern part of the survey area. Representative soils on which sand pine grows are Paola, St. Lucie, Hobe, and Jonathan soils. Cypress is prevalent along the extreme southern boundary of the survey area. Cabbage palm, live oak, and laurel oak are along the St. Lucie and Loxahatchee Rivers.

Timber management in the Martin County Area generally consists of natural regeneration following harvest cutting. Prescribed burning plays an important role in reducing "rough" and exposing mineral soil as a seedbed for natural reproduction. Fire also encourages grasses and forbs which help support various wildlife, such as deer, turkey, and quail.

Wood products are periodically shipped from various points in the survey area. There are a few small sawmills. The production of eucalyptus for pulpwood is a potential wood crop.

Woodland in the Martin County Area has high value as building sites. Consequently, woodland acreage, particularly along the coast, is being lost to urban development.

More detailed information on woodland management can be obtained from the local offices of the Soil Conservation Service, Florida Division of Forestry, and Florida Cooperative Extension Service.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (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 blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. Site index was determined at 25 years of age for South Florida slash pine and at 50 years for all other species. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

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.

Good wildlife habitat is widespread in Martin County Area, except in the urbanized areas near the coast. Wetland wildlife habitat is especially prevalent and produces many species of wading birds, reptiles, and amphibians. The main game species are white-tailed deer, bobwhite quail, and mourning doves. Other wildlife includes wild turkey, Florida mallard, raccoon, oppossum, rabbit, feral hog, gray fox, tree squirrel, armadillo, and a variety of songbirds, woodpeckers, and raptorial birds.

The most extensive areas of good habitat are in the undeveloped rangeland. Other important areas of smaller extent include the ocean beaches, which are used extensively for nesting by endangered and threatened sea turtles; the mangrove islands in Indian River, Loxahatchee River, and St. Lucie River, which are especially valuable as rookery and roosting areas for wading birds and pelicans and as nursery areas for many marine fish; and the higher, drier, still undeveloped ridge areas near the coast. Important preserve areas are

Jonathan Dickinson State Park and Hobe Sound National Wildlife Refuge.

One endangered plant, the beach star, and a number of endangered or threatened animals, ranging from the little-known and seldom-seen Florida mouse to such commonly seen species as the alligator and brown pelican, are found in the survey area. A detailed listing with information on range and habitat can 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 corn, cowpeas, sunflowers, and millet.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are pangolagrass, bahiagrass, and white clover.

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

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, sawpalmetto, cabbage palm, elderberry, blackberry, huckleberry, grape, and waxmyrtle.

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 and cypress.

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

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

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

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

wildlife management

Wildlife habitat management thrives on such disturbances 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. 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 plant diversity. 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

Bishop C. Beville, environmental 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, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or 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, and depth to a high water table affect the traffic supporting capacity.

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

sanitary facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are 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 soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

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

construction materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

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

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

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as limestone, are not considered to be sand and gravel.

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

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

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

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

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

water management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

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

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

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth 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; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

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

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

soil properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 22.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

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

engineering index properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If 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 22.

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

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an 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.

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

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

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

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

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

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

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The 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 less 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. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter 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 and table 18 give 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 are 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 are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. 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 and the soil is ponded. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Cemented pans are cemented or indurated subsurface layers within a depth of 5 or 6 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 special equipment is frequently needed in excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 18 shows the expected initial subsidence, which usually is a result of drainage, and annual subsidence, which usually is a result of oxidation.

Not shown in 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

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The results of physical, chemical, and mineralogical analyses of representative pedons in Martin County Area are given in tables 19, 20, and 21. The analyses are 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 other soils in the Martin County Area and for other counties in Florida are on file at the Soil Science Department, University of Florida.

Samples of soil for analyses were removed from carefully selected pits. The samples were air-dried, crushed, and sieved through a 2-millimeter screen. Most analytical methods used are outlined in Soil Survey Investigations Report No. 1 (*10*).

In table 19, particle size distribution was determined by a modified pipette method using sodium hexametaphosphate dispersion. Hydraulic conductivity and bulk density were determined on undisturbed soil cores. Water retention parameters were obtained from duplicate undisturbed soil cores placed in tempe pressure cells. Weight percentages of water retained at 100 centimeters water (1/10 bar) and 345 centimeters water (1/3 bar) were calculated from volumetric water percentages divided by bulk density. The oven-dried, sieved samples were used to determine the 15-bar water retention.

In table 20 extractable bases were obtained by leaching the soil samples with normal ammonium acetate buffered at pH 7.0. Sodium and potassium in the extract were determined by flame emission, and calcium and magnesium were determined by atomic absorption spectrophotometry. Extractable acidity was determined by the barium chloride-triethanolamine method at pH 8.2. Cation exchange capacity was calculated by summation of extractable bases and extractable acidity. Base saturation is the ratio of extractable bases to cation exchange capacity expressed in percent. Organic carbon was determined by modification of the Walkley-Black wet combustion method.

Electrical conductivity determinations were made with a conductivity bridge on 1:1 soil-water mixtures. The pH measurements were made with a glass electrode using a soil-water ratio of 1:1; a 0.01 molar calcium chloride solution in a 1:2 soil-solution ratio; and normal potassium chloride solution in a 1:1 soil-solution ratio. Aluminum, carbon, and iron were extracted from probable spodic horizons with 0.1 molar sodium pyrophosphate. Determination of the aluminum and iron was by atomic absorption, and the extracted carbon was by the Walkley-Black wet combustion method. Iron and aluminum extractable in sodium dithionite-citrate were determined by atomic absorption spectrophotometry.

Mineralogy of the clay fraction (less than 2 microns) shown in table 21 was ascertained by X-ray diffraction. Peak heights at 18 angstrom, 7.2 angstrom, 4.83 angstrom, and 4.31 angstrom positions represent montmorillonite, interstratified expandable vermiculite or 14-angstrom intergrades, kaolinite, gibbsite, and quartz, respectively. Peaks were measured, summed, and normalized to give percent soil minerals identified in the X-ray diffractograms. These percentage values do not indicate absolute determined quantities of soil minerals, but they do imply a relative distribution of minerals in a particular mineral suite. Absolute percentages would require additional knowledge of particle size, crystallinity, unit structure substitution, and matrix problems.

Sands are by far the major particle-size fraction in all horizons in all pedons (table 19) except in the IIC horizon of the Bessie soil and the IIC2ca horizon of the Chobee soil. Palm Beach, Satellite Variant, and Waveland pedons contain less than 5 percent clay throughout their profiles to a depth of 2 meters. Silt content of these soils is also less than 5 percent. Hobe and Salerno soils are inherently sandy to a depth of more than 1.5 meters but have slight increases in clay content in lower horizons. Jonathan, Lawnwood, Malabar, and Nettles soils are sandy to a depth of more than 1 meter but also have slightly increased clay content in lower horizons. Other soils, such as Boca, Hallandale, Jupiter, Pineda, Pinellas, Tuscawilla, Wabasso, and Winder soils, contain horizons that have 13 to 25 percent clay content within a depth of 1 meter. Except in a few horizons in the Chobee and Jupiter soils, silt content is generally well under 10 percent. The sand fraction of many soils along the coast and Allapatah Flats is dominated by medium sand. Droughtiness is a common characteristic of sandy soils, particularly those that are moderately well drained, well drained, or excessively drained.

Hydraulic conductivity in the Palm Beach and Satellite Variant soils is unusually high. These soils also retain very low amounts of plant available water. Hydraulic conductivity in the spodic horizons and argillic horizons of most Alfisols, Spodosols, and Ultisols rarely exceeds 5 centimeters per hour and frequently is near zero. Generally, sand horizons exhibit higher hydraulic conductivities than finer textured horizons; however, soil structure also affects hydraulic conductivity values, as shown by the extremely low values of spodic horizons in the Hobe, Jonathan, Lawnwood, Nettles, Salerno, Wabasso, and Waveland soils.

The plant available water in a soil can be estimated from bulk density and water content data. Generally, horizons that have 95 percent or more sand and low organic matter content retain low amounts of water. Organic horizons in Bessie, Chobee, and Gator soils retain by far the greatest amount of plant available water.

Generally, low values for extractable bases and cation exchange capacities (table 20) are indicative of low inherent soil fertility. The amount of organic matter, clay content, and type of clay present largely determine the cation exchange capacity of a soil. The cation exchange capacity is generally highest in surface, spodic, and argillic horizons. Only Bessie, Chobee, Gator, Jupiter, and Palm Beach soils have cation exchange capacities throughout their profiles in excess of 10 milliequivalents per 100 grams. Higher amounts of extractable bases also occur in the B2t, B2ca, and Cca horizons of the Boca, Ft. Drum, Pinellas, Riviera, Tuscawilla, Wabasso, and Winder soils. Calcium and magnesium are the dominant bases. Bessie and Ft. Drum soils and the lower horizons of the Tuscawilla soil contain appreciable amounts of sodium. Potassium occurs only in trace amounts throughout all horizons of all pedons, supporting the absence of weatherable minerals in Martin County Area soils.

Organic carbon content is generally low, with the surface horizon of Hobe, Jonathan, Lawnwood, Malabar, Pineda, Riviera, Satellite Variant, Waveland, and Winder soils containing less than 1 percent. Organic carbon content decreases rapidly as depth increases in all pedons, except in the Hobe, Jonathan, Lawnwood, Nettles, Salerno, Wabasso, and Waveland soils. These soils have a Bh horizon commonly containing 2 to 4 percent organic carbon. The greatest amounts of organic carbon occur in the Oa horizon of Bessie, Chobee, and Gator soils. Since organic carbon is directly responsible for soil nutrient and water retention capacities of sandy soils, management practices that conserve and maintain organic carbon are highly desirable.

Only Bessie, Chobee, Ft. Drum, and Gator soils have appreciable electrical conductivity values. Electrical conductivity reflects the amount of free salts in the soil solution. These values generally have to be in excess of 3 millimhos per centimeter before growth of salt sensitive plants is affected. Free salt content is very low in most Martin County Area soils.

Soil reaction in water exceeds pH 7.0 in at least one horizon of all but the Hobe, Jonathan, Lawnwood, Nettles, Salerno, Satellite Variant, and Waveland soils. The entire pedons of Boca, Jupiter, and Palm Beach soils are alkaline, and a reaction of pH 7.0 or above occurs in all but a few horizons of Chobee, Ft. Drum, Pinellas, Tuscawilla, and Winder soils. Soil reaction is generally 0.5 to 1.5 units lower in calcium chloride and potassium chloride solutions than in water. Nutrient availability generally is greatest in soil when the reaction is between pH 6 and 7.

Iron extracted by sodium pyrophosphate was 0.15 percent or less in selected horizons of Spodosols. The ratio of pyrophosphate extractable carbon and aluminum to clay in Hobe, Jonathan, Lawnwood, Nettles, Salerno, Wabasso, and Waveland soils was sufficient to meet the chemical criteria for spodic horizons. The relationship of pyrophosphate-extractable iron plus aluminum and the combined index of accumulation for these soils also met the criteria established for spodic horizons. Soils containing high amounts of citrate-dithionite extractable aluminum and iron detrimentally affect plant available phosphorus. In addition to spodic horizons, subsoils of Boca and Pineda soils contain appreciable amounts of iron capable of absorbing considerable amounts of phosphorus.

Sand fraction (2-0.05 millimeters) mineralogy is siliceous, and quartz is dominant in all pedons. Small amounts of heavy minerals are in most horizons. Crystalline mineral components of the clay fractions (0.002 millimeter) are given in table 21 for specific horizons of selected pedons. In general, the clay mineralogical suite consists of montmorillonite, a 14-angstrom intergrade, kaolinite, and quartz. Montmorillonite is in all but the Palm Beach and Waveland soils. It dominated the clay fracton in lower horizons of the Boca, Chobee, Ft. Drum, Hallandale, Jupiter, Lawnwood, Nettles, Pineda, Pinellas, Riviera, Salerno, Tuscawilla, and Winder soils. About one-half of the soils contained detectable amounts of 14-angstrom intergrade. Kaolinite was detected in all but the Jonathan and Palm Beach soils. Quartz occurred in all pedons.

Montmorillonite, least stable of the mineral components in the present environment, appears to have been inherited, as evidenced by frequent increases with profile depth. Considerable volume changes could result from shrinkage upon drying and swelling upon wetting of soils containing appreciable amounts of montmorillonitic clays. Soil horizons that have 50 percent or more montmorillonite contain little or no 14-angstrom intergrade minerals and frequently contain rather small amounts of kaolinite. Soils containing montmorillonite and 14-angstrom intergrade minerals have higher cation exchange capacities and retain more plant nutrients than soils dominated by kaolinite and quartz.

engineering index test data

Table 22 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 (*4*). 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.

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.

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.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*11*). 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 Psammaquents (*Psamm*, meaning sand texture, 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 Psammaquents.

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 siliceous, hyperthermic Typic Psammaquents.

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 their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*9*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*11*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Adamsville Variant

Soils of the Adamsville Variant are hyperthermic, uncoated Aquic Quartzipsamments. They consist of somewhat poorly drained, moderately permeable sandy material that overlies well decomposed organic material. These nearly level to gently sloping soils are on low, wave-built ridges that form a natural dike along the shore of Lake Okeechobee. Slopes are dominantly 2 to 3 percent but range from 0 to 5 percent. The water table is at a depth of 20 to 40 inches for 2 to 4 months in most years and between a depth of 40 and 60 inches for most of the rest of the year.

Adamsville Variant soils are geographically closely associated with Canova Variant, Floridana, Okeelanta, and Pompano soils. All of these soils are more poorly drained than Adamsville Variant soils. Canova Variant soils have a histic epipedon and an argillic horizon. Floridana soils have a mollic epipedon and an argillic horizon. Okeelanta soils are organic. Pompano soils have sandy material to a depth of 80 inches or more.

Typical pedon of Adamsville Variant sand, 0 to 5 percent slopes, in an area of natural vegetation; about 1.8 miles north of St. Lucie Canal and 250 feet east of U.S. Highway 441, NE1/4SW1/4NW1/4 sec. 10, T. 40 S., R. 37 E.

A—0 to 3 inches; dark gray (10YR 4/1) sand; single grained; loose; common fine and medium roots; slightly acid; clear wavy boundary.

C1—3 to 15 inches; light gray (10YR 7/2) sand; single grained; loose; neutral; clear wavy boundary.

C2—15 to 40 inches; light gray (10YR 7/1) sand; single grained; loose; about 40 percent fine shell fragments; moderately alkaline; weakly calcareous; gradual wavy boundary.

C3—40 to 54 inches; light gray (10YR 7/2) sand; single grained; loose; few to common white shell fragments; moderately alkaline; weakly calcareous; abrupt wavy boundary.

IIOa—54 to 70 inches; black (10YR 2/1) muck; massive; firm to friable; few dark gray (10YR 4/1) sand pockets in lower few inches; neutral; gradual diffuse boundary.

IIIC—70 to 80 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; few pockets and streaks of black sand; neutral.

Thickness of sandy material above the buried organic material depends on the position of the pedon on the natural dike. It ranges primarily from 24 to 60 inches. Pedons on the crest of the ridge may be more than 60 inches deep to the organic layer. Pedons near the base of the ridge are commonly less than 24 inches deep to the organic layer on either side. Reaction ranges from medium acid to moderately alkaline throughout the pedon. If the C horizon contains shells, it is calcareous.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or less. It is 2 to 5 inches thick.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 2 or less. The content of fine shell fragments varies, ranging from few to none to lenses or pockets that have a high shell content. The C horizon is sand or fine sand.

The IIOa horizon has hue of 10YR, value of 2, and chroma of 2 or less; or it is neutral and value is 2. In some pedons, the lower part of the horizon may consist of more fibrous, browner, less well decomposed organic material than is typical. Thickness of the IIOa horizon ranges from 12 to 36 inches.

The IIIC horizon has hue of 10YR, value of 4 to 7, and chroma of 3 or less. Chroma of 3 is due to organic stainings on sand grains. The IIIC horizon is sand or fine sand. It extends below a depth of 80 inches. In some pedons this horizon is absent.

Aquents

Aquents in this survey area are very poorly drained soils that consist of stratified marine sediment in tidal swamps. The color, texture, shell content, and sequence of layers vary among the layers and from one pedon to another, but color and texture are generally uniform within any one layer. Sandy material is dominant and makes up about 60 percent of these soils, but loamy and clayey material occurs in the upper part of some pedons. Slopes are less than 1 percent. These soils are flooded by daily tides or by storm tides.

Reference pedon of Aquents in a mangrove swamp on a small island on east side of the Intracoastal Waterway and just north of Long Island; about 1.75 miles northeast of Port Salerno in the Hanson Grant:

A—0 to 12 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable; few fine medium roots; common sand size shell fragments; moderately alkaline; calcareous; clear smooth boundary.

C1—12 to 20 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine and coarse roots, common sand size shell fragments; moderately alkaline; calcareous; gradual wavy boundary.

C2—20 to 32 inches; very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) loamy fine sand; few small shell fragments; moderately alkaline; calcareous; gradual wavy boundary.

C3—32 to 60 inches; gray (10YR 5/1, 6/1) fine sand; single grained; loose; moderately alkaline; calcareous.

Reaction ranges from mildly alkaline to strongly alkaline throughout the pedon. Most pedons are calcareous.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 2 or less. It is sand, fine sand, loamy sand, loamy fine sand, sandy loam, sandy clay loam, or clay. The sandier layers commonly vary in content of shell fragments, but the fine textured layers have few or no shell fragments. Thickness is variable but commonly ranges from 8 to 20 inches. In some pedons, thin layers of muck are above the A horizon.

The C horizon has hue of 10YR, value of 3 to 6, and chroma of 1 to 3; or it is neutral and value is 4 or 5. It is sand, fine sand, loamy sand, or loamy fine sand, with or without shell fragments. Subhorizons of the C horizon differ among each other primarily in color and texture. These differences may occur in any sequence.

Arents

Arents in this survey area are somewhat poorly drained to excessively drained soils consisting of variable textured fill material that has been reworked by earthmoving equipment and deposited over undisturbed natural soils, mostly in the low lying areas. This fill material contains fragments of former subsoils or organic soils. It has been excavated from soils having sandy, loamy, or clayey subsoils or consisting of organic material. Shell or limestone fragments are in some places. The material was excavated nearby, or it was transported from distant areas. Most areas have been smoothed or shaped to suit the desired use. Thickness of the material varies from a few feet to many feet. Slopes range from 0 to 35 percent. The water table ranges from a depth of about 20 to 72 inches or more.

Arents are closely associated with many of the soils in the survey area. They differ from the associated soils in not having an orderly sequence of soil horizons.

Reference pedon of Arents, 0 to 2 percent slopes, on the edge of the St. Lucie River; about 0.25 mile north of the mouth of Bessie Creek, NW1/4NW1/4NW1/4 sec. 6, T. 38 S., R. 41 E.

C—0 to 30 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few fine roots; numerous small to large lumps of dark grayish brown (10YR 4/2) sandy loam and sandy clay loam; few to common black (10YR 2/1) and dark reddish brown (5YR 2/2) weakly cemented spodic horizon fragments; neutral; clear wavy boundary.

IIA1b—30 to 36 inches; black (10YR 2/1) mucky fine sand; weak fine granular structure; very friable; many medium and coarse roots; common pockets of very dark gray (10YR 3/1) and dark gray (10YR 4/1) fine sand; neutral; clear wavy boundary.

IIA2b—36 to 60 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; few lenses of very dark gray (10YR 3/1) fine sand; few pockets of dark gray (10YR 4/1) and light gray (10YR 7/1) fine sand; neutral.

Reaction ranges from very strongly acid to moderately acid. Thickness of the mixed material ranges from about 20 to 50 inches in numerous small areas but is many feet thick in areas that make up spoil banks and dikes. In some pedons, the mixed material overlies organic material that ranges in thickness from 6 to 50 inches or more. In other pedons, the overburden rests on sand or fine sand or sand overlying loamy material. The mixed surface layer material is dominantly fine sand or sand ranging to loamy fine sand with few to common fragments or lumps of finer textured material, Bh fragments, organic matter, or shell fragments. Matrix colors are dominantly in shades of gray and brown.

The buried surface layer of the underlying natural soil may be thin or thick sand or fine sand, in hue of 10YR, value of 2 to 6, and chroma of 2 or less. Below this layer is dark to light colored, dominantly sandy material.

The range of characteristics used in describing this unit is broad and reflects the general nature of the unit. For the objectives of this survey, it was important to recognize the heterogeneity of the overburden material because characteristics of the material vary too much to make accurate interpretations. It was not important to separate these soils into texture, color, and thickness of horizons. Map units have been separated to identify areas where the land has been filled over and smoothed, areas where the mixed material overlies organic material, and areas of better drained spoil banks and constructed dikes.

Basinger series

Soils of the Basinger series are siliceous, hyperthermic Spodic Psammaquents. They are poorly drained, very rapidly permeable soils that formed in thick beds of sandy marine sediment. These nearly level soils are in sloughs, depressional areas, or poorly defined drainageways. They are saturated for long periods during the wet season and following heavy rainfall. Depressions are ponded most of the year. Slopes are less than 2 percent.

Basinger soils are geographically closely associated with Jonathan, Lawnwood, Placid, Salerno, St. Johns Variant, and Waveland soils. Except for Placid soils, these soils have a well developed spodic horizon. Jonathan soils are on slightly elevated knolls and ridges and are moderately well drained. Lawnwood, Salerno, and Waveland soils are in the flatwoods. Placid and St. Johns Variant soils are generally in depressional areas and have an umbric epipedon.

Typical pedon of Basinger fine sand in an area of native range; about 0.5 mile south of Cove Road and 1 mile north of where Florida Highway A1A crosses over the Florida East Coast Railroad, SE1/4NE1/4NW1/4 sec. 29, T. 38 S., R. 42 E.

A1—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many uncoated sand grains; many fine and medium roots; very strongly acid; gradual smooth boundary.

A21—6 to 12 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; common fine and medium roots; very strongly acid; clear wavy boundary.

A22—12 to 28 inches; light brownish gray (10YR 6/2) fine sand; few coarse distinct very dark grayish brown (10YR 3/2) mottles; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.

Bh—28 to 42 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; common medium to coarse pockets of noncemented very dark grayish brown (10YR 3/2) fine sand; few medium roots; very strongly acid; clear wavy boundary.

C1—42 to 60 inches; grayish brown (10YR 5/2) fine sand; common coarse faint dark grayish brown (10YR 4/2) brown (10YR 4/3) and few medium distinct very dark grayish brown (10YR 3/2) mottles; single grained; loose; very strongly acid; gradual wavy boundary.

C2—60 to 80 inches; brown (10YR 5/3) fine sand; common coarse distinct gray (10YR 6/1) and many coarse faint brown (10YR 4/3) mottles; single grained; loose; very strongly acid.

Thickness of the sandy material is more than 80 inches. Reaction ranges from extremely acid to medium acid throughout the pedon.

The A1 horizon has hue of 10YR, value of 2 to 5, and chroma of 2 or less. The A1 horizon is 2 to 8 inches thick. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 3 or less. The A2 horizon ranges from about 6 to 30 inches in thickness.

The Bh horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3; hue of 7.5YR, value of 3, and chroma of 2; or value of 4 and chroma of 2 or 4; or hue of 5YR, value of 3, and chroma of 3 or 4. Many pedons have an A&Bh horizon of mixed Bh and A2 horizon material. This horizon ranges from 6 to 20 inches in thickness.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 3 or less. It extends to a depth of 80 inches or more.

Bessie series

Soils of the Bessie series are clayey, montmorillonitic, euic, hyperthermic Terric Medisaprists. They are very poorly drained, slowly to very slowly permeable soils that formed in thick accumulations of hydrophitic plant remains overlying clayey sediment. These nearly level soils are in tidal swamps and most areas are flooded daily during periods of normal high tide. Slopes are less than 1 percent.

Bessie soils are geographically closely associated with Aquents and with Canaveral and Okeelanta Variant soils. Canaveral soils are better drained than Bessie soils and are mineral. Aquents soils are mineral. Okeelanta Variant soils are sandy below the organic material.

Typical pedon of Bessie muck in a mangrove tidal swamp on Hutchinson Island; 2 miles south of the St. Lucie County line, 300 feet west of Florida Highway A1A, and 100 feet south of road to Joe's Point, SE1/4 sec. 24, T. 37 S., R. 41 E.

Oa—0 to 18 inches; dark reddish brown (5YR 2/2) muck; massive; sticky; estimated 25 percent fiber unrubbed, 5 to 10 percent rubbed; estimated 60 percent fine mineral material; pale brown (10YR 6/3) sodium pyrophosphate extract; common fine and medium roots in upper half of horizon; medium acid; pH 5.6 in 0.01 molar calcium chloride solution; gradual wavy boundary.

IIC—18 to 44 inches; very dark grayish brown (10YR 3/2) clay; massive; very sticky, very plastic; few fine medium and coarse roots; soil flows easily between fingers when squeezed; n value is 1.039; few pockets dark reddish brown (5YR 2/2) muck in upper part of horizon; texture slightly coarser in lower part; pockets of dark gray and dark grayish brown fine sandy loam at a depth of about 36 inches increase in size and number as depth increases; medium acid; gradual wavy boundary.

IIIC—44 to 80 inches; dark gray (N 4/0) fine sand; single grained; loose; common fine white shell fragments; few whole shells; horizon grades to gray (N 5/0) as depth increases; fewer shell fragments in lower part; strongly alkaline; calcareous; strong effervescence in dilute HCl.

Reaction in the Oa horizon ranges from strongly acid to neutral in the calcium chloride solution. Reaction ranges from medium acid to mildly alkaline in the IIC horizon, and it is moderately alkaline to strongly alkaline in the IIIC horizon.

The Oa horizon has hue of 5YR and 10YR, value of 2, and chroma of 1 or 2. It is sapric, and texture is muck. The content of fine mineral material ranges from 40 to 70 percent. The Oa horizon ranges from 16 to 40 inches in thickness but is generally less than 30 inches.

The IIC horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is clay or sandy clay. Pockets of organic material are common in the upper part of the horizon, and pockets or lenses of coarser material are common in the lower part. The IIC horizon ranges from 8 to more than 40 inches in thickness but is commonly 10 to 30 inches.

The IIIC horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2; hue of 2.5Y or 5Y, value of 5, and chroma of 1 or 2; or it is neutral and value is 4 or 5. It is fine sand, loamy fine sand, or fine sandy loam, with or without shell fragments.

Boca series

Soils of Boca series are loamy, siliceous, hyperthermic Arenic Ochraqualfs. They are poorly drained, moderately permeable soils that formed in moderately thick beds of sandy and loamy marine sediment overlying a hard limestone ledge that has numerous fractures and solution holes. These nearly level soils are in the flatwoods. The water table is within a depth of 10 inches for 2 to 4 months during the rainy season in most years. Slopes range from 0 to 2 percent.

Boca soils are geographically closely associated with Hallandale, Pineda, Pinellas, Riviera, and Wabasso soils. Hallandale soils do not have an argillic horizon and have limestone at a depth of less than 20 inches. Pineda soils have a Bir horizon and do not have limestone. Pinellas soils have an Aca horizon and do not have limestone. Riviera and Wabasso soils have an argillic horizon that does not rest on limestone. In addition, Wabasso soils have a Bh horizon.

Typical pedon of Boca fine sand in an area in natural vegetation; about 0.9 mile south of Clements Road, 1.1 miles southwest of Florida Highway 710, and about 300 feet north of small graded road, NW1/4SW1/4SE1/4 sec. 11, T. 39 S., R. 37 E.

A11—0 to 4 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; slightly acid; gradual wavy boundary.

A12—4 to 8 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; common medium splotches of gray (10YR 6/1); neutral; clear wavy boundary.

A21—8 to 16 inches; light gray (10YR 7/2) fine sand; common coarse distinct pale brown (10YR 6/3) mottles; single grained; loose; neutral; gradual wavy boundary.

A22—16 to 25 inches; pale brown (10YR 6/3) fine sand; single grained; loose; mildly alkaline; abrupt wavy boundary.

B2tg—25 to 32 inches; light gray (5Y 7/1 and 2.5Y 7/2) fine sandy loam; many medium distinct light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; few to common pockets of light gray (10YR 7/2) fine sand; mildly alkaline; abrupt wavy to irregular boundary.

IIR—32 to 40 inches; hard limestone containing fractures and solution holes; calcareous; abrupt wavy boundary.

IIIC1—40 to 45 inches; light gray (10YR 7/1) fine sand; few medium to coarse dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; single grained; loose; mildly alkaline; clear wavy boundary.

IIIC2—45 to 50 inches; greenish gray (5GY 5/1) loamy fine sand; few fine to coarse distinct olive brown 2.5Y 4/4) mottles; single grained; loose; moderately alkaline; noncalcareous; clear wavy boundary.

IVC3—50 to 60 inches; light gray (5Y 7/1) fine sand and white shell fragments; single grained; loose; few small unbroken shells; moderately alkaline; calcareous.

Thickness of the solum and depth to limestone within the dominant part of a pedon ranges from 24 to 40 inches, but in solution holes and fractures, the depth to limestone ranges to 50 inches or more. Depth to the argillic horizon ranges from 20 to 36 inches in more than half of the pedons. In the rest of the pedons, the argillic horizon ranges to a depth of 40 inches or more.

The A1 horizon has hue of 10YR, value of 2, and chroma of 1; or value of 3 or 4 and chroma of 2 or less. It is 3 to 9 inches thick. The A1 or Ap horizon having value of less than 3.5 is less than 6 inches thick. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or less; or value of 7 and chroma of 4 or less. The A horizon is sand or fine sand. Reaction ranges from strongly acid to slightly acid.

Some pedons have a discontinuous B1 horizon that has hue of 10YR, value of 3 or 4, and chroma of 2 or 3; or value of 5 to 7 and chroma of 3 or more, with or without mottles of gray, yellow, or brown. The B1 horizon is sand or fine sand that has at least 3 percent increase in clay content from the horizon above, or, in places, it is loamy fine sand. It ranges from 0 to 14 inches in thickness. Reaction ranges from strongly acid to mildly alkaline.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 or less, with mottles of gray, yellow, brown, or olive. It is sandy loam, fine sandy loam, or sandy clay loam. Reaction ranges from neutral to moderately alkaline. In some pedons, it is calcareous. The Btg horizon ranges from 4 to 20 inches in thickness.

In some pedons a layer of mixed decomposed fragments of rock, marl, sand, or fine sand ranges from 1 inch to 5 inches in thickness. This layer has pockets of finer material between the Btg horizon and the limestone strata. It is variable in color, or it is highly mottled.

The layer of hard limestone has many fractures and solution holes, or it is made up of large flat boulders with solution holes. The rock ranges from 6 to 18 inches thick. Layers of sand to sandy loam, some of which have a variable content of shell fragments, are below the rock.

Canaveral series

Soils of the Canaveral series are hyperthermic, uncoated Aquic Quartzipsamments. They are somewhat poorly drained to moderately well drained, very rapidly permeable soils that formed in thick deposits of sand and fine shell fragments. These nearly level to gently sloping soils are in coastal areas on low dunelike ridges and on side slopes bordering sloughs and mangrove swamps. Slopes range from 0 to 5 percent. The water table is between a depth of 10 and 40 inches for 2 to 6 months in most years.

Canaveral soils are geographically associated with Palm Beach, Cocoa Variant, and Bessie soils. Palm Beach soils are excessively drained. Cocoa Variant soils have lime rock between a depth of 20 and 50 inches. Bessie soils are organic and very poorly drained.

Typical pedon of Canaveral sand on Hutchinson Island at Sailfish Point; 0.25 mile north of St. Lucie Inlet and 600 feet west of beach bordering the ocean, NE1/4NE1/4 sec. 17, T. 38 S., R. 42 E.

A—0 to 6 inches; dark brown (7.5YR 3/2) sand; single grained; loose; few fine roots; about 15 percent sand size shell fragments; neutral; clear wavy boundary.

C1—6 to 38 inches; light brownish gray (10YR 6/2) sand; single grained; loose; many multicolored fine shell fragments; moderately alkaline; calcareous; gradual wavy boundary.

C2—38 to 80 inches; light brownish gray (10YR 6/2) sand; single grained; loose; many multicolored fine shell fragments and a few large white shells; moderately alkaline; calcareous.

Reaction is neutral to moderately alkaline in all horizons to a depth of 60 inches or more. Shell fragments are calcareous. All horizons are sand or fine sand mixed with varying amounts of shell fragments.

The A horizon has hue of 7.5YR, value of 3, and chroma of 2; or hue of 10YR, value of 2 to 4, and chroma of 2.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 2; or value of 5 to 7 and chroma of 3 or 4; or value of 5 or 7 and chroma of 4. Sand grains are uncoated and color depends largely on the multicolored shell fragments. Content of shell fragments ranges from 10 to 60 percent. In some places, where these soils have been dredged and deposited as fill, color and sequence of layers vary.

Canova Variant

Soils of the Canova Variant are fine-loamy, siliceous, hyperthermic Typic Ochraqualfs. They are very poorly drained, moderately slowly to slowly permeable soils that formed in sandy and loamy marine sediment overlying limestone under conditions favorable for the accumulation of organic material. These nearly level soils are in low lying areas adjacent to Lake Okeechobee. Slopes are 0 to 1 percent. Under natural conditions the water table is above the surface most of the time.

Canova Variant soils are geographically closely associated with Jupiter, Floridana, and Okeelanta soils. Jupiter and Floridana soils do not have a histic epipedon. In addition, Jupiter soils have limestone within a depth of 20 inches and Floridana soils do not have limestone. Okeelanta soils have more than 16 inches of organic material overlying the mineral material.

Typical pedon of Canova Variant muck in an area planted to sugarcane in western Martin County; about 9.5 miles west of Indiantown, 2.75 miles north of the St. Lucie Canal, and 0.5 mile east of U.S. Highway 441, NE1/4NE1/4SW1/4 sec. 3, T. 40 S., R. 37 E.

Oap—12 inches to 0; black (10YR 2/1) muck, unrubbed and rubbed; about 10 percent fiber, less than 5 percent fiber rubbed; weak medium granular structure in upper part grading to massive; dark brown (10YR 4/3) sodium pyrophosphate extract; many fine and medium roots; strongly acid; clear smooth boundary.

A1—0 to 5 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; few fine and medium roots; discontinuous lenses and pockets of gray (10YR 5/1) fine sand; strongly acid; gradual wavy boundary.

A2—5 to 18 inches; gray (10YR 6/1) fine sand; common fine and medium grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) mottles; single grained; loose; few streaks of very dark gray (10YR 3/1) in old root channels; strongly acid; clear wavy boundary.

Btg—18 to 24 inches; grayish brown (2.5Y 5/2) sandy clay loam; few fine distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; slightly sticky, slightly plastic; sand grains coated and bridged with clay; few to common medium krotovinas of light brownish gray (10YR 6/2) and gray (10YR 6/1) fine sand; slightly acid; gradual irregular boundary.

IIC—24 to 30 inches; light brownish gray (10YR 6/2) fine sandy loam; massive; sticky and plastic; few to common shell fragments; common small soft white nodules of secondary carbonates; moderately alkaline; calcareous; abrupt irregular boundary.

IIIR—30 inches; hard limestone that has numerous fractures and a few solution holes filled with calcareous sandy loam or shell material.

Depth to the Btg horizon from the surface of the mineral soil is less than 20 inches except in fractures and solution holes in the limestone rock where depth ranges to 30 inches or more. Reaction ranges from slightly acid to strongly acid in the Oa and A horizons and from slightly acid to moderately alkaline in the Btg horizon.

The Oap horizon has hue of 10YR, value of 2, and chroma of 1. It ranges from 6 to 16 inches in thickness but is most commonly 8 to 12 inches thick. The Oap horizon is well decomposed sapric material.

The A1 horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The darker shades are dominant but lenses of gray and light gray fine sand are common. Thickness ranges from about 4 to 9 inches. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2, with or without mottles in shades of gray, brown, and yellow. Thickness ranges from 4 to 16 inches.

The Btg horizon has hue of 10YR, 2.5Y, and 5Y, value of 4 to 6, and chroma of 1 or 2; or it is neutral and value is 5. Mottles in shades of gray, brown, or olive are in some pedons. Thickness of the Btg horizon is generally 6 to 12 inches, but it ranges from 4 to 20 inches. Few to common pockets or krotovinas of A2 horizon material are in most pedons. The Btg horizon is dominantly sandy clay loam. In some pedons there is a thin subhorizon, the upper part of which is fine sandy loam.

The IIC horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 or 2; or is neutral and value is 5 or 6. It ranges from sand to fine sandy loam. It has few to many shell fragments, secondary carbonate nodules, or rock fragments. The IIC horizon is moderately alkaline and calcareous. It is absent in some pedons.

The underlying limestone is discontinuous because of numerous fractures and solution holes. Depth to the limestone is dominantly 24 to 40 inches below the surface, but it varies within short distances because of the fractures and solution holes.

Chobee series

Soils of the Chobee series are fine-loamy, siliceous, hyperthermic Typic Argiaquolls. They are very poorly drained, slowly to very slowly permeable soils that formed in thick beds of moderately fine marine sediment (fig. 12). These nearly level soils are in small to large depressional areas, in poorly defined drainageways, and on broad, low flats. They are saturated during the rainy season and after periods of heavy rainfall. Slopes are generally less than 1 percent, but range to 2 percent in places.

Chobee soils are geographically closely associated with Floridana, Gator, Riviera, Tequesta Variant, and Winder soils. Floridana soils have an argillic horizon between a depth of 20 and 40 inches. Gator soils are organic. Riviera and Winder soils do not have a mollic epipedon. Tequesta Variant soils have a histic epipedon.

Typical pedon of Chobee loamy sand in improved pasture; 2.75 miles west of Florida Highway 609, 1.2 miles south of Florida Highway 714, and about 1 mile southwest of ranch headquarters:

Oap—3 inches to 0; black (10YR 2/1) muck; less than 5 percent fiber rubbed; weak fine and medium granular structure; very friable; many fine roots; up to 50 percent uncoated sand grains; medium acid; clear smooth boundary.

A—0 to 6 inches; black (10YR 2/1) loamy sand; weak fine granular structure; friable; common fine roots; many uncoated sand grains; neutral; clear wavy boundary.

B21t&A—6 to 19 inches; black (10YR 2/1) sandy loam; weak coarse subangular blocky structure; firm to friable; common fine roots; sand grains coated and bridged with clay; many fine and medium pockets of dark grayish brown (10YR 4/2) loamy sand; moderately alkaline; clear wavy boundary.

B22t—19 to 24 inches; black (10YR 2/1) sandy clay loam; weak coarse subangular blocky structure; sticky and plastic; common fine roots; sand grains coated and bridged with clay; common fine pockets of dark grayish brown (10YR 4/2) loamy sand; mildly alkaline; abrupt irregular boundary.

B23tca—24 to 42 inches; gray (10YR 5/1) sandy clay loam; weak coarse subangular blocky structure; slightly sticky and plastic; common fine and medium roots; few white shell fragments; sand grains coated and bridged with clay and calcium carbonate; mildly alkaline; calcareous; clear wavy boundary.

IIC1—42 to 49 inches; grayish brown (2.5Y 5/2) sandy loam mixed with many fine and medium shell fragments; massive; slightly sticky; moderately alkaline; calcareous; clear wavy boundary.

Figure 12.—Chobee fine sandy loam. Tongues formed in the sandy clay loam subsoil when dark colored surface material filled old crayfish burrows. Depths are shown in meters and feet. Multiply figure on the left by 100 to determine the depth in centimeters.

IIC2—49 to 58 inches; light olive gray (5Y 6/2) clay loam; massive; slightly sticky and plastic; many white shell fragments and soft carbonate nodules; moderately alkaline; calcareous; clear wavy boundary.

IIC3—58 to 80 inches; greenish gray (5GY 5/1) sandy clay loam; massive; sticky and plastic; many white shell fragments and soft carbonate nodules;

common pockets of loamy sand; moderately alkaline; calcareous.

Thickness of the solum is more than 40 inches. A thin Oa or Oap horizon is on the surface of most pedons. It has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2. It is well decomposed organic material and is 0 to 5 inches thick.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Reaction ranges from slightly acid to moderately alkaline. Thickness ranges from 4 to 18 inches.

The Bt and Btca horizons have hue of 10YR or they are neutral, value of 2 to 5, and chroma of 1 or less; or hue of 5YR, value of 4 to 6, and chroma of 1 or 2, with or without mottles of gray or brown; or hue of 2.5Y, value of 4 or 5, and chroma of 2, with mottles. These 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 neutral to moderately alkaline. The Btca horizon is calcareous.

The IIC horizon has hue of 10YR, value of 5 to 7, and chroma of 1; hue of 2.5Y, value of 5 to 7, and chroma of 2; hue of 5Y, value of 5 to 7, and chroma of 1 or 2; or hue of 5GY, value of 5 or 6, and chroma of 1, with or without mottles. The IIC horizon ranges from loamy sand or loamy fine sand to clay loam. Reaction ranges from neutral to moderately alkaline and calcareous. Shell fragments are absent in some pedons (see fig. 12).

Cocoa Variant

Soils of the Cocoa Variant are sandy, siliceous, hyperthermic Entic Hapludolls. They are moderately well drained, rapidly permeable soils that formed in sandy and shelly marine sediment overlying coquina limestone. These nearly level soils are on ridges on barrier islands along the Atlantic coast. The water table is between a depth of 30 and 40 inches for brief periods during the rainy season. Slopes are smooth to convex and range from 0 to 2 percent.

Cocoa Variant soils are geographically closely associated with Bessie, Canaveral, and Palm Beach soils. Bessie soils are organic and are in mangrove swamps. Canaveral and Palm Beach soils do not have a mollic epipedon or limestone within a depth of 80 inches.

Typical pedon of Cocoa Variant sand in a formerly cultivated area on Joe's Point on Hutchinson Island; slightly over 1 mile south of the Jensen Beach Causeway, about 0.5 mile west of Florida Highway A1A, and 700 feet east southeast of north end of the Point, sec. 13, T. 38 S., R. 41 E.

A11—0 to 8 inches; very dark brown (10YR 2/2) sand; weak fine granular structure; very friable; common fine roots; few fine shell fragments; moderately alkaline; calcareous; clear wavy boundary.

A12—8 to 14 inches; dark brown (7.5YR 3/2) sand; single grained; loose; estimated 10 percent fine shell fragments; moderately alkaline; calcareous; clear smooth boundary.

B—14 to 20 inches; brown (7.5YR 5/4) sand; single grained; loose; estimated 50 percent shell fragments; moderately alkaline; calcareous; clear smooth boundary.

C—20 to 25 inches; very pale brown (10YR 7/3) sand; single grained; loose; more than 50 percent shell fragments; moderately alkaline; calcareous; abrupt wavy boundary.

IIR—25 inches; coquina limestone.

Depth to limestone ranges from 20 to 40 inches. The depth varies sharply within short distances. The pedon is mildly calcareous to moderately calcareous throughout. Sand is throughout the pedon. Content of shell fragments ranges from 10 to 50 percent, but weighted content in the control section is less than 40 percent.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2; hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 3. It is commonly 10 to 14 inches thick but ranges to 18 inches.

The B horizon has hues of 7.5YR and 5YR, value of 5, and chroma of 4; or hue of 10YR, value of 5, and chroma of 3 or 4. It is sand but is slightly sticky in some pedons where the soil is wet. It ranges from 4 to 18 inches in thickness.

The C horizon has hue of 10YR, value of 6 or 7, and chroma of 3 or 4. It ranges from 12 to 20 inches in thickness.

The coquina limestone ranges from soft to hard, but it is moderately cemented in most pedons.

EauGallie series

Soils of the EauGallie series are sandy, siliceous, hyperthermic Alfic Haplaquods. They are poorly drained, moderate to moderately rapidly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are in broad areas of flatwoods. A water table is within a depth of 10 inches for 2 to 4 months in wet seasons and within a depth of 40 inches for more than 6 months in most years. Slopes range from 0 to 2 percent.

EauGallie soils are geographically closely associated with Waveland, Lawnwood, Oldsmar, and Wabasso soils. Waveland soils are deeper to the Bh horizon than EauGallie soils and do not have a Bt horizon. Lawnwood soils do not have a Bt horizon. Oldsmar soils have a Bh horizon at a greater depth than EauGallie soils. Wabasso soils have a Bt horizon at a shallower depth.

Typical pedon of EauGallie fine sand in an area of native range; about 3.5 miles north of Florida Highway 708, and 1.25 miles west-southwest of U.S. Highway 1 and Poinciana Gardens in the Gomez Grant:

A1—0 to 5 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and few medium roots; mixture of light gray sand grains and black organic matter granules; very strongly acid; gradual wavy boundary.
A21—5 to 12 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine and medium roots; very strongly acid; gradual wavy boundary.
A22—12 to 28 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few fine and medium roots; few medium distinct grayish brown (10YR 5/2) mottles; very strongly acid; abrupt wavy boundary.
B2h—28 to 42 inches; black (5YR 2/1) fine sand; massive in place, crushes to moderate medium granular structure; firm sand grains coated with organic matter; few fine and medium roots; very strongly acid; clear wavy boundary.
Btg—42 to 50 inches; grayish brown (2.5Y 5/2) sandy clay loam; moderate medium subangular blocky structure; firm and slightly sticky; few fine and medium roots; sand grains coated and bridged with clay; slightly acid; gradual wavy boundary.
C—50 to 65 inches; mixed lenses and pockets of grayish brown (10YR 5/2) fine sand, loamy fine sand, and fine sandy loam; massive; friable; few pockets of grayish brown (2.5Y 5/2) sandy clay loam; slightly acid.

Thickness of the solum is more than 46 inches. Thickness of the A horizon is less than 30 inches. The Btg horizon is below a depth of 40 inches. The A and Bh horizons are sand or fine sand.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. It ranges from 3 to 9 inches in thickness. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 2 or less. The A horizon is very strongly acid or strongly acid.

The B2h horizon is neutral and value is 2; or it has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; hues of 5YR and 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 3, and chroma of 3. The sand grains are coated with organic matter. Reaction ranges from very strongly acid to slightly acid. A B3 horizon that has hue of 10YR, value of 3 to 6, and chroma of 3 commonly is below the Bh horizon. It is sand or fine sand. In some pedons there is an A'2 horizon in hue of 10YR, value of 4 or 5, and chroma of 1; or hues of 10YR and 2.5Y, value of 5 or 6, and chroma of 2.

The B2tg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or less, with or without mottles in shades of brown, yellow, or gray. It is sandy loam or sandy clay loam and has pockets of sand or loamy sand. Reaction is medium acid to mildly alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or less, with or without mottles in shades of yellow or brown. It is fine sand, loamy fine sand, or sandy loam and has pockets of finer material. Reaction is slightly acid to mildly alkaline.

Electra series

Soils of the Electra series are sandy, siliceous, hyperthermic Arenic Ultic Haplohumods. They are somewhat poorly drained, slowly or very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are on low ridges and knolls in the flatwoods and adjacent to drainageways. Slopes range from 0 to 2 percent. A water table is between a depth of 25 and 40 inches for cumulative periods of 4 months in most years and below a depth of 40 inches in dry periods.

Electra soils are geographically associated with Waveland, Nettles, and Pomello soils. Waveland and Pomello soils do not have a Bt horizon. Waveland and Nettles soils are more poorly drained than Electra soils and have an ortstein.

Typical pedon of Electra fine sand in an undisturbed flatwoods area; about 0.3 mile west of Florida Highway 76 and about 0.2 mile south of Locks Road, NW1/4NE1/4 sec. 7, T. 39 S., R. 41 E.

A1—0 to 6 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; mixture of light gray sand grains and black organic matter; very strongly acid; clear smooth boundary.
A21—6 to 12 inches; light gray (10YR 6/1) fine sand; single grained; loose; common fine and medium roots; common thin dark gray streaks in old root channels; very strongly acid; gradual smooth boundary.
A22—12 to 40 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine and medium roots; few thin dark grayish brown streaks in old root channels; grayish brown transition to Bh horizon in lower 2 or 3 inches; very strongly acid; abrupt irregular boundary.
B2h—40 to 48 inches; dark brown (7.5YR 3/2) fine sand; massive; weakly cemented in less than 50 percent of pedon; friable; common fine and medium roots; most sand grains well coated with organic matter, some sand grains uncoated; few tongues and pockets of light gray (10YR 6/1, 7/1) fine sand; very strongly acid; clear irregular boundary.
B21tg—48 to 56 inches; light gray (2.5Y 7/2) fine sandy loam; many fine and medium distinct brownish yellow (10YR 6/6, 6/8) and few fine distinct strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; slightly sticky when wet; few fine and medium roots; sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.
B22tg—56 to 68 inches; light gray (10YR 7/1) fine sandy loam; many medium and coarse brownish yellow (10YR 6/8) and reddish yellow (7.5YR 6/8; 5YR 6/8), common medium distinct very pale brown (10YR

7/3), and few fine and medium prominent red (2.5YR 4/6) mottles; weak fine and medium granular structure; very friable; slightly sticky; few fine and medium roots; sand grains thinly coated and bridged with clay; very strongly acid; gradual wavy boundary.

C—68 to 80 inches; light gray (2.5Y 7/2) loamy fine sand, becoming sandier as depth increases; many fine and medium distinct reddish yellow (7.5YR 6/8; 5YR 6/8) and yellowish red (5YR 5/8) mottles; weak fine granular structure; very friable; slightly sticky; very strongly acid.

Thickness of the solum is more than 60 inches. Reaction ranges from extremely acid through strongly acid, but most pedons are very strongly acid throughout.

The A1 horizon has hue of 10YR, value of 4 or 5, and chroma of 1. It ranges from 2 to 7 inches in thickness. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Total thickness of the A horizon ranges from 30 to 50 inches. In many pedons, a thin transitional horizon is between the A2 and the Bh 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; or hue of 5YR, value of 2 or 3, and chroma of 1 or 2. Some pedons have many light gray pockets or tongues from the A horizon. The B2h horizon ranges from 4 to 18 inches in thickness, but it is generally less than 10 inches. In some pedons, there is a thin B3 horizon of dark brown fine sand or a B3&Bh horizon which has a dark brown matrix with black or dark reddish brown, weakly cemented fragments of the Bh horizon.

In some pedons, there is a thin A'2 horizon of sand or fine sand that has hue of 10YR, value of 3 or 4, and chroma of 1; or value of 5, and chroma of 2 below the Bh horizon.

The Btg or B'tg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or value of 4 and chroma of 3 or 4; or hue of 2.5Y, value of 6 or 7, and chroma of 2, with mottles in shades of gray, brown, yellow, and red. The B2tg horizon is fine sandy loam or sandy clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2, with mottles of higher chroma. It is loamy fine sand or fine sand. The C horizon is at a depth of more than 60 inches.

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 thick beds of sandy and loamy marine sediment. These nearly level soils are in low sloughs and depressional areas. In most years, these soils are ponded for more than 6 months, and the water table is at a depth of less than 10 inches for much of the rest of the year. Slopes are less than 2 percent.

Floridana soils are geographically associated with Chobee, Pineda, Riviera, Tequesta Variant, Wabasso, and Winder soils. Chobee soils have a Bt horizon at a depth of less than 20 inches. Pineda and Riviera soils do not have a mollic epipedon. Tequesta Variant soils have a histic epipedon. Wabasso and Winder soils do not have a mollic epipedon. In addition, Wabasso soils have a spodic horizon and Winder soils have a Bt horizon at a depth of less than 20 inches.

Typical pedon of Floridana fine sand in a cypress pond; about 1.5 miles north of Palm Beach County line and 3 miles east of Florida Highway 711, 300 feet north of grade, SE1/4SW1/4NW1/4 sec. 22, T. 40 S., R. 41 E.

A1—0 to 15 inches; black (10YR 2/1) fine sand rubbed; weak medium granular structure; very friable; estimated 10 percent organic matter; many gray (10YR 5/1) pockets of fine sand; many fine and medium roots; slightly acid; gradual wavy boundary.

A2—15 to 27 inches; light brownish gray (2.5Y 6/2) fine sand rubbed; many fine and medium faint gray (10YR 5/1, 6/1) and grayish brown (10YR 5/2) mottles; single grained; loose; few pockets of black (10YR 2/1) organic matter; few medium roots; slightly acid; abrupt wavy boundary.

B2tg—27 to 37 inches; grayish brown (2.5Y 5/2) sandy clay loam; common medium distinct olive brown (2.5Y 4/4) mottles; massive to weak coarse subangular blocky structure; slightly sticky, slightly plastic; sand grains coated and bridged with clay; few medium roots; neutral; gradual wavy boundary.

B3g—37 to 50 inches; grayish brown (2.5Y 5/2) fine sandy loam; weak coarse subangular blocky structure; slightly sticky; neutral; gradual wavy boundary.

C—50 to 62 inches; light gray (10YR 7/1) fine sand; single grained; loose; common pockets of grayish brown (2.5Y 5/2) fine sandy loam; neutral.

Thickness of the solum is more than 48 inches. Reaction ranges from medium acid to moderately alkaline throughout the pedon.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or less. It ranges from 10 to 24 inches in thickness. Some pedons have a thin surface layer of muck. The A2 horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or less; or hue of 2.5YR, value of 5 or 6, and chroma of 2 or less, with or without mottles in shades of gray, brown, or yellow. Total thickness of the A horizon is 20 to 40 inches.

The B2tg horizon has hue of 10YR, value of 4, and chroma of 1; or value of 5 or 6 and chroma 1 or 2; or it is neutral and value is 4 to 7; or it has hue of 2.5Y, value of 5 to 7, and chroma of 2, with or without mottles in shades of gray, yellow, brown, or olive. It ranges from sandy clay loam to sandy loam. In most pedons this horizon has pockets of fine sand and loamy fine sand. The B2tg horizon ranges from 6 to 20 inches in thickness. The B3g horizon has a color range similar to that of the B2tg horizon. It ranges from loamy fine sand to fine sandy loam. In some pedons the B3 horizon may be absent.

The C horizon is below a depth of 48 inches or may be absent. It has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 or less. The C horizon is fine sand or loamy fine sand, with common pockets of fine sandy loam or sandy clay loam. In many pedons, white shell fragments are in this horizon.

Ft. Drum series

Soils of the Ft. Drum series are sandy, siliceous, hyperthermic Aeric Haplaquepts. They are poorly drained, moderately permeable soils that formed in sandy marine sediment. These nearly level soils are on low ridges and flats bordering sloughs and depressional areas. A water table is within a depth of 10 inches for 1 to 2 months during wet seasons and between a depth of 10 and 40 inches for 9 months or more in most years. Slopes range from 0 to 2 percent.

Ft. Drum soils are geographically closely associated with the Jupiter, Malabar, Oldsmar, Pinellas, and Valkaria soils. Jupiter soils have limestone within a depth of 20 inches. Malabar and Oldsmar soils have a Bt horizon. In addition, Malabar soils have a Bir horizon and Oldsmar soils have a Bh horizon. Pinellas soils have a Bt horizon underlying the Bca horizon. Valkaria soils have a Bir horizon and do not have a Bca horizon.

Typical pedon of Ft. Drum fine sand in an open hammock of cabbage palm within an improved pasture; about 75 feet west of the section line road; 1.25 miles north of Florida Highway 714, about 2 miles west of the intersection of Florida Highway 714 and Florida East Coast Railroad, SE1/4NE1/4SE1/4 sec. 7, T. 37 S., R. 37 E.

A11—0 to 7 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine roots; neutral; clear wavy boundary.

A12—7 to 14 inches; brown (10YR 5/3) fine sand; weak fine granular structure; very friable; common fine and medium roots; moderately alkaline; clear wavy boundary.

B1ca—14 to 18 inches; light brownish gray (10YR 6/2) fine sand; few fine distinct brownish yellow (10YR 6/6) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; sand grains coated with carbonates; strongly alkaline; calcareous; clear wavy boundary.

B21ca—18 to 28 inches; light gray (10YR 7/2) fine sand; few medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm and slightly cemented, strongest cementation in upper few inches; sand grains coated with carbonates; few fine roots; strongly alkaline; calcareous; clear wavy boundary.

B22ca—28 to 33 inches; light gray (10YR 7/2) fine sand; common fine and medium, few coarse distinct olive yellow (2.5Y 6/6) and yellow (10YR 7/8) mottles; weak medium subangular blocky structure; friable; few fine roots; sand grains coated with carbonates; strongly alkaline; calcareous; clear wavy boundary.

C1—33 to 51 inches; brownish yellow (10YR 6/6) fine sand; many medium pockets of light gray (10YR 7/2) fine sand; massive; slightly sticky; strongly alkaline; clear wavy boundary.

C2—51 to 80 inches; light gray (5Y 7/1) fine sand; single grained; nonsticky; strongly alkaline.

Thickness of the solum ranges from 24 to 52 inches. Depth to the Bca horizon ranges from 6 to 20 inches.

The A11 horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. If value is less than 4, thickness is less than 6 inches.

The A12 horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. Some pedons have an A2 horizon that has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Reaction ranges from medium acid to moderately alkaline.

The Bca horizon has hue of 10YR, value of 6 to 8, and chroma of 1, or chroma of 1 or 2 if mottled. Mottles are brownish yellow, yellow, light gray, or pale brown. The Bca horizon is loamy fine sand or fine sand that has coatings of secondary carbonates. It is generally friable or firm, but in some pedons it is very friable in the lower part of the horizon. Thickness of the Bca horizon ranges from 4 to 24 inches or more. Reaction is mildly alkaline to strongly alkaline.

The C1 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 8, with or without mottles of gray, brown, and yellow. It is fine sand or loamy fine sand. This horizon is discontinuous. Pockets of grayish, coarser or finer material are common. The C2 horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 or 3, with or without mottles. It is sand or fine sand. The C horizon extends to a depth of 80 inches or more.

Gator series

Soils of the Gator series are loamy, siliceous, euic, hyperthermic Terric Medisaprists. They are very poorly drained, moderately permeable soils that formed in moderately thick deposits of decomposed organic material and underlying loamy material. These nearly level soils are in marshes and wet depressional areas. They are saturated or covered with water except during extended dry periods. Slopes are less than 1 percent.

Gator soils are closely associated with Chobee, Floridana, Jupiter, and Winder soils. All of these soils are mineral. An argillic horizon is within a depth of 20 inches in the Chobee and Winder soils and between a depth of 20 and 40 inches in the Floridana soils. Jupiter soils have limestone within a depth of 20 inches.

Typical pedon of Gator muck in an area of improved pasture; about 8 miles north-northwest of Indiantown; 2 miles south of Florida Highway 714 and 1 mile west of

Florida Highway 609, NE1/4NE1/4NE1/4 sec. 35, T. 32 S., R. 38 E.

Oap—0 to 11 inches; black (10YR 2/1) muck; about 15 percent fiber unrubbed, less than 10 percent rubbed; moderate medium granular structure in upper part, grading to coarse subangular blocky structure in lower part; friable; many fine, few medium and coarse roots; about 35 percent mineral material; dark yellowish brown (10YR 3/4) sodium pyrophosphate extract; extremely acid (pH 4.3 in 0.01 molar calcium chloride solution); clear wavy boundary.

Oa2—11 to 24 inches; dark reddish brown (5YR 2/2) muck; about 30 percent fiber unrubbed, less than 15 percent rubbed; massive in place, crushes to weak medium and coarse subangular blocky structure; friable; common fine and medium roots; estimated 40 percent mineral material; very dark brown (10YR 2/2) sodium pyrophosphate extract; very strongly acid (pH 4.7 in 0.01 molar calcium chloride solution); gradual wavy boundary.

IIC1—24 to 48 inches; very dark gray (10YR 3/1) fine sandy loam; massive in places, crushes to weak coarse subangular blocky structure; sticky and plastic; many fine roots; sand grains coated and bridged with clay; neutral; clear wavy boundary.

IIC2—48 to 56 inches; gray (N 5/0) and grayish brown (2.5Y 5/2) sand; single grained; loose; few pockets of light brownish gray (10YR 6/2); common white shell fragments; mildly alkaline; calcareous.

The Oa horizon dominantly has pH value of more than 4.5 in 0.01 molar calcium chloride solution, but pH of less than 4.5 in the upper part of the horizon in some places. Reaction of the IIC horizon ranges from slightly acid to moderately alkaline and calcareous.

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; hue of 5YR, value of 2 or 3, and chroma of 1 through 3; or it is neutral and value is 3. The fiber content after rubbing is less than 15 percent of the soil volume. Mineral content ranges from about 10 to 40 percent.

The IIC1 horizon has hue of 10YR, value of 2 through 4, and chroma of 2 or less; hue of 2.5Y, value of 2 through 4, and chroma of 2; or it is neutral and value is 2 through 5, with or without mottles of brown, olive, or gray. It ranges from sandy loam to sandy clay. Pockets or tongues of dark grayish brown, grayish brown, or light brownish gray sand, loamy sand, or fine sandy loam are in this horizon in places. The IIC1 horizon is more than 20 inches thick and extends below a depth of 40 inches.

The IIIC2 horizon has hue of 2.5Y, value of 4 through 6, and chroma of 2; hue of 5Y, value of 5 or 6, and chroma of 1; or it is neutral and value is 5 or 6, with or without brown, olive, or gray mottles. It is sand or loamy sand. Few to many white shell fragments are in this horizon in places. The IIIC2 horizon is absent in some pedons.

Hallandale series

Soils of the Hallandale series are siliceous, hyperthermic Typic Psammaquents. They are poorly drained, moderately to moderately rapidly permeable soils that formed in thin beds of sandy marine sediment overlying hard, fractured limestone. These nearly level soils are on broad, low flats. They are periodically saturated during the wet season. Slopes are less than 1 percent.

Hallandale soils are geographically closely associated with Boca, Jupiter, Pineda, Pinellas, Riviera, and Wabasso soils. Except for Boca and Jupiter soils, these soils do not have limestone. Boca soils have an argillic horizon. Jupiter soils have a mollic epipedon, and Wabasso soils have a spodic horizon.

Typical pedon of Hallandale sand in pasture; about 10 miles north-northwest of Indiantown, 2.25 miles west of Florida Highway 609, and about 600 feet south of Florida Highway 714, NE1/4NW1/4NE1/4 sec. 35, T. 38 S., R. 38 E.

Ap—0 to 4 inches; black (10YR 2/1) sand; weak fine granular structure; very friable; many fine roots; medium acid; clear wavy boundary.

C1—4 to 8 inches; light brownish gray (10YR 6/2) sand; few fine faint yellowish brown mottles; single grained; loose; few fine roots; few small pockets of very dark grayish brown (10YR 3/2) sand; medium acid; clear wavy boundary.

C2—8 to 13 inches; grayish brown (10YR 5/2) sand highly mixed or mottled with gray (10YR 5/1) sand; single grained; loose; thin root mat at base of horizon overlying limestone; few thin strong brown (7.5YR 5/8) coatings on soft to hard yellow (10YR 7/8) concretions; slightly acid; abrupt irregular boundary.

IIR—13 to 20 inches; hard fractured limestone; fractures 1 inch to 4 inches wide, filled with grayish brown (10YR 5/2) sandy loam mixed with carbonates in some parts; very hard rock in upper part, much softer rock in lower part; surface of rock is smooth to wavy; clear irregular boundary.

IIC1—20 to 41 inches; light gray (10YR 7/2) and white (N 8/0) sandy clay loam; few fine faint yellowish brown mottles; weak coarse subangular blocky structure; very sticky; common small limestone fragments; moderately alkaline; calcareous; clear wavy boundary.

IIC2—41 to 58 inches; light brownish gray (10YR 6/2) sandy loam; few fine faint olive brown mottles; weak medium subangular blocky structure; sticky; many soft to hard carbonate nodules; moderately alkaline; calcareous; gradual wavy boundary.

IIC3—58 to 76 inches; greenish gray (5GY 6/1) fine sandy loam; common medium distinct yellowish brown (10YR 5/6), light yellowish brown (10YR 6/4), and brownish yellow (10YR 6/8) mottles; massive;

friable; common small pockets of soft carbonates; moderately alkaline; calcareous; gradual wavy boundary.

IIC4—76 to 80 inches; greenish gray (5GY 6/1) fine sandy loam mixed with many white shell fragments; massive; friable; moderately alkaline; calcareous.

Depth to limestone ranges from 6 to 20 inches in the main part of each pedon but is more than 20 inches where fractures occur. Reaction ranges from strongly acid to slightly acid in the A horizon and from medium acid to moderately alkaline in the C horizon. Reaction in the IIC horizon is mildly alkaline or moderately alkaline.

The Ap or A1 horizon has hue of 10YR, value of 2 to 5, and chroma of 1. It ranges from 2 to 6 inches in thickness. In some pedons there is an A2 horizon that has hue of 10YR, value of 4 to 7, and chroma of 1; or value of 5 and 6 and chroma of 2. It is sand or fine sand and ranges from 0 to 8 inches in thickness.

Pedons having an A2 horizon also have a B horizon. The B1 horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 3, with or without mottles of gray, brown, or yellow. It is sand or fine sand. The B2 horizon has hue of 10YR, value of 4 to 6, and chroma of 4; or value of 5 and chroma of 6, with or without gray, brown, or yellow mottles. It is sand or fine sand and has a 1 to 3 percent increase in content of clay. The B horizon ranges from 0 to 8 inches in thickness. Reaction ranges from medium acid to moderately alkaline.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; or value of 5 to 8 and chroma of 3; or value of 7 or 8 and chroma of 4. It is generally mottled in shades of yellow and brown. The C horizon is sand or fine sand.

The IIR horizon is a layer of hard limestone boulders that has fractures a few feet apart and few to common solution holes that range from a few inches to 36 inches in diameter. The fractures and solution holes commonly penetrate the rock and are filled with loamy Bt material. They generally have accumulations of secondary carbonates. The limestone ranges from 6 to 24 inches or more in thickness.

The IIC horizon has hue of 10YR, 2.5Y, and 5Y, value of 5 to 7, and chroma of 2 or less; or hue of 5GY, value of 5 to 7, and chroma of 1. In most pedons, this horizon has mottles in shades of brown, yellow, or olive. Shell fragments are not present in all pedons. The IIC horizon ranges from sand or loamy sand to sandy clay loam.

Hilolo series

Soils of the Hilolo series are fine-loamy, siliceous, hyperthermic Mollic Ochraqualfs. They are poorly drained, slowly to very slowly permeable soils that formed in beds of sandy and loamy marine sediment that is influenced by the underlying alkaline material. These nearly level soils are on low palm hammocks and along the borders of depressional areas and sloughs. Slopes are dominantly less than 1 percent but range to 2 percent.

Hilolo soils are geographically closely associated with Boca, Chobee, Hallandale, Jupiter, Pinellas, and Riviera soils. Boca soils have limestone below the argillic horizon. Chobee soils have a mollic epipedon and are more poorly drained than Hilolo soils. Hallandale and Jupiter soils have limestone at a depth of less than 20 inches. Pinellas and Riviera soils have an argillic horizon between a depth of 20 and 40 inches, and, in addition, Pinellas soils have a calcareous A2 horizon.

Typical pedon of Hilolo fine sand in a palm hammock; 2.5 miles south of Florida Highway 714, and slightly more than 0.5 mile east of Florida Highway 609, SW1/4SW1/4NE1/4 sec. 31, T. 38 S., R. 39 E.

A11—0 to 3 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine roots, few medium and coarse roots; many uncoated sand grains; neutral; clear wavy boundary.

A12—3 to 8 inches; very dark brown (10YR 2/2) fine sand; weak fine granular structure; very friable; many medium and few coarse roots; few medium grayish brown (10YR 5/2) pockets of sand coated with carbonates; mildly alkaline; clear wavy boundary.

B21tgca—8 to 18 inches; gray (10YR 5/1) sandy clay loam; few fine faint olive mottles; weak medium subangular blocky structure; friable; few medium roots; sand grains bridged and coated with clay; common streaks and nodules of carbonate accumulations; moderately alkaline; calcareous; clear wavy boundary.

B22tgca—18 to 40 inches; gray (10YR 6/1) sandy clay loam; common fine distinct yellowish brown (10YR 5/8), brownish yellow (10YR 6/6), and yellow (10YR 7/6) mottles, common medium faint very pale brown (10YR 8/4) mottles; moderate coarse subangular blocky structure; slightly sticky and slightly plastic; sand grains coated and bridged with clay; common white nodules of carbonate accumulations; moderately alkaline; calcareous; gradual wavy boundary.

B23tgca—40 to 56 inches; white (10YR 8/1) sandy clay loam; many coarse distinct very pale brown (10YR 7/4) and few fine and medium prominent yellowish brown mottles; moderate coarse subangular blocky structure; very sticky and plastic; common medium to coarse black streaks in old root channels; sand grains coated and bridged with clay; moderately alkaline; calcareous; gradual wavy boundary.

Cg—56 to 66 inches; light gray (10YR 6/1) fine sandy loam; massive; slightly sticky; moderately alkaline; calcareous.

Thickness of the solum ranges from 40 to 60 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is neutral to moderately alkaline. The

A horizon ranges from 6 to 10 inches in thickness. In some pedons, a thin horizon of calcareous fine sand or loamy fine sand is between the A and Btg horizons.

The Btgca horizon has hue of 10YR, value of 4 to 8, and chroma of 1; or value of 5 to 8 and chroma of 2; or hue of 2.5Y, value of 5 to 7, and chroma of 1 or 2, with mottles in shades of brown, yellow, and olive. It is sandy loam, fine sandy loam, or sandy clay loam. Average clay content of the upper 20 inches of the control section ranges from 18 to 35 percent. The Btgca horizon is mildly alkaline or moderately alkaline and is calcareous.

In some pedons, a B3g horizon is between the B2tgca and the Cg horizons. If present, it is similar in color to the B2tgca horizon except that mottles are fewer or absent. The B3g horizon is loamy sand, loamy fine sand, sandy loam, or fine sandy loam. It is mildly alkaline or moderately alkaline and is calcareous.

The Cg horizon has hue of 10YR, 2.5Y, 5Y, or 5GY; value of 5 to 7; and chroma or 2 or less. It ranges from sand to fine sandy loam. In some pedons shell fragments are in this horizon. Reaction ranges from mildly alkaline to strongly alkaline.

Hobe series

Soils of the Hobe series are sandy, siliceous, hyperthermic arenic Ultic Haplohumods. They are somewhat excessively drained, moderately permeable soils that formed in thick beds of sandy and loamy marine and eolian sediment. These soils are on nearly level and gently sloping, elevated knolls and ridges in the coastal areas of southeast Florida. The water table is between a depth of 60 and 80 inches. During the rainy season and following periods of heavy rainfall, however, it may rise to a depth of 50 inches. Slopes are 0 to 5 percent.

Hobe soils are geographically closely associated with Jonathan, Nettles, Salerno, St. Lucie, and Waveland soils. Jonathan, Nettles, Salerno, and Waveland soils are in an ortstein family. In addition, Jonathan soils do not have an argillic horizon below the spodic horizon; Nettles soils are poorly drained and have a spodic horizon between a depth of 30 and 50 inches; Salerno and Waveland soils are poorly drained and do not have an argillic horizon below the spodic horizons; and St. Lucie soils are excessively drained and do not have a spodic or an argillic horizon.

Typical pedon of Hobe fine sand, 0 to 5 percent slopes, in a wooded area; approximately 2.5 miles west of Stuart; 0.25 mile north of Rustic Hills and about 330 feet east of West Murphy Road, SE1/4NE1/4SW1/4 sec. 1, T. 38 S., R. 40 E.

A1—0 to 4 inches; gray (10YR 5/1) fine sand, weak fine granular structure; very friable; many fine and medium roots; mostly clean sand grains; very strongly acid; clear smooth boundary.

A21—4 to 9 inches; gray (10YR 6/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; gradual wavy boundary.

A22—9 to 44 inches; white (N 8/0) fine sand; single grained; loose; few fine and medium roots; strongly acid; diffuse wavy boundary.

A23—44 to 70 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine roots; few gray (10YR 5/1) and dark gray (10YR 4/1) streaks in old root channels; slightly acid; abrupt wavy boundary.

B2h—70 to 74 inches; black (5YR 2/1) loamy fine sand; weak fine and medium granular structure; massive; strongly cemented in about 30 percent of horizon; friable to firm; few fine and medium roots; common pockets of dark reddish brown (5YR 2/2); sand grains well coated with organic matter; few medium and coarse pockets of dark yellowish brown (10YR 4/4); strongly acid; clear irregular boundary.

B3&Bh—74 to 78 inches; dark yellowish brown (10YR 4/4) fine sand; weak fine granular structure; very friable; few fine and medium roots; few to common, firm, weakly cemented dark brown (10YR 3/3, 7.5YR 3/2) Bh fragments; sand grains thinly coated with organic matter; strongly acid; clear wavy boundary.

Btg—78 to 88 inches; gray (5Y 6/1) fine sandy loam; few to common, fine distinct olive (5Y 5/4) mottles; weak coarse subangular blocky structure; slightly sticky, slightly plastic; few medium roots; common medium to coarse distinct olive brown (2.5Y 4/4) and pale yellow (2.5Y 7/4) mottles in upper 3 inches; sand grains coated and bridged with clay; strongly acid.

Thickness of the solum is more than 65 inches. Reaction ranges from extremely acid to slightly acid in the A horizon and from extremely acid to strongly acid in the B horizon.

The A1 horizon has hue of 10YR, value of 4 to 6, and chroma of 1. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; or it is neutral, and value is 6 to 8. In the A horizon in some pedons, darker streaks are along old root channels. The A horizon is fine sand or sand and is more than 50 inches thick.

Some pedons have a B1h horizon. Where present, it has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. It is 0 to 3 inches thick.

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. In some pedons, pockets of A2 horizon material extend into this horizon . The B2h horizon is fine sand or sand. It ranges from 2 to 20 inches in thickness.

The B3 part of the B3&Bh horizon, where present, 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. The Bh part has a color range similar to the B2h horizon. The B3&Bh horizon is fine sand or sand. Total thickness of the A and Bh horizon is less than 80 inches.

The Btg 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 hue of 5Y, value of 5 or 6, and chroma of 1, with or without mottles in shades of yellow, brown, or red. It is fine sandy loam, sandy loam, or sandy clay loam with pockets or lenses of loamy fine sand. The Btg horizon is discontinuous or dips below a depth of 80 inches in some pedons but is present in 60 percent or more of each pedon.

Holopaw series

Soils of the Holopaw series are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs. They are poorly drained, moderately rapidly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are on broad, low lying flatlands and along poorly defined drainageways. The water table is at a depth of less than 10 inches for cumulative periods of 2 to 6 months during the wet season in most years. Slopes are less than 2 percent.

Holopaw soils are geographically closely associated with Floridana, Malabar, Oldsmar, Pineda, Riviera, and Wabasso soils. Floridana soils have a mollic epipedon and an argillic horizon between a depth of 20 and 40 inches. Malabar soils have a Bir horizon. Oldsmar soils have a spodic horizon. Pineda and Riviera soils have an argillic horizon between a depth of 20 and 40 inches. In addition, Pineda soils have a Bir horizon. Wabasso soils have a spodic horizon.

Typical pedon of Holopaw fine sand in a hayfield; about 1.7 miles south of Florida Highway 714 at the interchange of Sunshine State Parkway, and about 1 mile east of Loop Road in the Hanson Grant:

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

A21g—6 to 15 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine roots; common very dark grayish brown (10YR 3/2) streaks along root channels; slightly acid; clear smooth boundary.

A22g—15 to 38 inches; light gray (10YR 7/2) fine sand; few fine and medium distinct yellow (10YR 7/6) mottles; single grained; loose; few fine roots; neutral; clear smooth boundary.

A23g—38 to 42 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; neutral; abrupt irregular boundary.

B2tg—42 to 60 inches; grayish brown (10YR 5/2) sandy loam; common medium distinct dark grayish brown (10YR 4/2) mottles; massive in place; crushes to weak medium subangular blocky structure; slightly sticky, slightly plastic; common fine and medium dead roots; slightly acid; gradual wavy boundary.

B3g—60 to 80 inches; light olive gray (5Y 6/2) loamy sand; massive in place, crushes to weak medium subangular blocky structure; slightly sticky, slightly plastic; common coarse pockets of light gray sand; few fine dead roots; slightly acid.

Thickness of the solum ranges from 50 to 80 inches or more. Reaction ranges from strongly acid to neutral in the A horizon and from slightly acid to moderately alkaline in the B2tg and B3g horizon.

The A1 or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 2 or less. It is 2 to 9 inches thick. If the A1 horizon has value of less than 3.5, it is less than 7 inches thick. The A2 horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 or less to a depth of 30 inches. It has mottles with chroma of 2 or less, or the matrix has chroma of 2 or less and mottles of yellow and brown. Total thickness of the A horizon ranges from 40 to 72 inches.

The B2tg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 or less, with mottles in shades of brown and yellow. It is sandy loam or sandy clay loam, with or without pockets or lenses of sand. It ranges from 7 to 18 inches in thickness. The B3g horizon is similar in color and mottles to the B2tg horizon. In some pedons, the B3g horizon is absent.

In some pedons, a C horizon of gleyed sand or loamy sand with shell fragments is below the Btg horizon.

Hontoon series

Soils of the Hontoon series are dysic, hyperthermic Typic Medisaprists. They are deep, very poorly drained, rapidly permeable organic soils that formed in moderately thick beds of nonwoody plant remains. These nearly level soils are in freshwater swampy areas. The water table is at or above the surface except during extended dry periods. Slopes are less than 2 percent.

Hontoon soils are geographically closely associated with Basinger, Lawnwood, Placid, Samsula, Sanibel, and Waveland soils. Basinger and Placid soils are sandy soils that generally are on the fringe areas of the swamps. Lawnwood and Waveland soils are sandy soils that have a spodic horizon. They are in the adjacent flatwoods. Samsula soils have organic materials less than 51 inches thick. Sanibel soils are sandy soils that have an organic surface layer less than 16 inches thick.

Typical pedon of Hontoon muck in a large, densely wooded swamp; about 2.5 miles north of Florida Highway 714, 0.5 mile south of the St. Lucie County line, and about 1 mile northwest of the Glades spur of the Florida East Coast Railroad, NE1/4NE1/4SE1/4 sec. 3, T. 38 S., R. 37 E.

Oa1—0 to 18 inches; black (5YR 2/1) muck, unrubbed and rubbed; about 15 percent fibers, less than 5 percent rubbed; weak medium granular structure; many fine to coarse roots; estimated 10 percent mineral matter; common pockets of dark reddish brown (5YR 2/2, 3/3) more fibrous muck in upper 6 inches; yellowish brown (10YR 5/4) sodium pyrophosphate extract; extremely acid (pH 4 in 0.01 molar calcium chloride solution); gradual smooth boundary.

Oa2—18 to 30 inches; black (5YR 2/1) muck, unrubbed and rubbed; about 10 percent fibers, less than 5 percent rubbed; massive; sticky; common fine and medium roots; estimated 10 percent mineral matter; common small balls of dark reddish brown (5YR 2/2) muck; dark yellowish brown (10YR 3/4) sodium pyrophosphate extract; extremely acid (pH 4 in 0.01 molar calcium chloride solution); gradual wavy boundary.

Oa3—30 to 65 inches; black (5YR 2/1) muck, unrubbed and rubbed; about 20 percent fibers, less than 5 percent rubbed; massive; sticky; few fine and medium roots; estimated 20 to 30 percent mineral matter; few to common, small hard, angular fragments of cemented sand and organic matter; dark brown (10YR 3/3) sodium pyrophosphate extract; extremely acid (pH 4.2 in 0.01 molar calcium chloride solution).

Organic material is more than 51 inches thick. The surface is hummocky because of numerous clumps of fern roots, and in many places the upper 6 to 10 inches of the soil is loose, fibrous, reddish brown, organic material. In most pedons, dark to light colored sand is within a depth of 51 to 80 inches.

The Oa horizon has hue of 5YR or 10YR, value of 2, and chroma of 2 or less; or hue of 5YR, value of 3, and chroma of 2 or 3. The unrubbed fiber content is generally less than 30 percent, and the rubbed fiber content is less than 10 percent. Mineral content ranges from about 5 to 30 percent. The Oa horizon has pH value of less than 4.5 in the calcium chloride solution.

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 thick beds of sandy marine sediment. These nearly level to gently sloping soils are on slightly elevated knolls and ridges in flatwoods areas. Slopes are dominantly less than 2 percent but range to 5 percent.

Jonathan soils are geographically closely associated with Hobe, Nettles, Pomello, Salerno, Satellite Variant, and Waveland soils. Hobe soils do not have an ortstein and have an argillic horizon below the spodic horizon. Nettles soils are more poorly drained than Jonathan soils, have an argillic horizon, and the spodic horizon is at a depth of less than 50 inches. Pomello soils do not have an ortstein, and the spodic horizon is within a depth of 50 inches. Salerno and Waveland soils are more poorly drained than Jonathan soils, and Waveland soils have a spodic horizon within a depth of 50 inches. Satellite Variant soils do not have a spodic horizon.

Typical pedon of Jonathan sand in an area of undisturbed flatwoods; about 4.5 miles northwest of Hobe Sound, about 0.9 mile north of Poinciana Gardens subdivision entrance, and about 200 feet west of U.S. Highway 1 in the Gomez Grant:

A1—0 to 5 inches; dark gray (10YR 4/1) sand; weak fine granular structure; very friable; many fine roots; mixture of uncoated sand grains and organic matter granules; strongly acid; clear wavy boundary.

A21—5 to 22 inches; light gray (10YR 7/1) sand; single grained; loose; common medium and coarse roots; medium acid; gradual wavy boundary.

A22—22 to 38 inches; light gray (10YR 7/2) sand; single grained; loose; few medium roots; brownish streaks in old root channels; medium acid; gradual wavy boundary.

A23—38 to 56 inches; light brownish gray (10YR 6/2) sand; single grained; loose; few medium roots; few medium to coarse faint light gray (10YR 7/1, 7/2) sand pockets; medium acid; abrupt wavy boundary.

Bh—56 to 99 inches; black (5YR 2/1) loamy sand; massive; firm; weakly cemented in more than 60 percent of horizon; sand grains well coated with organic matter; many fine, medium, and coarse dead roots in upper few inches; pockets of gray (10YR 5/1), dark grayish brown (10YR 4/2), and dark reddish brown (5YR 3/3) sand; 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 A1 horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; or it is neutral and value is 4 to 6. It is 1 to 6 inches thick. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; or it is neutral and value is 5 to 8, with vertical darker streaks in old root channels. Thickness of the A horizon is more than 50 inches. The A horizon is sand or fine sand.

In some pedons, a transitional B1h horizon 1/2 inch to 4 inches thick and containing many uncoated sand grains is between the base of the A2 horizon and the top of the Bh horizon. It has hue of 10YR, value of 3 to 5, and chroma of 1 or 2.

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; hue of 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 to 4; or hue of 2.5YR, value of 2 or 3, and chroma of 4 to 6. It is more than 10 inches thick. The Bh horizon is sand, fine sand, loamy sand, or loamy fine sand. Cementation is variable in most pedons, but more than half of the Bh horizon in each pedon is weakly to strongly cemented. In many pedons, this horizon has pockets of A2 horizon material. 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. Other pedons have a B3&Bh horizon with matrix colors similar to the B3 horizon, with darker, firm Bh fragments.

In a few pedons, a C horizon is within a depth of 80 inches. It has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. It is sand or fine sand, and in places has pockets of loamy sand or loamy fine sand.

Jupiter series

Soils of the Jupiter series are sandy, siliceous, hyperthermic Typic Haplaquolls. They are poorly drained, rapidly permeable soils that formed in thin beds of sandy marine sediment overlying hard, fractured limestone. These nearly level soils are on low flats and hammocks. They are saturated in the wet season. Slopes are dominantly less than 1 percent, but along the edges of some areas there is an abrupt drop of 1 foot to 2 feet to adjacent soils.

Jupiter soils are geographically closely associated with Chobee, Floridana, Gator, Hallandale, and Hilolo soils. Chobee, Floridana, and Hilolo soils have an argillic horizon. Gator soils are organic. Hallandale soils do not have a mollic epipedon.

Typical pedon of Jupiter sand in a pasture; about 8 miles north-northwest of Indiantown, 1.85 miles south of Florida Highway 714, and slightly more than 1 mile west of Florida Highway 609, SE1/4SE1/4SE1/4 sec. 26, T. 38 S., R. 38 E.

Ap—0 to 4 inches; black (10YR 2/1) sand; weak fine granular structure; very friable; many fine roots; neutral; clear wavy boundary.

A12—4 to 10 inches; very dark grayish brown (10YR 3/2) sand, many fine and medium distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; weak fine granular structure; very friable; many fine roots; thin root mat on underlying rock; moderately alkaline; abrupt wavy boundary.

IIR—10 to 22 inches; hard, fractured limestone; fractures 1 inch to 4 inches wide and filled with A12 material mixed with carbonatic material in places; very hard rock in upper 6 to 8 inches, softer rock in lower part; rock surface smooth to wavy; moderately alkaline; calcareous; clear irregular boundary.

IIIC1—22 to 32 inches; light brownish gray (10YR 6/2) sandy clay loam; many fine faint grayish brown and light gray mottles; few fine distinct brownish yellow (10YR 6/8) mottles; weak medium granular structure; friable; common small soft to hard carbonate nodules; moderately alkaline; calcareous; gradual wavy boundary.

IIIC2—32 to 48 inches; light gray (10YR 7/2) sandy loam; common medium distinct brownish yellow (10YR 6/8) and yellowish brown (10YR 5/8) mottles; weak medium granular structure; friable; common small soft white carbonate nodules; moderately alkaline; calcareous; clear wavy boundary.

IIIC3—48 to 72 inches; olive gray (5Y 5/2) fine sandy loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak medium granular structure; common small light gray and white carbonate nodules and streaks; moderately alkaline; calcareous; clear wavy boundary.

IIIC4—72 to 84 inches; greenish gray (5GY 6/1) loamy sand mixed with white shell fragments; single grained; loose; moderately alkaline; calcareous.

Depth to limestone ranges from 6 to 20 inches in the main part of each pedon but is more than 20 inches where fractures occur. Reaction ranges from slightly acid to moderately alkaline throughout the pedon.

The Ap or A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and value is 2 or 3. It commonly ranges from 10 to 20 inches in thickness but is thinner where limestone is at a depth of less than 10 inches.

In some pedons, a C horizon is between the A horizon and the limestone. It has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; or hue of 2.5Y, value of 4 to 6, and chroma of 2. It is sand or fine sand. The C horizon ranges from 0 to 6 inches in thickness. In some pedons, a thin, discontinuous layer of soft weathered limestone is on the surface of the rock.

The IIR horizon is discontinuous hard limestone that has many fractures and a few solution holes. The limestone ranges from 6 to 24 inches or more in thickness.

The IIIC horizon has hue of 10YR, 2.5Y, and 5Y, value of 5 to 7, and chroma of 2 or less; or hue of 5GY, value of 5 to 7, and chroma of 1, with or without mottles in shades of brown, yellow, and olive. It ranges from sand or fine sand to sandy clay loam. Some pedons do not have carbonate nodules or shell fragments.

Lawnwood series

Soils of the Lawnwood series are sandy, siliceous, hyperthermic, ortstein Aeric Haplaquods. They are poorly drained, very slowly to slowly permeable soils that formed in thick beds of sandy marine sediment. These nearly level soils are on broad, nearly level flatwoods and in depressional areas. The water table is within a depth of 10 inches for 2 to 4 months and between a depth of 10 and 40 inches for 6 months or more. Depressions are ponded for 6 months or more. Slopes range from 0 to 2 percent.

Lawnwood soils are geographically associated with Basinger, Waveland, Placid, St. Johns Variant, and Wabasso soils. Basinger soils have organic stained layers that do not meet the requirements of a spodic horizon. Waveland soils have a spodic horizon below a depth of 30 inches. Placid soils are more poorly drained than Lawnwood soils and do not have a spodic horizon. St. Johns Variant soils have an umbric epipedon. Wabasso soils have an argillic horizon below the spodic horizon and do not have an ortstein.

Typical pedon of Lawnwood fine sand in a flatwoods area just west of Coral Gardens; about 1 mile west of U.S. Highway 1, and 0.75 mile north of Salerno Road in the Hanson Grant:

A11—0 to 5 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine roots; horizon is a mixture of uncoated sand grains and black organic matter; strongly acid; clear smooth boundary.

A12—5 to 17 inches; dark grayish brown (10YR 4/2) fine sand; common fine vertical streaks of very dark gray along root channels; weak fine granular structure; very friable; common fine and few medium roots; strongly acid; gradual wavy boundary.

A2—17 to 28 inches; light brownish gray (10YR 6/2) fine sand; common fine vertical streaks of dark grayish brown and light gray in old root channels, single grained; loose; strongly acid; abrupt wavy boundary.

B21h—28 to 42 inches; black (N 2/0) loamy fine sand; massive in place, crushes to moderate medium subangular blocky structure; firm; weakly to strongly cemented; few fine and medium roots; sand grains well coated with organic matter; strongly acid; gradual wavy boundary.

B22h—42 to 64 inches; dark reddish brown (5YR 2/2) fine sand; massive in place, crushes to weak medium granular; weakly to strongly cemented; firm to friable; few fine and medium roots; common to many, medium to coarse pockets of black (5YR 2/1) and dark reddish brown (5YR 3/3) fine sand; strongly acid; clear wavy boundary.

B3&Bh—64 to 80 inches; brown (10YR 4/3) loamy fine sand with common coarse tongues and fragments of black (5YR 2/1) and dark reddish brown (5YR 2/2) spodic material; weak fine granular structure; very friable; few medium roots; very strongly acid.

Thickness of the solum is more than 50 inches. Reaction ranges from extremely acid to slightly acid throughout the pedon.

The A horizon ranges from 20 to 30 inches in thickness. The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or less. Where the A1 horizon has value of 3 or less, it is less than 9 inches thick. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 2 or less. Some pedons have mottles of yellow or brown. Other pedons have a transitional layer 1/2 inch to 2 inches thick at the base of the horizon.

The Bh horizon is neutral and value is 2; or it has hue of 10YR or 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. All or part of the Bh horizon is weakly cemented into a massive horizon that is present in more than half of each pedon. The Bh horizon ranges from 12 to 40 inches thick. In places, matrix colors of the B3&Bh horizon includes hue of 10YR, value of 3 through 5, and chroma of 4. It is sand or loamy fine sand.

The C horizon, where present, has hue of 10YR, value of 5 to 7, and chroma of 2 or 3. It generally is below a depth of 60 inches. In some pedons, discontinuous pockets of loamy fine sand or sandy loam that have hue of 10YR and 2.5Y, value of 4 or 5, and chroma of 2 are below the B3&Bh horizon.

Malabar series

Soils of the Malabar series are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs. They are poorly drained, slowly to very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level soils are on broad, low areas of flatwoods and in sloughs. They are saturated in wet seasons. Slopes are dominantly less than 1 percent but range to 2 percent.

Malabar soils are geographically closely associated with Basinger, Holopaw, Oldsmar, Pineda, Pinellas, Riviera, and Valkaria soils. Basinger and Valkaria soils are sandy to a depth of 80 inches or more. Holopaw and Oldsmar soils do not have a Bir horizon, and Oldsmar soils have a spodic horizon at a depth of 30 to 50 inches. Pineda, Pinellas, and Riviera soils have an argillic horizon between a depth of 20 and 40 inches, and Pinellas and Riviera soils do not have a Bir horizon.

Typical pedon of Malabar sand in a grassy slough area; about 1.5 miles east of Florida Highway 609 and 1 mile south of Florida Highway 714, SE1/4SE1/4SW1/4 sec. 20, T. 38 S., R. 39 E.

A1—0 to 5 inches; very dark gray (10YR 3/1) sand; weak fine granular structure; very friable; many fine roots; many uncoated sand grains; medium acid; clear wavy boundary.

A2—5 to 15 inches; light gray (10YR 7/2) sand; common medium faint pale brown (10YR 6/3) and very pale brown (10YR 7/3) mottles; single grained; loose; few fine roots; few brownish yellow (10YR 6/8) streaks in root channels; slightly acid; gradual wavy boundary.

Bir—15 to 29 inches; brownish yellow (10YR 6/8) and strong brown (7.5YR 5/8) sand; few coarse distinct very pale brown (10YR 7/4) mottles; single grained; loose; iron coatings on sand grains; neutral; gradual wavy boundary.

A'2—29 to 42 inches; very pale brown (10YR 7/3) sand; common medium faint pale brown (10YR 6/3) mottles; single grained; loose; neutral; abrupt wavy boundary.

B'tg—42 to 64 inches; gray (5Y 5/1) sandy loam; common medium distinct olive brown (2.5Y 4/4) mottles; massive, weak coarse subangular blocky structure; sticky and slightly plastic; many brown and olive brown streaks in old root channels; sand grains coated and bridged with clay; few small iron concretions; neutral; gradual wavy boundary.

Cg—64 to 80 inches; gray (5Y 5/1) loamy sand; massive; sticky; horizon grades to loamy sand and sand as depth increases; neutral.

Thickness of the solum ranges from 46 to 80 inches. Reaction ranges from medium acid to moderately alkaline throughout the pedon.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 2 or less. It ranges from 4 to 8 inches thick. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 2; or value of 7 or 8 and chroma of 3. The A horizon is sand or fine sand.

The Bir horizon has hue of 10YR, value of 5 or 7, and chroma of 4 to 8; or value of 6, and chroma of 3 to 8; or hue of 7.5YR, value of 5, and chroma of 6 or 8. It is sand or fine sand.

The A'2 horizon has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1 or 2; or value of 7 and chroma of 3; or hue of 2.5Y, value of 6 or 7, and chroma of 2. It is sand or fine sand. Total thickness of the A, Bir, and A'2 horizons ranges from 40 to 72 inches.

The B'tg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; hue of 5Y, value of 5, and chroma of 1 or 2; or it is neutral and value is 5 or 6, with mottles in shades of brown, yellow, and olive. It is sandy loam, fine sandy loam, or sandy clay loam. In many pedons this horizon has lenses or pockets of coarser material.

The C 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 hue of 5Y, value of 5, and chroma of 1. It ranges from sand or fine sand to sandy loam. In some pedons this horizon has shell fragments. In a few pedons the C horizon is below a depth of 80 inches.

Nettles series

Soils of the Nettles series are sandy, siliceous, hyperthermic, ortstein Alfic Arenic Haplaquods. They are poorly drained, slowly or very slowly permeable soils that formed in sandy and loamy marine sediment. These nearly level soils are in broad areas of flatwoods and in shallow depressions in the flatwoods. The water table is at the surface for 2 to 4 months and between a depth of 10 and 40 inches for 6 months or more during most years. Depressions are ponded for 6 months or more in most years. Slopes are dominantly less than 1 percent but range to 2 percent near depressional areas and along drainageways.

Nettles soils are geographically closely associated with Hobe, Jonathan, Lawnwood, Oldsmar, Salerno, Wabasso, and Waveland soils. Hobe and Jonathan soils are better drained than Nettles soils. Hobe, Oldsmar, and Wabasso soils do not have an ortstein. Jonathan, Lawnwood, Salerno, and Waveland soils do not have an argillic horizon.

Typical pedon of Nettles sand in a flatwoods area; about 1 mile west of intersection of Loop Road and Florida Highway 714, about 800 feet north of Florida Highway 714, and about 400 feet east of Gator Trail, NW1/4SW1/4SW1/4 sec. 15, T. 38 S., R. 40 E.

A11—0 to 5 inches; very dark gray (N 3/0) sand; weak fine granular structure; very friable; many fine roots; common uncoated sand grains; very strongly acid; clear smooth boundary.

A12—5 to 12 inches; dark gray (10YR 4/1) fine sand; single grained; loose; common fine and medium roots; medium acid; gradual wavy boundary.

A2—12 to 32 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine, medium and coarse roots; very dark gray and dark gray streaks in old root channels; slightly acid; abrupt wavy boundary.

B21h—32 to 43 inches; black (10YR 2/1) sand; massive in place, crushes to moderate medium subangular blocky structure; weakly cemented; firm; few medium roots; most sand grains well coated with organic matter; strongly acid; clear wavy boundary.

B22h—43 to 51 inches; dark reddish brown (5YR 2/2) and black (5YR 2/1) fine sand; weak medium subangular blocky structure; weakly cemented; most sand grains coated with organic matter; common coarse pockets of dark brown (7.5YR 3/2) fine sand; strongly acid; abrupt irregular boundary.

B2tg—51 to 62 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium subangular blocky structure; friable; slightly sticky; few small pockets of light brownish gray (10YR 6/2) fine sand; few dark brown streaks in old root channels; brown (10YR 4/3) organic stainings on all fracture faces; sand grains thinly coated and bridged with clay; strongly acid; gradual wavy boundary.

C1—62 to 71 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; slightly sticky; few pockets of dark brown (10YR 3/3, 4/3) organic stainings; thin discontinuous weakly to strongly developed black Bh horizon material at base of horizon; strongly acid; clear wavy boundary.

C2g—71 to 80 inches; grayish brown (2.5Y 5/2) fine sandy loam that has common coarse distinct dark grayish brown (10YR 4/2) mottles with very dark grayish brown (10YR 3/2) exteriors; massive; slightly sticky; strongly acid.

The A1 horizon has rubbed hue of 10YR, value of 2 to 4, and chroma of 1 or less; or it is neutral and value is 2 to 4. Unrubbed, the mixture of clean sand grains and black organic matter has a salt-and-pepper appearance. Where the A1 horizon has value of 3.5 or less, it is less than 10 inches thick. 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. Total thickness of the A horizon ranges from 30 to 50 inches.

In some pedons, a B1h horizon is between the A2 and B2h horizons. 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 of a spodic horizon. It ranges from 0 to 4 inches in thickness.

The B2h horizon has hue of 10YR or 5YR, value of 2, 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 most pedons cementation is variable, but 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 few to common pockets of A2 horizon material are in the B2h horizon. The B2h horizon is sand, fine sand, loamy sand, or loamy fine sand. Reaction ranges from very strongly acid to medium acid. Thickness of the B2h horizon varies within short distances, ranging from about 3 to 30 inches or more.

In some pedons a B3&Bh horizon is below the B2h horizon. Where present, it has hue of 10YR, value of 3, and chroma of 2 or 3; or value of 4 to 6 and chroma of 3 or 4, with few to common darker, weakly cemented Bh fragments. It ranges from 0 to 8 inches in thickness. Reaction and texture ranges of the B3&Bh horizon are similar to those of the Bh horizon. In some pedons, there is a B3 horizon that has characteristics similar to those of the B3&Bh horizon but does not have Bh fragments.

The B2tg horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4; or hue of 2.5Y and 5Y, value of 5, and chroma of 2, with or without mottles in shades of gray, brown, and yellow. It is sandy loam, fine sandy loam, or sandy clay loam. Reaction ranges from strongly acid to neutral. Some pedons have pockets of coarser textured material. The B2tg horizon ranges from 6 to 24 inches or more in thickness.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or less; or hue of 5Y, value of 5 or 6, and chroma of 1 or 2, with mottles in shades of gray, yellow, and brown. Texture is variable and ranges from sand to sandy loam. Reaction ranges from strongly acid to mildly alkaline.

Okeelanta series

Soils of the Okeelanta series are sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists. They consist of very poorly drained, rapidly permeable soils that formed in hydrophytic, nonwoody plant remains and the underlying sandy marine sediment. These nearly level soils are in depressional areas and in large freshwater marshes and swamps. Under natural conditions the water table is above the surface much of the time. Slopes are 0 to 1 percent.

Okeelanta soils are geographically closely associated with Canova Variant, Floridana, Jupiter, and Sanibel soils. All of the associated soils are mineral soils. Canova Variant and Sanibel soils have a histic epipedon. Floridana and Jupiter soils have a mollic epipedon and, in addition, Jupiter soils are underlain by limestone.

Typical pedon of Okeelanta muck in a freshwater swamp; about 3.5 miles north of Hobe Sound, about 2.8 miles south of the east end of Cove Road, and about 0.6 mile east of U.S. Highway 1 in the Gomez Grant:

Oa1—0 to 4 inches; black (10YR 2/1) muck; less than 10 percent fiber unrubbed; weak medium granular structure; very friable; common fine roots, few medium and coarse roots; estimated 10 percent mineral content; brown (7.5YR 5/4) sodium pyrophosphate extract; medium acid; clear wavy boundary.

Oa2—4 to 26 inches; dark reddish brown (5YR 2/2) muck; less than 10 percent fiber unrubbed; massive; friable; estimated less than 10 percent mineral content; reddish brown (5YR 4/3) sodium pyrophosphate extract; medium acid; gradual wavy boundary.

Oa3—26 to 30 inches; black (10YR 2/1) muck; less than 5 percent fiber unrubbed; massive; friable; estimated 50 percent mineral content; brown (7.5YR 5/4) sodium pyrophosphate extract; common coarse pockets of black (10YR 2/1) sand; medium acid; clear smooth boundary.

IIC1—30 to 48 inches; very dark gray (10YR 3/1) sand; single grained; loose; moderately alkaline; gradual wavy boundary.

IIC2—48 to 80 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; moderately alkaline.

Thickness of organic material ranges from 16 to 40 inches. Reaction ranges from very strongly acid to neutral in the organic material and from medium acid to moderately alkaline in the underlying material.

The Oa horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 or 3; or hue of 7.5YR, value of 3, and chroma of 2. Fiber content ranges from 5 to 30 percent unrubbed and is commonly less than 10 percent rubbed. Mineral content ranges from 10 to 40 percent.

The IIC horizon has hue of 10YR, value of 2 to 7, and chroma of 1 or 2. In most pedons, this horizon is darkest immediately below the Oa horizon and grades to lighter colors as depth increases. The IIC horizon is sand, or loamy sand. In some pedons, shell fragments are in the lower part of the IIC horizon. In other pedons, a IIC horizon of sandy loam or sandy clay loam is below a depth of 50 inches.

Okeelanta Variant

Soils of the Okeelanta Variant are sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medihemists. Okeelanta Variant soils are very poorly drained, rapidly permeable soils that formed in accumulations of halophytic plant remains overlying sandy marine sediment. These nearly level soils are in tidal mangrove swamps that are flooded daily or periodically by high tides. Slopes are less than 1 percent.

Okeelanta Variant soils are geographically closely associated with Aquents and Bessie and Canaveral soils. Aquents are mineral soils and do not have organic material on the surface. Bessie soils have organic material that is more decomposed than Okeelanta Variant soils and they overlie clayey mineral material. Canaveral soils are mineral soils on low coastal ridges. They are better drained than Okeelanta Variant soils.

Typical pedon of Okeelanta Variant muck in a mangrove swamp on Hutchinson Island; about 0.25 mile south of the St. Lucie County line, and about 300 feet west of Florida Highway A1A, NW1/4SE1/4NE1/4 sec. 14, T. 37 S., R. 41 E.

Oa—0 to 4 inches; black (5YR 2/1) muck; massive; estimated 10 percent fiber unrubbed, less than 5 percent rubbed; common fine and medium roots; estimated 25 percent mineral material; dark brown (10YR 4/3) sodium pyrophosphate extract; medium acid; pH 6 in 0.01 molar calcium chloride solution; clear wavy boundary.

Oe—4 to 20 inches; dark reddish brown (5YR 2/2) mucky peat; massive; estimated 60 percent fiber unrubbed, 30 percent rubbed; common fine and medium roots; estimated 40 percent mineral material; light gray (10YR 7/2) sodium pyrophosphate extract; medium acid; pH 6 in 0.01 molar calcium chloride solution; gradual wavy boundary.

IIC1—20 to 28 inches; very dark brown (10YR 2/2) sand; single grained to massive; loose; estimated 15 percent organic matter; few medium roots; common fine shell fragments; mildly alkaline; calcareous; diffuse boundary.

IIC2—28 to 36 inches; very dark grayish brown (10YR 3/2) sand mixed with fine shell fragments; single grained; loose; diffuse boundary.

IIC3—36 to 42 inches; dark grayish brown (10YR 4/2) sand and fine shell fragments; single grained; loose; few small lumps of almost white cemented shell fragments; moderately alkaline; calcareous; clear smooth boundary.

IIC4—42 to 60 inches; gray (N 5/0) mixed sand and shell fragments; single grained; loose; moderately alkaline; calcareous.

Reaction ranges from very strongly acid to medium acid in the Oe and Oa horizons. The IIC horizon is mildly alkaline to strongly alkaline and is mainly calcareous. Thickness of the organic material ranges from 16 to 40 inches.

The Oa horizon has hue of 10YR and 5YR, value of 2, and chroma of 2 or less. It is about 50 percent fiber content, unrubbed and less than 15 percent rubbed. It is primarily sand and ranges from about 10 to 40 percent. The Oa horizon ranges from about 4 to 15 inches in thickness.

The Oe horizon is similar to the Oa horizon in range of color and, in addition, it has hue of 5YR, value of 3, and chroma of 2 to 4. It is about 35 to 70 percent fiber content, unrubbed, and 16 to 40 percent rubbed. In some pedons thin layers or pockets of sapric material are in the Oe horizon. Mineral content ranges from about 10 to 40 percent.

The IIC horizon has hue of 10YR, value of 2 to 7, and chroma of 2 or less; or value of 4 to 6 and chroma of 3; or hue of 2.5Y, value of 5 or 6, and chroma of 2; or it is neutral and value is 4 through 6. It is sand, fine sand, or loamy sand, with few to many fine and medium shell fragments. In some pedons shell fragments are absent in part of the IIC horizon.

Oldsmar series

Soils of the Oldsmar series are sandy, siliceous, hyperthermic Alfic Arenic Haplaquods. They are poorly drained, slowly to very slowly permeable soils that formed in sandy and loamy marine sediment. These nearly level soils are in broad areas of flatwoods and in wet depressional areas. Slopes range from 0 to 2 percent. These soils are saturated for long periods during the wet season. Depressions are ponded for 6 to 9 months in most years.

Oldsmar soils are geographically associated with Basinger, Floridana, Holopaw, Malabar, Nettles, Pineda, Riviera, Wabasso, and Waveland soils. Basinger soils do not have a spodic or an argillic horizon. Floridana soils have a mollic epipedon and do not have a spodic horizon. Holopaw and Malabar soils do not have a spodic horizon. In addition, Malabar soils have a Bir horizon. Nettles soils have an ortstein. Pineda and Riviera soils do not have a spodic horizon and have an argillic horizon within a depth of 20 to 40 inches. Wabasso soils have an argillic horizon within a depth of 40 inches. Waveland soils do not have an argillic horizon and have an ortstein.

Typical pedon of Oldsmar fine sand in an area of native rangeland; about 2 miles south of Florida Highway 714, 0.5 mile west of Loop Road, and 200 feet south of Woodham Road, NE1/4NE1/4NW1/4 sec. 34, T. 38 S., R. 40 E.

A1—0 to 5 inches; black (10YR 2/1) fine sand rubbed; weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

A21—5 to 14 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; few very dark grayish brown (10YR 3/2) streaks in old root channels; very strongly acid; gradual wavy boundary.

A22—14 to 35 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine and medium roots; very strongly acid; abrupt wavy boundary.

B21h—35 to 40 inches; black (10YR 2/1) fine sand; massive; friable; noncemented; common fine and medium roots; sand grains well coated with organic matter; very strongly acid; clear wavy boundary.

B22—40 to 46 inches; brown (10YR 4/3) fine sand; single grained; loose; few fine and medium roots;

few black (5YR 2/1) streaks and pockets; very strongly acid; abrupt wavy boundary.

B23t—46 to 60 inches; grayish brown (10YR 5/2) fine sandy loam; common fine and medium distinct mottles of brownish yellow (10YR 6/6) and dark grayish brown (10YR 4/2); massive in place, parts to weak medium subangular blocky structure; slightly sticky and slightly plastic; few fine and medium roots; sand grains coated and bridged with clay; medium acid.

Thickness of the solum is more than 44 inches.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or it is neutral and value is 2 to 4. It is 4 to 8 inches thick. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 2 or less; or it is neutral and value is 5 to 8. In some pedons this horizon has brown mottles. Reaction ranges from very strongly acid to slightly acid. Total thickness of the A horizon ranges from 30 to 50 inches. A darker transitional horizon is at the base of the A horizon in some pedons.

The B21h horizon has 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. It is fine sand or loamy fine sand. The B21h horizon may be weakly cemented in less than 50 percent of each pedon. Reaction ranges from very strongly acid to slightly acid.

The B22 horizon has hue of 10YR, value of 3, and chroma of 3; or value of 4 and chroma of 4; or hue of 5YR, value of 3, and chroma of 4. It is fine sand or loamy fine sand. Reaction ranges from very strongly acid to neutral. In some pedons, the B22 horizon is absent. In other pedons, there is a B22&Bh horizon that has matrix colors similar to the B22 horizon and darker, weakly cemented Bh fragments.

The B23t horizon has hue of 10YR and 2.5Y, value of 4 to 7, and chroma of 2 or less; or hue of 5Y, value of 5 or 6, and chroma of 2 or less. In most pedons this horizon has mottles of gray, brown, yellow, or red. This horizon is fine sandy loam, sandy loam, or sandy clay loam. Reaction ranges from strongly acid to moderately alkaline. Depth to the Btg horizon ranges from 40 to 70 inches. In some pedons the Btg horizon extends to a depth of more than 80 inches, and in other pedons, it is underlain by a sandy C horizon at a depth of about 50 inches.

Orsino series

Soils of the Orsino series are hyperthermic, uncoated Spodic Quartzipsamments. They are moderately well drained, very rapidly permeable soils that formed in sandy marine and eolian deposits. These nearly level to gently sloping soils are in coastal areas on sites that are transitional between higher ridges and more poorly drained soils in the flatwoods. Slopes range from 0 to 5 percent. A water table is between a depth of 40 and 60 inches for 6 months or more in most years.

Orsino soils are geographically closely associated with Jonathan, Paola, Salerno, Satellite Variant, and Waveland soils. Jonathan soils have a spodic horizon below a depth of 50 inches. Paola soils are excessively drained. Salerno and Waveland soils are more poorly drained than Orsino soils and have an ortstein. Satellite soils do not have diagnostic horizons within a depth of 80 inches.

Typical pedon of Orsino sand in an area in Port Salerno; between the Florida East Coast Railroad and Florida Highway A1A, about 20 feet west of intersection of Florida Highway A1A and Westfield Avenue in the Hanson Grant:

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

A2—3 to 25 inches; white (N 8/0) sand; single grained; loose; common fine and medium roots; strongly acid; abrupt irregular boundary.

B21&Bh—25 to 30 inches; strong brown (7.5YR 5/6) sand; single grained; loose; few fine and medium roots; common dark reddish brown (5YR 3/2) Bh fragments; medium acid; clear wavy boundary.

B22&Bh—30 to 41 inches; yellowish brown (10YR 5/4) sand, single grained; loose; common coarse dark brown (7.5YR 3/2) Bh fragments; medium acid; gradual wavy boundary.

C1—41 to 48 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; medium acid; gradual wavy boundary.

C2—48 to 80 inches; very pale brown (10YR 7/3) sand; single grained; loose; medium acid.

Reaction ranges from very strongly acid to medium acid throughout the pedon. The A1 horizon is sand, and below that is sand or fine sand to a depth of 80 inches or more. Silt and clay are less than 5 percent in the 10- to 40-inch control section.

The A1 horizon is neutral and value is 4 to 6; or it has hue of 10YR, value of 4 to 6, and chroma of 1. It is less than 6 inches thick. The A2 horizon is neutral and value is 6 to 8; or it has hue of 10YR, value of 6, and chroma of 1; or value of 7 or 8 and chroma of 1 or 2. It ranges from about 10 to 24 inches in thickness.

The B2 part of the B2&Bh horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8; or hue of 7.5YR, value of 5, and chroma of 6 or 8. Light gray or white tongues of the A2 horizon extend into the B2&Bh horizon. In some pedons, thin discontinuous layers or lenses of Bh horizon are at the place of contact between the A2 and B2&Bh horizons. These layers and the Bh part of the B2&Bh horizon has hue of 5YR, value of 2, and chroma of 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 2. The B2&Bh horizon ranges from about 12 to 30 inches in thickness.

The C horizon extends to a depth of more than 80 inches. It has hue of 10YR, value of 6 to 8, and chroma of 3 or 4. Mottles are generally absent.

Palm Beach series

Soils of the Palm Beach series are hyperthermic, uncoated Typic Quartzipsamments. They are well drained to excessively drained soils that formed in thick deposits of marine sand and fragments of shells. These nearly level to sloping soils are on dunelike ridges that are parallel to the coast. Slopes are dominantly 0 to 5 percent but range to 8 percent. The water table is below a depth of 120 inches.

Palm Beach soils are geographically associated with Beaches, Bessie, Canaveral, and Cocoa Variant soils. Beaches and Bessie soils are subject to tidal flooding. In addition, Bessie soils have organic material overlying clayey mineral material. Canaveral soils are less well drained than Palm Beach soils. Cocoa Variant soils are of redder hue than Palm Beach soils and are underlain by coquina rock.

Typical pedon of Palm Beach sand in an area of dense, subtropical hardwoods and shrubs on Jupiter Island; about 0.3 mile south of Florida Highway 707 and 1,000 feet west of the Atlantic Ocean, SE1/4 sec. 23, T 39 S., R. 42 E.

A—0 to 8 inches; black (10YR 2/1) sand; single grained; loose; common fine and medium roots; many uncoated sand grains; estimated 20 percent fine shell fragments; mildly alkaline; calcareous; clear wavy boundary.

C1—8 to 13 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; few fine and medium roots; estimated 25 percent fine shell fragments; mildly alkaline; calcareous; clear wavy boundary.

C2—13 to 27 inches; brown (10YR 5/3) sand; single grained; loose; few fine and medium roots; estimated 35 percent fine shell fragments; few lenses and pockets of weakly cemented shell fragments; mildly alkaline; calcareous; gradual wavy boundary.

C3—27 to 80 inches; pale brown (10YR 6/3) sand; single grained; loose; estimated 45 percent fine shell fragments; few large shell fragments; mildly alkaline; calcareous.

The pedon is sand throughout. All horizons effervesce weakly to strongly with dilute hydrochloric acid. In some pedons the C horizon has few to common lenses or pockets of shell fragments.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is 4 to 9 inches thick.

The C1 horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3; or value of 5 or 6 and chroma of 4. It is 5 to 18 inches thick.

The C2 and C3 horizons have matrix color in hue of 10YR, value of 5 through 7, and chroma 2 or 3. Discontinuous bands of dark sand are in many places. These bands appear to be remnants of a buried A horizon that developed during the formative stages of the dunes. They have hue of 10YR, value of 2, and chroma of 1; or value of 3 or 4 and chroma of 2 or 3. One or more of these bands that range from 4 to 10 inches thick may occur in a pedon.

Paola series

Soils of the Paola series are hyperthermic, uncoated Spodic Quartzipsamments. They are excessively drained, very rapidly permeable soils that formed in thick deposits of marine or eolian sand. These nearly level to moderately steep soils are on the coastal ridge and isolated knolls in coastal areas. Slopes range from 0 to 20 percent. The water table is below a depth of 72 inches.

Paola soils are geographically closely associated with Jonathan, Orsino, Pomello, Salerno, Satellite Variant, and St. Lucie soils. Unlike Paola soils which are in higher lying positions, Jonathan, Pomello, and Salerno soils have a spodic horizon. St. Lucie and Satellite Variant soils do not have a B horizon. Orsino and Satellite soils are more poorly drained than Paola soils.

Typical pedon of Paola sand; 1 mile east of Manatee Pocket at Port Salerno, 0.75 mile north of Cove Road and 0.25 mile west of the Intracoastal Waterway in the Hanson Grant:

A1—0 to 4 inches; gray (10YR 5/1) sand; single grained; loose; many small and medium roots; strongly acid; clear wavy boundary.

A2—4 to 28 inches; white (10YR 8/1) sand; single grained; loose; common medium and large roots; very dark grayish brown (10YR 3/2) and grayish brown (10YR 5/2) streaks in old root channels; strongly acid; gradual wavy boundary.

AB—28 to 32 inches; light gray (10YR 7/2) sand, intricately splotched or pocketed with light yellowish brown (10YR 6/4) and yellow (10YR 7/6) sand; single grained; loose; strongly acid; clear wavy boundary.

B&A—32 to 46 inches; yellowish brown (10YR 5/8) sand; single grained; loose; sand grains thinly coated with iron oxides; few tongues of light gray (10YR 7/2) sand from A2 horizon 1/2 inch to 1 1/2 inches in diameter extend through the horizon; thin, discontinuous lenses of weakly cemented, dark reddish brown (5YR 3/4) sand at upper boundary and encasing tongues; strongly acid; gradual wavy boundary.

B—46 to 68 inches; brownish yellow (10YR 6/8) sand; single grained; loose; sand grains thinly coated with iron oxides; few tongues of A2 horizon extend into horizon; strongly acid; gradual wavy boundary.

C—68 to 80 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; strongly acid.

Reaction is very strongly acid to medium acid throughout the pedon. The sand is to a depth of more than 80 inches.

The A1 horizon has hue of 10YR, value of 4 to 6, and chroma of 1. It is 2 to 5 inches thick. The A2 horizon has hue of 10YR, value of 6 to 8, and chroma of 2 or less. Total thickness of the A horizon ranges from about 12 to 45 inches.

The AB horizon dominantly has hue of 10YR, value of 5 to 7, and chroma of 2 or less. Within this matrix are numerous small to large pockets of B horizon material in hue of 10YR, value of 5, and chroma of 4 to 8; or value of 7 and chroma of 6 or 8; or hue of 7.5YR, value of 5, and chroma of 6 or 8; or value of 6 and chroma of 6. In some pedons the AB horizon is absent.

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, and chroma of 6; or value of 6 and chroma of 6 or 8 with few to common tongues of A2 horizon material. In some pedons, the outer edges of these tongues are very dark grayish brown to dark reddish brown sand that is weakly cemented. In some pedons the tongues are absent. In other pedons, a thin, discontinuous layer of sand, 1/2 inch to 2 inches thick, that 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 is at the base of the A2 horizon. The B horizon has colors similar to the B part of the B&A horizon, and it generally extends below a depth of 60 inches.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 3 or 4. It extends well below a depth of 80 inches.

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 thick beds of sandy and loamy marine sediments. These nearly level soils are on broad lowlands. A water table is within a depth of 10 inches for 1 month to 6 months in most years. Slopes are dominantly less than 1 percent but range to 2 percent.

Pineda soils are geographically associated with EauGallie, Malabar, Oldsmar, Pinellas, Riviera, Wabasso, and Winder soils. EauGallie, Oldsmar, and Wabasso soils have a spodic horizon. Malabar soils have an argillic horizon below a depth of 40 inches. Pinellas soils have calcium carbonate accumulations in the horizons above the argillic horizon. Riviera soils do not have a Bir horizon. Winder soils do not have a Bir horizon and have an argillic horizon within 20 inches of the surface.

Typical pedon of Pineda sand in an area of natural vegetation; about 10 miles south of Stuart, 300 feet west of the intersection of Florida Highways 76 and 708, 50 feet south of Florida Highway 76, NW1/4NE1/4NE1/4 sec. 26, T. 39 S., R. 40 E.

A11—0 to 5 inches; dark gray (10YR 4/1) sand; weak fine granular structure; very friable; many fine and medium, few coarse roots; black organic matter segregated into fine and medium granules; strongly acid; clear smooth boundary.

A12—5 to 8 inches; dark grayish brown (10YR 4/2) sand; few medium faint brown (10YR 5/3) mottles; single grained; loose; common fine and medium, few coarse roots; strongly acid; clear wavy boundary.

A2—8 to 15 inches; brown (10YR 5/3) sand, many fine faint yellow and brownish yellow mottles; single grained; loose; few fine roots; medium acid; clear wavy boundary.

B2ir—15 to 22 inches; brownish yellow (10YR 6/8) sand; few medium distinct very pale brown (10YR 7/3) and common medium distinct yellowish brown (10YR 5/8) mottles; weak fine granular structure; very friable; slightly acid; clear wavy boundary.

B3ir—22 to 36 inches; very pale brown (10YR 7/4) sand; common fine distinct brownish yellow (10YR 6/6) mottles; single grained; loose; few tongues of yellowish brown (10YR 5/8) extend into horizon; moderately alkaline; abrupt irregular boundary.

B2tg—36 to 44 inches; gray (5Y 5/1) fine sandy loam; common coarse distinct olive brown (2.5Y 4/4) mottles; weak medium and coarse subangular blocky structure; few old roots; sand grains coated and bridged with clay; few large pale brown (10YR 6/3) and gray (5Y 5/1) fine sand tongues and pockets; matrix of upper few inches is dark grayish brown (10YR 4/2); very strongly acid; clear wavy boundary.

B3g—44 to 60 inches; greenish gray (5G 5/1) and dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; friable; common coarse pockets of brown (10YR 4/3, 5/3) fine sand; medium acid; clear wavy boundary.

IIC—60 to 72 inches; mixture of greenish gray (5G 5/1) fine sand and white shell fragments; moderately alkaline; calcareous.

Thickness of the solum is 40 to 80 inches or more. Combined thickness of the A and Bir horizon is 20 to 40 inches. Reaction ranges from strongly acid to neutral in the A and Bir horizons and from neutral to moderately alkaline in the Btg and C horizons.

The A1 horizon is neutral and value is 3 or 4; or it has hue of 10YR, value of 2 or 3, and chroma of 1; or value of 4 and chroma of 1 or 2. Where value is 2 or 3, thickness of the horizon is less than 6 inches. The A2 horizon has hue of 10YR, value of 5, and chroma of 1 to 3; or value of 6 and chroma of 1 or 2; or value of 7 or 8 and chroma of 1 to 4. In some pedons the A2 horizon is absent.

The B2ir horizon has hue of 10YR, value of 6, and chroma of 3; 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. The B3ir horizon has hue of 10YR, value of 6 to 8, and chroma of

3 or 4. In some pedons, a thin discontinuous dark brown Bh horizon is at the base of the Bir horizon.

The B2tg horizon matrix is sandy loam, fine sandy loam, or sandy clay loam. Tongues of coarser material extend into this horizon from the horizons above. The B2tg horizon matrix has hue of 10YR, value of 4 to 7, and chroma of 2 or less; hue of 5Y, value of 5 or 6, and chroma of 1; hue of 2.5Y, value of 4 to 7, and chroma of 2; or is neutral and has value of 4 to 6. In most pedons this horizon is mottled in shades of yellow or brown. Tongues of sand, fine sand, or loamy sand are generally lighter colored than the matrix. In some pedons a loamy sand or sandy loam B1tg horizon is above the B2tg horizon. The B3g horizon, where present, is loamy sand or sandy loam. It is similar in color to the B2tg horizon and, in addition, it has hue of 5G, value of 5 or 6, and chroma of 1.

The Cg or IIC horizon has hue of 10YR and 2.5Y, value of 5 or 6, and chroma of 2 or less; or hue of 5Y, 5G, and 5GY, value of 5 to 7, and chroma of 1. It is sand, fine sand, loamy sand, or sandy loam and has few to many fine shell fragments. In some pedons this horizon is absent.

Pinellas series

Soils of the Pinellas series are loamy, mixed, hyperthermic Arenic Ochraqualfs. They are poorly drained, moderately permeable soils that formed in sandy and loamy marine sediment. These nearly level soils border sloughs and depressions in the flatwoods areas. They are periodically saturated during the rainy season and following heavy rainfall in other seasons. Slopes are dominantly less than 1 percent but range to 2 percent at the edges of some depressions.

Pinellas soils are geographically closely associated with Boca, Hallandale, Pineda, Riviera, Wabasso, and Winder soils. Boca soils have limestone below the argillic horizon. Hallandale soils do not have an argillic horizon and have limestone within a depth of 20 inches. Pineda and Riviera soils do not have a calcareous A2 horizon, and Pineda soils have a Bir horizon. Wabasso soils have a spodic horizon. Winder soils do not have a calcareous A2 horizon and have an argillic horizon within a depth of 20 inches.

Typical pedon of Pinellas fine sand in an undisturbed flatwoods area; 1.1 miles west of Florida Highway 710, about 400 feet east of end of Clements Road, and about 100 feet south of road, NW1/4NW1/4NW1/4 sec. T. 39 S., R. 37 E.

A1—0 to 5 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; mixture of organic matter and uncoated sand grains; many fine roots; medium acid; clear wavy boundary.

A21—5 to 11 inches; grayish brown (10YR 5/2) fine sand; many fine faint light gray and dark grayish brown mottles; single grained; loose; few fine and coarse roots; slightly acid; gradual wavy boundary.

A22ca—11 to 13 inches; dark grayish brown (10YR 4/2) fine sand; few fine distinct yellowish brown mottles; single grained; loose; few coarse roots; moderately alkaline; calcareous; gradual wavy boundary.

A23ca—13 to 16 inches; light gray (10YR 7/2) fine sand; many fine distinct brownish yellow (10YR 6/6) mottles; weak fine granular structure; very friable; secondary carbonates in interstices between sand grains; few coarse roots; strong bluish gray streaks in old root channels; moderately alkaline; calcareous; gradual wavy boundary.

A24ca—16 to 26 inches; white (10YR 8/2) fine sand; weak coarse subangular blocky structure; very friable; secondary carbonates in interstices between sand grains; strongly alkaline; calcareous; abrupt wavy boundary.

B2tg—26 to 38 inches; light olive gray (5Y 6/2) fine sandy loam; few coarse faint greenish gray (5GY 6/1) and few fine distinct olive brown mottles; weak coarse subangular blocky structure; slightly sticky, slightly plastic; sand grains coated and bridged with clay; common pockets of light gray fine sand; secondary carbonates in some old root channels; strongly alkaline; clear irregular boundary.

Cg—38 to 52 inches; light olive gray (5Y 6/2) fine sand; single grained; loose; few pockets of loamy fine sand; moderately alkaline; calcareous; gradual wavy boundary.

IIC—52 to 60 inches; light gray (5Y 7/1) fine sand mixed with white shell fragments; single grained; loose; many small unbroken shells; moderately alkaline; calcareous.

Thickness of the solum is less than 60 inches. Reaction of the A1 horizon and upper part of the A2 horizon ranges from medium acid to mildly alkaline. The lower part of the A2 horizon is mildly alkaline to strongly alkaline and is calcareous. Thickness of the A horizon ranges from 20 to 40 inches.

The A1 horizon has hue of 10YR or it is neutral, value of 2 to 4, and chroma of 1 or less. Where the A1 horizon has value of 3.5 or less, it is less than 6 inches thick. The A2 horizon has hue of 10YR, value of 4, and chroma of 2; or value of 5 to 8 and chroma of 1 to 3; or hue of 2.5Y, value of 5 to 7, and chroma of 2, with or without mottles in shades of gray, brown, or yellow. Subhorizons of the A2 horizon that have secondary carbonate accumulations have firm to loose consistence.

The B2tg horizon has hue of 10YR or 5Y, value of 5 to 8, and chroma of 1, with or without mottles; or chroma of 2, with mottles in shades of brown, yellow, olive, and gray. It is fine sandy loam, sandy loam, or sandy clay loam. The B2tg horizon is neutral to strongly alkaline and is calcareous.

The C and IIC horizons are similar in color to the B2tg horizon. The C horizon does not have shell fragments. The C and IIC horizons are fine sand or sand. Either of these horizons may be absent.

Placid series

Soils of the Placid series are sandy, siliceous, hyperthermic Typic Humaquepts. They are very poorly drained, rapidly permeable soils that formed in thick beds of sandy marine sediment. These nearly level soils are in wet depressional areas and along poorly defined drainageways in the flatwoods. They are ponded for 6 months or more in most years.

Placid soils are geographically closely associated with Basinger, Lawnwood, Pomello, Sanibel, St. Johns Variant, and Waveland soils. Lawnwood, Pomello, and Waveland soils are on higher elevations than Placid soils, do not have an umbric epipedon, and have a spodic horizon. St. Johns Variant soils have a spodic horizon. Sanibel soils have a histic epipedon. Basinger soils do not have an umbric epipedon and have organic stained layers.

Typical pedon of Placid sand in a wet depressional area; 100 feet east of trail and about 1.25 miles south of Florida Highway 707A and 0.5 mile west of Florida Highway 723, NE1/4SE1/4NW1/4 sec. 28, T. 37 S., R. 41 E.

A11—0 to 10 inches; black (N 2/0) sand; moderate medium granular structure; friable; many fine and medium roots; few uncoated sand grains; estimated organic matter content about 15 percent; very strongly acid; gradual wavy boundary.

A12—10 to 17 inches; black (10YR 2/1) sand; weak fine granular structure; very friable; many fine and medium roots; many uncoated sand grains; common streaks of gray (10YR 6/1) sand; very strongly acid; clear wavy boundary.

C1—17 to 27 inches; dark grayish brown (10YR 4/2) sand, highly mixed with gray (10YR 5/1) sand; single grained; loose; few fine and medium roots; very strongly acid; gradual wavy boundary.

C2—27 to 50 inches; gray (10YR 6/1) sand; common medium distinct dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) mottles; single grained; loose; very strongly acid; gradual wavy boundary.

C3—50 to 80 inches; light brownish gray (10YR 6/2) sand; single grained; loose; very strongly acid.

Reaction is strongly acid or very strongly acid throughout the pedon. The pedon is sand or fine sand.

The A1 horizon is neutral and value is 2 and 3; or it has hue of 10YR, value of 2 and 3, and chroma of 1 or 2. Organic matter content is less than 20 percent. The A1 horizon ranges from 10 to 24 inches in thickness.

The C horizon is neutral and value is 5 to 7; or it has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or value of 4 and chroma of 2. It has few to common mottles in shades of brown and yellow. In some pedons this horizon has thin vertical streaks or pockets that range from black to dark brown. The C horizon extends to a depth of 80 inches or more.

Pomello series

Soils of the Pomello series are sandy, siliceous, hyperthermic Arenic Haplohumods. They are deep, moderately well drained, moderately rapidly permeable soils that formed in thick deposits of sandy marine sediment. These nearly level to gently sloping soils are on low ridges and knolls in the flatwoods. Slopes are dominantly less than 2 percent but range to 5 percent. The water table is at a depth of 24 to 40 inches for 2 to 4 months during the wet season and at a depth of 40 to 60 inches in the drier seasons.

Pomello soils are geographically closely associated with Basinger, Hobe, Jonathan, Salerno, Satellite Variant, St. Lucie, and Waveland soils. Basinger soils are poorly drained and do not have a spodic horizon. Hobe soils have a spodic and an argillic horizon below a depth of 50 inches and are better drained than Pomello soils. Salerno soils are more poorly drained and have an ortstein. Jonathan soils also have an ortstein. Satellite Variant and St. Lucie soils do not have a spodic horizon, and St. Lucie soils are excessively drained. Waveland soils are poorly drained and have an ortstein.

Typical pedon of Pomello sand, 0 to 5 percent slopes, in an area of undisturbed natural vegetation; about 1.75 miles south of the Stuart city limits, and 200 feet west of the intersection of Florida Highway 76 and Indian Avenue in the Hanson Grant:

A1—0 to 3 inches; gray (10YR 5/1) sand; weak fine granular structure; very friable; many fine roots; mixture of uncoated sand grains and organic matter has a salt-and-pepper appearance; very strongly acid; clear smooth boundary.

A2—3 to 46 inches; light gray (10YR 7/2) sand; single grained; loose; few fine medium and coarse roots; few dark grayish brown (10YR 4/2) streaks in old root channels; very strongly acid; abrupt wavy boundary.

B21h—46 to 58 inches; dark reddish brown (5YR 3/3) sand; massive in place; parts to weak fine granular structure; very friable; few fine and medium roots; sand grains coated with organic matter; common dark reddish brown (5YR 2/2) pockets and weakly cemented bodies; very strongly acid; clear wavy boundary.

B22h—58 to 67 inches; dark reddish brown (5YR 2/2) sand; massive in place, parts to weak fine granular structure; very friable; few medium roots; few dark reddish brown (5YR 2/2) weakly cemented bodies; sand grains thinly coated with organic matter; very strongly acid; gradual wavy boundary.

Thickness of the solum is more than 40 inches and commonly exceeds 60 inches. Reaction ranges from very strongly acid to medium acid.

The A1 horizon has hue of 10YR or it is neutral, value of 4 to 6, and chroma of 1 or less. Thickness of the A1 horizon ranges from 1 inch to 5 inches. The A2 horizon has hue of 10YR or it is neutral, value of 6 to 8, and chroma of 2 or less. Thickness of the A horizon ranges from 30 to 50 inches.

The B2h horizon has 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 through 4. In some pedons, this horizon has few to common, small to large pockets of A2 horizon material. The B2h horizon may be weakly cemented in less than 50 percent of the pedon, or it may contain weakly cemented fragments. It ranges from 6 to more than 20 inches thick.

The B3 horizon has hue of 10YR, value of 3 or 4, and chroma of 3; or hue of 7.5YR, value of 4, and chroma of 2 through 4. Some pedons have a B3&Bh horizon in which the matrix has a color range similar to that of the B3 horizon and darker, weakly cemented Bh fragments.

The C horizon, where present, has hue of 10YR, value of 5 to 7, and chroma of 2 to 4.

Pomello Variant

Soils of the Pomello Variant are sandy, siliceous, hyperthermic Typic Haplohumods. These soils consist of deep, moderately well drained, moderately permeable soils that formed in thick, sandy marine or eolian sediment. These nearly level soils are on broad, low ridges in the flatwoods. The water table is between a depth of 30 and 40 inches for 1 month to 4 months during wet seasons in most years. Slopes range from 0 to 2 percent.

Pomello Variant soils are geographically closely associated with Basinger, Jonathan, Salerno, St. Lucie, and Waveland soils. Basinger soils do not have a spodic horizon. Basinger and Salerno soils are more poorly drained than Pomello Variant soils, and Jonathan and Salerno soils have an ortstein. St. Lucie soils do not have a spodic horizon and are excessively drained.

Typical pedon of Pomello Variant fine sand in an area of scrub pine rangeland; about 6 miles northwest of Indiantown, 4.2 miles south of Florida Highway 714, and 0.15 mile east of Fox Brown Road, along a private road, NE1/4SE1/4NE1/4 sec. 28, T. 38 S., R. 38 E.

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

A21—3 to 7 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and medium roots; medium acid; gradual wavy boundary.

A22—7 to 52 inches; white (10YR 8/1) fine sand; single grained; loose; few fine medium and coarse roots; few streaks of dark grayish brown in old root channels; medium acid; abrupt wavy boundary.

B2h—52 to 64 inches; black (10YR 2/1) fine sand; massive in place, parts to weak fine granular structure; very friable; few medium roots; sand grains coated with organic matter; few small pockets of light brownish gray (10YR 6/2) fine sand; strongly acid; clear wavy boundary.

B3—64 to 70 inches; brown (7.5YR 4/2) fine sand; single grained; loose; few very dark grayish brown (10YR 3/2) soft Bh fragments; strongly acid; gradual wavy boundary.

C—70 to 80 inches; brown (10YR 5/2) fine sand; single grained; loose; few very dark grayish brown (10YR 3/2) soft Bh pockets; strongly acid.

Depth to the Bh horizon is more than 50 inches. Reaction ranges from very strongly acid to slightly acid. The pedon is sand or fine sand throughout.

The A1 horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or less. It is a mixture of uncoated sand grains and black organic matter. Thickness ranges from 2 to 5 inches. The A2 horizon has hue of 10YR, value of 6 to 8, and chroma of 2 or less. In most pedons this horizon has darker streaks in old root channels.

In some pedons, a transitional horizon is between the base of the A2 horizon and the top of the Bh horizon. It has hue of 10YR, value of 3 to 6, and chroma of 2 or less, with many uncoated sand grains. This horizon ranges from 1 inch to 6 inches in thickness.

The B2h horizon has hue of 10YR and 5YR, value of 2 or 3, and chroma of 2 or less; hue of 5YR, value of 3, and chroma of 3; or hue of 7.5YR, value of 3, and chroma of 2. Few to common pockets of A2 horizon material are in some pedons. The B2h horizon ranges from 6 to 30 inches or more in thickness.

The B3 horizon has hue of 10YR and 7.5YR, value of 4, and chroma of 2 to 4; or hue of 5YR, value of 4, and chroma of 3 or 4. It is absent in some pedons. Some pedons have a B3&Bh horizon. Where present, the matrix has a color range similar to that of the B3 horizon, with few to common, soft, black or dark reddish brown Bh fragments.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. In some pedons this horizon is below a depth of 80 inches.

Pompano series

Soils of the Pompano series are siliceous, hyperthermic Typic Psammaquents. They are poorly drained, very rapidly permeable soils that formed in thick deposits of sandy marine sediment. These nearly level soils are in sloughs and poorly defined drainageways. The water table is within a depth of 10 inches for 2 to 6 months. Some areas are occasionally flooded for a period of 2 to 7 days in some years. Slopes range from 0 to 2 percent.

Pompano soils are geographically closely associated with Basinger, Holopaw, Malabar, and Riviera soils. Pompano soils do not have horizons with more than one unit of value darker than the overlying horizons within a depth of 40 inches. Holopaw and Malabar soils have an argillic horizon below a depth of 40 inches. Riviera soils have an argillic horizon between a depth of 20 and 40 inches.

Typical pedon of Pompano fine sand in an area of native range in the extreme western part of Martin County; about 0.2 mile north of Florida Highway 710 and about 1 mile south of Florida Highway 714, SW1/4SE1/4SW1/4 sec. 20, T. 38 S., R. 37 E.

A—0 to 5 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; medium acid; clear wavy boundary.

C1—5 to 12 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; medium acid; gradual wavy boundary.

C2—12 to 20 inches; grayish brown (10YR 5/2) fine sand, few fine distinct mottles of yellowish brown (10YR 5/4), yellow (10YR 7/6), and brown (10YR 4/3); single grained; loose; medium acid; gradual wavy boundary.

C3—20 to 80 inches; light gray (10YR 7/2) fine sand; single grained; loose; few brown (10YR 4/3) vertical streaks in upper part of horizon; neutral.

Reaction ranges from very strongly acid to mildly alkaline.

The A1 or Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or less. Horizons having value of 3 or less are less than 6 inches thick. Some pedons have an A12 horizon that has hue of 10YR, value of 4 or 5, and chroma of 2 or less.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or less; value of 7 and chroma of 4, or value of 8 and chroma of 3 or 4; or hue of 2.5Y, value of 5 or 7, and chroma of 2 or less. The higher chroma are due to uncoated sand grains or to thin coatings of organic matter on sand grains. Some pedons have shell fragments at a depth of more than 40 inches.

Quartzipsamments

Quartzipsamments in this survey area are excessively drained soils that consist of mixed sand and shell overburden material. Most of this material was dredged from adjacent canals and waterways and retains its original undulating topography. Slopes range from 0 to 8 percent.

Reference pedon of Quartzipsamments, 0 to 8 percent slopes, from the north side of the St. Lucie Canal; about 6.75 miles east of Indiantown and about 200 feet south of Florida Highway 726, SW1/4NW1/4NE1/4 sec. 28, T. 39 S., R. 40 E.

C1—0 to 6 inches; grayish brown (10YR 5/2) sand; single grained; loose; estimated 10 percent shell fragments; few coarse shell fragments and whole shells; moderately alkaline; calcareous; clear wavy boundary.

C2—6 to 80 inches; light gray (10YR 7/2) sand; single grained; loose; estimated 10 percent shell fragments; few coarse shell fragments and whole shells; few lumps of cemented shells; moderately alkaline; calcareous.

Reaction ranges from neutral to moderately alkaline throughout the pedon. Shell content is mainly 5 to 15 percent but in places ranges to 40 percent.

The C1 horizon dominantly has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. In a few pedons, it has value of 4. It is sand or fine sand. In a few places numerous lumps of cemented shell are scattered over the surface. The C1 horizon ranges from 0 to 6 inches in thickness.

In most pedons the C2 horizon has a color range similar to the C1 horizon, but in some pedons in coastal areas the lower part of the horizon is highly gleyed. Some pedons have pockets of gleyed sandy clay loam, pockets of cemented shell fragments, or a few limestone fragments. In other pedons in coastal areas, the overburden material is 2 to 5 feet thick overlying gleyed sandy clay loam or sandy clay.

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 beds of sandy and loamy marine sediments (fig. 13). These soils are on broad, low flats and in depressional areas. The water table is within a depth of 10 inches for 2 to 4 months in most years and between a depth of 10 and 30 inches for most of the rest of the year. Depressions are ponded for 6 to 12 months in most years. Slopes are less than 2 percent.

Riviera soils are geographically closely associated with Chobee, Floridana, Holopaw, Pineda, Wabasso, and Winder soils. Chobee and Floridana soils have a mollic epipedon. Holopaw soils have an argillic horizon below a depth of 40 inches. Pineda soils have a Bir horizon above the argillic horizon, and Wabasso soils have a spodic horizon above the argillic horizon. Winder soils have an argillic horizon at a depth of less than 20 inches.

Typical pedon of Riviera fine sand in an area of grassy sloughland; about 100 feet east of Florida Highway 710, 1.1 miles south of Florida Highway 714, and about 0.4 mile north of a railroad crossing on Florida Highway 710, NW1/4NE1/4 sec. 29, T. 38 S., R. 37 E.

A1—0 to 4 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine and few coarse roots; neutral; gradual wavy boundary.

A21—4 to 17 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; neutral; clear wavy boundary.

A22—17 to 31 inches; light gray (10YR 7/2) fine sand; single grained; loose; common coarse mottles or

Figure 13.—Riviera fine sand in a canal bank. Tonguing of the sandy A2 horizon into the Bt horizon is common. Numerous white shell fragments give the IIC horizon a speckled appearance.

pockets of very pale brown (10YR 7/3); neutral; clear wavy boundary.

A23—31 to 36 inches; discontinuous, horizontal bands of light gray (10YR 7/2) and brown (10YR 5/3) fine sand; single grained; loose; few medium distinct yellowish brown (10YR 5/8) streaks along old root channels; neutral; abrupt irregular boundary.

B2tg&A—36 to 42 inches; olive gray (5Y 5/2) fine sandy loan; few fine distinct strong brown (7.5YR 5/8) and olive brown (2.5Y 4/4) mottles; few fine tongues and pockets of light gray (10YR 7/2) material from the A2 horizon; weak coarse subangular blocky structure; friable, slightly sticky; sand grains coated and bridged with clay; many fine darker colored old root channels throughout; strongly acid; gradual wavy boundary.

C1g—42 to 56 inches; light gray (2.5Y 7/2) fine sand with common coarse distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/6) mottles; weak medium granular structure; very friable; few large pockets of olive gray (5Y 5/2) fine sand; mildly alkaline; gradual wavy boundary.

IIC—56 to 80 inches; light gray (10YR 7/1) fine sand mixed with many white shell fragments and few white shells; single grained; loose; moderately alkaline; calcareous.

The A1 horizon has hue of 10YR, value of 2 to 5, and chroma of 1. Where value is 3.5 or less, the horizon is less than 6 inches thick. The A2 horizon has hue of 10YR, value of 5 to 8, chroma of 1 or 2, with or without mottles or pockets in shades of brown, yellow, or gray. The A horizon is sand or fine sand. It is strongly acid to slightly acid and ranges from 20 to 40 inches in thickness.

The B2tg part of the B2tg&A horizon has hue of 10YR, 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 hue of 5Y, value of 5 or 6, and chroma of 1 or 2 with mottles in shades of brown and yellow. It is sandy loam, fine sandy loan, or sandy clay loam and has tongues or vertical inclusions from the A2 horizon. Reaction ranges from slightly acid to moderately alkaline. However, in some places, this horizon contains small bodies of pyrites. If this soil is drained, sulfates are released in these places and the reaction in localized spots becomes extremely acid.

The C1g horizon has hue of 10YR and 5Y, 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, with or without mottles of brown, yellow, or olive. This horizon ranges from sand to fine sandy loam and is slightly acid to moderately alkaline. It is absent in some pedons.

The IIC horizon generally is at a depth of more than 40 inches. It has hue of 10YR, 5Y, and 5GY, value of 5 to 7, and chroma of 1. This horizon is a mixture of sandy material and a varying amount of shell fragments. It is mildly alkaline or moderately alkaline and is calcareous.

St. Johns Variant

Soils of the St. Johns Variant are sandy, siliceous, hyperthermic Typic Haplaquods. They are deep, very poorly drained, moderately permeable soils that formed in thick deposits of sandy marine sediment. These nearly level soils are in depressions, sloughs, and low flatwoods. Slopes range from 0 to 2 percent. These soils are ponded for 6 months or more in most years, and except for dry seasons the water table is within 10 inches of the surface the rest of the time.

St. Johns Variant soils are geographically closely associated with Basinger, Lawnwood, Placid, Salerno, Samsula, Sanibel, and Waveland soils. Basinger soils do not have an umbric epipedon and a spodic horizon. Lawnwood, Salerno, and Waveland soils do not have an umbric epipedon and have an ortstein. Placid soils do not have a spodic horizon. Samsula soils are organic. Sanibel soils have a histic epipedon and do not have a spodic horizon.

Typical pedon of St. Johns Variant sand in a shallow depression in native rangeland; about 0.75 mile south of C-23 Canal, 0.6 mile west of Murphy Road, and about 0.25 mile north of Bessey Creek, SE1/4SW1/4SE1/4 sec. 2, T. 38 S., R. 40 E.

A11—0 to 4 inches; black (10YR 2/1) sand; weak fine granular structure; friable; many fine and medium roots; few uncoated sand grains; about 15 percent organic matter; very strongly acid; clear wavy boundary.

A12—4 to 14 inches; black (10YR 2/1) sand; weak fine granular structure; very friable; common fine and medium roots; few uncoated sand grains; few to common small pockets of grayish brown (10YR 5/2) sand; very strongly acid; gradual wavy boundary.

A21—14 to 30 inches; dark gray (10YR 4/1) sand; single grained; loose; few fine roots; many streaks of black (10YR 2/1) and very dark gray (10YR 3/1) sand in upper part; common fine and medium pockets of gray (10YR 5/1, 6/1) sand; very strongly acid; gradual wavy boundary.

A22—30 to 40 inches; gray (10YR 6/1) sand; common medium faint light grayish brown (10YR 6/2) mottles; single grained; loose; very strongly acid; gradual wavy boundary.

B1h—40 to 48 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; many uncoated sand grains; very strongly acid; abrupt wavy boundary.

B21h—48 to 54 inches; black (10YR 2/1) sand; common coarse faint dark brown (7.5YR 3/2) mottles; massive in place, parts to weak fine granular structure; sand grains well coated with organic matter; few weakly cemented fragments; very strongly acid; gradual irregular boundary.

B22h—54 to 62 inches; dark reddish brown (5YR 3/2) sand; weak fine granular structure; very friable; common medium pockets of black (5YR 2/1) sand; few coarse pockets of grayish brown (10YR 5/2) sand; very strongly acid; clear wavy boundary.

B3—62 to 72 inches; dark brown (10YR 4/3) sand; single grained; loose; very strongly acid.

Thickness of the A horizon ranges from 30 to 50 inches. Reaction is strongly acid or very strongly acid throughout the pedon. Some pedons have a few inches of muck on the surface.

The A1 horizon has hue of 10YR or it is neutral, value of 2 or 3, and chroma of 1 or less. It ranges from 10 to 20 inches in thickness. The A2 horizon has hue of 10YR or it is neutral, value of 4 to 7, and chroma of 2 or less. In most pedons, the A2 horizon has vertical darker streaks.

The B1h horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2, with many uncoated sand grains. It ranges from 0 to 10 inches in thickness.

The B2h horizon has 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. In most pedons, the upper part of the B2h horizon has uniform color and the lower part has mixed colors. In some pedons, less than 50 percent of the B2h horizon is weakly cemented, or it contains weakly cemented fragments. In some pedons, this horizon has small to large pockets of lighter colored A2 horizon material.

The B3 horizon has hue of 10YR, value of 3 or 4, and chroma of 3; hue of 6.5YR, value of 4, and chroma of 2 or 4; or hue of 5YR, value of 3, and chroma of 4. This horizon is absent in some pedons.

Where present, the C horizon has hue of 10YR, value of 5 to 7, and chroma of 3; or hue of 10YR and 2.5Y, value of 6 or 7, and chroma of 2. In some pedons, this horizon has pockets or discontinuous layers of loamy sand or loamy fine sand.

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 deposits of marine or eolian sand. These nearly level to moderately steep soils are on the coastal ridge and other elevated knolls in the flatwoods. Slopes are smooth to irregular and range from 0 to 20 percent. The water table is below a depth of 72 inches.

St. Lucie soils are geographically closely associated with Jonathan, Paola, Pomello, Salerno, and Satellite Variant soils. Jonathan, Pomello, and Salerno soils have a Bh horizon and are more poorly drained than St. Lucie soils. Paola soils have a B horizon within a depth of 45 inches. Satellite Variant soils are at a lower elevation than St. Lucie soils and are more poorly drained.

Typical pedon of St. Lucie sand on Rocky Point; 1 mile northeast of center of Salerno, and 0.5 mile south of the St. Lucie River in the Hanson Grant:

A—0 to 3 inches; gray (10YR 5/1) sand rubbed; single grained; loose; many fine and medium roots; mixture of uncoated sand grains and fine organic matter granules unrubbed; very strongly acid; gradual wavy boundary.

C—3 to 80 inches; white (10YR 8/1) sand; single grained; loose; many medium roots in upper 16 inches; dark gray streaks in old root channels in upper 20 inches; very strongly acid.

Reaction is very strongly acid or strongly acid throughout the pedon, but it may be less acid in the A horizon during dry periods due to the influx of salt-laden sea air. The pedon is sand to a depth of more than 80 inches and does not have a subsurface diagnostic horizon within a depth of 84 inches.

The A horizon is a mixture of uncoated quartz sand grains and black organic matter granules. It has rubbed hue of 10YR, value of 4, and chroma of 1; or value of 5 or 6 and chroma of 2 or less. The A horizon ranges from 1 inch to 4 inches in thickness.

The C horizon has hue of 10YR, value of 6, and chroma of 1; or value of 7 or 8 and chroma of 2 or less

Salerno series

Soils of the Salerno series are sandy, siliceous, hyperthermic, orstein Grossarenic Haplaquods. They are deep, poorly drained, very slowly to moderately slowly permeable soils that formed in sandy marine deposits. These soils are in broad, nearly level areas of flatwoods. They are saturated by a perched water table during the rainy season and following heavy rainfall in other seasons. Slopes are dominantly less than 1 percent but range to 2 percent along the edges of drainageways and depressions.

Salerno soils are geographically closely associated with Basinger, Jonathan, Nettles, Oldsmar, Wabasso, and Waveland soils. Basinger soils do not have a spodic horizon. Jonathan soils are on low knolls and ridges and are better drained than Salerno soils. Nettles, Oldsmar, and Wabasso soils have an argillic horizon and Oldsmar and Wabasso soils do not have an ortstein. Waveland soils have a spodic horizon at a depth of less than 50 inches.

Typical pedon of Salerno sand in an area of undisturbed flatwoods; about 2.5 miles south of Port Salerno, 1 mile north of Poinciana Gardens subdivision, and about 600 feet east of U.S. Highway 1 in the Gomez Grant:

A11—0 to 4 inches; black (N 2/0) sand rubbed; mixture of fine black organic matter granules and uncoated sand grains unrubbed; weak fine granular structure; very friable; many fine and medium roots; extremely acid; clear smooth boundary.

A12—4 to 9 inches; very dark gray (N 3/0) sand; single grained; loose; many fine and medium and few coarse roots; many uncoated sand grains; extremely acid; clear wavy boundary.

A21—9 to 17 inches; dark gray (10YR 4/1) sand; common very dark grayish brown (10YR 3/2) streaks in old root channels; single grained; loose; common fine and medium roots; very strongly acid; gradual diffuse boundary.

A22—17 to 46 inches; light brownish gray (10YR 6/2) fine sand; few dark grayish brown (10YR 4/2) streaks in old root channels; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.

A3—46 to 61 inches; brown (10YR 5/3) fine sand; common streaks and pockets of very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2); single grained; loose; few fine and medium roots; very strongly acid; abrupt wavy bondary.

B2h—61 to 76 inches; black (N 2/0) fine sand; few pockets of dark reddish brown (5YR 2/2); massive; firm; weakly cemented; few fine and medium roots; sand grains well coated with colloidal organic matter; extremely acid; clear irregular boundary.

B3&Bh—76 to 100 inches; dark reddish brown (5YR 3/4) fine sand; few weakly cemented dark reddish brown

(5YR 3/3) spodic fragments; single grained; loose; noncemented; few fine roots; extremely acid.

Thickness of the A horizon is more than 50 inches. The pedon is sand or fine sand throughout. Reaction is dominantly extremely acid to strongly acid but ranges to neutral in coastal areas.

The A1 or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2; or it is neutral and value is 2 to 4. Where value is less than 3.5, thickness is less than 10 inches. The A2 horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2; hue of 2.5Y, value of 5 to 8, and chroma of 2; or it is neutral and value is 5 to 8. The A3 horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 3. Streaks or mottles of dark grayish brown or very dark grayish brown are in the A2 and A3 horizons.

In some pedons, a transitional B1h horizon is between the A and B2h horizons. Where present, it has hue of 10YR, value of 2 to 4, and chroma of 1 or 2, with or without few to common, fine to medium streaks of A2 horizon material and common to many uncoated sand grains. Thickness ranges from 1 inch to 4 inches. The B1h horizon does not meet the requirements of a spodic horizon.

The B2h horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; or it is neutral and value is 2. More than half of the horizon in each pedon is weakly or moderately cemented. It is firm or very firm and frequently brittle. In many pedons, there are subhorizons of the B2h horizon. Where present, they have hue of 5YR, value of 3, and chroma of 2 to 4; or hue of 7.5YR, value of 3, and chroma of 2. These horizons are noncemented, and they have loose to friable consistence. Sand grains are coated with colloidal organic material. In some pedons, streaks or pockets of A2 horizon material are in the B2h horizon.

The B3 horizon, where present, 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, and it is noncemented. The B3&Bh horizon is similar in color to the B3 horizon and has few to common, medium to coarse, weakly to strongly cemented fragments of spodic material.

In some pedons, a C horizon is within a depth of 80 inches. It 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 2; or it is neutral and value is 5 or 6, with or without mottles or a few dark Bh fragments.

Samsula series

Soils of the Samsula series are sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists. They are very poorly drained, rapidly permeable soils that formed in well decomposed organic material overlying sandy marine sediment. These nearly level soils are in depressional areas and in freshwater swamps and marshes. Under natural conditions, the soil is ponded much of the time. Slopes are 0 to 1 percent.

Samsula soils are geographically closely associated with Basinger, Lawnwood, Placid, Sanibel, St. Johns Variant, and Waveland soils. All of those soils are mineral. Sanibel soils have a histic epipedon.

Typical pedon of Samsula muck in a large depression; about 4 miles northwest of Indiantown, about 0.75 mile west of Fox Brown Road, and 4 miles south of the intersection of Fox Brown Road and Florida Highway 714, SE1/4SE1/4SE1/4 sec. 33, T. 38 S., R. 38 E.

Oa1—0 to 12 inches; black (5YR 2/1) muck rubbed; about 5 percent fiber rubbed; moderate medium granular structure; very friable; dark brown (10YR 4/3) sodium pyrophosphate extract; common fine roots; extremely acid (pH 4 in 0.01 molar calcium chloride solution); gradual smooth boundary.

Oa2—12 to 34 inches; dark reddish brown (5YR 3/2) muck rubbed; about 8 percent fiber rubbed; weak medium granular structure; very friable; dark brown (10YR 4/3) sodium pyrophosphate extract; common fine and medium roots; extremely acid (pH 4 in 0.01 molar calcium chloride solution); gradual wavy boundary.

IIAb—34 to 44 inches; very dark gray (10YR 3/1) sand; single grained; loose; medium acid; gradual wavy boundary.

IICb—44 to 80 inches; light brownish gray (10YR 6/2) sand; single grained; loose; medium acid.

Thickness of the organic material ranges from 16 to 40 inches. The organic material has pH value of less than 4.5 in 0.01 molar calcium chloride solution and has pH range of 4.5 to 5.5 by Hellige-Troug analysis. The underlying mineral material is strongly acid to medium acid.

The Oa horizon has hue of 5YR, 7.5YR, and 10YR, value of 2, and chroma of 1 or 2; hue of 5YR, value of 3, and chroma of 2 or 3; or it is neutral and value is 2. The fiber content ranges from 30 to 60 percent unrubbed and is less than 16 percent rubbed.

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

The IICb horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2; or it is neutral and value is 4 through 6. It is sand or fine sand.

Sanibel series

Soils of the Sanibel series are siliceous, hyperthermic Typic Psammaquents. They are deep, very poorly drained, rapidly permeable soils that formed in thick beds of marine sand and are overlain by a thin mantle of organic material. These nearly level soils are in small to large marshes and swamps, depressional areas, and poorly defined drainageways. Water is above the surface for several months each year. Slopes are less than 1 percent.

Sanibel soils are geographically closely associated with Basinger, Hontoon, Lawnwood, Placid, Samsula, and Waveland soils. Basinger soils have a Bh horizon and do not have a histic epipedon. Hontoon and Samsula soils are organic. Lawnwood and Waveland soils are at a slightly higher elevation than Sanibel soils. They have a spodic horizon and do not have a histic epipedon. Placid soils have an umbric epipedon and do not have a histic epipedon.

Typical pedon of Sanibel muck in a large cultivated depressional area; about 2.2 miles northwest of the center of Indiantown, 1.4 miles north of intersection of Florida Highways 710 and 609, and about 500 feet east of Highway 609, SW1/4NW1/4SW1/4 sec. 30, T. 39 S., R. 39 E.

Oap—12 to 5 inches; black (5YR 2/1) muck, unrubbed and rubbed; about 15 percent fiber, less than 5 percent rubbed; weak medium granular structure; friable; many fine roots; about 10 percent mineral material; dark brown (10YR 3/3) sodium pyrophosphate extract; extremely acid (pH 4 in 0.01 molar calcium chloride solution); clear wavy boundary.

Oa2—5 inches to 0; dark reddish brown (5YR 2/2) muck, unrubbed and rubbed; about 30 percent fiber, less than 10 percent rubbed; massive; about 30 percent mineral material; many pockets or splotches of black (10YR 2/1); brown (10YR 4/3) sodium pyrophosphate extract; extremely acid (pH 4 in 0.01 molar calcium chloride solution); clear wavy boundary.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) sand; weak medium granular structure; very friable; common streaks of gray (10YR 5/1) sand; extremely acid; clear wavy boundary.

C1—4 to 11 inches; grayish brown (10YR 5/2) sand; single grained; loose; medium acid; gradual wavy boundary.

C2—11 to 80 inches; light gray (10YR 7/2) sand; single grained; loose; slightly acid.

Reaction ranges from extremely acid to slightly acid.

The Oa 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. It ranges from 8 to 16 inches in thickness. In some pedons the Oa2 subhorizon may consist of less decomposed hemic material.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or value of 3 and chroma of 2; or it is neutral and value is 2 or 3. Some pedons have few to many, fine to medium streaks or pockets of uncoated sand grains. The A horizon is sand or fine sand. It ranges from 2 to 8 inches in thickness.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. In some pedons, the upper part of the C horizon has chroma of 3. If chroma of 3 is present in this horizon, it is because of organic stains on sand grains and is generally in pedons that are transitional between soils in flatwoods and organic soils. The C horizon is sand or fine sand to a depth of 80 inches or more.

Satellite Variant

Soils of the Satellite Variant are hyperthermic, uncoated Typic Quartzipsamments. They are deep, moderately well drained, very rapidly permeable soils that formed in thick deposits of sandy marine sediment. These nearly level soils are on slightly elevated knolls and ridges in the flatwoods. Slopes range from 0 to 2 percent. The water table is between a depth of 40 and 60 inches for 6 to 9 months and between a depth of 30 and 40 inches for less than 60 cumulative days in most years.

Satellite Variant soils are geographically closely associated with Basinger, Jonathan, Pomello, Salerno, St. Lucie, and Waveland soils. Basinger soils are more poorly drained than Satellite Variant soils and have a Bh horizon. Jonathan soils have an ortstein and a spodic horizon. Pomello soils have a spodic horizon. Salerno and Waveland soils are more poorly drained than Satellite Variant soils and have an ortstein and a spodic horizon. St. Lucie soils are at a higher elevation and are better drained.

Typical pedon of Satellite Variant sand in Poinciana Gardens subdivision entrance and about 0.3 mile west of U.S. Highway 1 in the Gomez Grant:

A—0 to 5 inches; gray (10YR 5/1) sand; single grained; loose; many fine and medium roots; mixture of uncoated sand grains and organic matter has a salt-and-pepper appearance; strongly acid; clear wavy boundary.

C1—5 to 17 inches; light gray (10YR 7/2) sand; single grained; loose; common medium and coarse roots; medium acid; gradual wavy boundary.

C2—17 to 39 inches; light brownish gray (10YR 6/2) sand; single grained; loose; common fine and medium, few coarse roots; few darker streaks along old root channels; medium acid; gradual wavy boundary.

C3—39 to 80 inches; grayish brown (10YR 5/2) sand; single grained; loose; few fine and medium roots; darker streaks in old root channels; medium acid.

Reaction ranges from very strongly acid to slightly acid throughout the pedon. Sand extends to a depth of more than 80 inches.

The A horizon has hue of 10YR or it is neutral, value of 4 to 6, and chroma of 1 or less. It has a varying amount of fine black (10YR 2/1) organic matter granules. The A horizon ranges from 2 to 6 inches in thickness.

The C horizon has hue of 10YR or it is neutral, value of 5 to 8, and chroma of 1 or less; hue of 10YR, value of 4 to 7, and chroma of 2; or hue of 2.5Y, value of 4 to 6, and chroma of 2. Lower value or chroma of 2 in the C horizon is because of organic staining of sand grains. Horizons with lower value do not underlie horizons with value of more than one unit lighter. Some pedons have brownish mottles or stainings in root channels.

Tequesta Variant

Soils of the Tequesta Variant are fine-loamy, siliceous, hyperthermic Typic Umbraqualfs. They are very poorly drained, moderately permeable to slowly permeable soils that formed in sandy and loamy marine sediment under conditions favorable to the accumulation of organic material. These nearly level soils are in depressional areas and marshes. They are ponded for long periods. Slopes are less than 2 percent.

Tequesta Variant soils are geographically associated with Canova Variant, Chobee, Floridana, Gator, Okeelanta, Riviera, and Winder soils. Canova Variant soils do not have an umbric epipedon and have limestone within a depth of 40 inches. Chobee, Floridana, Riviera, and Winder soils do not have a histic or an umbric epipedon. Gator and Okeelanta soils are organic.

Typical pedon of Tequesta Variant muck in an undeveloped shallow depressional area in Caulkins Grove; about 2.3 miles southwest of Indiantown and 1.1 miles south of Florida Highway 76, NE1/4SW1/4 sec. 13, T. 40 S., R. 38 E.

Oa—14 inches to 0; black (10YR 2/1) muck; less than 5 percent fiber rubbed; weak medium granular structure; friable; estimated 40 percent sand; many uncoated sand grains; strongly acid; gradual wavy boundary.

A1—0 to 12 inches; black (10YR 2/1) sand; weak fine granular structure; very friable; estimated 15 percent organic matter; medium acid; gradual wavy boundary.

A2—12 to 16 inches; light brownish gray (10YR 6/2) sand; single grained; loose; common medium faint dark grayish brown (10YR 4/2) and gray (10YR 5/1) mottles; medium acid; clear irregular boundary.

B2tg—16 to 26 inches; grayish brown (10YR 5/2) sandy clay loam; common medium faint dark grayish brown (10YR 4/2) mottles; weak coarse subangular blocky structure; firm; slightly sticky and plastic; moderately alkaline; gradual wavy boundary.

B3g—26 to 34 inches; dark grayish brown (2.5Y 4/2) loamy sand; massive; nonsticky; few pockets of sand and sandy loam; few very dark grayish brown streaks in old root channels; moderately alkaline; gradual wavy boundary.

Cg—34 to 50 inches; light gray (2.5Y 7/2) and light brownish gray (2/5Y 6/2) sand; single grained; loose; few lenses or pockets of loamy sand; moderately alkaline.

Thickness of the solum is 30 inches or more. Reaction is strongly acid to neutral in the Oa and A horizons, and slightly acid to moderately alkaline in the Bt and C horizons.

The Oa horizon has hue of 10YR, value of 2, and chroma of 1; or hue of 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 or 3. It ranges from 6 to 16 inches in thickness.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or it is neutral and has value of 2 or 3. It is 10 inches or more in thickness. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 2 or less. In some pedons, the A2 horizon is absent. Total thickness of the A horizon is less than 20 inches.

The B2tg horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2; hue of 2.5Y, value of 3 to 5, and chroma of 2; or hue of 5Y, value of 4 or 5, and chroma of 1 or 2. Few to common mottles in shades of gray, brown, or olive may be present. The B2tg horizon is sandy clay loam, sandy loam, or fine sandy loam, but in most pedons this horizon has pockets of coarser textured material. Clay content of the Btg horizon ranges from 18 to 35 percent but is commonly 18 to 25 percent.

In some pedons the B3g horizon is absent. Where present, it has a color range similar to that of the B2tg horizon. It is loamy sand, loamy fine sand, or sandy loam, with or without pockets or lenses of coarser or finer material.

The Cg horizon has hue of 10YR or 5Y, 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 sand or loamy sand. In some pedons, this horizon has lenses or pockets of sandy loam or sandy clay loam. In a few pedons, all or part of the Cg horizon is mixed sand and shell fragments.

Terra Ceia Variant

Soils of the Terra Ceia Variant are euic, hyperthermic Typic Medisaprists. They are deep, very poorly drained, moderately to moderately rapidly permeable organic soils that formed in thick deposits of hydrophytic plant remains. These nearly level soils are in small to large mangrove swamps that are flooded daily or periodically by salty or brackish water. Slopes are less than 1 percent.

Terra Ceia Variant soils are geographically closely associated with Canaveral, Jonathan, Nettles, Okeelanta Variant, and Waveland soils. Okeelanta Variant soils are in a similar position to Terra Ceia Variant soils, but they differ in having 16 to 40 inches or organic material overlying sandy material. Canaveral, Jonathan, Nettles, and Waveland soils are in upland positions, do not have organic material, and are better drained than Terra Ceia Variant soils.

Typical pedon of Terra Ceia Variant muck in a mangrove swamp in the South Fork of the St. Lucie

River; about 5 miles south of Stuart on the east bank of the South Fork, and about 0.25 mile south of its junction with the St. Lucie Canal in the Hanson Grant:

Oa1—0 to 12 inches; black (10YR 2/1) muck; less than 5 percent fiber unrubbed; massive; slightly sticky; estimated mineral content 20 percent; common fine roots; light yellowish brown (10YR 6/4) sodium pyrophosphate extract; slightly acid (pH 6.5 in 0.01 molar calcium chloride solution); clear wavy boundary.

Oa2—12 to 40 inches; dark reddish brown (5YR 2/2) muck; less than 10 percent fiber unrubbed, less than 5 percent rubbed; massive; few fine roots; estimated mineral content about 10 percent; light yellowish brown (10YR 6/4) sodium pyrophosphate extract; slightly acid (pH 6.3 in 0.01 molar calcium chloride solution); gradual wavy boundary.

Oa3—40 to 60 inches; black (10YR 2/1) muck; less than 10 percent fiber unrubbed, less than 5 percent rubbed; massive; sticky; estimated 25 percent fine mineral matter; common pockets of dark reddish brown (5YR 2/2) muck; light yellowish brown (10YR 6/4) sodium pyrophosphate extract; slightly acid (pH 6.4 in 0.01 molar calcium chloride solution).

Thickness of organic material and depth to mineral material is more than 51 inches and commonly ranges to 60 inches or more. Reaction ranges from slightly acid to neutral throughout the pedon.

The Oa1 horizon has hue of 10YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 2, and chroma of 1 or 2. Fiber content is less than 10 percent unrubbed. In most pedons mineral content in this horizon is less than 20 percent, but in some pedons it ranges from 20 to 40 percent. Thickness ranges from 4 to 18 inches.

The Oa2 and Oa3 horizons have hue of 10YR, value of 2, and chroma of 1 or 2; hue of 5YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 or 3. Fiber content ranges from 10 to 30 percent unrubbed and less than 10 percent rubbed. Mineral content ranges from about 5 to 40 percent. In some pedons, fibers from woody plants range to about 30 percent. Sandy, loamy, or clayey mineral material is below the organic material.

Torry series

Soils of the Torry series are euic, hyperthermic Typic Medisaprists. They are deep, very poorly drained organic soils that formed in deposits of hydrophytic plant remains mixed with a high content of fine mineral material. These soils are in broad, freshwater marshes and are saturated most of the year. Slopes are less than 1 percent.

Torry soils are geographically closely associated with Adamsville Variant and Okeelanta soils. Adamsville Variant soils are mineral soils that have sandy material overlying an organic subsoil. Okeelanta soils are organic soils that have 16 to 40 inches of organic material overlying sandy material.

Typical pedon of Torry muck in a drained and cultivated area of sugarcane; about 1.8 miles south of Florida Highway 76, 0.1 mile north of Palm Beach County line, and 200 feet east of Florida East Coast Railroad, SE1/4SW1/4 sec. 26, T. 40 S., R. 38 E.

Oap—0 to 10 inches; black (10YR 2/1) muck; less than 5 percent fiber unrubbed; moderate medium and coarse granular structure; friable; estimated 60 percent mineral content; very dark grayish brown (10YR 3/2) sodium pyrophosphate extract; neutral; gradual wavy boundary.

Oa2—10 to 24 inches; black (5YR 2/1) muck; less than 5 percent fiber unrubbed; massive, breaks to moderate medium subangular blocky structure; very sticky; estimated 50 to 60 percent mineral content; very dark grayish brown (10YR 3/2) sodium pyrophosphate extract; neutral; gradual wavy boundary.

Oa3—24 to 56 inches; black (5YR 2/1) muck; about 25 percent fiber, less than 5 percent rubbed; massive; slightly sticky; estimated 20 percent mineral content; dark brown (10YR 4/3) sodium pyrophosphate extract; neutral; clear wavy boundary.

IIC—56 to 62 inches; light gray (10YR 7/2) loamy marl; massive; slightly sticky; common darker streaks and pockets; moderately alkaline; calcareous; abrupt wavy boundary.

R—62 inches; hard limestone.

Thickness of organic material and depth to limestone is more than 51 inches. Reaction ranges from medium acid to neutral in 0.01 molar calcium chloride solution.

The Oap horizon has hue of 10YR, value of 2, and chroma of 1; or it is neutral and has value of 2. Fiber content ranges from 2 to 10 percent rubbed. Mineral content ranges from 40 to 70 percent and consists mainly of clay. The Oap horizon is 6 to 14 inches thick.

The Oa2 horizon has hue of 10YR and 5YR, value of 2, and chroma of 1 or 2. Fiber content ranges from 2 to 10 percent rubbed. Mineral content ranges from 40 to 70 percent and consists mainly of clay. The Oa2 horizon extends below the surface to a depth of more than 18 inches.

The Oa3 horizon has hue of 10YR and 5YR, value of 2, and chroma of 2 or less. Fiber content ranges to 50 percent but is less than 15 percent rubbed. The Oa3 horizon has mineral content of 10 to 40 percent.

The IIC horizon has hue of 10YR or 2.5Y, value of 6 to 8, and chroma of 1 or 2. It ranges from sand to loamy marl and is 0 to 8 inches thick. Hard limestone is below the IIC horizon or the Oa horizon, generally at a depth of more than 60 inches.

Tuscawilla series

Soils of the Tuscawilla series are fine-loamy, carbonatic, hyperthermic Typic Ochraqualfs. They are poorly drained, moderately permeable soils that formed in thick beds of sandy and loamy marine sediment overlying fine calcareous material. These nearly level soils are on flatwoods and in semihammocky areas. Slopes range from 0 to 2 percent. The water table is within a depth of 10 inches for 2 to 6 months in most years.

Tuscawilla soils are geographically closely associated with Chobee, Floridana, Pinellas, Riviera, Wabasso, and Winder soils. Chobee soils are in depressional areas and have a mollic epipedon. Floridana soils are in depressional areas, have a mollic epipedon, and have an argillic horizon below a depth of 20 inches. Pinellas soils have an A2ca horizon and an argillic horizon below a depth of 20 inches. Riviera soils have an argillic horizon below a depth of 20 inches that has glossic properties. Wabasso soils have a spodic horizon within a depth of 30 inches overlying an argillic horizon. Winder soils have glossic properties.

Typical pedon of Tuscawilla sand in an area of improved pasture; 1.9 miles west of Florida Highway 609 and 0.5 mile south of Florida Highway 714; about 0.75 mile southwest of ranch headquarters, NW1/4NW1/4SW1/4 sec. 23, T. 38 S., R. 38 E.

Ap—0 to 4 inches; black (10YR 2/1) sand rubbed; weak fine granular structure; very friable; mixture of organic matter and uncoated sand grains; many fine roots; medium acid; clear smooth boundary.

A21—4 to 8 inches; dark gray (10YR 4/1) sand; single grained; loose; few fine and coarse roots; neutral; gradual wavy boundary.

A22—8 to 12 inches; light brownish gray (10YR 6/2) sand; common medium faint light gray (10YR 7/2) mottles; single grained; loose; common fine and coarse roots; dark brown streaks along old root channels; moderately alkaline; abrupt wavy boundary.

B1—12 to 15 inches; dark grayish brown (10YR 4/2) loamy sand; common fine faint grayish brown mottles; weak medium subangular blocky structure; friable; slightly sticky; many fine roots; sand grains coated and bridged with clay; neutral; abrupt irregular boundary.

B21t—15 to 22 inches; grayish brown (2.5Y 5/2) sandy clay loam; many fine and medium light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; sticky and plastic; many fine and few coarse roots; sand grains coated and bridged with clay; common carbonate accumulations along root channels; moderately alkaline; clear wavy boundary.

B22tca—22 to 32 inches; white (10YR 8/1) sandy loam; apparent texture is sandy clay loam; few coarse faint light gray (10YR 7/2) mottles; weak coarse granular structure; friable; few coarse roots; sand grains coated and bridged with clay and carbonates; many soft lime nodules, few hard lime nodules; strongly alkaline; calcareous; gradual wavy boundary.

B3ca—32 to 46 inches; light brownish gray (2.5Y 6/2) loamy sand; common medium distinct brownish yellow (10YR 6/6) mottles; weak coarse granular structure; friable; few coarse roots; sand grains coated with clay and carbonates; common soft and few hard lime nodules; strongly alkaline; calcareous; gradual wavy boundary.

IIC1—46 to 61 inches; light brownish gray (2.5Y 6/2) sandy loam; common medium distinct light olive brown (2.5Y 5/6) mottles; massive; friable; slightly sticky; few coarse roots; few pockets of soft lime and shell fragments; strongly alkaline; calcareous; clear wavy boundary.

IIC2—61 to 80 inches; greenish gray (5GY 6/1) and light brownish gray (2.5Y 6/2) sandy loam; massive; friable; slightly sticky; about 50 percent lime nodules and shell fragments; strongly alkaline; calcareous.

Thickness of the solum is 30 to 50 inches. Reaction ranges from strongly acid to moderately alkaline in the A horizon. The Btg horizon is neutral to strongly alkaline and is calcareous. The C horizon is mildly alkaline to moderately alkaline and is calcareous.

The Ap or A1 horizon is neutral, value is 2 to 4, and chroma is 0; or it has hue of 10YR, value of 2 to 4, and chroma of 1 or 2; or hue of 2.5Y, value of 4, and chroma of 2. It ranges from 4 to 6 inches thick. The A2 horizon is neutral and value is 4 to 8; or it has hue of 10YR, value of 4 to 8, and chroma of 1 or 2; or hue of 2.5Y, value of 4 to 7, and chroma of 2. Darker streaks are in root channels. The A horizon is fine sand and ranges from 8 to 20 inches in thickness.

The B1t horizon, where present, is similar in color to the upper part of the B2t horizon. It is sandy loam or loamy sand.

The Btg horizon has hue of 10YR or 2.5Y, value of 3 to 7, and chroma of 2 or less, generally highly mottled in shades of yellow, brown, and olive. It is sandy clay loam in the upper part and ranges to sandy loam in the lower part. Secondary carbonates commonly occur in root channels in the upper part of the horizon, and the carbonate content increases as depth increases. The Btg horizon ranges from 8 to 24 inches in thickness. Average clay content of the control section ranges from 18 to 35 percent but is dominantly 18 to 25 percent. The B3ca horizon is fine sandy loam or loamy fine sand and has matrix colors and carbonate content similar to those of the Btg horizon.

The IIC horizon has hue of 10YR and 2.5Y, value of 5 to 8, and chroma of 2 or less; or hue of 5Y and 5GY, value of 5 or 6, and chroma of 1. In most pedons, this horizon has mottles in shades of olive brown and yellow. Carbonates are mostly concentrated in pockets or cemented fragments. The IIC horizon generally is below a depth of about 30 inches. It ranges from sand or fine sand to sandy loam, and in most pedons it has fine shell fragments.

Udorthents

Udorthents in this survey area are well drained to excessively drained soils that consist of mixed sandy and loamy overburden material and rock fragments or boulders. This material was excavated from adjacent areas, deposited in long ridges, and shaped to form a dike along the shore of Lake Okeechobee. Side slopes are about 30 to 35 percent, and the narrow crest is 0 to 2 percent.

Udorthents are associated with Pompano and Adamsville Variant soils. They differ from the associated soils in lacking an orderly sequence of horizons and in having a high content of rock fragments.

Typical pedon of Udorthents, 0 to 35 percent slopes, at edge of roadway on top of Hoover Dike; about 0.5 mile south of the St. Lucie Canal locks at Port Mayaca, NE1/4SW1/4NE1/4 sec. 22, T. 40 S., R. 37 E.

C1—0 to 1 inch; mixed soil material, about 50 percent very dark gray (10YR 3/1) fine sand and about 45 percent grayish brown (10YR 5/2) fine sand; weak fine granular structure; very friable; few white shell fragments; moderately alkaline; calcareous; clear smooth boundary.

C2—1 to 6 inches; mixed soil material, about 70 percent grayish brown (10YR 5/2) fine sand and about 25 percent pale brown (10YR 6/3) fine sand; single grained; loose; many white shell fragments and few limestone fragments; moderately alkaline; calcareous; diffuse boundary.

C3—6 to 80 inches; mixed grayish brown (10YR 5/2) fine sand, light gray (10YR 7/2) fine carbonatic material; shell fragments and rock fragments in the interstices of cobbles and boulders. Cobbles 1 inch to 3 inches in diameter are dominant in the upper part and large boulders are dominant in the lower part. Soil material is moderately alkaline and calcareous.

The mixed soil material is dominant only in the upper 4 to 10 inches. The thin dark surface layer is the result of sodding. Other layers are variable in all soil properties. Side slopes and the crest areas have similar pedons.

Valkaria series

Soils of the Valkaria series are siliceous, hyperthermic Spodic Psammaquents. They are deep, poorly drained, rapidly permeable soils that formed in sandy marine sediment. These nearly level soils are in poorly defined drainageways and low lying areas. The water table is within a depth of 10 inches for 3 to 6 months and between a depth of 10 and 40 inches for 6 months or more in most years. Slopes range from 0 to 2 percent.

Valkaria soils are geographically closely associated with Basinger, Ft. Drum, Malabar, and Oldsmar soils. Basinger soils have a weak Bh horizon and do not have a Bir horizon. Ft. Drum soils have a Bca horizon. Malabar and Oldsmar soils have a Bt horizon. In addition, Oldsmar soils have a Bh horizon.

Typical pedon of Valkaria fine sand in an area of disturbed native rangeland; about 2.3 miles north of Florida Highway 714, and 1.9 miles west of the intersection of Florida Highway 714 and the Florida East Coast Railroad, NE1/4NW1/4SW1/4 sec. 5, T. 38 S., R. 37 E.

A1—0 to 7 inches; dark gray (10YR 4/1) fine sand, weak fine granular structure; very friable; many fine roots; strongly acid; abrupt wavy boundary.

A2—7 to 13 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few to common fine roots; medium acid; clear wavy boundary.

B11ir—13 to 19 inches; brown (10YR 5/3) fine sand; single grained; loose; few medium concretions; medium acid; clear wavy boundary.

B12ir—19 to 29 inches; pale brown (10YR 6/3) fine sand; many medium faint yellowish brown (10YR 5/6) mottles; single grained; loose; few medium concretions; medium acid; clear, wavy boundary.

B2ir—29 to 35 inches; yellowish brown (10YR 5/8) fine sand; single grained; loose; sand grains coated with iron oxides; few medium concretions; medium acid; gradual wavy boundary.

B3ir—35 to 45 inches; brown (10YR 5/3) fine sand; common coarse faint pale brown (10YR 6/3) mottles; single grained; loose; medium acid; gradual wavy boundary.

C1—45 to 55 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; medium acid; clear wavy boundary.

C2—55 to 70 inches; light gray (10YR 7/1) fine sand; many coarse distinct pale yellow (2.5Y 7/4) mottles; single grained; loose; medium acid; clear wavy boundary.

C3—70 to 80 inches; light yellowish brown (2.5Y 6/4) fine sand; single grained; loose; slightly acid.

Fine sand extends to a depth of 80 inches or more. Reaction ranges from strongly acid to neutral in the A horizon; from medium acid to neutral in the Bir horizon; and from medium acid to mildly alkaline in the C horizon.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Where value is 2 or 3, the horizon is less than 6 inches thick. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2.

The B1ir horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. This horizon is absent in some pedons. The B2ir horizon has hue of 10YR, value of 5 to 7, and chroma of 6 or 8; or value of 6 and chroma of 4.

It ranges from 6 to 20 inches in thickness. Some pedons have few to common, strong brown, small cemented concretions. The B3ir horizon has hue of 10YR, value of 5 to 8, and chroma of 3 or 4.

The C horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2; hue of 2.5Y, value of 6, and chroma of 2; or hue of 5Y, value of 6 or 7, and chroma of 1. In some pedons, the C horizon is mottled in gray, brown, or yellow.

Wabasso series

Soils of the Wabasso series are sandy, siliceous, hyperthermic Alfic Haplaquods. They are poorly drained, slowly or very slowly permeable soils that formed in sandy and loamy marine sediment. These nearly level soils are in broad areas of flatwoods and in wet depressional areas in the flatwoods. Slopes range from 0 to 2 percent. The water table is between a depth of 10 and 40 inches for more than 6 months and at less than 10 inches for 1 to 2 months in most years. Depressions are ponded for 6 to 9 months in most years.

Wabasso soils are geographically associated with Floridana, Oldsmar, Pineda, Riviera, and Winder soils. Floridana soils have a mollic epipedon. Oldsmar soils have a Bh horizon within 30 inches of the surface and a Bt horizon within 40 inches. Pineda soils have a Bir horizon. Riviera and Winder soils do not have a spodic horizon.

Typical pedon of Wabasso sand; about 9.25 miles west of Palm City; 0.25 mile south of Florida Highway 714, and 0.8 mile east of power line, SE1/4NW1/4NW1/4 sec. 22, T. 38 S., R. 39 E.

A11—0 to 2 inches; black (N 2/0) sand; weak fine granular structure; very friable; many fine roots; mixture of organic matter and uncoated sand grains; very strongly acid; abrupt wavy boundary.

A12—2 to 7 inches; very dark gray (N 3/0) sand; weak fine granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

A21—7 to 12 inches; gray (N 5/0) sand; single grained; loose; few to common fine roots; very strongly acid; clear wavy boundary.

A22—12 to 20 inches; light brownish gray (10YR 6/2) sand; single grained; loose; few to common fine and coarse roots; common very dark gray (10YR 3/1) streaks in old root channels; very strongly acid; clear wavy boundary.

B21h—20 to 23 inches; very dark gray (10YR 3/1) sand; single grained; loose; few coarse roots; common fine and medium pockets of black and dark gray sand; very strongly acid; clear wavy boundary.

B22h—23 to 36 inches; black (10YR 2/1) sand; massive; friable; few medium roots; common fine pockets of gray and dark gray sand; medium acid; clear wavy boundary.

B21t—36 to 41 inches; very dark grayish brown (10YR 3/2) fine sandy loam; few fine faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; slightly sticky and slightly plastic; common fine roots; sand grains bridged and coated with clay; slightly acid; clear wavy boundary.

B22t—41 to 49 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; few medium faint olive brown (2.5Y 4/4) mottles; weak medium subangular blocky structure; slightly sticky and slightly plastic; common fine roots; sand grains bridged and coated with clay; neutral; clear wavy boundary.

B23t—49 to 58 inches; olive gray (5Y 5/2) fine sandy loam; many medium distinct light olive brown (2.5Y 5/4) mottles; massive; slightly sticky and slightly plastic; few fine roots; sand grains bridged and coated with clay; moderately alkaline; clear wavy boundary.

C1—58 to 73 inches; olive gray (5Y 5/2) fine sandy loam; few fine faint light olive brown (2.5Y 5/4) mottles; massive; slightly sticky; few fine roots; moderately alkaline; clear wavy boundary.

C2—73 to 80 inches; greenish gray (5GY 6/1) sandy loam; massive; slightly sticky and slightly plastic; moderately alkaline.

Reaction in the A and Bh horizons ranges from very strongly acid to slightly acid. Reaction in the Bt horizon ranges from medium acid to moderately alkaline. The C horizon is neutral to moderately alkaline and is calcareous in some places.

The A1 horizon is neutral or has hue of 10YR, value of 2 to 4, and chroma of 1 or less. It ranges from 3 to 8 inches in thickness. The A2 horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 or less. Total thickness of the A horizon is less than 30 inches. In some pedons a thin transitional horizon that has hue of 10YR, value of 3 or 4, and chroma of 3 or less is at the base of the A horizon.

The B2h horizon has hue of 10YR or 5YR, value of 2, 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. Sand grains are well coated with organic matter. The B2h horizon ranges from 2 to 14 inches in thickness. The B2t horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3; or value of 5 or 6, and chroma 1 to 4; or hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 2 or less, with mottles in shades of gray, brown, yellow, or red. It is sandy loam or sandy clay loam. Some pedons have tongues or pockets of coarser material. Reaction ranges from medium acid to moderately alkaline. The B2t horizon is between a depth of 24 and 40 inches, and it ranges from 4 to more than 20 inches in thickness. In some pedons the Bt horizon is underlain by grayish fine sand or loamy sand.

The C horizon has hue of 5Y, 2.5Y, or 10YR, value of 4 to 6, and chroma of 3 or less; or hue of 5GY, value of 5 or 6, and chroma of 1 or less. It is loamy sand or fine sand, mixed with varying amounts of white shell fragments.

Waveland series

Soils of the Waveland series are sandy, siliceous, hyperthermic, ortstein Arenic Haplaquods. They are poorly drained, very slowly to moderately slowly permeable soils that formed in sandy marine deposits. These nearly level soils are in broad areas of flatwoods and in depressional areas in flatwoods. A 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 in most years. A perched water table is above the Bh horizon early in the rainy season and following heavy rainfall in other seasons. Depressions are ponded for 6 to 9 months in most years. Slopes are dominantly less than 1 percent but range to 2 percent along edges of drainageways and in depressions.

Waveland soils are geographically closely associated with Basinger, Jonathan, Lawnwood, Nettles, Oldsmar, Placid, Salerno, and Wabasso soils. Basinger and Placid soils are in depressions and sloughs and do not have a spodic horizon. In addition, Placid soils have an umbric epipedon. Oldsmar and Wabasso soils do not have an ortstein and have an argillic horizon below the spodic horizon. Nettles soils have an argillic horizon below an ortstein layer. Lawnwood and Salerno soils are on similar areas of flatwoods, but Lawnwood soils have an ortstein within a depth of 30 inches and Salerno soils have an ortstein below a depth of 50 inches. Jonathan soils are better drained than Waveland soils and have an ortstein below a depth of 50 inches.

Typical pedon of Waveland sand in an area in natural flatwoods vegetation; about 1 mile south of Salerno Road and 0.25 mile south of U.S. Highway 1 at the entrance to Lake St. George subdivision, SE1/4SW1/4SW1/4 sec. 31, T. 38 S., R. 42 E.

A11—0 to 7 inches; dark gray (N 4/0) sand; weak fine granular structure; very friable; many fine and medium and few coarse roots; organic matter segregated in fine and medium black granules; strongly acid; gradual wavy boundary.

A12—7 to 18 inches; dark gray (10YR 4/1) sand; weak fine granular structure; very friable; common fine and medium roots mostly in upper part; streaks of dark grayish brown (10YR 4/2) in old root channels; about one-half organic matter content similar to horizon above; medium acid; clear wavy boundary.

A21—18 to 36 inches; light gray (10YR 7/2) sand; single grained; loose; common fine and medium roots mostly in upper part; streaks of dark grayish brown (10YR 4/2) in old root channels; slightly acid; clear wavy boundary.

A22—36 to 43 inches; grayish brown (10YR 5/2) sand, single grained; loose; few medium roots; streaks of dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) in old root channels; strongly acid; abrupt wavy boundary.

B21h—43 to 47 inches; black (N 2/0) sand; massive in place, crushes to weak fine granular structure; friable; few soft, weakly cemented nodules; most sand grains coated with organic matter; few fine and medium roots; strongly acid; clear wavy boundary.

B22h—47 to 77 inches; black (N 2/0) loamy sand; massive, crushes to moderate medium and coarse subangular blocky structure; firm; moderately cemented; sand grains well coated with organic matter; few medium root remnants; lower 20 inches of mixed black (N 2/0, 5YR 2/1) and dark reddish brown (5YR 2/2); very strongly acid; clear wavy boundary.

B23h—77 to 91 inches; black (5YR 2/1) sand; weak fine granular structure; very friable; few weakly cemented pockets; common pockets of dark reddish brown (5YR 2/2) sand; most sand grains coated with organic matter; medium acid; gradual wavy boundary.

B3—91 to 110 inches; dark brown (7.5YR 4/4, 10YR 4/3) sand; single grained; loose; sand grains slightly coated with organic matter; medium acid.

Reaction ranges from very strongly acid to slightly acid in the A horizon and from very strongly acid to medium acid in the Bh horizon.

The A1 horizon is neutral and value is 2 to 4; or it has hue of 10YR, value of 2 to 4, and chroma of 1. Where value is less than 3.5, this horizon is less than 10 inches thick. The A1 horizon is a mixture of organic matter and uncoated sand grains. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. It may have mottles or streaks of lower value. The A horizon is sand or fine sand. Total thickness ranges from 30 to 50 inches.

Some pedons have a B1h horizon. Where present, it has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. It does not meet the requirements for a spodic horizon. Reaction ranges from very strongly acid to medium acid. The B1h horizon is sand or fine sand. It ranges from 0 to 4 inches in thickness.

The B2h horizon is neutral and value is 2; or it has hue of 10YR or 5YR, value of 2, 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, pockets of A2 horizon material are in the B2h horizon. Cementation ranges from noncemented to cemented. Fifteen to 65 percent of the Bh horizon vertical thickness or a subhorizon 1 inch or more thick in more than 50 percent of each pedon is weakly to strongly cemented. Consistence ranges from very firm in the strongly cemented parts to very friable in the noncemented parts. Few to common vertical tongues of the Bh horizon extend into the C horizon in some pedons. Thickness of the Bh horizon is highly variable within short distances. The B2h horizon is sand, fine sand, loamy sand, or loamy fine sand.

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. In many pedons this horizon is absent. In some pedons there is a B3&Bh horizon. Where present, color of the B3 part is similar to that of the B3 horizon and the Bh part is similar to the Bh horizon.

In some pedons a C horizon is below a depth of 50 inches. It has hue of 10YR or 5Y, value of 4 to 6, and chroma 1 to 4; or hue of 2.5YR, value of 5 or 6, and chroma of 2 or 4, with or without mottles in shades of gray, yellow, brown, or red. Many pedons have few to common, medium to large randomly scattered pockets of loamy sand, loamy fine sand, sandy loam, or fine sandy loam. Reaction is very strongly acid to medium acid.

Winder series

Soils of the Winder series are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs. They are poorly drained, slowly to very slowly permeable soils that formed in beds of sandy and loamy marine sediment. These nearly level soils are in long, low depressional areas in the flatwoods. They are ponded for 6 to 9 months in most years. Slopes are less than 2 percent.

Winder soils are geographically closely associated with Chobee, Floridana, Gator, Pineda, Riviera, Tuscawilla, and Wabasso soils. Chobee and Floridana soils have a mollic epipedon, and Floridana soils have an argillic horizon between a depth of 20 and 40 inches. Gator soils are organic. Pineda and Riviera soils have an argillic horizon between a depth of 20 and 40 inches and, in addition, Pineda soils have a Bir horizon. Tuscawilla soils are in a carbonitic family. Wabasso soils have a spodic horizon.

Typical pedon of Winder sand on a broad, low flat in improved pasture; about 2.3 miles south of Florida Highway 714, and 0.3 mile west of Florida Highway 609, NW1/4SW1/4NE1/4 sec. 36, T. 38 S., R. 38 E.

Ap—0 to 7 inches; dark gray (10YR 4/1) sand; weak fine granular structure; very friable; mixture of organic matter and uncoated sand grains; many fine and medium roots; medium acid; gradual wavy boundary.

A2—7 to 15 inches; gray (10YR 6/1) sand; many coarse faint grayish brown (10YR 5/2) mottles in upper part and common coarse light gray (10YR 7/2) mottles in lower part; single grained; loose; common fine and medium roots; few carbonate nodules at base of horizon; moderately alkaline; abrupt irregular boundary.

B&A—15 to 26 inches; light brownish gray (2.5Y 6/2) sandy clay loam; common vertical tubular intrusions of dark grayish brown (10YR 4/2) sand; sand grains coated and bridged with clay; moderately alkaline; clear wavy boundary.

B2tg—26 to 42 inches; light gray (2.5Y 7/2) sandy clay loam; common fine and medium distinct brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure; sticky and plastic; few medium roots; common fine white nodules of secondary carbonates; lower part more strongly gleyed; strongly alkaline; calcareous; gradual wavy boundary.

Cg—42 to 62 inches; greenish gray (5GY 6/1) loamy sand; common medium distinct olive brown (2.5Y 4/4) mottles; weak fine granular structure; friable; few to common white carbonate accumulations; strongly alkaline; calcareous; gradual wavy boundary.

IICg—62 to 80 inches; greenish gray (5GY 6/1) loamy sand mixed with many white shell fragments; single grained; loose; strongly alkaline; calcareous.

Thickness of the solum ranges from 24 to 50 inches. Reaction ranges from medium acid to neutral in the A horizon and from neutral to strongly alkaline in the Bt horizon.

The Ap or A1 horizon has hue of 10YR, value of 4 or less, and chroma of 1 or less. It ranges from 3 to 8 inches in thickness. The A2 horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 or less, with or without gray and brown mottles. Total thickness of the A horizon is less than 20 inches.

The B&A horizon has hue of 10YR, 2.5Y, 5Y, or it is neutral, has value of 4 to 7, and chroma of 2 or less, with mottles in shades of yellow, brown, or gray. The B part is sandy loam or sandy clay loam. Vertical intrusions of A2 horizon material about 1 inch in diameter are few to common. White nodules of secondary carbonates are in some pedons.

The B2tg horizon is similar in color and texture to the B part of the B&A horizon and has mottles of yellow, brown, and gray. Soft, white nodules of secondary carbonates are common to many.

The IICg horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 2 or less; or hue of 5GY, value of 5 to 7, and chroma of 1, with or without mottles of yellow, brown, or olive. It is loamy sand, sand, fine sand, or loamy fine sand. Shell fragments are absent in some pedons.

formation of the soils

In this section, the factors of soil formation are discussed and related to the soils in the survey area. In addition, the processes of soil formation are described.

factors of soil formation

Soil is produced by forces of weathering and soil formation acting on the parent material that has been deposited or accumulated by geologic agencies. The kind of soil that forms depends on (1) the type of parent material; (2) the climate under which soil material has existed since accumulation; (3) the plant and animal life in and on the soil; (4) the relief, or lay of the land; and (5) 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 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 only weakly expressed horizons. The effect of the parent material is modified greatly in some places by the effects of climate, relief, and plants and animals in and on the soil. As a soil forms, it is influenced by more than one of the five factors, but in some places all but one factor can have little effect. Modifications or variations in any of these factors result in a different 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 Martin County Area formed in materials that overlie and are influenced by four major geologic formations (*5*).

The oldest formation, the Caloosahatchee Marl, is of Pliocene age. It consists mainly of sand and varying amounts of shell, some of which are preserved unbroken. The Caloosahatchee Marl underlies the entire survey area. Although no surface exposures of the formation occur in the survey area, it lies close enough to the surface, in places, to be cut into by the deeper canals.

The Fort Thompson Formation is one of three formations of Pleistocene age that occur in the survey area. It consists of a series of alternating beds of limestone, shells, sand, and marl of marine, brackish, and freshwater origin. This formation rests unconformably on the Caloosahatchee Marl and dips from west to east. It is below a depth of about 10 feet at the edge of Lake Okeechobee and below a depth of 50 feet in the eastern part of the county.

The Anastasia Formation of Pleistocene age underlies most of the survey area. It rests unconformably on the Fort Thompson Formation. It consists of sand and shell beds and thin, discontinuous layers of sandy limestone and sandstone. The Anastasia Formation forms the backbone of the coastal ridge and is exposed in several places along the ocean shoreline.

Pamlico Sand of late Pleistocene age mantles all of the survey area and is the basic material in which most of the mineral soils have formed. The present land surface is the Pamlico Sand, which extends up to about 25 feet above sea level. Along the coastal ridge the Pamlico Sand is heaped up into ridges and dunes to elevations greater than 25 feet.

Within marshes and swamps that occur in the lowest areas of the present land surface are organic materials that have accumulated during recent times. These deposits of organic materials, ranging from 1 to 6 feet thick, overlie the Pamlico Sand.

climate

Martin 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 waters of the Atlantic Ocean and the Indian and St. Lucie Rivers. These waters contribute to the high humidity of the survey area. The climate in summer is uniform throughout the survey area. The climate, however, accounts for few differences among soils. Rainfall averages about 57 inches a year.

Such a climate as this aids in the rapid decomposition of organic matter and hastens chemical reactions in the soil. The heavy rainfall leaches the soils of most plant nutrients and has produced strongly acid conditions in many of the sandy soils. It also carries the less soluble fine particles downward. Consequently, many of the soils acted upon by these climatic conditions are sandy, have low organic matter content, low natural fertility, and low available water capacity.

plants and animals

Plants have been the principal biological factor in the formation of soils in the survey area, but animals, insects, bacteria, and fungi also have been important. Plant and animal life furnish organic matter and bring plant nutrients from the lower to the upper horizons. Differences in the amount of organic matter, nitrogen, and plant nutrients in the soils and differences in soil structure and porosity are caused by plants and animals. In places, roots of trees and crayfish have penetrated loamy subsoil horizons 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. They are most numerous in the upper few inches of the soil. Earthworms and some other small animals infest soil material, alter its chemical composition, and mix it with other soil material. The native vegetation in the survey area has affected soil formation more than other living organisms.

Man has influenced the formation of soils by clearing the forests, cultivating the soils, draining wet areas, and introducing different kinds of plants. The complex of living organisms that affect soil formation has been drastically changed as a result of man's activities. Except for loss of organic matter and minor erosion in places, few results of man's activities are yet apparent.

relief

Relief has affected the formation of soils in the Martin County Area mainly through its influence on soil-water relationships. Other factors of soil formation normally associated with relief, such as erosion, temperature, and plant cover, are of minor importance in the survey area.

Three general areas—flatwoods, swamps and marshes, and coastal ridge—are in the survey area. There are differences in soils among these general areas directly related to relief.

The soils in the flatwoods area have a high water table and are periodically wet to the surface. The soils, therefore, are not as highly leached as those of the coastal ridge. The soils in the swamps and marshes are covered with water for long periods of time and in many places have high organic matter content. The soils in the coastal ridge are at a higher elevation than those in the flatwoods and swamps and marshes. The deep, sandy soils on the ridge are mostly excessively drained and are not influenced by a ground water table. These soils 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, while other minerals are chemically inert and show little change over long periods of time. The translocation of fine particles within the soil to form the various horizons is variable under different conditions, but the processes always involve relatively long periods of time.

In Martin 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 the process involved in the formation of the soil horizon or soil horizon differentiation. The differentiation of horizons in soils in the Martin County Area is the result of accumulation of organic matter, leaching of carbonates, reduction and transfer of iron, accumulation of silicate clay minerals, or more than one of these processes.

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 but fairly large in others.

Carbonates and salts have been leached in all of the soils. The effects of leaching have been indirect in that the leaching permitted the subsequent translocation of silicate clay materials in some soils. Most of the soils of the survey area are leached to varying degrees.

The process of chemical reduction, or gleying, is evident in many of the soils in the Martin County Area except for the excessively drained soils. Gleying is caused by wetness. Gray matrix color in the B horizon of many soils and grayish mottles in other soils indicate the reduction of iron. In some sandy soils, however, gray color is that of the sand grains. Some horizons contain reddish brown mottles and concretions, which indicate the segregation of iron and 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, 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 a few patchy clay films on ped faces and in root channels. Compared with the other processes involved in soil formation, the translocation of silicate clays may be of minor importance in the formation of horizons in the soils of the Martin County Area.

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glossary

ABC soil. A soil having an A, a B, and a C horizon.

Absorption field. The area of natural soil into which a subsurface system of tile or perforated pipe distributes effluent from a septic tank.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding. A method of partially controlling excess water for the growth of citrus and other crops 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. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

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 (in tables). Bedrock is too near the surface for the specified use.

Depressions. An area that is 6 inches to 24 inches or more lower in elevation than the surrounding area and is ponded for long periods.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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(in tables). Too much organic matter for the intended use.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fill. Raise the surface level of the land to a desired level with suitable soil material.

Fine textured soil. Sandy clay, silty clay, and clay.

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 crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hammock. A densely wooded area, slightly elevated above adjacent areas, that has characteristic natural vegetation of cabbage palm, oaks, and pine and an understory of sawpalmetto, shrubs, and grasses. Soils are nearly level, poorly drained, and dominantly sandy and have a calcareous, loamy subsoil.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy and is cemented by organic matter.

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.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the 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.

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 area. An area that has little or no natural soil and supports little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. 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).

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 water(in tables). Depth to ground water is too great.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Ortstein. The B horizon in a Spodosol that is cemented by organic matter, by accumulated sesquioxides, or by both.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

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, 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. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

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 is permeated with pores or cavities.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

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 ground-water runoff or seepage flow from ground water.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

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 in conjunction with other laboratory data to evaluate the load supporting capability of a soil.

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.

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 narrow to broad, generally grassy, slightly depressed, poorly defined drainageway.

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 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A 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.

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.

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."

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unit (soil). A unique natural landscape that has a distinct pattern of soils and drainage features. Soil units are shown on the General soil map.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

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. Regulation of the water table, according to the need of the crop or other use, by means of canals, ditches, tile, pumping, or other appropriate methods.

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(in tables). Soil wet during period of use.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded at Stuart, Florida]

Month	Temperature					Precipitation		
	Normal monthly mean	Normal daily maximum	Normal daily minimum	Mean number of days with temperature of-- 90° F or higher	Mean number of days with temperature of-- 32° F or lower	Normal total	Mean number of days with rainfall of-- 0.10 inch or more	Mean number of days with rainfall of-- 0.50 inch or more
	°F	°F	°F			Inches		
January	65.9	75.5	56.2	0	(*)	2.39	4	1
February	67.0	77.0	57.1	0	(*)	2.36	5	2
March	70.1	80.4	59.7	1	0	3.11	6	3
April	74.3	83.5	65.3	2	0	3.46	7	3
May	77.6	86.6	68.6	7	0	4.48	7	3
June	81.2	89.9	72.4	16	0	6.59	9	4
July	82.3	91.0	73.5	22	0	6.56	13	6
August	82.8	91.4	74.0	26	0	5.51	10	5
September	81.5	89.3	73.8	14	0	9.46	13	6
October	77.6	85.1	70.1	4	0	8.36	10	5
November	72.1	80.4	63.8	(*)	0	2.38	4	2
December	67.6	76.8	58.4	0	(*)	2.32	5	2
Year	75.0	83.9	66.1	92	(*)	56.98	93	42

*Less than half a day.

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded at Fort Pierce, West Palm Beach, and Okeechobee, 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
			Fort Pierce				
32-----	January 6	(*)	(*)	30	6	30	3
28-----	(*)	(*)	(*)	30	0	30	0
			West Palm Beach				
32-----	(*)	(*)	(*)	21	1	22	1
28-----	(*)	(*)	(*)	21	0	22	0
			Okeechobee Hurricane Gate				
32-----	January 16	December 25	343	27	10	24	7
28-----	January 6	(*)	(*)	27	5	24	2

*When the frequency of occurrence in either spring or fall is 1 year in 10, or less, mean dates are not given.

TABLE 3.--SOIL RATINGS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP[1]

[See text for definitions of "slight," "severe," "poor," "low," "moderate," and other terms]

Map unit and component soils[2]	Percent of map unit[3]	Suitability for-- Cropland	Suitability for-- Pasture	Potential for-- Woodland	Limitations for-- Sanitary facilities[4]	Limitations for-- Building sites[5]	Limitations for-- Recreation areas[6]
1. Paola-St. Lucie (4 percent)		Very poor	Poor	Very low	Severe	Slight	Severe.
Paola	50	Very poor: droughty, very low fertility.	Poor: droughty, very low fertility.	Very low: seedling mortality, equipment limitations.	Severe: poor filter, too sandy, seepage.	Slight	Severe: too sandy.
St. Lucie	30	Unsuited: droughty, very low fertility.	Very poor: droughty, very low fertility.	Very low: seedling mortality, equipment limitations.	Severe: poor filter, too sandy, seepage.	Slight	Severe: too sandy.
Minor soils	20						
2. Palm Beach-Canaveral-Beaches (1 percent)		Unsuited	Unsuited	Very low	Severe	Slight	Severe.
Palm Beach	31	Unsuited: droughty, very low fertility.	Unsuited: droughty, very low fertility.	Very low: seedling mortality, equipment limitations.	Severe: poor filter, seepage, too sandy.	Slight	Severe: too sandy.
Canaveral	24	Very poor: droughty, very low fertility.	Poor: droughty, very low fertility.	Low: seedling mortality, equipment limitations.	Severe: wetness, seepage, too sandy.	Severe: wetness.	Severe: wetness, too sandy.
Beaches	14	Unsuited	Unsuited	Not rated	Not rated	Not rated	Not rated.
Minor soils	31						
3. Salerno-Jonathan-Hobe (5 percent)		Moderate	Moderate	Low	Severe	Severe	Severe.
Salerno	40	Moderate: wetness, low fertility.	Moderate: wetness, low fertility.	Low: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, cemented pan.	Severe: seepage, wetness.	Severe: too sandy, wetness.
Jonathan	23	Very poor: droughty, low fertility.	Poor: droughty, low fertility.	Very low: seedling mortality, equipment limitations.	Severe: wetness, cemented pan, too sandy.	Slight	Severe: too sandy.

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP[1]--Continued

Map unit and component soils[2]	Percent of map unit[3]	Suitability for-- Cropland	Suitability for-- Pasture	Potential for-- Woodland	Limitations for-- Sanitary facilities[4]	Limitations for-- Building sites[5]	Limitations for-- Recreation areas[6]
3.							
Hobe	12	Very poor: droughty, low fertility.	Poor: low fertility, droughty.	Very low: seedling mortality, equipment limitations.	Severe: poor filter, wetness, too sandy.	Slight	Severe: too sandy.
Minor soils	25						
4. Waveland-Lawnwood-Basinger (21 percent)		Moderate	Well	Low	Severe	Severe	Severe.
Waveland	45	Moderate: wetness, low fertility, droughty.	Well: wetness.	Low: equipment limitations, seedling mortality.	Severe: wetness, cemented pan, seepage.	Severe: wetness.	Severe: wetness, too sandy, percs slowly.
Lawnwood	20	Moderate: wetness, low fertility, droughty.	Well: wetness.	Low: equipment limitations, seedling mortality.	Severe: wetness, cemented pan, seepage.	Severe: wetness.	Severe: wetness, too sandy, percs slowly.
Basinger	10	Poor: wetness, low fertilty.	Moderate: wetness.	Low: seedling mortality, equipment limitations.	Severe: wetness, poor filter, seepage.	Severe: wetness.	Severe: too sandy, wetness.
Minor soils	25						
5. Nettles (6 percent)		Moderate	Well	Medium	Severe	Severe	Severe.
Nettles	75	Moderate: wetness, droughty.	Well: wetness.	Medium: equipment limitations, seedling mortality.	Severe: cemented pan, wetness, percs slowly.	Severe: wetness.	Severe: wetness, too sandy, percs slowly.
Minor soils	25						
6. Wabasso-Winder (5 percent)		Moderately well	Well	Medium	Severe	Severe	Severe.
Wabasso	40	Moderately well: wetness, droughty.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly.
Winder	35	Poor: ponding.	Moderate: ponding.	Low: seedling mortality, equipment limitations.	Severe: ponding, wetness, percs slowly.	Severe: ponding, wetness.	Severe: ponding, wetness.

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP[1]--Continued

Map unit and component soils[2]	Percent of map unit[3]	Suitability for-- Cropland	Suitability for-- Pasture	Potential for-- Woodland	Limitations for-- Sanitary facilities[4]	Limitations for-- Building sites[5]	Limitations for-- Recreation areas[6]
6.							
Minor soils	25						
7. Wabasso-Riviera-Oldsmar (22 percent)		Moderately well	Well	Medium	Severe	Severe	Severe.
Wabasso	30	Moderately well: wetness, droughty.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly.
Riviera	24	Moderately well: wetness, low fertility.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly, too sandy.
Oldsmar	15	Moderate: wetness, droughty.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: too sandy, wetness.
Minor soils	31						
8. Pineda-Riviera (20 percent)		Moderately well	Well	Medium	Severe	Severe	Severe.
Pineda	40	Moderately well: wetness, low fertility.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly, too sandy.
Riviera	30	Moderately well: wetness, low fertility.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly, too sandy.
Minor soils	30						
9. Pineda-Riviera-Boca (6 percent)		Moderately well	Well	Medium	Severe	Severe	Severe.
Pineda	28	Moderately well: wetness, low fertility.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly, too sandy.
Riviera	25	Moderately well: wetness, low fertility.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, percs slowly, seepage.	Severe: wetness.	Severe: wetness, percs slowly, too sandy.

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP[1]--Continued

Map unit and component soils[2]	Percent of map unit[3]	Suitability for-- Cropland	Suitability for-- Pasture	Potential for-- Woodland	Limitations for-- Sanitary facilities[4]	Limitations for-- Building sites[5]	Limitations for-- Recreation areas[6]
9.							
Boca	22	Moderately well: wetness, low fertility.	Well: wetness.	High: seedling mortality, equipment limitations.	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness, too sandy.
Minor soils	25						
10. Basinger-Ft. Drum-Valkaria (1 percent)		Poor	Well	Low	Severe	Severe	Severe.
Basinger	45	Poor: wetness, low fertility.	Well: wetness.	Low: seedling mortality, equipment limitations.	Severe: wetness, poor filter, seepage.	Severe: wetness.	Severe; too sandy, wetness.
Ft. Drum	20	Moderate: wetness, low fertility.	Well: wetness.	Medium: seedling mortality, equipment limitations.	Severe: wetness, poor filter, seepage.	Severe: wetness.	Severe: wetness, too sandy.
Valkaria	15	Moderate: wetness, low fertility.	Well: wetness.	Low: seedling mortality, equipment limitations.	Severe: wetness, poor filter, seepage.	Severe: wetness.	Severe: wetness, too sandy.
Minor soils	20						
11. Winder-Riviera (1 percent)		Poor	Moderate	Low	Severe	Severe	Severe.
Winder	45	Poor: ponding.	Moderate: ponding.	Low: seedling mortality, equipment limitations.	Severe: ponding, wetness, percs slowly.	Severe: ponding, wetness.	Severe: ponding, wetness.
Riviera	30	Poor: ponding.	Moderate: ponding.	Low: seedling mortality equipment limitations,	Severe: ponding, wetness, percs slowly.	Severe: ponding, wetness.	Severe: ponding, wetness.
Minor soils	25						
12. Floridana-Jupiter-Hilolo (5 percent)		Poor	Moderate	Medium	Severe	Severe	Severe.
Floridana	60	Poor: ponding.	Moderate: ponding.	Medium: equipment limitations, seedling mortality.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, percs slowly, too sandy.

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP[1]--Continued

Map unit and component soils[2]	Percent of map unit[3]	Suitability for--		Potential for--	Limitations for--		
		Cropland	Pasture	Woodland	Sanitary facilities[4]	Building sites[5]	Recreation areas[6]
12.							
Jupiter	15	Moderate: wetness, shallow root zone.	Well: wetness.	Low: windthrow hazard, seedling mortality.	Severe: depth to rock, wetness.	Severe: wetness.	Severe: too sandy, wetness, depth to rock.
Hilolo	7	Moderately well: wetness.	Well: wetness.	Medium: seedling mortality.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: too sandy, wetness.
Minor soils	18						
13. Chobee-Gator (1 percent)		Moderately well	Well	High	Severe	Severe	Severe.
Chobee	50	Moderately well: wetness.	Well: wetness.	High: seedling mortality, equipment limitations.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.
Gator	30	Moderately well: wetness.	Well: wetness.	Unsuited	Severe: floods, wetness, excess humus.	Severe: floods, wetness, low strength.	Severe: excess humus, wetness, floods.
Minor soils	20						
14. Okeelanta-Canova Variant-Floridana (1 percent)		Well	Well	Unsuited	Severe	Severe	Severe.
Okeelanta	40	Well: wetness.	Well: wetness.	Unsuited	Severe: ponding, poor filter, seepage.	Severe: ponding, low strength.	Severe: excess humus, ponding.
Canova Variant	30	Well: wetness.	Well: wetness.	Unsuited	Severe: wetness, depth to rock.	Severe: wetness, low strength.	Severe: excess humus, wetness.
Floridana	20	Poor: ponding.	Moderate: ponding.	Medium: equipment limitations, seedling mortality.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, percs slowly, too sandy.
Minor soils	10						

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP[1]--Continued

Map unit and component soils[2]	Percent of map unit[3]	Suitability for--		Potential for--	Limitations for--		
		Cropland	Pasture	Woodland	Sanitary facilities[4]	Building sites[5]	Recreation areas[6]
15. Bessie-Okeelanta Variant-Terra Ceia Variant (1 percent)		Unsuited	Unsuited	Unsuited	Severe	Severe	Severe.
Bessie	45	Unsuited	Unsuited	Unsuited	Severe: floods, wetness, percs slowly.	Severe: floods, wetness, low strength.	Severe: floods, wetness, excess humus.
Okeelanta Variant	30	Unsuited	Unsuited	Unsuited	Severe: floods, wetness, excess humus.	Severe: floods, wetness, low strength.	Severe: floods, wetness, excess humus.
Terra Ceia Variant	15	Unsuited	Unsuited	Unsuited	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.
Minor soils	10						

[1]The overall rating for the general soil map unit is based on the underlined rating for the dominant soil (soil that makes up the greater percentage of the map unit) or soils if more than one soil has the same rating. The percentage of the map unit to which the overall rating applies can be determined from the underlined rating.

[2]The percentage in parentheses following each of the map units represents the percentage of Martin County Area covered by the map unit.

[3]The percentages are estimates and are not based on measured acreage.

[4]Ratings apply to septic tank absorption fields and trench sanitary landfills.

[5]Ratings apply to dwellings without basements, small commercial buildings, and local roads and streets. A limitation of low strength applies only to local roads and streets.

[6]Ratings apply to camp areas, picnic areas, and playgrounds.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
2	Lawnwood fine sand	15,295	4.4
3	Lawnwood fine sand, depressional	2,089	0.6
4	Waveland sand	34,581	9.9
5	Waveland sand, depressional	3,918	1.1
6	Paola sand, 0 to 8 percent slopes	6,187	1.8
7	St. Lucie sand, 0 to 8 percent slopes	3,850	1.1
8	Palm Beach sand, 0 to 8 percent slopes	1,044	0.3
9	Pomello sand, 0 to 5 percent slopes	1,321	0.4
10	Basinger fine sand, depressional	2,785	0.8
12	St. Johns Variant sand	1,169	0.3
13	Placid sand	1,977	0.6
14	Satellite Variant sand	1,597	0.5
15	Electra fine sand	424	0.1
16	Oldsmar fine sand	13,214	3.8
17	Wabasso sand	35,774	10.3
19	Winder sand	8,848	2.5
20	Riviera fine sand	18,146	5.2
21	Pineda sand	35,228	10.1
22	Okeelanta muck	1,671	0.5
23	Urban land	1,472	0.4
24	Orsino sand, 0 to 5 percent slopes	355	0.1
25	Beaches	475	0.1
26	Pompano fine sand	779	0.2
27	Arents, organic substratum, 0 to 2 percent slopes	1,329	0.4
28	Canaveral sand, 0 to 5 percent slopes	820	0.2
30	Bessie muck	2,011	0.6
31	Cocoa Variant sand	162	(*)
32	Udorthents, 0 to 35 percent slopes	772	0.2
33	Paola-Urban land complex, 0 to 8 percent slopes	327	0.1
34	St. Lucie-Urban land complex, 0 to 8 percent slopes	482	0.1
35	Salerno sand	6,937	2.0
36	Arents, 0 to 2 percent slopes	3,153	0.9
38	Floridana fine sand, depressional	11,531	3.3
39	Quartzipsamments, 0 to 8 percent slopes	2,943	0.9
40	Sanibel muck	1,861	0.5
41	Jonathan sand, 0 to 5 percent slopes	4,173	1.2
42	Hallandale sand	3,585	1.0
44	Boca fine sand	5,027	1.5
45	Hilolo fine sand	1,279	0.4
47	Pinellas fine sand	6,403	1.8
48	Jupiter sand	2,550	0.7
49	Riviera fine sand, depressional	30,821	8.9
50	Okeelanta Variant muck	1,015	0.3
51	Pompano fine sand, occasionally flooded	371	0.1
52	Malabar sand	3,655	1.1
53	Arents, 2 to 35 percent slopes	1,238	0.4
54	Oldsmar fine sand, depressional	1,631	0.5
55	Basinger fine sand	11,275	3.2
56	Wabasso sand, depressional	1,967	0.6
57	Chobee loamy sand	4,908	1.4
58	Gator muck	2,643	0.8
60	Tequesta Variant muck	1,874	0.5
61	Hobe fine sand, 0 to 5 percent slopes	2,090	0.6
62	Nettles sand, depressional	382	0.1
63	Nettles sand	17,218	4.9
64	EauGallie fine sand	3,262	0.9
65	Tuscawilla sand	918	0.3
66	Holopaw fine sand	3,652	1.0
67	Aquents, frequently flooded	219	0.1
68	Pits	54	(*)
69	Hontoon muck	369	0.1
70	Canova Variant muck	1,780	0.5
72	Adamsville Variant sand, 0 to 5 percent slopes	280	0.1
73	Samsula muck	2,618	0.8
74	Torry muck	30	(*)
75	Ft. Drum fine sand	803	0.2
76	Valkaria fine sand	606	0.2
77	St. Lucie sand, 8 to 20 percent slopes	419	0.1
78	Pomello Variant fine sand	1,104	0.3
79	Terra Ceia Variant muck	489	0.1
86	Paola sand, 8 to 20 percent slopes	923	0.3
	Water	2,482	0.7
	Total	348,640	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. Only soils suitable for these crops are listed]

Map symbol and soil name	Oranges	Grapefruit	Tomatoes	Bahiagrass	Pangolagrass	Grass-clover
	Box	Box	Ton	AUM*	AUM*	AUM*
2 Lawnwood	325	400	15	9.0	10.0	12.0
4 Waveland	325	400	15	9.0	10.0	12.0
6 Paola	250	300	---	4.5	---	---
9 Pomello	250	400	---	3.5	---	---
13 Placid	435	500	12	8.5	9.5	10.5
14 Satellite Variant	250	400	---	5.0	---	---
15 Electra	---	---	---	6.0	---	---
16 Oldsmar	325	525	8	9.0	10.0	---
17 Wabasso	400	575	13	9.0	10.0	12.0
19 Winder	425	575	8	9.0	10.0	12.0
20 Riviera	425	575	---	9.0	10.0	12.0
21 Pineda	425	575	13	9.0	10.0	12.0
22 Okeelanta	---	---	---	12.0	10.0	15.0
24 Orsino	350	450	---	5.0	---	---
26 Pompano	300	400	13	8.0	10.0	10.0
28 Canaveral	400	525	---	4.0	---	---
31 Cocoa Variant	500	700	---	4.0	---	---
35 Salerno	350	450	10	8.0	10.0	10.0
40 Sanibel	---	---	---	12.0	13.0	15.0
41 Jonathan	---	---	---	3.0	---	---
42 Hallandale	375	500	16	5.5	---	---
44 Boca	375	575	16	8.0	9.0	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Oranges	Grapefruit	Tomatoes	Bahiagrass	Pangolagrass	Grass-clover
	Box	Box	Ton	AUM*	AUM*	AUM*
45. Hilolo	450	650	8	9.0	10.0	12.0
47. Pinellas	425	575	7	8.0	10.0	12.0
48. Jupiter	375	500	16	5.5	---	---
52. Malabar	325	575	13	8.0	10.0	12.0
55. Basinger	350	450	13	8.0	10.0	12.0
57. Chobee	425	500	6	12.0	13.0	15.0
58. Gator	---	---	---	12.0	13.0	15.0
60. Tequesta Variant	---	---	6	12.0	13.0	15.0
61. Hobe	---	---	---	3.5	---	---
63. Nettles	350	550	13	9.0	10.0	12.0
64. EauGallie	375	575	8	8.0	10.0	12.0
65. Tuscawilla	425	550	---	9.0	10.0	12.0
66. Holopaw	375	575	7	8.0	10.0	10.0
69. Hontoon	---	---	---	12.0	13.0	15.0
70. Canova Variant	---	---	6	12.0	---	15.0
72. Adamsville Variant	375	500	7	7.0	---	---
73. Samsula	---	---	---	12.0	13.0	15.0
74. Torry	---	---	---	12.0	13.0	15.0
75. Ft. Drum	375	500	9	8.0	10.0	10.0
76. Valkaria	350	450	12	7.0	9.0	9.0
78. Pomello Variant	250	400	---	3.5	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 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	118,191	---	118,191	---	---
IV	120,547	---	120,030	517	---
V	---	---	---	---	---
VI	17,716	---	---	17,716	---
VII	73,725	---	67,489	6,236	---
VIII	3,734	---	3,734	---	---

TABLE 7.--POTENTIAL PRODUCTION AND COMPOSITION OF LIVESTOCK FORAGE

[Only the soils that produce significant amounts of forage are listed]

Map symbol and soil name	Potential production		Composition of forage		
	Kind of year	Dry weight	Grass and grasslike	Forbs	Woody plants and trees
		Lb/acre	Pct	Pct	Pct
2-----Lawnwood	Favorable-----	6,000	75	10	15
	Normal-----	4,500			
	Unfavorable-----	3,000			
3-----Lawnwood	Favorable-----	7,000	85	15	(*)
	Normal-----	6,000			
	Unfavorable-----	4,500			
4-----Waveland	Favorable-----	6,000	75	10	15
	Normal-----	4,500			
	Unfavorable-----	3,000			
5-----Waveland	Favorable-----	7,000	85	15	(*)
	Normal-----	6,000			
	Unfavorable-----	4,500			
6-----Paola	Favorable-----	3,500	40	20	40
	Normal-----	2,500			
	Unfavorable-----	1,500			
7-----St. Lucie	Favorable-----	3,500	40	20	40
	Normal-----	2,500			
	Unfavorable-----	1,500			
9-----Pomello	Favorable-----	3,500	40	20	40
	Normal-----	2,500			
	Unfavorable-----	1,500			
10-----Basinger	Favorable-----	6,000	85	15	(*)
	Normal-----	5,000			
	Unfavorable-----	3,000			
12-----St. Johns Variant	Favorable-----	6,000	75	10	15
	Normal-----	4,500			
	Unfavorable-----	3,000			
13-----Placid	Favorable-----	6,000	85	15	(*)
	Normal-----	5,000			
	Unfavorable-----	3,000			
14-----Satellite Variant	Favorable-----	3,500	40	20	40
	Normal-----	2,500			
	Unfavorable-----	1,500			
15-----Electra	Favorable-----	3,500	40	20	20
	Normal-----	2,500			
	Unfavorable-----	1,500			
16-----Oldsmar	Favorable-----	6,000	75	10	15
	Normal-----	4,500			
	Unfavorable-----	3,000			
17-----Wabasso	Favorable-----	6,000	75	10	15
	Normal-----	4,500			
	Unfavorable-----	3,000			
19-----Winder	Favorable-----	4,000	55	20	25
	Normal-----	3,000			
	Unfavorable-----	2,000			
20-----Riviera	Favorable-----	7,000	70	20	15
	Normal-----	5,000			
	Unfavorable-----	3,000			

See footnote at end of table.

TABLE 7.--POTENTIAL PRODUCTION AND COMPOSITION OF LIVESTOCK FORAGE--Continued

Map symbol and soil name	Potential production		Composition of forage		
	Kind of year	Dry weight	Grass and grasslike	Forbs	Woody plants and trees
		Lb/acre	Pct	Pct	Pct
21----------------------------- Pineda	Favorable----------------- Normal-------------------- Unfavorable---------------	6 000 4,500 3,000	85	15	(*)
22----------------------------- Okeelanta	Favorable----------------- Normal-------------------- Unfavorable---------------	10,000 8,500 4,500	80	15	5
24----------------------------- Orsino	Favorable----------------- Normal-------------------- Unfavorable---------------	3,500 2,500 1,500	40	20	40
26----------------------------- Pompano	Favorable----------------- Normal-------------------- Unfavorable---------------	6,000 4,500 3,000	85	15	(*)
35----------------------------- Salerno	Favorable----------------- Normal-------------------- Unfavorable---------------	6,000 4,500 3,000	75	10	15
38----------------------------- Floridana	Favorable----------------- Normal-------------------- Unfavorable---------------	10,000 8,500 4,000	80	15	5
40----------------------------- Sanibel	Favorable----------------- Normal-------------------- Unfavorable---------------	10,000 8,500 4,000	80	15	5
41----------------------------- Jonathan	Favorable----------------- Normal-------------------- Unfavorable---------------	3,500 2,500 1,500	40	20	40
42----------------------------- Hallandale	Favorable----------------- Normal-------------------- Unfavorable---------------	4,000 3,000 2,000	75	10	15
44----------------------------- Boca	Favorable----------------- Normal-------------------- Unfavorable---------------	4,000 3,000 2,000	55	20	25
45----------------------------- Hilolo	Favorable----------------- Normal-------------------- Unfavorable---------------	4,000 3,000 2,000	55	20	25
47----------------------------- Pinellas	Favorable----------------- Normal-------------------- Unfavorable---------------	4,000 3,000 2,000	55	20	25
48----------------------------- Jupiter	Favorable----------------- Normal-------------------- Unfavorable---------------	4,000 3,000 2,000	55	20	25
49----------------------------- Riviera	Favorable----------------- Normal-------------------- Unfavorable---------------	7,000 6,000 4,500	85	15	(*)
52----------------------------- Malabar	Favorable----------------- Normal-------------------- Unfavorable---------------	7,000 5,000 3,000	70	15	15
54----------------------------- Oldsmar	Favorable----------------- Normal-------------------- Unfavorable---------------	7,000 6,000 4,500	85	15	(*)
55----------------------------- Basinger	Favorable----------------- Normal-------------------- Unfavorable---------------	6,000 5,000 3,500	85	15	(*)

See footnote at end of table.

TABLE 7.--POTENTIAL PRODUCTION AND COMPOSITION OF LIVESTOCK FORAGE--Continued

Map symbol and soil name	Potential production		Composition of forage		
	Kind of year	Dry weight	Grass and grasslike	Forbs	Woody plants and trees
		Lb/acre	Pct	Pct	Pct
56: Wabasso	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
57: Chobee	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
58: Gator	Favorable	10,000	80	15	5
	Normal	8,500			
	Unfavorable	4,500			
60: Tequesta Variant	Favorable	10,000	80	15	5
	Normal	8,500			
	Unfavorable	4,000			
61: Hobe	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
62: Nettles	Favorable	7,000	85	15	(*)
	Normal	6,000			
	Unfavorable	4,500			
63: Nettles	Favorable	6,000	75	15	10
	Normal	4,500			
	Unfavorable	3,000			
64: EauGallie	Favorable	6,000	75	10	15
	Normal	4,500			
	Unfavorable	3,000			
65: Tuscawilla	Favorable	4,000	55	20	25
	Normal	3,000			
	Unfavorable	2,000			
66: Holopaw	Favorable	6,000	85	15	(*)
	Normal	4,500			
	Unfavorable	3,000			
69: Hontoon	Favorable	10,000	80	15	5
	Normal	8,500			
	Unfavorable	4,500			
72: Adamsville Variant	Favorable	3,500	40	20	20
	Normal	2,500			
	Unfavorable	1,500			
73: Samsula	Favorable	10,000	80	15	15
	Normal	8,500			
	Unfavorable	4,500			
75: Ft. Drum	Favorable	4,000	55	20	20
	Normal	3,000			
	Unfavorable	2,000			
76: Valkaria	Favorable	6,000	85	15	(*)
	Normal	4,500			
	Unfavorable	3,000			
77: St. Lucie	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			

See footnote at end of table.

TABLE 7.--POTENTIAL PRODUCTION AND COMPOSITION OF LIVESTOCK FORAGE--Continued

Map symbol and soil name	Potential production		Composition of forage		
	Kind of year	Dry weight	Grass and grasslike	Forbs	Woody plants and trees
		Lb/acre	Pct	Pct	Pct
78: Pomello Variant	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			
86: Paola	Favorable	3,500	40	20	40
	Normal	2,500			
	Unfavorable	1,500			

*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]

Map symbol and soil name	Ordination symbol	Management concerns: Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
2 Lawnwood	4w	Moderate	Moderate	Moderate	Moderate	Slash pine	70	Slash pine, South Florida slash pine.
						Longleaf pine	60	
						South Florida slash pine	35	
3 Lawnwood	4w	Severe	Severe	Slight	Severe	Pond pine	60	
4 Waveland	4w	Moderate	Moderate	Moderate	Moderate	Slash pine	70	Slash pine, South Florida slash pine.
						South Florida slash pine	35	
						Longleaf pine	60	
5 Waveland	4w	Severe	Severe	Slight	Severe	Pond pine	60	
6 Paola	5s	Moderate	Severe	Slight	Slight	Sand pine	50	Sand pine.
7 St. Lucie	5s	Severe	Moderate	Slight	Slight	Sand pine	60	Sand pine.
9 Pomello	4s	Moderate	Severe	Moderate	Moderate	Slash pine	70	Sand pine.
						Longleaf pine	60	
						Sand pine	60	
						South Florida slash pine	35	
10 Basinger	4w	Severe	Severe	Severe	Severe	Pond pine	60	
12 St. Johns Variant	4w	Severe	Severe	Slight	Moderate	Pond pine	50	South Florida slash pine.
13 Placid	2w	Severe	Severe	Slight	Severe	Slash pine	90	Slash pine, South Florida slash pine.
						Longleaf pine	80	
						South Florida slash pine	55	
14 Satellite Variant	4s	Moderate	Severe	Slight	Slight	Slash pine	60	Slash pine, South Florida slash pine.
						Sand pine	55	
						South Florida slash pine	40	
15 Electra	4s	Moderate	Severe	Slight	Slight	Slash pine	70	Slash pine, sand pine, South Florida slash pine.
						Sand pine	65	
						Longleaf pine	65	
						South Florida slash pine	35	
16 Oldsmar	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine, South Florida slash pine.
						Longleaf pine	65	
						South Florida slash pine	45	
17 Wabasso	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine, South Florida slash pine.
						South Florida slash pine	45	
19 Winder	2w	Moderate	Moderate	Moderate	Moderate	Slash pine	90	Slash pine, South Florida slash pine.
						South Florida slash pine	55	

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Equip-ment limita-tion	Management concerns: Seedling mortal-ity	Management concerns: Wind-throw hazard	Management concerns: Plant competi-tion	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
20----------------- Riviera	3w	Moderate	Moderate	Moderate	Moderate	Slash pine---------- South Florida slash pine---------------	80 45	Slash pine, South Florida slash pine.
21----------------- Pineda	3w	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine --------------	80 70 45	Slash pine.
24----------------- Orsino	4s	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- Sand pine----------- South Florida slash pine --------------	70 60 70 35	Slash pine, sand pine, South Florida slash pine.
26----------------- Pompano	4w	Severe	Severe	Slight	Moderate	Slash pine---------- South Florida slash pine --------------	70 45	Slash pine, South Florida slash pine.
28----------------- Canaveral	4s	Severe	Severe	Slight	Moderate	Sand pine----------- Slash pine---------- South Florida slash pine --------------	70 70 35	Slash pine, South Florida slash pine.
31----------------- Cocoa Variant	3s	Moderate	Moderate	Slight	Moderate	South Florida slash pine -------------- Sand pine-----------	40 60	South Florida slash pine.
35----------------- Salerno	4w	Moderate	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine --------------	70 65 35	Slash pine, South Florida slash pine.
38----------------- Floridana	3w	Severe	Severe	Slight	Severe	Pond pine-----------	65	
41----------------- Jonathan	5s	Moderate	Severe	Slight	Slight	Sand pine-----------	45	Sand pine.
42----------------- Hallandale	4w	Moderate	Moderate	Moderate	Moderate	South Florida slash pine --------------	35	South Florida slash pine.
44----------------- Boca	2w	Moderate	Moderate	Slight	Moderate	South Florida slash pine --------------	55	South Florida slash pine.
45----------------- Hilolo	3w	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine --------------	80 70 50	Slash pine.
47----------------- Pinellas	4w	Moderate	Moderate	Moderate	Moderate	South Florida slash pine -------------- Longleaf pine-------	35 60	Slash pine.
48----------------- Jupiter	4w	Severe	Moderate	Moderate	Moderate	South Florida slash pine --------------	35	South Florida slash pine.
52----------------- Malabar	3w	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine --------------	80 70 45	Slash pine, South Florida slash pine.
54----------------- Oldsmar	4w	Severe	Severe	Slight	Severe	Pond pine-----------	60	
55----------------- Basinger	4w	Severe	Severe	Slight	Severe	Slash pine---------- Longleaf pine------- South Florida slash pine --------------	70 60 35	South Florida slash pine.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
56----------------- Wabasso	4w	Severe	Severe	Slight	Severe	Pond pine-----------	60	
57----------------- Chobee	2w	Severe	Moderate	Slight	Severe	Slash pine---------- Longleaf pine------- South Florida slash pine --------------	90 70 55	Slash pine, South Florida slash pine.
60----------------- Tequesta Variant	2w	Severe	Moderate	Moderate	Moderate	South Florida slash pine --------------	55	South Florida slash pine.
61----------------- Hobe	5s	Moderate	Severe	Slight	Slight	Sand pine-----------	45	Sand pine.
62----------------- Nettles	4w	Severe	Severe	Slight	Severe	Pond pine-----------	60	
63----------------- Nettles	3w	Moderate	Moderate	Slight	Moderate	Slash pine---------- South Florida slash pine --------------	80 45	Slash pine, South Florida slash pine.
64----------------- EauGallie	3w	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine-------	80 70	Slash pine.
65----------------- Tuscawilla	2w	Moderate	Moderate	Slight	Moderate	South Florida slash pine--------------- Slash pine----------	55 90	South Florida slash pine, slash pine.
66----------------- Holopaw	3w	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine --------------	80 70 45	Slash pine, South Florida slash pine.
72----------------- Adamsville Variant	3s	Moderate	Moderate	Slight	Slight	South Florida slash pine --------------	45	South Florida slash pine.
75----------------- Ft. Drum	3w	Moderate	Moderate	Slight	Moderate	South Florida slash pine --------------	45	South Florida slash pine.
76----------------- Valkaria	4w	Severe	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine------- South Florida slash pine --------------	70 60 35	Slash pine, South Florida slash pine.
77----------------- St. Lucie	5r	Severe	Moderate	Slight	Slight	Sand pine-----------	60	Sand pine.
78----------------- Pomello Variant	4s	Moderate	Severe	Slight	Slight	South Florida slash pine -------------- Sand pine-----------	35 45	Slash pine, South Florida slash pine.
86----------------- Paola	5r	Severe	Moderate	Slight	Slight	Sand pine-----------	50	Sand 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]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2 Lawnwood	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
3 Lawnwood	Severe: ponding, too sandy, percs slowly.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding, droughty.
4 Waveland	Severe: wetness, too sandy, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
5 Waveland	Severe: ponding, too sandy, percs slowly.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding, droughty.
6 Paola	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
7 St. Lucie	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
8 Palm Beach	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
9 Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
10 Basinger	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
12 St. Johns Variant	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
13 Placid	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
14 Satellite Variant	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
15 Electra	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
16 Oldsmar	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
17 Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
19 Winder	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
20-------------------- Riviera	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
21-------------------- Pineda	Severe: floods, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
22-------------------- Okeelanta	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
23.* Urban land					
24-------------------- Orsino	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
25.* Beaches					
26-------------------- Pompano	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
27.* Arents					
28-------------------- Canaveral	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
30-------------------- Bessie	Severe: floods, wetness, percs slowly.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus.	Severe: excess salt, wetness, floods.
31-------------------- Cocoa Variant	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
32.* Udorthents					
33:* Paola----------------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
34:* St. Lucie------------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
35-------------------- Salerno	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
36.* Arents					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
38 Floridana	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
39.* Quartzipsamments					
40 Sanibel	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
41 Jonathan	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
42 Hallandale	Severe: wetness, too sandy, depth to rock.	Severe: wetness, too sandy, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: wetness, too sandy.	Severe: wetness, droughty, thin layer.
44 Boca	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
45 Hilolo	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
47 Pinellas	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
48 Jupiter	Severe: too sandy, wetness, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: too sandy, wetness.	Severe: wetness, thin layer.
49 Riviera	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
50 Okeelanta Variant	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus, floods.	Severe: excess salt, wetness, floods.
51 Pompano	Severe: floods, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, floods.	Severe: wetness, too sandy.	Severe: wetness, floods.
52 Malabar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
53.* Arents					
54 Oldsmar	Severe: ponding, too sandy, percs slowly.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding, droughty.
55 Basinger	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
56-------------------- Wabasso	Severe: ponding, too sandy, percs slowly.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding, droughty.
57-------------------- Chobee	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
58-------------------- Gator	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding.
60-------------------- Tequesta Variant	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
61-------------------- Hobe	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
62-------------------- Nettles	Severe: ponding, too sandy, percs slowly.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding, droughty.
63-------------------- Nettles	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
64-------------------- EauGallie	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
65-------------------- Tuscawilla	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
66-------------------- Holopaw	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
67.* Aquents					
68.* Pits					
69-------------------- Hontoon	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
70-------------------- Canova Variant	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
72-------------------- Adamsville Variant	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
73-------------------- Samsula	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
74-------------------- Torry	Severe: excess humus, wetness, too clayey.	Severe: excess humus, wetness, too clayey.	Severe: excess humus, wetness, too clayey.	Severe: excess humus, wetness, too clayey.	Severe: excess humus, wetness, too clayey.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
75 Ft. Drum	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
76 Valkaria	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
77 St. Lucie	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
78 Pomello Variant	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
79 Terra Ceia Variant	Severe: floods, wetness, excess humus.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus.	Severe: excess salt, wetness, floods.
86 Paola	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
2 Lawnwood	Poor	Fair	Fair	Poor	Fair	Fair	Poor	Fair	Fair	Poor.
3 Lawnwood	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
4 Waveland	Poor	Fair	Fair	Poor	Fair	Fair	Poor	Fair	Fair	Poor.
5 Waveland	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
6 Paola	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
7 St. Lucie	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
8 Palm Beach	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	---	Very poor.
9 Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
10 Basinger	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	---
12 St. Johns Variant	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
13 Placid	Poor	Fair	Fair	Poor	Fair	Good	Good	Fair	Fair	Good.
14 Satellite Variant	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor	Poor	Poor	Very poor.
15 Electra	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
16 Oldsmar	Poor	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Poor.
17 Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.
19 Winder	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
20 Riviera	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair.
21 Pineda	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
22 Okeelanta	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	---	Good.
23.* Urban land										
24 Orsino	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
25.* Beaches										
26 Pompano	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
27.* Arents										
28 Canaveral	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
30 Bessie	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor.
31 Cocoa Variant	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
32.* Udorthents										
33:*										
Paola	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land.										
34:*										
St. Lucie	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land.										
35 Salerno	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor.
36.* Arents										
38 Floridana	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
39.* Quartzipsamments										
40 Sanibel	Very poor.	Poor	Poor	Very poor.	Very poor.	Good	Good	Poor	Very poor.	Good.
41 Jonathan	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
42 Hallandale	Poor	Poor	Poor	Poor	Poor	Fair	Good	Poor	Poor	Fair.
44 Boca	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
45 Hilolo	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
47 Pinellas	Very poor.	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
48 Jupiter	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor	Fair.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
49-----------------Riviera	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
50-----------------Okeelanta Variant	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
51-----------------Pompano	Very poor.	Very poor.	Poor	Fair	Poor	Fair	Fair	Very poor.	Poor	Fair.
52-----------------Malabar	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
53.* Arents										
54-----------------Oldsmar	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
55-----------------Basinger	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
56-----------------Wabasso	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
57-----------------Chobee	Poor	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good.
58-----------------Gator	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.
60-----------------Tequesta Variant	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
61-----------------Hobe	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
62-----------------Nettles	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
63-----------------Nettles	Poor	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Poor.
64-----------------EauGallie	Poor	Poor	Poor	Poor	Poor	Poor	Very poor.	Poor	Poor	Poor.
65-----------------Tuscawilla	Poor	Fair	Fair	Good	Fair	Fair	Fair	Fair	Good	Fair.
66-----------------Holopaw	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
67.* Aquents										
68.* Pits										
69-----------------Hontoon	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Fair	Good.
70-----------------Canova Variant	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
72-----------------Adamsville Variant	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Poor	Fair	Poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
73: Samsula	Very poor.	Very poor.	Poor	Fair	Very poor	Good	Good	Very poor.	Poor	Good.
74: Torry	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
75: Ft. Drum	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
76: Valkaria	Poor	Fair	Fair	Fair	Fair	Good	Fair	Poor	Poor	Good.
77: St. Lucie	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
78: Pomello Variant	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
79: Terra Ceia Variant	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
86: Paola	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

* 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]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2----------------- Lawnwood	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
3----------------- Lawnwood	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
4----------------- Waveland	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
5----------------- Waveland	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
6----------------- Paola	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
7----------------- St. Lucie	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
8----------------- Palm Beach	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
9----------------- Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
10---------------- Basinger	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
12---------------- St. Johns Variant	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
13---------------- Placid	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
14---------------- Satellite Variant	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
15---------------- Electra	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
16---------------- Oldsmar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
17---------------- Wabasso	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
19---------------- Winder	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
20---------------- Riviera	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
21---------------- Pineda	Severe: cutbanks cave, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, droughty.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
22---------------- Okeelanta	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: low strength, ponding.	Severe: ponding, excess humus.
23.* Urban land						
24---------------- Orsino	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
25.* Beaches						
26---------------- Pompano	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
27.* Arents						
28---------------- Canaveral	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
30---------------- Bessie	Severe: cutbanks cave, wetness.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: low strength, wetness, floods.	Severe: excess salt, wetness, floods.
31---------------- Cocoa Variant	Severe: cutbanks cave.	Slight---------	Moderate: wetness, depth to rock.	Slight---------	Slight---------	Moderate: droughty, too sandy.
32.* Udorthents						
33:* Paola------------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
Urban land.						
34:* St. Lucie--------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
Urban land.						
35---------------- Salerno	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
36.* Arents						
38---------------- Floridana	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
39.* Quartzipsamments						
40---------------- Sanibel	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
41---------------- Jonathan	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
42----------------- Hallandale	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty, thin layer.
44----------------- Boca	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
45----------------- Hilolo	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
47----------------- Pinellas	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
48----------------- Jupiter	Severe: depth to rock, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, thin layer.
49----------------- Riviera	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
50----------------- Okeelanta Variant	Severe: cutbanks cave, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: excess salt, wetness, floods.
51----------------- Pompano	Severe: cutbanks cave, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.
52----------------- Malabar	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
53.* Arents						
54----------------- Oldsmar	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
55----------------- Basinger	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
56----------------- Wabasso	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
57----------------- Chobee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
58----------------- Gator	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: low strength, ponding.	Severe: ponding.
60----------------- Tequesta Variant	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
61----------------- Hobe	Severe: cutbanks cave.	Slight----------	Moderate: wetness.	Slight----------	Slight----------	Severe: droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
62 Nettles	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
63 Nettles	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
64 EauGallie	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
65 Tuscawilla	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
66 Holopaw	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
67.* Aquents						
68.* Pits						
69 Hontoon	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: low strength, ponding.	Severe: ponding, excess humus.
70 Canova Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, excess humus.
72 Adamsville Variant	Severe: cutbanks cave, excess humus, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
73 Samsula	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
74 Torry	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.
75 Ft. Drum	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
76 Valkaria	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, droughty.
77 St. Lucie	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
78 Pomello Variant	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
79 Terra Ceia Variant	Severe: excess humus, wetness.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: low strength, wetness, floods.	Severe: excess salt, wetness, floods.
86 Paola	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.

* 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]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2-------------------- Lawnwood	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, cemented pan, wetness.	Severe: seepage, wetness, too sandy.	Severe: cemented pan, seepage, wetness.	Poor: area reclaim, seepage, too sandy.
3-------------------- Lawnwood	Severe: cemented pan, ponding, percs slowly.	Severe: seepage, cemented pan, ponding.	Severe: seepage, ponding, too sandy.	Severe: cemented pan, seepage, ponding.	Poor: area reclaim, seepage, too sandy.
4-------------------- Waveland	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, cemented pan, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness, cemented pan.	Poor: area reclaim, seepage, too sandy.
5-------------------- Waveland	Severe: cemented pan, ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: cemented pan, seepage, ponding.	Poor: area reclaim, seepage, too sandy.
6*------------------- Paola	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
7*------------------- St. Lucie	Slight-----------	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
8*------------------- Palm Beach	Slight-----------	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
9-------------------- Pomello	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: too sandy, seepage.
10------------------- Basinger	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
12------------------- St. Johns Variant	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
13------------------- Placid	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, ponding, too sandy.	Severe: seepage, wetness.	Poor: wetness, too sandy, seepage.
14------------------- Satellite Variant	Severe: wetness. poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
15------------------- Electra	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
16------------------- Oldsmar	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
17------------------ Wabasso	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: seepage, too sandy, wetness.
19------------------ Winder	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness, thin layer.
20------------------ Riviera	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
21------------------ Pineda	Severe: wetness, percs slowly, poor filter.	Severe: seepage, floods, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
22------------------ Okeelanta	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
23.** Urban land					
24------------------ Orsino	Moderate: wetness, poor filter.	Severe: seepage.	Severe: too sandy, seepage, wetness.	Severe: seepage.	Poor: too sandy, seepage.
25.** Beaches					
26------------------ Pompano	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
27.** Arents					
28------------------ Canaveral	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
30------------------ Bessie	Severe: floods, wetness, percs slowly.	Severe: seepage, floods, excess humus.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: too clayey, hard to pack, wetness.
31------------------ Cocoa Variant	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: area reclaim, seepage, too sandy.
32.** Udorthents					
33:*,**					
Paola---------------	Slight------------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
34:*,**					
St. Lucie	Slight	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
35 Salerno	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
36.** Arents					
38 Floridana	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: ponding.	Severe: ponding, seepage.	Poor: ponding.
39.** Quartzipsamments					
40 Sanibel	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
41 Jonathan	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
42 Hallandale	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: area reclaim, seepage, too sandy.
44 Boca	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: area reclaim, seepage, too sandy.	Poor: seepage, too sandy, wetness.
45 Hilolo	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
47 Pinellas	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
48 Jupiter	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness, seepage.	Severe: wetness, seepage, depth to rock.	Poor: area reclaim, seepage, too sandy.
49 Riviera	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
50 Okeelanta Variant	Severe: floods, wetness.	Severe: seepage, floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
51------------------ Pompano	Severe: floods, wetness, poor filter.	Severe: seepage, floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: seepage, too sandy, wetness.
52------------------ Malabar	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
53.** Arents					
54------------------ Oldsmar	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
55------------------ Basinger	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
56------------------ Wabasso	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
57------------------ Chobee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
58------------------ Gator	Severe: ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, excess humus.
60------------------ Tequesta Variant	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
61------------------ Hobe	Severe: poor filter.	Severe: seepage.	Severe: wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
62------------------ Nettles	Severe: cemented pan, ponding, percs slowly.	Severe: seepage, cemented pan, ponding.	Severe: ponding, too sandy.	Severe: cemented pan, seepage, ponding.	Poor: area reclaim, seepage, too sandy.
63------------------ Nettles	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, cemented pan, wetness.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: area reclaim, seepage, too sandy.
64------------------ EauGallie	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
65------------------ Tuscawilla	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness, thin layer.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
66: Holopaw	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: wetness, seepage, too sandy.
67.** Aquents					
68.** Pits					
69: Hontoon	Severe: ponding, poor filter.	Severe: excess humus, seepage, ponding.	Severe: excess humus, seepage, ponding.	Severe: seepage, ponding.	Poor: excess humus, ponding.
70: Canova Variant	Severe: depth to rock, wetness, percs slowly.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, too sandy.	Severe: area reclaim, seepage, wetness.
72: Adamsville Variant	Severe: wetness.	Severe: seepage, excess humus, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, excess humus.
73: Samsula	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
74: Torry	Severe: wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Poor: excess humus, hard to pack, wetness.
75: Ft. Drum	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
76: Valkaria	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
77*: St. Lucie	Slight	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
78: Pomello Variant	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
79: Terra Ceia Variant	Severe: floods, wetness, poor filter.	Severe: seepage, floods, excess humus.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: wetness, excess humus, excess salt.
86*: Paola	Slight	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

* Ground water contamination possible in places where there are many septic tank absorption fields.
** 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," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
2, 3 Lawnwood	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
4, 5 Waveland	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
6 Paola	Good	Probable	Improbable: too sandy.	Poor: too sandy.
7 St. Lucie	Good	Probable	Improbable: too sandy.	Poor: too sandy.
8 Palm Beach	Good	Probable	Improbable: too sandy.	Poor: too sandy.
9 Pomello	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
10 Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
12 St. Johns Variant	Poor: ponding.	Improbable: excess fines.	Improbable: too sandy.	Poor: too sandy, ponding.
13 Placid	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
14 Satellite Variant	Good	Probable	Improbable: too sandy.	Poor: too sandy.
15 Electra	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
16 Oldsmar	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
17 Wabasso	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
19 Winder	Poor: wetness.	Probable	Probable	Poor: too sandy, wetness.
20 Riviera	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.
21 Pineda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
22 Okeelanta	Poor: wetness.	Improbable: organic material.	Improbable: organic material.	Poor: excess humus, wetness.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
23.* Urban land				
24 Orsino	Good	Probable	Improbable: too sandy.	Poor: too sandy.
25.* Beaches				
26 Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
27.* Arents				
28 Canaveral	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
30 Bessie	Poor: wetness.	Improbable: organic material.	Improbable: organic material.	Poor: excess humus, excess salt, wetness.
31 Cocoa Variant	Poor: thin layer.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
32.* Udorthents				
33:*				
Paola	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
34:*				
St. Lucie	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
35 Salerno	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
36.* Arents				
38 Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
39.* Quartzipsamments				
40 Sanibel	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness, too sandy.
41 Jonathan	Good	Probable	Improbable: too sandy.	Poor: too sandy.
42 Hallandale	Poor: area reclaim, thin layer, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, too sandy, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
44 Boca	Poor: thin layer, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
45 Hilolo	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
47 Pinellas	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
48 Jupiter	Poor: area reclaim, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, too sandy, wetness.
49 Riviera	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.
50 Okeelanta Variant	Poor: wetness.	Improbable: organic material.	Improbable: organic material.	Poor: excess humus, excess salt, wetness.
51 Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
52 Malabar	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
53.* Arents				
54 Oldsmar	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
55 Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
56 Wabasso	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
57 Chobee	Poor: wetness.	Improbable: excess fines.	Improbable: too sandy.	Poor: wetness.
58 Gator	Poor: wetness.	Improbable: organic material.	Improbable: organic material.	Poor: excess humus, wetness.
60 Tequesta Variant	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
61 Hobe	Good	Probable	Improbable: too sandy.	Poor: too sandy.
62, 63 Nettles	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
64: EauGallie	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
65: Tuscawilla	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, small stones, wetness.
66: Holopaw	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
67.* Aquents				
68.* Pits				
69: Hontoon	Poor: low strength, wetness.	Improbable: organic material.	Improbable: organic material.	Poor: wetness, excess humus.
70: Canova Variant	Poor: area reclaim, wetness.	Probable: thin layer.	Improbable: too sandy.	Poor: excess humus, wetness.
72: Adamsville Variant	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
73: Samsula	Poor: wetness.	Improbable: organic material.	Improbable: organic material.	Poor: excess humus, wetness.
74: Torry	Poor: excess humus, wetness.	Improbable: organic material.	Improbable: organic material.	Poor: wetness.
75: Ft. Drum	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
76: Valkaria	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness, too sandy.
77: St. Lucie	Good	Probable	Improbable: too sandy.	Poor: too sandy.
78: Pomello Variant	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
79: Terra Ceia Variant	Poor: low strength, wetness.	Improbable: organic material.	Improbable: organic material.	Poor: excess humus, excess salt, wetness.
86: Paola	Good	Probable	Improbable: too sandy.	Poor: too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
2----------------- Lawnwood	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, cemented pan, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, cemented pan.
3----------------- Lawnwood	Severe: seepage.	Severe: seepage, ponding.	Severe: no water.	Ponding, percs slowly, cemented pan.	Ponding, droughty, fast intake.	Wetness, droughty, cemented pan.
4----------------- Waveland	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, cemented pan, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, cemented pan.
5----------------- Waveland	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: no water.	Ponding, percs slowly, cemented pan.	Ponding, droughty, fast intake.	Wetness, droughty, cemented pan.
6----------------- Paola	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water--	Droughty, fast intake, soil blowing.	Droughty.
7----------------- St. Lucie	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water--	Droughty, fast intake, soil blowing.	Droughty.
8----------------- Palm Beach	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water--	Droughty, fast intake, soil blowing.	Droughty.
9----------------- Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave--	Wetness, droughty, fast intake.	Droughty.
10---------------- Basinger	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
12---------------- St. Johns Variant	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, fast intake.	Ponding.
13---------------- Placid	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave--	Wetness, fast intake, soil blowing.	Wetness.
14---------------- Satellite Variant	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave--	Droughty, fast intake.	Droughty.
15---------------- Electra	Severe: seepage.	Severe: seepage, piping.	Severe: slow refill, cutbanks cave.	Cutbanks cave--	Wetness, droughty, fast intake.	Droughty.
16---------------- Oldsmar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
17---------------- Wabasso	Severe: seepage.	Severe: seepage, wetness.	Severe: slow refill.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
19. Winder	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
20. Riviera	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Percs slowly	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
21. Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
22. Okeelanta	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, subsides, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness.
23.* Urban land						
24. Orsino	Severe: seepage.	Severe: seepage, piping.	Severe: deep to water, cutbanks cave.	Deep to water	Fast intake, droughty, soil blowing.	Droughty.
25.* Beaches						
26. Pompano	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
27.* Arents						
28. Canaveral	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
30. Bessie	Moderate: seepage.	Severe: hard to pack, wetness, excess salt.	Severe: slow refill, salty water, cutbanks cave.	Percs slowly, floods.	Wetness, percs slowly, floods.	Wetness, excess salt, erodes easily.
31. Cocoa Variant	Severe: seepage.	Severe: seepage, piping.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Droughty, depth to rock.
32.* Udorthents						
33:* Paola	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Urban land.						
34:* St. Lucie	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Urban land.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
35----------------- Salerno	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave--	Wetness, droughty, fast intake.	Wetness, droughty.
36.* Arents						
38----------------- Floridana	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, fast intake, soil blowing.	Wetness, percs slowly.
39.* Quartzipsamments						
40----------------- Sanibel	Severe: seepage.	Severe: seepage, piping, ponding.	Slight---------	Cutbanks cave, ponding, subsides.	Ponding, soil blowing.	Wetness.
41----------------- Jonathan	Severe: seepage.	Severe: seepage, piping.	Severe: slow refill, cutbanks cave.	Deep to water--	Droughty, fast intake, soil blowing.	Droughty.
42----------------- Hallandale	Severe: depth to rock.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
44----------------- Boca	Severe: seepage.	Severe: seepage, piping, wetness.	Moderate: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
45----------------- Hilolo	Moderate: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Favorable------	Wetness, droughty, fast intake.	Wetness, erodes easily, droughty.
47----------------- Pinellas	Severe: seepage.	Severe: seepage, piping, wetness.	Moderate: slow refill.	Favorable------	Wetness, droughty, fast intake.	Wetness.
48----------------- Jupiter	Severe: depth to rock, seepage.	Severe: seepage, piping, wetness.	Severe: depth to rock.	Depth to rock--	Droughty, fast intake, wetness.	Wetness, droughty, depth to rock.
49----------------- Riviera	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, percs slowly.	Ponding, droughty, fast intake.	Wetness, droughty, percs slowly.
50----------------- Okeelanta Variant	Severe: seepage.	Severe: seepage, wetness, excess salt.	Severe: salty water.	Floods, subsides, excess salt.	Wetness, floods, excess salt.	Wetness, excess salt.
51----------------- Pompano	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Floods, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
52----------------- Malabar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave--	Wetness, droughty, fast intake.	Wetness, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
53.* Arents						
54 Oldsmar	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty, percs slowly.
55 Basinger	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
56 Wabasso	Severe: seepage.	Severe: seepage, ponding.	Severe: slow refill.	Ponding, percs slowly.	Ponding, droughty, fast intake.	Wetness, droughty, percs slowly.
57 Chobee	Slight	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, fast intake, soil blowing.	Wetness, rooting depth, percs slowly.
58 Gator	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding	Wetness.
60 Tequesta Variant	Severe: seepage.	Severe: seepage, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
61 Hobe	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
62 Nettles	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: no water.	Ponding, percs slowly, cemented pan.	Ponding, droughty, fast intake.	Wetness, droughty, cemented pan.
63 Nettles	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill.	Percs slowly, cemented pan, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, cemented pan.
64 EauGallie	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, droughty.
65 Tuscawilla	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
66 Holopaw	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake, droughty.	Wetness, droughty.
67.* Aquents						
68.* Pits						
69 Hontoon	Severe: seepage.	Severe: excess humus, ponding.	Slight: favorable.	Subsides, ponding.	Ponding, soil blowing.	Wetness.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
70: Canova Variant	Moderate: depth to rock.	Severe: seepage, piping, wetness.	Severe: slow refill, depth to rock, cutbanks cave.	Percs slowly, depth to rock, subsides.	Wetness, soil blowing, percs slowly.	Wetness, depth to rock, percs slowly.
72: Adamsville Variant	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Subsides, cutbanks cave.	Wetness, droughty, fast intake.	Droughty.
73: Samsula	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Wetness.
74: Torry	Moderate: excess humus, seepage.	Severe: excess humus.	Slight	Excess humus, poor outlets.	Wetness	Not needed.
75: Ft. Drum	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
76: Valkaria	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
77: St. Lucie	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, droughty.
78: Pomello Variant	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
79: Terra Ceia Variant	Severe: seepage.	Severe: excess humus, wetness, excess salt.	Severe: salty water.	Floods, subsides, excess salt.	Wetness, soil blowing, floods.	Wetness, excess salt.
86: Paola	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
2-----------------Lawnwood	0-17	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	17-28	Sand, fine sand	SP	A-3	0	100	100	85-100	2-4	---	NP
	28-64	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	64-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
3-----------------Lawnwood	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	6-27	Sand, fine sand	SP	A-3	0	100	100	85-100	2-4	---	NP
	27-50	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	50-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
4-----------------Waveland	0-18	Sand-------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	18-43	Sand, fine sand	SP	A-3	0	100	100	80-100	1-4	---	NP
	43-91	Sand, fine sand, loamy sand.	SP-SM, SM	A-2-4, A-3	0	100	100	85-100	9-20	---	NP
	91-99	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
5-----------------Waveland	0-2	Sand-------------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	2-43	Sand, fine sand	SP	A-3	0	100	100	85-100	1-4	---	NP
	43-77	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-2-4, A-3	0	100	100	85-95	9-20	---	NP
	77-91	Sand, fine sand, loamy fine sand.	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
	91-99	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	---	NP
6-----------------Paola	0-32	Sand-------------	SP	A-3	0	100	100	85-100	1-2	---	NP
	32-80	Sand, fine sand	SP	A-3	0	100	100	80-100	1-4	---	NP
7-----------------St. Lucie	0-80	Sand-------------	SP	A-3	0	100	100	85-99	1-4	---	NP
8-----------------Palm Beach	0-80	Sand-------------	SP-SM, SP, SW	A-1-B, A-3, A-2-4	0	100	75-100	15-90	1-5	---	NP
9-----------------Pomello	0-46	Sand-------------	SP, SP-SM	A-3	0	100	100	60-100	1-8	---	NP
	46-67	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	60-100	6-15	---	NP
	67-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	0	100	100	60-100	4-10	---	NP
10----------------Basinger	0-22	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	22-42	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	42-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
12----------------St. Johns Variant	0-14	Sand-------------	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	14-40	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	40-62	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	62-72	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
13----------------Placid	0-17	Sand-------------	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
	17-80	Fine sand, sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
14----------------Satellite Variant	0-80	Sand-------------	SP	A-3	0	100	100	85-95	1-4	---	NP

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	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	
15---------------- Electra	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	75-99	3-10	---	NP
	6-40	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	75-99	3-10	---	NP
	40-48	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-99	8-15	---	NP
	48-68	Sandy clay loam, sandy clay, fine sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	100	100	80-99	20-45	20-40	4-20
16---------------- Oldsmar	0-35	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	35-46	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3	0	100	100	80-100	5-20	---	NP
	46-60	Fine sandy loam, sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-100	20-35	20-35	5-15
17---------------- Wabasso	0-20	Sand-------------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	20-36	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-20	---	NP
	36-80	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	85-100	20-35	20-32	5-16
19---------------- Winder	0-15	Sand-------------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	15-26	Loamy sand, sandy loam, fine sandy loam.	SM, SC	A-2-4, A-2-6	0	100	100	80-100	15-25	<35	NP-15
	26-42	Sandy clay loam	SC	A-2-4, A-2-6, A-4	0	100	100	80-100	18-35	20-40	9-26
	42-80	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	60-100	50-100	40-85	3-20	<35	NP-10
20---------------- Riviera	0-36	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	36-42	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	42-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	0	60-80	50-75	40-70	3-10	---	NP
21---------------- Pineda	0-36	Sand-------------	SP, SP-SM	A-3	0	100	100	80-95	2-5	---	NP
	36-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	80-95	15-35	20-30	4-12
	60-80	Sand, loamy sand	SP-SM, SM, SP	A-3, A-1-b, A-2-4	0	100	100	30-95	4-15	---	NP
22---------------- Okeelanta	0-30	Muck-------------	Pt	A-8	0	---	---	---	---	---	---
	30-80	Fine sand, sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	85-100	80-95	2-15	---	NP
23.* Urban land											
24---------------- Orsino	0-25	Sand-------------	SP	A-3	0	100	100	85-95	1-3	---	NP
	25-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-7	---	NP
25.* Beaches											
26---------------- Pompano	0-80	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
27.* Arents											
28---------------- Canaveral	0-6	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

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
30 Bessie	0-18	Muck	Pt	A-8	0	---	---	---	---	---	---
	18-44	Clay, sandy clay	CH, SC	A-7	0	100	100	90-100	42-70	50-76	28-49
	44-80	Fine sand, loamy fine sand, fine sandy loam.	SP-SM, SM	A-2-4, A-3	0	100	90-100	80-100	8-25	---	NP
31 Cocoa Variant	0-14	Sand	SP, SP-SM	A-3	0	100	100	70-90	1-5	---	NP
	14-25	Sand	SW, SP, SP-SM	A-1-B, A-3	0	100	75-95	15-90	2-8	---	NP
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
32.* Udorthents											
33:* Paola	0-32	Sand	SP	A-3	0	100	100	85-100	1-2	---	NP
	32-80	Sand, fine sand	SP	A-3	0	100	100	80-100	1-4	---	NP
Urban land.											
34:* St. Lucie	0-80	Sand	SP	A-3	0	100	100	85-99	1-4	---	NP
Urban land.											
35 Salerno	0-9	Sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	9-61	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	1-8	---	NP
	61-76	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	76-99	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
36.* Arents											
38 Floridana	0-15	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	15-27	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	27-50	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-95	20-35	20-30	7-16
39.* Quartzipsamments											
40 Sanibel	12-0	Muck	Pt	---	0	---	---	---	---	---	---
	0-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-95	1-10	---	NP
41 Jonathan	0-5	Sand	SP	A-3	0	100	100	85-100	1-4	---	NP
	5-56	Fine sand, sand	SP	A-3	0	100	100	80-100	1-4	---	NP
	56-99	Fine sand, sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
42 Hallandale	0-4	Sand	SP, SP-SM	A-3	0	100	100	90-100	2-6	---	NP
	4-8	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-6	---	NP
	8-13	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-6	---	NP
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
44 Boca	0-8	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-99	2-12	---	NP
	8-25	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-99	2-12	---	NP
	25-32	Sandy loam, sandy clay loam.	SC, SM	A-2-4, A-6, A-2-6	0	100	100	80-99	17-40	<37	NP-20
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	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	
45----------------- Hilolo	0-8	Fine sand--------	SP-SM	A-2-4, A-3	0	100	100	80-95	5-12	---	NP
	8-18	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
	18-56	Sandy clay loam	SC	A-6, A-7-6	0	100	100	85-99	36-50	23-44	10-24
	56-66	Loamy sand, loamy fine sand, fine sandy loam.	SM	A-2-4	0	100	100	85-99	13-25	---	NP
47----------------- Pinellas	0-11	Fine sand--------	SP	A-3	0	100	100	90-100	2-4	---	NP
	11-30	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	30-35	Fine sandy loam, sandy clay loam.	SP-SM, SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	90-100	12-35	<30	NP-13
	35-60	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0-5	80-100	70-100	60-95	2-12	---	NP
48----------------- Jupiter	0-10	Sand-------------	SP-SM	A-3, A-2-4	0	100	100	85-95	5-12	<40	NP
	10	Weathered bedrock	---	---	---	---	---	---	---	---	---
49----------------- Riviera	0-36	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	36-42	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	42-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	0	60-100	50-86	40-85	3-10	---	NP
50----------------- Okeelanta Variant	0-4	Muck-------------	Pt	---	---	---	---	---	---	---	---
	4-20	Mucky-peat-------	Pt	---	---	---	---	---	---	---	---
	20-54	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	85-100	80-95	2-15	---	NP
51----------------- Pompano	0-5	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
	5-80	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
52----------------- Malabar	0-15	Sand-------------	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	15-29	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-90	3-12	---	NP
	29-42	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	42-80	Sandy clay loam, fine sandy loam, sandy loam.	SC, SM-SC, SM	A-2-4, A-4, A-6	0	100	100	80-90	22-40	20-40	4-15
53.* Arents											
54----------------- Oldsmar	0-33	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	33-52	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
	52-68	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-100	20-35	20-35	5-15
55----------------- Basinger	0-28	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	28-42	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	42-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	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	
56---------------- Wabasso	0-31	Fine sand--------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	31-35	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
	35-43	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	85-100	20-35	20-32	5-16
	43-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
57---------------- Chobee	0-6	Loamy sand-------	SP-SM, SM	A-2-4	0	100	100	85-99	12-25	<40	NP-10
	6-42	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
	42-80	Loamy sand, fine sand, sandy clay loam.	SP-SM, SM, SC	A-2-4, A-2-6, A-6, A-7	0	100	100	80-99	12-45	<45	NP-25
58---------------- Gator	0-24	Muck-------------	Pt	A-8	---	---	---	---	---	---	---
	24-48	Sandy clay loam, sandy loam, fine sandy loam.	SC, SM-SC	A-2-6, A-4, A-6	0	100	100	85-99	20-40	20-40	4-16
	48-56	Fine sand, sand	SP-SM	A-3, A-2-4	0	100	100	80-99	5-12	---	NP
60---------------- Tequesta Variant	14-0	Muck-------------	Pt	---	0	---	---	---	---	---	---
	0-12	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	12-16	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	16-26	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<40	NP-20
	26-34	Loamy sand, loamy fine sand, sandy loam.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
	34-50	Sand, fine sand, loamy sand.	SP-SM	A-3, A-2-4	0	100	100	80-100	5-12	---	NP
61---------------- Hobe	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	1-7	---	NP
	4-70	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	1-7	---	NP
	70-74	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	6-15	---	NP
	74-78	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	78-88	Sandy clay loam, sandy loam, fine sandy loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	85-100	15-35	<40	NP-15
62---------------- Nettles	0-5	Sand-------------	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	5-34	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	34-38	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
	38-70	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4, A-4	0	100	100	85-100	20-41	<28	NP-7
63---------------- Nettles	0-5	Sand-------------	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	5-32	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	32-51	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
	51-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4, A-4	0	100	100	85-100	20-41	<28	NP-7

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	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	
64 EauGallie	0-28	Fine sand	SP, SP-SM	A-3	0	100	100	80-98	2-5	---	NP
	28-42	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-20	---	NP
	42-50	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-98	20-35	<40	NP-20
	50-65	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-25	---	NP
65 Tuscawilla	0-12	Fine sand	SP-SM	A-3, A-2-4	0	85-100	85-100	75-90	5-12	---	NP
	12-32	Sandy clay loam, fine sandy loam.	SC	A-2, A-4, A-6	0-15	85-100	75-100	65-95	25-40	25-44	8-24
	32-46	Fine sand, sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
	46-80	Sand, loamy fine sand, sandy loam.	SP-SM, SM, SC	A-3, A-2	0	85-100	80-95	75-95	5-25	<35	NP-17
66 Holopaw	0-42	Fine sand	SP, SP-SM	A-3	0	100	95-100	70-95	2-10	---	NP
	42-60	Sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	95-100	70-99	15-30	<25	NP-7
	60-80	Loamy sand	SM	A-2-4	0	100	95-100	70-99	13-20	---	NP
67.* Aquents											
68.* Pits											
69 Hontoon	0-65	Muck	Pt	---	0	---	---	---	---	---	---
70 Canova Variant	12-0	Muck	Pt	---	---	---	---	---	---	---	---
	0-5	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-99	2-12	---	NP
	5-18	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-99	2-12	---	NP
	18-24	Fine sandy loam, sandy clay loam.	SC	A-2-4, A-2-6, A-6	0	100	100	80-99	25-40	20-40	8-26
	24-30	Variable	---	---	---	---	---	---	---	---	---
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
72 Adamsville Variant	0-54	Sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	54-70	Muck	Pt	---	---	---	---	---	---	---	---
	70-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
73 Samsula	0-34	Muck	Pt	---	---	---	---	---	---	---	---
	34-65	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	0	100	100	80-100	2-20	<40	NP-10
74 Torry	0-62	Muck	Pt, OH	A-7	0	100	100	95-100	85-100	60-100	30-50
	62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
75 Ft. Drum	0-7	Fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
	7-14	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
	14-33	Fine sandy loam, loamy fine sand, fine sand.	SM, SM-SC, SC, SP-SM	A-2-4, A-3	0	100	100	90-100	5-30	<30	NP-10
	33-80	Sand, fine sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	95-100	95-100	90-100	2-16	---	NP
76 Valkaria	0-7	Fine sand	SP, SP-SM	A-3	0	100	75-100	75-98	2-10	---	NP
	7-13	Sand, fine sand	SP, SP-SM	A-3	0	100	75-100	75-98	2-10	---	NP
	13-45	Sand, fine sand	SP, SP-SM	A-3	0	100	75-100	75-98	3-10	---	NP
	45-80	Sand, fine sand	SP, SP-SM	A-3	0	100	75-100	75-98	2-10	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	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	
77----------------- St. Lucie	0-80	Sand---------------	SP	A-3	0	100	100	85-99	1-4	---	NP
78----------------- Pomello Variant	0-52	Fine sand----------	SP, SP-SM	A-3	0	100	100	80-100	1-8	---	NP
	52-64	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	6-15	---	NP
	64-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	4-10	---	NP
79----------------- Terra Ceia Variant	0-60	Muck---------------	Pt	---	---	---	---	---	---	---	---
86----------------- Paola	0-35	Sand---------------	SP	A-3	0	100	100	85-100	1-2	---	NP
	35-80	Sand, fine sand	SP	A-3	0	100	100	80-100	1-4	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF 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	Permea- bility	Available water capacity	Reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cm^3	In/hr	In/In	pH	Mmhos/cm					Pct
2----------------- Lawnwood	0-17	<2	1.30-1.60	>6.0	0.03-0.08	3.6-6.5	<2	Low--------	0.24	5	2	1-3
	17-28	<1	1.50-1.70	>6.0	0.01-0.03	3.6-5.5	<2	Low--------	0.24			
	28-64	2-8	1.30-1.55	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	64-80	2-6	1.30-1.55	<0.6	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
3----------------- Lawnwood	0-6	<2	1.30-1.55	>6.0	0.03-0.08	3.6-5.5	<2	Low--------	0.24	5	2	1-3
	6-27	<1	1.50-1.70	>6.0	0.01-0.03	3.6-5.5	<2	Low--------	0.24			
	27-50	2-8	1.30-1.55	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	50-80	5-18	1.42-1.70	0.6-6.0	0.07-0.11	3.6-5.5	<2	Low--------	0.32			
4----------------- Waveland	0-18	<1	1.30-1.60	>6.0	0.03-0.08	3.6-7.3	<2	Low--------	0.24	5	2	1-3
	18-43	<1	1.50-1.70	>6.0	0.01-0.03	3.6-6.0	<2	Low--------	0.24			
	43-91	2-8	1.40-1.70	<0.2	0.10-0.15	3.6-6.0	<2	Low--------	0.24			
	91-99	5-18	1.45-1.70	2.0-20	0.10-0.15	3.6-5.5	<2	Low--------	0.32			
5----------------- Waveland	0-2	<1	1.30-1.60	>6.0	0.03-0.08	3.6-7.3	<2	Low--------	0.24	5	2	1-3
	2-43	<1	1.50-1.70	>6.0	0.01-0.03	3.6-6.0	<2	Low--------	0.24			
	43-77	3-12	1.40-1.70	<0.2	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	77-91	5-18	1.40-1.70	<0.6	0.10-0.15	3.6-5.5	<2	Low--------	0.24			
	91-99	3-10	1.45-1.70	2.0-20	0.05-0.10	3.6-5.5	<2	Low--------	0.24			
6----------------- Paola	0-32	<2	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Very low	0.15	5	1	<.5
	32-80	<3	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Very low	0.15			
7----------------- 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
8----------------- 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
9----------------- Pomello	0-46	>2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	Very low	0.17	5	1	>1
	46-67	>5	1.45-1.60	2.0-6.0	0.10-0.15	4.5-6.0	<2	Very low	0.20			
	67-80	>2	1.35-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	Very low	0.17			
10---------------- Basinger	0-22	.5-4	1.40-1.55	>20	0.03-0.07	3.6-7.3	<2	Low--------	0.10	5	2	2-1
	22-42	1-6	1.40-1.65	>20	0.10-0.15	3.6-7.3	<2	Low--------	0.10			
	42-80	1-3	1.50-1.70	>20	0.05-0.10	3.6-7.3	<2	Low--------	0.10			
12---------------- St. Johns Variant	0-14	1-4	1.35-1.45	6.0-20	0.10-0.15	4.5-5.5	<2	Low--------	0.20	5	2	1-5
	14-40	1-4	1.45-1.60	6.0-20	0.05-0.10	4.5-5.5	<2	Low--------	0.20			
	40-62	2-8	1.50-1.65	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low--------	0.20			
	62-72	2-6	1.50-1.60	6.0-20	0.05-0.10	4.5-5.5	<2	Low--------	0.17			
13---------------- Placid	0-17	<10	1.20-1.40	6.0-20	0.15-0.20	3.6-5.5	<2	Very low	0.17	5	2	2-10
	17-80	<10	1.30-1.60	6.0-20	0.05-0.08	3.6-6.5	<2	Very low	0.17			
14---------------- Satellite Variant	0-80	<1	1.45-1.55	>20	0.02-0.05	4.5-6.5	<2	Low--------	0.15	5	1	<1
15---------------- Electra	0-6	1-6	1.40-1.55	6.0-20	0.05-0.10	3.6-6.5	<2	Very low	0.15	5	2	1-2
	6-40	1-6	1.45-1.70	6.0-20	0.02-0.07	3.6-6.5	<2	Very low	0.15			
	40-48	1-6	1.50-1.70	0.6-2.0	0.10-0.15	3.6-5.5	<2	Very low	0.20			
	48-68	18-38	1.60-1.75	<0.2	0.10-0.15	3.6-5.5	<2	Very low	0.32			
16---------------- Oldsmar	0-35	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-7.3	<2	Very low	0.20	5	2	1-2
	35-46	2-8	1.42-1.59	0.2-6.0	0.10-0.15	3.6-7.3	<2	Low--------	0.20			
	46-60	15-30	1.60-1.69	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.24			
17---------------- Wabasso	0-20	<5	1.25-1.55	6.0-20	0.02-0.05	4.5-6.5	<2	Low--------	0.20	5	2	1-4
	20-36	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low--------	0.20			
	36-80	12-30	1.60-1.80	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Map symbol and soil name	Depth	Clay <2mm	Moist bulk density	Permea-bility	Available water capacity	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---------------- Winder	0-15	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
	15-26	10-18	1.45-1.65	0.2-0.6	0.06-0.10	6.1-7.8	<2	Low--------	0.20			
	26-42	20-30	1.60-1.70	<0.2	0.10-0.15	6.6-8.4	<2	Low--------	0.32			
	42-80	6-13	1.40-1.65	6.0-20	0.03-0.10	7.4-8.4	<2	Low--------	0.32			
20---------------- Riviera	0-36	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	<2	Low--------	0.17	4	2	.1-2
	36-42	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low--------	0.28			
	42-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	Low--------	0.15			
21---------------- Pineda	0-36	1-8	1.30-1.60	6.0-20	0.02-0.05	4.5-7.3	<2	Low--------	0.17	5	2	.5-6
	36-60	10-25	1.50-1.70	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	60-80	3-12	1.45-1.60	2.0-6.0	0.02-0.05	5.6-8.4	<2	Low--------	0.17			
22---------------- Okeelanta	0-30	---	0.22-0.38	6.0-20	0.20-0.30	4.5-6.5	<2	Low--------	----	---	2	>70
	30-80	1-5	1.30-1.55	6.0-20	0.05-0.10	5.1-7.8	<2	Low--------	0.15			
23.* Urban land												
24---------------- Orsino	0-25	>1	1.35-1.55	>20	0.02-0.08	4.5-6.0	<2	Very low	0.17	5	2	>1
	25-80	>2	1.35-1.55	>20	0.02-0.08	4.5-6.0	<2	Very low	0.17			
25.* Beaches												
26---------------- Pompano	0-80	<5	1.30-1.65	>20	0.02-0.05	4.5-7.8	<2	Low--------	0.15	5	2	1-5
27.* Arents												
28---------------- Canaveral	0-6	>2	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Very low	0.15	5	2	>.5
	6-80	>1	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Very low	0.15			
30---------------- Bessie	0-18	5-20	0.10-0.20	6.0-20	0.25-0.35	5.1-7.3	>16	Low--------	----	---	2	>60
	18-44	35-60	0.60-1.00	<0.2	0.15-0.18	5.6-7.8	>16	High-------	0.37			
	44-80	5-20	1.30-1.50	6.0-20	0.05-0.10	7.9-9.0	>16	Low--------	0.28			
31---------------- Cocoa Variant	0-14	1-4	1.25-1.50	6.0-20	0.5-0.10	7.4-8.4	<2	Low--------	0.15	2	2	1-3
	14-25	1-6	1.25-1.50	6.0-20	<0.5	7.4-8.4	<2	Low--------	0.15			
	25	---	---	---	---	---	---	-----------	----			
32.* Udorthents												
33:* Paola------------	0-32	<2	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Very low	0.15	5	1	<.5
	32-80	<3	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Very low	0.15			
Urban land.												
34:* 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
Urban land.												
35---------------- Salerno	0-9	<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
	9-61	<1-3	1.50-1.65	6.0-20	0.02-0.05	3.6-7.3	<2	Low--------	0.24			
	61-76	3-12	1.40-1.70	<0.6	0.05-0.10	3.6-5.5	<2	Low--------	0.24			
	76-99	3-8	1.45-1.65	6.0-20	0.02-0.10	3.6-5.5	<2	Low--------	0.24			
36.* Arents												
38---------------- Floridana	0-15	3-10	1.40-1.49	6.0-20	0.10-0.15	5.6-8.4	<2	Low--------	0.17	5	2	6-15
	15-27	1-7	1.52-1.53	6.0-20	0.05-0.10	5.6-8.4	<2	Low--------	0.32			
	27-50	15-30	1.60-1.69	<0.2	0.10-0.15	5.6-8.4	<2	Low--------	0.20			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Map symbol and soil name	Depth	Clay <2mm	Moist bulk density	Permea- bility	Available water capacity	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
39.* Quartzipsamments												
40--------------- Sanibel	12-0	---	0.15-0.25	6.0-20	0.20-0.25	3.6-7.3	<2	Low--------	0.15	4	2	>70
	0-80	2-6	1.50-1.60	6.0-20	0.10-0.15	3.6-7.3	<2	Low--------	0.15			
41--------------- Jonathan	0-5	<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
	5-56	<1-3	1.40-1.70	6.0-20	0.01-0.05	5.1-6.0	<2	Low--------	0.24			
	56-99	1-8	1.55-1.75	<0.2	0.10-0.15	3.6-5.0	<2	Low--------	0.28			
42--------------- Hallandale	0-4	<3	1.35-1.45	6.0-20	0.05-0.10	5.1-6.5	<2	Low--------	0.17	2	2	2-5
	4-8	<3	1.50-1.60	6.0-20	0.03-0.05	6.1-6.5	<2	Low--------	0.17			
	8-13	<3	1.50-1.60	6.0-20	0.03-0.05	5.6-8.4	<2	Low--------	0.17			
	13	---	---	---	---	---	---	-----------	----			
44--------------- Boca	0-8	<2	1.30-1.55	6.0-20	0.05-0.10	5.1-7.8	<2	Low--------	0.17	5	2	1-3
	8-25	.5-2	1.50-1.60	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.17			
	25-32	15-30	1.55-1.65	0.6-2.0	0.10-0.15	5.1-8.4	<2	Low--------	0.20			
	32	---	---	---	---	---	---	-----------	----			
45--------------- Hilolo	0-8	3-8	1.35-1.45	6.0-20	0.05-0.10	6.6-8.4	<2	Low--------	0.24	5	1	1-5
	8-18	12-25	1.55-1.75	0.2-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.37			
	18-56	20-35	1.60-1.75	0.2-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.37			
	56-66	5-18	1.40-1.60	<0.2	0.05-0.10	7.4-9.0	<2	Low--------	0.32			
47--------------- Pinellas	0-11	1-3	1.15-1.50	6.0-20	0.02-0.05	5.6-7.8	<2	Low--------	0.17	5	2	1-4
	11-30	3-8	1.40-1.60	6.0-20	0.10-0.15	6.6-9.0	<2	Low--------	0.17			
	30-35	13-30	1.50-1.65	0.6-2.0	0.10-0.15	6.6-9.0	<2	Low--------	0.24			
	35-60	2-8	1.55-1.65	6.0-20	0.02-0.05	7.9-8.4	<2	Low--------	0.17			
48--------------- Jupiter	0-10	2-8	1.35-1.50	6.0-20	0.12-0.18	6.1-8.4	<2	Low--------	0.17	2	2	1-3
	10	---	---	---	---	---	---	-----------	----			
49--------------- Riviera	0-36	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	<2	Low--------	0.17	4	2	1-2
	36-42	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low--------	0.28			
	42-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	Low--------	0.15			
50--------------- Okeelanta Variant	0-4	<1	0.22-0.38	6.0-20	0.20-0.35	4.5-6.0	>16	Low--------	----	---	2	>75
	4-20	<1	0.13-0.36	6.0-20	0.20-0.35	4.5-6.0	>16	Low--------	----			
	20-54	1-10	1.45-1.60	6.0-20	0.02-0.10	7.4-9.0	4-8	Low--------	----			
51--------------- Pompano	0-5	<1-8	1.20-1.50	>20	0.02-0.05	4.5-7.8	<2	Low--------	0.15	5	2	1-4
	5-80	<1-8	1.45-1.65	>20	0.02-0.05	4.5-7.8	<2	Low--------	0.15			
52--------------- Malabar	0-15	<4	1.20-1.55	6.0-20	0.03-0.08	5.6-8.4	<2	Low--------	0.20	5	2	1-2
	15-29	1-5	1.50-1.75	6.0-20	0.05-0.10	5.6-8.4	<2	Low--------	0.20			
	29-42	1-5	1.50-1.70	6.0-20	0.02-0.05	5.6-8.4	<2	Low--------	0.20			
	42-80	12-25	1.60-1.70	<0.2	0.10-0.15	5.6-8.4	<2	Low--------	0.32			
53.* Arents												
54--------------- Oldsmar	0-33	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-7.3	<2	Very low	0.20	5	2	1-2
	33-52	2-8	1.42-1.59	0.2-6.0	0.10-0.15	3.6-7.3	<2	Low--------	0.20			
	52-68	15-30	1.60-1.69	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.24			
55--------------- Basinger	0-28	.5-4	1.40-1.55	>20	0.03-0.07	3.6-8.4	<2	Low--------	0.10	5	2	.5-2
	28-42	1-6	1.40-1.65	>20	0.10-0.15	3.6-7.3	<2	Low--------	0.10			
	42-80	1-3	1.50-1.70	>20	0.05-0.10	3.6-7.3	<2	Low--------	0.10			
56--------------- Wabasso	0-31	<5	1.25-1.55	6.0-20	0.02-0.05	4.5-6.5	<2	Low--------	0.20	5	2	1-4
	31-35	1-12	1.50-1.75	0.6-20	0.10-0.15	4.5-7.3	<2	Low--------	0.20			
	35-43	12-30	1.60-1.80	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	43-80	2-12	1.40-1.70	6.0-20	0.05-0.10	7.4-8.4	<2	Low--------	0.17			
57--------------- Chobee	0-6	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
	6-42	20-35	1.55-1.75	<0.2	0.12-0.17	7.4-8.4	<2	Moderate	0.32			
	42-80	7-20	1.60-1.75	0.2-6.0	0.06-0.10	7.4-8.4	<2	Low--------	0.20			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Map symbol and soil name	Depth	Clay <2mm	Moist bulk density	Permea- bility	Available water capacity	Reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cm^3	In/hr	In/in	pH	Mmhos/cm					Pct
58---------------- Gator	0-24	0-2	0.20-0.30	6.0-20	0.30-0.40	3.6-6.0	<2	Low--------	----	---	2	55-80
	24-48	14-30	1.60-1.70	0.6-2.0	0.10-0.15	6.1-8.4	<2	Low--------	0.32			
	48-56	2-7	1.40-1.65	6.0-20	0.03-0.05	6.1-8.4	<2	Low--------	0.15			
60---------------- Tequesta Variant	14-0	---	0.2-0.4	6.0-20	0.20-0.25	5.1-7.3	<2	Low--------	----	---	2	35-70
	0-12	1-6	1.35-1.45	6.0-20	0.10-0.15	5.1-7.3	<2	Low--------	0.20			
	12-16	1-6	1.45-1.65	6.0-20	0.05-0.10	5.1-7.3	<2	Low--------	0.20			
	16-26	15-25	1.50-1.70	0.06-0.6	0.10-0.15	6.1-8.4	<2	Low--------	0.32			
	26-34	8-15	1.45-1.65	0.6-2.0	0.05-0.10	6.1-8.4	<2	Low--------	0.20			
	34-50	5-12	1.40-1.65	2.0-20	0.02-0.05	6.1-8.4	<2	Low--------	0.20			
61---------------- Hobe	0-4	<1-3	1.30-1.55	>20	0.05-0.08	3.6-6.5	<2	Low--------	0.17	5	2	1-2
	4-70	<1-3	1.50-1.70	>20	0.01-0.05	3.6-6.5	<2	Low--------	0.20			
	70-74	2-7	1.40-1.65	0.6-2.0	0.10-0.15	3.6-5.5	<2	Low--------	0.20			
	74-78	2-7	1.40-1.55	2.0-6.0	0.08-0.12	3.6-5.5	<2	Low--------	0.28			
	78-88	15-30	1.60-1.70	0.6-2.0	0.11-0.15	3.6-5.5	<2	Low--------	0.24			
62---------------- Nettles	0-5	<2	1.32-1.44	6.0-20	0.05-0.10	3.6-6.5	<2	Low--------	0.17	5	2	1-3
	5-34	<2	1.43-1.57	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.17			
	34-38	4-13	1.47-1.59	<0.2	0.10-0.15	4.5-6.5	<2	Low--------	0.24			
	38-70	10-30	1.60-1.69	<0.6	0.10-0.15	5.1-7.8	<2	Low--------	0.24			
63---------------- Nettles	0-5	<2	1.32-1.44	6.0-20	0.05-0.10	3.6-6.5	<2	Very low	0.17	5	2	1-3
	5-32	<2	1.43-1.57	6.0-20	0.02-0.05	3.6-6.5	<2	Very low	0.17			
	32-51	4-13	1.47-1.59	<0.2	0.10-0.15	4.5-6.5	<2	Very low	0.24			
	51-80	10-30	1.60-1.69	<0.6	0.10-0.15	5.1-7.8	<2	Low--------	0.24			
64---------------- EauGallie	0-28	<5	1.25-1.50	6.0-20	0.02-0.05	4.5-6.0	<2	Low--------	0.17	5	2	2-8
	28-42	1-8	1.45-1.60	0.6-6.0	0.05-0.10	5.1-6.5	<2	Low--------	0.20			
	42-50	13-31	1.55-1.70	0.6-6.0	0.10-0.15	5.6-7.8	<2	Low--------	0.32			
	50-65	1-13	1.45-1.55	2.0-6.0	0.05-0.10	5.6-7.8	<2	Low--------	0.32			
65---------------- Tuscawilla	0-12	1-5	1.10-1.40	6.0-20	0.05-0.10	5.6-8.4	<2	Low--------	0.20	5	2	1-3
	12-32	14-30	1.25-1.55	0.6-2.0	0.08-0.12	6.6-9.0	<2	Low--------	0.24			
	32-46	1-7	1.55-1.70	6.0-20	0.03-0.08	7.4-9.0	<2	Low--------	0.20			
	46-80	1-7	1.55-1.70	6.0-20	0.03-0.08	7.4-9.0	<2	Low--------	0.20			
66---------------- Holopaw	0-42	1-7	1.35-1.60	6.0-20	0.03-0.07	5.1-7.3	<2	Low--------	0.15	5	2	1-4
	42-60	13-28	1.60-1.70	2.0-6.0	0.10-0.15	6.1-8.4	<2	Low--------	0.20			
	60-80	8-13	1.50-1.60	6.0-20	0.05-0.10	6.6-8.4	<2	Low--------	0.17			
67.* Aquents												
68.* Pits												
69---------------- Hontoon	0-65	---	0.22-0.38	6.0-20	0.20-0.25	4.5-5.5	<2	Low--------	----	---	2	>75
70---------------- Canova Variant	12-0	---	0.3-0.5	6.0-20	0.20-0.25	5.1-6.5	<2	Low--------	----	---	2	>40
	0-5	<5	1.55-1.65	6.0-20	0.10-0.15	5.1-6.5	<2	Low--------	0.20			
	5-18	<5	1.60-1.70	6.0-20	0.05-0.10	5.1-6.5	<2	Low--------	0.20			
	18-24	18-35	1.30-1.50	0.06-0.6	0.12-0.15	6.6-8.4	<2	Low--------	0.32			
	24-30	---	---	---	---	---	---	-----------	----			
	30	---	---	---	---	---	---	-----------	----			
72---------------- Adamsville Variant	0-54	1-6	1.45-1.65	6.0-20	0.02-0.05	5.6-8.4	<2	Low--------	0.17	5	2	>1
	54-70	---	0.22-0.29	0.6-2.0	0.20-0.30	5.6-8.4	<2	Low--------	----			
	70-80	1-6	1.45-1.65	6.0-20	0.02-0.05	5.6-8.4	<2	Low--------	0.17			
73---------------- Samsula	0-34	---	---	6.0-20	0.20-0.25	4.5-5.5	<2	Low--------	----	---	2	>50
	34-65	---	---	6.0-20	0.02-0.05	3.6-5.5	<2	Low--------	----			
74---------------- Torry	0-62	---	---	0.6-2.0	0.20-0.25	5.1-7.3	<2	Moderate	----	---	2	>50
	62	---	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Map symbol and soil name	Depth	Clay <2mm	Moist bulk density	Permea- bility	Available water capacity	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
75---------------- Ft. Drum	0-7	1-3	1.30-1.55	6.0-20	0.05-0.10	4.5-7.3	<2	Very low	0.17	5	2	1-2
	7-14	1-3	1.30-1.55	6.0-20	0.05-0.08	5.6-8.4	<2	Very low	0.17			
	14-33	10-20	1.40-1.65	0.6-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.24			
	33-80	2-5	1.30-1.60	6.0-20	0.05-0.08	6.1-8.4	<2	Very low	0.17			
76---------------- Valkaria	0-7	1-3	1.35-1.50	6.0-20	0.05-0.10	5.1-7.3	<2	Low--------	0.15	5	1	1-4
	7-13	<2	1.45-1.60	6.0-20	0.03-0.08	5.1-7.3	<2	Low--------	0.15			
	13-45	2-5	1.45-1.60	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.15			
	45-80	1-5	1.45-1.60	6.0-20	0.03-0.08	5.1-8.4	<2	Low--------	0.15			
77---------------- 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
78---------------- Pomello Variant	0-52	<2	1.40-1.70	>20	0.02-0.05	4.5-6.0	<2	Low--------	0.10	5	1	<.5
	52-64	2-8	1.40-1.55	0.6-2.0	0.10-0.15	4.5-6.0	<2	Low--------	0.20			
	64-80	2-8	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	<2	Low--------	0.10			
79---------------- Terra Ceia Variant	0-60	1-20	0.20-0.40	2.0-20	0.20-0.35	6.1-7.3	>16	Low--------	----	---	2	>60
86---------------- Paola	0-35	<2	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Very low	0.15	5	1	<.5
	35-80	<3	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Very low	0.15			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--WATER FEATURES

[See text for definitions of terms such as "rare," "brief," "apparent," and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth*	Kind	Months
					Ft		
2----------------------- Lawnwood	B/D	None-------------	---	---	0-1.0	Perched	Jun-Oct
3----------------------- Lawnwood	B/D	None-------------	---	---	+2-1.0	Perched	Jun-Feb
4----------------------- Waveland	B/D	None-------------	---	---	0-1.0	Perched	Jun-Oct
5----------------------- Waveland	B/D	None-------------	---	---	+2-1.0	Perched	Jun-Feb
6----------------------- Paola	A	None-------------	---	---	>6.0	---	---
7----------------------- St. Lucie	A	None-------------	---	---	>6.0	---	---
8----------------------- Palm Beach	A	None-------------	---	---	>6.0	---	---
9----------------------- Pomello	C	None-------------	---	---	2.0-3.5	Apparent	Jul-Nov
10---------------------- Basinger	B/D	None-------------	---	---	+2-1.0	Apparent	Jun-Feb
12---------------------- St. Johns Variant	B/D	None-------------	---	---	+2-0	Apparent	Jun-Feb
13---------------------- Placid	B/D	None-------------	---	---	0-1.0	Apparent	Jun-Mar
14---------------------- Satellite Variant	A	None-------------	---	---	2.5-5.0	Apparent	Jun-Feb
15---------------------- Electra	C	None-------------	---	---	2.0-3.5	Apparent	Jul-Oct
16---------------------- Oldsmar	B/D	None-------------	---	---	0-1.0	Apparent	Jun-Feb
17---------------------- Wabasso	B/D	None-------------	---	---	0-1.0	Apparent	Jun-Oct
19---------------------- Winder	B/D	None-------------	---	---	0-1.0	Apparent	Jun-Dec
20---------------------- Riviera	C/D	None-------------	---	---	0-1.0	Apparent	Jun-Dec
21---------------------- Pineda	B/D	Rare-------------	---	---	0-1.0	Apparent	Jun-Nov
22---------------------- Okeelanta	A/D	None-------------	---	---	+1-0	Apparent	Jun-Jan
23.** Urban land							
24---------------------- Orsino	A	None-------------	---	---	3.5-5.0	Apparent	Jun-Dec

See footnotes at end of table.

TABLE 17.--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth*	Kind	Months
					Ft		
25.** Beaches							
26 Pompano	B/D	None	---	---	0-1.0	Apparent	Jun-Nov
27.** Arents							
28 Canaveral	C	None	---	---	1.0-3.0	Apparent	Jun-Nov
30 Bessie	D	Frequent	Very long	Jan-Dec	0-1.0	Apparent	Jan-Dec
31 Cocoa Variant	B	None	---	---	2.5-3.5	Apparent	Jun-Sep
32.** Udorthents							
33:** Paola	A	None	---	---	>6.0	---	---
Urban land.							
34:** St. Lucie	A	None	---	---	>6.0	---	---
Urban land.							
35 Salerno	B/D	None	---	---	0-1.0	Apparent	Jun-Nov
36.** Arents							
38 Floridana	B/D	None	---	---	+2-1.0	Apparent	Jun-Feb
39.** Quartzipsamments							
40 Sanibel	A/D	None	---	---	+1-1.0	Apparent	Jun-Feb
41 Jonathan	B	None	---	---	3.0-5.0	Apparent	Jun-Oct
42 Hallandale	A/D	None	---	---	0-1.0	Apparent	Jun-Nov
44 Boca	B/D	None	---	---	0-1.0	Apparent	Jun-Feb
45 Hilolo	D	None	---	---	0-1.0	Apparent	Jun-Oct
47 Pinellas	B/D	None	---	---	0-1.0	Apparent	Jun-Nov
48 Jupiter	A/D	None	---	---	0-1.0	Apparent	Jun-Nov
49 Riviera	D	None	---	---	+2-1.0	Apparent	Jun-Dec

See footnotes at end of table.

TABLE 17.--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth*	Kind	Months
					Ft		
50------------------------ Okeelanta Variant	D	Frequent--------	Very long-----	Jan-Dec	0-1.0	Apparent	Jan-Dec
51------------------------ Pompano	D	Common----------	Brief---------	Jun-Nov	0-1.0	Apparent	Jun-Nov
52------------------------ Malabar	B/D	None------------	---	---	0-1.0	Apparent	Jun-Nov
53.** Arents							
54------------------------ Oldsmar	B/D	None------------	---	---	+2-1.0	Apparent	Jun-Feb
55------------------------ Basinger	A/D	None------------	---	---	0-1.0	Apparent	Jun-Feb
56------------------------ Wabasso	B/D	None------------	---	---	+2-1.0	Apparent	Jun-Feb
57------------------------ Chobee	B/D	None------------	---	---	0-1.0	Apparent	Jun-Feb
58------------------------ Gator	D	None------------	---	---	+1-0	Apparent	Jun-Mar
60------------------------ Tequesta Variant	B/D	None------------	---	---	+2-1.0	Apparent	Jan-Dec
61------------------------ Hobe	A	None------------	---	---	5.0-6.0	Apparent	Jun-Oct
62------------------------ Nettles	B/D	None------------	---	---	+2-1.0	Perched	Jun-Feb
63------------------------ Nettles	B/D	None------------	---	---	0-1.0	Perched	Jun-Oct
64------------------------ EauGallie	B/D	None------------	---	---	0-1.0	Apparent	Jun-Oct
65------------------------ Tuscawilla	D	None------------	---	---	0-1.0	Apparent	Jul-Sep
66------------------------ Holopaw	B/D	None------------	---	---	0-1.0	Apparent	Jun-Nov
67.** Aquents							
68.** Pits							
69------------------------ Hontoon	A/D	None------------	---	---	+2-1.0	Apparent	Jan-Dec
70------------------------ Canova Variant	B/D	None------------	---	---	0-1.0	Apparent	Jan-Dec
72------------------------ Adamsville Variant	C	None------------	---	---	1.5-3.5	Apparent	Jun-Nov
73------------------------ Samsula	A/D	None------------	---	---	+2-1.0	Apparent	Jan-Dec
74------------------------ Torry	A/D	None------------	---	---	+1-1.0	Apparent	Jun-Feb

See footnotes at end of table.

TABLE 17.--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth*	Kind	Months
					Ft		
75----------------------- Ft. Drum	C	None-------------	---	---	0-1.0	Apparent	Jun-Nov
76----------------------- Valkaria	B/D	None-------------	---	---	0-1.0	Apparent	Jun-Sep
77----------------------- St. Lucie	A	None-------------	---	---	>6.0	---	---
78----------------------- Pomello Variant	C	None-------------	---	---	2.5-3.5	Apparent	Jun-Nov
79----------------------- Terra Ceia Variant	D	Frequent---------	Very long-----	Jan-Dec	0-1.0	Apparent	Jan-Dec
86----------------------- Paola	A	None-------------	---	---	>6.0	---	---

* The plus sign under "High water table--Depth" indicates ponding.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL FEATURES

[The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Bedrock		Cemented pan		Subsidence		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
	In		In		In	In		
2, 3. Lawnwood	>60	---	20-30	Thin	---	---	High	High.
4, 5. Waveland	>60	---	30-50	Thin	---	---	High	High.
6. Paola	>60	---	---	---	---	---	Low	High.
7. St. Lucie	>60	---	---	---	---	---	Low	Moderate.
8. Palm Beach	>60	---	---	---	---	---	Low	Low.
9. Pomello	>60	---	---	---	---	---	Low	High.
10. Basinger	>60	---	---	---	---	---	High	Moderate.
12. St. Johns Variant	>60	---	---	---	---	---	High	High.
13. Placid	>60	---	---	---	---	---	High	High.
14. Satellite Variant	>60	---	---	---	---	---	Low	High.
15. Electra	>60	---	---	---	---	---	Low	High.
16. Oldsmar	>60	---	---	---	---	---	Moderate	High.
17. Wabasso	>60	---	---	---	---	---	Moderate	High.
19. Winder	>60	---	---	---	---	---	High	Low.
20. Riviera	>60	---	---	---	---	---	High	High.
21. Pineda	>60	---	---	---	---	---	High	Low.
22. Okeelanta	>60	---	---	---	16-20	16-30	High	Moderate.
23.* Urban land								
24. Orsino	>60	---	---	---	---	---	Low	Moderate.
25.* Beaches								
26. Pompano	>60	---	---	---	---	---	High	Moderate.

See footnote at end of table.

TABLE 18.--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Cemented pan		Subsidence		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
	In		In		In	In		
27.* Arents								
28 Canaveral	>60	---	---	---	---	---	Moderate	Low.
30 Bessie	>60	---	---	---	16-18	16-24	High	High.
31 Cocoa Variant	20-40	Soft	---	---	---	---	Moderate	Low.
32.* Udorthents								
33:* Paola	>60	---	---	---	---	---	Low	High.
Urban land.								
34:* St. Lucie	>60	---	---	---	---	---	Low	Moderate.
Urban land.								
35 Salerno	>60	---	50-72	Thin	---	---	High	High.
36.* Arents								
38 Floridana	>60	---	---	---	---	---	Moderate	Low.
39.* Quartzipsamments								
40 Sanibel	>60	---	---	---	3-5	8-15	High	Low.
41 Jonathan	>60	---	50-75	Thin	---	---	Low	High.
42 Hallandale	<20	Soft	---	---	---	---	High	Low.
44 Boca	24-40	Soft	---	---	---	---	High	Moderate.
45 Hilolo	>60	---	---	---	---	---	High	Low.
47 Pinellas	>60	---	---	---	---	---	High	Low.
48 Jupiter	8-20	Soft	---	---	---	---	High	Low.
49 Riviera	>60	---	---	---	---	---	High	High.
50 Okeelanta Variant	>60	---	---	---	4-8	16-20	High	High.
51 Pompano	>60	---	---	---	---	---	High	Moderate.

See footnote at end of table.

TABLE 18.--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Cemented pan		Subsidence		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
	In		In		In	In		
52: Malabar	>60	---	---	---	---	---	High	Low.
53.*: Arents								
54: Oldsmar	>60	---	---	---	---	---	Moderate	High.
55: Basinger	>60	---	---	---	---	---	High	Moderate.
56: Wabasso	>60	---	---	---	---	---	Moderate	High.
57: Chobee	>60	---	---	---	---	---	Moderate	Low.
58: Gator	>60	---	---	---	2-6	20-28	High	High.
60: Tequesta Variant	>60	---	---	---	3-6	8-14	High	Low
61: Hobe	>60	---	---	---	---	---	Low	High.
62, 63: Nettles	>60	---	30-50	Thin	---	---	High	Moderate.
64: EauGallie	>60	---	---	---	---	---	High	Moderate.
65: Tuscawilla	>60	---	---	---	---	---	High	Low.
66: Holopaw	>60	---	---	---	---	---	High	Moderate.
67.*: Aquents								
68.*: Pits								
69: Hontoon	>60	---	---	---	16-24	>52	High	High.
70: Canova Variant	24-40	Soft	---	---	3-6	10-16	High	Low.
72: Adamsville Variant	>60	---	---	---	1-2	5-10	High	Moderate.
73: Samsula	>60	---	---	---	16-20	30-36	High	High.
74: Torry	>51	Hard	---	---	3-6	16-30	High	Moderate.
75: Ft. Drum	>60	---	---	---	---	---	High	Low.
76: Valkaria	>60	---	---	---	---	---	High	Moderate.
77: St. Lucie	>60	---	---	---	---	---	Low	Moderate.

See footnote at end of table.

TABLE 18.--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Cemented pan		Subsidence		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
	In		In		In	In		
78----------------------- Pomello Variant	>60	---	---	---	---	---	Low-------------	High.
79----------------------- Terra Ceia Variant	>60	---	---	---	20-30	>50	High------------	Moderate.
86----------------------- Paola	>60	---	---	---	---	---	Low-------------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--PHYSICAL ANALYSES OF SELECTED SOILS

Soil series and sample number	Depth	Horizon	Particle size distribution: Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Hydraulic conductivity	Bulk density (field moist)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	In										Cm/hr	G/cm^3	Pct (wt)	Pct (wt)	Pct (wt)
Bessie:															
S76FL-085-007-1---	0-18	Oa	--	--	--	--	--	--	--	--	39.0	0.12	542.5	414.9	82.3
S76FL-085-007-2---	18-44	IIC	0.0	0.5	5.8	32.5	3.0	41.8	6.3	51.9	37.3	0.75	92.1	80.3	28.5
S76FL-085-007-3---	44-80	IIIC	0.0	0.5	9.2	74.9	5.9	90.5	3.8	5.7	--	--	--	--	--
Boca:															
S77FL-085-016-1---	0-4	A11	0.0	2.0	8.4	77.0	9.9	97.3	1.4	1.3	27.9	1.33	9.7	6.0	2.5
S77FL-085-016-2---	4-8	A12	0.1	4.2	9.5	73.4	11.0	98.2	1.2	0.6	18.6	1.52	4.7	2.7	0.9
S77FL-085-016-3---	8-16	A21	0.1	4.2	11.6	71.8	10.9	98.6	0.9	0.5	21.7	1.58	4.1	2.3	0.6
S77FL-085-016-4---	16-25	A22	0.1	4.4	10.5	72.1	9.6	96.7	1.5	1.8	9.7	1.61	7.5	4.8	0.9
S77FL-085-016-5---	25-32	B2tg	0.1	3.2	8.7	60.1	9.8	81.9	3.5	14.6	1.3	1.56	24.5	22.5	8.5
Chobee:															
S78FL-085-022-1---	3-0	Oap	--	--	--	--	--	--	--	--	26.3	0.53	108.2	87.6	36.6
S78FL-085-022-2---	0-6	A	0.2	7.2	34.0	44.5	5.6	91.5	0.3	8.2	7.0	1.19	30.3	26.4	11.3
S78FL-085-022-3---	6-19	B21t&A	0.1	6.6	29.5	41.2	6.3	83.7	5.7	10.6	0.7	1.31	30.5	27.8	9.1
S78FL-085-022-4---	19-24	B22t	0.1	6.5	31.2	36.9	5.4	80.1	6.9	13.0	0.0	1.34	32.2	28.9	9.9
S78FL-085-022-5---	24-42	B23tca	0.1	4.3	19.0	26.7	5.1	55.2	22.4	22.4	0.1	1.50	26.2	24.7	16.1
S78FL-085-022-6---	42-49	IIC1ca	1.3	9.1	25.0	28.1	3.8	67.3	18.1	14.6	1.4	1.57	13.8	11.5	6.5
S78FL-085-022-7---	49-58	IIC2ca	0.2	3.5	12.7	14.9	3.3	34.6	34.7	31.3	0.0	1.78	18.2	17.1	11.6
S78FL-085-022-8---	58-80	IIC3ca	0.2	7.3	29.3	25.8	2.8	65.4	3.4	31.2	0.0	1.79	19.8	18.9	13.0
Ft. Drum:															
S78FL-085-023-1---	0-7	A11	0.0	0.1	1.7	68.3	28.2	98.3	0.0	1.7	27.4	1.31	10.0	6.8	2.8
S78FL-085-023-2---	7-14	A12	0.0	0.3	2.4	68.8	25.6	97.1	2.3	0.6	17.9	1.36	9.3	5.6	1.4
S78FL-085-023-3---	14-18	B1ca	0.0	0.4	2.0	67.2	27.6	97.2	2.3	0.5	2.4	1.25	30.2	26.9	16.0
S78FL-085-023-4---	18-28	B21ca	0.0	0.4	2.4	63.3	22.0	88.1	7.8	4.1	9.0	1.43	12.0	8.6	5.1
S78FL-085-023-5---	28-33	B22ca	0.0	0.2	2.2	67.2	23.3	92.9	3.6	3.5	1.0	1.54	17.1	11.9	5.6
S78FL-085-023-6---	33-51	C1	0.0	0.2	1.2	60.0	28.4	89.8	2.7	7.5	0.0	1.67	21.9	15.1	8.6
S78FL-085-023-7---	51-80	C2	0.0	0.1	0.7	70.3	22.6	93.7	1.6	4.7	0.7	1.61	15.8	8.0	3.6
Gator:															
S76FL-085-015-1---	0-11	Oap	--	--	--	--	--	--	--	--	36.8	0.64	94.3	86.8	22.3
S76FL-085-015-2---	11-24	Oa2	--	--	--	--	--	--	--	--	143.0	0.20	313.7	270.6	48.7
S76FL-085-015-3---	24-48	IIC1	0.1	3.1	27.3	37.7	7.2	75.4	6.2	18.4	9.4	1.46	26.2	22.5	15.9
S76FL-085-015-4---	48-56	IIC2	0.1	3.9	34.2	49.3	6.3	93.8	2.9	3.3	--	--	--	--	--
Hallandale:															
S76FL-085-013-1---	0-4	Ap	0.1	5.1	53.2	34.5	2.6	95.5	1.7	2.8	54.5	1.29	13.6	11.6	5.4
S76FL-085-013-2---	4-8	C1	0.1	4.9	45.7	41.0	6.2	97.9	0.7	1.4	19.5	1.62	5.1	3.6	1.5
S76FL-085-013-3---	8-13	C2	0.1	5.7	45.1	36.8	6.2	93.9	2.4	3.7	8.5	1.69	6.5	4.4	1.9
S76FL-085-013-4---	13-20	IIR	--	--	--	--	--	--	--	--	--	--	--	--	--
S76FL-085-013-5---	20-41	IIIC1	0.0	3.5	37.1	30.4	4.3	75.3	2.4	22.3	--	--	--	--	--
S76FL-085-013-6---	41-58	IIIC2	0.0	3.0	27.7	23.7	3.6	58.0	27.9	14.1	--	--	--	--	--
S76FL-085-013-7---	58-76	IIIC3	0.0	3.6	37.3	33.4	4.1	78.4	8.9	12.7	0.2	1.76	15.1	13.9	8.5
S76FL-085-013-8---	76-80	IIIC4	0.1	3.3	40.5	35.6	2.7	82.2	5.9	11.9	--	--	--	--	--

TABLE 19.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample number	Depth	Horizon	Particle size distribution: Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Hydraulic conductivity	Bulk density (field moist)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	In										Cm/hr	G/cm^3	- - - Pct (wt)	- - -	
Hobe:															
S76FL-085-008-1---	0-4	A1	0.0	1.4	18.8	71.1	6.4	97.7	1.2	1.1	34.5	1.20	6.5	4.4	3.1
S76FL-085-008-2---	4-9	A21	0.0	1.3	17.8	72.0	7.4	98.5	1.2	0.3	28.6	1.45	3.9	3.0	1.6
S76FL-085-008-3---	9-44	A22	0.0	1.4	18.9	71.3	7.0	98.6	1.4	0.0	42.4	1.53	3.3	2.1	1.5
S76FL-085-008-4---	44-70	A23	0.0	1.4	17.7	72.4	6.8	98.3	1.2	0.5	37.1	1.54	3.7	2.1	1.6
S76FL-085-008-5---	70-74	B2h	0.0	1.0	13.7	62.1	6.7	83.5	5.9	10.6	2.8	1.52	18.0	14.6	8.1
S76FL-085-008-6---	74-78	B3&Bh	0.0	1.2	15.8	67.3	7.2	91.5	3.3	5.2	12.3	1.48	11.4	8.5	4.9
S76FL-085-008-7---	78-88	Btg	0.0	1.0	14.6	56.6	6.8	79.0	1.6	19.4	0.1	1.66	19.4	16.2	8.7
Jonathan:															
S76FL-085-010-1---	0-5	A1	0.1	9.7	65.9	21.8	1.0	98.5	0.9	0.6	88.9	1.49	3.6	2.5	1.8
S76FL-085-010-2---	5-22	A21	0.1	10.6	63.4	24.7	0.8	99.6	0.1	0.3	120.0	1.55	3.0	2.1	1.3
S76FL-085-010-3---	22-38	A22	0.2	11.0	59.3	27.8	0.9	99.2	0.4	0.4	106.9	1.43	5.7	4.0	1.7
S76FL-085-010-4---	38-56	A23	0.2	9.6	54.5	32.8	1.7	98.8	0.8	0.4	62.4	1.52	3.3	1.9	1.0
S76FL-085-010-5---	56-99	Bh	0.2	8.3	52.8	24.2	1.2	86.7	5.8	7.5	1.8	1.56	18.6	13.2	4.8
Jupiter:															
S76FL-085-014-1---	0-4	A1p	0.1	3.5	38.5	42.0	7.2	91.3	3.5	5.2	24.9	1.42	17.6	13.5	6.0
S76FL-085-014-2---	4-10	A12	0.1	4.1	41.8	40.8	7.1	93.9	2.3	3.8	21.0	1.56	7.5	5.4	2.5
S76FL-085-014-3---	10-22	IIR	--	--	--	--	--	--	--	--	--	--	--	--	--
S76FL-085-014-4---	22-32	IIIC1	0.0	2.6	26.8	23.6	4.0	57.0	19.7	23.3	--	--	--	--	--
S76FL-085-014-5---	32-48	IIIC2	0.0	2.7	30.0	28.6	3.9	65.2	23.2	11.6	0.4	1.65	16.9	14.3	9.7
S76FL-085-014-6---	48-72	IIIC3	0.0	2.7	39.1	34.2	4.3	80.3	7.3	12.4	0.1	1.67	16.2	14.0	6.7
S76FL-085-014-7---	72-84	IIIC4	0.0	2.5	36.0	41.0	5.2	84.7	3.9	11.4	--	--	--	--	--
Lawnwood:															
S76FL-085-002-1---	0-5	A11	0.0	2.2	35.9	57.5	3.3	98.9	0.7	0.4	50.9	1.41	6.4	5.1	2.8
S76FL-085-002-2---	5-17	A12	0.0	1.8	29.4	61.6	5.2	98.0	1.5	0.5	25.0	1.58	4.5	2.8	1.5
S76FL-085-002-3---	17-28	A2	0.0	2.0	29.9	62.9	4.0	98.8	0.7	0.5	30.6	1.63	3.5	2.7	1.2
S76FL-085-002-4---	28-42	B21h	0.0	1.7	25.3	56.2	4.3	87.5	6.3	6.2	0.0	1.56	24.5	22.9	4.4
S76FL-085-002-5---	42-64	B22h	0.0	1.6	26.8	60.7	3.8	92.9	3.5	3.6	13.8	1.47	11.3	8.5	2.6
S76FL-085-002-6---	64-80	B3&Bh	0.0	1.8	27.6	54.6	3.2	87.2	1.9	10.9	5.3	1.62	13.7	9.9	3.6
Malabar:															
S76FL-085-021-1---	0-5	A1	0.0	6.5	49.7	32.1	7.3	95.6	3.7	0.7	58.5	1.36	8.9	6.5	2.0
S76FL-085-021-2---	5-15	A2	0.1	6.4	45.9	34.2	10.2	96.8	2.6	0.6	23.3	1.60	3.9	2.3	0.7
S76FL-085-021-3---	15-29	Bir	0.1	7.0	40.7	37.7	10.2	95.7	2.9	1.4	12.2	1.75	4.8	2.6	0.5
S76FL-085-021-4---	29-42	A'2	0.1	6.3	40.3	37.6	11.9	96.2	3.4	0.4	24.9	1.65	3.8	2.4	0.4
S76FL-085-021-5---	42-46	B'tg	0.1	6.7	39.1	27.2	6.2	79.3	3.1	17.6	0.1	1.83	15.5	14.8	9.6
Nettles:															
S76FL-085-001-1---	0-5	A11	0.3	7.9	46.1	39.2	3.6	97.1	2.2	0.7	30.9	1.44	10.6	9.1	3.6
S76FL-085-001-2---	5-12	A12	0.3	4.8	36.9	51.2	5.5	98.7	0.3	1.0	25.9	1.63	4.1	3.0	1.8
S76FL-085-001-3---	12-32	A2	0.2	5.4	37.0	50.8	5.4	98.8	0.3	0.9	28.6	1.69	3.2	1.8	1.4
S76FL-085-001-4---	32-43	B21h	0.3	5.1	35.2	47.5	5.1	93.2	2.6	4.2	0.7	1.74	20.7	12.5	2.1
S76FL-085-001-5---	43-51	B22h	0.4	5.6	32.9	50.9	5.8	95.6	1.0	3.4	21.2	1.62	7.5	5.1	1.8
S76FL-085-001-6---	51-62	B2tg	0.4	5.2	34.4	39.9	3.4	83.3	0.9	15.8	0.2	1.83	17.4	16.3	7.0
S76FL-085-001-7---	62-71	C1g	0.5	4.8	32.2	43.8	5.2	86.5	1.3	12.2	0.1	1.77	16.0	13.6	5.9
S76FL-085-001-8---	71-80	C2g	0.4	4.5	28.5	43.3	7.3	84.0	1.2	14.8	0.0	1.81	17.1	15.0	9.0

TABLE 19.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample number	Depth	Horizon	Particle size distribution: Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Hydraulic conductivity	Bulk density (field moist)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	In										Cm/hr	G/cm^3	Pct (wt)	Pct (wt)	Pct (wt)
Palm Beach:															
S76FL-085-011-1---	0-8	A	0.0	7.1	66.2	17.1	0.4	90.8	4.8	4.4	171.0	1.19	10.5	8.3	4.8
S76FL-085-011-2---	8-13	C1	0.0	6.8	68.5	18.5	0.3	94.1	3.1	2.8	230.5	1.33	7.0	5.6	2.5
S76FL-085-011-3---	13-27	C2	0.0	10.1	68.4	16.4	0.2	95.1	1.8	3.1	169.0	1.40	4.6	3.6	1.7
S76FL-085-011-4---	27-80	C3	0.0	9.0	62.8	25.7	0.7	98.2	0.4	1.4	125.0	1.56	2.7	1.9	0.4
Pineda:															
S76FL-085-005-1---	0-5	A11	0.0	3.6	50.8	42.2	2.3	98.9	0.4	0.7	85.4	1.38	5.8	4.9	2.6
S76FL-085-005-2---	5-8	A12	0.2	5.7	53.4	37.1	2.4	98.8	0.6	0.6	68.3	1.49	4.5	2.9	0.8
S76FL-085-005-3---	8-15	A2	0.2	5.1	47.5	42.8	3.4	99.0	0.5	0.5	21.7	1.66	7.0	4.9	0.4
S76FL-085-005-4---	15-22	B2ir	0.1	5.1	46.2	41.8	3.7	96.9	0.8	2.3	14.4	1.70	4.5	2.7	1.2
S76FL-085-005-5---	22-36	B3ir	0.2	6.3	46.5	42.1	3.7	98.8	0.7	0.5	39.0	1.68	2.6	1.7	0.6
S76FL-085-005-6---	36-44	B2tg	0.1	4.5	38.9	34.3	2.7	80.5	1.7	17.8	0.1	1.77	16.2	15.2	8.1
S76FL-085-005-7---	44-60	B3g	0.3	5.1	43.9	32.5	1.6	83.4	1.5	15.1	--	--	--	--	--
Pinellas:															
S77FL-085-017-1---	0-5	A1	0.1	1.4	6.4	78.4	10.2	96.5	2.0	1.5	39.1	1.19	14.1	10.0	4.9
S77FL-085-017-2---	5-11	A21	0.0	2.0	7.0	76.8	12.1	97.9	1.4	0.7	18.9	1.47	7.3	4.0	1.1
S77FL-085-017-3---	11-13	A22ca	0.1	1.9	5.9	75.7	11.3	94.9	2.0	3.1	3.3	1.54	13.6	9.3	3.1
S77FL-085-017-4---	13-16	A23ca	0.0	1.7	6.4	71.5	11.6	91.2	2.7	6.1	3.0	1.56	17.2	13.5	6.8
S77FL-085-017-5---	16-26	A24ca	0.0	1.8	5.7	74.7	10.3	92.5	3.3	4.2	4.6	1.56	16.2	12.3	7.6
S77FL-085-017-6---	26-38	B2tg	0.0	1.5	4.8	64.1	10.2	80.6	5.0	14.4	0.1	1.53	25.5	22.3	11.1
S77FL-085-017-7---	38-52	Cg	0.0	1.7	5.4	75.9	9.8	92.8	1.6	5.6	4.9	1.62	13.4	7.3	3.1
Salerno:															
S76FL-085-004-1---	0-4	A11	0.0	4.9	71.1	21.3	0.6	97.9	1.7	0.4	79.5	1.43	6.4	5.4	3.3
S76FL-085-004-2---	4-9	A12	0.0	3.8	69.4	25.2	0.3	98.7	0.9	0.4	76.3	1.52	4.9	3.9	2.1
S76FL-085-004-3---	9-17	A21	0.1	4.4	64.0	30.0	0.6	99.1	0.5	0.4	87.4	1.50	5.0	4.1	1.8
S76FL-085-004-4---	17-46	A22	0.1	4.9	63.6	30.0	0.7	99.3	0.3	0.4	76.9	1.57	4.1	3.2	1.3
S76FL-085-004-5---	46-61	A3	0.0	4.9	63.1	30.6	0.6	99.2	0.4	0.4	41.4	1.60	5.2	3.5	1.1
S76FL-085-004-6---	61-76	B2h	0.1	4.9	57.0	28.0	0.6	90.6	4.8	4.6	0.3	1.30	34.2	31.2	8.3
S76FL-085-004-7---	76-99	B3&Bh	0.1	5.4	61.0	25.5	0.4	92.4	1.0	6.6	5.0	1.61	13.3	8.9	2.7
Satellite Variant:															
S76FL-085-009-1---	0-5	A	0.0	4.5	76.2	17.7	0.4	98.8	0.4	0.8	126.0	1.47	3.6	2.9	1.9
S76FL-085-009-2---	5-17	C1	0.0	4.6	72.2	22.2	0.5	99.5	0.2	0.3	127.0	1.50	2.9	2.1	1.5
S76FL-085-009-3---	17-39	C2	0.1	5.2	68.3	25.0	0.6	99.2	0.4	0.4	126.0	1.50	2.6	2.1	1.4
S76FL-085-009-4---	39-80	C3	0.1	4.1	65.7	28.8	0.2	98.9	0.3	0.8	107.5	1.55	2.5	1.6	0.8
Tuscawilla:															
S77FL-085-020-1---	0-4	Ap	0.1	5.0	46.9	33.5	7.1	92.6	4.8	2.6	51.6	1.17	18.3	13.8	20.1
S77FL-085-020-2---	4-8	A21	0.1	7.2	50.9	31.6	6.3	96.1	3.0	0.9	77.9	1.36	7.4	5.4	2.4
S77FL-085-020-3---	8-12	A22	0.1	7.9	49.7	31.5	6.8	96.0	2.7	1.3	75.6	1.34	14.7	6.8	2.6
S77FL-085-020-4---	12-15	B1	0.0	5.5	39.4	30.8	7.2	82.9	4.6	12.5	52.2	1.63	14.5	12.8	6.7
S77FL-085-020-5---	15-22	B21t	0.0	4.3	35.6	27.8	4.9	72.6	2.7	24.7	3.4	1.29	29.2	26.9	16.8
S77FL-085-020-6---	22-32	B22tca	0.0	4.1	41.5	28.6	6.1	80.3	3.3	16.4	--	--	--	--	--
S77FL-085-020-7---	32-46	B3ca	0.0	5.0	43.6	31.7	5.0	85.3	2.8	11.9	2.7	1.70	15.1	14.2	8.1
S77FL-085-020-8---	46-61	C1	0.1	5.1	41.5	27.0	4.8	78.5	7.5	14.0	0.1	1.68	18.7	17.4	9.1
S77FL-085-020-9---	61-80	C2	0.1	3.4	31.9	33.7	4.2	73.3	11.5	15.2	0.1	1.71	18.1	16.7	9.9

TABLE 19.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample number	Depth	Horizon	Particle size distribution: Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Hydraulic conduc- tivity	Bulk density (field moist)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	In										Cm/hr	G/cm^3	- - - Pct (wt) - - -		
Wabasso:															
S78FL-085-024-1---	0-2	A11	--	--	--	--	--	--	--	--	16.5	1.14	33.9	24.2	11.4
S78FL-085-024-2---	2-7	A12	0.0	4.1	40.2	38.4	11.7	94.4	4.9	0.7	17.4	1.49	9.8	6.1	2.7
S78FL-085-024-3---	7-12	A21	0.0	3.3	37.3	40.4	15.3	96.3	2.9	0.8	21.8	1.54	7.0	4.0	2.4
S78FL-085-024-4---	12-20	A22	0.0	4.5	38.0	40.8	14.4	97.7	1.8	0.5	26.7	1.60	5.4	2.3	1.6
S78FL-085-024-5---	20-23	B21h	0.0	4.6	34.1	43.1	14.8	96.6	2.4	1.0	13.2	1.67	6.3	3.0	1.0
S78FL-085-024-6---	23-36	B22h	0.1	4.4	32.2	42.4	16.0	95.1	2.9	2.0	3.2	1.68	13.8	8.8	2.1
S78FL-085-024-7---	36-41	B21t	0.0	3.8	29.7	32.8	11.7	78.0	5.4	16.6	2.6	1.66	21.7	18.6	6.5
S78FL-085-024-8---	41-49	B22t	0.1	3.8	30.9	32.8	9.5	77.1	4.3	18.6	0.0	1.80	19.3	18.2	10.2
S78FL-085-024-9---	49-58	B23t	0.0	3.8	34.5	31.0	8.4	77.7	4.6	17.7	0.1	1.78	17.8	16.1	10.1
S78FL-085-024-10--	58-73	C1	0.0	4.6	41.7	29.9	5.2	81.4	4.1	14.5	0.1	1.90	15.3	13.9	8.7
S78FL-085-024-11--	73-80	C2	0.1	5.3	44.7	28.0	2.8	80.9	2.9	16.2	0.0	1.72	24.7	22.5	8.7
Waveland:															
S76FL-085-003-1---	0-7	A11	0.1	10.3	65.0	23.6	0.5	99.5	0.1	0.4	92.0	1.38	7.2	6.2	3.2
S76FL-085-003-2---	7-18	A12	0.2	7.6	59.2	30.6	1.2	98.8	0.8	0.4	60.8	1.58	3.5	2.8	1.8
S76FL-085-003-3---	18-36	A21	0.3	8.6	58.6	30.8	1.1	99.4	0.2	0.4	51.9	1.64	3.4	2.7	1.1
S76FL-085-003-4---	36-43	A22	0.2	7.8	53.7	35.0	2.1	98.8	0.7	0.5	29.5	1.63	4.4	3.0	0.7
S76FL-085-003-5---	43-47	B21h	0.4	9.5	60.1	27.0	0.4	97.4	1.4	1.2	0.7	1.66	14.2	11.8	1.7
S76FL-085-003-6---	47-77	B22h	0.4	10.5	57.1	21.2	0.7	89.9	5.1	5.0	2.2	1.40	24.1	20.7	6.5
S76FL-085-003-7---	77-90	B23h	0.2	5.6	61.4	23.8	0.3	91.3	4.0	4.7	5.6	1.60	12.8	9.8	3.2
S76FL-085-003-8---	90-99	B3	0.0	3.4	68.5	25.9	0.1	97.9	0.3	1.8	40.7	1.58	7.1	5.4	1.2
Winder:															
S77FL-085-019-1---	0-7	Ap	0.1	6.8	52.1	32.5	6.2	97.7	1.2	1.1	21.3	1.58	6.2	3.8	1.1
S77FL-085-019-2---	7-15	A2	0.1	6.6	47.9	31.8	7.1	93.5	2.2	4.3	10.7	1.74	8.6	5.7	2.3
S77FL-085-019-3---	15-26	B&A	0.1	5.4	37.7	25.9	5.5	74.6	4.9	20.5	0.5	1.38	32.2	26.9	14.2
S77FL-085-019-4---	26-42	B2tg	0.1	4.3	26.1	19.0	3.8	53.3	21.3	25.4	0.5	1.84	15.4	14.6	9.5
S77FL-085-019-5---	42-62	Cg	0.0	5.8	45.4	26.5	6.0	83.7	5.5	10.8	0.4	1.73	15.2	11.9	5.7

TABLE 20--CHEMICAL ANALYSES OF SELECTED SOILS

Soil series and sample numbers	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	pH: $CaCl_2$ .01M (1:2)	pH: KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
	In		-----Milliequivalents/100 grams of soil----							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Bessie:																				
S76FL-085-007-1	0-18	Oa	15.52	36.21	120.99	5.40	178.12	27.25	205.37	87	19.72	330.00	5.5	5.6	5.4	--	--	--	--	--
S76FL-085-007-2	18-44	IIC	8.83	31.27	67.70	3.28	110.98	15.44	126.42	88	5.32	71.25	6.0	6.2	5.8	--	--	--	--	--
S76FL-085-007-3	44-80	IIIC	19.20	6.91	17.74	0.45	44.30	0.00	44.30	100	0.78	24.00	8.5	8.3	8.2	--	--	--	--	--
Boca:																				
S77FL-085-016-1	0-4	A11	4.52	0.51	0.08	0.02	5.13	1.00	6.13	84	1.13	0.15	7.7	7.1	6.9	--	--	--	--	--
S77FL-085-016-2	4-8	A12	0.84	0.15	0.03	0.00	1.02	0.43	1.45	70	0.28	0.07	7.8	7.2	7.3	--	--	--	--	--
S77FL-085-016-3	8-16	A21	0.43	0.12	0.03	0.00	0.58	0.56	1.14	51	0.09	0.06	7.8	7.5	7.5	--	--	--	--	--
S77FL-085-016-4	16-25	A22	1.60	0.26	0.07	0.01	1.94	0.61	2.55	76	0.09	0.09	8.4	7.7	7.8	--	--	--	--	--
S77FL-085-016-5	25-32	B2tg	17.48	1.57	0.66	0.05	19.76	3.37	23.13	85	0.08	0.24	8.6	7.9	7.4	--	--	--	0.06	0.50
Chobee:																				
S78FL-085-022-1	3-0	Oap	36.74	4.12	0.67	0.86	42.39	24.02	66.41	64	40.16	3.13	6.0	5.8	5.7	--	--	--	--	--
S78FL-085-022-2	0-6	A	20.31	1.60	0.28	0.07	22.26	5.76	28.02	79	4.37	0.68	6.6	6.4	6.2	--	--	--	--	--
S78FL-085-022-3	6-19	B21T&A	13.75	1.24	0.87	0.06	15.92	4.45	20.37	78	2.83	1.78	7.2	6.8	6.8	--	--	--	0.01	0.11
S78FL-085-022-4	19-24	B22t	17.19	1.03	0.28	0.04	18.54	4.64	23.18	80	1.93	0.75	7.5	7.1	7.1	--	--	--	0.02	0.10
S78FL-085-022-5	24-42	B23tca	23.50	0.74	0.18	0.05	24.47	3.01	27.48	89	0.49	0.58	7.8	7.3	7.3	--	--	--	0.01	0.12
S78FL-085-022-6	42-49	IIC1ca	20.25	0.49	0.14	0.05	20.93	1.68	22.61	93	0.40	0.36	7.9	7.4	7.4	--	--	--	--	--
S78FL-085-022-7	49-58	IIC2ca	19.50	0.49	0.09	0.03	20.11	1.40	21.51	93	0.30	0.42	8.0	7.5	7.4	--	--	--	--	--
S78FL-085-022-8	58-80	IIC3ca	28.00	1.85	0.04	0.09	29.98	6.34	36.32	83	0.13	0.21	7.8	7.5	7.2	--	--	--	--	--
Ft. Drum:																				
S78FL-085-023-1	0-7	A11	5.43	0.66	1.35	0.06	7.50	3.09	10.59	71	3.25	0.78	6.9	6.3	6.3	--	--	--	--	--
S78FL-085-023-2	7-14	A12	1.90	0.19	1.50	0.02	3.61	0.03	3.64	79	0.63	1.08	8.3	7.4	7.5	--	--	--	--	--
S78FL-085-023-3	14-18	B1ca	17.00	0.43	6.46	0.03	23.92	0.00	23.92	100	1.74	3.38	8.5	7.8	8.3	--	--	--	--	--
S78FL-085-023-4	18-28	B21ca	--	0.23	1.22	0.01	--	0.00	--	--	0.20	1.35	9.0	7.9	8.5	--	--	--	--	--
S78FL-085-023-5	28-33	B22ca	14.25	0.21	1.52	0.01	15.99	0.00	15.99	100	0.21	1.10	9.0	7.9	8.5	--	--	--	--	--
S78FL-085-023-6	33-51	C1	3.43	0.44	2.57	0.03	6.47	0.66	7.13	91	0.10	1.23	8.5	7.8	7.8	--	--	--	--	--
S78FL-085-023-7	51-80	C2	2.68	0.33	1.35	0.02	4.38	0.36	4.74	92	0.15	0.80	8.5	7.8	7.8	--	--	--	--	--
Gator:																				
S76FL-085-015-1	0-11	Oap	32.32	6.33	1.36	0.72	40.73	80.39	121.12	34	36.61	1.46	4.6	4.3	4.0	--	--	--	--	--
S76FL-085-015-2	11-24	Oa2	40.54	6.17	1.82	0.41	48.94	60.64	109.58	45	26.52	2.29	4.8	4.7	4.4	--	--	--	--	--
S76FL-085-015-3	24-48	IIC1	15.12	1.60	0.22	0.15	17.09	5.24	22.33	77	0.41	0.75	6.9	6.3	6.3	--	--	--	--	--
S76FL-085-015-4	48-56	IIC2	16.89	0.75	0.09	0.04	17.77	0.00	17.77	100	0.07	0.41	7.7	7.5	7.5	--	--	--	--	--
Hallandale:																				
S76FL-085-013-1	0-4	Ap	6.05	0.36	0.02	0.17	6.60	3.52	10.12	65	2.34	0.25	--	--	--	--	--	--	--	--
S76FL-085-013-2	4-8	C1	0.92	0.06	0.00	0.05	1.03	0.57	1.60	64	0.29	0.25	--	--	--	--	--	--	--	--
S76FL-085-013-3	8-13	C2	7.92	0.24	0.02	0.25	8.43	0.74	9.17	92	0.21	0.31	--	--	--	--	--	--	--	--
S76FL-085-013-4	13-20	IIR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S76FL-085-013-5	20-41	IIIC1	23.15	1.03	0.15	0.15	24.48	1.45	25.93	94	0.12	0.45	--	--	--	--	--	--	--	--
S76FL-085-013-6	41-58	IIIC2	22.75	1.20	0.13	0.09	24.17	1.20	25.37	95	0.10	0.51	--	--	--	--	--	--	--	--
S76FL-085-013-7	58-76	IIIC3	22.47	2.36	0.18	0.11	25.12	1.56	26.68	94	0.08	0.42	--	--	--	--	--	--	--	--
S76FL-085-013-8	76-80	IIIC4	21.77	2.03	0.32	0.09	24.21	1.15	25.36	95	0.08	0.38	--	--	--	--	--	--	--	--

TABLE 20--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample numbers	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	$CaCl_2$ .01M (1:2)	KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
	In		Milliequivalents/100 grams of soil							Pct	Pct	Mmho/cm				Pct	Pct	Pct	Pct	Pct
Hobe:																				
S76FL-085-008-1	0-4	A1	0.37	0.20	0.02	0.02	0.61	3.89	4.50	14	0.83	0.03	4.8	3.7	3.2	--	--	--	--	--
S76FL-085-008-2	4-9	A21	0.05	0.03	0.00	0.01	0.09	0.41	0.50	18	0.16	0.02	5.4	4.1	3.8	--	--	--	--	--
S76FL-085-008-3	9-44	A22	0.02	0.01	0.00	0.01	0.04	0.00	0.04	100	0.04	0.02	6.4	6.3	5.7	--	--	--	--	--
S76FL-085-008-4	44-70	A23	0.02	0.00	0.00	0.01	0.03	0.08	0.11	27	0.04	0.02	6.2	6.1	6.1	--	--	--	--	--
S76FL-085-008-5	70-74	B2h	0.56	0.01	0.05	0.04	0.66	21.10	21.76	3	1.37	0.04	5.1	4.5	4.0	1.27	0.01	0.40	0.32	0.04
S76FL-085-008-6	74-78	B3&Bh	0.07	0.04	0.02	0.02	0.15	8.74	8.89	2	0.54	0.02	5.2	4.4	4.2	--	--	--	--	--
S76FL-085-008-7	78-88	Btg	0.89	1.78	0.08	0.11	2.86	6.97	9.83	29	0.11	0.04	5.4	4.3	3.8	--	--	--	0.08	0.12
Jonathan:																				
S76FL-085-010-1	0-5	A1	0.28	0.07	0.00	0.01	0.36	2.05	2.41	15	0.63	0.01	5.1	3.8	3.4	--	--	--	--	--
S76FL-085-010-2	5-22	A21	0.02	0.00	0.00	0.01	0.03	0.41	0.44	7	0.12	0.01	5.8	5.0	4.2	--	--	--	--	--
S76FL-085-010-3	22-38	A22	0.02	0.00	0.00	0.01	0.03	0.20	0.23	13	0.16	0.01	5.7	4.6	4.0	--	--	--	--	--
S76FL-085-010-4	38-56	A23	0.01	0.00	0.00	0.00	0.01	0.14	0.15	7	0.24	0.01	5.8	5.0	4.3	--	--	--	--	--
S76FL-085-010-5	56-99	Bh	0.01	0.17	0.02	0.01	0.21	25.61	25.82	1	3.21	0.03	4.5	3.7	3.6	3.14	0.03	0.60	0.31	0.04
Jupiter:																				
S76FL-085-014-1	0-4	A1p	8.52	0.98	0.29	2.01	11.80	4.20	16.00	74	2.25	0.23	7.3	6.7	6.5	--	--	--	--	--
S76FL-085-014-2	4-10	A12	12.17	0.34	0.07	0.42	13.00	0.74	13.74	95	0.76	0.23	7.8	7.2	7.2	--	--	--	--	--
S76FL-085-014-3	10-22	IIR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S76FL-085-014-4	22-32	IIIC1ca	21.82	0.95	0.16	0.08	23.01	1.23	24.24	95	0.21	0.31	8.0	7.5	7.4	--	--	--	--	--
S76FL-085-014-5	32-48	IIIC2ca	21.17	0.79	0.15	0.04	22.15	0.91	23.06	96	0.14	0.35	8.1	7.6	7.5	--	--	--	--	--
S76FL-085-014-6	48-72	IIIC3ca	20.04	1.54	0.15	0.07	21.80	1.32	23.12	94	0.09	0.41	8.3	7.7	7.4	--	--	--	--	--
S76FL-085-014-7	72-84	IIIC4ca	19.84	1.12	0.13	0.07	21.16	0.79	21.95	96	0.06	0.37	8.2	7.7	7.4	--	--	--	--	--
Lawnwood:																				
S76FL-085-002-1	0-5	A11	0.10	0.07	0.02	0.01	0.20	2.26	2.46	8	0.64	0.04	5.5	4.0	3.7	--	--	--	--	--
S76FL-085-002-2	5-17	A12	0.01	0.01	0.00	0.00	0.02	1.36	1.38	1	0.25	0.03	6.1	4.5	4.3	--	--	--	--	--
S76FL-085-002-3	17-28	A2	0.00	0.00	0.01	0.00	0.01	0.45	0.46	2	0.08	0.03	6.4	5.8	4.9	--	--	--	--	--
S76FL-085-002-4	28-42	B21h	0.91	2.80	0.16	0.01	3.88	27.10	30.98	13	4.00	0.16	4.8	4.1	3.7	3.50	0.02	0.30	0.23	0.04
S76FL-085-002-5	42-64	B22h	0.24	0.89	0.08	0.00	1.21	13.10	14.31	8	1.26	0.11	5.6	4.8	4.4	1.17	0.01	0.30	0.35	0.04
S76FL-085-002-6	64-80	B3&Bh	0.39	2.35	0.11	0.02	2.87	7.91	10.78	27	0.46	0.12	5.4	4.7	4.3	0.46	0.03	0.32	0.13	0.04
Malabar:																				
S76FL-085-021-1	0-5	A1	0.87	0.13	0.02	0.03	1.05	1.90	2.95	36	0.80	0.40	5.8	4.9	4.7	--	--	--	--	--
S76FL-085-021-2	5-15	A2	0.20	0.02	0.01	0.00	0.23	0.09	0.32	72	0.10	0.24	6.3	5.7	5.5	--	--	--	--	--
S76FL-085-021-3	15-29	Bir	0.34	0.10	0.01	0.00	0.45	0.09	0.54	83	0.03	0.02	7.2	6.8	6.9	0.05	0.06	0.01	0.03	0.07
S76FL-085-021-4	29-42	A'2	0.11	0.02	0.01	0.00	0.14	0.09	0.23	61	0.02	0.02	7.3	7.1	7.1	--	--	--	--	--
S76FL-085-021-5	42-46	B'tg	5.23	1.31	0.25	0.05	6.84	2.55	9.39	73	0.18	0.22	6.8	6.3	5.7	--	--	--	0.03	0.16
Nettles:																				
S76FL-085-001-1	0-5	A11	0.24	0.10	0.02	0.02	0.38	4.97	5.35	7	1.19	0.05	4.9	3.5	3.3	--	--	--	--	--
S76FL-085-001-2	5-12	A12	0.03	0.02	0.00	0.00	0.05	1.13	1.18	4	0.19	0.03	5.8	4.3	4.0	--	--	--	--	--
S76FL-085-001-3	12-32	A2	0.03	0.02	0.02	0.00	0.07	0.90	0.97	7	0.08	0.04	6.2	5.2	4.6	--	--	--	--	--
S76FL-085-001-4	32-43	B21h	0.58	0.77	0.12	0.01	1.48	15.36	16.84	9	2.00	0.07	5.1	4.0	3.7	1.95	0.02	0.18	0.12	0.04
S76FL-085-001-5	43-51	B22h	0.30	0.36	0.06	0.00	0.72	10.39	11.11	6	1.08	0.06	5.3	4.4	4.0	1.07	0.02	0.20	0.11	0.04
S76FL-085-001-6	51-62	B2tg	1.18	2.35	0.16	0.04	3.73	5.87	9.60	39	0.23	0.10	5.3	4.4	3.9	--	--	--	0.05	0.06
S76FL-085-001-7	62-71	C1g	1.30	2.22	0.16	0.04	3.72	6.78	10.50	35	0.26	0.06	5.3	4.4	3.9	--	--	--	--	--
S76FL-085-001-8	71-80	C2g	1.72	2.55	0.17	0.04	4.48	5.87	10.35	43	0.20	0.10	5.2	4.3	3.8	--	--	--	--	--

TABLE 20--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample numbers	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	$CACl_2$ .01M (1:2)	KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
	In		-----Milliequivalents/100 grams of soil----							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Palm Beach:																				
S76FL-085-011-1	0-8	A	15.44	0.67	0.30	0.02	16.43	0.57	17.00	97	1.32	0.12	7.6	7.2	7.2	--	--	--	--	--
S76FL-085-011-2	8-13	C1	14.84	0.47	0.19	0.01	15.51	0.00	15.51	100	0.44	0.12	7.7	7.2	7.6	--	--	--	--	--
S76FL-085-011-3	13-27	C2	14.54	0.57	0.15	0.01	15.27	0.00	15.27	100	0.16	0.35	7.4	7.2	7.1	--	--	--	--	--
S76FL-085-011-4	27-80	C3	13.64	0.28	0.15	0.02	14.09	0.00	14.09	100	0.06	0.31	7.7	7.4	7.3	--	--	--	--	--
Pineda:																				
S76FL-085-005-1	0-5	A11	0.19	0.07	0.01	0.02	0.29	1.82	2.11	14	0.56	0.05	4.9	4.0	3.8	--	--	--	--	--
S76FL-085-005-2	5-8	A12	0.01	0.01	0.01	0.01	0.04	1.36	1.40	3	0.24	0.04	5.5	4.5	4.1	--	--	--	--	--
S76FL-085-005-3	8-15	A2	0.00	0.00	0.01	0.00	0.01	0.45	0.46	2	0.08	0.03	6.0	5.9	4.8	--	--	--	--	--
S76FL-085-005-4	15-22	B2ir	0.01	0.00	0.03	0.00	0.04	0.45	0.49	8	0.06	0.04	6.1	5.8	5.3	0.08	0.03	0.00	0.03	1.29
S76FL-085-005-5	22-36	B3ir	0.14	0.00	0.00	0.00	0.14	0.09	0.23	61	0.02	0.05	8.5	7.3	7.2	0.08	0.01	0.00	0.01	0.11
S76FL-085-005-6	36-44	B2tg	5.61	0.36	0.02	0.06	6.05	5.45	11.50	53	0.18	0.23	4.9	4.4	3.8	0.10	0.15	0.65	0.03	0.16
S76FL-085-005-7	44-60	B3g	6.49	0.33	0.03	0.06	6.91	4.31	11.22	62	0.08	0.15	6.0	5.4	4.5	--	--	--	--	--
Pinellas:																				
S77FL-085-017-1	0-5	A1	2.55	0.34	0.08	0.03	3.00	4.49	7.49	40	1.46	0.07	5.8	4.7	4.6	--	--	--	--	--
S77FL-085-017-2	5-11	A21	0.45	0.11	0.02	0.00	0.58	1.13	1.71	34	0.27	0.03	6.2	5.3	5.1	--	--	--	--	--
S77FL-085-017-3	11-13	A22ca	16.33	0.49	0.06	0.01	16.89	0.78	17.67	96	0.38	0.13	8.1	7.5	7.5	--	--	--	--	--
S77FL-085-017-4	13-16	A23ca	19.93	0.51	0.10	0.01	20.55	0.35	20.90	98	0.34	0.14	8.4	7.7	7.9	--	--	--	--	--
S77FL-085-017-5	16-26	A24ca	18.43	0.55	0.11	0.00	19.09	0.00	19.09	100	0.14	0.13	8.7	8.0	8.3	--	--	--	--	--
S77FL-085-017-6	26-38	B2tg	24.48	5.43	1.11	0.06	31.09	2.90	33.98	91	0.25	0.40	8.8	8.1	7.6	--	--	--	0.03	0.05
S77FL-085-017-7	38-52	Cg	8.86	2.30	0.58	0.02	11.76	1.21	12.97	91	0.17	0.65	8.3	7.9	7.7	--	--	--	--	--
Salerno:																				
S76FL-085-004-1	0-4	A11	0.88	0.40	0.04	0.04	1.36	10.45	11.81	12	2.26	0.05	4.4	3.3	2.9	--	--	--	--	--
S76FL-085-004-2	4-9	A12	0.10	0.10	0.00	0.00	0.20	1.82	2.02	10	0.70	0.03	4.8	3.6	3.4	--	--	--	--	--
S76FL-085-004-3	9-17	A21	0.01	0.05	0.00	0.00	0.06	0.91	0.97	6	0.24	0.02	5.8	4.2	3.7	--	--	--	--	--
S76FL-085-004-4	17-46	A22	0.01	0.03	0.00	0.00	0.04	0.45	0.49	8	0.12	0.02	6.0	4.4	4.0	--	--	--	--	--
S76FL-085-004-5	46-61	A3	0.00	0.03	0.00	0.00	0.03	0.45	0.48	6	0.13	0.03	5.3	4.4	4.0	--	--	--	--	--
S76FL-085-004-6	61-76	B2h	0.34	0.21	0.07	0.01	0.63	26.80	27.43	2	4.14	0.08	4.4	3.6	3.4	4.21	0.00	0.40	0.30	0.03
S76FL-085-004-7	76-99	B3&Bh	0.08	0.10	0.03	0.01	0.22	10.90	11.12	2	0.58	0.06	4.9	4.0	3.8	--	--	--	--	--
Satellite Variant:																				
S76FL-085-009-1	0-5	A	0.24	0.07	0.00	0.01	0.32	0.82	1.14	28	0.49	0.01	5.5	4.1	3.7	--	--	--	--	--
S76FL-085-009-2	5-17	C1	0.02	0.00	0.07	0.01	0.10	0.14	0.24	42	0.09	0.01	5.8	5.4	4.8	--	--	--	--	--
S76FL-085-009-3	17-39	C2	0.02	0.00	0.00	0.00	0.02	0.27	0.29	7	0.14	0.01	5.9	5.3	4.2	--	--	--	--	--
S76FL-085-009-4	39-80	C3	0.02	0.02	0.01	0.00	0.03	0.41	0.44	7	0.13	0.01	5.8	4.7	4.1	--	--	--	--	--
Tuscawilla:																				
S77FL-085-020-1	0-4	Ap	9.03	0.73	0.06	0.16	9.98	6.01	15.99	62	3.46	0.18	6.0	5.5	5.4	--	--	--	--	--
S77FL-085-020-2	4-8	A21	1.53	0.08	0.01	0.07	1.69	0.86	2.55	66	0.61	0.06	6.7	6.1	6.0	--	--	--	--	--
S77FL-085-020-3	8-12	A22	1.68	0.11	0.03	0.06	1.88	1.12	3.00	63	0.59	0.06	6.8	6.1	6.0	--	--	--	--	--
S77FL-085-020-4	12-15	B1	7.98	1.58	0.16	0.23	9.95	3.28	13.23	75	0.99	0.10	7.3	6.5	6.1	--	--	--	0.06	0.11
S77FL-085-020-5	15-22	B21t	31.06	4.40	0.54	0.18	36.18	5.36	41.54	87	1.16	0.29	8.3	7.5	7.1	--	--	--	0.10	0.47
S77FL-085-020-6	22-32	B22tca	25.93	2.55	0.53	0.10	29.11	1.82	30.93	94	0.49	0.25	8.6	7.6	7.5	--	--	--	0.04	0.09
S77FL-085-020-7	32-46	B3ca	22.88	1.25	0.59	0.04	24.76	0.52	25.28	98	0.25	0.27	8.8	7.7	7.8	--	--	--	0.02	0.10
S77FL-085-020-8	46-61	C1	24.08	1.60	1.19	0.08	26.95	2.29	29.24	92	0.13	0.36	8.8	7.8	7.5	--	--	--	--	--
S77FL-085-020-9	61-80	C2	25.56	1.21	1.59	0.07	28.43	3.67	32.10	89	0.07	0.43	8.9	7.9	7.4	--	--	--	--	--

TABLE 20--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample numbers	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Sum	Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	$CaCl_2$ .01M (1:2)	KCl 1N (1:1)	Pyrophosphate extractable: C	Fe	Al	Citrate dithionite extractable: Al	Fe
	In		-----Milliequivalents/100 grams of soil----							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Wabasso:																				
S78FL-085-024-1	0-2	A11	0.68	0.66	0.15	0.05	1.54	36.16	37.70	4	17.64	0.21	3.9	3.2	3.0	--	--	--	--	--
S78FL-085-024-2	2-7	A12	0.32	0.37	0.80	0.03	1.52	4.12	5.64	27	2.38	0.70	3.6	3.3	3.3	--	--	--	--	--
S78FL-085-024-3	7-12	A21	0.07	0.08	0.00	0.01	0.16	1.44	1.60	10	0.61	0.04	4.4	3.4	3.4	--	--	--	--	--
S78FL-085-024-4	12-20	A22	0.02	0.03	0.00	0.00	0.05	0.08	0.13	38	0.45	0.03	5.4	3.8	3.6	--	--	--	--	--
S78FL-085-024-5	20-23	B21h	0.39	0.08	0.00	0.00	0.47	1.73	2.20	21	0.70	0.04	5.3	3.9	3.9	0.42	0.02	0.03	0.01	0.16
S78FL-085-024-6	23-36	B22h	1.73	0.28	0.00	0.00	2.01	3.90	5.91	34	1.58	0.24	5.0	4.5	4.5	1.26	0.08	0.05	0.03	0.16
S78FL-085-024-7	36-41	B21t	7.80	1.52	0.00	0.02	9.34	9.06	18.40	51	2.59	0.55	4.8	4.5	4.4	--	--	--	0.06	0.41
S78FL-085-024-8	41-49	B22t	0.70	1.89	0.00	0.04	2.63	5.90	8.53	31	1.50	0.35	4.8	4.5	4.3	--	--	--	0.03	0.21
S78FL-085-024-9	49-58	B23t	14.00	2.02	0.00	0.04	16.06	3.33	19.39	83	0.79	0.50	7.1	6.9	6.9	--	--	--	0.03	0.82
S78FL-085-024-10	58-73	C1	9.25	2.06	0.00	0.05	11.36	3.03	14.39	79	0.41	0.29	7.4	7.1	7.1	--	--	--	--	--
S78FL-085-024-11	73-80	C2	10.03	2.10	0.20	0.05	12.38	2.95	15.33	81	0.21	0.22	7.3	7.0	7.0	--	--	--	--	--
Waveland:																				
S76FL-085-003-1	0-7	A11	0.23	0.12	0.00	0.01	0.36	2.26	2.62	14	0.58	0.02	5.3	3.8	3.4	--	--	--	--	--
S76FL-085-003-2	7-18	A12	0.03	0.04	0.00	0.00	0.07	1.36	1.43	5	0.27	0.03	5.9	4.4	3.6	--	--	--	--	--
S76FL-085-003-3	18-36	A21	0.01	0.02	0.00	0.00	0.03	0.45	0.48	6	0.08	0.02	6.1	5.0	4.3	--	--	--	--	--
S76FL-085-003-4	36-43	A22	0.06	0.05	0.02	0.00	0.13	0.68	0.81	16	0.14	0.04	5.4	4.5	4.2	--	--	--	--	--
S76FL-085-003-5	43-47	B21h	0.49	0.55	0.09	0.00	1.03	4.07	5.10	20	0.74	0.08	5.2	4.1	4.1	0.78	0.00	0.05	0.01	0.07
S76FL-085-003-6	47-77	B22h	2.15	3.04	0.32	0.00	5.51	62.35	67.85	8	4.98	0.16	5.0	4.2	3.8	4.87	0.02	0.35	0.27	0.03
S76FL-085-003-7	77-90	B22h	0.39	0.57	0.09	0.00	1.05	23.04	24.09	4	1.66	0.08	5.6	4.7	3.8	1.66	0.04	0.88	0.41	0.05
S76FL-085-003-8	90-99	B3	0.25	0.24	0.05	0.00	0.54	9.99	10.53	5	0.58	0.07	5.7	4.9	4.5	1.00	0.00	0.30	0.15	0.05
Winder:																				
S77FL-085-019-1	0-7	Ap	0.91	0.18	0.02	0.07	1.18	1.80	2.98	40	0.35	0.04	5.8	4.8	4.6	--	--	--	--	--
S77FL-085-019-2	7-15	A2	14.53	0.81	0.05	0.16	15.55	1.17	16.72	93	0.11	0.16	8.0	7.5	7.4	--	--	--	--	--
S77FL-085-019-3	15-26	B&A	18.06	5.22	0.25	0.52	24.02	5.19	29.24	82	0.07	0.26	8.3	7.8	7.2	--	--	--	0.05	0.21
S77FL-085-019-4	26-42	B2tg	23.01	1.63	0.23	0.13	25.00	1.47	26.47	94	0.08	0.17	8.7	7.8	7.7	--	--	--	0.02	0.13
S77FL-085-019-5	42-62	Cg	19.86	2.14	0.52	0.21	22.73	1.86	24.59	92	0.09	0.35	8.6	7.8	7.5	--	--	--	--	--

TABLE 21.--CLAY MINERALOGY OF SELECTED SOILS

Soil series and sample number	Depth	Horizon	Clay minerals				
			Montmor- illonite	14 Angstrom intergrade	Kaolinite	Quartz	Amorphous
	In		Pct	Pct	Pct	Pct	Pct
Boca:							
S77FL-085-016-1	0-4	A11	40	---	10	50	---
S77FL-085-016-5	25-32	B2tg	65	---	4	31	---
Chobee:							
S78FL-085-022-3	6-19	B21t&A	97	---	1	2	---
S78FL-085-022-4	19-24	B22t	97	---	1	2	---
S78FL-085-022-8	58-80	IIC3ca	98	---	1	1	---
Ft. Drum:							
S78FL-085-023-1	0-7	A11	28	27	11	34	---
S78FL-085-023-4	18-28	B21ca	---	---	---	100	---
S78FL-085-023-7	51-80	C2	85	---	6	9	---
Hallandale:							
S76FL-085-013-1	0-4	Ap	---	---	---	---	100
S76FL-085-013-7	58-76	IIIC3	57	14	19	10	---
Hobe:							
S76FL-085-008-1	0-4	A1	---	---	---	100	---
S76FL-085-008-3	9-44	A22	---	---	---	100	---
S76FL-085-008-5	70-74	B2h	21	13	21	45	---
S76FL-085-008-7	78-88	Btg	36	28	36	---	---
Jonathan:							
S76FL-085-010-1	0-5	A1	12	---	---	88	---
S76FL-085-010-3	22-38	A22	---	---	---	(*)	100
S76FL-085-010-5	56-99	Bh	---	---	---	(*)	100
Jupiter:							
S76FL-085-014-1	0-4	A1p	12	15	---	73	---
S76FL-085-014-6	48-72	IIIC3g	85	---	9	6	---
Lawnwood:							
S76FL-085-002-1	0-5	A11	---	---	---	100	---
S76FL-085-002-4	28-42	B21h	---	(*)	(*)	100	---
S76FL-085-002-6	64-80	B3&Bh	57	---	43	(*)	---
Malabar:							
S76FL-085-021-1	0-5	A1	24	---	15	61	---
S76FL-085-021-3	15-29	Bir	---	---	42	58	---
S76FL-085-021-5	42-46	B'tg	---	---	63	37	---
Nettles:							
S76FL-085-001-1	0-5	A11	---	(*)	14	86	---
S76FL-085-001-4	32-43	B21h	---	9	7	84	---
S76FL-085-001-6	51-62	B2tg	50	---	38	12	---
S76FL-085-001-8	71-80	C2g	73	---	19	8	---
Palm Beach:							
S76FL-085-011-1	0-8	A	---	---	---	100	---
S76FL-085-011-4	27-80	C3	---	10	---	90	---
Pineda:							
S76FL-085-005-1	0-5	A11	(*)	(*)	---	100	---
S76FL-085-005-4	15-22	B2ir	(*)	23	22	55	---
S76FL-085-005-6	36-44	B2tg	16	29	37	18	---
S76FL-085-005-7	44-60	B3g	54	15	22	9	---
Pinellas:							
S77FL-085-017-1	0-5	A1	61	---	10	29	---
S77FL-085-017-6	26-38	B2tg	58	---	7	35	---
S77FL-085-017-7	38-52	Cg	82	---	6	12	---

See footnote at end of table.

TABLE 21.--CLAY MINERALOGY OF SELECTED SOILS--Continued

Soil series and sample number	Depth	Horizon	Clay minerals				
			Montmor-illonite	14 Angstrom intergrade	Kaolinite	Quartz	Amorphous
	In		Pct	Pct	Pct	Pct	Pct
Riviera:							
S77FL-085-018-1	0-4	A1	32	---	15	53	---
S77FL-085-018-5	36-42	Btg&A	82	---	5	13	---
S77FL-085-018-6	42-56	Cg	69	---	16	15	---
Salerno:							
S76FL-085-004-1	0-4	A11	---	---	---	100	---
S76FL-085-004-6	61-76	B2h	5	3	5	87	---
S76FL-085-004-7	76-99	B3&Bh	52	(*)	40	8	---
Satellite Variant:							
S76FL-085-009-1	0-5	A	18	---	22	60	---
S76FL-085-009-3	17-39	C2	6	---	9	85	---
S76FL-085-009-4	39-80	C3	4	---	3	93	---
Tuscawilla:							
S77FL-085-020-1	0-4	Ap	41	---	10	49	---
S77FL-085-020-5	15-22	B21t	29	---	15	56	---
S77FL-085-020-8	46-61	C1	65	---	19	16	---
S77FL-085-020-9	61-80	C2	78	---	12	10	---
Wabasso:							
S78FL-085-024-1	0-2	A11	---	---	9	91	---
S78FL-085-024-6	23-36	B22h	20	---	18	62	---
S78FL-085-024-7	36-41	B21t	8	32	38	20	---
Waveland:							
S76FL-085-003-1	0-7	A11	---	---	---	100	---
S76FL-085-003-5	43-47	B21h	---	(*)	30	70	---
S76FL-085-003-8	90-99	B3	---	---	---	---	100
Winder:							
S77FL-085-019-1	0-7	Ap	64	---	14	22	---
S77FL-085-019-3	15-26	B&A	64	---	15	21	---
S77FL-085-019-5	42-62	Cg	84	---	6	10	---

*Trace.

TABLE 22.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture
										Pct		Lb/ft3	Pct
Boca fine sand:[1] (S77FL-085-016)													
A21--------8 to 16	A-3 (01)	SP	100	100	93	3	1	--	--	--	NP	102	16
B2tg------25 to 32	A-2-4(00)	SM	100	100	94	17	14	14	14	--	NP	112	15
IIIC3-----50 to 60	A-3 (01)	SP	100	79	69	4	2	2	1	--	NP	105	16
Ft. Drum fine sand:[2] (S78FL-085-023)													
B21ca-----18 to 28	A-2-4(00)	SM	100	100	99	13	5	3	3	--	NP	100	17
C1--------33 to 51	A-2-4(00)	SM	100	100	99	16	10	9	9	--	NP	107	16
C2--------51 to 80	A-3 (01)	SP-SM	100	100	100	10	4	2	2	--	NP	103	13
Gator muck:[3] (S76FL-085-015)													
IIC1------24 to 48	A-2-6(01)	SC SM-SC	100	100	92	34	24	21	19	34	16	105	18
Hallandale sand:[4] (S76FL-085-013)													
IIC1------20 to 41	A-3 (01)	SP	100	100	97	3	--	--	--	--	NP	99	16
Hobe fine sand:[5] (S76FL-085-008)													
B2h-------70 to 74	A-2-4(00)	SM	100	100	97	13	6	4	3	--	NP	102	16
Btg-------78 to 88	A-2-4(00)	SM	100	100	98	21	18	17	17	--	NP	113	14
Jonathan sand:[6] (S76FL-085-010)													
A23-------38 to 56	A-3 (01)	SP	100	100	82	3	--	--	--	--	NP	103	14
Bh--------56 to 99	A-2-4(00)	SM	100	100	80	14	5	4	4	--	NP	98	17
Jupiter sand:[7] (S76FL-085-014)													
IIIC3-----48 to 72	A-2-4(00)	SM	100	100	93	16	11	10	9	--	NP	118	13
Lawnwood fine sand:[8] (S76FL-085-002)													
A2--------17 to 28	A-3 (01)	SP	100	100	95	2	--	--	--	--	NP	103	15
B21h------28 to 42	A-2-4(00)	SP-SM	100	100	95	12	--	--	--	--	NP	96	19
B3&Bh-----64 to 80	A-2-4(00)	SP-SM	100	100	94	11	8	7	5	--	NP	115	13

See footnotes at end of table.

TABLE 22.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture
										Pct		Lb/ft3	Pct
Malabar sand:[9] (S77FL-085-021)													
Bir------15 to 29	A-3 (01)	SP-SM	100	100	80	5	2	--	--	--	NP	109	12
B'tg-----42 to 64	A-2-4(00)	SM-SC	100	100	88	24	19	16	16	22	4	120	11
Nettles sand:[10] (S76FL-085-001)													
A2-------12 to 32	A-3 (01)	SP	100	100	90	3	1	1	1	--	NP	106	14
B21h-----32 to 43	A-3 (01)	SP-SM	100	100	92	9	--	--	--	--	NP	103	16
B2tg-----51 to 62	A-4 (00)	SM-SC	100	100	94	41	12	12	12	22	4	116	12
Palm Beach sand:[11] (S76FL-085-011)													
C3-------27 to 80	A-3 (01)	SP	100	100	62	1	--	--	--	--	NP	105	13
Pineda sand:[12] (S76FL-085-005)													
B2ir-----15 to 22	A-3 (01)	SP	100	100	89	4	3	1	1	--	NP	106	14
B2tg-----36 to 44	A-2-4(00)	SM	100	100	89	17	17	16	16	--	NP	117	13
IIC------60 to 72	A-1-B(01)	SW	100	100	30	4	4	3	3	--	NP	113	12
Pinellas fine sand:[13] (S77FL-085-017)													
A24ca----16 to 26	A-2-4(00)	SP-SM	100	100	97	11	6	6	4	--	NP	105	15
B2tg-----26 to 38	A-2-4(00)	SM	100	100	97	17	14	13	12	--	NP	109	15
IIC------52 to 60	A-3 (01)	SP	100	74	63	4	2	1	1	--	NP	103	13
Riviera fine sand:[14] (S77FL-085-018)													
A2-------17 to 31	A-3 (01)	SP	100	100	100	4	--	--	--	--	NP	96	15
B2tg-----36 to 42	A-2-4(00)	SM	100	100	100	21	17	16	15	--	NP	112	13
IIC2-----56 to 80	A-3 (01)	SP	100	86	85	4	2	2	2	--	NP	101	15
Salerno sand:[15] (S76FL-085-004)													
A22------17 to 46	A-3 (01)	SP	100	100	88	2	1	--	--	--	NP	101	15
B2h------61 to 76	A-3 (01)	SP-SM	100	100	90	9	1	--	--	--	NP	99	18
Satellite Variant:[16] (S76FL-085-009)													
C3-------39 to 80	A-3 (01)	SP	100	100	88	2	--	--	--	--	NP	102	14

See footnotes at end of table.

TABLE 22.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture
										Pct		Lb/ft3	Pct
Tuscawilla sand:[17] (S77FL-085-020)													
B21t-----15 to 22	A-2-7(02)	SC or SC	100	100	86	30	26	24	22	44	24	104	18
B22tca---22 to 32	A-2-6(01)	SC	100	77	65	32	26	17	12	25	13	115	14
IIC2-----61 to 80	A-2-6(01)	SC	100	100	90	25	21	18	16	35	17	118	12
Wabasso sand:[18] (S78FL-085-024)													
B22h-----23 to 36	A-3 (01)	SP-SM	100	100	90	8	--	--	--	--	NP	107	13
B22t-----41 to 58	A-2-6(01)	SC	100	100	93	26	21	19	18	32	15	112	15
C2-------73 to 80	A-2-6(00)	SC	100	100	87	20	20	19	19	30	16	115	14
Waveland sand:[19] (S76FL-085-003)													
A21------18 to 36	A-3 (01)	SP	100	100	82	2	1	--	--	--	NP	102	15
B21h-----43 to 77	A-3 (01)	SP-SM	100	100	85	9	4	3	2	--	NP	99	14
Winder sand:[20] (S77FL-085-019)													
B&A------15 to 26	A-2-6(00)	SC	100	100	86	21	19	17	16	33	15	113	14
B2tg-----26 to 42	A-4 (01)	SC	100	100	89	43	39	33	23	18	10	127	9
IICg-----62 to 80	A-2-4(00)	SM	100	100	83	17	14	10	10	--	NP	115	13

[1]Boca fine sand:
1.1 miles southwest of Florida Highway 710, 0.9 mile south of Clements Road, 300 feet north of graded road, NW1/4SW1/4SE1/4 sec. 11, T. 39 S., R. 37 E.

[2]Ft. Drum fine sand:
1.25 miles north of Florida Highway 714, 1.0 mile east of Okeechobee County line, NE1/4NE1/4SE1/4 sec. 7, T. 38 S., R. 37 E.

[3]Gator muck:
2.0 miles south of Florida Highway 714 and 1.0 mile west of Florida Highway 609, NE1/4NE1/4NE1/4 sec. 35, T. 38 S., R. 38 E.

[4]Hallandale sand:
2.25 miles west of Florida Highway 609, 600 feet south of Florida Highway 714, NE/4NW1/4NE1/4 sec. 22, T. 38 S., R. 38 E.

[5]Hobe fine sand:
0.25 mile north of Rustic Hills and 300 feet east of Murphy Road, SE1/4NE1/4SW1/4 sec. 1, T. 38 S., R. 40 E.

[6]Jonathan sand:
0.9 mile north of Poinciana Gardens entrance and 200 feet west of U.S. Highway 1 in Gomez Grant.

[7]Jupiter sand:
2.0 miles south of Florida Highway 714, 1.0 mile west of Florida Highway 609, SE1/4SE1/4SE1/4 sec. 26, T. 38 S., R. 38 E.

[8]Lawnwood fine sand:
1.0 mile west of U.S. Highway 1, 0.75 mile north of Salerno Road in Hanson Grant.

[9]Malabar sand:
1.5 miles east of Florida Highway 609, 1.0 mile south of Florida Highway 714, SE1/4SE1/4SW1/4 sec. 20, T. 38 S., R. 39 E.

[10]Nettles sand:
800 feet north of Florida Highway 714, 400 feet east of Gator Trail, NW1/4SW1/4SW1/4 sec. 15, T. 38 S., R. 40 E.

[11]Palm Beach sand:
0.3 mile west of ocean and 1,000 feet south of Florida Highway 707 on Jupiter Island, SW1/4 sec. 23, T. 39 S., R. 42 E.

[12]Pineda sand:
100 yards west of junction Florida Highway 76 and Florida Highway 708 on south right-of-way Florida Highway 76, NW1/4NE1/4NE1/4 sec. 26, T. 39 S., R. 40 E.

[13]Pinellas fine sand:
1.1 miles west of Florida Highway 710 and 100 feet south of Clements Road, NW1/4NW1/4NW1/4 sec. 11, T. 39 S., R. 37 E.

[14]Riviera fine sand:
1.1 miles south of Florida Highway 714 and 100 feet east of Florida Highway 710, NW1/4NE1/4NE1/4 sec. 29, T. 38 S., R. 37 E.

[15]Salerno sand:
1.0 mile south of U.S. Highway 1 and Mariner Sands, 600 feet east in Gomez Grant.

[16]Satellite Variant sand:
0.3 mile south of Poinciana Gardens entrance, 0.6 mile west of U.S. Highway 1 in Gomez Grant.

[17]Tuscawilla sand:
1.9 miles west of Florida Highway 609 and 0.5 mile south of Florida Highway 714, NW1/4NW1/4SW1/4 sec. 23, T. 38 S., R. 38 E.

[18]Wabasso sand:
3.2 miles east of Florida Highway 609, 0.25 mile south of Florida Highway 714 and 0.8 mile west of power line, SE1/4NW1/4NW1/4 sec. 22, T. 38 S., R. 39 E.

[19] Waveland sand:
1.0 mile south of Salerno Road, 0.25 mile south of U.S. Highway 1, SE1/4SW1/4SW1/4 sec. 31, T. 38 S., R. 42 E.

[20]Winder sand:
2.3 miles south of Florida Highway 714 and 0.3 mile west of Florida Highway 609, NW1/4SW1/4NE1/4 sec. 36, T. 38 S., R. 38 E.

TABLE 23.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Adamsville Variant	Hyperthermic, uncoated Aquic Quartzipsamments
Basinger	Siliceous, hyperthermic Spodic Psammaquents
Bessie	Clayey, montmorillonitic, euic, hyperthermic Terric Medisaprists
Boca	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Canaveral	Hyperthermic, uncoated Aquic Quartzipsamments
Canova Variant	Fine-loamy, siliceous, hyperthermic Typic Ochraqualfs
Chobee	Fine-loamy, siliceous, hyperthermic Typic Argiaquolls
Cocoa Variant	Sandy, siliceous, hyperthermic Entic Hapludolls
EauGallie	Sandy, siliceous, hyperthermic Alfic Haplaquods
Electra	Sandy, siliceous, hyperthermic Arenic Ultic Haplohumods
Floridana	Loamy, siliceous, hyperthermic Arenic Argiaquolls
Ft. Drum	Sandy, siliceous, hyperthermic Aeric Haplaquepts
Gator	Loamy, siliceous, euic, hyperthermic Terric Medisaprists
Hallandale	Siliceous, hyperthermic Typic Psammaquents
Hilolo	Fine-loamy, siliceous, hyperthermic Mollic Ochraqualfs
Hobe	Sandy, siliceous, hyperthermic Arenic Ultic Haplohumods
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Hontoon	Dysic, hyperthermic Typic Medisaprists
Jonathan	Sandy, siliceous, hyperthermic, ortstein Typic Haplohumods
Jupiter	Sandy, siliceous, hyperthermic Typic Haplaquolls
Lawnwood	Sandy, siliceous, hyperthermic, ortstein Aeric Haplaquods
Malabar	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Nettles	Sandy, siliceous, hyperthermic, ortstein Alfic Arenic Haplaquods
Okeelanta	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists
Okeelanta Variant	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medihemists
Oldsmar	Sandy, siliceous, hyperthermic Alfic Arenic Haplaquods
Orsino	Hyperthermic, uncoated Spodic Quartzipsamments
Palm Beach	Hyperthermic, uncoated Typic Quartzipsamments
Paola	Hyperthermic, uncoated Spodic Quartzipsamments
Pineda	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Pinellas	Loamy, mixed, hyperthermic Arenic Ochraqualfs
Placid	Sandy, siliceous, hyperthermic Typic Humaquepts
Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods
Pomello Variant	Sandy, siliceous, hyperthermic Typic Haplohumods
Pompano	Siliceous, hyperthermic Typic Psammaquents
Riviera	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Salerno	Sandy, siliceous, hyperthermic, ortstein Grossarenic Haplaquods
Samsula	Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists
Sanibel	Siliceous, hyperthermic Typic Psammaquents
Satellite Variant	Hyperthermic, uncoated Typic Quartzipsamments
St. Johns Variant	Sandy, siliceous, hyperthermic Typic Haplaquods
St. Lucie	Hyperthermic, uncoated Typic Quartzipsamments
Tequesta Variant	Fine-loamy, siliceous, hyperthermic Typic Umbraqualfs
Terra Ceia Variant	Euic, hyperthermic Typic Medisaprists
Torry	Euic, hyperthermic Typic Medisaprists
Tuscawilla	Fine-loamy, carbonatic, hyperthermic Typic Ochraqualfs
Valkaria	Siliceous, hyperthermic Spodic Psammaquents
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods
Waveland	Sandy, siliceous, hyperthermic, ortstein Arenic Haplaquods
Winder	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs

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